PREMATURE DE-AGRICULTURISATION AND ITS CONSEQUENCES: RURAL DEPENDENCY AMONG AFRICAN HOUSEHOLDS IN LIMPOPO PROVINCE, SOUTH AFRICA.

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1: Premature de-agriculturisation and rural dependency: a twin-track approach

Broadly, as development proceeds, the shares of output and workforce in agriculture fall, and, within agriculture, more capital-intensive methods on larger farms come to predominate.[1] However, some developing countries feature *low agricultural salience*, in that the agricultural workforce share (and/or GDP share) falls well below the level expected at their PPP-GNP per person.[2] Many factors might account for this, such as oil, other minerals, arid climate, or other sources of non-agricultural comparative advantage – some, perhaps, harbingers of development. Here, we argue that another cause of low agricultural salience, especially in countries with great farm inequality, is *premature de-agriculturisation* (PDA), often due to the concentration of cropland into large, capital-intensive farms. This concentration usually results from a history of forced land alienation or clearances, often associated with unequal access to the capital or inputs required to develop farmland. Unless redressed, it may durably damage rural livelihoods.

We explore this with a twin-track approach. Cross-national regressions (Section 2) provide initial evidence of PDA linked to farm inequality. Recent survey evidence (Section 3) in a clear-cut case of PDA, South Africa, explores its impact on rural livelihoods, and identifies an outcome harmful to growth and welfare: *rural dependency*, meaning a rural sector unable to support itself without substantial net income transfers from urban areas.

Section 2 shows that, across countries, PPP-GNP per person helps to predict agriculture's share in workforce and GDP, but that identifiable groups of countries with below-predicted *workforce* shares have histories and/or geographies liable to generate PDA. This happens in part via high Ginis of land distribution (for various reasons[3]) that retard agricultural development by concentrating much land, in countries still facing labour surpluses and capital constraints, into inappropriately[4] large units with high capital/labour and land/labour ratios. Both workforce PDA and high land Ginis are concentrated in Latin America, South Africa, and parts of the former Soviet bloc:

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[1] (a) Exceptionally, agriculture may be *less* labour-intensive than other sectors in some highly developed economies with large farms. (b) However, the generally higher labour-intensity of agriculture (and small farming) applies even more strongly if formal, high-cost human capital is valued as well as physical capital. (c) Greater labour-intensity is often reflected in choice of products, not just of techniques of growing a given product. (d) Cheaper labour, relative to capital, in low-income countries and on smaller farms is also reflected in the fact that their capital is more 'labouresque', i.e. produced, maintained and used with higher labour/capital ratios [Sen 1968].

[2] Per-person real resource flows are here measured as gross *national* product at 1993 purchasing-power parity. Agriculture's output share is its value added (gross of depreciation) as a share of gross *domestic* product.

[3] Historical (large inequalities as traditionally-farmed land was seized and improved for large plantation-style agriculture under Iberian colonisation or apartheid, or State or collective farming in some Communist countries) and/or geographical (huge grazing farms on low-quality land, far away from small arable farms on better land).

[4] Apart from evidence that 'large is labour-extensive and inefficient' in *agriculture* in labour-surplus countries [Binswanger, Deininger and Feder 1995; Lipton 1993], there are hints that *aggregate* economic growth is reduced by land inequality - perhaps by shifting land to large farms, with (for such countries) 'inappropriately' high capital/labour ratios in a consequently high-cost, shrinkage-prone agriculture. For developing countries, substantially and significantly slower growth of PPP-GDP per person is 'predicted' by higher farmland Ginis [Deininger and Olinto 2000; Tyler and el-Ghonemy 1993], and also by high *income* inequality [Barro 2000], itself partly determined by land inequality [de Janvry and Sadoulet 2000].

i.e. where most smallholdings - plus upgraded farm inputs - were alienated to very large farms. Low *output* shares for agriculture cannot so readily be aligned with high land Ginis or meaningful country groupings as can low *workforce* shares. However, agriculture in South Africa has substantially (and significantly) lower shares than predicted of both GDP and workforce given GDP. So there are two downward pressures on workforce and income for South Africa's rural poor in the labour-surplus former 'homelands' areas: a squeeze both on the normally labour-intensive farm sector, and on labour-intensity even within that squeezed sector.

Section 3 reviews a rural survey of Limpopo Province, South Africa [Kirsten et al. 2002] to explore the income sources, assets, and workforce structures associated with PDA. This study was part of an EU-supported comparative study of three drylands areas,[5] so we compare some Limpopo results with analogous data from Rajasthan, India [Sagar 2002], which has not experienced PDA; India shows no signs of being an outlier in the cross-national regressions. We also compare results within Limpopo among regions, and households, with differing degrees of reliance on local earnings, especially farming. In Limpopo, only 39 percent of households (as against 88 percent in Rajasthan) derive over half of their income from local earnings, while 59 percent derive over half from external sources: 32 percent from migrant remittances and 27 percent from pension incomes. In Limpopo, in each case the proportion of income derived from the named source averages over 78 percent; in the households reliant on external incomes over 90 percent of working-age male residents are unemployed, as against about 40 percent in the households reliant on local incomes. PDA in Limpopo has meant rural African livelihoods characterised by low salience of agriculture, high unemployment, widespread poverty and rural dependency - all significantly mitigated in West region, where land and livestock are more widespread.

In Limpopo, the land Gini is 0.93 (Annex 1), higher than almost any estimate worldwide [IFAD 2001: 117-9]. In South Africa as a whole, 15 percent of farmland is divided among mainly African farm operators (mostly part-time), about a million of them, leaving 85 percent of land with some 60,000 white commercial farmers outside the surveyed (smallholding) areas [NDA 2001; Department of Land Affairs, 2002].[6] In these areas, most rural households rely for over 90 percent of income on sources other than own-account farming. Little of this 'over 90 percent' comprises local farm employment, or rural non-farm sector (RNFS) activity.

Why is Limpopo's shrunk farm income and employment linked, not to high non-farm factor income in a development transition, but to rural dependency? First, local non-farm demand growth [Hazell and Ramasamy 1991] and labour hire are normally diminished by unequal, capital-intensive farming. Second, the early shrinkage of agriculture and the large-farm, capital-intensive thrust in many countries with high PDA - in Latin America and parts of the former Soviet bloc, as well as in the Limpopo study - cut the proportion of rural people in seasonal farmwork, and thus seeking off-

[5] This paper derives from EU-supported research on the impact - on fertility, migration, and thus and otherwise agro-environmental sustainability - of land and asset size and distribution in selected rural drylands of Limpopo province (S Africa), Rajasthan (India), and Botswana [at www.sussex.ac.uk/Units/PRU/demography.html]. The focus of the project differs from that of this paper, so that some data desirable for this paper are absent or sketchy.

[6] About 2 percent of land in large White-owned farms in 1994 had been redistributed up to the end of 2001, only about a twentieth of it through DLA projects and the rest through private transactions.

season, often local, employment in RNFS. Third, PDA reduces the role of agroclimatic income risk, easing the pressure on rural households to seek a divers-ified, risk-diffusing RNFS 'portfolio' of income-generating options. Hence PDA in Limpopo is unlike the mature, successful de-agriculturisation that characterised much of Asia (including to some extent the Rajasthan survey area), in which initial smallholder productivity growth induced subsequent growth as rural households diversified into non-farm activity [Byrd et al. 1990; Hazell and Ramasamy 1991]. In Limpopo, instead, PDA generates rural dependency, with large rural groups surviving not by local production but by 'specialising' in receiving migrant remittances or, where available, other transfers such as pensions. Recent sharp falls in agricultural employment suggest that rural dependency, although a long-run effect of land distributions associated with apartheid, may have intensified since its demise.[7]

Section 4 discusses some possible policy implications for PDA countries such as South Africa. What policies for land reform, water, agricultural research, infrastructure, RNFS development, or the macro-economy are appropriate to cut unemployment, poverty, and rural dependency in, say, African areas of rural Limpopo? This paper (even with international comparisons) cannot hope to prove which, among such policies, are cost-effective; but it can indicate that some are non-starters, and that others are worth analysing further.

2. Agriculture and smallholdings: initial conditions, rural development paths and international evidence of PDA

In this section we use cross-national regressions to investigate the following hypotheses:

(a) the output share of agriculture in GDP is inversely related to PPP-GNP per capita
(b) the share of agriculture in the total workforce is inversely related to GNP per capita
(c) high land inequality depresses the output share of agriculture
(d) high land inequality depresses the workforce share of agriculture.

Before presenting the regressions, we review some theory underlying such regularities. This review needs to explain why – though regularities (a), (b) and (d) are supported by the cross-national regressions – there is, at best, very weak evidence for regularity (c).

A number of simple theoretical structures could generate empirical regularities (a) and (b). Either a standard 2x2 Heckscher-Ohlin model or a two-good specific-factors model (e.g. Krugman and Obstfeld, 2003 ch.3), with countries identical in either case except for exogenous differences in factor endowments, would suffice. In the specific-factors framework, with manufactures produced by capital and labour and food by land and labour, it would be necessary to suppose that it was cross-country variations in capital per head rather than land per head that mattered (or else it would be that land-rich countries had both high GNP/head and *high* output and workforce shares in agriculture).[8]

[7] Total paid *farm* employment fell only slowly in 1985-93 (from 1.32m to 1.14m). However, from 1994 to 2001, total employment in *agriculture, fisheries and forestry* - including self-employment - dropped by some 66 percent. [Vink and Kirsten 1999].

[8] A specific-factors model, with agricultural capital unimportant, becomes less plausible as development proceeds. But both theory and empirics show that a H-O model, to explain agriculture's share in trade

Regularities (c) and (d) will not arise in a simple constant-returns-to-scale, perfect-competition world, since in such a world farm size is indeterminate and variations in the distribution of farm sizes have no effects. If constant returns do not apply, but transactions in free markets for *either* land (sales or rentals) *or* farm labour and supervision are costless, then there may be an optimal (unit-cost-minimising) *operated* land size, dependent on relative factor prices. That size could be reached despite any initial degree of *owned* land inequality; but in fact severe imperfections and transactions costs in both land and labour markets greatly limit land rentals and sales, and raise the costs of agricultural labour hire as farm scale rises. Such agency costs mean that the equilibrium distribution of operated land may be substantially determined by the distribution of owned land - itself much influenced by historical factors, mediated by legal or spatial (fn. 3) constraints on land transfer.

For the extreme case of exogenous land distribution, we can then ask how changes in land inequality will affect agriculture's workforce and output shares. Rather than formalising this fully, we consider the consequences of an equalizing land transfer: for non-intersecting Lorenz curves, any reduction in land inequality can be represented as a sequence of such transfers.[9] The simple algebra of the (partial equilibrium) effect of such a transfer on labour demand and output supply in agriculture is as follows: we consider labour, but the formulae apply equally to output. Denote land by N and labour by L and the average and marginal labour-land ratios by A(N) and M(N). Then $M(N) = A(N) + N.A'(N)$. A small equalizing land transfer from a farm of size N_1 to a smaller one of size N_0 raises labour if and only if:

$$M(N_0) - M(N_1) = \{A(N_0) - A(N_1)\} + N_0.A'(N_0) - N_1.A'(N_1) > 0$$

Suppose that A'(N) is negative. Then the term in braces is *positive*: it is the increased employment on the *transferred* land. The second term, $N_0.A'(N_0)$, which is *negative*, arises from the fall in labour-intensity on the smaller farm as a result of its enlargement; the third term, $-N_1.A'(N_1)$, which is *positive*, results from the rise in labour-intensity on the larger farm as a result of its shrinkage. Even if A'(N) is negative, then, we cannot be sure that an equalizing land transfer will raise labour demand. If A"(N) were sufficiently positive labour demand would fall. We cannot exclude this possibility in general, since the graph of A(N) against N must *eventually* flatten out, implying some positive curvature, which *may* make M'(N) positive for some range(s) of N. Nevertheless, for a given equalizing redistribution, and in the absence of information or prior presumption concerning A"(N),[10] the bigger the gap in the labour-land ratio between the 'receiving' and 'giving' farms, the more likely it is that labour will rise. Similarly, if land productivity falls as farm size increases, the bigger the gap in land productivity between the 'receiving' and 'giving' farms, the more likely it is that output will rise.

What is known about differences, among farms of different sizes, in labour-land ratio and land productivity in developing countries? Agency costs play an important role. Small farms have lower unit transactions-costs of labour search, supervision and

(let alone workforce or GDP), requires four factors (land, labour, capital, education) [Leamer 1984, Lal and Myint 1996, Wood 1994].

[9] Proved in Sen 1972.

[10] Published empirical work on labour-land ratios and land productivity tends to report grouped data on averages, so that only very rough estimates of such quantities can be extracted.

screening, but higher transactions costs (and lower access to sources of risk diffusion) in acquiring and managing physical capital and new technology. Therefore, where the share of capital in farm production is small, the land-labour ratio is an increasing function of farm size, making land productivity higher on small farms. If the share of capital in farm output is significant, both capital-labour and capital-land ratios increase with scale. This, in principle, could make land productivity either higher or lower on smaller farms, but in developing countries the effect of smaller farms' lower labour-linked transactions-costs appears to dominate: many studies suggest substantial declines of land productivity with farm size[11]. The labour-land ratio also declines substantially with farm size, and this fall is *necessarily* sharper than the fall in land productivity, since labour productivity increases with farm size.[12] We now give some examples of the micro evidence, both on links from farm size to the labour-land ratio and land productivity and on simulated effects of specific redistributions.

On labour-land ratios, in Pakistan in 1972 farms above 60.7 ha engaged 0.12 workers per hectare and farms of 20.2-60.7 ha 0.22 w/ha – whereas farms below 0.4 ha engaged 9.15 workers per hectare, and farms of 0.4-1.0 ha 3.32 w/ha.;[13] data for Bangladesh, Thailand, Indonesia and India were comparable [Booth and Sundrum 1984: 100-109]. In the same study simulations were used to show that completely egalitarian redistribution would raise labour demand and use: by only 8.6 per cent in Java, but by 19-24 per cent in the Outer Islands of Indonesia, Bangladesh, Pakistan and Thailand [Booth and Sundrum 1984: 279-80]. In another study, a plausible model of partial land redistribution on Brazil's estate sub-sector raised person-year equivalents of labour use in agriculture from 2.6 to 3.0 million over the 1978 base case [Kutcher and Scandizzo 1981: 201]. This confirms the finding of Berry and Cline [1979: 58] that labour use 'could be expected to rise as the result of measures that redistributed land from the large-farm sector into smaller family farms'. [14] World Bank evidence from the 1970s showed 'employment per hectare higher .. in those countries that have .. more equal distribution of land ownership' [ibid: 37].

On land productivity, the sources cited above (and many others quoted there), together with Binswanger et al. [1995], provide just as large a balance of evidence that this falls with increasing farm size as farm labour input rises, although – as noted earlier – the fall is less sharp.[15] However, Booth [2002: 185], citing 'post-Green-Revolution' evidence from Indonesia, shows farm income per hectare falling from Rp K 718 for holdings below 0.1 ha, 162 at 0.1-0.24 ha, and 102 at 0.25-0.49 ha to Rp K 31 at 2.5-

[11] These are sketched below. Major reviews include Berry and Cline [1979], Binswanger et al. [1995], Booth and Sundrum [1984], Ishikawa [1978], Kutcher and Scandizzo [1981] and Lipton [1993, 1997]. We have omitted the complication of non-constant returns to scale. If anything, there appear to be mildly decreasing returns to scale in developing-country agriculture [Binswanger et al 1995; Binswanger and Rosenzweig 1993; Lipton 1993; van Zyl et al 1996]. This would strengthen the negative effect of farm size on farm workforce via rising land/labour ratios. On the objection that smaller farms have difficulty in meeting export and supermarket standards, see sec. 4

[12] The elasticity of labour/land to farm size equals the elasticity of output/land to farm size minus the elasticity of output/labour to farm size.

[13] For other size-groups w/ha were: 1-2ha, 1.72; 2-3ha, 1.12; 3-5.1ha, 0.82; 5.1-10.1ha, 0.52; and 10.1-20.2ha, 0.32 w/ha [Booth and Sundrum 1984: 101].

[14] If the shift is from bigger farms *to the landless*, the farmland Gini will not necessarily fall (though in practice it is likely), but a rise in labour use in agriculture (given the above fact) *is* logically necessary.

[15] If land productivity *and* labour productivity rise with scale, then (unless effects via capital productivity are important and offsetting) land division is technically inefficient; on the evidence in developing countries, productivity of land falls and that of labour rises [Binswanger et al. 1995].

3ha, 28 at 3-3.5 ha, 27 at 3.5-4.5 ha, and Rp K 23 on farms larger than 4.5 ha. Much of this gap is because 'smaller holdings often contain better quality land' [ibid.]: the extent to which this reduces output gains from redistribution depends on whether such land quality differences are exogenous.[16] Such gains are implied by the persistence of part of the gap even between holdings on land of similar region, type or quality [Binswanger 1995; Lipton 1993; Berry and Cline 1979]. Nevertheless, as farm size rises, the decline in output-per-hectare is not so marked, clear or universal as in labour-per-hectare (see fn. 14), and output effects of land redistribution might be further offset by the slower uptake of innovations by small than by medium-sized farms.

To sum up, the balance of the evidence in developing countries is that greater land inequality is expected to be associated with falls in both output supply and labour demand in agriculture. The step from lower labour demand in agriculture to a lower *share* of workforce there is unproblematic. For output, however, lower farm size might affect non-agricultural output, complicating any conclusion about the effect of greater land inequality on the agricultural output share. Very unequal farmland might well, by stimulating capital-intensity in farming and thus attracting capital into agriculture, reduce capital available to support non-farm output or its growth, making the effect on the agricultural output *share* of GDP indeterminate.[17] Further, there is evidence that farmland inequality, as well as other forms of inequality, may retard economic growth in poor countries [see above, fn. 4]; if so, that could as well affect non-farm as farm output, again making for an indeterminate impact of equality on the farm *share* of output. Among the mechanisms proposed to explain this growth retardation are that inequality raises the cost of physical and human capital-market entry to those without collateral [Birdsall et al. 1995] or shifts society from achievement to ascription as unequal asset inheritance makes education, enterprise and jobs more 'secure' against mass competition [Lipton 1995]. If, as seems possible, such mechanisms will weigh particularly heavily on activities intensive in the use of physical and human capital, then over time any link from inequality to a raised agricultural output share will tend to be offset. All this may largely explain why, although (d) is strongly supported by the cross-country regressions reported below, (c) is not.

Our hypotheses, and the discussion above, have emphasized the effects of land inequality without paying attention to mean farm size. That would be trivially justifiable in the analysis of a single country, if it could be assumed that redistribution would not change the total number of holdings, but for cross-country analysis more care is needed. To anticipate, we find in all our analysis that the land Gini drives out farm size as an explanatory variable. Why? Large mean farm size is found in countries with greater land abundance, which as such normally *increases* farm workforce and output; yet given land abundance larger farm size, e.g. due to land clearances, *reduces* workforce and output per hectare. The balance of effects on agriculture's share in total workforce and output looks indeterminate. By regressing agricultural output and workforce shares on the land Gini (rather than on mean farm size), we may capture those aspects of farm size that result from choices - to which can therefore be attributed

[16] Land quality may be greater because smaller farms, having lower transaction costs of labour, raise land quality, e.g. by extra maintenance or 'labouresque' investment activity (e.g. terracing,, drainage). [Sen 1968].

[17] By symmetry, the release of labour from agriculture might raise non-agricultural output by lowering wages. Such effects may be assumed to be small in labour-surplus economies.

'responsibility' for higher or lower labour or land per hectare - rather than from land abundance.[18]

We now explore the correlates of cross-national variation in shares of agriculture in workforce and GDP. We use data on all the countries for which data are available[19], but we control for variations in country size by weighting the observations by the square root of total workforce.[20] To investigate the associations with land inequality we use farmland Gini coefficients and mean farm size for the 44 countries with such data, but also try dummy variables for Latin America, the former Soviet bloc, and South Africa, where past policies to shift agriculture into large farms have led to high inequality and the use of capital-intensive production methods. In the equation for the workforce share of agriculture, we include its output share as a control, to allow for omitted factors affecting the output share and thus the workforce share.

Our findings are summarized in table 1, in which only our preferred regressions (i.e. those that have survived the elimination of grossly insignificant regressors) are reported. As regards the output share of agriculture (hypotheses (a) and (c)), we find a strong association with GNP per capita (equation 1). A 10 percent rise in GNP per capita is associated with a fall in the agricultural output share of about 1.2 percent of GDP, supporting hypothesis (a). However, neither the Gini coefficient of operated land, nor the Latin American and transitional dummies have any impact, so hypothesis (c) is not supported.[21] Nor does mean farm size have any impact. PDA *might* have lowered the agricultural output share not only because of the possible scale effects on land productivity noted earlier, but also because 'artificially' large scale (due to imposed land inequality) might be associated with either inefficient production methods or with urban bias (unequal land may be just one manifestation of urban bias, see Lipton 1977). However these ideas do not find *general* support in our data. Nevertheless, South Africa is a significant outlier, as represented by the coefficient on the dummy in equation 1: in the absence of the dummy, the fitted share of agriculture in GDP for SA is 7.1 percent, as compared with the actual share of 3.3 percent.

Table 1: National output and workforce shares in agriculture

[18] However, this goal is partly thwarted by the strong curvilinear relationship (see below) between land Ginis and mean farm size, and hence probably land abundance.

[19] The data cover all transitional (former Soviet Union plus transitional countries in Eastern Europe only) and developing countries listed in FAOSTAT, our source for numbers of agricultural and non-agricultural economic actives in 2000. Regressions (1) and (2) were done for 105 countries with all data except farmland Ginis, and (3) for 44 with all data. Latest available (1999) data for per-person dollar GNP, made roughly comparable by measurement at PPP of 1993, are from World Bank sources. So is agriculture's percentage GDP share, available only as an integer, averaged for 1999, 2000 and 2001 (to reduce impact of climatic fluctuations on farm output). Ginis of operated farmland are mostly from the latest available FAO Agricultural Census, but vary in source, and date (from 1961 to 1998). This variation, the approximation of agriculture's GDP share and much else, the extreme roughness of PPP conversions, and conceptual and definitional problems around 'agricultural workforce' are among major sources of noise.

[20] If countries may be viewed as aggregates of independent regions, then the error variance will decrease with country size, indicating that an initial heteroscedasticity correction of this kind is desirable [Blanchet 1988].

[21] We were concerned that these results might have been distorted by cross-country variation in the share of extractive industry in non-agricultural GDP, but this variable was found to have no statistical significance when included in our equations for agricultural output and workforce shares.

Regression no.	1	2	3	4
Dep. Var: Ag share of	GDP	workforce	workforce	workforce
AgshGDP		0.47(1.72)*	0.34(2.33)**	0.46(1.65)
LnGNP/cap	-11.98(-12.13)***	-16.54(-4.05)***	-11.98(-4.25)***	-16.26(-3.87)***
Landgini		-45.61(-6.54)***		-43.25(-4.58)***
SAdum	-3.81(-4.18)***		-23.19(-3.89)***	
LAdum			-18.95(-3.72)***	-1.98(-0.38)
TRANSdum			-26.65(-5.76)***	
Constant	115.22(13.99)***	197.06(5.23)***	139.77(6.11)***	194.09(4.99)***
Nobs	105	44	105	44
R-squared	0.65	0.83	0.74	0.83

Notes:
(1) All equations estimated by weighted OLS using square roots of workforce as weights;
(2) All equations pass Ramsey RESET test easily;
(3) Heteroscedasticity corrected S.E.s in eqns 1 and 3 only, on the basis of the Cook-Weisberg test;
(4) *=sig 10 percent, **=sig 5 percent, ***=sig 1 percent

Turning to the share of agriculture in total workforce, our results are summarised in equations 2 and 3, where both hypotheses (b) and (d) are supported. In equation 2 we estimate that a rise of 10 percent in GNP/capita lowers agriculture's workforce share by 1.7 percent of total workforce, and a 1 percent rise in the Gini of operated land lowers it by 0.46 percent. In equation 3 we use blunt instruments - dummy variables - in place of the land Gini, to allow us to include many more countries. The estimated effect of higher GNP/capita on the agricultural workforce share is somewhat smaller than in equation 2 (at 1.2 percent), and there are large effects from our land inequality proxies – in the range 19-27 percent for the Latin American and Transitional groupings, and for South Africa. Since we do not have land Ginis for the Transitional group or for South Africa, we can only compare the dummy variable and land Gini explanations for Latin America. As shown in equation 4, the result is conclusive: it is land inequality rather than 'Latin Americanness' that accounts for the low agricultural workforce share there. The weighted mean of the land Gini for the 17 Latin American countries in our sample is 0.83, compared with 0.51 in the other 31 countries,[22] so the estimated average effect of land inequality in Latin American countries, using equation 2, is to lower the agricultural workforce share by 14.6 percent (the dummy variable regression suggests a somewhat larger effect). We have controlled for the output share of agriculture in each equation, but in our preferred equation 2 it is barely significant (p=0.094).

When mean farm size is added to the reported equations, it is insignificant in every case. This is perhaps not surprising, for reasons discussed earlier. However, the land Gini and mean farm size are highly (nonlinearly) correlated - the sample rank correlation is 0.71- so to some extent the superior statistical performance of the Gini may be an artifact of the linearity of our estimating equations.

[22] The unweighted means are 0.82 and 0.56.

Table 1 links low workforce shares of agriculture in low- and middle-income countries with high farmland Ginis (cols. 2 and 4), and with groups of countries that concentrated land in large farms (col. 3). Where such concentration precedes the economic signal of rising labour costs,[23] it exemplifies PDA. However, high land inequality is not the only likely cause of PDA in the sense of 'artificially' or 'prematurely' low agricultural shares of workforce (or output). PDA in any country is likely to reflect the intensity of several linked phenomena common in developing countries, especially sub-Saharan Africa, but not readily summarised in a single indicator: differentiated protection of industry, foreign-exchange policy biased against tradables [Krueger et al. 1991], industrial subsidy or agricultural tax, selectively anti-rural public policies (on tax, public expenditure, or assignment of State-employed personnel), or privately induced non-competitive or coercive practices damaging to agriculture. These manifestations of 'urban bias' [Lipton 1977, 1984] are probably associated with high farmland inequality, helping to explain the high betas on the land Ginis and dummies in Table 1. Urban interest groups - most powerful where urban bias is greatest - benefit from an unequal agriculture, and from supporting and stabilising large farms against the rural poor. Big farms are likelier than more equal smallholdings to provide, for urban use and inexpensively, marketed surpluses of product, savings surpluses for investment, and migrant 'surplus' labour (because labour/land ratios are below those on small farms). Overall, the link between 'urban bias' and PDA, of workforce or output, remains to be explored. We confine ourselves to workforce PDA manifested as premature concentration of land into large farms, and now turn to its impact in Limpopo, South Africa, on livelihoods and dependency among rural people thus deprived of farm resources.

3. An analytical anatomy of rural African livelihoods in Limpopo province

3.1 The household sample and the survey area

The historical legacy and racial composition of South Africa were reflected in the sample design. The socio-economic characteristics of the former 'homeland' areas of South Africa are quite different from those of other areas: this study focuses only on the (exclusively African) households in the former Lebowa homeland areas of Limpopo Province.

Twenty four villages were randomly selected from the list of villages in four magisterial districts (obtained from the list of villages surveyed during the 1996 census) [Statistics South Africa, 2000]. 585 randomly selected households were interviewed in the 24 villages,[24] containing 4,338 persons, 5.2 percent of the villages' population. These villages are largely isolated and remote, with low levels of development. Despite lacking basic infrastructure (good roads, electricity, water), most villages have experienced some improvement during the past 5 years through targeted government investment in such infrastructure. Respondents were interviewed with a structured questionnaire on amounts of land or other assets, migration and fertility behavior.

[23] These induce larger farms even without PDA; for transaction-cost reasons, they tend to replace labour by capital, and to cut labour/land ratios.

[24] The proportion of households selected differed across villages. Unless otherwise stated, the statistics presented later have been calculated using weights inversely proportional to the probability of a given household having been selected.

For some purposes the villages are clustered into three 'regions': West, South and Central. 'West' comprises areas to the west of the provincial capital, Polokwane (Pietersburg), in the former Lebowa districts of Mokerong (which includes Phalala; see section 3.4). The region - African-farmed and White-farmed areas alike - is relatively dry, with extensive livestock production the dominant farming activity, although some dryland maize and other crops are produced, in White farms under irrigation (boreholes). White-owned farms include game and beef ranches and large-scale potato producers, so there is substantial African employment on white commercial farms in some areas. 'Central' comprises the former Lebowa districts of Mankweng, Sekgosese, Seshego, and Bochum. Although the northern areas of this region are livestock-producing, by contrast Mankweng district, lying south east of Pholokwane, is predominantly maize-producing. 'South' comprises the former Lebowa districts of Zebediela, Sekhukhune, Nebo, and Thabamoopo. Farming in this region south of Polokwane is dominated by unproductive and variable dryland maize and sorghum.

3.2 Incomes, assets and unemployment at all-sample level

In this section we provide empirical support for the main theses of the paper, by demonstrating the special structure of rural African livelihoods, especially the low salience of agriculture, and rural dependency with household-level 'specialisation' by income-source, as described below. We use data from a comparable survey in dryland areas of Rajasthan [Sagar 2002] to illustrate a more typical profile.

Table 2 gives income and asset statistics, disaggregated by poverty and landholding status, for the Limpopo and Rajasthan surveys.[25] The disparity in the shares of income from different sources is striking. We divide income into wages, farm income, pensions and remittances, treating the first two of these as income from 'local' factors and the other two from 'external' factors; we also subdivide wages by sector. In rural Rajasthan,[26] 83 percent of income is local, with pensions and remittances playing, on average, a minor role; in Limpopo[27] only 44 percent of income is local. The big difference is in own-farm income: 38 percent in Rajasthan and only 4 percent in Limpopo.

[25] Comparing the areas covered by the two samples, and using PPP exchange rates, income per adult equivalent is some 50 percent higher in the Limpopo area than in the Rajasthan area, and – with respect to the official rural poverty line in Rajasthan – household poverty incidences are respectively about 20 percent and 29 percent.

[26] Henceforth we omit the qualifiers; our surveys are restricted to rural dryland areas in both cases and additionally to former homeland areas in the Limpopo case.

[27] Our 'income' measure is somewhat imperfect. We estimate production for own-consumption using household reports of the fraction of needs so met (details available from authors). Farm income is defined as production for own-consumption plus sales, an overestimate inasmuch as purchases of inputs were unavailable to us and so had to be ignored.

Table 2: Assets, income, landedness and poverty: whole sample.

	hhinc	aeqinc	wages % of hhinc	o/w local*	pens % of hhinc	farm % of hhinc	remit % of hhinc	hhwea	aeqwea	land % of wealth	smallstock % of wealth	largestock % of wealth	dwellings % of wealth	hhassts % of wealth	fmassts % of wealth
Limpopo															
total	19504	5487	39.1	(24.6)	17.8	4.3	38.8	53902	15214	4.6	3.3	11.0	63.8	13.8	3.4
landed (57%)	19572	5287	30.8		20.9	6.8	41.6	61842	16276	7.0	4.3	16.0	56.6	10.8	5.2
landless (43%)	19454	5753	50.2		13.7	1.0	35.2	43318	13799	0.0	1.5	1.6	77.6	19.3	0.0
nonpoor (80%)	23263	6641	39.2		16.5	3.9	40.5	58601	17092	4.0	3.1	12.2	62.0	14.7	3.9
poor (20%)	4672	935	37.8		42.9	12.4	6.8	35360	7805	8.5	4.6	3.3	75.8	7.7	0.1
Rajasthan															
total	42792	11083	44.8	(44.8)	4.0	38.4	12.8	300200	77724	64.2	3.3	2.1	25.4	1.3	3.7
landed (93%)	43903	11234	43.7		3.7	39.8	12.8	318678	82251	64.9	3.3	2.1	24.8	1.3	3.7
landless (7%)	27525	9004	67.9		10.0	9.0	13.1	46181	15491	0.0	9.1	4.2	83.1	2.9	0.8
nonpoor (71%)	54456	14064	45.7		4.3	36.2	13.9	336307	86249	64.0	3.5	2.0	25.7	1.4	3.4
poor (29%)	14471	3843	36.8		1.5	58.7	3.0	212527	57024	65.0	2.8	2.4	24.0	1.0	4.7

* Local wages are defined as total wages less civil service wages

Notes:

(a) All estimates are weighted means, with weights inversely proportional to selection probabilities;

(b) 'hhinc' is income per household; 'aeqinc' is income per resident adult equivalent: the no of aes per household is defined as (adults plus 0.5*children)^0.5; 'remit' is remittance income in goods and cash; 'pens' is pensions; 'farm' is sales of agricultural produce plus estimated production for own-consumption; 'hhwea' and 'aeqwea' are wealth per household and per adult equivalent; 'hhassts' are household assets; 'fmassts' are inanimate farm assets.

(c) asset valuations are those provided by respondents, except for livestock (valued at prevailing market prices) and land in Limpopo (valued at 1500 Rand/ha).

Agricultural wages[28] account for a further 3 percent in Rajasthan and 4 percent in Limpopo,[29] so local agriculture accounts for 41 percent and 8 percent of income respectively, though the low Limpopo figure hides sharp regional differences (Section 3.4). Further, the similar shares of wages, and of non-agricultural wages, conceal an important sectoral disparity between the roles of the rural non-farm sector. In Rajasthan, of the 45 percent of income from wages, none derives from civil service employment; in Limpopo the wages share is 39 percent, over a third of which (14 percent of all income) is so derived. This suggests that the low salience of agriculture in Limpopo is accompanied by relative weakness in the rural nonfarm (RNF) sector; this is confirmed by greater RNF activity in the less 'de-agriculturised' West region.

A weak RNF sector, in a country or region with agricultural workforce or output shares well below the values predicted from mean PPP-GNP, is a sign of PDA.[30] Transition from agricultural growth to 'mature' de-agriculturisation normally involves early RNF growth. This is faster and more labour-intensive after, or in the late stages of, rapid and widely shared growth of local small-farm income. Substantial *initial* growth of extra rural income usually originates mainly in agriculture. To the extent that such income goes to smaller farmers and/or farmworkers,[31] it is likelier to be spent on local, labour-intensive RNF products [Mellor 1976]. This model, of linkages from small-scale farm growth to local RNF growth, is supported by many micro-studies [Bell et al. 1982, Hazell and Roell 1983, Harriss 1987, Hazell and Ramasamy 1991] and by national surveys of rapid rural development in China [Byrd et al. 1990] and of 'proto-industrialisation' in fifteenth-century Flanders and elsewhere [Kriedte et al 1981; Ogilvie et al 1996]. Three sorts of linkage have been measured from agricultural growth: backward, to extra production and employment in input sectors; forward, to processing and other value-adding for crop or animal products; and via consumption, as smallholders and farmworkers spend extra income locally. Usually, consumption linkages, especially to services (construction, transport, retail), are the most important for local output and income. PDA is suggested in Limpopo by apparently small RNF income, linked to low own-farm output and employment - especially as RNF income appears to loom larger in the agriculturally most active West region, and much larger in the Indian survey. Where RNF *and* own-farm output and employment are very low, high rural dependency is needed to survive.

The minor role in livelihoods of own-farm output is underscored for Limpopo by a comparison of landless and landed households.[32] We see in table 2 that, though an estimated 43 percent of Limpopo households are landless, these average no less

[28]This risks double-counting to the extent that smallholders earn wages on each others' farms (rather than on large commercial farms, as is the case to an unknown extent in the Limpopo sample), so the totals given are likely to be overestimates.

[29] Local agricultural wages are 11 percent of total (local) wages, which are 39 percent of total income (Table 2). Employment in agriculture, including self-employment, is only 22 percent of all rural employment in the Limpopo survey (about 44 percent in the Rajasthan survey). The employment numbers, estimated from individuals who reported a sector of work, must be treated with caution, some individuals may have failed to report a sector of work, even though they in fact work on their own land.

[30] Rather than of, say, strong comparative advantage in a non-farm sector, or other possible causes of below-'predicted' agricultural shares of GDP or workforce.

[31] Not only self-employment, but even *hired* employment, per hectare usually rises as farm size falls [Lipton 1993].

[32] Access to common grazing land is not taken into account in our measure of landholding. However, absence of cropland is strongly associated with lack of livestock, and therefore with lack of benefits from common grazing.

income than the landed:[33] in Rajasthan, where only 7 percent are landless, they average 37 percent less. The low salience of land ownership in Limpopo is emphasised by the comparatively low share of wealth that is held in the form of land (table 2)[34]. It is not that Limpopo households are especially deprived of land *area*: landed households have an estimated 2.9ha each on average (1.7ha in Rajasthan) and distribution among landed households is reasonably even (Gini = 0.35), but this dryland has low productive capacity, being largely unirrigated. With rainfall scanty and unreliable, the use of purchased farm inputs (which are widely available) is seen by Limpopo smallholders as too costly or risky, given credit costs and constraints. This has to be understood in the context of many decades when land, rural power, irrigation, credit and research were heavily steered towards large farms – much more so than in Rajasthan, where smallholders purchase many farm inputs, including appropriate improved seeds and irrigation.

The finding that *on average* landedness within former 'homelands' areas is not beneficial for income does not imply that it is not beneficial for poverty risk (it could be, for instance, that landedness was associated with a relatively low variance of income). To consider directly the association between landedness and poverty incidence, we use a poverty line comparable to that used for Rajasthan.[35] It happens to identify about 20 percent of the Limpopo households as income-poor. Landed households have *higher* estimated poverty than landless ones (23 percent versus 16 percent, p=0.11); a finer disaggregation of households by land size suggests no significant association with poverty risk either way, in contrast to the strong negative relationship shown in several other developing countries [Ravallion and Sen 1994; IFAD 2001, p. 76].[36] To sum up: it seems that landholding *within* the former homelands areas of Limpopo is irrelevant at best to average income and poverty risk, fitting in with the low share of own-farm income in household income. Despite the lack of obvious welfare differences between landed and other households *within* these areas, their residents are harmed by the penning-up of over 90 per cent of Limpopo's farmland with a tiny minority of large farms. Because this minority has obtained almost all the farm water, technology and inputs, landholding in the ex-homelands, unless much increased or far better supported than at present, can on average yield little income.

It is important to go beyond averages, however, and, our later disaggregation by region shows that for a minority of regionally-concentrated non-poor households (in West),

[33] The null of equality of income per household between landed and landless households cannot be rejected in Limpopo, but is rejected in Rajasthan at the 1 percent level.

[34] The asset value and share estimates in table 2 must be treated with considerable caution. (1) Livestock aside, asset valuations are with one exception those given by household respondents themselves. The exception is that no such valuation was available for land in Limpopo, since land is rarely if ever traded: the assumed figure of 1500 Rand/ha is based on market prices for comparable land in adjacent commercial farming areas [Department of Land Affairs, 2002a]

[35] To estimate poverty lines we started from the Rajasthan (rural) expenditure per person at the Indian poverty line of 332.65 Rupees/person/month [Dr. S. Sharma, Centre for Development Economics, Delhi School of Economics, pers. comm., based on unpublished database, 1999-2000 round, National Sample Survey]. Assuming that below the poverty line the gap between income and expenditure (net dissaving, mainly possible borrowing) is small, we converted this into Rand using a PPP-adjusted exchange rate (the adjustment derived from the 2000-01 World Development Report, pp 274-5). In both Rajasthan and Limpopo we used sample mean numbers of adult equivalents per household to convert the per person line into a per-aeq line, which for Limpopo is 1594 Rand/aeq/yr.

[36] In Rajasthan too, there is a strong association between poverty risk and landholding.

the possession of large livestock and inanimate farm assets *is* important to livelihoods, and strongly correlated with size of landholding (section. 3.4). That escape from poverty through agriculture in Limpopo is possible may have important implications for the possible benefits to be derived from land reform, and from research or infrastructure provision that raises the productivity of smallholders' land and other farm assets.

If *landlessness* as such is not responsible for poverty on average, what is? To investigate this, we look directly at the characteristics of poor households: initially, mean income and asset shares (table 2). The poor derive a similar mean share of income from wages as the non-poor,[37] but a large share from pensions and a smaller share from migrant remittances. As will be shown, these averages are a manifestation of (a) sharp specialisation by income-source among households in general, and (b) relatively high and relatively low poverty incidence, respectively, among households mainly dependent on pensions and on migrancy.[38] As regards *assets*, table 2 shows that poor households on average hold low shares in productive non-land farm assets, especially large livestock and inanimate farm assets. The holdings of such assets are in fact highly skewed. The Gini of wealth is 0.48, but the concentration indices for farm assets and largestock are 0.89 and 0.80 respectively.[39] Only about one household in six has any inanimate farm assets at all, and only one in six has any large livestock (one in sixteen has both, and poverty in this subgroup is essentially zero). These data fit in with the idea, explored further below, that agricultural assets are associated with non-poverty, but only for a minority of non-poor households.

If landlessness cannot explain the bulk of poverty, perhaps worklessness may. Our survey indicates extremely high unemployment for rural Limpopo, estimated at 60 percent for males of working age and 70 percent for males and females together (see table 3).[40] An estimated 60 percent of households have no individual of working age employed (we call such households 'workless', not quite accurately). Given the high mean share of wages in income and the low salience of farm incomes, it might be assumed that poverty would be concentrated in workless households, and estimated poverty incidence is indeed somewhat higher in them, although not very significantly so (23 percent compared to 16 percent in working households, p=0.14). Yet income per adult equivalent in workless households is, on average, no less than in households with one working individual of working age. The implication, examined below, is that mean income shares are obscuring a specialisation among households, whereby worklessness (or wagelessness) is associated with higher incomes from remittances and/or pensions.

[37] Compare Rajasthan, where the poor, of whom only 7 percent are landless, derive a high share of income from farming and a correspondingly low share from wages.

[38] Depth of poverty is significantly lower for pension-dependent households (defined below; estimated mean income per adult equivalent among the poor is 23 per cent below the poverty line) than for others (around 50 per cent).

[39] The concentration index is analogous to the Gini. For instance the associated Lorenz curve for, say, largestock has households ordered by wealth on the x-axis and the cumulative share of total largestock on the y-axis.

[40] The unemployment rate is defined as [100*unemployed/(unemployed plus employed)] for individuals aged 16-64 throughout the month before survey. About 8 percent of the unemployed – this applies to males and females separately – describe themselves as 'not seeking work'. In the light of the very high unemployment rate (and the existence of a separate category for 'labour disabled – not seeking work') we decided to interpret the able-bodied non-work-seekers as discouraged workers and include them in the unemployed total.

Table 3: Working age residents in Limpopo sample

Males and females

	Hh has no pen or remit inc			Hh has pension income			Hh has remittance income			All households		
	Freq.	Percent	se	Freq.	Percent	se	Freq.	Percent	se	Freq.	Percent	se
missing/other	9	1.3	0.54	24	1.52	0.4	16	1.69	0.5	41	1.44	0.29
housewife	42	11.6	1.89	37	8.15	1.65	41	11.44	2.03	102	10.07	1.14
studying	133	24.66	2.42	182	25.11	2.18	210	28.80	2.34	450	26.63	1.46
unemployed	184	32.14	2.57	290	43.40	2.52	272	39.84	2.54	642	38.63	1.59
employed	179	29.45	2.38	80	8.42	1.14	84	9.67	1.29	327	16.32	1.06
retired/disabled	7	0.85	0.41	85	13.39	1.8	49	8.56	1.64	104	6.91	0.89
Total	554	100		698	100		672	100		1666	100	

Males

	Hh has no pen or remit inc			Hh has pension income			Hh has remittance income			All households		
	Freq.	Percent	se	Freq.	Percent	se	Freq.	Percent	se	Freq.	Percent	se
missing/other	3	1.74	1.13	12	1.98	0.74	10	3.21	1.24	18	1.88	0.58
housewife	0	0.00		1	1.46	1.44	0	0.00		1	0.67	0.67
studying	57	25.23	3.71	92	32.64	3.78	90	40.30	4.58	203	32.43	2.53
unemployed	62	24.09	3.6	117	42.47	3.97	95	37.01	4.33	235	35.01	2.5
employed	121	47.26	4.09	41	10.99	2.1	31	11.10	2.44	185	23.85	2.03
retired/disabled	4	1.70	0.97	22	10.47	2.8	10	8.37	3.39	29	6.16	1.51
Total	247	100		285	100		236	100		671	100	
male unemployment rate		33.80%			79.40%			77.00%			59.50%	

3.3 Income-source specialisation of livelihoods: a three-way split

In the absence of PDA, the normal expectation regarding rural incomes by source may perhaps be exemplified by the evidence in Table 2 on our Rajasthan sample. There, 'local incomes' (wages plus own-farm income) account for 83 percent of income (82 percent for the non-poor and 95 percent for the poor). Looking across households at income-source specialisation, we find that 88 percent of households obtain more than 50 percent of income from local sources. PDA in Limpopo - associated with the huge net historical alienation of land and other rural resources from Africans to Whites and the absence of access by Black villagers to land management income via local tenancy[41] - has predictably led to the high shares of migrancy income and the high rates of landlessness and unemployment among rural Africans already discussed. Given overall shares of local, remittance and pension income equal to 43 percent, 39 percent and 18 percent respectively, one's initial presumption might be to find many households living on a mix of local, remittance and pension income corresponding very roughly to the aggregate shares. What the sample reveals instead is a *specialisation* among households as regards these three income sources that is remarkable in the light of the overall income shares. If these were identical in all households, no household would derive 50 percent or more of income from one source. In fact, an estimated 98 percent of the households are specialised in this sense. 39 percent are *factor-reliant* (FR) and in these households an average of 93 percent of income is local; 32 percent are *migrancy-dependent* (MD), with 84 percent of income on average coming from remittances; and 27 percent of households are *pension-dependent* (PD), with 79 percent of income on average coming from pensions.

This 'three-way-split' of households may account for our earlier findings. If high non-local incomes should be associated with low local incomes (and high unemployment), then a weak or absent association between poverty and worklessness or landlessness may be the result.[42] Our Limpopo data exhibits each of these associations. For earnings, we computed rank correlation coefficients between 'local' income (farm income plus wages) and pensions and remittances respectively.[43] The estimates are:

rho(pensions, local income) = -0.2973 (p=0.0000), 513 observations
rho(remittances, local income) = -0.3076 (p=0.0000), 513 observations

For a further test, we divided the sample according to whether pension and remittance income together were sufficient to push the household above the poverty line: about 50 percent of the sample are 'externally subsistent' in this sense. On average, local income in externally-subsistent households is only 18 percent of local income in other

[41] Tenancy has been prohibited, although this has not prevented widespread 'labour tenancy' (peonage, quasi-sharecropping) on White farms. Tenancy in African areas has been minimal, not because of legal restraints but because of customary law.

[42] The result may also be partly due to offsetting effects of much higher unemployment among *both* households with pensions (which have high poverty incidence) *and* with migrancy income (which have little poverty) than among households with neither.

[43] A rank correlation test is more appropriate than a linear one in view of the highly bunched nature of the data (many zeroes). The correlation for local income against (pensions plus remittances) was –0.44 (p=0.000). The same tests on our Rajasthan sample give a very small positive, insignificant correlation between local income and pensions and negative but much smaller correlations between local income and remittances (rho=-0.12, p=.003) and local income and external income (rho=-0.10, p=0.02)

households.[44] Little of this can be accounted for by the small differences in demographics (number or proportion of persons of working age) between pension-dependent and local-factor-reliant households, or even by the somewhat larger differences between these groups and migrancy-dependent households (Table 4).

So the negative association between external and local incomes is a strong one. To test the association with unemployment, we reclassified households according to whether they had, or did not have, pension and remittance income.[45] 43 percent of households have pension income and 45 percent have remittance income (an estimated 18 percent have both). In line with the income correlations, we find that the male unemployment rates in pension-receiving and remittance-receiving households are similar and in the range 75-80 percent (see table 3), against 34 percent in the 30 percent of households with no such external income.[46] This finding is robust to the inclusion of controls for education status and region. The results of a probit analysis of individual employment status on education status, region and whether or not the household is in receipt of pension or remittance income are given in table 5. Thus, for example, a working-age male living in a household that is in receipt of pensions has an employment probability that is 34.4 percent lower than if the household has no pension receipts. The equivalent figure for a member of a remittance-receiving household is 28.5 percent. One may note also in the table that (a) while higher education has a substantial positive effect on the chances of employment, secondary education has a negative effect, and (b) living in West is much better for employment prospects than living in South or Central.

What can explain resident adult unemployment rates that are so much higher in pension/remittance receiving households than in other households? Suppose first that household composition can be treated as exogenous. Then the existence of an external income source may reduce the incentive for residents to seek work in either household type, increasing their unemployment rate. But why, then, are recipients of pensions and remittances more willing to share income with unemployed residents than are recipients of local factor incomes? For households reliant on remittances, migrancy may be cyclical, so that household members take turns to migrate for work. That apart, if the relatively competent (and educated) tend to migrate, then those left behind are more likely to be unable to find work even if they are motivated to do so. This still leaves the question of why pensioners are willing to share income with fellow-adults who accept unemployment rates so far above those in households receiving neither pensions nor remittances. Endogenising household composition - to allow for the impact of income types upon decisions about household formation, modification and destruction - may help (though it raises complex questions that we can only touch on here). Households unable to provide a minimum of subsistence to their members must collapse; conversely working-age individuals, even if unemployed, may succeed in attaching themselves to viable households, including those dependent on non-local income. Perhaps, especially in the case of PD households, such attachments involve an element of coercion.

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[44] 11 percent of households are externally-subsistent in Rajasthan, and their local incomes average 76 percent of those in other households.

[45] This reclassification avoids the selection bias that use of the FR/MD/PD classification would have entailed (see next footnote).

[46] As one would expect (one is *selecting* households that have little local income) the male unemployment rates in the PD and MD households that together account for 59 percent of all households are even higher, at 93 percent and 92 percent.

Table 4: Three way split: demography, income and assets

	Shares	Demography Residents	Aeq	Wkage	WkageM	WkageF
All	100.0%	6.29(.15)	4.17(.09)	3.19(.09)	1.26(.06)	1.93(.06)
FR	38.5%	6.80(.22)	4.42(.13)	3.53(.13)	1.51(.09)	2.02(.08)
PD	26.8%	6.80(.34)	4.58(.18)	3.30(.19)	1.41(.16)	1.88(.14)
MD	32.3%	5.30(.22)	3.55(.13)	2.73(.15)	0.88(.11)	1.85(.10)
other	2.3%					
FRpoor	28.8%	7.46(.40)	4.76(.22)	3.73(.23)	1.32(.20)	2.41(.15)
FRn-poor	71.2%	6.53(.26)	4.28(.15)	3.44(.15)	1.58(.09)	1.86(.09)
PDpoor	26.3%	8.34(.68)	5.48(.29)	4.55(.20)	2.30(.33)	2.25(.25)
PDn-poor	73.7%	6.25(.38)	4.26(.21)	2.85(.21)	1.09(.12)	1.75(.17)
MDpoor	6.3%	6.37(.59)	3.77(.36)	2.38(.34)	0.52(.25)	1.87(.18)
MDn-poor	93.7%	5.22(.23)	3.53(.14)	2.75(.16)	0.90(.12)	1.85(.10)

	Incomes MeanHH	MeanAE	%Pens	%Remit	%Wages	%Farm
All	19504(1394)	5487(418)				
FR	20523(2929)	5089(696)	4.0	2.9	87.6	5.5
PD	10827(694)	2662(227)	79.2	10.0	5.2	5.6
MD	25068(2100)	8204(821)	8.6	84.1	5.0	2.2
FRpoor	3694(484)	758(85)	1.3	0.0	80.5	18.2
FRn-poor	27342(3900)	6844(915)	4.1	3.1	88.0	4.8
PDpoor	6639(332)	1226(43)	85.4	0.1	5.8	8.7
PDn-poor	12326(795)	3177(263)	77.9	12.0	5.1	5.0
MDpoor	3198(535)	889(153)	0.0	97.2	0.0	2.8
MDn-poor	26546(2132)	8698(847)	8.7	84.0	5.1	2.2

	Assets hh wealth	aeq wealth	land % wealth	smallstock % wealth	largestock % wealth	dwellings % wealth	hh assts % wealth	fm assts % wealth
All	53902	15214	4.6	3.3	11.0	63.8	13.8	3.4
FR	57258(5315)	14893(1903)	3.9(.5)	2.3(.4)	12.9(2.3)	57.9(3.6)	15.9(1.8)	7.1(2.3)
PD	52450(6081)	13576(1972)	6.2(.8)	5.1(.1)	12.0(5.7)	64.5(6.1)	12.1(2.3)	0.0(0)
MD	49774(4436)	16640(2129)	4.2(.7)	3.4(.7)	6.2(2.3)	72.4(3.3)	12.7(2.2)	1.1(.5)
	selected data only, provided below							
FRpoor					4.8(3.7)			0
FRn-poor					14.4(2.6)			8.5(2.7)
PDpoor					2.3(1.5)			0.2(0.2)
PDn-poor					14.2(6.8)			0
MDpoor					0			0
MDn-poor					6.5(2.4)			1.2(.6)

Note: Shares of income from principal source: PD-79.1%; MD-84.1%;FR-93.0%; ginis of income/aeq: PD 31%, MD 42%, FR 56%. Wkage=number of working age residents (M=male, F=female)

Table 5. Male unemployment and non-local household incomes			
	Marginal effects (%: s.e in brackets)	p-values	Means of regressors (%)
Education:			
Primary	-0.9(1.0)	0.371	93.7
Secondary	-9.3(0.5)	0	64.4
Higher	25.2(1.0)	0	6.6
Pension-recipient hh	-34.4(0.4)	0	41.4
Remittance-recipient hh	-28.5(0.4)	0	27.9
Resident of South	-21.2(0.7)	0	16.4
Resident of Central	-12.0(0.7)	0	68.5
Pseudo R-sq=15.7%			

We now look more closely at the mean characteristics of the dependent households of each type, with the aid of Table 4. There are significant differences in income per adult equivalent among the three groups. MDs are 60 percent better-off on average than FRs, who are themselves twice as well-off as PDs. Poverty incidence, only 6 percent for MD households, is estimated to be a little higher for FRs than for PDs (29 percent versus 26 percent), despite the mean income differential; and mean poverty depth is also far lower for PDs than for FRs. This reflects much higher income inequality among FR households than among PD households, as would be expected (Ginis in table). We do not find significant mean wealth differences among the groups. As far as wealth shares are concerned, there is a hint that farm assets (for FR households) and largestock (for FR and PD households) may be associated with absence of poverty.[47] As noted earlier, holdings of both of these assets are highly concentrated: such assets are associated with the absence of poverty only for a minority of households, as we will see.

3.4 Regional variations: agriculture and livelihoods in West

Our survey data, summarised in table 6, reveal some significant regional variations in the data, most strikingly between West and the other two regions, Central and South. Summing up, West is the most prosperous region of the three, poverty incidence is only about half that in the other two regions, and unemployment is markedly lower than elsewhere. Only in West does agriculture account for an important fraction of income, both through own-farm production and agricultural wages, and only in West are there important holdings of large livestock and inanimate farm assets. Households that own both of these assets have high income and low poverty.

As regards the comparative importance of agriculture to income in the three regions, adding own-farm income to agricultural wages shows that agriculture in Central and South accounts for no more than 3 percent of income, and perhaps as much as 30 percent in West.[48] Agricultural wages, less than 0.5 percent of income in Central and

[47] The poor have a higher share in dwellings. This is consistent with, but need not imply, the presence of capital market imperfections that prevent even the landed poor from escaping poverty through more effective land use.

[48] Adding own-farm sales to agricultural wages on African farms would involve double-counting. However, as indicated, farm wages are mostly earned on white commercial farms.

South, account for 20 percent in West. Little of this comprises employment on African-owned farms; the much higher figure in West corresponds to much greater proximity to White commercial farms. So agriculture is important to livelihoods in West both through own-farm income and directly through agricultural wage income.[49] A further clue comes from a disaggregation of employment: inspection of the data disaggregated by sector shows that lower unemployment in West than elsewhere can be clearly associated with extra persons in West farming their own land.

Table 6: Regional disparities in Limpopo

	Central	South	West
No of hhs	128	244	121
Income			
hhold income	13401(932)	19900(1893)	26784(3036)
aeq income	3838(401)	5727(567)	6617(727)
poverty	22.50%	21.10%	11.10%
%wages	41.90%	37.10%	46.10%
of which, agriculture	0.40%	0.40%	19.80%
of which, civil service	26.10%	14.99%	0.00%
%pens	31.40%	16.50%	12.90%
%farm	2.60%	2.80%	12.80%
%remit	24.10%	43.60%	28.20%
%local, non-civil-service*	18.40%	24.91%	58.90%
Wealth			
hhold wealth	72373(8673)	45061(3340)	80126(7410)
aeq wealth	21137(3696)	12943(1251)	20063(2024)
Land			
prop. Landed	0.56	0.52	0.91
mean landholding(landed)	2.52(.39)	3.08(.18)	2.27(.09)
land Gini (landed)	0.56(.020)	0.29(.019)	0.23(.014)
Three-way split			
FR	30.6	39.8	43.0
PD	44.1	24.8	11.7
MD	25.2	33.6	35.6
Mixed-source	0.0	1.8	9.7
Farming assets			
% with largestock	12.5	13.7	33.5
% with inanimate fm. assets	2.3	11.4	80.0
% with both fm. asset types	2.3	4.0	30.2
Unemployment			
All	77.3%	71.8%	60.4%
Men	69.3%	59.0%	50.9%

* share of farming plus non-civil-service wages
Note: estimated standard errors in brackets.

We cannot measure the extent to which RNF incomes in West are underpinned by demand from agricultural incomes, but it is of note that virtually all non-agricultural

[49] Among the employed (including self-employed), agriculture accounts for 5 percent in Central, 14 percent in South, and 52 percent in West.

local wages in this region are generated in industry and services - in Central and South, 62 percent and 40 percent respectively of wages derive from civil service employment[50] – with the result that, in spite of the high share of income deriving from agriculture in West, the share of income deriving from industry plus service-sector wages is *higher* in West than in Central or South (26 percent compared to 16 percent and 22 percent). Total income from local, non-civil-service activity accounts for 59 percent of total income in West (Central 18 percent, South 25 percent). Theory and other empirical work suggest that, given below-predicted agricultural shares, a weak RNF sector is evidence of PDA.

The special nature of West is also revealed in asset structures. 91 percent of households in West are landed, compared to 56 percent in Central and 52 percent in South. Moreover, land is most equally distributed in West. The land Gini among landholders in West is 0.23 (0.36 elsewhere); 87 percent of landed households there have between one and four hectares (51 percent elsewhere). Landedness as such has already been shown to be rather unimportant to income, but we can discern an indirect effect through other farm assets, especially inanimate farm assets and large livestock. Holdings of these two types of asset highly skewed and are highly correlated with one another (Spearman rank correlation coefficient = 0.3845, p=0.0000). Outside West, relatively few households report holding any assets in each of these categories, as table 6 shows. As for holders of assets in *both* categories, they comprise only 2.3 percent of households in Central, 4.0 percent in South and 30.2 percent in West. We find, unsurprisingly, that the chance of a household having both largestock and inanimate farm assets is strongly related to landholding, in that virtually no households with less than 1 ha are in this category.[51] This category of households does very well as regards both income and poverty risk: average income is double that earned in other households and poverty incidence is virtually zero (1.6 percent; only 2 households in the sample are in this category).

4. Conclusions and implications

Section 2 showed that, of 105 developing and transitional countries with available data, those with past land distribution experiences conducive to PDA tend to have very substantially below-predicted agricultural workforce shares - as do the high-farmland-Gini countries. This is consistent with evidence and theory that large farms have substantially lower labour/land ratios than small, probably because transactions-costs associated with labour are substantially higher on large farms. In low-income countries, with inexpensive or 'surplus' labour (and, increasingly, scarce land), high levels of land inequality are likely to be associated with (possibly inefficient) PDA, rather than with mature transition from agriculture. An 'acid test' of this may be the success of rural non-farm populations in finding productive employment, rather than sinking into rural dependency and/or high unemployment rates.

Therefore, in section 3, we examined the livelihoods of poorer rural people (Africans) in a survey area demonstrably affected by extreme inequality of farmland and other farm-linked assets, inputs and services: Limpopo province, South Africa. Testing the extent and impact of de-agriculturisation was helped by the possibility of comparison

[50] Including teachers but not parastatal employment.

[51] Regression analysis suggests that *both* living in West *and* landholding are strongly associated with both the possession of inanimate farm assets and livestock and the quantity possessed.

within the survey area (one of the three regions, West, had substantially more farm-linked activity), and between it and a parallel survey in a more 'normally' agricultural rural area in Rajasthan, India. Overall, we found very low shares of income (8 percent) and assets (22 percent) associated with agriculture in the South African survey area. This outcome was associated with poverty and rural dependency: 50 per cent of rural African households in Limpopo derive less than one-fifth of income from *any* local sources, including farm and non-farm wages; prime-age (15-59) male unemployment is 59 percent (Table 3). Such outcomes are less marked in West, and are almost absent in Rajasthan. This confirms the finding of many studies elsewhere that rural non-farm employment is normally the result of agricultural growth, not of agricultural decline, and certainly not of PDA associated with extreme inequality of land and other farm inputs. The extent of 'specialisation' by rural S Africans in dependency on migrant or (separately) pension incomes, and the scale of unemployment - highly visible, not just statistical - among these specialists, was surprising. So was the quite significant amount of farmland-per-household, 2.8 hectares, among the 57 percent with cropland; yet, contrary to findings elsewhere, the landed were no less poverty-prone (and had no higher mean income) than the landless, confirming that farm inequality and PDA in rural S Africa encompass far more than land: researched seeds and animals, fertilisers, market access, perhaps above all controlled farm water.

What implications have these findings for policy change in rural S Africa? Experience in many countries confirms the feasibility of substantial poverty reduction via consensual (or at least widely tolerated) land redistribution, and of subsequent progress in farm output and (thanks to much higher labour/land ratios on small farms) employment [e.g. Binswanger et al. 1995; Lipton 1993, 1995]. About 3 in 4 of S Africa's dollar-poor are rural, almost all of them Africans in former 'homelands' such as the parts of Lebowa, Limpopo province, in our survey; rural poverty incidence is highest in Limpopo and the Eastern Cape provinces, where 44 percent of S Africa's poor reside [Development Bank of Southern Africa 2000]. It is natural to look to land redistribution to the rural poor - remedying past discrimination and land seizures - as a tool of poverty reduction as well as of farm efficiency, given the large proportions of unemployed rural poor.

Such an approach - specifically, the consensual transfer of one-third of commercial farmland from Whites (and the State) to poor Africans - was part of the African National Congress's manifesto on its assumption of office in 1994. Substantial efforts were made in pilot programmes. Even before 1994 the World Bank made clear its support, and potential financing role, for wide-scale, consensual land redistribution [Van Zyl, Kirsten and Binswanger, 1996]. However, the Government of South Africa (and the provincial administrations) did not implement this widely or very effectively, and have now largely replaced that approach by efforts to individualise communal tenure; to broaden the ownership of other White farms through 'equity sharing'; and, above all, to obtain voluntary transfer of some White-owned farmland into *middle-to-large* African commercial farms.

Such a transfer will not achieve the full efficiency and employment gains that appear, from cross-sections of larger and smaller farms (and of countries with these), to be possible by a shift from the former to the latter. Such a shift is the natural implication of (a) international evidence for such potential gains, plus (b) our finding from Limpopo that severe inequality between the former homelands and the White farm

sector is inducing the former, not to develop RNF incomes, but to fall into rural dependency. Smaller and more equal farms (and countries having them [Deininger and Olinto 2000]) achieve faster growth, less unemployment, and less poverty in early development.

An objection to this approach as a cure for PDA [Reardon and Barrett 2000] is that industrialisation of agriculture has marginalised small-scale farmers in developing countries, excluding them from the profitable markets of the rich north. However, South Africa's African-run farms are mostly deficit (extra output will feed the family), and if not cater mainly for local markets, so the problems referred to here are less important. Where small farmers do sell for exports and supermarkets, intermediation may be needed to facilitate timely collection for processing, crop uniformity, pesticide safety, or labour standards; where this is successfully achieved, including in some African cases (tea in Kenya, cotton in Burkina), smaller farms' labour-transaction-cost advantages resurface. But successful intermediation may not be profitable, and even if it is cannot be taken for granted without public or collective action.

However, the merits of land redistribution in any specific *post-PDA* case cannot be assumed. It is not obvious that South Africa (or Russia), with farming *already settled* into severe asset and input inequality in the context of PDA, can "undo history" and improve outcomes by reverting to a more equal small-farm model. Can this be done consensually? Will disruption costs, e.g. with capital assets and water systems geared to large-scale farming, be excessive? Are rural people long deprived of land, water control, research, and other relevant farm resources - and the supply systems that might service these - eager, or even able, to operate in a small-farm environment (however apparently attractive in cross-section), or is it true that a peasant sector "when once destroyed, can never be supplied" [Goldsmith 1770]?

All such questions require assessment of *alternatives*. Starting from South Africa's very high (and genuine) unemployment - with its consequences for failed townward migration, family breakdown and crime - can mass poverty (and slow growth) be tackled *without* substantial, productive absorption of labour in small-scale agriculture, and in a rural NFS linked to its growth? Is it, instead, feasible to start from the base given by PDA (even if ill-advised in retrospect) and convert harm to good, by growth of an urban non-farm sector until labour shortage suffices to 'justify' the currently inefficiently low labour absorption of large-scale agriculture? The weak growth performance, high unit labour costs, and low competitiveness and labour absorption of modern manufacturing in South Africa, as compared say to Malaysia with its much more normal de-agriculturisation process, suggest little hope for that sequence, but we cannot rule it out. Conversely the ex post correction of PDA by getting land and other farm resources to an underemployed, but far from destroyed, peasantry appears to have proved feasible in a range of cases, both in Latin America and in transition economies (China 1977-84, Vietnam (1988-93), and post-communist Albania, Armenia and Romania).

Economic development paths almost always involve de-agriculturisation. Normally, this is of a 'mature' agricultural sector; following a spurt of rapid and labour-intensive agricultural growth, mainly on smallholdings. Changing demand patterns (Engel's Law) and voluntary savings transfers out of agriculture then make it attractive and feasible for both migrant workers and entrepreneurs to shift to modernising industry

and services. A quite different path is involved in PDA. A farm sector, made extremely unequal, provides little productive work on its large and capital-intensive farms, while its smallholdings lack resources (in S Africa water control, research, and marketing systems for inputs and outputs). Labour floods from such a sector to the towns, but the sources of investment finance, adequate to employ it, are not clear. Our findings support much development theory and empirical work indicating that there is seldom an obvious alternative, if seeking broad-based growth, to a path *through* small-scale agriculture and related RNF activity. Rural dependency will not do it. The experience of Rajsathan - and to a lesser extent of West region in Limpopo - suggests that standard alternatives, even in South Africa, may.

Annex 1. A rough estimate of the Gini of landholdings in Limpopo Province

The following steps were used to construct an approximate distribution of landholdings in Limpopo Province.

(1) The size distribution of White commercial farms is estimated from Census of Agriculture 1993, p.4. (hereafter 'the Census') This gives the numbers of farms in each of 14 size categories as well as enabling the mean holding in each category to be calculated. Our estimate assumes that all farms within each category are equal-sized (fitting a smoothed distribution seemed inappropriate in view of the crude nature of the calculation being performed).

(2) It is assumed that there are one million smallholdings in South Africa. The Census gives the total area of White commercial farms as 82.76 million ha. and states that this comprises 87 percent of total farmland. Using these numbers, the mean (grazing plus arable) land per smallholding can be estimated at 12.37 ha.

(3) Our sample estimate of the mean size of smallholdings (arable land only) in Limpopo is 2.85ha. Assuming Limpopo smallholdings to be representative of smallholdings in the country as a whole, and that the grazing to arable ratio is constant across Limpopo smallholdings, allows us to approximate the *relative* size distribution of Limpopo smallholdings by scaling up each holding in the sample by (12.37/2.85).

(4) To estimate the total number of smallholdings in Limpopo, we use two methods: (a) using the Census figure of 4.5 million for the rural population, and applying our sample estimates for mean household size and the proportion of households landless, gives an estimate of 0.27 million smallholdings; (b) the Census puts 23 percent of South Africa's rural population in Limpopo, implying 0.23 million smallholdings, if provincial smallholdings are in proportion to population.

(5) Taking the average of the two estimates in (4), 0.25 million, allows us finally to approximate the size distribution of smallholdings in Limpopo by scaling up the distribution from (3). The aggregate size distribution of land is estimated by simply amalgamating the estimated distribution of smallholdings and commercial farms.

	Results			
	Mean size (hectares)	**Number**	**Total land (million ha)**	**Gini**
Commercial farms	1055.9	5053	5.3	0.80
Smallholdings	12.4	250000	3.1	0.39
Total	32.9	255053	8.4	0.93

References

Barro, R. 2001. 'Inequality and growth in a panel of countries'. *Journal of Economic Growth* 5: 5-32.

Bell, C., P. Hazell and R. Slade. 1982. *Project Evaluation in Regional Perspective.* Baltimore: Johns Hopkins.

Binswanger, H., K. Deininger and G. Feder. 1995. 'Power, distortions, revolt and reform in agricultural land relations'. In J. Behrman and T. N. Srinivasan (eds.), *Handbook of Development Economics: vol. IIIB*, Amsterdam: North Holland.

Binswanger, H. and M. Rosenzweig. 1981. *Contractual Arrangements, Employment and Wages in Rural Labour Markets.* New York: Agricultural Development Council.

Binswanger, H. and M. Rosenzweig. 1993. 'Wealth, weather risk, and the composition and profitability of agricultural investments'. *Economic Journal*, 103: 56-78.

Berry, R. and W. Cline, 1979. *Agrarian Structure and Productivity in Developing Countries.* Baltimore: Johns Hopkins.

Blanchet, D., 1988. 'Estimating the Relationship between Population Growth and Aggregate Economic Growth in LDCs: Methodological Problems.' In *Consequences of Rapid Population Growth in Developing Countries.* New York: Taylor and Francis.

Booth, A. 2002. 'The changing role of non-farm activities in agricultural households in Indonesia: some isights from the agricultural censuses', *Bulletin of Indoinesian Economic Studies*, 38: 179-200.

Booth, A. and R. Sundrum. 1984. *Labour Absorption in Agriculture.* Delhi: Oxford University Press.

Byrd, W. A. and Lin Qingsong. 1990. *China's Rural Industry.* Oxford: World Bank Research Publications.

Deininger, K. and Olinto, P. 2000. *Asset distribution, inequality and growth.* Policy Research Working Paper no. 2375. Washington, D.C.: World Bank.

Department for Land Affairs. 2002.
http://land.pwv.gov.za/publications/parliamentary_questions/nat_assembly.htm

Department for Land Affairs. 2002a. Land price database located at
http://land.pwv.gov.za/redistribution/newpage7.htm

Development Bank of Southern Africa. 2000. *Development Report 2000*

Goldsmith, O. 1770. *The Deserted Village.* London.

Harriss, B. 1987. 'Regional growth linkages from agriculture: discussion'. *Journal of Development Studies*, 23: 275-89.
Hazell, P. and A. Roell. 1983, *Rural growth linkages: household expenditure patterns in Malaysia and Nigeria.* Research Report no. 40. Washington, D.C.: International Food Policy Research Institute.

Hazell , P. and Ramasamy, C. 1991. *The Green Revolution Reconsidered: the impact of high-yielding varieties in South India.* Baltimore: Johns Hopkins.

IFAD (International Fund for Rural Development). 2001. *Rural Poverty Report 2001: the challenge of ending rural poverty.* Oxford: Oxford University Press.

Ishikawa, S. 1978. *Labour Absorption in Asia Agriculture.* International Labour Organisation: Asian Regional Employment Programme forn Employment Promotion.

de Janvry, A. and E. Sadoulet. 2000. 'Growth, poverty and inequality in Latin America: a causal analysis'. *Review of Income and Wealth* 46: 267-87.

Kirsten, J. J. Rwelamira, F. Fraser and M. Makhura. 2002. The effect of rural inequality on fertility, migration, environment and thus agricultural sustainability: a case study in the arid and semi-arid areas in Limpopo Province, South Africa. At www.sussex.ac.uk/Units/PRU/demography.html

Kriedte, P., H. Medick and J. Schlumbohm. 1981. *Industrialization before Industrialization: Rural Industry in the Genesis of Capitalism.* Cambridge: Cambridge University Press.

Krueger, A., M. Schiff and A. Valdes. 1991. *The Political Economy of Agricultural Pricing Policy.* Baltimore: Johns Hopkins.

Krugman, P. and M. Obstfeld. 2003. *International Economics: Theory and Policy.* 5th ed. Addison Wesley Longman.

Kutcher, G. and P. Scandizzo. 1981. *The Agricultural Economy of Northeast Brazil.* Baltimore: Johns Hopkins.

Lal, D. and H. Myint. 1996. The Political Economy of Poverty, Equity and Growth: a comparative study., Oxford: Clarendon Press.

Leamer, E. 1984. *The Sources of International Comparative Advantage.* Cambridge, Mass: MIT Press.

Lipton, M. 1977. *Why Poor People Stay Poor: urban bias and world development.* London: Temple Smith.

---------- 1984. 'Urban bias revisited'. In Harriss, J. and Moore, M.P. (eds.), *Development and the Rural-Urban Divide.* London: Frank Cass.

---------- 1993. 'Land reform as continued business: the evidence against stopping'. *World Development Studies* 21: 641-57.

---------- 1995. ' Market, redistributive and proto-reform: can liberalisation help the poor?'. *Asian Development Review* 13(1): 1-35
Mellor, J. 1976. *The New Economics of Growth: a strategy for India and the developing world.* Ithaca: Cornell University Press.

NDA 2001 Abstract of agricultural statistics, National Department of Agriculture, Pretoria

Ogilvie, S. and M. Cerman, eds. 1996. *European Proto-Industrialization* (Cambridge: Cambridge University Press.

Reardon, T. and Barrett, C.B. 2000. Agroindustrialization, globalization, and international development: An overview of issues, patterns, and determinants. *Agricultural Economics*, Vol. 23 Special issue, September: 195-205.

Sagar, V. 2002. The effect of inequality on human fertility, migration and agricultural stability: The case of West Indian Drylands: Rajasthan. At www.sussex.ac.uk/Units/PRU/demography.html

Sen, A.K. Choice of techniques (3rd ed.). Cambridge: Cambridge University Press.

Sen, A.K. 1972, *On Economic Inequality.* Clarendon Lectures. Oxford University Press.

Statistics South Africa. 2000. Unpublished information provided by the census office for the 1996 census. Information also available at http://www.statssa.gov.za/

Ravallion, M. and B. Sen. 1994. *How land-based targeting affects rural poverty.* Policy Research paper no. 1270. Washington, D.C.: World Bank.

Tyler, G., R. el-Ghoneimy and C. Yves. 1993. 'Alleviating rural poverty through agricultural growth'. *Journal of Development Studies* 29: 358-64.

Vink, N. and J.F. Kirsten. 1999. A descriptive analysis of employment trends in South African agriculture. *Agrekon*, Vol. 38 no.2, June 1999.

Wood, A. 1994. *North-South Trade, Employment and Inequality: changing fortunes in a skill-driven world.* Oxford: Clarendon Press.

van Zyl, J., J. Kirsten and H. Binswanger (eds.) 1996. *Agricultural land reform in South Africa: Policies, Markets and Mechanisms.* Oxford University Press, Cape Town.