SOUTH AFRICAN AGRICULTURE IN TRANSITION: THE 1990s

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1 THE POLICY ENVIRONMENT

Deregulation and liberalization were a fact of life in the agricultural sector of South Africa during the 1980s.[1] The process was characterized by change within an existing institutional structure, as the main role players involved in the sector remained in place despite the general relaxation in State intervention. This changed with the election of the government of national unity 1994, although in agriculture at least some direct policy changes had to wait until 1996, i.e. until after the withdrawal of the National Party from the GNU. The most important policy initiatives taken subsequent to this time included land reform, institutional restructuring in the public sector, the promulgation of new legislation, including the Marketing of Agricultural Products Act and the Water Act, trade policy and labour market policy reform. These policies are discussed below. The purpose of these policy reforms was to correct the injustices of past policy, principally through land reform, to get the agricultural sector on a less capital-intensive growth path and to enhance the international competitiveness of the sector. The impact of the reforms is discussed in terms of these goals in the subsequent parts of the article.

1.1 Land Reform

The Department of Land Affairs, successor to the Department of Regional and Land Affairs, completed the process of land reform policy design with its White Paper (RSA, 1997) while implementation of the programme had started in 1994. Land reform was to consist of the land restitution, the redistribution and the tenure reform programmes. Dissatisfaction, especially with aspects of the redistribution programme, resulted in a redesign of the programme during 2000.

The land issue has always played a central role in the struggle for democracy in South Africa, and one of the first steps after 2 February 1990 was the repeal of racially-based land legislation. In this earlier period the work of the Development Bank on land reform (reported in Brand *et al,* 1992), the proceedings of a 1990 conference hosted by IDAS A (De Klerk, 1991) and the PhD thesis of Van Schalkwyk (1995) influenced the shape of the land reform programme. The debate gained momentum with a 1992 workshop in Swaziland where the World Bank brought together various groups from South Africa as well as scholars and practitioners from other countries in Southern Africa and elsewhere (published as World Bank, 1993). The next milestone was the rural restructuring study of the World Bank, presented at the 'Options for land reform' conference of the Department of Economics and Planning of the ANC in Johannesburg in 1993. The results were taken up in the White Paper on the Reconstruction and Development Programme (RSA, 1994), and the White Paper on Land Reform (RSA, 1997).

'See Vink, 2000, for a review of recent South African literature on the process and results of deregulation in agriculture in the period since the early 1980s.

These 'options' included a proposal by DBSA for equity sharing projects, and a wide range of these has subsequently been implemented (see Ngqangweni *et al,* 1995). The first of these projects to be implemented, the DBSA-funded Whitehall Project, was formally evaluated at an early stage (Eckert *et al,* 1996).

A large proportion of the analytical work that supported the policy positions taken during these debates was subsequently published in Van Zyl *et al.* (1996). The work of the World Bank also served as input into a number of subsequent publications, including World Bank (1993), Christiansen and Cooper (1995), Deininger and Binswanger (1995) and Deininger (1999).

More recently, the debate has shifted to progress with the implementation of the land reform programme. Some of the more important contributions include Plewman *et al.* (1995); Department of Land Affairs (1997); Atkinson *et al.* (1998); Hall (1998); Kirsten *et al.* (1996); Kirsten and Van Zyl (1999) and Graham and Lyne (1999). The last three of these are of particular interest, as they show empirically the slow pace of land transfer (see Section 2 below).

The five salient lessons of international experience with land reform were taken as (Christiansen, 1996):

- *The speed of implementation of the programme.* In the absence of fast paced programmes, a combination of excessive bureaucracy, centralisation of the process and legal challenges is likely to render the programme ineffective. The importance of this lesson is reflected by the recent farm invasions in Zimbabwe.
- *Economic viability of the options.* Before a reform programme is implemented, there must be a careful assessment of the models or livelihood options available to rural households. Further, in computing the costs and benefits, other assistance and infrastructure necessary to generate the income should be planned.
- *Political acceptability and legitimacy of the programme.* There must be a consensus across the spectrum of political opinion that the programme is both necessary and the most acceptable way of achieving the stated goals. Land reform programmes are not irreversible, particularly where this consensus has not been achieved.
- *A clear definition of the role that the public sector can and will play.* The proposed programme must be evaluated in light of an understanding and acceptance of the respective roles of the public and private sectors (including NGOs). Programmes that have relied entirely on the public sector in the belief that only the State is capable of maintaining integrity, delivering services, determining needs, and managing the process have generally failed.
- *Land reform is only one part of a comprehensive programme of economic reconstruction.* The redistribution of land is necessary, but not sufficient to guarantee the success of a development programme. Additional services, including infrastructure, markets, incentives, social services etc. have to be provided as part of a comprehensive rural development programme. This is necessary both to sustain higher productivity consequent on reform and to include others who may not benefit from the direct provision of land.

The conclusion from these lessons is that market-assisted land redistribution programmes tend to perform better than those administered by the public sector. Reliance on the market mechanism stems from the observed weakness of non-market oriented programmes that typically vest too much control in public sector bureaucracies which tend to develop their own set of interest that are often in conflict with the rapid redistribution of land. Nonetheless, a well-functioning land market is not a sufficient condition for the subdivision of large, mechanized and relatively ineffcient farms into smaller family farms, specifically where economic and institutional distortions favour large farms. Therefore, non-market interventions in the form of grants and post-settlement support are necessary. Executing land reform through grants or vouchers to beneficiary groups who buy from willing sellers also obviates

the need for a land reform/settlement agency, and thus reduces the opportunities for bureaucratic rent seeking. The cost and delays of expropriation proceedings are also avoided.

In South Africa, a pilot land reform programme was designed, more or less in accordance with the guidelines of the market-assisted approach. In practice, however, beneficiary households usually had to pool their meagre grants in order to buy land from a willing seller. The reason was at least partly due to the fact that the Subdivision of Agricultural Land Act (Act 70 of 1970) has yet to be repealed, which would have enabled the sub-division of farms into affordable pieces of land.

The Department of Land Affairs spent a lot of time and effort in mobilising communities and assisting them in accessing government grants to acquire land. However, the Department's own research shows that, in most cases, farms financed with land grants and settled by groups of households, were too small to support all of the beneficiaries as full-time farmers (Ministry of Agriculture and Land Affairs, 2000). The Department of Land Affairs anticipated that emerging farmers would use the grant to leverage loan finance for additional land. However, research by Graham and Lyne (1999) shows that most creditworthy farmers did not qualify for a land grant as the means test applied to potential beneficiaries precluded individuals with a monthly household income greater than Rl 500.

Thus, a new approach to land reform has been proposed after extensive consultation and planning during the course of last year (Ministry of Agriculture and Land Affairs, 2000). In providing for an extended scale of grants, dependent on an increasing own contribution, it fits directly with the new vision of the Ministry to benefit the rural poor and to assist in the establishment of a class of commercial black farmers. This iniative will, however, also fail unless efforts to implement the programme are well planned and well co-ordinated, unless support services for agriculture, i.e. research, extension, finance, information, infrastructure are in place to provide the conducive environment for a vibrant and successful agricultural sector, and unless the problem of bureaucratic centralization is addressed.

1.2 Institutional Restructuring in the Public Sector

One of the main features of South African agricultural policy in the 1990s was the extent of institutional restructuring that took place. There were generally three reasons for these processes. Some institutions (e.g. the Development Bank, the Land Bank, the Agricultural Research Council, the Department of Regional and Land Affairs, the Development Corporations in the former homelands, etc.) were believed to be too closely aligned with apartheid policies aimed at 'development' of the former homeland areas or at favouring commercial farmers (see e.g. Callear and Mthethwa, 1996; DBSA & LAPC, 1997). Such institutions were subjected to restructuring programmes aimed at realigning them to a new mandate in support of the development priorities of the new government.

In the second case, the public sector agencies supporting the agricultural sector were subjected to the same processes of 'provincialization' that came about with the adoption of the Interim Constitution. In the case of agriculture, the former 'own' and 'general affairs departments were amalgamated to form the core of the new National Department of Agriculture, there was a redeployment of functions and staff from the former homeland Departments of Agriculture to the new National Department and to the new Provincial Departments of Agriculture. During this process a change was also effected in the relationship between the National and Provincial Departments of Agriculture and farmer lobby groups.[2]

In the third instance, agricultural institutions in the public sector were reoriented to fit in with new policy directions. The most radical of these changes occurred in the changes to agricultural marketing policy (see below).

[2]Until the 1990s the policy of the Department of Agriculture was to negotiate with only one representative body of farmers, namely the South African Agricultural Union (SAAU now known as Agriculture South Africa or Agri - SA)

1.3 The Promulgation of the Marketing of Agricultural Products Act, No 47 of 1996

This new Act represented a radical departure from the marketing regime to which farmers had become accustomed in the period since the 1930s (Groenewald, 2000). While far reaching, the deregulation that had taken place since the 1980s was piecemeal, uncoordinated, and accomplished within the framework of the old Marketing Act, with the result that any policy changes could easily be reversed. The new Act changed the way in which agricultural marketing policy would henceforth be managed in South Africa.

The recommendations of the Kassier Committee (1992) were based on the premise that a stronger, more centralized and more representative authority was required to override the vested interests in the regulated marketing system as it existed at the time. The main purpose of the recommended 'Agricultural Marketing Council' would, therefore, be to manage deregulation. This principle of a managed transition was carried over into the new Act, which, however, went further in building safeguards to protect the disempowered. This was accomplished through the ingenious definition of the goals of the Act, the conditions under which intervention could take place and the process for allowing this to happen (see Vink, 1998).

Commercial farmers reacted to these changes in a wide range of different ways, some of which are described below. It is, however, ironic that the earlier attempt to provide marketing support services for small farmers under the BATAT programme (see e.g. Van Reenen, 1997) foundered, and it is not clear that small farmers are any better off now than under the previous regime. Yet there has been some research on ways in which their access to markets could be improved (see e.g. Bay ley, 1996; Madikizela and Groenewald, 1998; Matungul, 1999).

1.4 The Promulgation of a new Water Act, No 36 of 1998

An earlier lack of research on the economics of water use in South Africa was partly rectified during the process of the drafting of the White Paper on water (a process described by Carter, 1996). As can be expected, economists emphasised the desirability of water markets. Backeberg (1995; 1997) argued that increasing scarcity and competition for water resulted in a recognition that public policies must change to manage water as an economic commodity. Another example of this genre can be found in the work of Armitage (1997), who studied the demand side for water by investigating how water markets can lead to more efficient use of water. Hassan *et al.* (1996), Louw and Van Schalkwyk (1997) and Van Zyl and Vink (1997) also address the efficiency of water use. Changes resulting from the new Act that were expected to impact most severely on agriculture include the higher priority afforded to water used by humans and the environment, the termination of the riparian principle of water rights, the implementation of an integrated catchment management system, the termination of subsidised water prices and greater cross-border co-operation between Southern African countries. Slow progress in the implementation of the Act has, however, minimized the impact to date.

1.5 Trade Policy Reform

The new South African government embarked on a process of trade policy reform that aimed to reverse decades of 'inward industrialization' strategies. The distinguishing characteristic of these reforms was a willingness to expose businesses in the country to tariffs that were often below the bound rates negotiated in the Uruguay Round of the GATT. Whereas agricultural trade had been managed through quantitative controls, the Marrakech Agreement called for the tariffication of all agricultural goods, and a phased reduction in the tariffs. South Africa also participated in the renegotiation of the Southern African Customs Union treaty, agreed to the new SADC trade protocol, and negotiated a

free trade agreement with the EU. In all these cases, the country agreed in principle to liberalise agricultural trade further. Finally, the country gained membership of the Cairns Group, thus signalling its intention to unilaterally liberalize its trade regardless of the progress made by the developed countries in withdrawing farm support programmes. These policies have had a marked affect on the sector, as will be discussed below.

1.6 Labour Market Reform

While labour legislation governing working conditions, wage rates, etc. has progressively become applicable to the agricultural sector over a period of more than a decade, certain aspects of the land reform programme have also impacted on the manner in which labour is managed in the agricultural sector. Here specific mention should be made of the introduction of legislation that governs the occupational rights of workers who live on farms. Further labour market reform is also expected, especially with the application of the Basic Conditions of Employment Act to agriculture.

Table 1. Characteristics of land redistributed in KwaZulu Natal, 1997 and 1998

Farm Characteristic	Government assisted		Private Mortgage		Private cash		Inheritance and donations	
	1997	1998	1997	1998	1997	1998	1997	1998
Number of transactions	21	4	43	26	50	62	69	91
Mean sale price of farms (R 000)	684.9	559.2	787.6	643.8	104.2	127.1		
Mean area of farms (ha)	572	1095	150	221	65	106	18	23
Total market value of land (Rm)	14.38	2.24	33.87	16.74	5.21	7.88		
Total area of land	12022	4382	6459	5757	3242	6588	1210	2158

Source: Graham and Lyne, 1999.

2 LAND TRANSFERS UNDER THE LAND REFORM PROGRAMME

Recent studies of deed transfers to previously disadvantaged persons through private transactions in the Northern Province and KwaZulu-Natal have revealed that the number of private transactions was greater than the number of transactions where the government was involved, at least in the period until the end of 1998. While some farmers were collectively or individually making use of the government grants to purchase land, a considerable number of private land transactions have already taken place without farmers making use of these measures. The extent of the superior performance of the private transactions in this period in KwaZulu Natal is illustrated in Table 1. In the Northern Province a similar trend was found, with a total of 62 transactions outside the land reform programme recorded during 1997, compared to 3 under the formal land reform programme.

Nevertheless, progress with the formal land reform programme picked up some momentum in the years after 1998, as is shown in Table 2 below.

Despite this acceleration in the land reform programme, overall progress has been slow, and the programme has been redesigned in an attempt to speed up the rate of transfers.

Table 2. Land redistribution in South Africa (cumulative to end November 2000)

Province	Commercial farmland (ha)	Completed land reform (ha)	%	Approved land reform (ha)[1]	%
Eastern Cape	10815867	37388.2	0.35	48596.4	0.45
Free State	11572000	71437.9	0.62	84024.8	0.73
Gauteng	823623	2864.8	0.35	5560.4	0.68
KwaZulu Natal	3439403	140345.7	4.08	153946.5	4.48
Mpumalanga	4486320	29067.7	0.65	47388.8	1.06
Northern Cape	29543832	361290.4	1.22	-	
Northern Province	7153772	22157.5	0.31	26743.2	0.37
North West	6785600	9719.7	0.14	17186.1	0.25
Western Cape	11560609	10640.1	0.09	24791.7	0.21
Total	86186026	684912.1	0.80	-	-

Note: Includes projects that had been approved at Ministerial level, but where the land is yet to be transferred.

Table 3. Farm employment in South Africa ('000)

	1985	1990	1991	1992	1993	1994	1995	1996
Regular	807	728	702	657	648	620	602	610
Casual and seasonal	516	456	413	394	492	302	289	304
Total	1324	185	1116	1051	1139	922	891	914

3 EMPLOYMENT

Table 3 shows the most recent macro level data on farm employment in South Africa. These data show that the sector shed about 200 000 regular employees between 1985 and 1996, and a further 200 000 casual and seasonal workers.

While the long-term trend in farm employment is unambiguously downwards, Figures 1 and 2 below show that agricultural employment has declined at a slower pace than employment in the economy in general since at least 1990. The conclusion can, therefore, be drawn that the decline in farm employment is only partly the result of a secular decline in the contribution of the sector to the economy. A higher economic growth rate over the past 2 decades may have resulted in a less pronounced downward trend in employment.

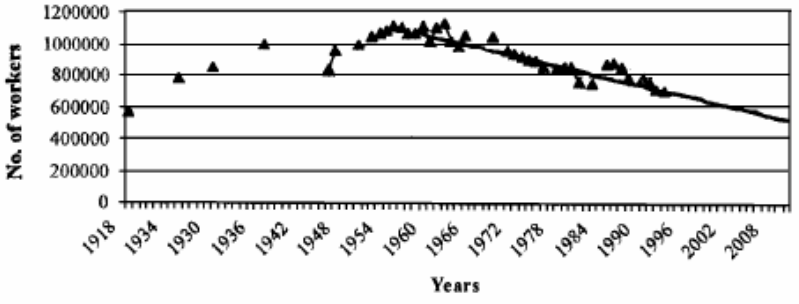

Figure 1. Regular employment in agriculture, 1918–2010. ▲ Regular employment; — Linear (Reg. employment)

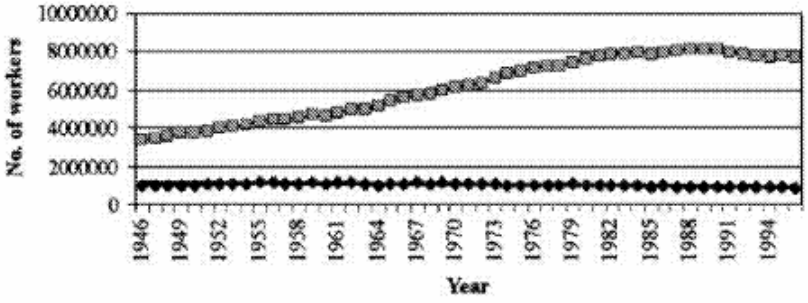

Figure 2. Formal sector employment 1946–1996. ◆ Agriculture; ■ Formal Sect. Employment

4.1 Growth in Total Factor Productivity

Any dynamic analysis of the effects of an increase in input prices has to account for the fact that farmers will react to profit pressures in a number of different ways. Table 4 shows that real gross annual capital formation, which was fairly stagnant in the period from 1980, has increased at a higher rate since 1990. Thus, farmers have reacted positively to political changes, greater access to international markets and to positive real interest rates since the beginning of the decade (the Table also shows that this has been accompanied by a decline in employment in the sector).

The TFP (Total Factor Productivity) ratio provides a more comprehensive measure of productivity growth in agriculture. The trend in TFP growth for commercial agriculture in South Africa is shown in Table 5.

A number of important conclusions can be drawn from the data presented in Table 5.

- The domestic terms of trade for intermediate and capital goods for commercial farmers were negative throughout the period 1960-96, thus the input prices they paid were rising faster than the output prices they received throughout the period.

Table 4. Growth in employment and capital formation 1947-96

	Total number of farm employees	Real Gross Capital Formation
1947-96	0.160471	2.005
1947-80	1.155652	2.654999
1980-96	-1.86128	0.677346
1990-96	-4.22271	7.785498

Table 5. Trends in TFP, 1947-96

	Terms of Trade	TFP	Net Farm Income
1960-80	-0.18	2.05	4.03
1980-90	-2.58	0.96	-3.73
1980-96	-1.80	1.19	-2.23
1990-96	-0.91	1.56	0.32
1960-96	-1.01	1.66	1.20

- The rate at which the domestic terms of trade turned against commercial farmers worsened during the first phase of deregulation (roughly from 1980), and improved subsequently, but still at a far higher rate than during the period 1960-80.
- The terms of trade measure only the rate of changes in the prices of intermediate and capital goods relative to the rate of change in output prices. Total Factor Productivity measures the relative rate of growth in the value of all inputs (including land and labour) and outputs (i.e. it accounts for the volume of inputs and outputs as well as the prices). The data show that TFP growth slowed during the first phase of deregulation, then increased again thereafter.
- During the period 1980-90, when inflation rates in South Africa had reached their peak and TFP growth was at its weakest, Net Farm Income growth was negative (i.e. commercial farmers' profit margins grew thinner every year). However, by 1990 TFP growth had recovered sufficiently to cause a positive annual growth in Net Farm Income in the period up to 1996.

4.2 The Elasticity of Input Substitution

The TFP results reported above measure the extent to which farmers have reacted to the cost-price squeeze, and it is clear that one of the principle solutions was to change not only the volume of inputs used, but also the particular input mix. Thus, their ability to adopt new modes of production depends critically on their ability to substitute inputs in reaction to relative price changes. Some years ago research showed that farmers' ability to substitute inputs was severely constrained by state intervention in the sector, but that this had improved as a result of the first stages of deregulation during the 1980s (Van Zyl and Groenewald, 1988; Sartorius von Bach and van Zyl, 1991). The Tables below show these trends, updated to the present (Poonyth and van Zyl, 2000).

The data in Table 6 show the elasticity of substitution between input pairs in South African agriculture between 1970-73 and 1994-98. When the sign of the elasticity is positive, the two inputs are substitutes. Thus, for example, the Table shows that if the price of labour increases, the use capital will increase and *vice versa.* When the sign of the elasticity is negative, the two inputs are complements. Thus, the Table shows that if the price of labour increases, the use of both intermediate goods and of land will decrease. The following comparisons can be made between the two periods 1970-73 and 1994-98.

Table 6. Allen elasticities of substitution between input pairs

	Capital	Labour	Intermediate goods	Land
1970-73				
Capital	-1.0933	1.2628	0.2654	0.1776
Labour		-2.0651	-0.7927	-1.6747
Intermediate goods			-0.5080	0.5512
Land				7.4453
1994-98				
Capital	-1.7567	1.3670	0.2697	0.3900
Labour		-2.4619	-0.0292	-1.1572
Intermediate goods			-0.4943	0.5149
Land				0.9274

- The ability of farmers to react to changes in the price of an input by using less of that input has generally improved, as shown by the own price elasticities. For example, as the price of capital (i.e. the interest rate) increases, so less capital is used. The data show that the elasticity of substitution for capital declined from - 1.0933 to - 1.7567, and for labour from -2.0651 to -2.4619 between the periods 1970-1973 and 1994-1998. Land provides an interesting exception, where price increases lead to increased sales, possibly in the expectation of further increases. The extent of this reaction has, however, tempered considerably since the early 1970s, as can be seen from the decline in the elasticity from 7.4453 to 0.9274.
- The elasticity of substitution between capital and labour has increased from 1,2628 to 1,3670, thus farmers' ability to substitute capital for labour has improved, albeit marginally.
- The degree of complementarity between labour and intermediate goods has dropped from -0.8 to -0.03. The conclusion is that, where labour and intermediate goods used to be complementary, there is now very little connection between them. Thus, farmers' flexibility has improved.
- There has been almost no change in the substitutability between capital and intermediate goods, and between land and intermediate goods.

Thus, there is some evidence of improved flexibility in input substitution in South African agriculture. This result is confirmed by the data in Table 7, which show the shadow elasticities of substitution between input pairs, i.e. the percentage adjustment in input ratios to changes in factor price ratios. The following observations can be made.

- The extent of the adjustment between capital and labour has increased, albeit only slightly, from 0.6592 to 0.6608 (the change from 1982-85 to 1994-98 was larger, namely from 0.5228 to 0.6608).
- The substitutability between capital and land has increased considerably, from -0.1027 (i.e. they were relatively weak substitutes) to 0.6148 (i.e. they have become relatively strong complements).
- The complementarity between capital and intermediate goods has improved from 0.3865 to 0.4249.
- Land and intermediate goods have also switched from being weak substitutes (-0.0596) to being relatively strong complements (0.3718).

While these results point to increased flexibility in input substitution, they have to be interpreted with care, as there is an evident factor bias toward capital intensity in South

Table 7. Morishima shadow elasticities of substitution

	Capital	Labour	Land	Intermediate goods
1970-73				
Capital	0	0.6592	-0.1027	0.3865
Labour		0	0.3644	0.3530
Land			0	-0.0596
Intermediate goods				0
1994-98				
Capital	0	0.6608	0.6148	0.4249
Labour		0	0.3762	0.2809
Land			0	0.3718
Intermediate goods				0

Table 8. Scale economies in South African agriculture

Year	Scale economies	Year	Scale economies	Year	Scale economies
1971	0.9347	1981	0.8636	1991	0.8056
1972	0.9335	1982	0.8442	1992	0.8051
1973	0.9245	1983	0.8451	1993	0.8094
1974	0.9138	1984	0.8301	1994	0.8116
1975	0.9044	1985	0.8280	1995	0.7998
1976	0.8971	1986	0.8432	1996	0.7935
1977	0.8913	1987	0.8387	1997	0.7903
1978	0.8879	1988	0.8246	1998	0.7848
1979	0.8888	1989	0.8110		
1980	0.8843	1990	0.8048		

African agriculture. The extent of this bias, and the way in which it has changed over time, is discussed in the next Section.

4.3 Economies of Scale

There has been much debate on the extent of scale economies in South African agriculture. To estimate the extent to which they exist, it is necessary to measure per commodity for relatively homogeneous production systems, and to adjust for resource quality. The data reported in Table 8 below cover the entire agricultural sector and have, obviously, not been adjusted for land quality. The only valid conclusion that can be drawn from Table 8 is, therefore, the trend in scale economies over time. In this respect, the data show relatively unambiguously that scale economies in South African agriculture have declined continuously since 1970.

This result is confirmed by the data in Table 9, which shows the bias in input shares in the agricultural sector in South Africa. From these data it is evident that the bias has been capital using and labour, land and intermediate good saving. At average factor shares for the entire period, the bias of technological change has been capital using at +0.193 annually, and labour, land and intermediate good saving at -0.0139%, -0.0227% and -0.1598% respectively.

The bias toward capital using has decreased at times, but never on a sustained basis. For example, the extent of the bias decreased after the early 1980s when simultaneous financial market deregulation and the withdrawal of overt interest rate subsidies from agriculture resulted in positive real rates of interest. However, the advent of negative real rates of interest in the economy at large during 1987-89 resulted, as expected, in an increase in the bias toward capital intensity.

A similar increase in the bias is found in the early 1990s, when interest rate subsidies were targeted to agriculture as part of the drought assistance schemes that were introduced during that time. The factor bias toward capital using increased from 0.1797 in 1992 to 0.2174 in 1994, after which it again started a slow decline.

The bias toward labour saving (i.e. towards decreased employment in agriculture) is also unambiguous throughout the period, but has changed in magnitude over time. Here the data predictably show almost the same inflexion points as the capital-using bias. For example, the bias decreased in the early 1980s (from -0.0169 in 1983 to -0.0134 in 1989) as the effects of the first phase of deregulation of the sector were felt. However, the bias toward labour shedding increased again after the reintroduction of negative real interest rates to farmers in the form of drought relief subsidies.

Finally, the data also reveal the change in factor shares in favour of the use of intermediate goods that was brought about by the increase in exports, especially from the horticultural sector, after 1990. The bias toward the saving of intermediate goods decreased from -0.1762 in 1991 to -0.1318 in 1998.

Table 9. The bias in technological change in South African agriculture

Year	Capital	Labour	Land	Intermediate
1980	0.1923	-0.0167	-0.0208	-0.1503
1981	0.1891	-0.0166	-0.0215	-0.1513
1982	0.1719	-0.0169	-0.0197	-0.1694
1983	0.1611	-0.0169	-0.0195	-0.1826
1984	0.1856	-0.0149	-0.0191	-0.1690
1985	0.2045	-0.0145	-0.0184	-0.1594
1986	0.1993	-0.0143	-0.0188	-0.1627
1987	0.2017	-0.0140	-0.0190	-0.1622
1988	0.2134	-0.0139	-0.0181	-0.1587
1989	0.1987	-0.0134	-0.0197	-0.1662
1990	0.1863	-0.0138	-0.0197	-0.1737
1991	0.1811	-0.0139	-0.0200	-0.1762
1992	0.1797	-0.0139	-0.0206	-0.1756
1993	0.2115	-0.0138	-0.0227	-0.1483
1994	0.2174	-0.0137	-0.0229	-0.1454
1995	0.2132	-0.0144	-0.0241	-0.1422
1996	0.2117	-0.0153	-0.0255	-0.1372
1997	0.2086	-0.0161	-0.0261	-0.1344
1998	0.2060	-0.0170	-0.0268	-0.1318
1970-98	0.1930	-0.0139	-0.0227	-0.1598

The analysis in this section shows that the agricultural sector has become more efficient and more flexible as a result of the processes of deregulation that have taken place. Not only has the productivity of the sector increased, but so has the ability of farmers to adjust production processes to changing relative prices. However, the results also show that there are remaining inefficiencies in the system. The most important of these seems to be a persistent bias toward the use of capital that is unwarranted in terms of the factor proportions available to farmers. Nevertheless, it is also important from a policy perspective to establish the extent to which the input (and output) prices to which farmers are reacting are still distorted by market imperfections or by government intervention. This issue is raised in the next section.

5 POLICY DISTORTIONS IN SOUTH AFRICAN AGRICULTURE

Farmers make decisions on what to produce and on what inputs to use in production on the basis of the relative prices of different product combinations, of different input combinations and of different input-output combinations. If, for example, farmers are following production practices that result in a level of capital intensity that is not warranted by the availability of labour relative to (scarce) capital, it is because the price of capital and/or of labour has been distorted by government policy or by some inherent imperfection in the market. Thus, policy makers need to be aware of the extent of these distortions.

Table 10. Total domestic support to South African agriculture (PSE)

	1990-91	1991-92	1992-93	1993-94	1995-96	1996-97	1997-98
Total PSE (Rbn)	2 848	3 904	7 499	4 119	0.536	3.574	1.351
Percentage PSE	13.69	16.74	31.04	14.50	2.28	8.87	2.72

Table 10 shows the magnitude of state intervention in South African agriculture, measured in terms of the Producer Support Estimate (PSE) calculation as prescribed by the OECD. While a partial measure of government intervention, it has the advantage of allowing cross-country comparisons, as the application of the method is monitored internationally.

The increase in PSE in 1992-93 was the result of the final pay-off of drought-related subsidies that were granted during the previous decade. The updated PSEs show that the degree of subsidization for South African agriculture has reached levels that are lower than those for Australia, and comparable with New Zealand, traditionally the lowest agricultural subsidisers in the world. The conclusion that can be drawn from these data is that the output prices that South. African farmers receive are market prices, i.e. that they are relatively undistorted by government intervention. This much can be expected after the extensive deregulation of agricultural marketing that has taken place.

6 POLICY IMPLICATIONS

Since the beginning of the 1990s South African agriculture has been subjected to a land reform programme, and agricultural markets have been extensively deregulated. Macro-level analyses reported here show that the sector as a whole has benefited from this process; however, there have been both winners and losers.

In the first instance it is clear that small farmers as a group have not benefited at all. Land reform has been slow and has affected only a few, while little has been done to address the needs of the poorest farmers in the former homeland areas. Farm workers have also not benefited as a group, although those fewer skilled permanent workers have seen an increase in their real earnings.

There is strong evidence of improved flexibility in input substitution in South African agriculture. The extent of the adjustment between capital and labour has increased, the substitutability between capital and land has increased, the complementarity between capital and intermediate goods has improved and land and intermediate goods have switched from being weak substitutes to being relatively strong complements.

Yet an evident bias toward capital using technology remains. At average factor shares for the entire period, the bias of technological change has been capital using, and labour, land and intermediate good saving. Thus, while the sector as a whole may have become more efficient, is still displays a bias towards capital intensity that is not justified by the relative factor endowments of the country.

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