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# Stages of Growth in the South African Economy: The Role of Agriculture

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## ABSTRACT

This paper identifies the stages of growth in the South African economy with particular reference to agriculture. Simple  $\alpha$ -matrix causality tests are used to determine the direction of causality between the gross sectoral products of the economy and the gross agricultural product. The percentage share of the agricultural industry in the South African economy is relatively small and continues to decline as the economy grows. However, there has been a greater integration of agriculture within the economy during the 1990s as a result of the liberalisation of many aspects of the economy. Agriculture may have played a passive role in the economy, but has provided foreign exchange revenue from net exports to facilitate growth in other sectors of the economy. In a more decontrolled environment, the agricultural sector will become increasingly susceptible to the changes in the macroeconomy, particularly the exchange rate.

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## INTRODUCTION

A persistent tendency in economic thought is to systemise the process of economic growth within a framework of sequential stages. Several attempts to divide economic history into discrete segments are testimony to this trend. The early work on this subject was conducted by Friedrich List and Karl Marx during the nineteenth century, each with his particular version of the sequential 'stages of growth' theory. List proposed five stages, namely savage, pastoral, agricultural, agricultural-manufacturing and commercial. His model posited increased industrial development and export demand as prerequisites for agricultural progress, thus advocating policies that would promote industrialisation. In contrast, Marx's stages were primitive communism, ancient slavery, medieval feudalism, industrial capitalism and socialism. He stressed the importance of

technical change in shaping economic institutions and considered agricultural productivity as a 'precondition' to the emergence of industrial capitalism.

There have been a number of developments since the time of these early proponents. List's approach was modified by Clark (1940) to cover three stages, i.e. primary, secondary and tertiary. His formulation of the transformation required the intersectoral transfer of labour to sectors of higher productivity, suggesting that labour would move to industry from agriculture. The 1960s saw the emergence of Rostow's (1964) 'leading sector' stages of growth approach, focusing on how society moved from one stage to another. He introduced the concept of a sequence of leading sectors, which succeed each other as the basic generators of growth. Following this view, the 'dual economy' models developed out of an attempt to understand the relationship between a lagged traditional sector and a growing modern sector (Lewis, 1954, 1955; Kaldor, 1966; Fei and Ranis, 1964)

Many authors had a rather limiting view of agriculture, the reasons for this being twofold. First, the income elasticity of demand for unprocessed food is less than unity and declines with higher incomes. Hence, the demand for raw agricultural products grows more slowly than consumption in general. Second, increased labour productivity in agriculture means that the same farm output can be produced with fewer workers, implying a transfer of labour to other sectors of the economy (Eicher and Staatz, 1990; Timmer, 1990). As agriculture's share of the economy was perceived to be declining, the need to invest in agriculture in the short run was played down.

Even within the agricultural sector, four evolving stages have been proposed (Timmer, 1990). The earliest phase of development is concerned with 'getting agriculture moving' (Mosher, 1966). This includes investment in the prime movers of agriculture, which are identified by Rukuni and Anandajayasekaram (1994) as new technology, human capital, infrastructure, effective institutions and a favourable political and economic environment. As the early investments pay off, the agricultural sector evolves into the next phase where it becomes a key contributor to the overall growth process, as outlined by Johnston and Mellor (1961). This development includes increase in the supply of food for domestic consumption, the release of labour for industrial development, thus enlarging the size of the market for industrial output, increasing the supply of domestic savings and earning foreign exchange. The third phase is the integration of agriculture with the rest of the economy, through the development of more effective labour and credit markets that link the urban and rural economies. The idea is that this will 'speed up the process of extracting labour and capital from these uses in agriculture

with low returns for those in industry or services with high productivity' (Timmer, 1990). The fourth phase can be seen in the treatment of agriculture in industrial economies, i.e. the USA and Europe. Commodity support policies, particularly in respect of prices, become the primary vehicle for supporting farm incomes. These subsidies have major effects on resource allocation.

The rest of the paper will attempt to clarify the situation in South Africa with regard to its various stages of growth. The next section supplies a view of the perceived stages of growth in the South African economy. Section three then analyses trends in sectoral output growth, while causality tests are performed in the subsequent section to determine whether agriculture has been a leading or passive sector in the economy. The final section gives a summary of the findings.

## STAGES OF GROWTH IN THE SOUTH AFRICAN ECONOMY

A number of authors have contributed to the literature on the stages of growth within the South African context, for example Lumby (1995), Jones (1991), Wickens, (1989) and Minnaar (1989). These authors highlight some of the forces that initiate change in economic growth. In a recent article Van der Berg (1993) has summarised the stages of growth in South Africa according to five phases.

The first stage is the agricultural phase up to 1868, when the country was dominated by subsistence agriculture due to the limited scope for exports, together with small and fragmented domestic markets and scarce inputs. The environment was not conducive to economic growth, owing to poor demand, supply and institutional factors. Substantial developments in industry resulted from the mineral discoveries in the middle to late 1800s.

The second phase was the agricultural/mining phase from 1868 to 1924. In the early stages of this phase agriculture and mining were the dominant driving forces in the economy. Diamond and gold discoveries induced large labour, capital and entrepreneurial transfers to South Africa. This in turn spurred domestic industry and agriculture but most consumer goods were imported due to limited domestic supply. The First World War fuelled the process of import substitution in manufactured goods, this process being carried further by the adoption of a policy of tariff protection from 1925 onwards (Lumby, 1990). Table 1 shows increases of the sectoral shares, over the period 1911-23, for manufacturing, construction and electricity of 5.71%, 8.43% and 2.38% per annum. In 1911 local manufacturing consisted mainly of sheltered industries dependent on gold mines for their

continued existence, with little general expansion of secondary industry (Lumby 1990). This was the result of a widely dispersed population, expensive transport facilities and a lack of cheap energy (lack of markets). South African industry experienced considerable expansion during the second half of the 1920s. This start was however restrained by the Great Depression of 1929-32.

The third phase from 1924 to 1933, saw the laying of the foundations of industrial policy. This was a period of consolidation and restructuring. The sectoral share of manufacturing continued to increase together with electricity at the rates of 2.89% and 8.58% per annum respectively. This growth was predominantly at the expense of agriculture. The government therefore attempted to stimulate agriculture, address the 'poor white' problem and reduce dependency on mining, a wasting resource. The policy initiatives during this period included: the organisation of agricultural marketing; labour legislation excluding blacks from certain jobs and reducing their ability to compete with whites; and the protection of domestic industry through tariffs to promote import-substituting industries.

The fourth phase from 1933 to 1974, was a period of diversifying industrialisation. The industrial growth in the early thirties was partly the result of South Africa's decision to abandon the gold standard and devalue the currency in December 1932 (Lumby, 1995). The increased price of gold (due to the devaluation) and the multiplier effects which flowed from the subsequent gold mining boom of the 1930s, were felt chiefly in the construction industry and local manufacturing (Lumby, 1995). Table 1 shows that there was tremendous economic growth at the beginning of this stage (1933-39), with significant growth in all sectors of the economy. Real GDP per capita for the economy as a whole grew at the rate of 5% per annum, with the per capita growth of agriculture, mining, manufacturing, construction and electricity being 4.9%, 2.34%, 8.42%, 15.53% and 6.16% respectively.

The fourth phase was characterised by several demand surges, largely due to: another devaluation of the South African currency; industrial expansion to support World War II; the international minerals boom of the 1960s; and the gold price rise following the first oil price shock of 1970s. These demand-led booms laid the foundations for sustained high economic growth, and the increased sophistication and diversification of industrial activity. The 1960s saw rapid growth which was closely correlated with developments in manufacturing. The growth of construction in the 1960s was substantial, but since the 1970s the performance has declined, this may be the result of the high interest-high inflation economy which was a feature of the 1970s and 1980s (Jones, 1991).

**Table 1: Sectoral GDP shares and growth rates of at factor cost (R millions)<sup>1</sup>**

Period	Years	Total	AGR	MIN	MAN	CON	ELE	TRA	Other
WW I and its aftermath	1911	100	21.5	27.3	4.15	0.7	1.03	10.03	35.3
	1923	100	20.1	17.1	7.9	1.9	1.3	11.0	40.6
Second stage of growth	Share	-	NS	-5.26	5.71	8.43	2.38	NS	1.29
	RSP	NS	NS	-5.68	5.29	8.00	1.96	NS	0.89
	RSPPC	-1.99	NS	-7.25	3.72	6.44	NS	NS	-0.69
Consolidation and restructuring	1924	100	21.0	16.6	7.8	1.8	1.2	10.8	40.6
	1933	100	13.3	21.4	10.1	1.1	2.5	10.8	48.7
Third stage of growth	Share	-	-6.20	NS	2.89	-5.27	8.58	NS	NS
	RSP	NS	-4.83	NS	4.26	NS	9.95	2.00	2.15
	RSPPC	NS	-6.97	NS	2.11	-6.10	7.79	NS	NS
Pre WW II growth	1933	100	13.3	21.5	10.1	1.1	2.5	10.8	40.6
	1939	100	13.2	18.8	12.4	2.2	2.5	10.2	40.7
Stage Four	Share	-	NS	-2.61	3.41	10.53	NS	-1.10	NS
	RSP	6.90	6.80	4.29	10.31	17.42	8.05	5.80	7.02
	RSPPC	5.00	4.90	2.34	8.42	15.53	6.16	3.91	5.13
WW II and its aftermath	1940	100	12.6	19.4	12.8	1.9	2.4	9.7	41.1
	1947	100	15.3	10.5	17.6	2.7	1.9	10.1	41.9
Stage Four	Share	-	NS	-8.64	5.01	NS	-2.81	NS	NS
	RSP	3.90	5.50	-4.74	8.91	8.08	NS	4.69	4.32
	RSPPC	2.16	3.76	-6.48	7.17	6.34	NS	2.95	2.59
Diversifying Industrialisation	1948	100	16.4	10.3	18.1	3.4	1.8	9.9	41.9
	1974	100	9.4	12.2	21.4	5.3	2.3	8.9	40.1
Stage Four	Share	-	-3.02	-0.80	0.75	1.63	1.53	NS	0.48
	RSP	5.09	2.12	4.34	5.89	6.77	6.67	5.09	5.62
	RSPPC	3.22	NS	2.42	3.97	4.85	4.75	3.17	3.70
Secular Stagnation	1975	100	8.34	11.2	23.4	5.2	2.6	9.2	40.3
	1993	100	4.3	8.3	22.3	0.7	3.8	7.7	50.1
Stage Five	Share	-	-2.86	-2.64	NS	-2.20	1.11	-1.56	1.38
	RSP	1.94	NS	NS	2.27	NS	4.04	0.57	3.52
	RSPPC	NS	-3.07	-2.48	NS	-2.41	1.70	-1.77	1.18
Total Period	1911	100	21.5	27.3	4.2	0.7	1.0	10.0	35.3
	1993	100	4.3	8.3	22.3	3.1	3.8	7.7	50.6
	Share	-	-1.78	-0.92	1.94	1.74	1.53	-0.27	0.07
RSP	4.51	2.73	3.59	6.45	6.25	6.04	4.24	4.58	
RSPPC	2.56	0.78	1.63	4.50	4.29	4.09	2.29	2.62	

Note: Growth rates are calculated as  $x=e^{\beta t}$  where  $\beta$  is the growth rate,  $x$  is the variable of interest and  $t$  is a time trend.

Source: Sectoral GDP shares were derived from various issues of *South African Statistics*.

Stimulated by the gold mines, electricity also experienced rapid growth. This growth continued in the 1970s with the establishment of large power stations in the former Eastern Transvaal (Jones, 1991). In 1965, the share of manufacturing in GDP exceeded the combined contribution of the agricultural and mining sectors for the first time. This signalled a significant broadening of the industrial base away from the pre-war concentration on primary products and the production of consumer goods, towards a wide range of intermediate goods (Lumby, 1995). In contrast, agriculture experienced moderate growth in the 1960s which even slowed down in the 1970s. Despite the growth and diversification of South African industry during the decades following the Second World War, the manufacturing sector continued to remain reliant upon the export earnings of the primary sector.

The fifth stage from 1975 until the present has been a period of secular stagnation. This is reflected in the low and non-significant growth of output in of most sectors of the economy and the decline in the corresponding per capita figures. The factors causing these low growth rates were: international recession; an overvalued exchange rate of the rand in the 1970s; and economic sanctions that served to limit South African exports. Import substitution offered no further scope for growth, and domestic demand was stagnant. Moreover, there was an unattractive environment for economic growth. This can be attributed to social and political conflict in South Africa; regional wars and destabilisation policies by the South African government to counter what it termed a 'total onslaught'; deteriorating international relations, culminating in sanctions and disinvestment pressures from abroad; labour conflict and the visible collapse of the apartheid paradigm's legitimacy and ability to be maintained without coercion (van der Berg, 1993). The three decades after 1960 the transformation of the economy has been characterised by growth of the secondary sector followed by mining and agriculture.

Over the sample period, agriculture in South Africa has played a diminishing role in its contribution to GDP (21.5% in 1911 compared to 5.1% in 1990), with its share declining at the rate of 1.78% per annum (see Table 1). This decline has been interpreted by some as the normal pattern of economic development, by others as being exacerbated by distorted policy incentives (World Bank, 1994). The fastest growing economic sectors have been manufacturing, construction and electricity, which experienced annual growth rates of sectoral shares between 1.5% and 2.0% over the entire period 1911-93.

South Africa's GDP increased from R289 million in 1911 to R258 348 million in 1990, at the annual growth rate in *real* GDP of 4.51%. Even though the share of agriculture's contribution to total GDP declined between 1911 and 1990, the

growth rate of agriculture's real GDP contribution increased at 2.73% per year, which was about the same rate as the population growth rate (2.8%) over the same period. Manufacturing was the fastest growing sector with the average annual growth rate of 6.45% per year, while construction and electricity expanded at 6.25% and 6.04% respectively. Mining had a lower growth rate of 3.59%, and transportation a growth rate of 4.24%. These results obviously suggest that emphasis has shifted from agriculture and mining to manufacturing.

Increases in per capita GDP did not depend directly on increases in food production. However, even though agriculture's direct contribution to GDP is low, its indirect effects, in other words market relationships, are relatively high (Brand, 1969; Townsend, 1997). Food supply expanded to meet the growing demand that accompanied economic development, thus avoiding the use of scarce foreign exchange to finance imports. Even though agriculture has not played a leading role in the economic growth of South Africa during the past decades, foreign exchange earnings by agricultural exports have helped finance inputs imported for other sectors, mainly manufacturing. (Brand, 1969). It would appear that the most important market contributions of agriculture to economic development in South Africa has been to facilitate growth in other sectors of the economy, particularly industry.

In order to separate the different stages of growth, tests for long-run relationships and causality between these sectors were performed. This provided some information as to whether agriculture has been a leading or passive sector in the economy. The next section provides the analysis.

## **TESTING FOR LONG-RUN RELATIONSHIPS AND CAUSALITY**

### **Methodology**

A common approach used to test for long run relationships between variables is cointegration and recent literature has proposed many alternative methodologies to test for cointegration between variables. The Johansen approach (1988) is used in this analysis: this has superseded some of the other tests, such as the more common Augmented Dickey-Fuller (ADF) test (1981). The present approach allows the estimation of all cointegrating relationships and constructs a range of statistical tests to test hypotheses about how many cointegrating vectors there are and how they work in a system.

Johansen (1988) proposed a general framework for considering the possibility of multiple cointegrating vectors, and this framework also allows questions of causality and general hypothesis tests to be carried out in a more satisfactory way. The procedure begins by defining a VAR of a set of variables  $X_t$

$$X_t = \pi_1 X_{t-1} + \dots + \pi_k X_{t-k} + e_t \quad t = 1, \dots, T \quad (1)$$

If there are four variables in the model, then this becomes a four-dimensional  $k$ -th order vector autoregression model with Gaussian errors.  $X_t$  is a vector of all relevant variables and  $k$  is large enough to make the error term white noise. The length of the lag can be determined by the Akaike Information Criteria (AIC) or the Schwarz Criteria (SC). In this form, the model is based on minimal behavioural assumptions on the economic phenomenon of interest. This then allows for a maximum likelihood analysis if we assume Gaussian errors. The VAR model can be reparameterised in error correction form (Cuthbertson *et al* 1993) as:

$$\Delta x_t = \sum_{i=1}^{k-1} \Gamma_i \Delta x_{t-i} + \Pi x_{t-k} + e_t \quad t = 1, \dots, T$$

$$\text{where} \quad \Gamma = [(I + \pi_1), (I + \pi_1 + \pi_2), \dots, (I + \pi_1 + \dots + \pi_k)] \quad (2)$$

$$\Pi = I - \pi_1 - \pi_2 - \dots - \pi_k$$

$I$  is the identity matrix. The Johansen testing procedure is a multivariate likelihood ratio test for an autoregressive process with independent Gaussian errors. The procedure involves the identification of rank of the matrix  $\Pi$ . The heart of the Johansen procedure is simply to decompose  $\Pi$  into two matrices,  $\alpha$  and  $\beta$ , such that:

$$\Pi = \alpha\beta' \quad (3)$$

The rows of  $\beta$  may be defined as the  $r$  distinct cointegrating vectors, i.e. the cointegrating relationships between the four non-stationary variables, and the rows of  $\alpha$  show how these cointegrating vectors are loaded into each equation in the system. The loading matrix, therefore, effectively determines the causality in the system; i.e. it allows us to test the direction in which causality flows. Johansen (1988) gives a maximum likelihood estimation technique for estimating both matrices and outlines suitable tests to find the number of distinct cointegrating vectors that exist, as well as to test hypotheses about the matrices. Locating a unique cointegrating vector implies that the variables are integrated of order one, since the reduced rank condition of  $\Pi$



can be viewed as a multivariate analogue of the ADF test for a unit root (Dickey, 1990).

Testing restrictions on  $\beta$  in equation (3), allows testing parameter restrictions on the long-run properties of the data. By testing restrictions on the  $\alpha$ -matrix, the direction of causality within the model can be tested. This causality test has superseded those introduced by Granger (1969). Mosconi and Giannini (1992), and Hall and Wickens (1993), developed similar estimation and testing procedures for causality within systems of integrated variables which exhibit cointegration. Hall and Wickens use a more restrictive definition of causality than Mosconi and Giannini, involving only long-run conditions. They suggest that a sufficient, but not necessary, condition for weak (long-run) causality is given by a simple restriction on the Johansen loading matrix,  $\alpha$  in  $\Pi = \alpha\beta'$ . If the  $\alpha$ -matrix has a complete column of zeros, then no cointegrating vector will appear in a particular block of the model, thus indicating no causal relationship. Using this approach for the bi-variate case of agriculture and another sector in the economy, this can be represented as an expansion of equation 3, namely:

$$\begin{bmatrix} \Delta x_a \\ \Delta x_o \end{bmatrix} = \begin{bmatrix} \gamma_{ai} \\ \gamma_{oi} \end{bmatrix} \begin{bmatrix} \Delta x_{ai-1} \\ \Delta x_{oi-1} \end{bmatrix} + \begin{bmatrix} \alpha_{1a} & \alpha_{1o} \\ \alpha_{2a} & \alpha_{2o} \end{bmatrix} \begin{bmatrix} \beta_{1a} & \beta_{1o} \\ \beta_{2a} & \beta_{2o} \end{bmatrix} \begin{bmatrix} x_{ai-1} \\ x_{oi-1} \end{bmatrix} \quad (4)$$

where  $x_a$  is the agricultural sector's real product and  $x_o$  is the real product of another sector in the South African economy, i.e. mining, manufacturing, transportation, construction, electricity and 'other' in this particular analysis. Each of these sectors was used in sequence, i.e. causality was tested between agriculture and mining, then between agriculture and manufacturing, etc. A weather variable was included in each of these equations to account for variations in climate. If  $\alpha_{1a} \neq 0$ ,  $\alpha_{1o} = 0$ ,  $\alpha_{2a} = 0$  and  $\alpha_{2o} = 0$ , then causality runs from the relevant sector 'o' to agriculture and there is no feedback in the system from agriculture to the relevant sector. Bi-directional causality requires  $\alpha_{1a} \neq 0$ ,  $\alpha_{1o} \neq 0$ ,  $\alpha_{2a} \neq 0$ , and  $\alpha_{2o} \neq 0$ , while no causal relationship requires  $\alpha_{1a} = 0$ ,  $\alpha_{1o} = 0$ ,  $\alpha_{2a} = 0$ , and  $\alpha_{2o} = 0$ .

## Results

The  $\alpha$ -matrix tests described above were performed, while the Wald test of the restrictions were used to test the significance of the loading weight (Hall and Milne 1994, Caporale and Pittis, 1995).

Table 2: Unit Root tests on sectoral real product series

GDP variable	AR process	Dickey-Fuller/Augmented Dickey-Fuller test	CRDW test*	Johansen test
<b>Agriculture, Forestry and Fishery: Levels</b>	1	-1.09	0.04	1.21
First difference		-5.72	1.87	51.23
<b>Mining and quarrying: Levels</b>	1	-0.41	0.02	0.17
First differences		-7.21	1.59	40.98
<b>Manufacturing: Levels</b>	3	-1.86	0.01	3.59
First difference		-4.82	1.16	21.33
<b>Transportation: Levels</b>	2	-0.61	0.01	0.38
First differences		-5.89	1.48	29.77
<b>Construction: Levels</b>	1	-1.59	0.01	2.57
First differences		-5.96	1.05	30.33
<b>Electricity: Levels</b>	1	-0.44	0.03	0.19
First differences		-6.74	1.41	36.78
<b>Others: Levels</b>	1	-0.17	0.01	0.07
First differences		-5.72	1.15	28.05
<b>Weather: Levels</b>	1	-7.50	1.64	43.68
<b>Critical Values</b>		<b>-2.9</b>	<b>0.58</b>	<b>3.57</b>

Note: \*CRDW is the Cointegrating Regression Durbin Watson test proposed by Sargan and Bhargava (1983)

A rolling regression with a window size of 30 years was used in the analysis in an attempt to capture the variation in causality over time, i.e. causality was determined between the variables for the time period 1911-1940, then from 1912 to 1941, etc. to the end of the period. Additional tests (Dickey-Fuller, 1981) for determining the order of integration of the individual variables were also performed (Table 2). All the variables are integrated of the order one  $I(1)$ . The causality tests are presented in Table 3, 1940 represents the 30 year sample (1911-1940). Due to the extensive number of regressions tested, only a summary of the results is presented in the table.

Bivariate causality tests were then performed between all sector real products between 1911 and 1993 to determine whether agriculture was causally prior, which would suggest that growth in agriculture affects the growth of other economic

sectors. As the strength of the relationship is likely to vary over time, corresponding to different 'stages of development', a time-varying approach was used in the analysis.

**Table 3: Causality between real product of agriculture and other sectors**

Causal relationship of agriculture with:	Period of no causal relationship	Uni-directional causality		Period of bi-directional causality
		Period	Direction	
Manufacturing	1940-1956	1957-1987	Manufacturing to agriculture	1988-1993
Transportation	1940-1974	1975-1987	Transport to agriculture	1987-1993
Construction	1940-1961	1962-1988	Construction to agriculture	1989-1993
Electricity	1940-1968	1969-1990	Electricity to agriculture	1991-1993
Other	Intermittent until 1951	1979-1988	Other to agriculture	1952-1978, 1989-1993

The causality results suggest no causal relationship between the sector GDPs and agriculture from 1911 to about the late 1950s. This is contrary to *a priori* expectations. Causality would be expected to exist between some sectors. A possible explanation is that most of the strong sector linkages occurred before 1911. Agriculture dominated the economy until 1868 prior to the discovery of diamonds with economic growth remaining minimal (van der Berg, 1993). The subsequent discovery of diamonds and gold stimulated the initial boom in infrastructural investment, which in the larger part of South Africa took place during the last quarter of the nineteenth century. This is evidenced by the fact that the open railway mileage in South Africa increased from 160 in 1875 in the Cape Colony to some 4167 around the turn of the century (Brand 1969). The discovery of diamonds and gold also served to increase the rural population considerably. This larger market caused a surge in farming throughout South Africa. Where the market had mainly been wool, grain, hides and skins, there was now a market for fresh produce and meat. In consequence, there was a rapid change from a self-sufficient economy to intensive production methods (Joubert and Groenewald 1974).

The absence of a causal relationship between agriculture and manufacturing between 1940-56 and between agriculture and transport is somewhat surprising. However, as mentioned in an earlier section, the main driving force behind manufacturing in the early 1940s was industrial expansion to support the war effort. While the major impact on agriculture was from agricultural policies on agricultural production, i.e.: the effects of the agricultural marketing boards. The mining sector was primarily responsible for the growth of the transport system.

The direction of causality within the system becomes significant after the 1970s, with the predominant direction of causality being from manufacturing, transportation, construction and electricity to agriculture. However, from the late 1980s there is significant bi-directional causality, reflecting the greater integration of agriculture into the economy. This corresponds to the deregulation and liberalisation of many aspects of the agricultural sector, which made it more responsive to the market conditions faced by other sectors of the economy. To the extent that the sector has become more integrated, it has also become more vulnerable to changes in the economic environment in which it operates. Changes in the operation of industries from which it buys inputs or sells output to, will impact more significantly on agriculture itself. This suggests that agriculture is currently at the initial stages of phase three of Timmer's (1990) evolution of agriculture model discussed above, while it also shows some characteristics of stage four. Agriculture in South Africa can be separated into two distinct sectors, namely a large-scale commercial sector producing both food and industrial crops for sale by means of sophisticated production practices and a high level of purchased inputs, and a small-scale, basically subsistence sector using few inputs and producing primarily for its own needs. These different sectors are obviously at different stages of growth, with the small-scale sector positioned at the beginning of the first stage, and the large-scale sector positioned at the beginning of the third stage.

## CONCLUSION

This paper has attempted to identify the stages of growth in the South African economy with particular focus on agriculture. Simple  $\alpha$ -matrix causality tests were used to determine the direction of causality between sectors of the economy. The percentage share of the agricultural industry in the South African economy is relatively small and continues to decline as the economy grows. However, there has been a greater integration of agriculture within the economy in the 1990s as a result of the liberalisation of many aspects of the economy. Thus, the agricultural sector will be increasingly subject to the changing economic environment and

changes in the operation of industries from which it buys inputs and to which it sells output.

The present stage of agriculture's development corresponds to the initial stages of phase three of Timmer's (1990) proposed scheme where agriculture becomes a significant contributor to the overall growth process. In order to improving these contributions, a number of strategies are relevant for South Africa. Market expansion, investment in research and development, land reform and the reduction of small-scale biases will all help in enhancing performance to ensure increased efficiency, export earnings and employment opportunities (Townsend, 1997).

<sup>1</sup>Abbreviations used in Table 1 : AGR – Agriculture, Forestry and Fishing, MIN – Mining and Quarrying, MAN – Manufacturing, CON – Construction, ELE – Electricity, Gas and Water, TRA – Transport, Storage and Communication. RSP – real sectoral product (i.e. output by kind of economic activity) RSPPC – real sectoral product per capita.

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