Technical change and the destruction of farm employment
by
Norman Bromberger
Carnegie Conference Paper No.273
TECHNICAL CHANGE AND THE DESTRUCTION OF FARM EMPLOYMENT: IS THERE A PROBLEM? IS IT AMENABLE TO PUBLIC POLICY AMELIORATION?

Introductory note.

This short paper has emerged from the meetings of the Working Group on the Public Allocation of Resources. The Group wanted a paper on the implications for employment of increasing capital-intensity, 'mechanisation' and labour-saving technical change in the economy as a whole. It could not find a volunteer, and had to make do with this more limited discussion of some of these problems as they arise in the farming sector. It is contributed to the Conference as a modest addition to those papers from other sources which are dealing with aspects of the farming situation (e.g. Nos. 23-28). It has one or two points about policies to make about which some members of the Group felt strongly, but perhaps its main feature is a moderate scepticism about the crisis nature of the alleged problem.

1. A statement of the problem in outline

1.1. Historically, agriculture practised on White-owned farms has been the largest employer of labour in the economy, although the jobs offered have been relatively of low-productivity and have commanded relatively low wages. (We ignore here important distinctions between alternative forms of farm labour-organisation viz. share-cropping, labour tenancy, wage-employment with substantial subsidiary cropping and grazing rights, pure wage-employment etc.) The labour force on White-owned farms continued to expand after the Second World War during the phase which D. Hobart Houghton described as a 'major agricultural revolution' and reached an historical peak (or plateau) in the 1960s decade. One set of figures gives total employment in the 'modern agricultural sector' as reaching 1,221,000 in 1960 and 1,351,000 in 1970 - accounting for in those years 21.3% and 16.7% respectively of all economically active persons (and of course a higher percentage of 'modern sector employment'). The introduction and use of lorries and tractors and mechanised (non-hand-held) implements of various kinds was at this stage compatible with the expansion of employment.

1.2. Since that decade employment in agriculture (I shall use this short-hand term to refer to agriculture and forestry on White-owned farms or estates) has been declining absolutely: 973,000 is the 1980 figure in the series for which the 1960 and 1970 figures have already been listed. This amounts to something like a 25% decline in the decade and a half since the mid-1960s. These figures present a sharper and more sudden reversal of employment trends than is probably the case, but there is no doubt that the trend is downwards.

1.3/......
1.3. The trend is expected to continue. It was suggested by Francis Wilson, before this absolute decline had clearly set in, that the South African economy might well be facing the threat of a two-phase drastic reduction in farm employment. He drew on analogies with American experience in the period 1930-1960. The first phase, associated with a range of innovations including the early use of petrol-driven draught power, reduced the demand for labour in many farming processes but, as a result of increased output per unit area, increased the demand for harvesting labour: so the overall effect was less clear-cut. However, in the second phase of the reduction the focus would shift to the labour-saving mechanisation of the harvesting stage of grain (especially, maize) production. Other harvesting processes would go the same way. In addition he speculated that chemical innovation, in particular the use of weedicides to replace hand-hoeing by seasonal female labour, might reinforce the drastic character of the employment reduction that lay ahead. In the 1970s there was confirmatory evidence that weedicides were capable of making startling reductions in part of the labour force. De Klerk's study of the use of combine-harvesters in the maize areas of the Western Transvaal (Paper No. 27 at this Conference) has confirmed substantial employment reductions during the period from 1968.

It seems to be expected that these processes have not yet worked their full way through farming.

1.4. Such expected, or actually realised, reductions in agricultural employment may be seen (and have been seen) as disastrous - in the primary sense that they would involve a substantial addition to unemployment. In this view the other sectors of the economy, given plausible growth rates of output and assuming no change in the labour-saving character of technical change taking place, would be hard put to absorb productively the natural increase in the labour-force - let alone several hundreds of thousands of workers to be jettisoned by agriculture. As Frank Biggs wrote of the 1970s experience: 'It would appear that one may safely assume that the substitution effect dominates in the modern agricultural sector, that additional investment in agriculture actually destroys jobs, and the dilemma is that not enough replacement jobs are being created in other sectors of the economy.' In this view, then, it is the failure (or alleged, or predicted, failure) of the rest of the economy to re-absorb labour no longer employed in agriculture which constitutes the problem.

1.5. A milder view is that an increase in outright unemployment of primary (male) workers is less the problem than an increase in the insecurity and (probably) poverty of women and children attached to male ex-farm-workers - such deterioration in their position resulting from a loss of casual and seasonal jobs themselves and their dependence on intrinsically unreliable remittances from distant workers/...
workers (now) employed in towns or mines. Presumably in this view it is
influx control which constitutes at least part of the problem. 7

1.6. The reasons for the adoption of the labour-saving, capital-using technical
changes believed to lie behind the reduction in employment in agriculture have
not always been clear in the accounts. One clear view that does emerge is that
(put loosely) farmers are using more capital and less labour because a range
of Government policies have intentionally (or unintentionally) reduced the
'cost of capital' relative to the 'cost of labour'. Policies have distorted
relative factor-prices (as economists say) and hence the relative employment
of factors.

1.6.1. Taxation provisions have allowed machinery to be written off quickly and since
1977 to be treated as current expenditure; 8 it has also been argued that the
tax system has encouraged amalgamation of farms - and labour-input per unit of
output tends to fall with farm-size (in a given line of farming). 9 The cluster
of monetary, financial and other policies which led in the context of high rates
of inflation to negative real long-term interest rates have also been pointed
to as reducing the cost of borrowing and of financing capital equipment.10
Import and exchange controls, in so far as they maintained an overvalued rand,
made imports of capital goods cheaper than otherwise.

1.6.2. Policy directions flow directly from such an analysis: remove the distortions!
"If relative prices were to be less skewed in favour of capital ... then capital
and labour will be combined more appropriately in South Africa," wrote Biggs.11
And it is of interest that recent policy has been moving in that direction by
setting interest rates and the exchange rate somewhat freer to seek more
'equilibrium' levels - in both cases (rising interest rates and falling rand
exchange-rate) in directions which increase the 'cost of capital.' 12

1.7. A common-sense approach to explaining the increase in capital-intensity on farms
would point to the flow of new technical equipment from developed countries.
Of course such an explanation is not inconsistent with one which concentrates
on 'factor-price distortions' (as in 1.6): the cheaper, relatively, capital
goods are to obtain and use the more likely it is that some of the new capital-
intensive equipment being developed overseas will turn out to be profitable and
will be adopted. So stressing the strength of the international trend to large-
scale, capital-using technology does not eliminate the 'remove factor-price
distortions' policy recommendation; but it does raise the possibility that it
will be enough. New techniques may be profit-increasing even at 'equilibrium'
relative factor-prices; they may indeed embody such technical advances and
produce such increases in all-round productivity that they will be profitable
at/......
at any set of relative factor-prices one cares to think of. (In a country such as India railways and steam-locomotives were profitable in the 19th century despite very low wage-costs; it is my impression that this also applies in the case of recent earth-moving, bulk-handling equipment of various types - it is so technically superior that a drastic fall in the relative cost of labour would not induce a reversion to more labour-using methods).

1.7.1. Within a perspective in which capital-using technical change in farming is seen as substantially (though not entirely) 'autonomous', or relatively insensitive to feasible changes in relative factor-prices, policy concerns either switch to alternative rural possibilities of (possibly) non-farm employment and development or switch to recommendations for making the non-farming sectors of the economy more labour-absorptive or both.

1.7.2. The first of these alternatives I shall not say anything about in this outline because it is not a well-developed theme, though I am inclined to think it deserves a lot more attention than it has received. The second will to some extent duplicate what has already been said in 1.6 about farming: remove factor-price distortions - they will have some effect although one cannot say in advance how much; consider distortions in the other direction - as with wage-subsidies in the deconcentration and growth points; remove the range of regulatory restrictions on small business; square-up to the need for eliminating influx control - working on the assumption that in some employment spheres real wages will tend to fall and labour-absorption will be encouraged, and also that self-employment and small-scale enterprise will be promoted; consider, also, labour-using public infrastructural investment schemes (as promoted, for instance, by Norman Reynolds in Paper No. 234 at this Conference: 'Public Works as the core of a rural development strategy' - note that this might also classify as an example of rural non-farm employment-creation referred to in 1.7.1.)

1.8 I am afraid that the attempt to compress may have made the above outline obscure. Perhaps a summary of the outline will help:

(a) There is evidence that the number of workers on farms is dropping rapidly and will continue to do so.

(b) This is an extremely serious problem because the capacity of the rest of the economy to absorb labour is very limited.

(c) The important causal factor behind farm employment reduction is 'mechanisation' and the application of new capital-using technical changes.

(d)/......
(d) Proposed policy responses may be classified as to (i) whether they presume the changes are sensitive to change in the relative prices of capital and labour or not, and (ii) whether they focus on the farming sector or on the rest of the economy.

2. Some reservations about the scale and nature of the problem and about the appropriateness of some suggested policy recommendations.

There are facts which do not fit too well into the picture outlined above - either on farms or the the economy as a whole. There are alternative (or at least, additional) ways of explaining the curtailment of farm employment. There are queries to be placed against the policy of encouraging labour-intensity by increasing real interest rates. I shall try to expand these points in what follows while making quite clear that much of the discussion is tentative.

2.1. How rapid and substantial is the reduction in overall farm employment, and for how long will it be sustained?

There are grounds for thinking that the reduction of employment in commercial agriculture may have been exaggerated, and that even if it were not it is unlikely that such a rate of decline would be sustained.

2.1.1. The Current Population Survey has shown an increase of about 11% in the number of Africans engaged in agriculture between May 1978 and May 1981, as Simkins has noted, and there has been a further slight increase to April 1982. It is possible that this represents increased involvement in 'subsistence' agriculture, though a parallel increase in the number of Coloured agricultural workers (about 9%) could not be explained in this way.

2.1.2. Interestingly enough the Agricultural Census, now appearing for the late 1970s, reports an increase in the number of agricultural workers of all types over the years 1977 to 1979: from (roughly) 1,25 million to 1,33 million. There is impressionistic evidence that during the recession in the general economy there was a great increase in the number of work-seekers approaching farmers, and some survey evidence that in Natal some of these were given employment in the years around 1977-79. While employment experience varied by type of agricultural enterprise there were some branches and some processes where it was possible to absorb labour.

2.1.3. While the sugar industry's employment figures do not suggest that there was an overall increase in employment it is widely reported that the rapid rise in fuel prices and the increasing availability of labour since the mid-1970s brought about reversals in decisions made earlier in the decade by sugar-farmers to use imported mechanical equipment in several processes. In 1980

Ardington/......
Ardington and Evans wrote: 'By 1976 some 5% of the crop was mechanically harvested and nearly 40% was mechanically loaded. Today both these figures have been halved and there has been a significant move towards more labour-intensive techniques of production.' More surprisingly they claimed that in 'the grain growing areas of the country' the increasing tendency to follow the 'American model' had also been reversed, at least partly because of the 'increasing capital cost (of very large machines) in relation to the size of the farming unit'.

2.1.4. The above paragraphs do not of course imply that there has been no reduction in farm employment! They assert rather that there was at least some slowing down of the process in the second half of the 1970s, even some suggestions of a (possibly counter-cyclical) limited increase. This itself should make us wonder about the expected continuation of the decreasing trend for some decades, but there are other reasons for doing so as well.

2.1.5. For instance, machine-using and labour-saving techniques are not equally available in all branches of agriculture, nor are they likely to be. This is the result of the specific character of products (such as quality table fruit which requires 'love and tender care', or sugarcane which loses condition and sucrose more rapidly if harvested by chopper-harvester methods) or the specific nature of topography and climatic factors. The influence of topography is illustrated in the case of sugar-cane by the difficulty of using machines developed for (say) Australian flat-country conditions on the hillsides of much of the South African canelands. It is also the case that within some areas, of which the areas of the Western Cape near Cape Town are an example, diversification and intensification leading to considerably higher physical and value outputs per unit area have tended to keep up employment levels in the face of labour-saving innovation. It is probably the case that such strategies are limited to certain areas - but it is also to some extent a question of markets. This is hardly a proper discussion of the issue but it should serve to correct the idea that combine-harvesters are a symbol of what will happen everywhere and soon.

2.2 Is the absorptive capacity of the rest of the economy as low as widely imagined? (Or: is the unemployment rate in the region of 20%?)

I hope that during discussions of the major papers to be presented to this Conference on unemployment we shall make real progress in answering this question. Here it is appropriate simply to mention some issues - and cross-refer to the substantive discussions.
2.2.1. Everyone seems agreed that the growth of jobs in 'the modern sector' has not kept pace with the growth of the African labour force in the last 2-3 decades. J.A. du Pisanie puts those not so employed into the 'peripheral sector' and shows it as growing from 28.5% of the economically active population in 1960 to 40.4% in 1980. In terms of persons, the increase is from roughly 1,630,000 to 4,252,000. The disagreement seems to be over whether a very substantial percentage of those 4.25 million persons should be regarded as unemployed or whether they should be seen as employed but with little job-security, probably with low incomes or with low productivity in subsistence-type activities.

2.2.2. Since late-1979 the Current Population Survey has been attempting to measure unemployment among African males and females, and later among the Coloured and Indian segments of the population. Using a strict definition (in particular that an unemployed person must 'work' less than 5 hours in the week before interview) it has shown African unemployment, on which I shall concentrate, as declining since 1977 and now showing some slight cyclical fluctuation in a range around 4.5 - 6.0% (for males), 13-15% (for females) and 7.3 - 8.5% (combined). There are also substantial regional differences, and differences between cities, towns and non-urban areas. This looks at first to be a very different world from that of the 40% 'peripheral sector'. But on reflection of course the C.P.S. definition would rule out all those actually working (for more than 5 hours a week) in those activities which are not recorded in the official enumeration of employment.

2.2.3. The issues then are (a) whether the C.P.S. is simply mistaken, and (b) if it is not, what the 'work' done by those not included in the formal employment statistics but counted as workers by the C.P.S. actually amounts to: what hours? what pay or productivity? what irregularity? is much of it simply the 'make-work' of people with no jobs in sight? There will be evidence on some of these questions at the Conference.

2.2.4. From my empirical vantage-point it appears that there is a good deal of variation: concentrations of purchasing-power make 'informal sector' incomes in Soweto and Pinetown higher than in Lower Roza outside Qumbu in the Transkei (see Terence Müll's paper No. 47) and they in turn are likely to be higher than those in more remote areas of the Transkei. There does appear to be for those with some sort of access to urban labour markets (and in Natal that applies to hundreds of thousands who are not formally living in urban areas) a surprising amount - at least for men - of temporary or casual paid work; and such work is not absent/...
absent in the peri-urban areas themselves. However as I report in another paper (No. 271) much work is of short duration, is unpaid and appears to be "fill-in".

2.2.5. However, we must remember we are talking about unemployment and labour absorption in relation to agriculture - and agriculture is the sector where real wages are currently lowest (although there is a good deal of variation, even within the same farming enterprise in the same area). The point I wish to make is that while it may be important from various points of view to insist that much 'informal sector' activity is arduous, uncertain and poorly paid it may under certain conditions be at least as good as certain types of farm and forestry employment. From this perspective there is more absorptive capacity in the economy at lower levels of remuneration and productivity than may at first seem to be the case. Having said which, in the context of this Conference, one has not necessarily eliminated the problem: but low incomes present in principle a different policy problem from unemployment.

2.3. Is mechanisation/technical change the main causal factor behind the reduction of farming employment?

Although there is obvious prima facie evidence that 'labour is being replaced by capital' in S. African commercial agriculture there have been other forces or influences at work, tending to reduce farm employment totals, and it is worth attempting to apportion responsibility between them if one is to consider changing fiscal and other policies in an attempt to change relative factor-prices: a policy approach which assumes that factor-substitution or technical innovation is the main influence. I am unable to mount adequate discussions of these questions here: pointing will have to do!

2.3.1. Government has set its face against certain forms of African presence on 'white farms', in particular the system of 'labour tenancy' which had survived particularly in parts of Natal, and has used legislative and administrative pressures to attack the system. Farm Labour Boards have also in some areas been used in an attempt to reduce African occupation of farms. We have here one facet of geopolitical policy in South Africa: the farming heartlands have not been seen as appropriate areas to encourage the presence, growth, economic development and human flourishing of a Black labour force.

2.3.2. It is clear that Black workers have moved off farms for the classic reasons. In some cases at least relocation in 'homelands' areas has facilitated access (or probable access) to urban employment. Ardington & Evans refer to the competitive/......
competitive environment in which the sugar industry recruits part of its able-bodied labour force of cane-cutters in the Transkei: relative wages are determinants of labour supply.

2.3.3. Slow output growth in recent years in some farming enterprises, especially those directed at export markets, has made a contribution to the reduction of employment - given that labour productivity has grown for a variety of reasons.

2.3.4. The number of farming units and the area in use have both contracted, the first far more drastically than the latter. Farm amalgamations are a substantial part of the story and 'consolidation' is involved; but there is also some tendency for farms in certain areas to be abandoned for reasons of drought, security, and other considerations causing farmers to move off the land. Whether the disappearance of employment which may transpire under these conditions is to be taken at face value is another matter.

2.3.5. The long-run ecological problems of farming in this country (raised at this Conference by amongst others J.McI. Daniel in Paper No. 144) of course threaten farm employment - among other things.

2.4. Do policies to 'increase the relative price of capital' and slow down the rate of absorption of 'modern' technology have associated costs not so far specified? These questions are beyond my reach at present: I note them for those who are interested.

2.4.1. While people with experience in the Working Group were certain that labour-saving decisions were actually promoted in business by negative real interest rates, there is a view that is concerned about the alleged growth-retarding effects of high interest rates. This issue was not thrashed out in the Group and so I insert it here rather lamely.

2.4.2. It seems to me that there may well be externalities involved in the application of latest vintage technology: fundamentally, new knowledge is 'carried' in capital goods and spread by their acquisition and use. In the rare case that a country may invent its own 'appropriate' technology it may make a virtue of technological autarky, but normally it simply runs the risk of losing its technically-oriented human capital.

3. It seems clear that for various reasons, not only connected with mechanisation and technical change, farms have been providing employment and incomes for less poor workers than they used to. While we must not underestimate the possibility that some part of this process is the classic one by which productivity and real wages rise on the land and in the non-farm sectors, there are enough serious/......
serious doubts about this to make it worth close attention whether South African society should not be investing more resources and working out new institutional arrangements in the commercial farming sector as well as in the 'homelands' rural areas which are more normally thought of when 'rural development' is discussed.
Footnotes


2. I do not think it will be useful in a short discussion paper such as this to plunge into the detail of conflicting sources nor to try to make distinctions between 'regular', 'casual', 'seasonal' and 'domestic' workers on farms. This latter set of distinctions may in fact be very important - but the coverage in the various time-series is uneven and confusing. The figures quoted in the text are from J.A. du Pisanie, 'Verwagte Regionale Verspreiding van Ekonomiese Aktiwiteite en Bevolking tot die jaar 2000', REFA No. 8, University of Pretoria, August 1981: quoted in F.P. Biggs, 'Aspects of Combining Capital and Labour in South Africa with Special Reference to the Modern Agricultural Sector', Bureau of Economic Research/Unit for Future Research, Stellenbosch, April 1982: p.5. The figures in the text refer to all who did some work on farms.


4. See for instance, Anthony R. Evans, 'Farm Labour in the Viljoenskroon District' (SALDRU Farm Labour Conference, (1976) Paper No. 40). Evans was in fact referring to the increase in farm real wages, and the reduction in the availability of casual labour. He thought this might lead to 'a switch to single cropping and weedicides' away from mixed cropping (including groundnuts and maize seed which are labour intensive) and hand-hoeing. Of such a switch he wrote: 'We have calculated that this would without difficulty reduce our present labour force by 2/3'. I return to the availability of labour at a later point.

5. I have not yet seen de Klerk's thesis or papers based on it and do not know how substantial the declines were.

6. F.P. Biggs, op.cit., p.10

7. The view expressed in 1.5 is my improvisation on what I understand of de Klerk's findings, but it may be somewhat inaccurate.


9. See a striking and very useful paper by A.J. Ardington and A.R. Evans, 'Employment in Market Agriculture', delivered to the Work for the Future Conference, Durban, 1980. (Ardington was then Chairman of the S.A. Cane Growers' Association, Durban).
10. Spies and Biggs, op.cit., p.23. See especially Table 2.12 which shows that on their calculations the long-term real rate of interest was negative in 6 of the 10 years 1971-1980 and less than 0.30% in 3 of the remaining 4 years.

11. F.P. Biggs, op.cit., p.37

12. Spies and Biggs, op.cit., pp. 24-29; entitled 'Institutional impediments to small business.'


14. This is the latest month for which I have been able to find industrial classifications in the CPS data.


16. The survey referred to was a pilot investigation carried out for me by Eugene van Vuuren throughout Natal in late 1979 and early 1980. Chairmen of Conservation Committees in each district were interviewed about their experience and about their impressions of other farmers' experience in their district. In addition to the technique-reversals in sugar (referred to in next paragraph of text), van Vuuren came across some evidence of reversion to hand-methods in timber-growing (by smaller growers - felling, de-branching), some evidence of labour-intensive enterprises being introduced because of increased labour-availability e.g. cotton, hybrid maize seed production, cash cropping. Some labour was also being taken up for general development work on farms. There were also opposite tendencies at work.

17. Ardington and Evans, op.cit., p.4. Also see Jane Nelson, 'A Survey on Technical Change and Employment in the South African Cane Industry', Dept. of Agricultural Economics, University of Natal, Pietermaritzburg, January 1983. The survey on which this was based was extended in July 1983. Use is made of Nelson's 1982 write-up in D. Budlender's paper No. 26 for this Conference.


20. This point emerged during the project of which Nelson's report forms part. The starkest illustration of the point is to be seen on some very large estates run by sugar-millers : where there is a diversity of topography the techniques in use range from the most capital-intensive to ox-drawn ploughs and hand-methods for planting, hoeing and fertilization.
21. R. Africa and I did work on technical change and employment in Western Cape agriculture in 1976 which remains unpublished: the complexity of the technical dimension to the issues made a formal report very difficult, but certain facts did emerge fairly clearly.

22. Note also in the sugar case the interesting phenomenon of the emergence of small-scale Black sugar-producers, now plugged in to the main industry physical, financial and marketing systems. There is no doubt that employment of various kinds has expanded in some of these areas. One would expect higher labour-intensiveness within this context.


26. My source for this is memory: I connect it with a remark by P.J. van der Merwe during a Workshop on Unemployment. However Johan Maree in 'Farm Labour in the Dealsville District, O.F.S.', SALDRU Farm Labour Conference (1976) Paper No. 47, reported that the regulations laid down by the local Bantu Labour Control Board concerning the maximum number of labourers a farmer might employ were 'very generous'. He interpreted them in terms of 'flush(ing) out unemployed adults on farms in the district'. (p.10)

27. Source as in footnote 9: p.5.
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