

SECOND CARNEGIE INQUIRY INTO POVERTY  
AND DEVELOPMENT IN SOUTHERN AFRICA

Mechanizing farming: Implications  
for employment, incomes and  
population distribution

by

Michael de Klerk

Carnegie Conference Paper No.27

Cape Town

13 - 19 April 1984

CONTENTS

	<u>Page</u>
1. Changes in technology and the structure of farming .....	2
2. Changes in employment patterns	
2.1 The level of employment .....	7
2.2 The composition of employment .....	8
3. Causes of technological change .....	13
3.1 Labour shortage .....	13
3.2 Economies of scale .....	15
3.3 Increasing farmers' control over the labour process .....	17
3.4 The cumulative nature of technological change .....	19
3.5 Institutional factors .....	20
4. Unemployment .....	22
5. Summary and conclusions .....	23
NOTES .....	24

MECHANIZING FARMING : THE IMPLICATIONS FOR EMPLOYMENT,  
EMPLOYMENT, INCOMES AND POPULATION DISTRIBUTION

To date, little research has been done in South Africa to assess the nature and strength of the link between technological change and employment. The study on which this article is based had the following amongst its main objectives : to determine

- the degree to which mechanization has occurred on maize farms
- the extent to which mechanization has brought about changes in the level of employment and in the characteristics of farm workers,
- the causes of mechanization,
- and whether any decline in employment on farms has led to a rise in unemployment.

From the findings, it is possible to make a number of deductions about changes in the geographical distribution of the population and in the incomes of farm workers and their families. These are, respectively, an important determinant and an important indicator of poverty in South Africa.

A survey <sup>1</sup> was conducted of 61 maize farms in six magisterial districts of the Western Transvaal: Coligny, Delareyville, Koster, Lichtenburg, Schweizer-Reneke and Wolmaransstad. Maize production almost certainly generates considerably more employment than any other branch of agriculture in South Africa, and the Western Transvaal, in most years, produces more maize than any other region. Information was gathered about harvesting, delivery of the harvest and weeding for the years 1968-81. In 1968, these were the last three tasks for which large numbers of seasonal workers were still employed. The technology of all three has changed radically in recent years.

## 1. CHANGES IN TECHNOLOGY AND THE STRUCTURE OF FARMING

The traditional technique of reaping was by hand. Until about 25 years ago, all maize was reaped in this way. Hand reapers walked along the rows, breaking loose the 'heads' or 'blaarkoppe', and putting them into sacks which were collected for threshing. Typically, a team of seasonal workers, anything between ten and two hundred strong, was employed to reap.

Threshing, that is, separating the grain from the cobs, has for many years been done mechanically. But until recently, it was done by a simple machine, powered by a tractor, and operated by a small team of permanent and seasonal workers.

Nowadays, combine harvesters do almost all reaping and threshing in a single mechanical operation. Seasonal workers are still employed to glean - i.e. to collect the blaarkoppe left behind by the combine - but in much smaller numbers. The number of permanent workers involved has dropped too.

Also until about 25 years ago, all maize was delivered to co-operative depots in sacks. The filling, weighing, sealing, loading, unloading, sampling and stacking of 90 kg sacks was back-breaking work, for which many seasonal workers - mainly men from black rural areas - were employed. The advent of silos and bulk-transport vehicles completely transformed this: from combine to silo maize is 'no longer touched by human hand'. Seasonal employment for this operation has almost entirely disappeared.

Weeding was the last form of seasonal employment to be mechanized, or more accurately, to be superseded to a significant extent by chemicals. Weedicides are now sprayed on almost all maize planted in the Western Transvaal. Like combine-harvesting, they have not completely displaced seasonal workers who are still employed - in smaller numbers - to deal with weeds which are resistant to weed-killers.

Besides technology, the three factors on which employment patterns appear to depend most are wages, the surface area of farming units and the yield or output of maize per hectare.

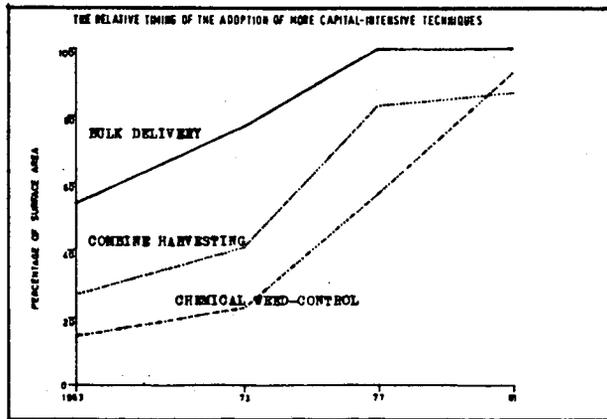
The connection between changes in technology, wages and output per hectare and changes in the level of employment needs no explanation. Between changes in farm size and changes in employment, the link is not so obvious. Farm enlargements increase potential economies of scale, i.e. they create the opportunity to lower the average cost of production. This generally involves either purchasing more or larger labour-replacing machines, which it would not be profitable to use on smaller areas of land, or using existing machinery and labour on an enlarged area. The second of these options is frequently chosen: farmers are reluctant to retrench permanent workers who have worked for them for some while but who have become redundant as a result of mechanisation. However, there are no such personal ties between farmers and workers employed on other farms. So when additional land is bought or rented, the workers who were previously employed on that land are often not re-employed.

At the start of the data-collection period, in 1968, between 25 and 30 percent of the area planted with maize was being harvested by combine. By the end of the period, in 1981, this had risen to about 95 percent. The greatest part of the change-over took place between 1973 and 1977. The most popular machine used was the smaller, tractor-drawn combine. (See Figure 1).

The adoption of bulk handling and storage techniques was more advanced in 1968: by that stage, more than half the crop - 54 percent - was already being delivered in bulk, and by 1977 virtually the entire crop was reaching silos in this way. (See Figure 1).

By comparison, chemical weed control was not nearly as widespread in 1968. Only 15 percent of the area planted with all crops was being sprayed with weed-killers at that stage. But the pace of advance was quick and by 1981 weed-killers were being used on roughly 95 percent of the total crop surface area. (See Figure 1)

FIGURE 1.



Between 1969 and 1976, data collection by the Department of Agriculture<sup>2</sup> shows the average cash-only<sup>3</sup> daily wage of seasonal maize-harvest workers to have roughly doubled from 39 to 77 cents per day. The average found in the author's survey was R1,54 per day in 1981.

On the other hand,<sup>4</sup> according to the Department, the average all-inclusive annual wage of permanent workers rose almost three-fold between 1970 and 1977 - from R220 to R653. The author's estimate for 1981, based on the same method of calculation, was R1 777. On a daily basis, the increase was therefore from about 60 cents to R4,85, between 1970 and 1981. However, caution should be exercised in relating the estimates of the Department to those of the author. Other evidence suggests either that the

author's estimate for 1981 was above the true average or that the Department's estimates for 1970 - 1977 and subsequent years were below the true average. This is discussed in detail elsewhere.<sup>5</sup>

When the rise in the cost-of-living is allowed for, the real wage increases are seen to be much smaller. For seasonal workers, between 1969 and 1981, it is no more than 20 percent. That is, from 39 cents per day in 1969, the real wage rose to only 47 cents in 1981 (at 1969 prices). The gain for permanent workers was more tangible; the real wage rate increased from R220 p.a. in 1969 to R338 p.a. in 1977 (at 1970 prices). The author's 1981 estimate, also at 1970 prices, was R564 p.a. Bearing in mind the above qualification, this represents about a two-and-half-fold real increase. On a daily basis, the real rise was therefore from about 60 cents in 1970 to R1,55 in 1981. (See figures 2 and 3).

FIGURE 2.

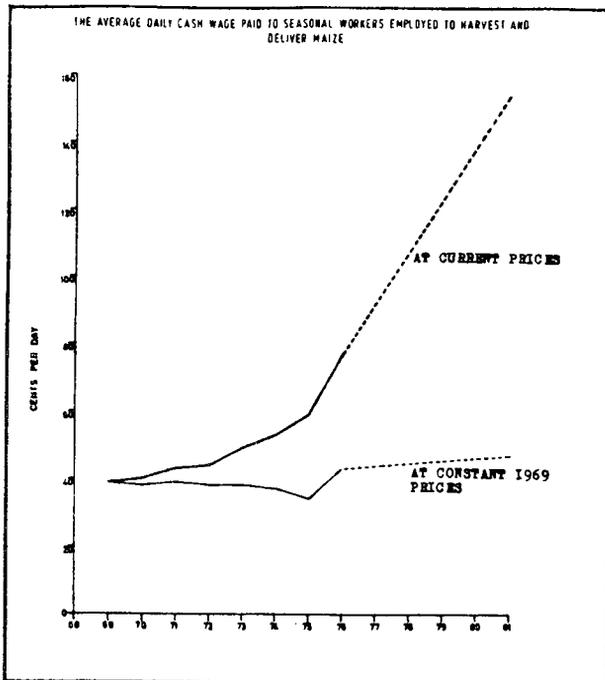
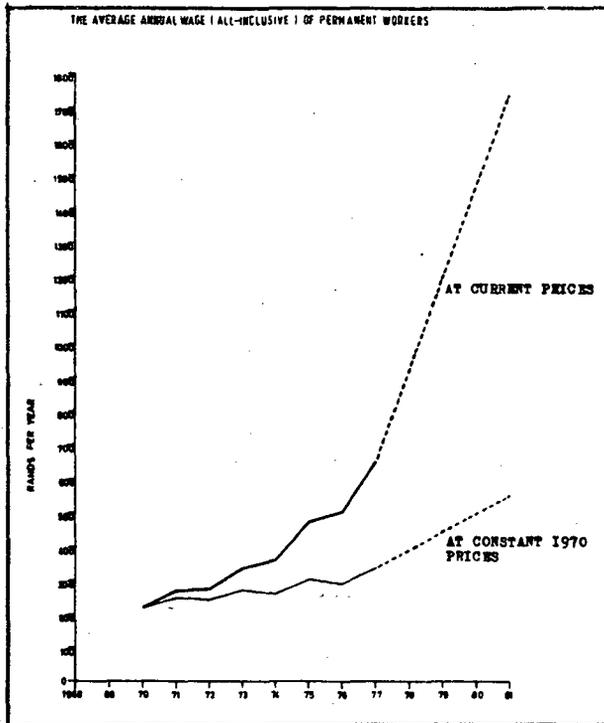


FIGURE 3.



Over the 13 years, the average gross surface area of farming units in the survey grew by almost 75 percent from 664 ha in 1968 to 1155 ha in 1981. No less than two thirds of the increase came about in the period 1973-1977. These changes should be seen against the background of a near-constant total area planted with maize, and therefore indicate a substantial increase not only in the size of farms but also in the degree of concentration of ownership or control.

Finally, despite some sharp fluctuations in the middle 70's, the trend of output per hectare was firmly upwards. On average, the expected yield grew by a little short of 6,25 per annum, resulting in a total rise of almost 120 percent between 1968 and 1981.

These changes in technology, wages, farm size and yield were accompanied by profound changes in both the level and the composition of employment.

## 2. CHANGES IN EMPLOYMENT PATTERNS

### 2.1 The level of employment

Between 1968 and 1981 the average number of seasonal workers per farming unit engaged in harvesting and delivering the maize crop fell by about 50 percent. For permanent workers, the fall was restricted to 20 percent. However, when the increase in the average size of farming units is taken into account so that employment is measured on a constant (per 1 000 hectares) basis, the decline in the number of jobs is seen to have been almost 70 percent for seasonal and 50 percent for permanent workers. Because the total area planted with maize in the Western Transvaal changed little over the 13 years, these estimates give the best indication of the percentage change in the actual number of workplaces in harvesting and delivery. See 'total' trend line in Figure 4. In addition to the fall in the number of seasonal workers employed, the average period of employment fell noticeably, from 10 to 8,5 weeks per farm.

In the other major form of seasonal employment, weeding, the adoption of new techniques also led to a contraction in the number of jobs. The number of seasonal workplaces per farming unit fell by between 25 and 30 percent over the 13 years. On a constant (per 1000 ha of arable land) scale, the contraction turns out to have been much greater - about 60 percent. As in the case of harvesting, this gives a reasonable indication of the fall in the actual level of seasonal weeding employment available in the Western Transvaal. Also in common with harvesting, the period of sharpest decline occurred in the mid 70's - between 1973 and 1977. The average duration of seasonal weeding employment also shortened, from about 8,5 to 8 weeks per farm.

The actual number of workers who found seasonal employment in weeding and/or harvesting cannot be calculated accurately. However, in the six magisterial districts covered by the survey, it appears to have been approximately 105 000 in 1968 and 40 000 - 45 000 in 1981. Although the number of permanent workers per 1 000 ha harvested fell by nearly 50 percent, because harvesting, delivery and weeding are only three of the full annual range of activities for which permanent workers are required, census data shows the number of permanent farm workers employed in the region to have fallen much less than proportionately - from about 30 000 in 1969 to 26 000 in 1978 (the latest year for which census data is available).

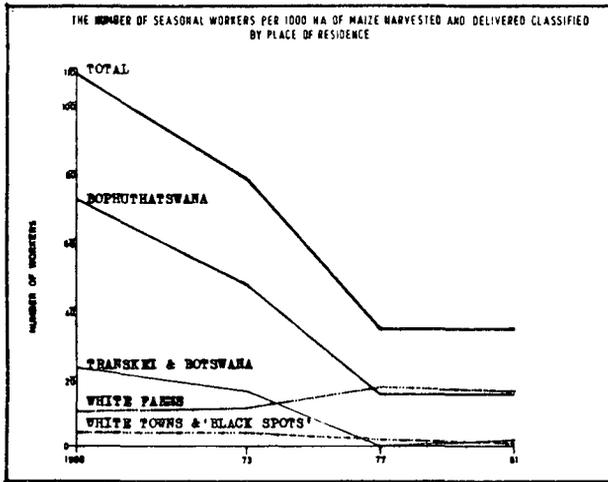
Of the total decline in seasonal employment between 1968 and 1981, about 37 percent can be ascribed to the replacement of hand- by mechanical-harvesting, about 32 percent to the adoption of chemical weed-sprays, about 24 percent to the reorganisation of hand-harvesting<sup>6</sup>, prior to the introduction of mechanical harvesting techniques, about 7 percent to the introduction of bulk handling and storage techniques, and less than 1 percent to the replacement of tractor-drawn by self-propelled combines.

## 2.2 The composition of employment

At the start of the period 66 out of every 100 seasonal harvest workers came from Bophuthatswana. By the end, no more than 44 out of every 100 did. All of the balance and more was taken up by the families of permanent farm workers, whose share of seasonal harvest employment increased from about 10 percent to almost 50 percent during the 13 years. People from the Transkei, Botswana, white towns and "black spots" were also employed, but in comparatively small numbers.

When the pattern of residence is superimposed on the pattern of falling harvest employment, it is found that whereas in 1968 workers drawn from "external" sources, i.e. Bophuthatswana, Transkei, etc., could count on about 100 workplaces per 1 000 ha of maize harvested, by 1981 the number was less than 20. Even those from "internal" sources, i.e. who lived on white farms, whose share of employment had grown so much, benefitted little in net terms: from 10 jobs per 1 000 ha in 1968, the actual number increased only to 16 in 1981. Figure 4 illustrates.

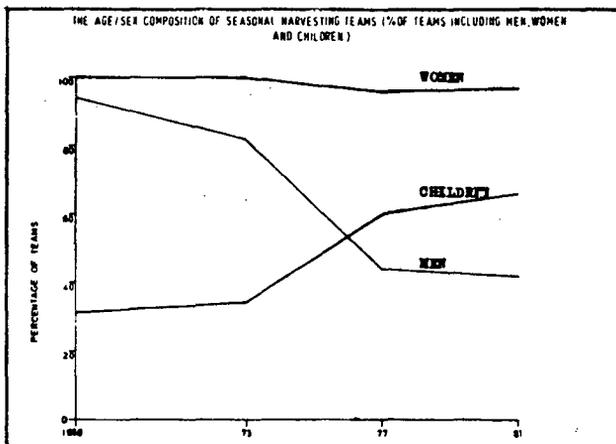
FIGURE 4.



Almost all "external" seasonal harvest workers came from rural communities, and, though few had their homes in "black spots", the majority lived in areas where people from "black spots" are known to have been relocated. The data collected does not allow one to estimate the number of relocated people who found seasonal work on white farms, but there are several indications that it was small.

Women formed the backbone of almost all seasonal harvesting teams, and appear always to have done so. Men, on the other hand, made up a declining, and children a steadily rising, proportion. Whereas in 1968 all but a few teams included men and only 30 percent included children, 13 years later only about 40 percent had adult male members as against about 65 percent which incorporated children (See Figure 5). Teams from external sources were most likely to include men, and those recruited internally, children. Children were most likely to be called on to glean behind a combine, and men to harvest by hand and handle sacks.

FIGURE 5.



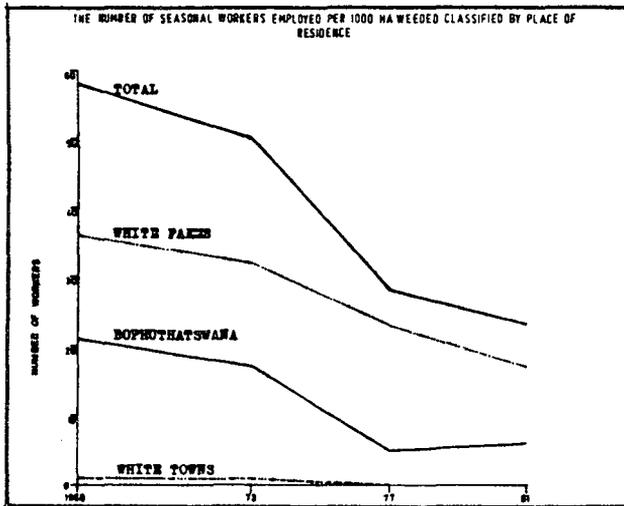
If one were to try to sketch a profile of a typical seasonal harvesting team, at the start of the period when most harvesting was still done by hand and most delivering in sacks, the team would be comparatively large - about 50 strong - would be recruited from a black rural area - most probably Bophuthatswana - and would consist of men and women in more or less equal proportions and a few children. In contrast, at the end of the period, when most harvesting was done mechanically and

most delivering in bulk, the typical team would be comparatively small - about half the size it was 13 years earlier - would be drawn from the families of permanent farm workers and would be composed rather more of women than of children with perhaps a sprinkling of men.

In keeping with mechanization, the greatest part of these changes occurred between 1973 and 1977.

For seasonal workers employed to hoe, the picture is noticeably different. Even in 1968, between 60 and 65 percent of workers were recruited from the families of permanent workers, and by 1981 this had grown to between 70 and 75 percent. In terms of the number of workplaces per 1 000 ha weeded, while places were available for 36 internal and 22 external workers in 1968, in 1981 the respective numbers had dropped to 17 and 6. (See Figure 6.)

FIGURE 6.



As in the case of harvesting, almost all external weeding workers came from rural communities, although, from the mid 70's, very few came from localities into which people are known to have been moved in terms of the state's relocation programme. Again, it was women who were in the majority in hoeing teams, though throughout the period 2 out of every 3 teams included children. Men played a relatively small and diminishing role. Almost all children came from white farms, while most teams from "outside" sources included men. On average, hoeing teams were considerably smaller than harvesting teams in 1968, having about 30 members, but their numbers seem to have been much less noticeably reduced by the adoption of more capital-intensive methods: in 1981 the size of the average hoeing team was still between 20 and 25, almost the same as for harvesting. Once more, the period in which the characteristics of weeding workers changed most was the middle 70's.

Over the years the likelihood of both harvesting and weeding being done by the same workers increased steadily. As early as 1968, nearly 60 percent of harvesting teams shared some workers - mostly seasonal - in common with weeding teams. By 1981 this had risen as high as 90 percent. Together with the shift of seasonal jobs from external to internal workers, this suggests that the contraction of seasonal employment during the last decade or so has been accompanied by a considerable increase in what one could call "the degree of concentration of job occupancy". The consequence of both trends is that fewer and fewer households are sharing the income generated by agricultural production.

Except in one respect, little information was collected about the characteristics of permanent workers. The great majority appear to have been men who lived with their families on the farm where they were employed.

At harvest time in 1968, a little more than half operated machines, while the remainder performed manual work. Surprisingly perhaps, the proportion of machine operators hardly increased in the following thirteen years, and in 1981 roughly 60 percent of permanent workers were machine operators and 40 percent manual workers. Mechanization reduced the number of harvesting jobs for both - by between 45 and 50 percent for machine operators per 1 000 ha, and by about 55 percent for manual workers. Once more, most of this change came about between 1973 and 1977.

### 3. CAUSES OF TECHNOLOGICAL CHANGE

When questioned about their reasons for mechanizing harvesting, farmers mentioned the following factors (in descending order of importance):

1. labour unavailable
2. combine harvesting quicker
3. labour unreliable
4. combine harvesting cheaper
5. combine harvesting easier to control
6. bulk handling made combine harvesting easier
7. wages became too high

#### 3.1 Labour shortage

From the first, third and seventh of these factors, it appears that farmers perceived a shortage of reliable labour at wages rate that they were prepared to pay, as one of the most important reasons for harvest mechanization. But complaints of difficulty in finding workers have been a feature of capitalist agriculture in South Africa for many years, so this explanation should not simply be accepted at face value.

In particular, in the case of seasonal workers such complaints should be treated with caution. As has been pointed out in an analysis of seasonal employment on Californian farms,

" ... the farmer's incentives are entirely in the direction of more intense demand (for harvest-labour) than crop or climate require. Here is the explanation for the persistent reports of labour shortage while no crops spoil. The farmer's demand (for harvest labour) is more or less as he states it. He can, by the large, provide some employment for most of the workers he calls for. He could also harvest the crop with many less. So long as the cost of recruiting additional labour remains negligible and the cost of unemployment is borne by the community, and so long as the piece rate system prevails, the farmer will continue to demand a larger number of workers for a shorter period of time in preference to a small number of workers for a longer period of time."<sup>7</sup>

Nevertheless, there is a good deal of evidence to support the farmer's complaints. During the crucial years of the early and middle 1970's, when most mechanization was taking place, the real wages of permanent farm workers did rise. (See Figure 3.) At the same time, permanent employment on farms fell. This combination of events does suggest that men were more reluctant to take permanent farm jobs.

Also although Figure 2 does not show any increase in the average wage of seasonal workers, it is likely that such a rise did actually occur. The reasons for this are both that women and children were progressively replacing men in seasonal teams, and that an ever-increasing number of seasonal workers were employed to glean rather than har-

vest by hand. Since it is likely that women and children were paid less than men, and it is certain that gleaners were paid less than hand-harvesters, an unchanged average real wage implies that women and children employed to glean were, in fact, paid more than previously. So the same combination of events - a rise in real wages and a fall in employment - can be identified for both permanent and seasonal workers.

Further support for farmers' complaints is to be found in developments elsewhere in the economy in the early and middle 1970s. While real farm wages rose in absolute terms, relative to real wages in mining, manufacturing and construction - the industrial sectors which were the main alternative sources of employment for men from rural areas - they actually fell. And, during this period employment opportunities in these sectors expanded rapidly. In other words, for men employed on farms, urban jobs became increasingly attractive. It does therefore, appear that, to a significant extent, mechanisation on farms took place in response to an increasing "urban labour pull".

This strand of evidence suggests that for men, if not for women, the contraction in the number of farm jobs that accompanied mechanization may not have resulted in extended periods of unemployment in black rural areas.

### 3.2 Economies of scale

The second and fourth of the farmers' reasons for harvest-mechanization concerned the relative quickness and cheapness of combine-harvesters.

The greater the initial fixed outlay for a particular method of production, the greater the potential for lowering the average cost by increasing the level of production. This is often referred to as "economies of scale". More capital-intensive techniques, therefore possess greater potential economies of scale than less capital-intensive techniques. To realise this potential, it is necessary, first, to have a range of techniques of varying capital-intensity, and second, that the scale of production be increased sufficiently.

In the case of maize-harvesting in the Western Transvaal, the first of these conditions was fulfilled in the 1960s, when combine-harvesters became generally available. The degree of fulfilment of the second condition varied from farm to farm, but was given a considerable boost in the late 60s and particularly in the early and middle 70s, both by the rapid increase in the average size of farms and by the marked, if a little unstable, rise in crop yields. In the survey 23 percent of the purchases of additional land were accompanied in the same year, or followed in the next year, by the purchase of a combine.

When costs are calculated, it is surprising to find that the critical harvest tonnage above which it was cheaper to use combines was only 250 tonnes. Only 2 or 3 percent of farms in the sample handled tonnages which were below this in 1976. And even in 1968 when the average harvest tonnage was considerably smaller, and the relative cost of hand-harvesting lower, no more than about 10 percent of farms in the sample would have found it cheaper to harvest by hand.

This is a crucial finding because it shows that on all except the smallest farms, the switch to combine harvesting was merely a question of time and of a suitable stimulus, from the time that combines first became generally available. The growing reluctance of men to take

farm jobs and the simultaneous rapid increase in the size of farms in the first half of the 70s appear to have provided the stimulus but in the end it is chiefly to the development of new technology abroad that harvest mechanization should be ascribed. This suggests that the reduction in farm employment was due mainly to a "rural labour push" rather than to an "urban labour pull".

On the second strand of evidence, unemployment seems a much more likely consequence of harvest mechanization than the previous subsection indicates, not only for women but also for men.

### 3.3 Increasing farmers' control over the labour process

It is clear that control over the labour process was an important reason for harvest mechanization, and also for the introduction of weedicides.

"Experience has shown that farmers tend with the greatest eagerness to accept ... a new implement if it offers possibilities for making the task or life easier for them ... (and are) inclined to think of the economy of the matter after (they have) decided that the particular implement is ... the one (they) would like to have."<sup>8</sup>

Although "combine harvesting is easier to control" ranked only fifth in the reasons given by farmers for harvest-mechanization, almost all of the seven main reasons given by farmers can be seen as attempts to increase their degree of control.

The many tasks performed by hand which were subsequently taken over by machines represent only one aspect of control. The composition of seasonal teams is another. Recall that the size of seasonal teams shrank considerably.

Also, while women were always the mainstay of seasonal teams, children to a large extent replaced men and residents of white farms tended to replace resident of black rural areas. Fewer workers are certainly more readily controllable than many; women and children less fractious than men; and the families of permanent farm workers living at or near the site of operations a more accessible and dependable source of labour than independent communities living far afield. To this one can add the appreciable shortening of the harvest period.

There is a further consideration: when attributes such as physical strength and stamina are indispensable for tasks such as reaping by hand and handling sacks, and they are in short supply (at the wage rate on offer) then there is a sense in which they qualify as "skills". While the traditional techniques were still in use, farmers had no option but to go to the "reserves" and negotiate for the men they needed in substantial numbers. With the introduction of mechanical harvesters and bulk handling, these "skills" were no longer essential, and the bargaining position of communities in black rural areas was undercut. In this sense "deskilling" can be said to have occurred, and the balance of power and control shifted more firmly into the hands of farmers.

However, there is another side to this. Many machine operators who remain - mostly drivers of combines and heavy duty delivery vehicles - have acquired new, less abundant ("genuine") skills, some of which are in demand in urban areas. Though the "training school", Boskop, in Potchefstroom is regularly over-booked and most farmers approved of its courses in principle, many expressed reluctance to send workers employed on their own farms for training - particularly in the driving and vehicle maintenance courses - because of the tendency of such workers to leave farms soon after training. For workers, driver's licences and maintenance skills create more than a little leverage, as is reflected by rising real wage rates for permanent workers.

Organizing labour - which many farmers expect in the foreseeable future - may be less difficult in these circumstances. However, the increase in real wages that is already occurring and that could be expected to follow the emergence of unions, will not necessarily lead to an increase in family incomes, as is shown elsewhere.<sup>9</sup>

#### 3.4 The cumulative nature of technological change

The sixth reason given by farmers for the purchase of combines was that "bulk handling made combine-harvesting easier".

Without bulk delivery and storage systems, the manual handling of 90 kg sacks would still have remained. This required the presence of men, who could be recruited in sufficient numbers only from the "reserves". It was the prior introduction of bulk-handling on most farms that opened the way for combine-harvesting to phase out seasonal teams from black rural areas.

To a lesser extent, combine-harvesting in turn played the same catalytic role in the adoption of chemical weed sprays, though the process was rather different. In contrast to harvesting, hoeing seems generally to have been allocated to the families of permanent farm workers, as a matter of tradition. So there was relatively little scope to switch labour sources. However, with the spread of combines, there was a tendency to plant maize in 3 foot rather than 7 foot rows, although this was more than just for harvesting convenience. Between 7 foot rows a tractor can plough lightly, which is the normal preliminary to hand hoeing. Between 3 foot rows, this is no longer possible, and even wielding a hoe is difficult, once the maize is a foot or two high. So weed sprays applied at or shortly after planting were a natural complement to the use of combines fitted with 3 foot intakes.

While it would be wrong to suggest that there is a simple chain reaction in the process of technological change, these two examples do serve to demonstrate the presence of an important cumulative, interdependent element.

### 3.5 Institutional Factors

State policy on farm labour and on the cost of farm inputs in general, perhaps unexpectedly, does not appear to have been a notable cause of the technological changes considered here.

The only significant change in state policy on the pricing of capital goods that occurred during the period being considered was the tax provision which enabled farmers to write off the entire cost of new machinery in the year of purchase, thereby reducing both their tax liability and the cost of new machinery. But this was introduced only in 1977, by which time the greatest part of mechanization had already occurred, as can be seen from Figure 1.<sup>10</sup>

What was probably more important was the descent of real interest rates into the negative range that accompanied the upsurge of inflation in the middle 70s. Since real farm wages appear to have either risen or remained roughly constant during this period, the real price of machinery certainly fell relative to that of labour. This made mechanization more attractive. But this process was only tenuously connected to changes in institutional factors.

Potentially more important was the State's population relocation policy, which was in full swing during the 1970s. However, the rural areas of the Western Transvaal were less affected than most. Labour tenancy in the region appears never to have been widespread, and there are only a few instances recorded of black families being removed from white-owned land.<sup>12</sup> In addition, though many "black spots" were "cleared", only a very small percentage of

workers on white farms had their homes in these areas, as Figure 4 shows. Nor is there any evidence that the activities of (farm) Labour Control Boards were important.

So the State's relocation programme appears to have been, at the most, a minor cause of mechanization. Rather, events happened in reverse. To the extent that they have led to the retrenchment and removal of permanent workers and their families to black rural areas, farm consolidation and mechanization should be seen as an informal, perhaps unintended, element of the relocation programme.

But, two caveats: first, as pointed out above, it is chiefly seasonal workers from black rural areas not permanent workers resident on white farms who have been affected by the events described above. And second, though there is clear evidence that the number of permanent workers on white farms in the region has fallen, it is not clear how far this has been accompanied by their and their families' move from white to black rural areas. Findings presented elsewhere<sup>13</sup> show that at least part of the decline in permanent farm employment has been absorbed by a contraction in the average number of permanent workers per family (living on white farms). This suggests that, instead of whole households leaving white farms, some of the younger members are now looking for work in urban areas, while their families - still numbering at least one permanent farm worker - remain on their former employer's farm. Several farmers referred to just such a set of circumstances. Only one fact emerges for certain: that is the increased dependence of rural black families on income from urban areas.

#### 4. UNEMPLOYMENT

What happened to the workers who left the farms? The way in which the research was undertaken did not provide a direct answer. However, from national and regional wage and employment statistics, it appears that the fall in farm employment was to some extent compensated for by a rise in industrial employment.

For men, the main alternatives to farm work were jobs in mining, manufacturing and construction. During the economic boom in the first half of the 1970s, employment<sup>14</sup> and real wages in these industries increased rapidly. This suggests both that jobs in these sectors became more attractive and that many men previously employed on farms were able to find work in urban areas. In the second half of the 70s, the number of jobs and real wages in these industries rose more slowly, and actually fell in some instances. But during this period, the number of permanent workers on farms seems to have remained fairly constant, and even risen slightly. So most men who could no longer find employment in agriculture, or who no longer wanted it, were probably able to find work elsewhere.

For women employed on farms, on the other hand, the only significant avenues of alternative employment were in urban domestic service and in the "informal sector". There are no records of informal employment and wages, but it is clear that there was no appreciable increases in either employment or real wages for domestic workers. In contrast to men, therefore, most women made redundant by technological change on farms - and they made up the bulk of those whose seasonal jobs were phased out - would probably have found it difficult to get other work. For those who relied on seasonal or domestic work on farms merely to supplement regular income from other family members, this would have been unfortunate. But for those with no such stable sources of income, it would have been disastrous. It is women living in black rural areas who have borne the brunt of technological change on farms.

## 5. SUMMARY AND CONCLUSIONS

Extensive mechanization and increases in farm size have taken place on Western Transvaal farms in the last decade and a half. These have been accompanied by a substantial reduction in employment, mainly of seasonal workers; by the transfer of seasonal jobs from workers living in black rural areas to those living on white farms; and by the replacement of men by women and children in seasonal teams.

Those on whom the burden of having to find alternative employment has fallen most heavily are residents of black rural areas. Households which have relied chiefly on female breadwinners are most likely to have suffered a critical loss of income.

The contraction in permanent farm employment manifested itself partly in an exodus of black families from white farms and partly in a decline in the average number of permanent workers per family. Both are likely to have increased the incidence of oscillating migration between urban and rural areas.

The real wages of workers who have retained their jobs appear to have increased. However, evidence discussed elsewhere<sup>15</sup> suggests that, for families living on white farms, this was more than offset by the decline in the number of permanent workers per family. Mechanization appears to have been associated with a deterioration in family incomes from on-farm employment.

All of these consequences point to an increasing dependence of black families, both in black and in white rural areas, on income from urban sources.

NOTES

1. For details of the survey method, see de Klerk, M.J.: "The Incomes of Farm Workers and Their Families : A study of Maize Farms in the Western Transvaal", Second Carnegie Inquiry into Poverty and Development in Southern Africa, Conference Paper No. 26, University of Cape Town, 1984 (forthcoming), Section 1.
2. The Department carries out detailed annual surveys of the costs of maize production in three of the most important maize producing regions, of which the Western Transvaal is one. About 80 farms are visited in the Western Transvaal.
3. Insufficient data was collected to calculate an all-inclusive wage for seasonal workers. A rough approximation of the average daily value of food supplied (free) in 1981 is 47 cents (See de Klerk: op. cit., Sections 2.2 and 4.2)
4. Items included are weekly or monthly cash payments, payment in form of bags of threshed maize, cash bonuses, food, clothing, grazing and cultivation rights, medical assistance and paid leave. The most important omission is housing. The method of estimation follows that adopted by the Department of Agriculture. (See de Klerk: op. cit., Sections 2.1 and 4.1).
5. See de Klerk: op. cit., Section 4.1.
6. In the 1960s, before the general adoption of combines, farmers re-organised threshing in a way that saved a considerable amount of labour without the purchase of additional machinery. This was done by having one central threshing point instead of moving the threshing machine from field to field. This part of the calculation is based on time studies conducted by the Department of Agriculture.

7. Fisher, L.H.: The Harvest Labor Market in California, Harvard University Press, Cambridge Massachusetts, 1953, p.11. Not all of Fisher's assumptions apply perfectly in the Western Transvaal, but the analogy is close enough to be highly relevant.
8. Republic of South Africa Commission of Inquiry into Agriculture (chairman: M.D. Marais) Second Report, Government Printer Pretoria, RP 84/1970, p.165.
9. See de Klerk: op.cit., Section 4.6.
10. Farmers were asked explicitly about the influence of this tax provision in their decision to purchase machinery. Almost all replied that it had played no significant role.
11. In contrast to most of the rest of the Transvaal, of the six magisterial districts in the survey, only one was affected by Abolition of Labour Tenancy notices published in the Government Gazette. Farmers confirmed that labour tenancy had never been widespread in the region.
12. See Surplus People's Project (Publisher: Surplus People's Project, Durban 1983), evidence on Western Transvaal. Again farmers' reports confirm this.
13. See de Klerk: op.cit., Section 4.6.
14. Total employment in mining changed little. But recruitment of black mine workers in South Africa increased substantially. In Bophuthatswana, the number increased from 6 000 in 1970 to 33 000 in 1976.
15. See de Klerk: op.cit., Section 4.6.

MICHAEL DE KLERK  
SCHOOL OF ECONOMICS  
UNIVERSITY OF CAPE TOWN  
APRIL 1984

These papers constitute the preliminary findings of the Second Carnegie Inquiry into Poverty and Development in Southern Africa, and were prepared for presentation at a Conference at the University of Cape Town from 13-19 April, 1984.

The Second Carnegie Inquiry into Poverty and Development in Southern Africa was launched in April 1982, and is scheduled to run until June 1985.

Quoting (in context) from these preliminary papers with due acknowledgement is of course allowed, but for permission to reprint any material, or for further information about the Inquiry, please write to:

SALDRU  
School of Economics  
Robert Leslie Building  
University of Cape Town  
Rondebosch 7700