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# Kieler Arbeitspapiere Kiel Working Papers

Working Paper No 62

On Determinants of Foreign Investments in francophone African Manufacturing - Some Cross-Country Regression Results

> by Rolf J. Langhammer

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#### Working Paper No 62

On Determinants of Foreign Investments in francophone African Manufacturing - Some Cross-Country Regression Results

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#### I. Problem Setting

Till today the analysis and evaluation of the industrialization process in developing countries (LDC) focus on semi-industrialized LDC<sup>1</sup> with either success in orienting their industrialization strategies at comparative advantages on markets of industrialized countries or failures in pursueing an "excessive" inward-looking strategy thus employing less domestic resources than required. The situation of poor LDC or even "least developed countries" (LLDC) however, has been neglected, either because of the rudimentary character of a beginning industrialization which only enables rather preliminary results and/or simply because of data shortages.

This underrepresentation of poor LDC of LLDC in empirical analysis, however, does not fit in the urgency of giving an advice to these countries how to industrialize.

The question of industrialization in these countries is at the same time equivalent with the question of how foreign investors locate because local entrepreneurship is still poorly developed<sup>2</sup>. Therefore in the following the amount and structure of foreign direct investments (FDI) in manufacturing in

This article is part of a research project which covers the role of foreign direct investments in manufacturing in Subsaharian Africa. The project is sponsored by the Deutsche Forschungsgemeinschaft (SFB 86, Hamburg/Kiel). The author appreciates critical comments provided by S. Heldt, U. Hiemenz and H.R. Krämer on an earlier draft.

 See for eample <u>H.B. Lary</u>, Imports of Manufactures from Less Developed Countries (New York: National Bureau of Economic Research, 1968). See for a recent evaluation of industrialization strategies based on case studies J.B. Donges, A Comparative Study of Industrialization Policies in Fifteen Semi-Industrial Countries, Weltwirtschaftliches Archiv, Tübingen, Bd. 112 (1976), pp. 629-659.

Though the outstanding role of foreign direct investments in the industrialization process of Subsaharian Africa has been widely acknowledged an analysis which goes beyond a description of the pattern is still missing apart from some disaggregated regression analysis based on the DAC capital stock data of 1967 and accomplished by Emerson. See for the "descriptional" approach G. Ngango, Les Investissements d'Origine Extérieure en Afrique Noire Francophone; Statut et Incidence sur le Développement, (Paris: Présence Africaine, 1973), pp. 282-318. - H. Hveem, The Extent and Type of Direct Foreign Investment in Africa, in: C. Widstrand (Ed.), Multinational Firms in Africa (Stockholm: Almquist & Wiksell, 1975), pp. 59-91. - L.L. Rood, Foreign Investments in African Manufacturing, The Journal of Modern African Studies, London, Vol. 13 (1975), pp. 13-34. - See for the mentioned cross country analysis which, however, is aggregated on the level of total foreign direct investments in primary, secondary and tertiary activities M. Emerson, The Structure and Distribution of Foreign Private Investment in Developing Countries, in: G.L. Reuber, Private Foreign Investment in Development, OECD Development Centre, (Oxford: Clarendon Press, 1973), pp. 251-294.

a rather homogenous group of small LDC and LLDC - the francophone African countries - will be analysed in order to explore determinants of FDI in the specific case of poor LDC or LLDC which have strong interpendencies in historical and geographical affairs as well as in economic policies referring to fiscal and monetary affairs and which still maintain close economic relations to the former metropolitan country<sup>1</sup>.

It can be presumed that (within the framework of a cross country regression analysis) location decisions of foreign investors adjust to inter-state differentials in supply and demand conditions of host countries more sensibly in a group of neighboured, homogenous, and closely interconnected countries like the francophone states than in a sample of world-wide scattered and economically diversified LDC. In other words, we assume that among the francophone African countries the competition for FDI in manufacturing is rather strong first because non-economic determinants of alternative location decisions such as interstate differentials in language, politial administration, education and social legislation are insignificant thus stressing the importance of the economic determinants and second because the countries are likely to compete for the same type of investments, i.e. mainly for investments in light consumer industries. In economic terms this would imply higher elasticities of the dependent variables than they would be under conditions of a cross country regression analysis whose sample is usually formed by "external" criteria such as the availability of data stemming from international statistical publications. In general those samples are biased in favour of the semi-industrialized LDC in Latin America and Asia.

<sup>&</sup>lt;sup>1</sup> The sample includes Benin, Cameroon, the Central African Empire (CAE) the People's Republic of Congo, Chad, Gabon, Ivory Coast, Mali, Mauretania, the Malagasy Republic, Niger, Senegal and Togo. With the exception of Togo, Chad and the Malagasy Republic, the states belong to either the Central African Customs and Economic Union (UDEAC) or the Economic Community of West Africa (CEAO). Furthermore the states either form two monetary unions (in West and Central Africa) or maintained fixed parities to the common currency of the two monetary unions (CFA-Frs) after they established national currencies (Mauretania, Mali, the Malagasy Republic).

II. The Model

The simple theoretical framework bases on the profit maximizing investor whose location decision depends on the return-cost relation in alternative host countries which is characterized by the domestic market size (D), factor and distribution costs (S), external economies of agglomeration (A) and the actual development level (L). According to the latter determinant a minimum level will probably be required to attract FDI.

Since the return-cost ratios are different in the various industrial sectors we may assume that not only the absolute amount of FDI in the specific sample countries will be influenced by inter-state differentials in return-cost relations but also its sectoral structure.

According to this distinction between absolute figures and sectoral ratios as dependent variables our set of equations is splitted in two groups:

(1) 
$$y_{i}^{s} = f (D^{s}, S^{s}, A^{s}, L^{s})$$

and

(2) 
$$\frac{y_{j}^{s}}{\sum_{i} \frac{y_{i}^{s}}{v_{i}^{s}}} = f(D^{s}, S^{s}, A^{s}, L^{s})$$

where  $y_j^{s}$  denominates the amount of FDI in sector j and in country s;  $D^{s}$  is the demand indicator of country s,  $S^{s}$  is the corresponding supply indicator,  $A^{s}$  is the agglomeration indicator of country s and  $L^{s}$  denominates the development level of country s.

Equation (1) and (2) will be estimated each for 1963 and 1969 to take account f shiftings in the explanatory power of the independent variables. Additionally a "lagged" regression is introduced, in which the dependent variables with their values of 1975 are estimated by the independent variables with their values of 1969. The functions were estimated in their double-logarithmic form thus assuming constant elasticities.

#### III. The statistical denomination of the dependent variables

In a former article<sup>1</sup> it has been tried to identify a "proxy" for foreign investments in francophone Africa. Since nearly all states belong to the Franc-Zone, in which private capital flows, either from the former metropolitan country to the African states or vice versa, are not accurately reco**rded**<sup>2</sup>, information on the capital stock of foreign dominated enterprises (FED) were taken instead. However, only in few cases disaggregated time series of capital stock data are available. Therefore "legal" liability figures on the level of firms, i.e. the equity capital in FDE, have been taken as a proxy for "actual" asset figures. Using available data on the Cameroonian FDE in the manufacturing sector as a test<sup>3</sup>, it has been shown that the ratio between the capital stock (accumulated investments) and the equity capital is rather stable over time. That means that the expansion of capacity in FDE was financed not only by profits or long-term debts from official and private sources, but also by an equivalent increase of equity capital.

The envirty capital data of about 500 FDE in 1963 and 1969, resp. 700 in 1975<sup>4</sup> operating in the manufacturing sector of the francophone states, were aggregated

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R. J. Langhammer, Estimating the Stock of Foreign Direct Investments in the Manufacturing Sector of Francophone Subsaharian African Countries, 1963-1975, Kiel Working Paper, No 54, Kiel, February 1977, forthcoming in: Mondes en Développement, Paris.

<sup>&</sup>lt;sup>2</sup> Usually only the private capital flows which are connected with French official aid, are recorded in the annual reports of the Franc-Zone secretariat. See <u>Comité Monétaire de la Zone Franc</u>, La Zone Franc en 1969 (Paris: 1971), 3 p. 100.

R. J. Langhammer, op. cit, p. 9.

<sup>&</sup>lt;sup>†</sup> The data were calculated from <u>Ediafric</u>, Societés et Fournisseurs d'Afrique Noire et de Madagascar, Guide Economique Noria, annual. (Paris: Ediafric).

up to the two-digit ISIC level to be used as dependent variables in the cross-country regression equations. All variables in absolute terms (group 1) which were derived from the equity capital data have been calculated on a per capita basis first to eliminate the domestic market size effect on the left side of the equation which is considered to be a proxy for the demand indicator as an independent variable. Second we hypothesize that the per capita figures of FDE equity capital positively correlate with L<sup>S</sup>, since the scope for intra-sectoral diversification at a given size of population increases with the rising development level.

In detail the following variables data will be explained:

#### Group 1

- 1) FDE Equity Capital in ISIC sectors 20-38 (total manufacturing) per capita, in Mill. US-\$, 1963, 1969, and 1975<sup>1</sup>
- FDE Equity Capital in ISIC sectors 20-22 (food, beverages, and tobacco) per capita, in Mill. US-\$, 1963, 1969, and 1975,
- 3) FDE Equity Capital in ISIC sectors 23-24 (textiles and clothing) per capita, in Mill. US-\$, 1963, 1969, and 1975
- 4) FDE Equity Capital in ISIC sector 31 (chemicals) per capita in Mill. US-\$, 1963, 1969, and 1975
- 5) FDE Equity Capital in ISIC sectors 35-38 (metal manufacturing and transport equipment) per capita, in Mill. US-\$ 1963, 1969, and 1975

#### Group 2

6) FDE Equity Capital in ISIC sectors 20-22 to Total FDE Equity Capital in Manufacturing Industries (ISIC 20-38), 1963, 1969, and 1975

In 1962, 1963, and 1970 Mail, the Malagasy Republic and Mauretania left the CFA-Franc-Zone, introduced national currencies, but maintained fixed parities to the CFA-Franc. All figures in national currencies were converted into US-\$\$ in which the GDF data are expressed too. Although the exchange rate between CFA-Frs and US-\$\$ changed in 1969 due to the devaluation of the French franc, the same rate as 1963 and 1969 was used for the 1975 figures (1000 CFA-Frs = 4.051 US-\$) to avoid exchange rate effects in the changes of the figures. The number of observations amounts to fourteen in 1963 and 1969, but only thirteen in 1975, due to missing data on the equity capital of FDE in the Malagasy Republic in that year.

- 7) FDE Equity Capital in ISIC sectors 23-24 to Total FDE Equity Capital in Manufacturing Industries (ISIC 20-38), 1963, 1969, and 1975
- 8) FDE Equity Capital in ISIC sector 31 to Total FDE Equity Capital in Manufacturing Industries (ISIC 20-38), 1963, 1969, and 1975
- 9) FDE Equity Capital in ISIC sectors 35-38 to Total FDE Equity Capital in Manufacturing Industries (ISIC 20-38), 1963, 1969, and 1975.

#### IV. The Statistical Specification of the Independent Variables

The statistical specification of the independent variables is confined because of data inadequacy especially on the supply side. In any case the variables should be regarded as proxies whose appropriateness is bound to implicit assumptions.

We use total population  $(TOTPOP)^{1}$  as the well-known indicator for the domestic market size (D). Due to the high subsistence nature of some countries in the sample this variable may overestimate the permanent effective demand for industrial goods and may therefore be inadequate. We therefore introduce the percentage of wage earners to total population (WAGEAR) alternatively as D<sup>S</sup>. In both cases we hypothesize a positive correlation between the group 1 of dependent variables and D<sup>S</sup> since an increase in D<sup>S</sup> tends to enlarge the diversification potential within the specific sectors. We furthermore expect that the population size is more relevant as D<sup>S</sup> in the "early" industrial sectors such as food and textiles than in chemicals and metals, because the low purchasing power of the rural population is usually directed towards the former industries. As to the "group 2" of equations we expect that correspondingly to the above-mentioned argument a rize of the domestic market size tends to increase the percentage of food and textiles investments in total manufacturing. The sign of D<sup>S</sup> may therefore in this case be positive too but its statistical significance<sup>2</sup> depends on the general significance of demand factors as deter-

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See for the complete text of abbreviations and for the sources the appendix. An independent variable is called significant if at least a confidence level of 95 percent is reached according to the t-distribution. Additionally to the t-values the beta-weights for the regression coefficients are presented in the tables. The beta-weights are defined as the **relation** between the standard deviations in the independent and dependent variable multiplied by the estimated regression coefficient for the independent variable. The betaweight is therefore a measure for the relative contribution of the independent variable in the regression function to the **change** of the dependent variable.

minants of FDI and on the significance of the other variables. As to the factor and distribution costs (S<sup>S</sup>) we make two important assumptions. First we assume that the distribution costs are not different in the sample countries and can therefore be neglected in a cross-country regression analysis. If we regard the investor as the minimizer of transportation costs in the Weberian sense under conditions of ubiquitous inputs he will minimize total transportation costs by locating near the final consumer, that is the urban agglomeration being in most cases identical with the only outside-communication centre (harbour or airport). In the case of light consumer industries we may assume that many of the inputs are imported by air so that transportation costs do not differ widely among the sample countries. Nevertheless there is some degree of arbitrariness in this assumption. The other one is more reasonable. We assume that the capital costs are equal for all countries, because the countries belong to the Franc-Zone or have strong monetary connections with this Zone in which capital can circulate free of restrictions. We can therefore assume inter-state factor price equalization for capital. Consequently factor price differentials are determined only by wage differentials. Under the plausible assumption that in all sample countries effective wages equally deviate from the minimum wages we denominate the latter ones as S<sup>S</sup> by using the lowest category of qualification in non-agricultural activities and in urban areas as the precise figure (MINWAG). However, we expect that wage differentials are indicators for skill differentials so that wages will be positively correlated with the dependent variables rather than negatively. This considers the case of foreign investors gradually replacing expensive but high-qualified expatriates by experienced local labour force. As to group 2 of the dependent variables we hypothesize that the positive correlation to nominal wages is the stronger we higher the percentage of skill-intensive industries (chemicals and partly metal manufacturing) to total manufacturing is.

However, minimum wages do not consider inter-state productivity differentials which we assume to be substantial between remote Sahel-states and the more developed coastal countries. We have therefore calculated value added per employee figures on the basis of ECA sectoral cross country estimates for each country. However, these figures are biased in favor of higher values for countries in which capital-intensive industries such as food manufacturing prevail, because we used the percentage of industries in total manufacturing as sectoral weights. The thus calculated total value added figure were referred

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to units of minimum wages (PROADJ), so that differences in factor productivity and differences in wages will be balanced. Using this adjusted productivity figure alternatively to nominal wages as S<sup>S</sup> we expect this variable to be positively correlated with group 1 and group 2 of the dependent variables with an upward tendency in the more capital-intensive chemical and food sectors.

The agglomeration variable  $A^{S}$  is represented by the urbanization level (URBAN) and hypothesized to be positively correlated to the dependent variables, whereas the level of development  $L^{S}$  is approximated by the per capita income (GDPCAP). Again a positive correlation can be presumed.

#### V. Interpreting the Regression Results

Using two alternative independent indicators each for the demand and supply variable there are four possible alternative regressions to be estimated from which we choose the "best" one according to the coefficient of determination  $\tilde{T}^2$  adjusted by degrees of freedom as the relevant criterion<sup>1</sup>.

In general the question how foreign investors adjust to inter-state differentials in demand and supply conditions as well as to the agglomeration and development level cannot be answered without referring explicitly to specific sectors and years.

However, table 1 in which the amount of total investments in manufacturing is explained indicates somewhat of a general outcoming that is that investments sensibly adjusted to demand, agglomeration and development level differentials rather than to differentials in supply conditions. Among these three leading determinants of investments, the development level and the agglomeration gained in importance over time in accordance to the hypothesized signs whereas among the two demand indicators a shift from the wage earners percentage to the population size as the best explanatory variable can be observed. Considering the growing elasticity of investment changes to upward changes in agglomeration this shift obviously reveals that a higher growth of urban population

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<sup>1</sup> The adjusted  $R^2$ 's are presented underneath the  $R^2$ 's in brackets.

relatively to the growth of total population positively influenced investment decisions and compensated investors for the low absolute level of population in some francophone countries. Hence FDI in total manufacturing are directed to urban demand rather than to the very low purchasing power of rural population. This result runs parallel to that of the positive impact of a relatively advanced development level on investment decisions even in countries with an extremely small population<sup>1</sup>. Furthermore it seems that investments adjusted to inter-state changes of the independent variables with a lag of few years since the results of the lagged regression function are more conclusive than those of the non-lagged function.

Contrasting to the aggregate results of table 1, the sectoral results (tables 2-5) are less lucid. There is no conclusive explanation of investment adjustments in the food sector except the one that supply conditions seem to be more relevant in this sector than for total manufacturing. This may reflect a "split" within the food sector in two diverging groups: the one of import substituting investments such as in beverages, tobacco, grain milling and dairy products and the other one - gaining in importance over time - of outward-oriented investments in agricultural processing such as in fruits and fish canning as well as in coffee and cocoa processing.

Considering the low growth potential of effective domestic demand in some of these countries after the exhaustion of the import-substitution potential it seems reasonable to expect a shift from inward-looking food investments to outward-looking investments if the natural conditions for the latter group of investments are given. The positive but still insignificant minimum wage coefficient in the lagged function tends to support this hypothesis by indicating higher per capita investments in food in those "wage leader" countries such as the Ivory Coast in which natural resources of outward looking agricultural processing are available. Additionally the skill component involved in the wage level may be of some relevance for outward-

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<sup>&</sup>lt;sup>1</sup> This is the case of Gabon which due to the export of raw materials increasingly demanded on world markets has the highest per capita income of the sample countries but the lowest population size. Gabon exactly fits in Hirshman's terminology of "import enclaves" where import substitution solely concentrates on local urban demand of few consumer goods with a very low domestic value added content.

oriented investments if a minimum standard of skilled and experienced local manpower in labour intensive industries is required being available in the advanced coastal countries rather than in the backward Sahel states.

The outstanding result of table 3 explaining the per capita amount of textiles does not seem to be the high positive impact of agglomeration and population size but the **neg**ligible relevance of the development level together with negative coefficients of the supply indicators. The former reveals that a rising development level obviously did not widen the scope of <u>intra</u>-sectoral diversification as it would be indicated by rising per capita investment figures in textiles.

The latter relevant result of table 3, the negative correlation between adjusted productivity figures and per capita investment figures may demonstrate the labour-intensity of textile production and the low skill requirements in this sector which enables even the LLDC to attract FDI in textiles, however, as it can be supposed, with suboptimal production units at the beginning of the reference period.

Just an opposite result is presented for the chemical sector (table 4) in which the development level seems to be the most relevant variable. However, in spite of the theoretically plausible positive productivity coefficients in this capital-intensive sector, further reaching interpretations are hampered by the high heterogenity of chemical industries in francophone Africa. They include inward-looking consumer industries (soaps, perfumes, plastics) as well as outward-looking intermediate industries (oil milling,fertilizers,insecticides), small scale as well as large scale units, with labour-intensive as well as capital-intensive technologies.

Hence the unexplained but statistically significant "rest" may be due to structural changes within the two-digit ISIC sector rather than to the inappropriateness of the independent variables. Given the average case of a capitallabour ratio in chemical industries which is far above the sectoral average of the total manufacturing sector in Africa<sup>1</sup>, however, it can be presumed

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<sup>&</sup>lt;sup>1</sup> See a cross country analysis of ECA which indicates a value added per employee figure of US-\$ 3166 for the chemical sector and a corresponding figure of US-\$ 2317 for the total manufacturing sector. ECA, Survey of Economic Conditions in Africa, 1972, (Part I), E/CN.14/595 (Part I), New York 1973, p. 128.

that higher labour costs in the more advanced countries than in the backward Sahel countries do not act as a barrier to investments in chemicals but on the contrary underline the tendency to locate in more advanced countries because of the complementary character of skilled local manpower to capitalintensity<sup>1</sup>.

The results of table 5 for the metal manufacturing sector run parallel to those for the textile sector in so far as the agglomeration variable is positively correlated with FDI throughout the whole period whereas the development level which was hypothesized to have a positive impact on the dependent variable loses in importance and even turns to be negatively correlated. Contrasting to food and chemicals both sector include industries which are predominantly inward-looking thus opening the scope for factor price distorting importsubstitution policies. This perhaps could explain why the FDI in both sectors did not adjust to inter-state development differentials in the assumed direction though those differentials enlarged over time and though the metal manufacturing sector involves a wide diversification potential along an increasing development level. Another possible reason why countries at the end of the development scale increasingly attracted relatively large amounts of FDI in metal manufacturing and therefore caused a change of the sign of the development coefficient refers to the existence of the customs unions. Within the context of the two common markets in West and Central Africa foreign investors installed wage-intensive metal assembly plants in some low-wage countries which were directed to the domestic as well as to the markets of neighboured customs union members<sup>2</sup>.

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In some cases it may be justified to complement capital-intensity by raw material-intensity in chemicals such as vegetable oil milling. Besides the availability of raw materials, however, skilled local manpower seems to be a relevant locational variable especially in the chemical sector. An analysis of the wage earner structure in the total manufacturing sector of Senegal 1967 for example provides a percentage of qualified local wage earners (that is the total of local wage earners minus "ouvriers specialises", "manoeuvres", "apprentis" and "autres") to total wage earners of 66.7 percent for the total manufacturing sector against 70.6 percent for the chemical industry. See <u>République du Sénégal</u>, Ministère du Plan et de l'Industrie", Recensement des Activités Industrielles 1966-1967 (Dakar 1970.)

<sup>&</sup>lt;sup>2</sup> See for example the Central African Customs and Economic Union in which metal assembly plants were located exporting 20-50 percent of total output to customs union members.

See P. Robson, Economic Integration in Africa (Allen & Unwin; London 1968), p. 195.

Therefore in this case the development levels of the host as well as of the neighboured export countries seem to be the more appropriate variable than the development level of the host country alone.

Tables 6-9 which try to explain the sectoral structure of FDI in francophone Africa demonstrate some well-known stages of industrial development beginning with a high percentage of food investments in total investments in countries at a very low development level. Though this result maintains its validity throughout the whole period (table 6), the negative correlation weakens parallel to an increase of the average development level of all countries. This might be explained by the fact that in addition to the traditional importsubstituting industries in food a rising percentage of new FDI in agricultural processing is export-oriented and that these industries mostly locate in the more advanced countries in which raw materials as well as experienced labour are available. The positive impact of the latter domestic resource is documented by a positive correlation between the ratio and the minimum wage level as the indicator of skill availability. However, this correlation is not strong probably because of the still major role of capital intensive import-substitution industries in this sector.

In total it can be argued that new export-oriented FDI in the food sector act as a countervailing force against the "law" of a strong negative correlation between the food ratio and the development level in the sample countries, after the first stage of investments in beverages and tobacco has been passed.

Some of the outcomings of table 3 concerning the absolute amount of textile investments are also valid for the corresponding ratio (table 7). Again high agglomeration levels as well as the low skill requirements are connected with a high ratio of textiles to total manufacturing investments. More remarkable, however, seems to be the negative correlation between the ratio and the development level which, in contrast to table 3, becomes stronger over time. In other words, the food sector has been replaced by the textile sector as a key sector in the LLDC after the average development level of all countries has increased. There are at least two possible explanations for this result. First, foreign investors shift to more domestic resource-intensive industries

and the second secon

if these resources have been made available<sup>1</sup>. Taken the example of the LLDC in this sample this had been the case after the countries got experienced with modern manufacturing involving more capital-intensive sectors (food) at the beginning than afterwards. Second, simultanously to improved supply conditions demand conditions changed too as a consequence of rapidly growing urbanization and a weakened importance of local handicraft whose relevant market seems to be the rural population. Hence the scope of FDI in textiles has improved in correspondance to these structural changes in demand and supply conditions.

Parallel to the unsatisfactory results of explaining the absolute amount of FDI in chemicals the ratio too fails to be explained by the independent variables (table 8). It can be presumed that this is not only due to the above-mentioned heterogenity of the industries involved but can also be explained by the rather unequal regional distribution of investments in chemicals with a set of small scale inward-looking investments in all countries which is overlapped by few large scale export-oriented industries in few coastal countries. Since our dependent variables are based on liability figures the latter group of equity capital-intensive investments.

The estimated equations for the metal manufacturing ratio resemble those for the textile ratio in respect to changes of the GDP coefficient and the relevance of the agglomeration variables. Since many of the industries are assembly plants (radios, cars, bicycles) whereas another group concentrages on the production of small tools, supply and demand conditions are of different importance for each of the two groups of industries.

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<sup>&</sup>lt;sup>1</sup> This development is supported by corresponding FDI in the primary sector in order to improve the quality as well as quantity of for example local fibres. Anyhow foreign investors tend to favour imported techniques including imported raw materials at the very beginning of industrialization in LLDC. This may also explain the gradual shift from food to textiles as leading sectors since the dependency on imported techniques and raw materials is higher in the food than in the textiles sector.

The equations, however, demonstrate a rather substantial change till 1970 stressing the growing importance of the domestic market and a shift of high metal ratios from low-wage to high-wage countries. This seems to be a result which one could have expected earlier since metal manufacturing investments are usually not the forerunners of industrialization in LLDC. However, the existence of the customs unions provides an interesting "break" of this rule. The metal manufacturing sector seems to be the only one in which aspect of low wages in connection with the existence of currency and customs unions played a significant role. Due to unsolved problems of harmonizing the national industrialization plans within the integration schemes double investments in nearly all relevant sectors have been launched and probably eroded the location argument of labour-intensive assembly plants in low-wage countries. Additionally growth of domestic demand enabled the establishment of new metal manufacturing plants so that the heterogenity of this sector steadily increased since 1963. Both arguments may be responsible for the decrease of the explanatory power of the independent variables.

#### VI. Conclusions

Apart from the well-known problem of deriving causalities from cross-cauntry correlations the results of our analysis are subject to various constraints. On the one hand the constraints mainly stem from the use of proxies instead of original data on FDI as dependent variables and from the heterogenity as well as structural changes within the two-digit sector and on the other hand from the implicit assumption that foreign investors flexibly adjust the amount of investments to inter-state differentials in magroeconomic aggregates. However, it seems probable that because of technologically determined plant sizes indivisibilities or lum-sum investments are major obstacles to the assumed flexibility. This would explain why particularly in the rather capital-intensive chemical sector the results were inconclusive indicating discretionary "jumps" in the investment supply curve rather than fluent changes, in addition to wide inter-state differentials in the amount of investments. Market size would therefore be better approached by the degree of capacity utilization for which data are not available than by the capacity itself.

Furthermore the problem of excess capacities touches the question of the relevance of policy variables which we assumed to be less important in a sample of customs and currency union members than in world wide country samples. Though among the francophone countries the scope for different incentive policies does not seem to be substantial there is nevertheless some degree of policy-induced investment decisions because official foreign aid which positively and significantly correlates with the stock of FDI in total Subsaharian countries<sup>2</sup> is granted at more concessionary terms for the LLDC in the sample than for the more advanced countries. Theoretically this would rise the capital-labour ratio in the LLDC and lead to a factor-intensity being inadequate under the employment objective. Since, however, the definition of LLDC and the distribution of exclusive LLDC soft loans has not gained practical importance before the beginning of the seventies it remains doubtful whether the inter-state differentials in the amound and conditions of official foreign aid have seriously influenced our results. Another aspect seems to be more essential; this is the type of foreign investors in African manufacturing gradually changing from the "colonial" type with limited geographical and sectoral spread<sup>3</sup> to the multinational corporations which today mainly invest in the agricultural processing export-oriented industries in francophone Africa. Multinational Corporations (MC) are likely to be more world market-oriented than the "colonial" type and therefore

pay more attention to the supply potential than to the size of domestic markets if they invest in small francophone African countries.

<sup>&</sup>lt;sup>1</sup> Nationally diversified incentive policies would mainly include different tax and tariff systems as well as levels, and different investment promotion acts. In francophone Africa this is not the case.

<sup>&</sup>lt;sup>2</sup> See Emerson, op. cit., p. 257.

<sup>&</sup>lt;sup>3</sup> See for this aspect W. <u>Chudson</u>, Africa and the Multinational Enterprise, in H.R. Hahlo, J. G. Smith, and R.W. Wright (Eds.), Nationalism and the Multinational Enterprise, Legal Economic and Managerial Aspects (A.W.Sijthoff, Leiden), pp. 146-147.

This answers the questions why supply factors which in general determine the competitiveness of export-oriented industries on world markets played a more significant role in food industries (table 2) than in total manufacturing and why cross-country analysis failed to provide conclusive results in the chemical sector which is splitted into two quite different groups of large scale outward-looking investments concentrated on few countries and preferred by the MC and the rest of small scale domestic market ioriented industries scattered all over the countries.

On the opposite side the two other sectors - textiles and metal manufacturing are still dominated by the "colonial" type of domestic market-oriented investors. This, however, includes the penetration of domestic as well as of neighboured customs union member markets. Following the Linder argument it seems to be plausible that the costs of exploring an export market which is identical with the markets of neighboured African countries are neglible compared with those being necessary to penetrate into the markets of industrialized countries. We can therefore subsume the penetration of both "regional" and "domestic" markets under the common headline of inward-looking investments.

In general demand factors still prevail in explaining the pattern of FDI. The high positive impact of agglomeration on the per capita figures of FDI fits in this result because it reveals a convergence between the production structure of foreign dominated firms based on standardized consumer goods which equal those produced in industrialized countries and the demand structure of urban population imitating the "europeanized" consumer tastes of high-income groups such as civil servants and expatriates. Additionally this impact is enforced in those African countries in which the regional income distribution is extremely unequal because of a vacuum between the only commercial and administrative agglomeration with its high purchasing power and some scattered rural towns.

By focusing on and locating near the only agglomeration area foreign investors simply adjust to these specific African conditions as well as to the policies

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of host countries which privilege formal and discriminate informal activities<sup>1</sup>.

As a brief summary it can be argued that import-substitution still determines the structure of FDI in total manufacturing. A sectoral disaggregation, however, marks some distinction between textiles and metal manufacturing in which the cross-country analysis witnessed a stronger relevance of inwardlooking industrialization than in food and chemicals. In the latter sectors the regression results turned to be inconclusive probably because of the increasing relevance of supply variables in some export-oriented industries. There is some evidence that inter-state differentials in wage costs are outweighed as location determinants by raw material and skill availiability. In both aspects it can be presumed that the gap between the coastal more advanced countries and the hinterland Sahel states tends to enlarge either because of natural advantages in favour of the former group and/or because of considerable inter-state flows of the mobile part of population from the latter to the former group of countries. Since the econometric proof of the adjustment process of FDI to inter-state demand and supply differentials in this group of countries is hampered by various conceptual and statistical obstacles our cross-country analysis seems to be a challenge to further disaggregated research rather than a clearing of the role of FDI in the industrialization process of small LDC and LLDC.

In the context of the Ivory Coast this aspect is analysed by H. Joshi, J. Lubell, J. Mouly, Abidjan, Urban Development and employment in the Ivory Coast, World Employment Programme, ILO, Geneva, pp. 89-90. See for a detailled analysis of host country policies favouring formal activities in an anglophone African country ILO/UNDP Employment, Incomes and Equality, A Strategy for Increasing Productive Employment in Kenya (ILO, Geneva, 1972), especially part II.

#### Appendix

Abbreviations and Complete Text of Independent Variables

TOTPOP Total Population in Million, 1963 and 1970 Total Wage Earners in percent of Total Population 1963<sup>1</sup> and WAGEAR 1970 or at nearest year for 1963: (Source: Ediafric, op.cit) for 1970: Commission des Communauté Européennes, Les Conditions d'Installation d'Entreprises Industrielles dans les Etats Africains et Malgache Associés, 2eme Edition Vol., 1-19, Bruxelles 1974 Statistisches Bundesamt der Bundesrepublik Deutschland, Allgemeine Statistik des Auslandes, Länderkurzberichte, Stuttgart u. Mainz: Obervolta 1975, Elfenbeinküste 1975, Kongo 1974, Zentralafrikanische Republik 1974, Dahomé 1974, Gabun 1976, Niger 1976, Tschad 1974, Mali 1976, Madagaskar 1974, Senegal 1974, Togo 1975, Kamerun 1974. MINWAG Legal Minimum Wages per hour for Non-Agricultural Workers in Urban Areas, Lowest Category of Qualification, in CFA-Frs. 1963 and 1970. (Source: Ediafric, Noméro Spécial du Bulletin de l'Afrique Noire, Memento de l'Industrie Africaine 1966, (Paris: Ediafric, 1966) for 1970: Commission des Communautés Europénnes, Les Conditions d'Installation d'Entreprises Industrielles, various countries, Decembre 1972: - Union Doaunière et Economique des Etats de l'Afrique Centrale, Sécretariat Général Situation de l'Emploi en UDEAC, Brazzaville, Mars 1971. PROADJ Labour Productivity in Manufacturing per Week Adjusted by Differentials in Minimum Wages<sup>1</sup> in US-\$ 1963 and 1970 or at nearest year. Calculated by the following formula which assumes a weekly working period

 $p' = \frac{v_i}{1}$ , where p' is the productivity, v' the annual industrial value added per employee divided by 52, and  $1^4$  the legal minimum wage per hour multiplied by 50. The calculated figures are presented in table 10 in the appendix.

of 50 hours

URBAN	For 1963 <sup>1</sup> : Population in Cities greater than 5000 Inhabitants to Total Population in percent
	(Source: Ediafric, Numéro Spécial du Bulletin de l'Afrique Noire, No 413, Memento de l'Industrie Africaine 1966, (Paris: Ediafric, 1966)
	for 1970: Urban Population as a Percentage of Total Population in 1970
	(Source: UN, ECA, Survey of Economic Conditions in Africa, 1972, Part 1, New York 1973, p. 269).
GDP /CAP	Gross Domestic Product at Market Prices per Capita in US-\$ 1963 and 1970
	(Source: UN, ECA, A Survey of Economic Conditions in Africa,

1970, Part II, New York 1971. -Survey of Economic Conditions in Africa, 1972, Part 1, New York 1973).

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Tabl	е	1
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Year	Dependent Variable			Indepen	dent Varia	ables <sup>a</sup>					
	Total FDE Equity Capital in Manufacturing Industries (ISIC 20-38) per Capita		Demand 1	Indicators	Supply 1	Indicators	Agglomera- tion Indi- cator	Development level Indi- cator	R <sup>2</sup>	F	D.W.
	(IBIC 20-90) per capita	CONST	TOTPOP	WAGEAR	MINWAG	PROADJ	URBANI	GDPCAP			
1963		- 7.1240		1.6944		1.7005	0.8800	0.0165	0.849	12.671	2.174
	t-Values	- 1.2520	1	2.5464**		1.5280	1.0251	0.0170	(0.782)		
	Beta-Weights			0.8458		0.2696	0.2423	0.0046			
1969		- 8.0760		0.3694		1.2492	0.2907	1.1695	0.746	6.623	2.277
	t-Values	- 1.6392		0.6170		0.8975	0.7760	1.4330	(0.634)		
	Beta-Weights			0.2685		0.1801	0.1826	0.5485			
1975		- 6.6985	0.5044			- 1.4461	0.3336	1.5380	0.939	30.678	2.705
	t-Values	- 4.1214*	2.6348**			- 0.2347	2.5491**	7.1066*	(0.908)		
	Beta-Weights		0.3567			- 0.0269	0.2767	0.9513	•		
				' '		ł		1			
	<sup>a</sup> Abbreviations see text.			•							

\* Statistically significant at the 1 % level.

\*\* Statistically significant at the 5 % level.

Sources: See text.

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Table	2
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Year	Dependent Variable			Independent	Variables	1					
	Total FED Equity Capital in ISIC 20-22 (Food,		Demand	Indicators	Supply In	ndicators	Agglomera- tion Indi- cator	Development level Indi- cator	R <sup>2</sup>	F	D.W.
	Capita	CONST	TOTPOP	WAGEAR	MINWAG	PROADJ	URBANI	GDPCAP			
1963		- 3.9639		2.9445		2.9133	1.2433	- 1.8637	0.713	5.591	2.615
	t-Values	- 0.3668		2.3299**		1.3783	0.7625	- 1.0127	(0.586)		
	Beta-Weights			1.0676		0.3355	0.2487	- 0.3741			
1969		- 8.5102		0.9255		2,5032	- 0.0496	0.6268	0.635	3.917	2.472
	t-Values	- 1.3304		1.1905		1.3852	- 0.1019	0.5915	(0.473)	1	
	Beta-Weights			0.6216		0.3334	- 0.0288	0.2716			
1975		-15.267		- 0.4922	2.8778		0.4197	0.9620	0.628	3.376	2.805
	t-Values	- 1.8825	. •	- 0.5483	1.2464		0.9873	0.7201	(0.442)		
	Beta-Weights			- 0.3843	0.5238		0.2897	0.4950			
		·		I	I			I Į	1	l	
	Abbreviations see text.										
	* Statistically significant	at the 1 % leve	1.								

\*\* Statistically significant at the 5 % level.

Sources: See text.

Table	3
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	Dependent Variable	Independent Variables <sup>a</sup>									
Year	Total FDE Equity Capital in Textiles (ISIC 23-24) per Capita	CONST	Demand In	dicators	Supply I MINWAG	ndicators	Agglomera- ration Indi cator URBANI	Development level Indi- cator GDPCAP	R <sup>2</sup>	F	D.W.
1067		0.6207	1 9019		4 9041		E 4775	1 4901	0 902	0.174	1 703
. , , , , , , , , , , , , , , , , , , ,	t Walnes	- 9.9291	0.0500**		- 4.0941		2.4/22	1.4891	0.002	9.194	1. (3)
		- 0.9670	2.2520**		- 1.5854		4.1462*	0.9184	(0./14)		
	Beta-Weights		0.4433		- 0.2744		0.9192	0.2510			
1969		6.0340	1.6144			- 6.1947	1.7792	- 0.0173	0.662	4.407	1.768
	t-Values		1.9722			- 2.2134	3.0285**	- 0.0181	(0.512)		
	Beta-Weights		0.5904			- 0.5751	0.7197	- 0.0052			
1975		8.7866	1.7242			- 7.1543	2.2101	- 0.1921	0.867	13.090	1.526
	t-Values	1.7327	2.8868**			- 3.7216*	5.4134*	- 0.2845	(0.801)		
	Beta-Weights		0.5751			- 0.6270	0.8648	- 0.0560			
				1	]		1		l	1	
	<sup>a</sup> Abbreviations see text.										
	* Statistically significant	at the 1 $\%$ level	•								
	** Statistically significant	at the 5 % level	•								

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Sources: See text.

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#### Table 4

	Dependent Variable			Independ	lent Varia	ables <sup>a</sup>					
Year	Total FDE Equity Capital in Chemicals (ISIC 31) per Capita	al FDE Equity Capital Chemicals (ISIC 31) Capita		Demand Indicators Su		Supply Indicators		Development level Indi- cator	R2	F	D.W.
		CONST	TOTPOP	WAGEAR	MINWAG	PROADJ	URBANI	GDPCAP			
1963		-48.164	1.8470			6.6730	1.5851	5.2225	0.842	12.025	1.630
ł	t-Values	- 6.3731*	3.2831*			4.5425*	1.7418	4.1531*	(0.772)		
	Beta-Weights		0.5474			0.8160	0.3367	1.1133			
1969		-17.264		- 0.7609		1.2581	0.5032	2.5338	0.633	3.889	2.320
	t-Values	- 2.7358**	•	- 0.9922		0.7057	1.0488	2.4239**	(0.471)		
	Beta-Weights			- 0.5192	,	0.1703	0.2967	1.1534			
1975		-14.003	1.0947			0.4123	0.1616	2.2896	0.732	5.449	2.279
	t-Values	- 2.8952**	1.9216			0.2249	0.4149	3.5551*	(0.597)		
	Beta-Weights		0.5449			0.0539	0.0944	0.9967			
	a company and the		1	1	•	н 	i	1	1	I	I
	Abbreviations see text.	at the 1 of laws									
	- Statistically significant	at the f % level	•								
	** Statistically significant	at the 5 % level	•								
	<ul> <li>Abbreviations see text.</li> <li>* Statistically significant</li> <li>** Statistically significant</li> </ul>	at the 1 % level at the 5 % level				•					

Sources: See text.

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	Dependent Variable			Independ	ent Variab	les <sup>a</sup>					
Year	Total FDE Equity Capital in Metal Manufacturing		Demand In	dicators	Supply In	ndicators	Agglomera- tion Indi- cator	Development level Indi- cator	"2		זע
	per Capita	CONST	TOTPOP	WAGEAR	MINWAG	PROADJ	URBANI	GDPCAP	п		2
1963		- 2.2692	2.0413		-10.538		4.2003	4.7653	0.926	28.063	3.077
	t-Values	- 0.3724	3.9299*		- 4.8174*		5.1457*	4.7527*	(0.893)		
	Beta-Weights		0.4741		- 0.5856		0.6991	0.7961			
1969		- 5.4850	1.7715			- 3.2685	1.6623	0.7800 -	0.642	4.031	2.032
	t-Values	- 0.6794	1.9484			- 1.0514	2.5474**	0.7350	(0.483)		
	Beta-Weights		0.6005			- 0.2812	0.6232	0.2183			
1975		-13.860		1.0827	3.9875		1.8284	- 1.5171	0.685	4.361	1.426
	t-Values	- 0.8301		0.5858	0.8388		2.0891	- 0.5516	(0.528)		
	Beta-Weights			0.3775	0.3241		0.5636	- 0.3486			1

<sup>a</sup> Abbreviation see text.

\* Statistically significant at the 1 % level.

\*\* Statistically significant at the 5 % level.

Sources: See text.

Table (	6
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ear	Dependent Variable			Independer	nt Variable	8 <sup>8</sup>					ĺ
	Ratio Equity Capital in Food (ISIC 20-22) to Equity Capital in	o ]]		licators	Supply Indicators		Agglomera- tion Indi cator	Development level Indi- cator	R <sup>2</sup>	F	D.W.
	Total Manufacturing	CONST	TOTPOP	WAGEAR	MINWAG	PROADJ	URBANI	GDPCAP			
963		- 0.0051		1.5532	3.6229		- 0.2663	- 3.0099	0.485	2.117	2.670
	t-Values	- 0.0008		1.9808	1.7129	[	- 0.2501	- 2.6021**	(0.256)		
	Beta-Weights .			1.2632	0.5427		- 0.1195	- 1.3554			
1969		- 0.9349	i	0.5987	1.9671		- 0.2689	- 1.3930	0.299	0.959	1.996
	t-Values	- 0.2700		1.4019	1.5566		- 1.0994	- 1.8093	(-0.127)		
	Beta-Weights			1.0200	0.8037		- 0.3958	- 1.5311	1		
975		- 4.6179	- 0.7458		3.1713		0.0341	- 1.5094	0.342	1.037	2.740
	t-Values	- 1.1311	- 1.7239		1.6062		0.1173	- 1.6836	(0.012)		
	Beta-Weights		- 0.7676		1.0071		0.0412	- 1.3554			

Sources: See text.

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	Dependent Variable											
ear	Ratio Equity Capital in Textiles (ISIC 23-24) to Equity Capital		Demand Indicators Supply Indicators Agglomera- Developmen tion Indi- level Indi- cator cator							F	D.W.	
	in Total Manufacturing	CONST	TOTPOP	WAGEAR	MINWAG	PROADJ	URBANI	GDPCAP				
963		- 0.8062	1.6837		- 3.8301		3.1518	0.1432	0.543	2.675	1.958	
	t-Values	- 0.0806	1.9751		- 1.0669		2.3528**	0.0870	(0.340)			
	Beta-Weights	d I	0.5912		- 0.0806		0.7932	0.0362				
969		15.800	1.8575			- 7.6601	1.3254	- 1.4569	0.697	5.179	1.799	
	t-Values	2.3935**	2.4881**			- 3.0091**	2.4735**	- 1.6720	(0.563)	1		
	Beta-Weights		0.7051			- 0.7381	0.5564	- 0.4566				
75		15.4850	1.2198			- 7.0097	1.8765	- 1.7302	0.819	9.039	1.843	
	t-Values	3.0319**	2.0278			- 3.6204*	4.5637*	- 2.5440**	(0.728)			
	Rote Woights		0.4724	1		- 0 7132	0 8525	- 0 5850				

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Sources: See text.

Τa	ъı	е	8
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	Dependent Variable											
	Ratio Equity Capital in Chemicals (ISIC 31) to Equity Capital			ndicators	Supply Ir	dicators	Agglomera- tion Indi- cator	Development level Indi- cator	r <sup>2</sup>	Ŧ	D.W.	
	in Total Manufacturing	CONST	TOTPOP	WAGEAR	MINWAG	PROADJ	URBANI	GDPCAP			· · · · · · · · · · · · · · · · · · ·	
163		-33.247		- 2.8620		3.4590	2.2664	3.9125	0.500	2.249	1.790	
	t-Values	- 2.8904**		- 2.1277		1.5376	1.3059	1.9975	(0.278)			
	Beta-Weights			- 1.2871		0.4940	0.5622	.,0 <b>•974</b> 2				
69		- 9.1884		- 1.1303		0.0089	0.2125	1.3643 '	0.297	0.951	2.462	
	t-Values	- 1.8320		- 1.8545		0.0063	0.5573	1.6421	(-0.015)			
	Beta-Weights			- 1.3438		0.0021	0.2183	1.0464			•	
75		- 7.3042	0.5903			0.5569	- 0.1720	0.7516	0.254	0.682	1.789	
	t-Values	- 1.7392	1.1933			0.3498	- 0.5087	1.3439	(-0.118)			
	Beta-Weights		0.5639			0.1398	- 0.1928	0.6279				

Sources: See text.

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Table 9

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	Dependent Variable		-								
	Ratio Equity Capital in Metals (ISIC 35-38) to Equity Capital in		Demand In	dicators	Supply In	ndicators	Agglomera- tion Indi- _cator	Development level Indi- cator	R <sup>2</sup>	F	D.W.
	Total Manufacturing	CONST	TOTPOP WAGEAR		MINWAG PROADJ		URBANI	GDPCAP			
1963	t-Values Beta-Weights	6.4544 1.1510	1.8322 3.8352* 0.7173		- 9.4740 - 4.7064* - 0.8869		1.8786 2.5010** 0.5268	3.4193 3.7059* 0.9624	0.821 (0.742)	10.362	2.124
1969	t-Values Beta-Weights	4.2811 0.5861	2.0146 2.4491** 0.7693			- 4.7339 -1.6831 - 0.4577	1.2085 2.0468 0.5091	- 0.6597 - 0.6870 - 0.2074	0.629 (0.465)	3.827	1.726
1975	t-Values Beta-Weights	- 3.4912 - 0.2161		1.5399 0.8611 0.6906	2.7230 0.5919 0.2847		1.2413 1.4656 0.5919	- 2.8387 - 1.0665 - 0.8391	0.513 (0.269)	2.105	1.512
	Abbreviations see text. * Statistically significant ** Statistically significant	at the 1 % level. at the 5 % level.		I	I	1	I		1	1	I

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Sources: See text.

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#### Table 10\* - Raw Data of Francophone African Countries

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	GDP/T	GDP/TOTPOP		P TOTPOP		URBANI		MINWAG		WAGEAR		VAENPL		PBOADJ		FDE Equity Capital ISIC-Sectors 20-36		tal in 20-38	PDE Equity Capital ISIC-Sectors 20-22		pital in 20-22	In FDE Equity Capital in ISIC-Sectors 23-24			FDE Equity Capital in ISIC-Sector 51			PDE Equ ISIC-Se	ty Capi?	-38
Countries	1963	1970	196	53	1970	1963	1970	1963	1969	1963	1969	1963	1970	1963	1971	1963	1969	1975	1963	1969	1975	1963	1969	1975	1963	1969	1975	1963	1969	1975
Cameroon	125	175	5.00	00 5	5.840	16.0	41.0	33.0	39.0	4.1	2.9	2 342	4 567	6.738	11.118	27.356	46.299	117.272	4.156	12.578	30.569	0.376	4.213	12.485	0.109	1.732	19.319	1.940	4.241	9.592
CAE	109	121	1.30	0 1	1.610	15.0	16.4	22.8	28.5	3.5	1.3	2 156	2 152	8.978	7.169	2.094	6.198	9.447	0.608	1.215	2.657	1.296	3.504	3.633	0.004	0.932	0.992	0.186	0.377	0.130
Congo	154	251	0.90	0 0	.940	26.5	31.0	31.9	45.9	4.6	8.8	2 942	3 600	8.756	7.446	12.145	20.607	9.937	10.163	18.201	4.302	0.604	0.101	1.661	0.061	0.421	1.094	1.264	0.170	0.681
Ivory Const	217	346	3.60	0 4	1.310	24.5	19.0	42.4	58.3	5.7	6.1	2 873	4 355	6.433	7.093	19.558	64.775	179.958	8.025	26.230	45.290	3.788	9.771	48.527	3.095	9.905	43.338	3.593	4.881	17.691
Benin	70	93	2.30	0 2	2.690	11.0	11.9	34.0	38.1	1.4	1.5	3 125	2 572	8.726	6.163	1.851	5.720	9.427	1.754	2.475	2.945	0.008	2.098	4.967	0.041	0.122	0.482	0.001	0.689	0.628
Gabon	413	670	0.40	0 0	.500	16.0	11.4	33.0	52.0	11.0	12.7	1 523	2 811	4.382	5.132	2.188	10.091	19.797	0.089	1.641	4.677	0.001	0.571	1.020	0.002	0.770	0.948	0.203	0.045	1,288
Upper Volta	44	58	4.60	0 5	5.380	5.0	4.2	29.0	31.0	0.5	0.6	3 095	2 766	10.132	B.471	0.855	4.549	16.212	0.810	2.026	11.784	0.001	1.369	1.924	0.001	0.709	1.580	0.001	0.243	0.587
Mali	64	53	4.30	0 5	5.050	6.7	7.1	32.0	32.0	0.5	1.1	1 900	2 652	5.636	7.867	0.041	1.029	12.793	0.001	0.267	0.510	0.004	0.219	9.336	0.001	0.202	0.964	0.001	0.324	1.985
Mauretania	159	163	0.70	1 00	.170	8.8	1.7	35.2	41.3	2.1	1.1	3 100	3 608	8.361	8.294	0.709	3.253	3.139	0.706	2.868	2.491	0.001	0.001	0.001	0.001	0.162	0.446	0.001	0.001	0.001
Niger	84	90	3.00	0 4	.020	4.6	4.3	27.0	30.0	0.4	0.7	3 788	2 233	13.319	7.066	0.344	7.203	12.011	0.002	0.968	1.823	3.001	2.431	2.937	0.239	0.843	4.375	0.001	0.158	0.001
Senegal	· 198	203	3.30	0 3	5.930	27.0	27.3	44.0	50.6	3.2	2.0	3 567	5 282	7.691	9.911	32.185	60.485	94.380	9.200	16.305	27.794	3.771	15.212	22.524	9.763	17.492	27.725	1.078	2.986	5.076
Chad	64	78	3.30	0 3	1.710	7.0	7.6	22.0	30.0	0.6	0.5	3 417	2 938	14.746	9.297	0.473	4.545	8.584	0.002	2.787	3.913	0.001	1.215	4.051	0.243	0.284	0.170	0.101	0.117	0.211
Togo	83	137	1.6	0 1	1.970	12.0	10.5	29.7	35.6	1.0	1.6	4 080	2 717	13.042	7.246	0.174	2.747	12.234	0.052	1.552	4.456	0.001	1.073	4-497	0.120	0.122	0.920	0.001	0.001	0.203
Malagasy Republic	113	132	5.8	ωle	5.750 1	10.0	10.5	29.0	29.0	5.8	4.1	2 708	2 724	8.865	9.082	9.305	44-557	n.d.a.	5.254	20.385	n.d.a.	2.138	9.176	n.a.a.	0.401	1.600	n.d.a.	1.195	i 1.519	n.d.a.
1																														
* See for the full meaning	of the	abbrevi	tions	parts	ill an	to VI b	the tex	t.																						

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Source: See text.