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## Bottlenecks to growth in Sub-Saharan Africa during the first development decade: some results from a cross-country regression analysis

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# Kieler Arbeitspapiere Kiel Working Papers

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Working Paper No 68

Bottlenecks to Growth in Subsaharian Africa  
during the First Development Decade:  
Some Results from a Cross-Country  
Regression Analysis

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## I. Introduction

This paper tries to investigate why Subsaharian Africa was the tail-light of all developing areas according to its growth performance in the sixties. During this First Development Decade Subsaharian African countries<sup>1</sup> scored an annual average rate of real GDP growth of 4.7 percent which is less than the corresponding rate of 5.4 percent of all developing market economies and less than the UN minimum target rate for this decade of 5.0 percent<sup>2</sup>. It also lags behind estimated "full employment" growth rates up to the year 2000 even under optimistic assumptions with regard to unemployment rates during the last quarter of this century<sup>3</sup>. Whether this unsatisfactory result is mostly due to the transition from the colonial status to independence and its costs, to insufficient preconditions for developmental activities as far as physical and human infrastructure endowment is concerned or to the lack of domestic as well as foreign capital funds, is open to question. Though there are some arguments ascribing an essential role to education in the African economic development of the sixties, in contrast to capital shortage in South Asia and to an adverse social structure in Latin America acting as deterrents to economic growth<sup>4</sup>, private capital shortages may have also blocked the growth process of total Subsaharian Africa, where up to now the public sector outweighed the private sector as the major capital source /Emerson, 1973, pp. 256-587, and where in many countries a net private capital outflow was compensated by a net public capital inflow /IBRD, in: Banque Centrale des Etats de l'Afrique de l'Ouest, 1973, No 203, p. 237. Since the impact of some of the above-cited obstacles to growth has to be regarded as being intangible, if the cross-country regression approach is applied to a sample of Subsaharian states, this paper is confined to the role of capital

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<sup>1</sup> The countries and their basic performance data are recorded in the appendix table 1\*.

<sup>2</sup> See /UN Resolutions, 1961/.

<sup>3</sup> /Hiemenz, 1977/.

<sup>4</sup> /Galbraith, 1971/.

in macroeconomic terms, to the various channels through which capital is directed to African states and to its productivity. Though there are a lot of cross-country regression investigations<sup>1</sup> focusing on this topic, an analysis which concentrates on Subsaharian Africa exclusively and which identifies over- and underachievers concerning the African growth path is still missing, probably because of data shortages<sup>2</sup>. If, however, Galbraith's hypothesis that bottlenecks to growth are different with respect to specific developing areas<sup>3</sup> is assumed to be valid, then world-wide country samples which are normally used and in which Subsaharian countries are mostly underrepresented do not seem to be the correct basis for the identification of specific African growth bottlenecks even if these samples reduce the risks of random results by increasing the number of observations. Since all Subsaharian countries belong to the low-income group of developing countries we may assume a good deal of homogeneity within the sample which perhaps compensates for the smaller number of observations compared to world-wide country samples.

## II. The Model

Our theoretical framework is based on the postulate that growth depends on the availability of domestic savings as well as of the foreign capital inflow which is mainly composed of private investments and foreign aid. This is the approach which has been discussed and empirically tested in literature<sup>4</sup>. However, in the context of economic growth at the very beginning of the development path, as it is the case of all Subsaharian countries, the overall product-

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<sup>1</sup> /Chenery and Strout, 1965. - Rahman, 1968. - Landau, 1971. - Weißkopf, 1972.- Papanek, 1972. - Papanek, 1973, Chenery and Carter, 1973/.

<sup>2</sup> See for example /Papanek, 1973, p. 123/.

<sup>3</sup> We suppose that Galbraith's argument gains in importance if the early stage of economic development in Africa - the first post colonial decade - is analysed, because of the high demand for local personal and physical infrastructure as a consequence of getting independent and the short-term inelastic supply of these factors of production.

<sup>4</sup> See the survey article of /Mikesell and Zinser, 1973/.

ivity of capital is probably at least as essential as the amount of available finance funds<sup>1</sup>. There are some considerations supporting this hypothesis. The probably most important one focus on the argument of indivisible lump-sum investments in the capital-intensive sectors of physical and human infrastructure (construction, land improvement, education and administration) at a low level of development. These investments get fully utilized only at a later more advanced stage of development and therefore lag in contributing to an increase of overall capital productivity<sup>2</sup>. Furthermore most African countries pursued an inward-looking industrialization strategy during the early sixties which tended to favour the production of non-tradable goods and to raise the capital-labour-ratio.

Hence our basic relationship to be tested is the following

$$(1) \quad t_{GDP} = a_0 + a_1 S + a_2 A_B + a_3 ICOR$$

where  $t_{GDP}$  denominates the average annual rate of real GDP growth 1960-1970,  $S$  the average ratio of annual savings to annual GDP in percent,  $A_B$  the average ratio of annual bilateral DAC-aid to GDP in percent and  $ICOR$  the average of annual incremental capital-output-ratios during the same period.

This function can be widened up in different ways:

- 1) We discriminate between private and public savings ( $S_{pr}$  resp.  $S_{pu}$ ) each measured as a percentage of annual GDP. This discrimination is important because private savings can be assumed to have had a higher positive impact on growth than public savings, first because the exploitation and export of raw materials as the major source of savings in the small African economics were run by private expatriates and second because public savings were

<sup>1</sup> Investigations undertaken by [Zimmerman, 1971] resulted in a higher impact of the ICOR on GDP growth of a 1 1 developing countries than of the savings ratio. [Hiemenz, 1977], disaggregating the LDC according to high-, middle- and low-income groups complements Zimmerman's results by demonstrating a stronger correlation between growth and capital productivity in low-income LDC than in the other groups. It therefore seems reasonable to assume that this phenomenon is to be found especially in the African context.

<sup>2</sup> This argument runs parallel to an analysis of [Schatz, 1971], who stresses an adverse economic environment as a major barrier to African economic development instead of capital shortage. In our sense the inadequate infrastructural endowment of most African states at the beginning of the sixties could be subsumed under the heading of adverse economic environment.

likely to be squeezed by capital-intensive investments in infrastructure and governments consumption expenditures.

- 2) Choosing the stepwise regression approach we additionally introduce three variables which try to approximate a) the development level (D), b) the importance of mineral exploitation in total economic activity (M) and c) the role of the Yaoundé association agreement (J), i.e. the preferential EEC-treatment of francophone Africa with regard to market access and multi-lateral aid. Whereas the first variable is expressed by the per capita GDP in 1965, the two other ones are approximated by dummies separating the sample into two groups of countries which either showed an average share of the mining sector in total GDP above the 10 percent level or not or belonged to the Yaoundé-group or not. With respect to the first variable we hypothesize a positive correlation between growth and the GDP which, however, is likely to be strong only if the critical level of the per capita GDP marking the full capacity utilization of infrastructure investments has been achieved. Since the African countries do not show wide inter-state differentials in per capita GDP and are all clustered below the 250 US-\$ level - with one exception (Gabon) - there are some doubts whether a) the full capacity utilization of lump-sum investments could be achieved by increasing the development level up to only 250 US-\$ and whether b) the diversification potential being a function of the income level changes significantly within an income interval of only 50-250 US-\$ as it was the case in Africa during the sixties.

As to the dummy variable for the mineral exploitation we hypothesize a positive regression coefficient. However, there are some doubts, whether the coefficient is significantly different from zero, first because of an assumed strong positive correlation between mineral exports involving a high element of location rent and domestic savings<sup>1</sup>, so that the savings regression coefficient absorbs much of the mineral export effects on growth [Mikesell and Zinser, p. 18; Papanek, 1973, p. 126]. Second, the high degree of capital-intensity which is inherent in mining activities may

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<sup>1</sup> The partial correlation coefficient between the mining dummy and total savings amounts to 0.47 in our sample and is statistically significant at the 99 percent confidence level.

countervail some of the positive export effects on growth by charging the balance of payments because of the high demand for imported technology. It seems to be plausible to expect such a countervailing effect particularly in those African countries which considerably expanded existing mining activities during the sixties or began to exploit mineral resources (Mauretania, Liberia, Zaire). Consequently the positive net balance of payments effect and hence the residual impact of mining activities on growth is likely to be limited in Africa during the first development decade.

As to the Yaoundé association scheme the African members a) may have gained from the preferential access to the EEC-market compared to the anglo-phone countries and b) benefitted from the multilateral EEC-development aid. Furthermore and perhaps more relevant could be the considerable technical, monetary and budgetary assistance granted by France especially in favour of francophone states. Though some of the Yaoundé effects of aid flows are absorbed by the other explanatory variables such as the budgetary assistance by public savings, the monetary assistance by private inflows or the EEC-aid by aid flows, there may be a residual positive effect of the Yaoundé-agreement on growth. Again, however, some countervailing forces have to be discussed.

First, an external one: the Yaoundé group includes some of the poorest countries in Africa with considerable absolute disadvantages with regard to landlockedness and bad natural resource endowment. One can doubt whether these external disadvantages could be outweighed by the associate status already after the first postcolonial decade. Another perhaps more relevant countervailing effect of the Yaoundé scheme touches the dominant position of France in its former colonies which is documented by agreements between France and the francophone states on guaranteed export and import prices above the world-market price level and above the prices of EEC-competitors still even during the period of the first Yaoundé association agreement (1964-1969). If the suggestive conclusion would be correct that the French policy towards the francophone states resulted

a) in a transfer of real resources from the African consumer to the French exporter [Kreinin, 1973, p. 170] and

b) gave implicate incentives to African countries to perpetuate the "colonial" production structure,

then the Yaoundé-effect would be of less importance if the association



agreement did not erode the monopoly power of France. There are arguments concluding that this was not the case during the sixties [Kreinin, 1973, p. 171; Ndongko 1973, pp. 223-229].

- 3) The same set of variables as introduced above will be referred not only to the growth of total GDP but also to that of the manufacturing sector ( $t_{MAN}$ ). Bearing in mind the low percentage of manufacturing in total economic activity during the reference period 1960-1970 we do not expect as suggestive results as for total growth.

During the first development decade most of foreign as well as local resources have been directed towards non-manufacturing activities, especially in mining, construction and public administration, so that the overall ICOR obviously does not reflect the capital-output ratios of the manufacturing sector. We therefore introduce an alternative variable to the unknown ICOR in manufacturing that is the productivity of the capital stock invested by foreigners in the manufacturing sector ( $V$ ) as measured by value added in manufacturing per unit of foreign-owned capital stock in manufacturing 1967. Although there does not exist an exhaustive information on the ratio of foreign-owned capital to totally invested capital in non-subsistence sectors for all African countries some corresponding data on Kenya, Ghana, Nigeria and the francophone countries [ILO/UNDP, 1972, p. 443; Langhammer, 1977b, p. 2; Heldt, 1977a, appendix tables] support the assumption that this ratio exceeded 50 percent during the sixties and was significantly higher in francophone than in anglophone countries. The more relevant argument in favour of the use of  $V$  as a proxy for capital productivity, however, is that foreign-owned firms mostly operate in the urban formal sector, whose performance can be documented in the national accounts easier than that of the informal sector in which locally-owned firms dominate. We may therefore assume that recorded growth rates of value added in African manufacturing - particularly during the reference period in which the statistical documentation was rudimentary anyhow - were overwhelmingly linked to the performance of foreign-owned firms.

4) In addition to domestic savings and official foreign aid the net private capital inflow (P) is forced in the regression equation. P is defined as the private capital inflow n.i.e. minus investment income outflow. Since the latter figure is substantial in the context of a "normal" African country in which a low-interest policy - compared to the capital-exporting industrialized country - is pursued<sup>1</sup> and in which therefore foreign investors are stimulated to repatriate investment income, the private capital outflows often outweigh the inflows thereby reducing the explanatory power of P.

Additionally our analysis in this case is confined to only fourteen countries covering the period 1965-70 because of lacking data on disaggregated balance of payments accounts<sup>2</sup>.

By adding the independent variables which have been discussed above under 1)-4) our original equation (1) is enlarged to

$$(2) \quad t_{GDP} = f(S_{pr}, S_{pu}, A, ICOR, P, D, M, J)$$

and

$$t_{MAN} = f(S_{pr}, S_{pu}, A, V, P, D, J).$$

---

<sup>1</sup> This is especially the case in the African member states of the Franc-Zone whose three central banks (West African-, Central African-, and Malagasy Central Bank) have been frequently advised by the World Bank as well as by the IMF to raise the interests up to the level of the French capital market (Banque Centrale des Etats de l'Afrique de l'Ouest, 1973).

<sup>2</sup> Particularly in the context of African countries whose balances of payments were nearly exclusively determined by the exploitation and export of natural resources during the sixties it is indispensable to smooth erratic fluctuations in the capital accounts by averaging annual figures in order to specify "normal" percentages of net private capital inflow to GDP. Only three countries (Ghana, Nigeria and Ethiopia) allow for the calculation of 1960-70 figures based on annual values. For some other anglophone countries corresponding data are available since 1963/64. As for the francophone countries additional obstacles arise because of their monetary union with France in which intra-union private capital flows are not accurately recorded [Langhammer, 1977a]. The residual sample of fourteen countries for the 1965-70 subperiod therefore involves a bias towards anglophone countries.

Using the stepwise regression approach we only discuss those regression equations whose explained variance could not be increased by adding additional independent variables. All functions were estimated in their linear form to obtain results which are compatible with those achieved by other authors. Furthermore there is no a priori - argument that a non-linear function would better approximate the cluster of observations.

In a second step the regression equations will be applied to determine the demand for resources under the target of the UN First Development Decade, i.e. an annual rate of real GDP growth of 5 percent, as well as under higher growth targets.

### III. Interpretation of Regression Results

Our results presented in table 1 indicate that

- the capital productivity as expressed by the ICOR played a key role in determining total growth during the sixties,
- the availability of local capital funds as expressed by domestic savings had a higher positive impact on growth than foreign capital inflow be it private or public<sup>1</sup>,
- among the total of local capital funds the private savings contributed to growth significantly more than the public savings,
- the explanatory power of the ICOR considerably increases if the sample is reduced to those more developed African countries whose private capital inflows are known<sup>2</sup>,
- the productivity of capital invested in manufacturing by foreigners contributed to growth in manufacturing to a less extent than the ICOR

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<sup>1</sup> Though we only used the bilateral aid as an indicator for public foreign capital inflow instead of including multilateral aid, the results do not change significantly if bilateral aid is replaced by total aid. Corresponding tests for the 1965-70 period support this statement, which does not surprise because multilateral aid amounted to only one third of total aid.

<sup>2</sup> The improved quality of the regression equation estimated by using 1965-70 data may also be explained by a decrease of the standard deviation of all variables over time which indicates the transition from extremely negative performance results of some African countries during the first half of the post-colonial decade to a "normal" growth process during the second half (see appendix table 1\* ).

Table 1 - Determinants of Growth in Sub-Saharan Africa 1960-1970 - Regression Results<sup>a</sup>

Dependent Variables		Independent Variables											
t GDP	CONSTANT	S	S <sub>pr</sub>	S <sub>pu</sub>	A <sub>B</sub>	ICOR	P	V	R <sup>2</sup> adjusted	n	F	D.W.	
t-values Beta-weights	1960-1970												
	4.1387 (6.3349*)	0.0720 (1.4256)							0.03	31	2.03	1.846	
	2.5538 (2.1335*)	0.2539 (1.9923***)			0.2202 (1.5645)				0.08	31	2.29	1.843	
	3.7143 (3.3823*)	0.1089 (0.3868)			0.3027 (0.2260)	- 0.3293 (- 3.2109*)			0.31	31	5.47	1.841	
	2.8754 (2.8334**)	0.4791 (2.8082*)	0.2509 (2.1334**)		0.3117 (1.8533***)	- 0.4954			0.18	17	4.55	1.559	
	2.4079 (2.1109***)		0.4825 (0.3087)	- 0.1605 (- 0.9165)					0.17	17	2.67	1.483	
	4.8223 (3.8706*)		0.5937 (2.3036**)	- 0.2362	0.0870 (0.8187)	- 0.5291 (- 3.9945**)			0.58	17	8.50	2.358	
	5.9109 (4.6665*)		0.2137 (2.4464**)		0.1360 (0.8187)	- 0.6522 (- 4.1167*)			0.47	17	5.71	3.067	
			0.4110	0.2920 (1.3619)	0.2489 (1.2366)	- 0.6261 (- 0.7717)							
			0.4297	0.3889									
t <sub>MAN</sub>	1965-1970												
	11.567 (6.7643*)	0.0209 (0.2252)			- 0.1002 (- 0.5605)	- 1.5896 (- 7.0089*)	- 0.1903 (- 0.4537)		0.84	14	17.784	2.353	
		0.0595			- 0.0742	- 0.9091 (- 0.1184)							
	1960-1970												
	6.5527 (6.0680*)	0.1542 (1.8453***)							0.07	31	3.405	2.003	
t <sub>MAN</sub>	4.7343 (2.3404**)	0.3242 (0.1965)			0.2526 (1.0621)				0.08	31	2.274	2.100	
	2.3936 (1.0191)	0.4130 (2.6562**)			0.2063 (1.2917)	0.2977 (1.2917)	0.4193 (1.7843***)		0.15	31	2.695	2.040	
		0.5233			0.2431		0.3174						

<sup>a</sup> The complete text of the abbreviations and the sources of the variables are listed in the appendix.  
\* Statistically significant at the 1 percent level. -\*\* Statistically significant at the 5 percent level. - \*\*\* Statistically significant at the 10 percent level.

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did with respect to total growth. However, this may be due to the link of spot capital stock data for 1967 to growth results of a ten-years period,

- the other variables discussed above such as the development level, the mining dummy and the Yaoundé membership were not significantly correlated to growth. Particularly in the case of the mining dummy we assume that the impact of this variable has been mostly absorbed by the significant variables, especially by savings due to the strong correlation between mining activities and savings. With regard to the Yaoundé membership the partial correlation coefficients suggest that, even if we would suppose a strong positive impact of aid on growth, which in fact is not verified by the regression results, the Yaoundé members did neither receive more bilateral aid in terms of GDP nor total aid than the anglophone non-Yaoundé countries.

The emerging role of the ICOR can be underlined by estimating the change of GDP growth which is due to the change of the ICOR and the change of the gross investment ratio. For that purpose we regressed the differences between the 1965-70 and the 1960-65 growth rates to the corresponding differences of the ICOR's and the investment ratios (I/GDP).

We obtained the following equations:

$$\begin{aligned} \text{Diff}_{\text{GDP}} &= - 0.5130 - 0.2043 \text{ Diff}_{\text{ICOR}} & n &= 26^1 \\ &(- 0.7510) (-2.3396)^{**} & R^2 &= 0.19 \end{aligned}$$

and

$$\begin{aligned} \text{Diff}_{\text{GDP}} &= - 0.4244 + 0.1597 \text{ Diff}_{\text{I/GDP}} & n &= 26 \\ &(- 0.5801) (+1.3538) & R^2 &= 0.07 \end{aligned}$$

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<sup>1</sup> We eliminated five countries which during the period 1965-70 had negative ICOR's.

Hence in the African context an increase of GDP growth rates was significantly<sup>1</sup> linked to a rise of the incremental capital productivity rather than of the investment ratio.

Comparing these results to those obtained for other developing areas or for the developing world as a whole we find strong parallels to Zimmerman's investigations for all LDC suggesting a higher influence of the ICOR on growth than of the investment-ratio although Zimmerman did not explain the differences of the variables for same countries at different periods [Zimmerman, 1971, pp. 9-11]. Other regionally disaggregated investigations which, however, did not consider the capital productivity but the amount of available local and foreign capital funds as independent variables [Papanek, 1973, p. 123] resulted in insignificant correlations of savings and foreign inflows on African growth, yet on the basis of only ten countries. Although our results tend to revalue at least the influence of domestic and particularly private savings Papanek's general statement that the impact of local and foreign capital funds on growth is more virulent for Asian and Mediterranean countries than for the Latin American and African states remains unchallenged.

With the exception of the results for the Latin American countries Papanek's regression coefficients differ more significantly from zero than ours. In this context it can be argued that the parallelism between the relatively low savings and foreign inflow regression coefficients for the American group and those for the African group is to some extent determined a) by the bias in Papanek's sample towards small Central American and Caribbean countries<sup>2</sup> and b) by the outstanding role of exports of raw materials in small Latin American and African countries compared to Asian states in which the production and export of manufactures increasingly gained in importance.

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<sup>1</sup> The asterisks mark the significance level as indicated in table 1.

<sup>2</sup> This assumption emerges out of the high number of observations for the American group (n = 37), whereas the core of large Latin American countries does not amount to more than a dozen countries.

The inherent hypothesis would be that if local and foreign capital funds mainly flow into capital-intensive exploitation of natural resources, their impact on growth is reduced a) because of a high demand for imported technology charging the balance of payments and b) because of either considerable outflows of investment incomes and/or an increase of public budgetary receipts which perhaps are suboptimally allocated compared to private capital funds. Furthermore primary export earnings depend on external components (climate, world supply or demand constellations, technological innovations) which may reduce the degree of capacity utilization and hence the capital productivity especially in those capital-intensive extractive activities in which technologically determined indivisibilities prevail. Consequently there is some evidence that the overall ICOR contributes to explain inter-state growth differentials in developing areas with a dominant role of exploitation of natural resources rather than in areas with some progress in industrialization. In the latter areas such as in Asia or in the Mediterranean countries the availability of capital funds as expressed by savings and foreign capital inflows may be of a greater relevance in explaining growth performance.

To provide some empirical evidence on the magnitude of the productivity gap as well as on the finance gap in Subsaharian Africa we estimate the demand for capital funds and the productivity mix under the 5 percent target of the UN First Development Decade by using the regression equation (table 1)

$$t_{GDP} = 3.7143 + 0.1349 S + 0.2260 A_B - 0.3293 ICOR.$$

For that purpose two of the three independent variables are held constant according to their averages calculated from those countries whose data did not diverge by more than the standard deviation from the average of the total sample. We thus exclude the extreme cases which are mainly the three South African states Lesotho, Botswana, and Swaziland with high aid ratios and some countries exporting mining commodities and having high savings ratios (Gabon, Zaire, Zambia<sup>1</sup>). The third variable is designated to be the

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<sup>1</sup> According to S the following countries we eliminated: Gabon, Zaire, Botswana, Lesotho and Zambia; as for the aid ratio Liberia, Nigeria, Botswana, Ethiopia, Lesotho and Swaziland are extreme cases, whereas Mali, Senegal, Burundi, Chad, CAE and Zaire have ICOR's which considerably deviate from the African average.

instrument variable by which the target rate is determined. We confront the theoretically desired figures with the actual figures of the instrument variable and calculate the finance gap on the basis of the 1967 GDP and repeat this procedure for the three possible constellations (table 2).

The results signify that

- in accordance to the explanatory power of the single variables the savings gap is more relevant than the aid gap<sup>1</sup>,
- the finance gap increases over-proportionally if African countries should have envisaged an additional growth of only 0.5 percent above the UN-target,
- the "optimal" mix of the ICOR and the gross investment ratio signals a reduction of the latter ratio simultaneously with a more productive use of capital funds.

In order to determine the relevance of either gaps in local funds or in aid flows we applicated another method by confronting the deviations of actual and designed growth - the latter as documented in the individual development plans of African countries-- with the deviations of actual and designed savings ratios on the one hand and the deviations of designed and actual aid ratios on the other hand. Since the development plans considerably differ in the accurateness of finance targets we had to reduce the sample to those Yaoundé associates<sup>2</sup> whose plans of the sixties were more homogenous than those of the anglophone group and thus involved less guesswork [Kommission, 1969]. However, the results signal a positive but statistically insignificant correlation between the deviations<sup>3</sup>:

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<sup>1</sup> The aid gap of 60 mill. US-\$ under the 5 percent target is equivalent with a percentage of only 1.0 of total DAC-bilateral aid provided for all developing countries in 1967 whereas the corresponding percentage amounts to 6.2 under the 5.5 percent target.

<sup>2</sup> Benin (1966-70), Ivory Coast (1967-70), Mali (1961-66), Mauretania (1963-66), Niger (1967-70), Senegal (1965-69), Togo (1966-70), Upper Volta (1967-70), Cameroon (1966-70), Chad (1966-70), CAE (1967-70), P.R. Congo (1964-68), Gabon (1966-70). The figures in brackets denominate the plan period.

<sup>3</sup> See for an extended analysis of causes of deviations between target and actual macroeconomic performance figures in Tropical Africa [Shen, 1977].



Table 2 - Finance- and Productivity Gaps in African Growth 1960-1970

Target rate of GDP growth	Variables held constant			Instrument Variable						Finance gap respect- ively Productivity gap	
				Actual Value			Desired Value				
	ICOR	S	A <sub>B</sub>	ICOR	S	A <sub>B</sub>	ICOR	S	A <sub>B</sub>		In mill. US-\$ 1967 <sup>b</sup>
1960-70 in percent											
5.0		8.2	4.8	3.0			2.7			0.3 <sup>c</sup>	
	3.0	8.2				4.8			5.2	0.4	60
	3.0		4.8		8.2			8.8		0.6	112
5.5		8.2	4.8	3.0			1.2			1.8 <sup>c</sup>	
	3.0	8.2				4.8			7.4	2.6	392
	3.0		4.8	8.2				12.5		4.3	803

<sup>a</sup> Estimated by the function  $t_{GDP} = 3.7143 + 0.1349 S + 0.2260 A_B - 0.3292 ICOR$  where  $t_{GDP}$  denominates the average rate of growth of real GDP 1960-70, S the average annual gross saving ration 1960-70, A the average annual ratio of bilateral aid to GDP and ICOR the annual average incremental capital-output-ratio, both of the same period. - <sup>b</sup> The total of 1967 GDP of the countries concerned has been taken as the reference value. - <sup>c</sup> The desired mix of the ICOR and the gross investment ratio amounts to 2.7 and 13.5 under the target rate of 5 percent growth and 1.2 resp. 6.6 under the 5.5 percent rate, whereas the actual mix amounted to 3.0 and 14.4.

Source: See Appendix.

$$\begin{aligned} \text{DEV}_{t\text{GDP}} &= -1.2883 + 0.1199 \text{ DEV}_S + 0.3025 \text{ DEV}_A & R^2 &= 0.13 \\ &(-5.8738) (+0.7477) & (+0.8131) & n = 13 \end{aligned}$$

$\text{DEV}_{t\text{GDP}}$  = Actual minus designed growth of GDP.

$\text{DEV}_S$  = Actual minus designed ratio of annual savings to GDP

$\text{DEV}_A$  = Actual minus designed ratio of annual bilateral aid to GDP.

Hence our assumption that instead of the availability of capital funds the capital productivity has to be regarded as the major bottleneck factor to growth in Subsaharian Africa still remains valid.

#### IV. The Determinants of Savings, Aid and Capital Productivity

##### A) Savings

The aspect to which we turn now has been already widely discussed in the literature cited above and empirically analysed especially for the Latin American countries and the whole developing world, but not yet for the total of Subsaharian African countries. The results indicated a significant negative correlation between the foreign capital inflow and savings as well as a positive impact of exports of raw materials on savings. However, the conclusion from correlation to causality was challenged [Papanek, 1972, World Bank, 1975, p. 368], because of both conceptual problems and statistical tautology; the former because of the undue simplification which is involved in the aggregation of different forms and origins of private and public savings and because of exogenous factors which can lead to similar correlations between savings and inflow as the "causality" approach suggests<sup>1</sup>; the latter

<sup>1</sup> Besides the hypothesis that a short-term shortage of investment opportunities causes a shift of foreign capital to consumption and consequently a fall of domestic savings the "causality" approach argues that the availability of foreign aid slows down the psychological pressure of the government to increase saving efforts [Rahman, 1968].

because savings in LDC are often statistically recorded as the residual between investments and foreign capital inflow. Though within the cross-country regression approach many of these deficiencies cannot be eliminated we try to tackle some of them a) by discriminating between private and public savings and b) by focusing on aid inflows instead of the trade balance as an indicator of capital inflow and on export growth instead of GDP growth. By proceeding in this way we take account of statistical obstacles to estimate the private capital inflow in all African countries, which arise because of roughly recorded intro-Franc-Zone capital flows, but also because of the fact that in most of the African countries the annual inflow of public aid was quantitatively more relevant than long-term private capital inflows during the sixties. Furthermore since the characteristics of the typical African country, low per capita income and population, do not allow for an efficient inward-looking development strategy, the performance of the external sector determines overall economic development and hence justifies the use of export growth instead of GDP growth as an explanatory variable. That means that instead of the regression equations

$$S = f(t_{GDP}, F), \text{ where } F \text{ denominates the trade balance-GDP ratio [World Bank, 1975, p. 384]}$$

and

$$S = f(E, F), \text{ where } E \text{ denominates the ratio of exports to GDP [Weisskopf, 1972, p. 37]}$$

we run the regression of public and private savings ( $S_{pr}$  resp.  $S_{pu}$ ) on the growth of exports ( $t_{EXP}$ ).

We furthermore discriminate between mineral exporting and non-mineral exporting countries and on the ratio of bilateral plus multilateral DAC-aid to GDP ( $A_T$ ) for the period 1965-70 which allows for a larger sample than for the 1960-70 period.

The results are the following:

$$S = 10.387 + 0.3405 t_{EXP} - 0.8753 A_T \quad n = 18^1$$

$$(3.6448)^* (1.5059) \quad (-4.2109)^* \quad R^2 = 0.58$$

<sup>1</sup> Benin, Gambia, Ivory Coast, Liberia, Mauretania, Niger, Nigeria, Senegal, Sierra Leone, Togo, Upper Volta, Cameroon, Chad, CAE, Rwanda, Botswana, Tanzania.

$$S_{pr} = 5.2630 + 0.4199 t_{EXP} - 0.2253 A_T \quad n = 18$$

$$(2.1654)^{**} \quad (2.1771)^{**} \quad (-1.2708) \quad R^2 = 0.28$$

$$S_{pu} = 5.1239 - 0.0794 t_{EXP} - 0.6500 A_T \quad n = 18$$

$$(5.3048)^* \quad (-1.0354) \quad (-9.2263)^* \quad R^2 = 0.83$$

In general the introduction of the mining dummy demonstrates that differences in the saving behavior of countries exporting agricultural primary products and those additionally or exclusively exporting minerals are not significant. That means that the mining dummy picks up some of the effects of total exports on savings without improving the explanatory power of the independent variables. We therefore concentrate the interpretations on the above two-fold regression equations.

In this context, however, the results strongly support the critics against an aggregation of private and public savings to a total savings function. Though in both equations the familiar outcome is achieved that aid and savings are negatively correlated, the power of the correlation differs in both cases being higher relevant for public savings and non-relevant for private savings. Another substantial difference is that the export growth significantly<sup>1</sup> contributed to an increase of private savings but not of public savings. The latter result does not support a priori considerations that the growth of (primary) exports besides its effect on private savings tends to raise public savings, be it via taxation of foreign-owned corporation profits stemming from primary exports, be it via export taxes or via increased profits of state-owned firms operating in the primary sector. Apart from the obvious fact, however, that governments savings behavior is more influenced by non-economic factors than private savings behavior and therefore more difficult to analyse we challenge the above-mentioned causality running from high aid inflows via a reduced "psychological" pressure to save to a squeeze of public savings. Instead of this it can be presumed that many African countries (probably in first place the "backward" francophone Sahel-states<sup>2</sup>) are permanently faced with budget

<sup>1</sup> Using the double-logged type of function the export growth coefficient positively deviates from zero even at the 1 percent level.

<sup>2</sup> Our sample is biased in favor of francophone states (12 of 18 countries) among which are the poorest African countries.

deficits caused either by a weak basis of taxation and/or high public expenditures for infrastructure investments. Consequently foreign aid is mainly determined to fill this gap<sup>1</sup>. Hence the causality runs the other way, from budget deficits to high aid requirements.

Furthermore, the discrepancy between Papanek's untested hypothesis that exports of raw materials are relatively easy to tax - compared to wage or profit incomes - and therefore facilitate higher rates of governments savings [Papanek, 1973, p. 126] and our results may be partly due to the low number of African countries which exclusively rely on the exports of rent-intensive minerals for which this hypothesis could be of greater relevance than for the rather heterogenous and diffused group of exportable agricultural products<sup>2</sup>.

As to the former outcome, the positive impact of exports on private savings, we assume that business savings are more concerned than private household savings a) because of the very low income level of the sample countries in the sixties which restricted the income expenditure mainly to the demand for necessary consumer goods as food, beverages, textiles and housing [ECA, 1973/74] and b) because of distorted factor prices including low interest rates which acted as disincentives to local savings and stimulated the transfer of savings abroad.

In general the impact of export growth on private savings in Subsaharian Africa though being statistically relevant seems to be lower than for the other regionally concentrated samples analysed by Papanek. We suppose that this can be explained not only by supply bottlenecks to savings but also by a low capital-absorptive capacity. Since African countries during the sixties mostly pursued an inward-looking development strategy potential investors were probably not stimulated to shift funds to other activities than the exploitation of natural resources or some highly protected industries, oriented towards the small domestic market. Under these conditions the export growth

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<sup>1</sup> This is an important way of allocating aid in the Franc-Zone countries, where France finances budget deficits of the poorer members, but also in the South African countries Lesotho, Botswana, and Swaziland.

<sup>2</sup> This assumption is supported by the positive but statistically insignificant correlation between the mining dummy and public savings.

of the late sixties was obviously insufficient to allow for a level of total savings by which the development decade target of 5 percent (DDT) could have been achieved. If we regard the average annual total aid inflow (6.7 percent of GDP) for the eighteen countries as exogenous then the export growth rate being necessary to achieve the DDT-savings ratio of 8.8 percent - as documented in table 2 - was 13.1 percent instead of actually 8.6 percent. Hence apart from the low capital productivity insufficient export growth was obviously another bottleneck to overall economic growth in Subsaharian Africa<sup>1</sup>.

#### 4. Aid

The inflow of bilateral and multilateral aid into LDC is ruled by various economic and non-economic aspects which depend on political and economic inter-dependences between donor countries and agencies on the one hand and aid-receiving LDC on the other hand. In the specific case of African LDC which by far receive the highest amount of aid measured as a percentage of total GDP<sup>2</sup> ties stemming from the colonial period together with post-colonial preferential schemes (EEC-association agreement for the francophone area and bilateral intra-Commonwealth aid agreements) mainly determine the amount of technical assistance, budgetary, project or emergency aid. According to these different forms total aid varies between pure emergency and distress relief and performance-oriented aid. In this context it has been argued that aid unlike private capital inflow is biased towards countries with a balance-of-payments constraint [Papanek, 1973, p. 122] whereas the opposing hypothesis would stress that aid adjusts of different degrees of capital-absorptive capacity and is therefore biased towards LDC with a better performance factor endowment, or a higher development level [Mikesell, 1966, pp. 164-173]. The results of table 1 in which aid has been correlated to a performance indicator, i.e. growth, did not provide suggestive empirical evidence in favour of one of the hypotheses. Though bilateral aid was positively linked to growth, the confidence level was low. Compared with Papanek's results which indicated a considerably higher impact of aid on growth for the non-African LDC it could therefore be argued that during the sixties aid flows to African

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<sup>1</sup> The partial correlation coefficient of - 0.23 between the ICOR and export growth points at some repercussions between the two bottlenecks.

<sup>2</sup> In 1971 the Latin American LDC received a 0.6 percentage of bilateral aid to GDP. The corresponding figures for Asia amounted to 1.1 percent and for Africa to 2.2 percent.

countries were less efficiency-oriented and more concessionary than those received by the rest of LDC. Given the case of LLDC which primarily include Subsaharian countries, Papanek's hypothesis would hence gain some relevance especially for this group of LDC. In the following we try to refine our results a) by discriminating between bilateral and total aid where the latter variable includes multilateral aid and b) by running regressions of aid on performance and trade gap indicators for the total period 1960-70 as well as for the subperiod 1965-70 for which data are available. The discrimination between bilateral and total aid is based on the assumption, that multilateral more than bilateral aid usually flows into large-scale projects exceeding the financial capacity of a single donor country [Roemer, 1966]. Since these projects include a high import content, a long maturity period and a low short-term capital productivity we suppose that the actual performance or the actual development level of aid-receiving LDC are more relevant criteria for bilateral than for total aid. Supposed that this hypothesis is plausible then the relevance of actual performance as an explanatory variable of aid depends on the ratio of multilateral aid to total aid. This ratio amounts to approximately one third for the average of Subsaharian countries. Hence we do not expect different criteria in granting bilateral and total aid as statistically significant in our sample.

Running regressions of the total aid - GDP - ratio ( $A_T$ ), 1965-70, and of the bilateral aid - GDP - ratio ( $A_B$ ), 1960-70 resp. 1965-70, on the per capita income in 1965 ( $D$ ) as the development level proxy and alternatively on the GDP growth ( $t_{GDP}$ ) 1960-70 resp. 1965-70, on the trade gap - GDP - ratio ( $F$ ), 1960-70 resp. 1965-70, as the "proof of needs" indicator, as well as on the Yaoundé dummy ( $J$ ) it can be shown that

- growth performance had not a decisive positive effect on aid flows,
- the Yaoundé coefficient, probably due to the activities of the EEC-development fund, turned from a negative sign for bilateral to a positive but statistically insignificant sign for total aid,
- the Yaoundé dummy absorbs, some of the effects of the per capita income level on aid, since the Yaoundé group includes the most "backward" African countries.

The residual significant results demonstrate that although both variables, the per capita income as well as the trade gap, are significantly correlated with

bilateral aid at a reasonable confidence level, the latter variable has the greater impact which is reinforced if we run regressions of total aid. Thus the arguments are supported that aid distribution in Africa in general is biased towards countries with a foreign exchange gap and that this bias is especially relevant in multilateral aid. The results are the following:

period 1960-70				
$A_B = 2.1053$	$+ 0.0237 D$	$+ 0.2848 F$	$R^2 = 0.29$	
(1.4328)	(2.2628)**	(3.7468)*	$n = 31$	
subperiod 1965-70				
$A_B = 1.9953$	$+ 0.0232 D$	$+ 0.2909 F$	$R^2 = 0.34$	
(1.3236)	(2.0460)**	(4.1345)*	$n = 31$	
$A_T = 3.6553$	$+ 0.0202 D$	$+ 0.3418 F$	$R^2 = 0.38$	
(2.1272)**	(1.5627)	(4.2629)*	$n = 31$	

The opposing argument of multicollinearity between the variables<sup>1</sup> does not fit in the African conditions of the sixties with relatively low inter-state per capita income differentials, permanent and considerable foreign exchange gaps of the LLDC and corresponding surpluses of some countries being at a higher income level<sup>2</sup>.

<sup>1</sup> The argument would stress that high per capita incomes of LDC may be linked with permanent foreign exchange gaps in the course of inward-looking industrialization either because of an inelastic import demand for capital goods and energy and/or because of stagnating export earnings stemming from the traditional exports of raw materials.

<sup>2</sup> LLDC-countries as Chad, Upper Volta, Botswana, Malawi, Lesotho, Benin, Rwanda, CAE and Gambia were permanently - that means during the ten years period under observation - faced with foreign exchange gaps of about 10 percent of annual GDP, whereas those countries outside the LLDC group which mainly export minerals scored permanent trade surpluses (Liberia, Gabon, Mauretania, Zaire, Swaziland and Zambia). The remarkable exception of a permanent surplus country without mineral resources is represented by the Ivory Coast.



It seems to be a striking feature of an unchanged economic structure of many African countries during the sixties (mostly under fixed exchange rate - regimes vis à vis the metropolitan countries) that the number of states with either permanent surpluses or deficits is rather high whereas only a very small number shows fluctuations in the trade balance. The latter group obviously had more options to finance an episodical gap either by private or public foreign sources or by drawing down of foreign reserves than the majority group of permanent deficit countries. Our results suggest that this group mainly depended on aid flows as a remedy to finance trade gaps because of lacking own reserves and attractive investment potentials. In this context it could be argued that the fixed exchange rates - regimes between African deficit countries and their major trading partners contributed to some extent to the lack of private foreign capital inflow because they prevented African countries from adjusting the external value of domestic resources to changing price-ratios between local and external factors of production. Instead of this protection instruments were built up as a substitute for exchange rate changes thus disencouraging foreign as well as domestic capital fund holders to invest in other sectors than in primary activities or some local import substitution industries<sup>1</sup>. Under these circumstances it was predominantly non-risk capital, i.e. aid flows, which filled resource gaps in post-colonial Africa without changing the colonial production patterns in the sixties, neither directly nor indirectly by mobilizing local and foreign risk capital.

### C. Capital Productivity

The most striking outcome of table 1 was the high impact of inter-state differences in marginal capital productivity on inter-state growth differentials. However, the use of the ICOR as a measure of overall capital productivity is submitted to serious constraints among which the unknown amounts of

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<sup>1</sup> The "natural" disadvantages of post-colonial Africa, i.e. small domestic markets, lack of skilled labour and entrepreneurship, and a rudimentary infrastructure, may - together with the infant industry argument - justify an inward-looking strategy in the non-primary sectors for a transitory period /Robson, Lury 1969, pp. 67-70/, but on the other hand the tendency of local African politicians, whose interests are vested, and some benefiting investors to extend this period as long as possible is rather obvious apart from the often exculpatorily cited "external effects" /Güsten, 1974, p. 332, footnote 2/.

the total capital stock and the average capital-output-ratio at the beginning of the reference period are the most crucial ones [ECE, 1964, pp. 18-20]. Hence the suitability of the ICOR as an indicator of the efficiency of capital investment is likely to be limited. However, this argument seems to be less valid for LDC than for DC [Zimmerman, p. 77]. Furthermore we suppose that in the African scenario characterized by a low capital stock at the beginning of the first post-colonial decade the later total economic growth has been mainly influenced by the current gross capital formation within the same ten years period and less by the fixed capital formation during the colonial stage<sup>1</sup>. Additionally our reference period seems to be long enough to approximate an average capital productivity figure.

By trying to identify the determinants of the capital productivity in Sub-Saharan Africa we first refer to findings which emerged from a world-wide sample of LDC [Hiemenz, 1977, pp. 1-8]. In this context it has been argued that the relation between the ICOR and the per capita income as an indicator of the development level is u-shaped, with falling ICOR's from a low income level up to a turning-point of about 400 US-\$ which indicates a rising utilization degree of a technically determined and hence indivisible capital stock. Beyond the turning-point more advanced technologies and a changing production structure towards more capital-intensive sectors cause a gradual increase of the ICOR. Corresponding tests for our sample, however, cannot support this argumentation, since all Subsaharian countries have to be subsumed under the income group ranging far below the turning point. On the contrary even a weak positive correlation between the ICOR and the per capita GDP emerges. What seems to be more relevant as an explanatory variable for ICOR differentials is the discrimination between non-mineral- and mineral-exporting countries where the latter group shows significantly higher gross investment ratios but only marginally higher GDP growth rates. Hence we may assume that the average capital productivity was lower in those African countries specialized on the exports of minerals than in the other countries whose export structure was determined by agricultural commodities, probably because the former group was faced with high costs of imported physical and human capital acting as a deterrent to GDP growth.

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<sup>1</sup> This statement is purely qualitative and cannot be tested empirically because of lacking data on the African capital stock.

We therefore argue that in the African context instead of the per capita income level, the type of capital goods acquired and the type of economic activity in which the capital formation is primarily launched could provide appropriate explanations for inter-state ICOR-differentials.

As to the type of capital goods acquired we discriminate between two main groups, the one of residential and non-residential buildings, other construction and work (including land improvement) and the other one of transport and machinery equipment. In general investments in the first group account for 50-75 percent of total gross fixed capital formation in Africa during the sixties. We hypothesize that the ICOR tends to be higher the more the capital formation concentrates on the first group which mainly includes capital-intensive infrastructure investments with a low short-term capital productivity. A test of this hypothesis, however, is impeded because only thirteen Sub-Saharan countries provide corresponding data of at least a three-years-period in the sixties<sup>1</sup>. Splitting the data of Ghana, into two subperiods (1960-65 and 1965-70) and applying a double-logged type of function<sup>2</sup>, we obtain the following equation

$$\ln ICOR = -4.0457 + 1.2076 \ln C \quad R^2 = 0.15$$

$$(-1.2003) \quad (1.4746) \quad n = 14$$

where C indicates the average percentage of gross fixed capital formation launched in the above-mentioned first group of capital goods to total gross fixed capital formation during the respective periods. The regression coefficient shows the hypothesized sign but is not significantly different from zero. Apart from the low number of observations this may be explained by time-lags between the launching of investments in this group and their impact on GDP growth. Since the variables primarily base on the average of five years the lag may exceed this period. Furthermore we cannot estimate differentials in the capital-output-ratios of the single components in the first group. The high aggregation level does therefore not permit the test of the assumption that for example capital-output-ratios in land improvement investments differ significantly from the ratios in construction or dwellings.

<sup>1</sup> According to the UN Yearbook of National Accounts Statistics, these countries are Cameroon, Ethiopia, Ghana, Ivory Coast, Kenya, Lesotho, Malawi, Nigeria, Sierra Leone, Tanzania, Togo, Uganda and Zambia.

<sup>2</sup> The results stemming from the estimation of a linear function do not deviate widely from those of the double-logged function.

Similar data problems arise if we turn to the type of economic activity in which investments are launched. During the sixties capital formation in Subsaharian Africa was concentrated on the tertiary sector (wholesale and retail trade, restaurants and hotels, transport, storage, communication and other services) by about 65 percent of total capital formation<sup>1</sup>. Though the assumption does not seem to be implausible that capital productivity in the tertiary sector is lower than in the other sectors and that therefore countries whose development strategy is oriented towards primary or secondary activities show lower ICOR's a cross-country regression test fails because of data shortages. Nevertheless it can be shown that in those African countries where data are available, the amount of capital formation in agriculture, forestry and fishing does not all correspond to the high percentage of these activities in total GDP. Only in one country (Kenya) the capital formation in these primary activities slightly exceeded 10 percent of total capital formation measured as a five-years-average, whereas in the other countries this percentage was considerably lower. Bearing in mind that capital formation is likely to be confronted with technical indivisibilities especially in the tertiary sector and hence provokes excess capacities in low-income countries it can be asked whether some African countries pursued an appropriate strategy - under growth and employment objectives - to allocate capital funds mostly to the tertiary sector either directly by public investments or indirectly by providing incentives for private investors to concentrate on tertiary activities. On the other hand it is obvious that a minimum endowment with services and infrastructure is an indispensable prerequisite for any economic activity. It can be presumed that mainly the most backward African states concentrated in the Yaoundé-group suffered from this bottleneck and therefore stimulated the capital allocation in tertiary activities during the first development decade, with consequence regarding the overall short-term or medium-term productivity<sup>2</sup>. Additionally other bottlenecks of

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<sup>1</sup> This figure has been calculated by taking the five-years-averages of nine countries (Gambia, Senegal, Cameroon, Kenya, Ethiopia, Tanzania, Mauritius and Zaire).

<sup>2</sup> Though the Yaoundé member states show significantly higher ICOR's than the anglophone countries, we do not link this result to institutionally factors, but to the comparatively bad resource endowment of the Yaoundé countries.

the backward countries as unskilled labour and a lack of managerial facilities may have also influenced the productivity of capital in a negative way [ECA, Statistical and Economic Information Bulletin for Africa, No 4 (1973), p. 57, footnote 137].

#### V. Conclusions and Further Questions

Our results from tracing the growth path of Subsaharian Africa during the first development decade revealed the low capital productivity as a major reason for lagging behind other developing areas with regard to GDP growth. Compared to this bottleneck the availability of local and foreign capital funds was less relevant. This seems to be an interesting deviation from other investigations which stressed the bottleneck role of available capital funds, be it savings, aid or foreign private capital, especially for Asia and the Mediterranean countries. Among the various capital funds private savings ranged next to capital productivity, whereas governments savings did not play any role in fostering growth and were influenced by other components than the growth of exports which were closely connected with private savings. The most striking deviation from other investigations was demonstrated by the low impact of aid on growth which we explained by the considerable regional spread of aid favoring the backward African states which were permanently faced with resource gaps. This spread was more evident in multilateral than in bilateral aid.

Apart from the frequently cited warnings to rely too much on cross-country regression analysis which only "averages the past" there are, however, various questions open to further analysis in our context. Since the interstate differentials in ICOR could not be explained satisfactorily we may argue some general hypotheses. Supposed that the colonial inheritance of Subsaharian Africa, as indicated by its product set offered on world markets, by the scarcity of human capital and by a communication net linking some import enclaves to the outside world and isolating rural domestic resources, seriously hampered structural changes in economic development, then it is understandable that the majority of African states promoted lump-sum capital formation in physical and human infrastructure causing high capital-output-ratios at a very low income level. In addition factor price policies which were not oriented towards alternative costs of resources may have favoured the run for formal education

and a white-collar-job and hence reinforced the flow of human and physical resources in private and especially public tertiary activities [Kamarck, 1971, pp. 77-79]. Whether this strategy was misleading because of fostering excess capacities in the tertiary sector and of neglecting the employment of domestic resources in primary and secondary activities whose short-term capital productivity is generally higher, cannot be answered by drawing on one decade. If the above-cited cross-country regression analysis applied to a world-wide sample, marks the 400 US-\$ per capita income level as the turning-point from downward to upward movements of the capital-output-ratio and therefore indicates somewhat of a full capacity utilization level of the existing capital stock in low-income countries, then many African countries are far from having arrived at that level even today. There is, however, some evidence emerging from country studies that apart from an adverse natural resource endowment different policy attitudes towards specific sectors had important effects on the overall performance. In this context, the quite different growth paths of the Ivory Coast and Ghana, two states with striking similarities in factor endowment and size at the beginning of the development decade, are the most frequently cited examples. Whereas the Ivory Coast pursued a policy of outward-oriented diversification in agricultural primary and processing activities encouraging private entrepreneurship in small-scale farm units, Ghana focused on an extensive import substitution strategy, on investments in large-scale infrastructure projects and on the creation of state farms and cooperatives in the primary sector<sup>1</sup>. In our sample the two countries continuously appear as overachiever respectively underachiever with regard to GDP growth and capital productivity though the Ivory Coast devoted more attention to public investments in physical and human infrastructure during the second half of the sixties and was therefore faced with a slight decrease in capital productivity and though Ghana changed its economic policy in the other direction during the same period, i.e. after the Nkrumah fall, and scored a rise of capital productivity. An analysis of sectoral ICOR's would throw some more light on the impact of different sectoral policies on the overall economic performance of African states. Another aspect to be discussed separately refers to different factor price policies of African countries including

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<sup>1</sup> See [Heldt, 1977 b] and the literature quoted there.

the foreign exchange regimes. Though still today all African countries in general depend on the export of primary products for which an increased flexibility of exchange rates has less consequences than for manufactured goods [Crocket and Nsouli, 1977] it may be argued that changing policies with regard to regional as well as sectoral export diversification should be accompanied by more flexibility in exchange rates than it was the case in Africa during the sixties, where the francophone countries tried to strengthen trade relations with the EEC-partners of France and where the anglophone countries tried to do the same towards the whole EEC. Furthermore the monetary unions in francophone Africa during the whole decade and still 1966 in anglophone East Africa were likely to be detrimental for the backward members which tried to start a diversification policy by enforced intra-union exports of non-traditional goods to the more advanced member states. This seems to be obvious, because the backward states could not autonomously adjust to existing factor price level differentials between the union members.

In general, given the high relevance of the external sector on growth performance in Subsaharian Africa, there is some evidence that the growth lag of this developing area during the sixties as compared to other areas, can only partly be explained by an adverse resource endowment, but to a larger extent by national policies favouring the "big push" in capital-intensive prestige projects as well as especially by the rigidities of strong institutional ties between former colonies and economically stagnating metropolitan countries in fiscal, monetary, trade and aid affairs, thereby strictly limiting sectoral and regional diversification strategies outside the traditional area.

# List of Variables and Sources

- $t_{GDP}$  average annual growth rate of GDP at 1970 market prices 1960-70  
Source: ECA, Statistical and Economic Information Bulletin for Africa, No. 4 (1973), E/CN. 14 SEIB/4
- ICOR Incremental capital-output-ratio 1960-70, average for years shown  
Source: See above
- $t_{MAN}$  average annual rate of value added growth in manufacturing and electricity 1960-69 constant factor cost 1960  
Source: ECA, Survey of Economic Conditions in Africa, 1970 (Part II), New York 1971
- S Gross Savings/GDP at current market prices, 1960-70, 1965-70 average for years shown  
Source: IBRD. World Tables 1976
- $S_{pr}$  Gross Private Savings/GDP at current market prices 1960-70, average for years shown  
Source: See above
- $S_{pu}$  Gross Public Savings/GDP at current market prices 1960-70, average for years shown  
Source: See above
- $A_B$  Net official Receipts of Bilateral DAC-Aid/GDP at current market prices, 1960-70, 1965-70, average for years shown  
Source: ECA, Survey of Economic Conditions in Africa, 1970 (Part I), 1971 (Part I)
- D GDP per capita 1967 in US-\$  
Source: See above
- M dummy  $\delta_2$  countries with a percentage of mining in GDP 1965 higher than 10 percent  
 $\delta_1$  = residual sample countries
- V Value Added in Manufacturing and Electricity 1967/Stock of Foreign Direct Investments in Manufacturing at the End of 1967  
Source: See above; DAC/OECD, Stock of Private Direct Investments by D.A.C. Countries in Developing Countries End 1967, OECD, Paris 1972



- P Private Capital n.i.e. minus Investment Income/GDP,  
1965-70  
average for years shown,  
Source: See above; IMF, Financial Statistics, Washington, Monthly.
- J Dummy: Members of Yaoundé association agreement = 2  
Non-members = 1
- E annual average growth rate of exports in current  
US-\$ 1965-70  
Source: IBRD, World Tables 1976
- A<sub>T</sub> Net official Receipts of Bilateral plus Multilateral  
DAC-Aid/GDP at current market prices, 1965-70  
average for years shown  
Source: ECA, Survey of Economic Conditions in Africa
- C percentage of gross fixed capital formation in  
dwellings, non-residential buildings, construction and  
other workd (including land improvement) to total  
gross fixed capital formation  
Source: UN, Yearbook of National Accounts Statistics,  
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Table 1\* - Growth rates of GDP, Investment Ratios, and Incremental Capital-Output-Ratios (ICOR's) in Subsaharian Africa for years 1960-65, 1965-70, and 1960-70, at 1970 market prices

Country	Compound annual percentage rate of growth of GDP			Gross Investment Ratio at constant prices <sup>1</sup>			Incremental Capital-Output ratio at constant prices		
	1960 to 1965	1965 to 1970	1960 to 1970	1960 to 1964	1965 to 1969	1960 to 1969	1960 to 1965	1965 to 1970	1960 to 1970
	(5):(2)	(6):(3)	(7):(4)	(8):(5)	(9):(6)	(10):(7)	(11):(8)	(12):(9)	(13):(10)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Benin	2.74	6.97	4.86	16.4	16.0	16.2	6.0	2.3	3.3
Gambia	5.24	3.79	4.51	11.9	12.9	12.4	2.3	3.4	2.7
Ghana	3.07	2.50	2.78	16.6	13.1	14.8	5.4	5.2	5.3
Ivory Coast	9.29	8.87	9.08	15.0	17.2	16.1	1.6	1.9	1.8
Liberia	6.68	1.33	4.00	21.7	17.2	19.5	3.2	12.9	4.9
Mali	- 0.92	2.31	0.69	12.6	12.8	12.7	-13.7	5.5	18.4
Mauritania	11.18	4.94	8.06	42.5	12.8	30.2	3.8	3.6	3.7
Niger	7.05	2.77	4.91	10.0	8.7	9.4	1.4	3.1	1.9
Nigeria	4.78	2.69	3.73	11.4	12.9	12.2	2.4	4.8	3.3
Senegal	2.22	0.48	1.35	10.8	13.9	12.3	4.9	29.0	9.1
Sierra Leone	8.75	1.88	5.31	10.3	13.0	11.6	1.2	6.9	2.2
Togo	6.97	9.89	8.43	10.7	14.9	12.8	1.5	1.5	1.5
Upper Volta	- 0.82	6.93	3.02	8.8	11.8	10.3	-10.7	1.7	3.4
Burundi	- 8.03	3.80	- 2.97	6.4	6.6	6.5	- 0.8	1.7	- 2.9
Cameroon	2.92	6.50	4.71	11.5	14.7	13.1	3.3	2.3	2.8
Chad	0.67	1.72	1.19	11.1	10.1	10.6	16.6	5.9	8.9
Central Afr. Empire (CAE)	0.47	2.23	1.35	15.4	16.2	15.8	32.8	7.3	11.7
Congo	3.85	6.46	5.15	38.5	29.5	34.0	10.0	4.6	6.6
Gabon	5.26	8.04	6.65	32.3	24.2	28.2	6.1	3.0	4.2
Rwanda	- 7.63	15.80	3.42	7.3	8.1	7.7	- 1.0	0.5	2.3
Zaire	- 1.29	4.18	1.41	18.0	22.0	20.0	-14.0	5.3	14.1
Botswana	6.33	5.39	5.86	11.3	20.2	15.8	1.8	3.7	2.7
Ethiopia	5.04	5.58	5.31	12.0	13.6	12.8	2.4	2.4	2.4
Kenya	7.34	8.61	7.97	16.1	17.9	17.0	2.2	2.1	2.1
Lesotho	7.30	3.80	5.55	6.0	11.0	8.5	0.8	2.9	1.5
Madagaskar	1.29	5.89	3.59	9.4	13.1	11.2	7.2	2.2	3.1
Malawi	9.25	5.95	7.60	13.0	15.6	14.3	1.4	2.6	1.9
Swaziland	11.65	3.07	7.36	22.9	19.5	21.2	2.0	6.4	2.9
Tanzania	6.99	6.80	6.90	16.4	17.1	16.7	2.4	2.3	2.4
Uganda	5.38	11.83	8.60	11.4	14.3	12.8	2.1	1.2	1.5
Zambia	6.48	7.28	6.88	25.0	23.2	24.1	3.9	3.2	3.5

<sup>1</sup> Averages for years shown.

Source: ECA/UN. Statistical and Economic Information Bulletin for Africa. No 4, 1973, pp. 58 - 59.