International Labour Review, Vol. 120, No. 5, September-October 1981

Agrarian structure, technology and employment: agricultural development in Chile, 1955-65

André GUICHAOUA and Jean MAJERES*

Introduction

How, in a market economy, does the growth of an economic sector—in this case agriculture—affect the various categories of production units it comprises? More generally, is a policy of growth compatible with a policy aimed at creating employment and increasing the labour productivity of the peasant masses? It is this central question which we shall attempt to answer in the article that follows through an analysis of growth and, more particularly, the process of capitalisation in Chilean agriculture during the 1950s and the 1960s.

The choice of this period is interesting in more than one respect. On the one hand, it was on the whole characteristic of a strategy of growth based on extremely inegalitarian economic and social structures (the conservative government of J. Alessandri), which reflects fairly accurately the political philosophy of dualism and economic "take-off" based on sustained growth of the market and the simultaneous elimination of "precapitalist" obstacles to its expansion. On the other hand, the statistical data are copious, relatively comparable and credible, and they cover a period of sufficient duration to make it possible to perceive the *structural* changes.

Besides being based on an analysis of standard farms (see below), this study is of interest, notably for the countries of Latin America, in that it shows that the trend towards polarisation in agriculture is inherent in the prevailing agrarian system and the laws of the market, which lead inevitably to different accumulation capacities and, in consequence, to different levels of technology. Since the main instruments of this differentiation, so detrimental to the mass of the peasantry, are the intensification

* Respectively, Sociology Assistant at the University of West Brittany and official of the International Labour Office. The views expressed here are the authors' and do not necessarily reflect those of the institutions to which they belong.

and mechanisation of agricultural production, it is apparent that the intermediate techniques used by certain categories of small producers cannot on their own provide a structural and lasting remedy to the proletarianisation and pauperisation that is the lot of more and more peasants.

The first part of the article retraces the principal structural and technological changes between 1955 and 1965 in the various types of farms, notably from the point of view of soil utilisation and capitalisation. In the second part we shall evaluate the effects of these changes on agricultural employment; and by way of conclusion we shall examine the place and prospects of the various sectors of the peasantry in a context of intensive "modernisation" of agriculture.

Structure, technology and trends of different categories of farms, 1955-65

Typology

In order to account, using available data, for the different economic reasoning governing the behaviour of the various categories of farms, we grouped them into four main categories on the basis of the agricultural censuses of 1955 and 1965 as well as of studies carried out by the Inter-American Committee for Agricultural Development (CIDA).[1] From these four main categories we derived "standard" farms.

The criterion used for differentiating them was the size of the farm, but we observed that this tallies fairly closely with other significant factors such as soil utilisation, volume of output, nature and scale of employment and working capital.

All these elements together led us to the following typology:

1. *Farms up to 20 hectares.* Commonly called "minifundia", these are "sub-family" farms (according to the CIDA terminology) too small to satisfy the needs of a family or to ensure productive employment of its active members (estimated at 2 at least).

2. *Farms between 20 and 100 hectares.* These are family or "commercial family" (CIDA) farms large enough to meet the needs of a family and provide productive employment for 2, 3 or 4 active persons. Although most of them are steadily losing their relative weight on the agricultural market, some are nevertheless managing to launch themselves on a process of accumulation by specialising in (still) profitable types of production adapted to their characteristics.

3. *Farms between 100 and 1,000 hectares.* These are agricultural undertakings employing 4 to 12 persons; their economic behaviour shows that they can be defined as "dominant intensive capitalist farms" (DICFs).

Table 1. Distribution of total land area, arable land, and land under crop, 1955 and 1965

Category of farm	No. of farms		Total land area		Arable land		Land under crop	
	1955	1965	1955	1965	1955	1965	1955	1965
All farms (%)	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**
Up to 20 ha	62.8	73.7	1.8	2.8	2.9	4.4	7.4	13.4
20 to 100 ha	22.9	17.4	5.6	6.3	8.2	8.9	12.9	13.0
100 to 1 000 ha	12.1	7.6	19.4	18.2	25.4	23.2	44.3	42.3
1 000 ha and over	2.2	1.3	73.2	72.7	63.5	63.5	35.4	31.3
All farms (1 000 units or hectares)	**151**	**253**	**27 712**	**30 644**	**12 964**	**16 859**	**1 647**	**2 457**

4. *Farms 1,000 hectares and over in size.* These are undertakings generally employing more than 12 persons; by their nature they are "dominant extensive capitalist farms" (DECFs).

Of course, these basically technical criteria do not suffice to identify coextensive, homogeneous social groups or social classes, but the analysis that follows—which is confirmed by studies of a socio-political nature[2]—gives grounds for thinking that by and large and on the macro-economic level the categories on which our theoretical argument is based roughly correspond to highly different patterns of social-political behaviour and strategies.

The structural characteristics

A. Access to land

The principal characteristic of the agrarian structure in Chile was clearly both in 1955 and in 1965 the extraordinary concentration of landed property (see table 1). Already exceptional in 1955, it had even increased slightly in 1965: the Gini coefficient (0.924 in 1955 and 0.937 in 1965) indicates one of the highest inequality ratios in the world. The figures for arable land and land under crop reveal the basic difference between the two types of large farms—extensive and intensive; the biggest control the maximum amount of land but the others surpass them in their share of land under crop.

The relative share of all land under crop of farms up to 20 hectares and from 20 to 100 hectares in size is much greater than their share of the total area or of all arable land; however, for them more intensive utilisation of the available land is a critical element—especially in the case of the smallest of them—in a survival strategy marked by the farming of ever poorer land.[3]

B. Soil utilisation

Changes in the combination and rotation of crops, which are particularly important for estimating the demand for agricultural manpower, showed the overwhelming importance, both in 1955 and in 1965, of cereals and row crops (such as maize, beans, potatoes, etc.) in farms of the first two categories; however, commercial family farms shared in the general trend towards a drop in food-crop growing while sub-family farms increased their cereal crop area by 45 per cent, as well as the areas given over to potatoes, maize and beans; this is a disquieting development since these are low-value crops mainly intended for domestic consumption. In the other categories of farms, the drop in food crops accelerated the closer they came in size to the largest farms.[4] Reconversion was mainly in favour of fodder plants (which represented in 1965 two-thirds of the crop in the DECFs), but also (in the DICFs) in favour of industrial crops which are the mark of major intensification, all the more so since these products (sugar beet and oleaginous plants) were practically nonexistent in 1955.

Finally, the areas reserved for market gardening increased very considerably in commercial family farms, a change evidently related to the galloping urbanisation of the 1950s and 1960s since this type of farming expanded above all in specialised farms on the periphery of population centres.

C. Output and productivity

The bulk of total output of almost all crops was produced by the dominant capitalist farms (approximately half by the DICFs and a third by the DECFs). These large farms ignored low-value crops in favour of those of high market value. The commercial family farms made a limited effort to adapt by increasing their industrial crops, but they also tended, like the minifundia, to produce more wheat and potatoes for food.

As far as productivity is concerned, there was a real division between the farms of less than 100 hectares and those of more than 100, in which it was often twice as high. During the period analysed, in small farms there was an almost general drop in the productivity of cereals (wheat, oats and barley) and potatoes.[5]

With the exception of barley and beets in 1955, productivity was very similar in all the large farms. In the case of several crops, it was even slightly higher in the DECFs than in the DICFs. This clearly shows the similarity of the cultivation methods and techniques. The enormous under-use of the land by the great landowners is not incompatible with rapid adaptation to new market conditions.

Changes in the farming system

These few clues make it possible to distinguish roughly two types of change in the farming system.

The abandonment by the large farms of their traditional cultivation of cereals and the development of industrial crops reflected a process of capitalisation and intensification in the best-endowed farms which alone were capable of responding to market constraints and demands; this change confirmed and reinforced the existing economic and social differentiation.

On the other hand, the still decisive role of cereals and row crops in family consumption obliged the small and medium-sized farms to maintain or increase their output although they could do so only by over-exploiting the soil and overworking themselves. In order to offset flagging productivity the area under cereal cultivation had to be increased, but this led in the vast majority of cases to (i) the use of land previously considered as being waste or not fit for cultivation, which could not fail to depress productivity still further; and (ii) a decrease in other food and cash crops, which accentuated the farmers' dependence on the market, where they were obliged to buy the essential foodstuffs they could not (or could no longer) produce on their own plots (vegetables in particular). Soil exhaustion also results in human exhaustion, since people have to work harder to combat the drop in productivity. So long as the area under cereals can be extended, this overwork will be a matter of increasingly less productive labour on the farm; thereafter it will take the form of secondary wage labour outside the farm. In Chile there was in fact a twofold drop in the profitability of labour; longer working hours made necessary to offset lower productivity of the land were combined with a major drop in the market value of the foodstuffs produced.

Capitalisation

We shall limit ourselves here to studying the two most significant factors from the point of view of accumulation capacity: mechanisation and livestock. Other factors could of course be mentioned, such as land improvement; however, particularly as regards areas under irrigation, they were of no great importance. Since they would have involved heavy investment and have shown a return only in the long term, they could not be developed very significantly for want of special programmes and a positive political will. This lack of interest, compounded by the exceptional advantages granted to importers of mechanical equipment and to large landowners (ridiculously low interest rates), reflected a deliberate choice in favour of a policy of productivity improvement and rationalisation of the management of large farms, rather than of increasing the scale of production.

A. Mechanisation

Together with changes in the rotation of crops and farming procedures, mechanisation investment was the most revealing symptom of

the changes in the rural productive forces. Our analysis will be limited to the types of mechanical equipment that are best documented and affect the most significant operations: traction and processing of the harvest.

Less than 1 per cent of the minifundia and at most 7 per cent of the commercial family farms (double the 1955 level) owned a tractor in 1965 and the effective rate of mechanisation remained extremely low in both these categories, in which the farms were of course not all in one block.[6] In fact, for the country as a whole, even if hiring is included, only 50,000 farms at most could have used a tractor for at least a part of their agricultural work in 1965. Accordingly some 80 per cent of farms did not use mechanical traction and almost all of these were in these first two categories.

As regards the DICFs, which owned half the stock of tractors, they came close to an economic optimum of one tractor per 100 cultivated hectares. Hence they appear, at least since 1955, to have mechanised the bulk of all operations that could be mechanised taking account of their crop rotation systems. Between the two censuses, the increase in mechanisation was proportional to that in land under crop.

In the case of the DECFs, the number of tractors increased more slowly than the land crop. Over-all, they did not even maintain their previous level of mechanisation, although it was already very low and the percentage of land under crop was derisory. Theirs was a true case of absolute disinvestment.

The number of stationary threshers, already a very outmoded type of equipment, dropped significantly (by 5.5 per cent) and they were replaced by combine harvesters (+9.4 per cent over the same period). But this was a highly localised phenomenon: 85 per cent of these highly productive and sophisticated machines were owned by farms of over 100 hectares. The DICFs held almost 60 per cent of the stock and, again, it can be observed that these farms measured up to "rational" norms in the management and utilisation of equipment, which they were even able to hire out to commercial family farms to a considerable extent.

In the small and medium-sized farms, the increase in the stock of stationary threshers was spectacular (86 and 42 per cent, respectively); this was mainly the result of the purchase of equipment given up by large farms. This is a clear case of *intermediate mechanisation*, above all of commercial family farms. For the minifundia, the increase in absolute threshing capacity corresponded in fact to a relative drop in the level of mechanisation, since the number of hectares under cereal cultivation increased much more rapidly than that of machines, even though, in practice, the harvests of sharecroppers were frequently handled with the equipment owned by the large farms.

As for the DECFs, their lack of interest in mechanisation and the disinvestment which accompanied it was clearly evident. Their sales of used stationary threshers were in no way offset by a corresponding increase

in the number of combine harvesters; in fact there was a reduction in the latter of almost 10 per cent so that it was only because areas under cereals dropped massively (by 34 per cent) that the relative level of mechanisation increased at all.

During the ten years from 1955 to 1965 there was thus a very marked differentiation in the economic and technical conditions in Chilean agriculture, and this was effected mainly thanks to and for the benefit of a well-defined category of farms. The strong capitalisation of the DICFs made them the dominant group, i.e. the ones that contributed the most to establishing the production conditions and the level of competition prevailing on the domestic market. Capital, by becoming the strategic factor, tended simultaneously to reduce the decisive role previously played by access to land and the control of its ownership. The large landowners made up a social group which, in effect, held back the increase in agricultural production. Their underinvestment in agriculture resulted in a decline in their traditional economic position in this sector, but illustrated also the tendency of some of them to realise their assets and transfer them to other sectors where the return on capital was higher.

However, the real gap was between farms that could and those that could not enter into this process of modernisation and this distinction brought into prominence the existence of relations of domination and dependence between production systems situated at different technological levels. The scale of the investment required, the high cost of depreciation and upkeep, the conditions of access to credit and (official) subsidies, all these had the effect of restricting the possibility of innovation.

In the particular case of combine harvesters, the limited diffusion of technology is evident from the figures indicating the proportion of them in each farm category in 1955 and 1965: less than 4 per cent of them were in minifundia and 10 per cent approximately in commercial family farms; on the other hand, the intensive capitalist farms had a virtual monopoly of them: they already owned more than half of these machines in 1955 and accounted for almost 70 per cent of the increase over the ten years, and this helped to make them the driving force in the development of Chilean agriculture.

The exclusive dynamism of the intensive capitalist farms condemned the other types of farms to a strategy of survival. Thus, small and medium-sized farms had to fall back on other techniques and types of transaction (second-hand market, hiring, etc.). Hiring, for example, made the machinery more profitable by raising its rate of utilisation; in this way the small farmers could mechanise at least some of the most arduous farming operations, even if such "assistance" did increase their dependence on the large landowners. The use of hired modern equipment is a typical example of what is sometimes called *selective mechanisation.*

In a similar vein, the acquisition of used equipment—stationary threshers in particular—is in fact a sign of access to *progressive technology*

(less productive than new equipment but within the reach of those with modest purses).

It remains to be established whether the use of intermediate technology, which had the effect of strengthening the position of these farms, can alter their basic economic situation in the long run or whether, conversely, it only serves to retard the slow deterioration in their production conditions.

B. Livestock

The importance of livestock production is evident in all four types of farms, even though it differed in nature from one to another. In 1955 it amounted to between 45 per cent (in the large farms) and approximately 50 per cent (in the small and medium-sized farms) of the value of total agricultural production. Here we shall consider only cattle and sheep, which are economically the most significant.

At the beginning of the period almost half the cattle (particularly the dairy herds) were to be found in the DICFs; two-thirds of the sheep, on the other hand, were concentrated in the DECFs. By 1965 these two traditional forms of specialisation had become even more marked. The intensive capitalist farms increased their stocks of cattle, which are more profitable in modern breeding conditions, by 10 per cent and diminished those of sheep by 7 per cent. At the same time, the areas of land given over to natural and seeded pasture were considerably reduced (by 14.3 per cent).

In the extensive farms the cattle population remained stable and the sheep population increased by almost 20 per cent. Sheep production cost is low and there is abundant space: the livestock unit (LU)[7] grazing load per hectare remained extremely low and the percentage of unworked land devoted to animal feeding only dropped from 97 to 94 over the ten years.

Study of the situation of small and medium-sized farms shows very clearly that they are run by general farmers rather than stockbreeders of an industrial type. However, some changes are worth noting. In these farms, the grazing load per hectare, which even in 1955 was so high as to pose serious feeding problems, had significantly increased by 1965 (1.75 LU/ha[8] in the minifundia!). The livestock yield was very low, both in meat and milk (in milk per cow it was approximately 20 per cent lower in the minifundia than in the farms of more than 100 hectares).

Roughly two sorts of livestock raising could, therefore, be distinguished. In small and medium-sized farms cattle rearing was essentially a mixed operation: milk and meat had to be obtained from non-selected cattle, poorly looked after and also used as draught animals in the smallest farms; hence the very low yield. In large farms production tended to be specialised, either in meat or in milk. For example, for the production of milk, considering only the "permanent dairy farms" (producing milk over at least eight months per year), 83 per cent of these were concentrated in farms of more than 100 hectares.

Effects of structural and technological changes on agricultural employment and labour productivity

In the last analysis, it is marketable surplus that determines an undertaking's potential for accumulation and growth; hence the importance to it of having enough land, of raising the productivity of both labour and the land, and of securing a satisfactory share of the market for its various products (particularly those that fetch the highest prices). The combination of these elements constrains the nature of the techniques and cultivation methods used, and these in turn determine the working time needed for production and hence the scale of employment offered in each of the categories of farms.[9]

Changes in working time

The calculations of working time per standard farm presented below,[10] when related to the number of workers in each type of farm, give us the theoretical levels of activity of agricultural workers (see table 2). These levels reflect working time directly devoted to agricultural production (and not total hours worked per day[11]). The following conclusions can be drawn from them:

(i) The DICFs were the farms in which the displacement effects of mechanisation were the most intense (cereal cultivation in particular), but they re-engaged redundant manpower for more labour-intensive industrial and market gardening crops. Employment therefore remained at the same general level over the period studied and was better distributed throughout the year. Workers were kept on in farms because of jobs connected with mechanisation or made possible by it; these jobs increased labour productivity but their creation demanded new investment that only these farms went in for.

As for the levels of activity, they scarcely varied between 1955 and 1965. This means that, because of the relatively large volume und mobility of wage employment in DICFs they had enough margin for manoeuvre to allow them to keep total employment at a level proportional to the working time necessary. Bearing in mind our earlier reservation (see note 11 and notes 1 to 4 of table 2), it can be said that level of activity in them corresponded, in the prevailing technological conditions at the time of each census, to full employment of manpower.

(ii) The reduction in working time in the DECFs was general. It reached almost 40 per cent in cereals and colza production, but four-fifths of this drop was caused simply by a reduction in the areas given over to these crops. The moderate increase in working time for industrial crops, wine-growing and market gardening in no way made up for the massive dismissals that resulted. Even in livestock rearing working times went down 10 per cent.

Table 2. Working time necessary, manpower available[1] and theoretical level of activity[2] in each type of standard farm, 1955 and 1965

Standard farm	Up to 20 ha		20 to 100 ha		100 to 1 000 ha		1 000 ha and over	
	1955	1965	1955	1965	1955	1965	1955	1965
Working time								
Crop cultivation[3] (days)	109.6	109.8	265.0	284.5	1 011.5	992.3	3 100.4	2 488.3
Livestock[4] (days)	46.3	57.6	137.6	139.0	524.7	525.6	1 816.7	1 632.2
A. Total (years)[5]	**0.60**	**0.65**	**1.56**	**1.64**	**5.95**	**5.88**	**19.06**	**15.97**
Δ 1955/1965 (%)		+8.3		+5.1		−1.2		−16.2
Available manpower, by socio-occupational status (%)								
Unpaid family workers[6]	71.5	80.7	53.5	58.1	21.3	20.6	4.7	5.9
Administrators, salaried employees and supervisory personnel[7]	2.9	0.8	3.7	2.4	7.3	6.8	10.5	10.9
Inquilinos and *inquilinos medieros*[8]	6.1	1.0	13.1	6.6	27.7	20.3	34.9	27.0
Wage earners, peons[9] and *afuerinos*[10]	19.5	17.5	29.7	32.9	43.7	52.3	49.9	56.2
Total (%)	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
B. Average manpower per standard form	**1.27**	**1.70**	**2.64**	**2.83**	**9.08**	**8.95**	**34.30**	**27.62**
Δ 1955/1965 (%)		+33.9		+7.2		−1.4		−19.5
Theoretical level of activity: A/B (%)	47.2	38.2	59.1	58.0	65.5	65.7	55.6	57.8

[1] Men only, from 15 to 64 years [2] Agricultural work only. [3] Only fodder cultivation has been omitted for lack of reliable data. [4] Large animals only. [5] Of 258 working days. [6] Permanent, temporary and casual. [7] The *capataces* (foremen), *mayordomos* (superintendents), *bodegueros* (storekeepers), *llaveros* (gate-keepers), etc. [8] Workers under tacit contracts, close to sharecroppers, whereby the *inquilino* may live on the farm and works in exchange for remuneration in cash or in kind; payment in kind (*regalias*) consists of produce from the farm, of the right—temporary and precarious—to a plot of land (*ración*) or of the right to graze a certain number of animals on the farm (*talaje*). [9] Piece-workers. [10] Day labourers from the neighbourhood or passing through the region.

Not only did lack of investment make it impossible to maintain employment but full employment of the manpower retained was again not as well ensured as in the DICFs: in particular *inquilinos* were not as fully replaced by wage earners. The improvement in the level of activity over the ten years indicated more "rational" personnel management but all its effects had not yet made themselves felt.

(iii) In commercial family farms, mechanisation accentuated the decrease in working times connected with reduced cereal production, but total employment grew slightly thanks to the spread of market gardening and the introduction of beets. This increase was, however, not large enough to offset the rise in the number of economically active persons, with the result that the underemployment of manpower (mainly of family workers, it should be recalled) in relation to the level of full employment established in DICFs tended to rise. This constraint on employment resulted from lack of new development capital and the difficulty of diversifying the crops at a time when yield of subsistence crops was constantly menaced.

(iv) In the minifundia, mechanisation had a very minor influence and did not offset the rise in employment resulting from the increased area under cereals. Total employment increased by 8 per cent, but by 1966 he area under crop had reached its ceiling.

The level of activity, already very low in 1955 compared with other farms, dropped by a further 20 per cent over the ten years because of the increase in the number of economically active persons, with the result that a large part of working capacity was not utilised on these farms. Unable to find alternative employment on the large estates or in industry, these workers represented roughly speaking the mass of labour made superfluous by the economic and social conditions prevailing in the dominant capitalist farms at the time.

Strictly speaking, these people were not unemployed, since their "free" time was not idle: they would be better described as semi-proletarians. The balance of resources on small properties depends as much on the products of the land as on the availability of casual external work, often on the large farms. Should the former be lacking as a result of bad climatic conditions or should job opportunities drop sharply because of mechanisation, this precarious balance, which allows neither for the accumulation of a surplus nor for the possibility of extracting more from the already overexploited land, is then destroyed and at least some of the available hands are forced to abandon the farm.

This relative overpopulation is by no means confined to the minifundia. In a latent state it exists also in a large part of the medium-sized farms where, as we have seen, the actual level of employment is a concomitant of a low general level of utilisation of production factors, a low profitability of the land and a modest income for the farmers. However, these farmers will sooner or later be obliged to intensify their

production (and to mechanise) if they are to keep in step with the general evolution of the market. Many of them will then have no choice but to swell the ranks of the semi-proletarians or migrants. They are already on the point of being chased out of agriculture by the accumulation of capital in the most productive farms.

Trends in the socio-occupational status of agricultural manpower

The restructuring of the social production relations which accompanied these economic and technical changes is brought out by the changes in socio-occupational status shown in table 2 above.

In all farms the socio-occupational structure was simplified: (i) through the progressive elimination of outdated social relationships (*inquilinos* and *inquilinos medieros*) and the consequent growth in the number of wage earners; and (ii) through the reinforcement of the share of family labour in farms of less than 100 hectares.

In minifundia, where the increase in available manpower was substantial (34 per cent), almost all the work was done by members of the family. Services of a feudal type dwindled to a mere 1 per cent of the total labour force and were strictly localised in some 2,300 farms (out of 186,000). The relative share of wage earners declined but this concerned only 13.5 per cent of the farms, notably those that were highly specialised: industrial-type livestock rearing, horticulture, flower growing, tree nurseries, etc.

In commercial family farms there was only a slight increase in available manpower but a marked shift in employment status. For example, the sharp drop in indirect tenant farmers was offset to some extent by the increase in family labour, and partly by the steady rise in wage employment. It seems that most of these farms tended to become family concerns rather than to take on a capitalist character. Nevertheless, large contingents of agricultural wage earners in approximately a quarter of the farms indicated a capitalist-type accumulation.

In the DICFs family labour tended to decline. There appeared to be a more pronounced division of tasks, with supervisory and administrative personnel amounting to almost 7 per cent of the total. There were changes in status from *inquilinos* to wage earners. The total number of workers did not increase: although the category seemed to create wage earning jobs (+20 per cent in 10 years per standard farm), it was also the one most affected by mechanisation so that the increase in production did not lead on balance to additional employment.

In the DECFs the share of family labour was tiny. Supervisory personnel were particularly abundant, as were technical and administrative staff. Above all, wage earners overwhelmingly replaced precarious tenants. It was in these farms, traditionally dubbed feudal, that wage earners were proportionately the most numerous. The owners carried out an unprece-

dented rationalisation of employment by eliminating a fifth of their total personnel in ten years! Bearing in mind the disinvestment noted in this category and a simultaneous tendency towards greater specialisation accompanied by high productivity, it would seem therefore that these large proprietors judged it more profitable either to invest elsewhere (in urban property speculation, in particular), or to "rationalise" the management of manpower by increasing the mobility of the workforce and generalising wage earning employment.

The organic composition of capital and labour productivity

Trends in the organic composition of capital (the capital/labour ratio) well reflect these changes. Table 3 and diagrams 1 and 2 summarise the main aspects of this ratio and confirm one of the major contradictions in the capitalist development of Chilean agriculture: over all, the accumulation and concentration of capital in the hands of a few large farmers were clearly conditional on the economic decline of the vast majority of small and medium-sized farmers and this differentiation came about largely as a result of mechanisation. The main conclusions that can be drawn from this are as follows:

(i) Decapitalisation, which was both the cause and the effect of a rapid process of pauperisation, was particularly marked in minifundia. Modern technology (and even intermediate technology) was beyond their reach. Labour productivity (and that of the land) declined relatively and absolutely.

(ii) Capital equipment per worker increased in medium-sized farms and permitted a real increase in productivity, but in spite of this notable effort these farms lost ground it the prevailing conditions of the market: their comparative productivity index dropped 12 points. Consequently, although selective mechanisation (widespread use of tractors, for example) and intermediate technology (stationary threshers) had an undeniably beneficial effect, a gradual decline in competitiveness set in.

(iii) Capitalisation and productivity increased very significantly and to the same extent in both DICFs and DECFs.

This does not contradict our argument concerning disinvestment and the extensiveness of the DECFs; as already pointed out, it reflects specialisation in certain types of production which were among the best adapted to their structural characteristics (for example, 18 per cent growth in live capital (livestock) per worker). While over-all productivity in DECFs was lower its level compared to that of the highly capitalised units remained constant. Moreover, the "advantages" of mechanisation are evaluated in terms of the comparative costs of manual or mechanical labour, and it must not be forgotten that the relative independence of the employment market enjoyed by DECFs enabled them to maintain a level of wages far below

Table 3. Physical capital equipment per active worker[1]

Standard farm	Tractors per 1 000 active workers			Combine harvesters per 1 000 workers		
	Number		Δ 1965/1955 %	Number		Δ 1965/1955 %
	1955	1965		1955	1965	
Up to 20 ha	5.3	5.6	+ 5.7	1.1	0.45	−59.1
20 to 100 ha	17.8	30.4	+70.8	3.8	3.7	− 2.6
100 to 1 000 ha	45.5	64.5	+41.8	11.5	12.7	+10.4
1 000 ha and over	39.0	60.2	+54.4	9.5	10.5	+10.5

Standard farm	Stationary threshers per 1 000 workers			Livestock units (LU) per 1 000 workers		
	Number		Δ 1965/1955 %	Number		Δ 1965/1955 %
	1955	1965		1955	1965	
Up to 20 ha	2.1	1.5	−28.6	1.8	1.6	−11.1
20 to 100 ha	7.8	8.1	+ 3.8	4.2	3.8	− 9.5
100 to 1 000 ha	16.7	13.7	−18.0	7.2	7.5	+ 4.2
1 000 ha and over	13.1	11.6	−11.5	11.5	13.6	+18.3

[1] Men above 15 years of age.

Diagram 1. Changes in labour productivity between 1955 and 1965 (physical productivity in quintals of wheat/hectare/active worker).

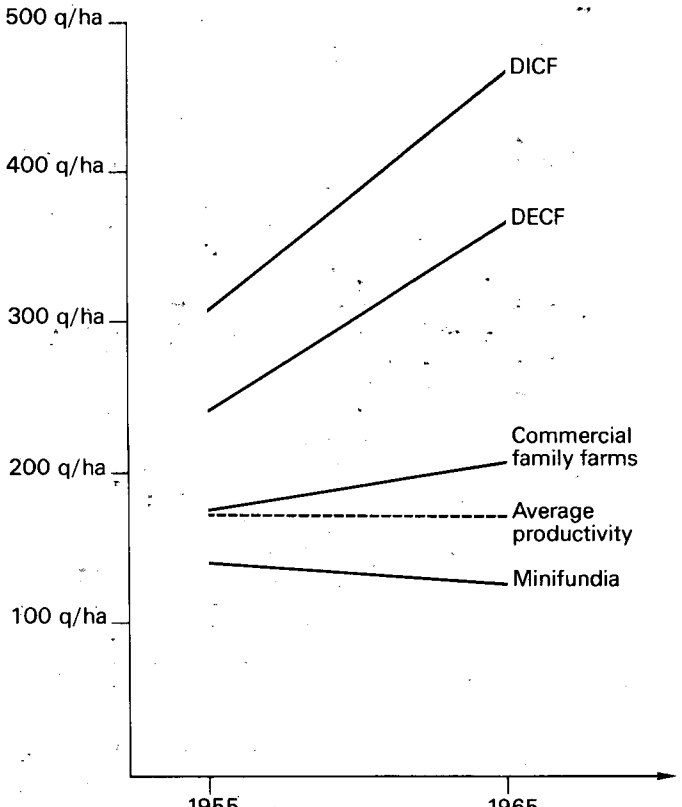
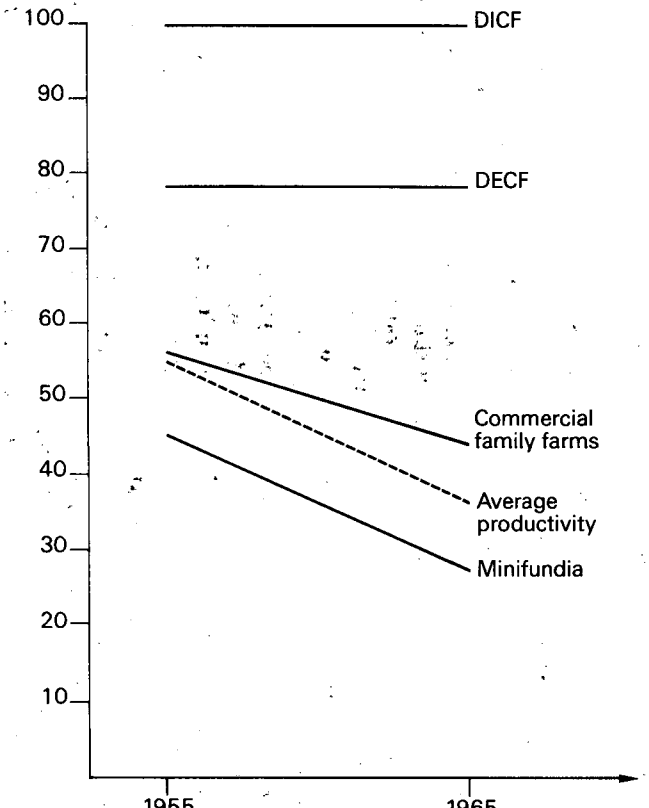


Diagram 2. Comparative indices of labour productivity and changes between 1955[1] and 1965[2] compared to the level in the DICF



[1]Base 100 = 309.3 q wheat/hectare/active worker, level in the DICF in 1955. [2]Base 100 = 465.6 q wheat/hectare/active worker, level in the DICF in 1965.

that in the DICFs and hence to adapt themselves to changes in market conditions at lower levels of capitalisation.

(iv) The highly capitalised producers responded best to the dominant economic conditions since it was their very economic strength that contributed most to determining those conditions.[12]

Consequently, their labour productivity continued to increase very considerably. The level of mechanisation at any point in time is no more than a snapshot of a process of constant advances as mechanisation is steadily extended to other farming operations with the advance of technology. This shows that, in the technical development of a sector or a branch, to speak of catching up to a given technological level is meaningless: in a market economy there can be no question of a technological moratorium or breathing space. The dominant capitalist units are constantly revolutionising their production techniques; hence, material devised to meet the needs of large expanding farms is, and always will be, inappropriate for those of small and medium-sized farms in decline.[13]

(v) Finally, the observed stagnation in average labour productivity (see diagram 1) over the period risks being somewhat deceptive: it gives no idea of the sweeping changes that took place in the various types of farms and masks the massive drop (19 points, or 34 per cent, in 10 years) in the average productivity index calculated in relation to farms with the *highest* performance (see diagram 2).

Conclusions

The preceding analysis has shown that most of the minifundia were unable to share in the process of economic growth, and peasant families managed to survive only by engaging in outside employment, generally in the large neighbouring farms in which a large part of the personnel consisted of temporary and casual workers.

In a period of rapid mechanisation in the large properties, it was the precarious tenants and the casual labourers that were the first to be affected. However, the rationalisation of labour, i.e. basically mechanisation and the spreading out of tasks over the year, was not yet sufficiently advanced for the large landowner to be able to do without numerous seasonal workers at the peaks of the agricultural calendar. The great abundance of unemployed and poor small producers made it possible for these landowners to hire the necessary workers for wages quite inadequate to cover their basic needs (wages far below those of urban manual workers and no social security contributions).

Far from being marginal, these additional workers played a decisive economic role. Their employment, although accompanied by special conditions, responded to a temporary need of capital and it was as such that it subsisted; this is well illustrated by the provision to landless workers

of family gardens under Land Reform Regulation No. 6 of 1963, the purpose of which may be assumed to have been to maintain in agriculture the manpower necessary for the casual needs of the large farms.

In addition, during the period the low growth of the Chilean industrial sector did not offer sufficient productive employment (almost all the industrial capital equipment was imported from the United States) and it was not possible to transfer the redundant rural population to other *productive* sectors. The process of displacement and proletarianisation of rural workers could not therefore be total and it assumed special forms, since the "proletariat" had to maintain a tie with the land so as to ensure its immediate survival through the production of foodstuffs for self-consumption.

The minifundia could therefore be defined as a food base for the unemployed day labourer or peon to fall back on. In the circumstances, the independent semi-proletarianised producers were the only ones to have an objective interest in adopting "progressive" technology, i.e. in making small investments to increase their food-producing abilities at a productivity level that did not need to be competitive. For them, the production of the foodstuffs is worth while even at disproportionate labour cost: with survival at stake it would be quite pointless to make the comparison [14] with remuneration from an unattainable job. The major attraction of "progressive" technology would then be to relieve the farmer and his family of at least part of their burden of overwork. Within the framework of a market economy and in the only sector where they have an immediate future, such technology amounts, in effect, to a subsidy to low productivity, and one that, for a time at least, makes overwork on his plot a little more bearable for the small farmer, and allows the large landowners to keep the wages of the semi-proletarians at starvation level. But only for a time since, as we have just seen, the technological progress of the dominant units (constantly boosted by foreign imports) allows for no respite during which total employment could be increased durably at a given technical level.

Analysis of the effects of this continuous "modernisation" of agriculture and the increased division of labour on the entire Chilean economy and society—and conversely of the impact of the capitalist development of the other sectors on agriculture—would require an examination of other successive and complex levels of interdependence and dependence of agriculture in the national and regional economy. But the rapidity of the technical and economic changes which occurred over the decade under study and the new contradictions which they introduced into an unchanged social framework make it easy to understand why considerable sectors of the small and medium peasantry played an active part in the socio-political changes that took place in the period 1965-73.

Furthermore, as we observed at the outset, the case under study is by no means unique: the polarisation we have described is inherent in an agrarian structure and system that are only too common, particularly in

Latin America, and any attempt to outline an economic policy favourable to the peasants must inevitably be based on an analysis of these facts.

Notes

[1] Dirección de Estadística y Censos: *III.º Censo Nacional Agrícola Ganadero, 1955. Resumen General del País*, tomo IV (Santiago, Ministerio de Economía, 1960). Idem: *IV.º Censo Nacional Agropecuario, Año agrícola 1964-1965, Resumen General del País*, tomo I (1969). CIDA: *Chile, tenencia de la tierra y desarrollo socio-económico del sector agrícola* (Santiago, Talleres gráficos Hispano-Suiza, 1966). Our typology corresponds to the CIDA classification, which combines the criteria of surface area and employment, and to the differentiation thresholds used by René Billaz to characterise the levels of capitalisation and access to the market (see *Structures agraires chiliennes en 1965. Essai de caractérisation sur la base des données du recensement de 1965* (Paris, IRAM, 1974)). We use to some extent the same criteria but from a different angle.

[2] See, for example, Yves Goussault: *Crise et réforme des structures agraires: le cas chilien*, thèse de doctorat d'Etat, Université de Paris I, 1973.

[3] In the category up to 20 hectares, 88 per cent of the total area was considered as cultivable area in 1965 (as against 77 per cent in 1955). This figure reached even more than 92 per cent in the farms of less than 5 hectares. Bearing in mind houses and other buildings, this represented an absolute ceiling, any piece of land at all being used as agricultural land.

[4] This drop was mainly the result of the Klein-Sachs agreement signed with the United States, which, by giving completely free entry to American wheat, flooded the Chilean market at prices which were impossible to compete with locally. The resulting drop in the level of agricultural prices was indisputably a decisive factor in the changes analysed here.

[5] Also, the growth in productivity of maize and beans occurred exclusively in the farms of less than 1 hectare (for maize) and less than 5 hectares (for beans), i.e. farms where the techniques were akin to those of gardening. In the other minifundia, the 1965 productivity level for these products was also below that of 1955.

[6] Some authors, however, do not hesitate to hypothesise in their somewhat unrealistic models that the fragmentation and small size of plots does not hinder mechanisation. See, for example, I. Inukai: "Farm mechanisation, output and labour input: a case study in Thailand", in *International Labour Review*, May 1970, p. 458.

[7] The LU is a composite unit combining cattle and sheep on the basis of 1 head of cattle = 1 unit, 1 sheep = 0.1 unit.

[8] Our estimate, which corrects the figure of 2.28 LU/ha derived from the statistics. It should be noted that in the best of cases a natural meadow can support a grazing load of 0.5 LU/ha; to be sure, seeded pastures can bear a load of 2 units, but there were none in these farms.

[9] On these various points, it is worth consulting a recent article by B. Agarwal ("Agricultural mechanisation and labour use: a segregated approach". in *International Labour Review*, Jan.-Feb. 1981), which analyses, from a slightly different angle, the effects of mechanisation in the wheat regions of the Punjab (India).

[10] They are based on the data of the CIDA (op. cit., p. 27), improved in the light of the effects of mechanisation according to Sociedad Nacional de Agricultura (Chile): *Manual de planificación agrícola* (Santiago, 1966).

[11] These figures hence do not include the upkeep of production tools, installations, material, etc., nor the time for certain movements (such as the transportation of personnel) and marketing.

[12] Locally at least, since they are themselves obliged to cope with the competition imposed by large North American exporters.

[13] A phenomenon further reinforced by the fact that this imported equipment is designed and developed on the basis of different technological and mechanical considerations.

[14] Contrary to what theoreticians of marginalism and dualism think; see, for example, Arthur Lewis: "Summary: the causes of unemployment in less developed countries and some research topics", in *International Labour Review*, May 1970, p. 584.