

Second Carnegie Inquiry into Poverty and Development
in Southern Africa

Implications and Implementation
of Income Redistribution:
An Investigation Based on Social
Accounting Matrix

by

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PREFACE

At the end of August 1986, a two-day workshop entitled Macroeconomic Policy and Poverty in South Africa: The Crucial Issues was held at the University of Cape Town. The impetus for this Workshop arose out of a perceived void in South African economic thinking. Researchers on poverty deal with microlevel issues in great detail, but often lose sight of the broader context within which ground-level issues are placed. Macroeconomists, by contrast, tend to theorise about financial and monetary matters and overlook the implications of macro-economic policy for the poorer sections of the population.

Accordingly, in December 1985, Terence Moll began working on the topic and travelled round the country. He spoke to various academics from Economics Departments in the Transvaal, Natal, Orange Free State and the Cape, trying to draw on existing research and encouraging people to think about this area. These were eventually drawn together in a Workshop designed to encourage economists to think at the macroeconomic level about poverty and welfare issues in South Africa.

The Workshop was hosted by the School of Economics and the Southern African Labour and Development Research Unit. Thirteen papers were presented and about 25 economists from a number of different South African universities attended. Arising out of the vigorous discussion and debate, it was suggested that some of the papers be published in revised form in the post-Carnegie Working Paper series. A review and critique of the Workshop papers by Terence Moll will be appearing in due course.

We are grateful not only for this support but also for the continued interest in research work of this nature.

Francis Wilson

1. INTRODUCTION

It is widely recognised that very large income disparities exist in South Africa, not only between population groups but also within them, particularly amongst Blacks.

Recently the Office of the government's Central Economic Advisory Services (CEAS) has published a social accounting matrix (SAM) for South Africa for the year 1978 (CEAS, 1986; Eckert and Crouch, 1986; Stadler et al. 1986). The SAM provides a detailed statistical structure for evaluating income distribution patterns in South Africa. A brief description of the SAM structure is provided in the Appendix. The reliability of the statistical data embodied in the SAM may be called into question but no comprehensive body of information exists which would allow better estimates to be obtained on a systematic basis.

Numerous micro-studies on poverty in South Africa have been carried out, many of which were published and presented at the Second Carnegie Conference at the University of Cape Town (Carnegie, 1984). It is not the intention of this paper to enter into the debate of the real dimensions of poverty (or for that matter of the unrecorded income of the rich), but rather to investigate the sensitivity of the economy to various trends and measures influencing income distribution. For this purpose the structure provided by the SAM is admirably suited. If better or alternative data become available, these can be substituted in the SAM structure and evaluated using methods such as those used in this investigation.

The published SAM reflects conditions as they existed in 1978. Conditions have changed since then and it is important to be able to update and extrapolate data and conclusions to later years for investigating alternative possible development patterns and growth rates. This is a further important issue which will be addressed in this paper.

2. INCOME DISTRIBUTION ACCORDING TO THE 1978 SAM

The SAM provides information on income distribution by income quintiles for each population group (White, Coloured, Asian and Black) in terms of per

capita income computed from household income data calculated from the 1980 Population Census. The top 20 percent income bracket is further subdivided into the 80-90, 90-95 and 95-100 percent income categories. Thus for each population group the current income for seven income levels is provided.

The SAM provides information on earned and unearned income, taxes, savings, transfers, private consumption expenditure (PCE) and some smaller items for each income group, so that it is possible to relate remuneration, current income and PCE for each income category. In Table 1 these relationships are indicated for each population group as well as for the population as a whole.

In Table 2 the current income per capita for each of the income classes is indicated. It can be seen that these levels are indeed very low for Blacks in the lower income classes and a closer look should perhaps be taken at the reality of these levels. However, no adjustments are made in this investigation.

A widely used procedure for describing and comparing income distribution patterns is by means of Lorenz curves and Gini coefficients. In a Lorenz curve the percentage of total income is plotted against the income percentile. Plots for the total population, as well as for both Whites and Blacks are shown in Figure 1. If income were completely uniformly distributed, the Lorenz curve would coincide with the diagonal. The area between the diagonal and the curve provides an indication of the level of income inequality. Its ratio to the triangular area under the diagonal is known as the Gini coefficient. Values for Gini coefficients are provided in Table 3 where they are also compared with other Gini coefficients for South Africa calculated by Simkins (1979) as well as with values calculated for some other countries by Paukert (1973, 1981). In all cases current income is used in the plots, i.e. income from all sources and before taxation (see Table 1).

The Gini coefficient values of Table 3 clearly indicate that the income distribution of South Africa compares very unfavourably. In fact the highest value out of 57 countries listed by Paukert is 0,64 (for Gabon). The maldistribution for Blacks alone is also severe, only four countries exceeding its value of 0,55. On the other hand the Gini coefficient of 0,39 for Whites alone is typical of the values found in the Western democracies. The countries listed in Table 3 have been chosen because they have characteristics which make their comparison with South Africa of intrinsic interest. The topic will nevertheless not be pursued further here.

TABLE 1: SOURCES OF INCOME RELATIVE TO PCE FOR SAM IN 1978

	WHITES	COLOUREDS	ASIANS	BLACKS	TOTAL
<u>Remuneration</u>					
Industry	0,9374	0,9512	0,8225	0,8292	0,9007
Domestic services	0,0008	0,0435	0,0037	0,0883	0,0316
Gov. remuneration	0,1932	0,2316	0,1894	0,1849	0,1936
Total remun.	1,1314	1,2264	1,0156	1,1025	1,1259
<u>Unearned income*</u>					
ex-GOS	0,3890	0,0782	0,2111	0,1227	0,2745
GOV transfers	0,0842	0,0468	0,0267	0,0126	0,0568
HH transfers	0,0040	0,0017	0,0021	0,0569	0,0202
Ext transfers	0,0115	0,0019	0,0064	0,0025	0,0078
Current income	1,6202	1,3550	1,2619	1,2971	1,4851
less Tax	0,2823	0,1614	0,1306	0,1072	0,2125
Disposable income	1,3379	1,1937	1,1313	1,1899	1,2726
less:					
Savings	0,1563	0,1035	0,0383	0,0659	0,1196
Imports	0,0965	0,0620	0,0685	0,0439	0,0763
HH transfers	0,0040	0,0017	0,0021	0,0569	0,0202
Domestic services	0,0552	0,0000	0,0000	0,0000	0,0316
Adjustment for SWA	0,0259	0,0264	0,0223	0,0232	0,0250
PCE relative values	1,0000	1,0000	1,0000	1,0000	1,0000
PCE (1975 R millions)**	7437	1055	479	4046	13017

Notes: * ex-GOS = income from gross operating surplus, e.g. rent, dividends
 Gov transfers = transfers from government, e.g. pensions
 HH transfers = transfers from other households
 Ext transfers = transfers from abroad

** Values deflated from 1978 to 1975 prices by GDE deflator of 1,3680

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TABLE 2: PER CAPITA INCOME GROUPINGS DEVELOPED FROM THE 1980 POPULATION CENSUS

PERCENT OF POPULATION	HOUSEHOLD INCOME PER CAPITA (1975 RANDS)*			
	WHITES	COLOUREDS	ASIANS	BLACKS
0 - 20	0 - 972	0 - 135	0 - 249	0 - 43
20 - 40	972 - 1462	135 - 243	249 - 374	43 - 94
40 - 60	1462 - 2025	243 - 371	374 - 550	94 - 193
60 - 80	2025 - 3035	371 - 652	550 - 869	193 - 430
80 - 90	3035 - 4223	652 - 969	869 - 1286	430 - 715
90 - 95	4223 - 5685	969 - 1322	1286 - 1733	715 - 948
95 - 100	5685 +	1322 +	1733 +	948 +

Source: Eckert and Crouch (1986)

Note: * Incomes are given for 1980 but have been deflated to 1975 Rand values using the GDE deflator value of 1,847

TABLE 3: GINI COEFFICIENTS FOR CURRENT INCOME: SOUTH AFRICA COMPARED TO SOME OTHER COUNTRIES

COUNTRY	GDP PER CAPITA 1975 (US\$)	YEAR	GINI COEFF	SOURCE
<u>South Africa</u>				
White	5360*	1980	0,39	1
Black	510*	1980	0,55	1
All groups	1370	1980	0,66	1
" "	1180	1976	0,65	2
" "	1360	1970	0,71	2
<u>Other countries</u>				
Mexico	955	1963	0,53	3
United Kingdom	3440	1964	0,38	3
Zambia	450	1959	0,48	3
South Korea	440	1970	0,40	4

Sources: 1) This investigation. Data based on 1980 population census as processed for the SAM by Eckert & Crouch (1986).
 2) Simkins (1979)
 3) Paukert (1973)
 4) Paukert et al. (1981)

Note: * Calculated on the assumption that the distribution of current income indicated by the SAM for 1978 (62,4% White, 27,1% Black) could be used to distribute the GDP between these population groups.

3. EFFECT OF INCOME REDISTRIBUTION ON THE ECONOMY

A calculation procedure has been developed by Paukert *et al.* (1981) for evaluating parametric changes in SAM type of matrix structures. In particular the effect of income redistribution can be evaluated. Various runs were carried out in which a redistribution of income was assumed while keeping the rest of the SAM structure fixed.

The distribution of both current income and of PCE for the various runs are shown in Table 4. The effects of these different distributions on a range of economic variables are indicated in Table 5 for a fixed GDP for all the runs¹⁾. The effects of income redistribution, economic trends and policies on GDP growth (and also the reverse interactive effects of GDP growth on such factors) are dealt with in Sections 4.3 and 7.

1) As indicated in the appendix, simulation runs are actually carried out in the first place for fixed exogenous final demand (FD) rather than fixed GDP. The exogenous FD consists mainly of exports (EXP) and gross domestic investment (GDI). The main other elements of FD, i.e. PCE and current government expenditure (GE) are endogenous in the model. Comparison on the basis of fixed GDP allows relative shifts to be calculated for the same size of the economy (as defined by the size of the GDP).

TABLE 4: INCOME AND EXPENDITURE PATTERNS FOR RUNS ANALYSED IN TABLE 5

PERCENTAGE BY POPULATION GROUP				
RUN*	WHITES	COLOUREDS	ASIANS	BLACKS
DISTRIBUTION OF CURRENT INCOME				
1	62,38	7,37	3,12	27,12
2**	63,03	7,50	3,16	26,30
3**	63,21	7,40	3,17	26,22
4	53,74	7,34	3,62	35,30
5	60,93	7,19	3,05	28,83
DISTRIBUTION OF PCE				
1	57,13	8,11	3,68	31,08
2**	63,03	7,50	3,16	26,30
3**	63,21	7,40	3,17	26,22
4	44,92	8,06	4,69	42,33
5	55,60	7,88	3,58	32,94

Notes: * All runs are based on the 1978 SAM. Only the deviations from the SAM are indicated below:

- 1) Unmodified SAM
- 2) All current income and PCE distributed as for Whites
- 3) All current income and PCE distributed as for Blacks
- 4) Distribution as calculated for a 'surprise-free' scenario for the year 2000
- 5) Social welfare payments to Blacks (Government transfers) increased 10-fold

** Full White (run 2) or Black (run 3) current income patterns are assumed, i.e. not only PCE but also tax, savings and other income components (see Table 1). Hence PCE and CI distributions are identical.

The effect of the different distributions of current income between Whites and Blacks shown in Table 5 are very clear. Obvious effects of Black relative to White patterns are those of a significant increase in employment, lower government income and savings, and a much higher PCE, particularly for consumer non-durables such as agricultural products, but relatively lower expenditure on consumer durables and services such as machinery and finance. Imports are considerably reduced for an equivalent GDP. The overall increase

in employment is of course very favourable. It is strongly related to the increased demand for agricultural products which are relatively labour intensive¹⁾. The lower government income and savings are a result of lower tax and savings rates for Blacks.

TABLE 5: RESPONSE OF THE ECONOMY TO VARIATIONS IN STRUCTURAL PARAMETERS FOR CONSTANT GDP

RUN*	SAM VALUES REL. TO GDP	PERCENT CHANGE RELATIVE TO SAM VALUES*			
		WHITE CI PATTERN**	BLACK CI PATTERN**	PCE PATTERN FOR 2000	BLACK TRANSFER X 10
	1	2	3	4	5
Exog FD	0,6919	2,33	-4,84	-0,60	0,26
GDP	1,0000	0,00	0,00	0,00	0,00
Total Output	1,9788	-2,87	5,13	0,64	0,84
GOS	0,4623	-2,13	3,72	0,48	0,56
Remuneration	0,5377	1,83	-3,19	0,41	-0,48
Current income	0,6969	0,23	0,67	-0,03	1,86
PCE	0,4773	-8,21	15,39	1,93	2,21
Government income	0,2407	9,39	-18,13	-2,17	0,25
Savings	0,3049	2,94	-5,57	-0,81	0,09
Imports	0,3895	1,48	-3,52	-0,36	0,30
Total employment	0,1474	-4,50	8,41	1,01	0,95
Black employment	0,0880	-4,90	9,09	1,09	0,93
Agriculture	0,0836	-14,82	25,70	3,28	1,02
Finance	0,1213	12,11	-23,32	-2,57	-0,31

* See Table 4 (and text) for run descriptions.

** Runs have also been carried out where only the PCE pattern has been made uniform for the races - with less pronounced results which are not considered here.

1) The assumption of a linear relationship between employment and output (and, indeed, of constant proportions throughout the model) is made. This may not always be very realistic.

The fourth run is representative of a pattern of income redistribution which could reasonably be expected to occur in the economy if the average trends of the economy over the past ten years (i.e. a 'surprise-free' scenario - see also row 3 of Table 6) were to be maintained till the year 2000. Results calculated for this distribution reflect a pattern of economic effects which is in harmony with the observations made for runs 2 and 3 for pure White or Black expenditure patterns (i.e. a trend towards the Black pattern) but at a feasible level of redistribution. It does not merit further investigation or comment.

The fifth run reflects a significant macro-economic policy adjustment towards higher government transfer payments to Blacks, presumably in the form of pension, disability, unemployment and similar benefits. Its effects are somewhat different in character from those of run 4 although both are concerned with redistribution of income to Blacks. The differences are related to the fact that these transfers to Blacks are made through taxation rather than remuneration. This results in the increased Black expenditure being at the expense of government spending on all other items. It can be seen to have a positive effect on employment and PCE of Blacks which is obviously desirable. The taxation restructuring required to raise the government income for such transfer payments is not considered here but is described in principle in Section 4.4. The specific case where the transfers are derived by a compensating increase in direct taxation of Whites is discussed in Section 6.

4. LONG-TERM ECONOMIC TRENDS AND SCENARIOS

So far we have only considered variations about the static picture for 1978. We shall now take a closer look at trends occurring in the economy, possible variations of these trends and their effect on income distribution and other relevant economic variables.

4.1 Trends in GDP and Final Demand

The South African Reserve Bank supplies tables of national accounts time series values in its Quarterly Bulletins. Most of the time series display very strong long-term trends with superimposed cyclic and random patterns. Of particular interest is the time series for GDP which is shown as a log-linear

plot in Figure 2. A straight line relationship on such a plot indicates a constant growth rate. It can be seen that a relatively steady pattern was maintained over the post-World War II period until the early 1970s. Since then, and particularly after 1980, there has been an obvious decline and instability in the growth performance of the economy. In fact, the average growth rate over the past ten years has been only marginally above 2 percent per annum while in the post-war period up to 1975 it averaged nearly 5 percent.

In the national accounts, data series for expenditure on GDP by the various categories of final demand (PCE, GE, GDI and EXP) as well as imports (IMP) are provided. When these series are divided by GDP, the random and cyclic patterns become more marked while the break in the long-term trend in the 1970s becomes less obvious. If the post-World War II trends for these ratios were to persist to the year 2000 this would result in the shifts in the percentage distribution of FD categories indicated by the difference between rows 2 and 3 of Table 6. These results indicate a major shift away from consumer goods and towards investment and government spending. Further considerations on the distribution of FD will be taken up under point 4 of Section 5.

TABLE 6: DISTRIBUTION OF TOTAL FINAL DEMAND BETWEEN ITS MAJOR CATEGORIES FOR DIFFERENT INPUT-OUTPUT DATA STRUCTURES AND GROWTH SCENARIOS

	PERCENT SHARE OF FD				
	PCE	GE	GDI	EXP	TOTAL
SAM (1978)	44,28	4,43	19,95	31,35	100,00
Trend value for 1978*	47,90	3,94	19,11	29,05	100,00
Projection to 2000 *	41,42	5,58	23,35	29,65	100,00
LG scenario for 2000	41,00	5,00	23,00	31,00	100,00
HG scenario for 2000	50,00	5,00	16,00	29,00	100,00

Note: * These values are based on log-linear fits to national accounts data for the FD categories, corrected for imports and components of the fourth quadrant of the I-O table (i.e. direct tax on retail sales and remuneration of domestic servants and government employees)

4.2 Employment and Income Trends

A log plot of time series data for total employment in the South African economy (but excluding informal and subsistence employment), is provided in Figure 3. The data are obtained from a study by Roukens de Lange and Van Eeghen (1984). The break in the long-term trend around the year 1975 is very evident. The same data are also plotted in Figure 4 as a ratio relative to GDP (E/G).

It can be seen that this ratio has shown a consistent downward trend over many years. There does appear to have been a slowing down of the trend in recent years but recent reports indicate large scale lay-offs of workers which will probably pull the trend back to the long-term trend line.

The long-term trend line for E/G represents an annual decrease in this ratio of about 2,2 percent. This was acceptable while GDP growth rate was around 5 percent, leaving an overall employment growth rate of about 2,8 percent which is in line with population growth rates. However, when GDP growth rate is itself only about 2,2 percent, this means that no opportunities are being created to absorb the annual increase in the labour force which has been running at about 2,6 percent. It is particularly serious for the Black population whose employment growth rate is lowest but whose population growth rate is the highest.

Remuneration data are available from labour statistics provided by Central Statistical Services (CSS) which match the employment data. They can therefore be used to calculate remuneration per worker for each population group and industrial sector. The trends for these remuneration levels are usually not consistent over the whole post World War II period, but since the early 1970s there has been a consistent growth in other-than-White remuneration levels while White levels have remained almost constant. These trends have been introduced into a computer model based on the SAM structure which allows extrapolation of the SAM and related information. Thus income distribution patterns can be computed for future years for different scenarios described in terms of alternative sets of growth patterns and economic parameter values.

4.3 Alternative Scenarios

In an unpublished report by Roukens de Lange, Thomas and Spies (1986), two alternative growth scenarios have been described for the South African economy. These can be looked upon as a low growth (LG) and a high growth (HG)

scenario. The identifying characteristics of the scenarios are summarised in Table 7 and will not be elaborated on here. The LG scenario is assumed to correspond to a 2 percent growth rate because this has been the experience over the past decade - a period of turbulence and frustrated efforts and initiatives. The HG scenario is set at a 5 percent growth rate because that has been the experience during times of creative initiatives, sustained motivation and successful diversification.

Further essential parameters which must be selected to describe the scenarios are those giving the distribution of the FD between its major categories. The values selected are indicated in rows 4 and 5 of Table 6. The basis for choosing these distributions is described under point 4 of Section 5.

There are many other important parameters which must be selected for the scenarios. For example, the scenario descriptions indicate the need for adjustment of the sectoral distribution of FD and some such adjustments have, in fact, been introduced in scenario calculations. There are, however, so many model parameters which can be adjusted that it was considered best to keep them fixed except where clear and important trend values, such as those considered above were available.

Some sensitivity tests were carried out on selected model parameters, some of which are of particular interest for the investigation of the possible impact of macro-economic measures on the economy, employment and income distribution. These will be discussed in Section 5.

TABLE 7: SCENARIO CHARACTERISTICS

SCENARIO ELEMENT	LOW GROWTH (2,0 PERCENT)	HIGH GROWTH (5,0 PERCENT)
Overall characteristics	Slow adaptation; obstructions; disequilibrium enforced or shattered; perverted developments	Rapid structural shifts; creative tension; inward industrialisation; pragmatic; interactive; sustained motivation
1) Population	Emigration (skilled) Whites; Black population explosion	Skilled White immigration; Black urbanisation with fertility decline
2) Political environment	Internal unrest, violence, boycotts; conflict escalation; violent power transfer	No distorting effect; creative tension; conflict resolution
3) Education & training	Brain drain; lack of funds; manpower not upgraded; entrepreneurial breakdown	Education revolution; higher productivity; entrepreneurial spirit
4) Technology	High capital/labour ratio; high technology imports; production methods not indigenised	Lower capital/labour ratio; small scale production; appropriate technology
5) Income distribution	Great inequality; ineffective tax structure protection existing wealth; speculation	Redistribution; tax reform; successful development projects; 'social market' economy
6) Employment	Low absorption in formal sector; ineffective informal sector;	Labour intensive; small business and informal sector growth; 'self-help'
7) Government expenditure	Spending on security, less on 'productive' services; bureaucratisation	Expansion public sector; basic needs projects; social & physical infrastructure development
8) Fixed investment	Government up, private down; large export-tied, capital-intensive; no foreign capital	Less capital intensive; government up, construction up, machinery down; small projects
9) Private consumption expenditure	Limited market for durables; luxury imports; heavy taxation; inflation hedging	Decline luxury & imported goods; redistribution; high Black spending
10) Import/Export	Export focus on primary products; unstable world prices & demand; no effective import replacement; BoP deficits	Focussed export drives; growth less than GDP; selective import control & substitution; strengthened rand
11) Regional spread	Stimulated decentralisation; constrained and unstable urbanisation	Effective urbanisation
12) Sectoral spread	Less diversified; emphasis mining & mine related spending; defence related spending	Growth export industries; construction; goods for social development; basic household goods
13) GDP growth	1-2,5 percent; retardation throughout	4-5,5 percent; flourishing new patterns

4.4 Income and Expenditure Patterns for Alternative Scenarios

The SAM structure was introduced into the Scenario Evaluation Model (SAMSEM) referred to above and used to estimate PCE distribution patterns for the year 2000 for both the LG and the HG scenarios. Results are shown for the various population groups (but not income classes) in Table 8A. Also shown there are distributions of remuneration employment in the formal economy (EMP), population (POP) and the economically active (EA) population. Values for 1978 are provided for comparison. In Table 8B the PCE, both per worker and per capita, the remuneration per worker, and the ratio EMP/EA are shown for the same model runs.

In both the LG and the HG scenarios there is a shift towards increased Black expenditure but this is considerably greater for the latter. In the case of the LG scenario the shift is not due to increased employment levels of Black relative to White, but rather to an assumed continuation of trends of increasing remuneration of other-than-White workers.

In the case of the HG scenario, Black employment levels are seen to rise considerably. This is based on the assumption that levels of employment relative to population size in other-than-Black groups do not rise above the levels of 1978 and that any relative increase in employment is transferred to Blacks. Even so, the level of Black employment relative to the economically active population declines to 88,8 percent of the 1978 value by the year 2000 (see Table 8B).

Only PCE and remuneration values are provided for the two scenarios in Tables 8A and 8B while income distribution data in earlier sections and in Tables 2 to 4 have been specified mainly in terms of Current Income (CI). The reason for this is that remuneration and PCE levels are specified by model and scenario parameters and data, whereas CI is dependent on savings, unearned income and tax levels, as is evident from Table 1. Savings and tax levels are determined by the requirements for government expenditure and fixed investment which are specified by the scenario conditions. However, they can be obtained in many different ways, and not only from private individuals but also from corporate and institutional bodies. Tax and savings of private individuals can be split in many different ways between population and income groups and through direct and indirect means. This is an area which is wide open to exploration for the evaluation of alternative macro-economic measures, but such an investigation has not yet been undertaken.

TABLE 8A: DISTRIBUTION OF PRIVATE CONSUMPTION EXPENDITURE (PCE), REMUNERATION (REMUN), CURRENT INCOME (CI), EMPLOYMENT (EMP), ECONOMICALLY ACTIVE (EA) AND TOTAL RESULTS CALCULATED FOR THE SAM IN 1978, AND FOR LOW GROWTH (LG) AND HIGH GROWTH (HG) SCENARIOS FOR THE YEAR 2000

	PERCENTAGE DISTRIBUTION				TOTAL ¹⁾
	WHITES	COLOURED	ASIANS	BLACKS	(ABSOLUTE LEVELS)
<u>SAM (1978)</u>					
CI ²⁾	62,4	7,4	3,1	27,1	19975
REMUN	57,4	8,8	3,3	30,5	14650
PCE ³⁾	57,1	8,1	3,7	31,1	13020
EMP	23,1	10,7	2,8	63,4	7087
POP	16,3	9,3	2,9	71,5	27300
EA	17,8	9,1	2,3	70,8	10260
<u>LG Scenario (2000)</u>					
REMUN	44,6	9,0	4,6	41,8	24760
PCE	45,0	8,0	4,2	42,8	19047
EMP	21,4	12,8	3,5	62,3	8107
POP	12,2	7,8	2,5	77,5	44860
EA	14,3	8,5	2,1	75,1	17920
<u>HG Scenario (2000)</u>					
REMUN	38,2	6,9	3,3	51,6	33123
PCE	37,6	5,9	3,7	52,8	30907
EMP	18,4	9,9	2,6	69,1	10954
POP	12,2	7,8	2,5	77,5	44860
EA	14,3	8,5	2,1	75,1	17920

Source: CI, REMUN PCE and EMP calculated from results of SAMSEM model.
EA and POP values from Grobbelaar (1983, 1984).

Notes:

1. CI, REMUN and PCE totals in 1975 R millions;
EMP, POP and EA in thousands of people.
2. CI depends on tax and saving levels which are not specified for the LG & HG scenarios.
3. The total PCE relates only to consumption expenditure on goods produced in the formal economy. It excludes sales tax, payments to domestic servants and imported goods (see Table 1).

TABLE 8B: RELATIVE VALUES FOR EMPLOYMENT, REMUNERATION AND PRIVATE CONSUMPTION EXPENDITURE*

	POPULATION GROUP				
	WHITES	COLOUREDS	ASIANS	BLACKS	AVERAGE
<u>SAM (1978)</u>					
EMP/EA	0,934	0,882	0,888	0,633	0,691
REMUN per worker	5140	1700	2440	990	2070
PCE per worker	4540	1390	2430	900	1840
PCE per capita	1695	329	531	190	493
<u>LG Scenario (2000)</u>					
EMP/EA	0,677	0,683	0,741	0,373	0,452
EMP/EA rel to 1978	0,725	0,774	0,834	0,589	0,654
REMUN per worker	6370	2150	4010	2050	3050
PCE per worker	4940	1470	2820	1610	2350
PCE per capita	1563	423	711	229	416
<u>HG Scenario (2000)</u>					
EMP/EA	0,788	0,716	0,741	0,562	0,611
EMP/EA rel to 1978	0,844	0,812	0,839	0,888	0,884
REMUN per worker	6280	2110	3840	2260	3020
PCE per worker	5770	1680	4020	2160	2820
PCE per capita	2125	517	1038	470	689

Source: Calculated from values in Table 8A.

Notes: * See notes for Table 8A.
REMUN and PCE values are expressed in 1975 Rands per year per person.

5. PARAMETRIC SENSITIVITY OF THE ECONOMY

The SAM model uses input-output, national accounts, employment, income and expenditure data. Time trends for many of these are also provided. All this adds up to a very large number of data items, each of which can in theory be varied so that the sensitivity of every economic variable of interest can be tested against it. In practice this cannot be done without expending an unreasonable amount of time and effort even when simplified and systematised methods are used (West, 1981). Furthermore most parameters are not responsive to variation by macro-economic manipulation and we shall therefore only look at a few cases of special interest.

We have seen that certain significant trends are at work in the economy such as the trend towards a decreasing employment/GDP (or E/G) ratio, increasing wage rates, redistribution of income away from Whites, and a shift in the distribution of FD categories such as PCE relative to total FD. Before proposing any macro-economic measures it is useful to evaluate the sensitivity of the economy to the adjustment of such trends.

1. Income redistribution:

The sensitivity of the economy to income redistribution was explored in Section 3 and Tables 4 and 5. It will therefore not be considered again here¹⁾.

2. Freezing of employment/GDP (E/G) ratio at 1985 levels:

The most significant effect in this case is on employment and wage rate levels. Employment would increase by 39,0 percent by the year 2000. This would be adequate to cope with the natural increase in the economically active population if the economy were to grow at a rate of about 2,9 percent per annum. Of course, when employment increases but the growth rate of GDP remains constant, income per worker has to drop by the same relative amount, i.e. 39 percent. White per capita income levels would then be 16,8 percent below 1978 levels while Black levels would still be 53,7 percent higher than in 1978. The stabilisation of the E/G ratio would require a major departure from existing trends in the economy and in particular in the technology of production. This would introduce many factors into the model data structure which have not so far been considered.

3. Freezing remuneration at 1985 levels:

The main effect of this assumption is a halt in the increasing spending power of Blacks. Instead of commanding 40,3 percent of the PCE by the year 2000 (for surprise-free extrapolation) this share is restricted to 32,4 percent. One would expect, however, that employment levels might rise relatively, promoting economic development along the lines considered under the previous point.

1) It should be mentioned that in all scenario extrapolation runs it was assumed that unemployed people and their dependants would have incomes distributed equally between the lowest two income classes as specified for the 1978 SAM (see Table 2). This income could be considered as derived from transfers from other income classes, either as household transfers or through informal sector activities.

4. Redistribution of final demand:

Comparison of rows 2 and 3 in Table 6 shows that a significant shift is occurring in the distribution of FD between its various categories. In the HG scenario it is assumed that this direction is shifted drastically to that indicated in the fifth row. The value of 16,0 percent for GDI is in line with a long-term trend value of investment intensity corresponding to about the year 1960 and also with the HG assumptions of lower capital intensity and simpler or appropriate technology (see Table 7).

A point that immediately arises when such a low level of investment is assumed for a high growth scenario is that it would be expected that high growth would require a high level of investment. It can be shown, however, (Roukens de Lange *et al.*, 1986) that the level of investment is much less sensitive to the economic growth rate than to the economic life time or rate of obsolescence of investment goods. Calculations carried out using a simple model indicate that values for the ratio of investment requirements to GDP (I/G) increase by about 15 percent when the growth rate of the economy is increased from 2 to 5 percent per year. On the other hand the investment requirements increase by about 85 percent when the life time of capital is halved from 10 to 5 years. This result indicates that what is generally seen as an increasing capital intensity in recent years may in fact have been more closely related to rapid obsolescence of capital goods as a result of technological change rather than to a real increase in operating capital investment per unit production. The relatively overpriced Rand (related to high gold prices), low interest rates and the generous capital depreciation allowances of the past 10 to 15 years would certainly have contributed to this. On the other hand the current low value of the Rand and the phasing out of capital investment allowances will encourage a reduction in spending on fixed investment.

The government expenditure (GE) is assumed to rise for both the LG and the HG scenarios, in the former case presumably mainly as a result of a relative increase of expenditure on security and in the latter case as a result of increased community services. It is important to recognise that most government spending is actually in terms of remuneration and welfare payments which do not resort to GE but affect the PCE. The source of these payments is, in terms of the model, that of taxation, and this will have a macro-economic effect on the economy through its income

redistribution and employment effects. Another form of government spending occurs through the gross domestic investment (GDI) component. This could be in the form of public works projects which would also have a significant effect on employment and the performance of the economy. Such effects will be explored in the next section.

The assumption is made that exports will be relatively lower for the HG than for the LG scenario, and imports will decline commensurately to keep a long-term Balance of Payments (BoP). Although this aspect will not be explored in this paper it allows for the possibility of macro-economic policy exploration in the foreign trade regime.

The decrease in exports and investment in the HG scenario is compensated for by a relative increase in PCE which will of course be distributed differently by population group and by sector, and which, by the nature of the technology associated with the HG scenario, will be qualitatively different and presumably have more of a 'Third World' flavour.

The overall effect on the economy and income distribution of the distribution of FD has been tested in the context of LG and HG scenario runs. Some results are presented in Tables 8A and 8B. For a true sensitivity analysis it would be necessary to look at the effect of each component separately.

6. MACRO-ECONOMIC MEASURES

We have not so far considered how changes in trends can be brought about in the economy. Certain trends will change as a result of natural pressures such as the exchange rate or externally imposed conditions such as sanctions. Macro-economic policy measures such as restructured taxation, social welfare payments and government financed development projects will directly affect the direction of development of the economy. Other measures such as depreciation allowances, employment and export subsidies, import duties and controlled interest rates will have a more indirect effect on the sort of parameters which were considered in the previous section. There will be lags and elasticities in the response of the economy. This is not the concern of this paper which is limited to the evaluation of structural effects and specific assumptions about the nature of the response of the economy.

A number of runs investigating the effects of various economic measures have been carried out, two of which will be briefly described and analysed here. Much more work can be done but it is important not to race ahead and come to hasty and misleading conclusions. There are many possible traps, and results must be analysed in the light of a thorough understanding of both the character of the model and of all the realities affecting the case being investigated. The model can help to indicate relative magnitudes and sensitivities but it is dangerous to use it without a full appreciation of all the issues at stake, including those not encompassed by the model. Interaction between model results and a broad understanding of the economic system can be very helpful in creating deeper insight and allowing better judgement in making macro-economic policy decisions.

The first run relates to run 5 of Tables 4 and 5 in which payments transferred by Government to Blacks are increased by a factor of ten. The results presented in Table 5 are based on the assumption of a fixed level of GDP. Comparison with SAM conditions indicates a significant increase in PCE despite a decrease in remuneration and an increase in savings. This seems unrealistic and requires a more careful look at the model. What has actually happened is that the increase in government expenditure is not balanced by an increase in government income, and in obtaining a solution for the system other government expenditure items are decreased proportionally. The solutions obtained do not show this up, nor do they indicate what the consequences of reduced government expenditure in other parts of the economy might be. Deficit financing is of course possible, but this must be extracted either from the economy or from loans abroad. The assumption made here is that a balance in government income and expenditure must be maintained in the long-term. To compensate for the demand made on government spending through transfer payments to Blacks, taxes must therefore be raised.

A run was carried out in which direct taxes on Whites were increased by an amount equal to Black transfers. In this case a more plausible combination of variations in VA and FD components was obtained compared to those of run 5 of Table 5 (GDP is again assumed unchanged). The run results indicate a slightly higher level of wages and lower level of saving. In terms of FD components there is a more modest increase in PCE matched by a slight decline in exogenous FD (i.e. a combination of fixed investment, exports and some other smaller items). Government income is up by a large 7,62 percent but this includes the increase in White taxation which is transferred to Blacks and

which does not contribute to FD. The most significant effect is on the distribution of PCE. The White share declines from 57,1 percent for the pure SAM data to 55,6 after the first stage of redistribution to Blacks and down further to 54,3 percent after increasing White taxes. There is a matching shift in Black PCE and a small adjustment for Coloureds and Asians. Another noteworthy effect is an increase in the share of VA for sectors supplying Black consumer goods, and a corresponding decrease in White-dominated sectors. For example, Agriculture grows by 1,01 and Clothing by 1,69 percent. On the other hand the sector Fabricated Metals and Machinery is down by 0,40 percent and Finance by 1,02 percent (c.f. run 5 of Table 5).

The second investigation explored here is concerned with stimulating the economy and creating employment through Public Works Programmes (PWP). Recently the government has allocated R600 million to a special employment programme, R280 million of which is to be spent on PWPs (Barker, 1986). A run was carried out on the model in which the impact of this spending (deflated to match the 1975 prices used in the model) in the construction sector was evaluated. When the results of the run are compared on the basis of fixed GDP their impact is much as might be expected and small in their effect. Most economic variables are affected by less than 0,1%. The most notable effects occur in the construction sector itself which grows by 2,0 percent, and in the non-metal minerals sector which, as a result of indirect demand generated for building materials, grows by 1,17 percent. All these values are quite small because of the relatively small scale of the project, which represents only about 5 percent of the total investment by government in construction in 1978. In specifying the run conditions no allowance was made for the fact that the PWP programme would probably be more labour intensive with a higher level of Black labour than the average construction project. This aspect could be explored further in more specifically orientated model runs.

In the run explored here the most important effect to be investigated is that of the stimulation of economic growth and employment. If it is assumed that all PWP investment is fully applied to increase exogenous FD without replacing existing investment and employment, the run results indicate a growth in GDP of 0,53 percent, 0,29 percent of which is due to the direct effect of increasing final demand by R280 million. The total increase in employment is found to 0,63 percent.

7. ECONOMIC GROWTH RATE

In Section 4.3 both a low and a high growth scenario were considered and in Table 7 the identifying characteristics of these two scenarios were summarised. These considerations were expressed in terms of qualitative economic and human attitudinal characteristics rather than in terms of specific economic policies and parameters. We shall now take a closer look at these latter factors.

Currently indexes such as those of volume of production or composite business cycle indicators (S.A. Reserve Bank, June 1986) are depressed, indicating a very low level of demand, low productivity and a resultant low level of GDP. Under present conditions, any economic policy which stimulates the demand for locally produced goods will raise the level of GDP without any immediate investment requirements. Public Works Programs (PWP's) should be very effective in raising economic activity because wages and salaries will tend to be directed towards lower income groups and be spent immediately, thus generating a big multiplier effect. In a recent paper, Abedian and Standish (1986) therefore recommend PWP's as particularly effective for stimulating a recovery in the economy and generating employment.

Presently there is excess monetary liquidity in the economy in the sense that there is a high level of savings relative to investment demand, particularly through institutional savers. This flow of funds is now being directed largely towards a probably overpriced share market and is not being used for investment. It could, however, be well utilised to finance infra-structure development and basic needs, but this would require specific policy measures to direct investments this way and would imply significant deficit financing by government, probably coupled to artificially low level interest rates.

It is possible for Government to simply spend on relief in the many areas of great need in the country and in this way to stimulate demand in the economy. Sooner or later the existing capital stock would be fully utilised and more investment would be required. It is therefore obvious that PWP's should be directed as far as possible to self-help projects and capital creation, whether physical or human. It is very important to recognise that not all investment is of equal value. For example, there is a very significant difference in the impact of investment spending on construction relative to manufactured goods in terms of characteristics such as import content, employ-

ment creation, human skill requirements, etc. What is perhaps even more important to consider is the social utility of the investment, its life time and its ability to create further employment opportunities.

8. CONCLUSIONS

A social accounting matrix (SAM) provides a very broad structural and data basis of the economy and can be used in a model to evaluate the economy-wide effects of trends and macro-economic policies. A wide range of conclusions can be drawn from the computer runs and calculations carried out on such a SAM based model and a brief outline of such conclusions is provided here. Many of these are still tentative and much research remains to be done to combine interactively the calculation power of the model with a broad understanding and knowledge of economic and social realities. Such an interactive process can result in a deeper and more specific quantitative understanding of the forces at work in, or imposed upon the economy.

The analysis of income distribution data provided by the SAM provides evidence of the extent of maldistribution of income, and hence of poverty in South Africa. The Gini coefficient calculated for the total population is 0,66 which is the highest out of 57 countries for which data are available. Not only is the income distribution skew for the population as a whole but also within the Black population itself. Its Gini coefficient of 0,55 ranks with the highest, although it is not untypical for developing countries. On the other hand the Gini coefficient of 0,39 for the White population only is fairly typical of those for Western democratic countries.

Runs carried out on the artificial assumptions of a population with either a completely White or a completely Black income and expenditure pattern indicate that there are clearly desirable features associated with the latter. For the same level of GDP, total employment and Black employment are respectively 12,9 and 14,0 percent higher, imports are 5,0 percent lower and PCE is 23,6 percent higher. Government income, however, is down by 27,5 percent and savings by 8,5 percent, and it is not clear whether a Black pattern would allow adequate Government services and investment to be provided with which to run the economy and the country. Other comparative values are those for value added by the agricultural sector which would be 40,5 percent larger, and for the financial sector which would be 35,4 percent smaller. Although the model does

not give a direct indication of growth potential, the higher level of consumer demand would stimulate growth of the economy as a whole and reduce poverty.

Several mechanisms for income redistribution have been tested. If government transfer payments to Blacks (e.g. pensions and unemployment benefits) were to be increased ten-fold (to a level of 81 percent of total transfer payments to Whites), the Black share of private consumption expenditure (PCE) would increase from 31,08 to 32,94 percent of the total (see Table 4). A further run, not considered before, indicates that if the transfer were to be made at the expense of the White taxpayers, this share would increase to 33,9 percent.

Projections of trends over the past 10 to 15 years indicate an increase in wage income per worker in other-than-White groups which results in income redistribution. If a low growth (LG) scenario of 2 percent annual growth in GDP is assumed, the White share of PCE declines from 57,1 to 45,0 percent by the year 2000. For a high growth (HG) scenario of 5 percent annual growth, this share is reduced further to 37,6 percent, even though the per capita level of PCE of Whites still rises by 25,4 percent. The difference between the low and high growth scenario is not due to wage levels, which are assumed the same in both scenarios, but to employment levels. For the LG scenario these are projected to decrease for Blacks from 63,3 percent of the economically active (EA) population in 1978 to 37,3 percent by the year 2000. Even for the HG scenario the share of the EA population involved in the formal economy declines, but only to 56,2 percent.

Given the high and growing levels of unemployment it is likely that a continued rise in remuneration per worker will not materialise and a projection assuming wage income per worker fixed at 1985 levels indicates that the Black share of PCE would be restricted to 32,4 percent for an otherwise 'surprise-free' extrapolation. On the other hand market and socio-political forces, as well as macro-economic policies, could promote more labour intensive practices. A projection carried out on the assumption that the long-term downward trend in the value of the ratio of employment to GDP were to be stabilised in 1985 indicates that employment would be relatively 39 percent higher by the year 2000. White per capita income levels would decline by 16,8 percent while Black levels would be 53,7 percent higher.

In considerations of poverty and redistribution of income the question of which factors promote economic growth is absolutely crucial. In the LG (2%

p.a.) scenario it is assumed that trends observed in the economy over the past decade - and for many aspects those for the entire post World War II period - will persist to the year 2000. This implies increasing capital intensity resulting in the fraction of GDP spent on investment increasing from a trend value of 19,1 percent in 1978 to 23,4 percent by 2000. This occurs mainly at the expense of PCE. The scenario also implies lower employment, though higher skill level requirements, more imports of high technology and luxury goods, and almost certainly a highly unstable socio-political environment. In the HG (5% p.a.) scenario, technology and investment are assumed to become less capital and more labour intensive, and the rate of obsolescence of capital goods declines. The expenditure on investment is assumed to decline to about 16 percent of final demand, corresponding approximately to trend levels for 1960. The decline in investment is matched by an increase in PCE, which is assumed to stimulate demand and hence the growth rate of the economy.

The effect of a special programme for employment creation, which was recently brought into effect and in which the government has allocated an amount of R280 million to public works programmes, has also been investigated by the model. Its effects on the economy in terms of redistribution are relatively small but its effects on growth stimulation could be significant. Although the amount spent represents only 0,29 percent of the (1978) GDP, its growth effect could be 0,53 percent on GDP and 0,63 percent on employment. These values are based on the assumption that final demand is increased by the full R280 million. Much of the investment would be introduced into the economy through the construction sector but with industrial support effects in other industries.

The SAM model used in this investigation is not a growth model although it has been combined interactively with trend projections. It is clear from other considerations that the quality and life time of fixed investment is of vital importance in determining the growth potential of the economy. The development of a dynamic model could help provide quantitative insight into the sensitivity of economic growth to the characteristics of fixed investment. It could thereby provide clearer guidance on the impact of macro-economic measures and investment programmes on the development of the economy and the relief of poverty.

APPENDIX

As does an input-output (I-O) table, a Social Accounting Matrix (SAM) provides a matrix structure of interactions between economic sectors. However, in the case of the SAM this is extended to incorporate production, capital financing and external accounts of the National Accounts, as well as detailed income and expenditure data broken down by population group, income class and economic sector.

A SAM has been published recently by the Central Economic Advisory Services (CEAS, 1986) for South Africa for the year 1978. It consists of a 24-sector I-O table for South Africa for 1978; remuneration patterns for each of these sectors for the four population groups and for ten occupation categories in each of these; expenditure patterns by households divided up into seven income classes for each population group; and national accounts data for 1978 obtained from the Quarterly Bulletins of the South African Reserve Bank and presented in a matrix structure. More detailed descriptions are provided by Stadler et al. (1986) and Eckert and Crouch (1986).

The mathematical manipulation of the SAM is very similar to that used in the well-known applications of I-O tables. The most important relationship in I-O tables is that linking input (= output) totals (X) to final demand (F) and the coefficient matrix A. This is given by

$$X = F (I-A)^{-1}$$

where I is an identity matrix and the inverse matrix $(I-A)^{-1}$ is known as the Leontief inverse. The main difference for the SAM is that further items are incorporated in the matrix structure. Adaptations to SAM theory are described by Paukert et al. (1981) and by Pyatt and Roe (1977).

In the structure put forward by Paukert, solutions are found for row (= column) totals for fixed exogenous final demand consisting mainly of exports and fixed investment. Excluded from the final demand are private consumption expenditure and current government expenditure which are differentiated into their various components (see Table A.1) and endogenised by including them in the coefficient matrix structure. The effects of variations in the parametric structure of the economy (which may be related to macro-economic policy measures) on row totals, and hence on derived quantities such as GDP, savings or employment, can then be investigated.

Calculations carried out on the above basis assume that the total exogenous final demand (FD) is fixed. Changes in economic variables such as savings, taxation and import structure will, therefore not be balanced individually in the exogenous FD vector. Budget deficits and balance of payment (BoP) effects are also not brought into consideration so that results are to some extent unrealistic.

Another source of unreality relates to the fact that by fixing exogenous FD, the GDP is allowed to vary between runs. Results such as are presented in Table 5 have therefore been adjusted by a factor fixing the GDP for the various runs so that comparisons are made for a constant size of economy (as defined in terms of GDP). This can be seen to be more realistic, for example, in the case where imports are assumed to increase by 10 percent. A run carried out for this assumption resulted in a decrease in GDP of 3.46 percent and a resultant relative decline in all calculated variables by this percentage. No allowance is made for the probability that an increase in imports would have to be matched by an increase in exports in order to maintain the BoP which would compensate for the drop in GDP. This does not imply that economic growth cannot be boosted by import replacement but merely gives recognition to the fact that the SAM, when applied in a static calculation process, does not provide a growth model but only a systematic method for expressing relative magnitudes of economic variables.

Despite the above reservation about the static SAM it must nevertheless be recognised that variations in the ratio of GDP to exogenous FD can provide a significant indication of relative growth potential as, for example, in the case of White relative to Black spending patterns presented in Table 5. Further considerations of the question of economic growth are dealt with as a separate issue in Sections 4.3 and 7.

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CAPTIONS FOR FIGURES

FIGURE 1: Lorenz curves for current income for total population, Whites and Blacks.

FIGURE 2: Gross domestic product at factor costs in logarithms of 1975 R-millions.

FIGURE 3: Total employment in the formal economy.

FIGURE 4: Employment/GDP in 1975 R-millions.

FIG 1 : between table 2 & 3

FIG 2 : section 4.1 between § 1 and § 2

FIG 3 & 4: section 4.2 somewhere in the middle

Figure 1

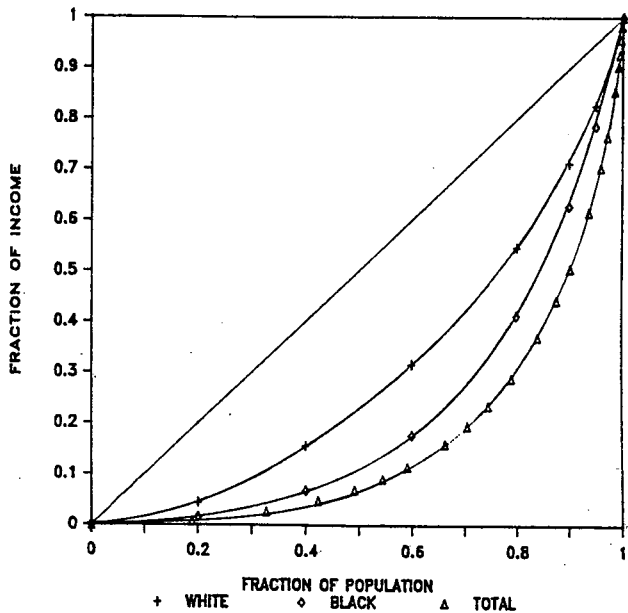


Figure 2

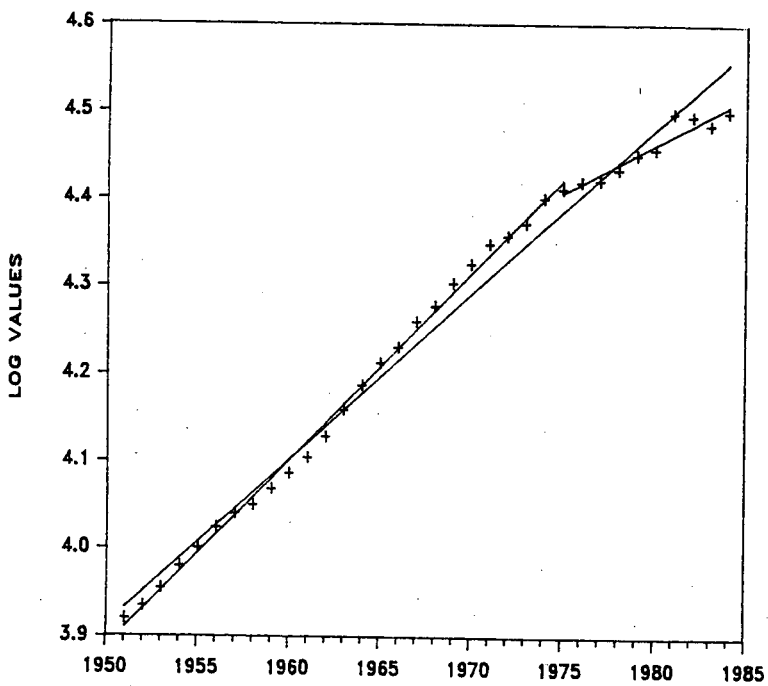


Figure 3

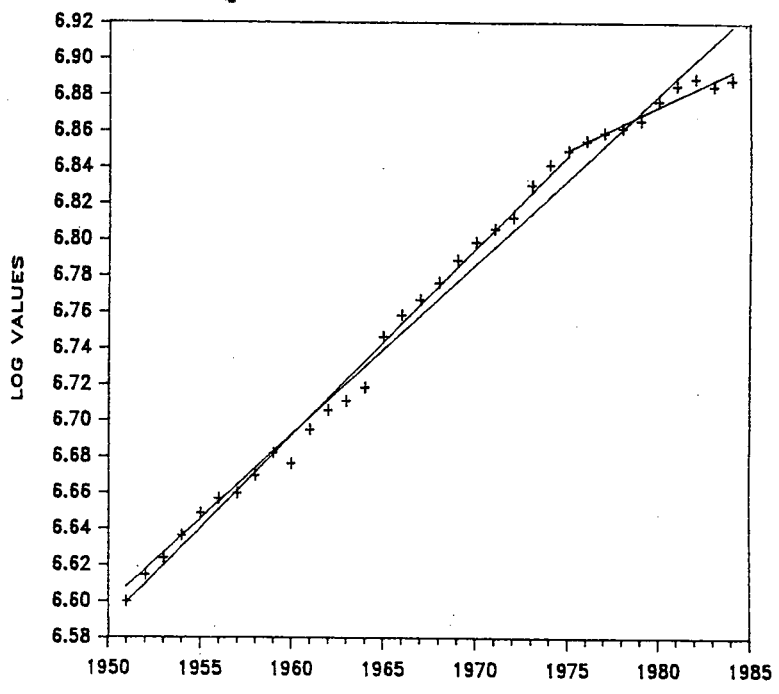


Figure 4.

