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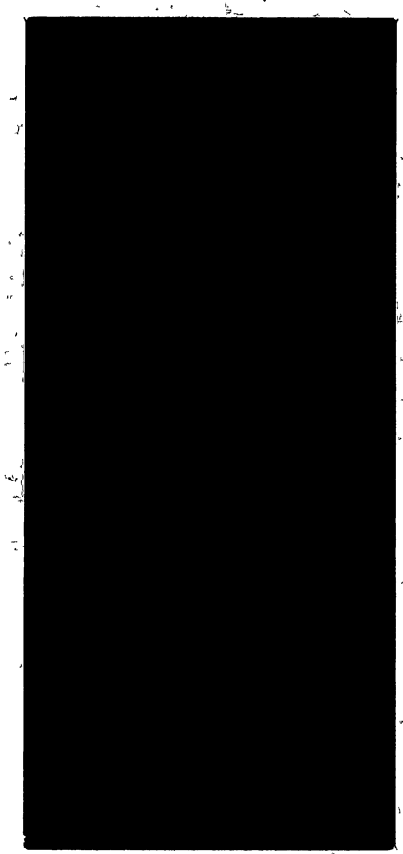

A Constant-Market-Share Look at African Exports in the 1960s

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I. Introduction

In this paper, the growth of exports during the 1960s of particular products of particular African nations to particular OECD destinations is divided into the growth that would have occurred had the source maintained a constant share of the destination market and the growth owing to a changed share.[1] The following emerge from this constant-market-share (CMS) look at export growth:

1. While the CMS growth rate of African products averaged 5.2 percent per year, the shares of African exports were declining slowly (on average, at roughly 0.4 percent per year).

2. The destination markets were growing faster for important exports, (i.e., those with a large absolute export value), but the African losses in relative share were also more serious for these exports.

3. For those exports in which an African source commanded a large share (i.e. over half) of the destination market, there was a *universal* decline of shares.

4. The growth rates of the destination markets were in general lower for the traditional destinations of African exports (i.e. France, West Germany, the United Kingdom, and the United States), which grew by much less than 5.2 percent.

5. Dramatic share growth escaped all the African sources examined except the Ivory Coast, whose share of destination markets grew (on average) at 17 percent per year.

A "look" leaves many questions unanswered. The African losses of shares during the 1960s may be due, in part at least, to the actions of the destination countries to reduce the importance of their trade with former colonies; but it is difficult not to impute the major blame to the African

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[1]The 120 products/sources/destinations so examined cover (in value) roughly half of Africa's exports.

sources on grounds of supply, quality or marketing failures. On the other hand, the rate of loss of shares was, on average, surprisingly small considering the poor general economic performance of African countries in the 1960s; perhaps better performance in the 1970s would be rewarded with not only recaptured but even augmented shares.

II. Method

The approach used here is neither new nor complex.[2] Essentially, we are concerned with the change during the 1960s in the value of exports of particular commodities from particular African sources to particular national destinations, and the division of that change into: 1) the growth that would have occurred had there been constant market shares (hereafter CMS) of the destination's imports of the commodity; and 2) the growth due to alteration in the African exporter's share of the destination market. Symbolically, we examine $S_{ijkt}\ E_{jkt}$, where E_{jkt} is the total value of the imports (CIF)[3] by the j^{th} destination of the k^{th} commodity[4] in the t^{th} year[5], and S_{ijkt} is the i^{th} (African) source's share of that market. The growth rate per year of this value (g) between two years, 0 and T, can be approximated by (suppressing hereafter the subscripts i, j, and k)

$$g = \frac{S_T E_T - S_0 E_0}{T S_0 E_0} \quad . \tag{1}$$

This overall growth rate can be divided into the growth rate of the destination market, $e = (E_T - E_0)/TE_0$, and a residual, r:[6]

$$g = e + r \tag{2}$$

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[2]Its earliest application to international trade appears to be Tyszynski [1951], but it had been used previously in the analysis of regional problems (see, for example, Creamer [1943]). For a general survey of the attempts at and problems with constant-market-share analysis, see Leamer and Stern [1970], Chapter VII; and for a more detailed critique, see Richardson [1970].

[3]Since we use the data of the importing country; see Appendix.

[4]Defined by a three- or four-digit SITC classification; see Appendix.

[5]Actually, only two periods are considered. The base "year" (0) is the average of 1960-64 and the terminal "year" (T) the average of 1965-69 (or as many of these years as data are available; see Appendix).

[6]It is values of g (i.e. the overall growth rate), e (i.e. the part of the overall growth rate due to the "expansion effect"), and r (i.e. the part of the overall growth rate due to other factors-- the "residual" effect), that are considered

This residual, r, is equal to the growth rate of the i^{th} share of the j^{th} market, $s = (S_T - S_0)/TS_0$, plus a term involving interaction between s and e:

$$r = s\,(1 + eT) \tag{3}$$

Thus, for the usual case, where $e > 0$, r overstates s. This is the "sequence-of calculation" effect for non-infinitesimal changes-- see Richardson [1971a]-- and may be significant. In the sample studied here, r is within 25 percent of s for just over half the observations; hence, r should be throughout considered a "residual", neither equivalent to the rate of share change, s, nor independent of the rate of CMS growth, e.

The empirical work of the next section will look at these values of g, e, and r and analyze the way and extent they vary between sources, destinations, and products.

This, then is one method whereby export growth can be divided into components. It is no accident that the method itself has been presented before its theoretical rationale, for the latter is weak. As a result, the interpretation of its output (i.e. the variables g, e, and r) is fraught with uncertainty. A few of these problems require brief discussion here.[7]

The CMS approach to export expansion can be derived[8] from the more basic assumptions of 1) heterogeneity of the varieties of the product produced by the different export sources,[9] 2) unchanging homothetic and separable importer preferences between the varieties of different export sources, and 3) unchanging relative prices of the different varieties.[10] While strong, these assumptions

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[6](cont.) in this paper, between the first half and the second half of the 1960s, and for 120 different observations. An observation is a unique combination of source (i), destination (j), and product (k).

[7]The best general treatments are Ooms [1967] and Richardson [1971].

[8]See Armington [1969] or Leamer and Stern [1970].

[9]Where product is defined by SITC classification.

[10]Or a unitary elasticity of substitution to the preference function. The third assumption can be dropped entirely if one has knowledge of *both* the movement in relative prices (or usually, relative unit values) *and* the elasticity of substitution of the importer's preference function. See, for example, Hutcheson and Porter [1972].

do provide some rationale for the CMS approach in the case of, for example, the exports of coffee to the United States by Ethiopia (of "arabica") and the Ivory Coast (of "robusta"). But the number of African exports that can be viewed as significantly heterogeneous with respect to the different national varieties is surely few.

Once a product is perceived as essentially homogeneous (with respect to national varieties), national shares can no longer be so derived since importer preference systems (between "varieties") become straight lines.[11] Indeed, without the introduction of some sort of rising cost curve to specific export markets,[12] there is no determination of national market shares for such products (other than in a probabilistic sense). It is this problem that leads Richardson to conclude that "CMS analysis cannot be made to fit the case of perfectly homogeneous goods."[13]

This discussion of homogeneity and heterogeneity raises a second problem with CMS analysis: what is the market for which an exporter's "share" is a meaningful theoretical or empirical construct? The choice usually falls on either the world market or the various national (or regional) markets, with the former preferred for the more homogeneous products on the grounds that national or regional preferences about the geographical source of the inputs are then of little importance.[14] As regards the CMS approach, Richardson

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[11]We are assuming that the various exporters do not comprise an oligopoly, in which case constancy of market shares might be derivable from a tacit-cooperation, no-side-payments, non-zero-sum model.

[12]For example, per-unit transport costs which are, for some reason, an increasing function of the volume shipped to a market. Let the FOB price in i be p_i, the per-unit transport cost from i to j be τ_{ij}, and x_{ij} be the volume exported from i to j. If the demand in j for the product is such that the CIF price there (assume a zero tariff) equals $a - b\sum_i x_{ij}$, the market in j is in equilibrium at

$$p_1 + \tau_{1j}\, x_{1j} = p_2 + \tau_{2j} x_{2j} = \cdots = a - b\sum_i x_{ij} \ ;$$

for i = 1, 2, ..., I, this yields I linear equations to determine the I variables, $x_{1j}, x_{2j}, \ldots, x_{Ij}$. The shares of each of the I exporters to j are therefore determined. But all this begs the question, to what extent are shares <u>in fact</u> determined by transport costs?

[13]Richardson [1970], p. 31.

[14] For an extended discussion of this choice, see Ooms [1967], pp. 112-13, and Neisser and Modigliani [1953], pp. 49-55.

argues that "importers can switch relatively easily from one supplier to another, for as simple a reason as, say, a taste for variety," and hence that "the norm of constant shares of given *geographical* markets is much less compelling when goods are very homogeneous."[15]

Where economists cannot perceive much *physical* heterogeneity among national varieties of a product, as for example between cocoa from Ghana and that from the Ivory Coast, they are reluctant to concede that colonial ties, commercial connections, trade preferences, currency blocs, etc.,[16] past or present, may create as stable a geographical pattern of trade flows for homogeneous primary products as for the more heterogeneous manufactured products.[17] Accordingly, studies either have been apologetic about choosing the country of destination as the appropriate market for analysis of primary-product exports,[18] or have in fact accepted the apparent dictates of logic and used the world market as the reference point.[19]

But the stubborn fact persists-- importers *do* act as if they have strong and stable preferences concerning the geographical source of products, even for such "homogeneous" products as comprise nearly all African exports. Through the 1960s, roughly two thirds of Belgian imports of copper alloys (SITC 682.1) came from Zaïre, which provided only one tenth of such French imports; roughly one third of French imports of coffee (SITC 071.1) came from the Ivory Coast, which provided less than 5 percent of such U.S. imports; roughly half of U.S. imports of raw cotton (SITC 263.1) came from Egypt, which provided less that 10 percent of such West German imports; etc. No model

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[15]Richardson [1970], p. 31.

[16]See Thorbecke [1960], pp. 92-94, for a fuller list.

[17]For an attempt to measure the extent to which Great Britain "prefers" the (mostly primary) products of the Commonwealth countries over the "same" products of Latin America, see Naranjo and Porter [1972].

[18]For example: "...we have been able to extend the approach used for manufactured goods exports...to the exports of raw materials and food. The empirical results were fairly satisfactory, although the theoretical justification is less adequate than in the case of manufactured goods... . The fact remains, however, that... the empirical results are better than theoretical analysis would allow the economist to hope." Neisser and Modigliani [1953], pp. 52, 55.

[19]For example, GATT [1965], pp. 23-32, where, in a CMS-type analysis of the export performance of the less developed countries, "no account was taken of the geographical destination of exports and it was tacitly assumed that the world market of each commodity formed a unit" (p. 24).

based on the world market can replicate the actual national patterns of primary-product trade flows nor explain the stability of national shares; an empirically meaningful model must be based on national shares, no matter what the basic theory of homogeneous product suggests. The problem with such "basic" theory is that it fails to recognize that all products are somewhat heterogeneous, between sources and, more importantly, that the search for and establishment of trade connections are not without cost.

The separation of export growth rates into various "effects" necessarily involves preconceptions that must be made clear. Consider, for example, the division of the growth rate of Moroccan exports of olive oil (SITC 421.5) to Italy into an "expansion effect" (i.e. the growth rate of *total* Italian imports of olive oil) and a "residual effect" (i.e. the rest). The expansion effect is usually interpreted as largely, if not entirely, determined by such exogenous forces as Italian income growth, income elasticities, cross-price elasticities, movements of prices of complements of and substitutes for olive oil (from all sources), etc. The residual effect, on the other hand, is seen as largely, if not entirely, determined by such endogenous forces as Moroccan olive oil production, internal demand, pricing, packaging, export incentives, etc. Often the residual is referred to as the "competitiveness effect" to make quite clear the implication that any change in Morocco's share of Italian olive oil imports is imputed to the internal economic (or political) forces of Morocco. This inference of exogenous or endogenous from the division into expansion and residual effects raises three specific issues.

One, there are forces that cannot be resolved into a pure exogenous or endogenous category.[20] Most obvious, and probably most important, of these is the state of international relationship between the source and destination countries. It takes two to quarrel, and it is often not clear who has caused the resulting change of market share-- especially where a former colony and colonist are involved.

Two, it is obvious that there are many factors, truly exogenous to the exporting country, that will not appear in the expansion effect. In short, any demand structure(or changes of structure) in the importing country that

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[20]Not to mention that such a twofold division leaves no room for the effects of interactions between exogenous and endogenous factors.

is not neutral[21] between the different national sources of imports will mean a change in national shares and hence, in a CMS model, that an exogenous factor is incorrectly thrust into the residual effect.[22] It is also true, though perhaps not so obvious, that endogenous factors can be involved in the expansion effect. Whenever the maintenance of the market share requires adjustment on the part of the exporter-- in such things as the quality, quantity, or price of the product-- a part of the exporter's "competitiveness" will become lodged in the expansion effect. Even for a particular commodity being exported to a particular destination, the supposedly exogenous expansion effect may reflect to some extent the capacity of the exporter to adjust to changing conditions.[23] In short, one should be cautious in identifying the expansion effect with forces exogenous to the exporter and the residual effect with forces endogenous to the exporter.

And three, the observation (over time) of a particular product sent from a particular exporting source to a particular importing destination, neglects possible interactions between products, sources and destinations.[24] A negative residual effect may well represent positive "competitiveness" if the exporting country is redirecting its exports to more attractive destinations or transforming its export composition toward more promising products. These larger, general-equilibrium (and welfare[25]) issues are necessarily neglected in a product-by-product CMS approach.[26]

Subject to all these caveats, it is the intention of the next section to examine African exports during the 1960s from this viewpoint of expansion and residual effects. While several interesting features appear, it should be emphasized that this is a "look", as the title advertises, rather than a

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[21]Neutral, in the sense that the market shares (in value terms) of the various sources are not altered.

[22]For a full discussion of these factors, see Fleming and Tsiang [1956], pp. 219ff.

[23]What Kindleberger [1962], Chapter 7, calls the "capacity to transform." For an indication of the empirical importance of this capacity as between the advanced and the less developed countries, see Porter [1970].

[24]See Ooms [1967], p. 105.

[25]A negative residual indicates movement "away" from a particular product (at least with respect to the particular destination). Whether there is a net benefit or loss involved in such a shift requires not only general-equilibrium but also welfare analysis-- neither of which is possible within the CMS approach.

[26]A fault which is only partly repaired when the results are summed over a source's exports and destinations in the usual "macro" application of the CMS approach.

thorough analysis. At the least, the latter would require an investigation into the causes of the signs and sizes of the residual effects. Typically, when such analysis is conducted, it consists of a comparison of the residual with some indicator of price or cost competitiveness of the country.[27] This is difficult here for three reasons: 1) the relevant cost data for African countries are often either unavailable or unreliable; 2) prices[28] vary much less between different national sources for primary products (which comprise almost all of our observations)[29] than for manufactures; and 3) unit values for primary products are more likely than for manufactures to move for reasons other than "competitiveness" (such as quality, seasonal and marketing factors). Thus , no more than a "look" at the residuals is attempted in Section III.

III. Results

The unit of observation in this paper is a particular product (defined by its SITC classification) going from a particular African source (i.e. nation) to a particular destination (i.e. nation). The sample is not random; the observations were gathered so as to include the principal destinations of the major exported products of Africa.[30] The search ceased, arbitrarily, at 120 observations--variously involving 27 products, 26 sources and 8 destinations-- with a total (average annual CIF) trade value in 1968-69 of U.S. $2.5 billion; the sample therefore covers more than half of the total African (non-petroleum, OECD-destined, CIF-valued) exports [31] during the late

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[27]See, for examples, Fleming and Tsiang [1956], Balassa [1962], and Kreinin [1967].

[28]More accurately, unit values, since these are what emerge from the data.

[29]Though they do vary (for CIF data) by more than might be suspected for such "homogeneous" primary products. On the average, over 1965-69, the unit values of the African source of more than one third of the observations studied here (i.e. 47 of 120) differed from the unit values of the destination's rest-of-world imports by more than 10 percent.

[30]Excluding only petroleum (i.e. SITC 331.1); see Appendix for a discussion of the data.

[31]The OECD petroleum imports from Algeria, Nigeria, Egypt, the Equatorial Customs Union (i.e. C.A.R., Chad, Congo-Brazzaville, and Gabon), and Tunisia plus all OECD imports from Libya have been excluded as an approximation of African oil exports. Source of this total: OECD (various years). The OECD total is not only easier to find but may also be more appropriate since no non-OECD destination appears in the sample. Hereafter, this figure is meant when "total African exports" are referred to.

1960s (i.e. 1965-69).[32] The value of total African exports grew at a rate of about one and one half percent per year between the early and late 1960s while the sample total grew at 4.78 percent per year during this period.[33] This indicates that the products excluded from the sample fared distinctly less well in the 1960s; the excluded products consisted principally of 1) the exports of South Africa and Rhodesia, 2) the exports of those African nations for which sufficient international trade data is unavailable throughout the 1960s, and 3) the "minor" exports of the African countries for which data existed.

There is always a dilemma in samples such as this whether the observations should be weighted by their importance (as, say, by their base-year export values) or treated as equals (in the sense that the characteristics of the product-source-destination movements, and not of the individual dollars of trade value, are the relevant "observations" of African exports movements during the 1960s). Since we believe that the usefulness of this sample is at the micro level, we incline for the most part toward the latter-- i.e. unweighted-- treatment; but a brief description of the weighted results is interesting.

The weighted average annual growth rate of value of exports, in the sample, between the early and late 1960s was 4.78 percent. Of this, the expansion effect accounted for a growth rate of 5.20 percent and the residual for a growth rate of -0.42 percent. These figures can be compared to world trade for this period, which grew at more than 10 percent per year[34] and for which the residual effect is necessarily zero. This comparison suggests two conclusions:

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[32]It covers slightly less than half during the early 1960s (i.e. 1960-64).

[33]Where the per annum growth rates are approximated by:

$$\frac{1}{5}\left[\left(\sum_{t=1965}^{1969} V_t\right)\Big/\left(\sum_{t=1960}^{1964} V_t\right) - 1\right] ,$$

where V_t is the relevant total value of trade in year t.

[34]Source: *United Nations*, various years. The per annum growth rate is calculated in the same way as shown in footnote 33.

1. Since the weighted average expansion effect of African exports falls short of that of world exports, the typical dollar of African exports was in those products and/or destined to those importing countries where demands were growing at less than the average world rate.

2. Since the weighted average residual effect of African exports was negative, the typical dollar of African exports was losing ground, albeit at less than one half of one percent per year, to the exports (of the same products to the same destinations by non-African sources).

The median and unweighted means for the 120 observations are given (and the weighted mean repeated) in Table 1. For the overall annual growth rate and for each of the expansion and residual effects, the median is noticeably less than the unweighted mean, indicating that the distribution of each of these three growth rates is skewed toward the higher (positive) values[35]; the *average product* had a smaller overall, expansion, and residual growth rate than the *product average*.

Table 1

Average Sample Growth Rates of Expansion, Residual, and Overall Effects

Growth Rate of	Median	Unweighted Mean	Weighted Mean
Expansion (e)	+2.30%	+4.77%	+5.20%
Residual (r)	-0.12	+3.20	-0.42
Overall (g)	+4.56	+7.97	+4.78

The differences between the weighted and unweighted means is also instructive. Overall, the important African exports (i.e. those with large base-year trade value) must have grown less rapidly than the lesser exports. This is readily verified by looking at the six products for which the 1960-64 annual average trade value (among the sample observations) exceeded U.S. $100 million[36]; for three of the six, the overall growth rate was negative, and the weighted average overall growth rate of the six was only 5.05%[37]

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[35]This is, of course, partly due to the logic of arithmetic: a number cannot decrease by more than 100 percent, while it can increase by more. But, aside from that, for each of the three distributions, the large percentage increases are more frequent and larger absolutely than the large percentage decreases.

[36]Namely, in order of 1960-64 average trade value, copper (SITC 682.1), cocoa (072.1), coffee (071.1), wine (112.1), cotton (263.1), and peanuts (groundnuts) (221.1).

[37]Which is, not surprisingly, very close to the weighted mean.

Among these six "important" products, only copper had a high overall growth rate (17.77%), while several "lesser" products grew overall at rates exceeding 10 percent; tea (SITC 074.1, at 16.81%), wood (242.3, 11.41%), manganese (283.7, 20.32%) and peanut oil (421.4, 33.88%).[38] The difference between the weighted and unweighted mean of the overall growth rates can also be seen as an expression of the fact that the "important" African exporting countries grew less rapidly than the "lesser",or the "important" destinations for African exports grew less rapidly than the "lesser".

The difference between the weighted and unweighted means of the expansion-effect growth rates is in the opposite direction. The markets of the more important products/sources/destinations grew more rapidly than the lesser. This suggests, as far as income elasticity is concerned, that the markets for Africa's principal exports grew more rapidly in the 1960s than for its minor exports; a small piece of evidence, but it adds to the growing mass, that export diversification does not automatically mean a movement in the direction of a (weighted) higher income elasticity of demand for exports.

Finally, for the growth rate of the residual, the unweighted mean is more than 3 percent per year, and the weighted mean a negative figure. This indicates a loss of market shares in important products and a gain of market shares in the lesser products (of the sample). As Table 2 shows, for *all* eight product/source/destination observations with 1960-64 trade above U.S. $40 million, the residual effect is negative. Although 100 percent of eight does not provide a very sophisticated test, it does support the hypothesis that African market shares have tended to deteriorate for the important exports and rise for the smaller. Moreover, this would appear to be an endogenous factor to the African exporters, for "importance" rarely means big from the viewpoint of the destination. Of the eight items in Table 2, only two comprise 50 percent (or more) of the importer's market for the item,[39] and the residual effects for those two are among the least negative in Table 2.

There appears to exist, however, independently of the above "export-importance" effect on the residual, a "share-of-destination-market" effect.

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[38]This latter is an example of the shortcomings of the inevitably partial-equilibrium CMS approach (discussed in Section II). To what extent is the decline in peanut exports a cause or an effect of the dramatic rise in exports of peanut oil? And to what extent is the net effect of the two movements a gain or loss for the sources involved?

[39]I.e. wine (Algeria to France) and copper (Zaïre to Belgium-Luxembourg).

Table 2

Growth Rates of "Important" Observations

PRODUCT (SITC)	SOURCE	DESTINATION	Growth Rate		
			EXPANSION EFFECT	RESIDUAL EFFECT	OVERALL
Oranges (051.1)	Algeria	France	2.29%	-14.96%	-12.67%
Coffee (071.1)	Ivory Coast	France	4.12	-4.80	-0.68
Cocoa (072.1)	Ghana	US	0.92	-2.16	-1.24
Wine (112.1)	Algeria	France	-7.26	-3.15	-10.41
Peanuts (221.1)	Senegal	France	-0.13	-9.94	-10.07
Copper (682.1)	Zaire	Bel-Lux.	18.13	-1.39	16.74
Copper (682.1)	Zambia	UK	13.61	-5.52	8.09
Copper (682.1)	Zambia	West Germany	18.78	-5.78	13.00

Note: "Important" means that (annual average) trade during 1960-64 was over U.S. $40 million.

Table 3

Growth Rates of "Major-Share-of-Market" Observations

PRODUCT (SITC)	SOURCE	DESTINATION	Growth Rate		
			EXPANSION EFFECT	RESIDUAL EFFECT	OVERALL
Bananas (051.3)	Somalia	Italy	29.99%	-30.15%	-0.16%
Tomatoes (054.4)	Morocco	France	4.88	-0.19	4.69
Wine (112.1)	Algeria	France	-7.26	-3.15	-10.41
Peanuts (221.1)	Nigeria	UK	-9.88	-6.97	-16.85
Palm Kernel (221.3)	Nigeria	West Germany	-3.64	-5.59	-9.23
Cotton (263.1)	UAR	US	-7.20	-4.24	-11.44
Agave (265.4)	Tanzania	UK	-14.04	-0.93	-14.97
Phosphate (271.3)	Morocco	France	15.56	-3.80	11.76
Phosphate (271.3)	Morocco	UK	2.80	-1.47	1.33
Phosphate (271.3)	Morocco	Bel-Lux.	36.53	-16.89	19.64
Lead Ore (283.4)	Morocco	France	8.74	-10.11	-1.37
Peanut Oil (421.4)	Nigeria	UK	28.94	-4.79	24.15
Peanut Oil (421.4)	Senegal	France	25.43	-3.38	22.05
Olive Oil (421.5)	Tunisia	France	3.88	-6.83	-2.95
Palm Oil (422.2)	Zaire	West Germany	5.19	-4.40	0.79
Palm Oil (422.2)	Zaire	Italy	14.69	-6.89	7.80
Copper (682.1)	Zaire	Bel-Lux.	18.13	-1.39	16.74

Note: "Major-Share-of-Market" means that the source provided over 50 percent of the destination's imports of the product (annual average) during 1960-64.

Table 3 shows that, for *all* 17 items in which a source provided over 50 percent of the destination's imports of a product (during 1960-64), the share deteriorated in the late 1960s. This "disadvantage" of a large share, as far as maintaining or increasing one's share is concerned, has been noticed elsewhere.[40] But it is not at all clear whether it is due to exogenous or endogenous factors (with respect to the African source). It could represent an exogenous "regression" phenomenon whereby market shares of particular destinations slowly tend toward a source's share of the world market; or it may represent, endogenously, the oft-noted inability of established, dominant market-leaders to bestir themselves sufficiently to maintain their positions[41]; or it may represent some combination of the endogenous and exogenous whereby traditional trading ties are lessened for mutual (and largely non-economic) reasons.[42]

The 120 observations of expansion and residual growth rates were further examined for systematic differences over product, source, or destination by means of regression on dummy variables representing the principal products, sources, and destinations of the sample.[43] The procedure was to regress each growth rate on the three sets of dummies (i.e. the product set, the source set, and the destination set), select the set that yields the most significant[44] reduction in the variance of the relevant growth rate (relative to the degrees of freedom involved), and then add (sequentially) a second or third set if it significantly further reduces the variance.

With respect to the expansion growth rate, both the product and

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[40]See Maizels [1968], pp. 159-68, and de Vries [1967], Chapters 3 and 4.

[41]See, for example, Singh [1964], where India's declining shares are viewed in terms of oligopoly analysis.

[42]For eleven of the 17 items in Table 3, trade between a former colony and colonist is involved.

[43]Obviously, if a product (or source or destination) appears only once in the sample, having its own dummy variable would be equivalent to removing it from the sample. And this problem partially remains when it appears only a few times. For this reason, to conserve degrees of freedom and to leave several observations in the "all other" category, several appearances were arbitrarily required to escape the category "all other". Nine product, ten source, and four destination dummy variables emerged.

[44]With a cut-off at 95%.

destination sets of dummies contribute significantly to its explanation.[45] Normalized on "all other" products and destinations, the resulting regression can be written:

$$e = 10.99\% + \left\{\begin{array}{ll} +3.31\% & \text{for SITC 05x} \\ +0.98\% & \text{for SITC 071} \\ +0.64\% & \text{for SITC 072} \\ -5.39\% & \text{for SITC 221.1} \\ -0.20\% & \text{for SITC 24x} \\ -6.81\%^{*} & \text{for SITC 263} \\ +6.55\%^{*} & \text{for SITC 271} \\ -1.10\% & \text{for SITC 281} \\ +18.28\%^{*} & \text{for SITC 682} \end{array}\right\} + \left\{\begin{array}{l} -7.39\%^{*} \text{ for France} \\ -8.20\%^{*} \text{ for W. Germany} \\ -11.49\%^{*} \text{ for U.K.} \\ -10.97\%^{*} \text{ for U.S.A.} \end{array}\right\} \quad (4)$$

Notes: * indicates significantly different from zero at 95%.

x in the SITC number indicates that all digits qualified.

$R^2 = 0.55$

The two most striking aspects of regression (4) are: 1) the size of the constant term; and 2) the large negative influence of the important and traditional destinations of African exports. Taken together, they indicate that the expansion effects were (for "all other" products) essentially *zero* for the United Kingdom and the United States, and only around 3 percent for West Germany and France during the 1960s; the expansion growth rate, on the other hand, was nearly 11 percent (again, for "all other" products) for "all other" destinations.[46]

The coefficients of the product dummies are much less dramatic. Their significance as a set is essentially due to the presence of three products: 1) cotton (SITC 263.1), which, for "all other" destinations, had an expansion growth rate of only 4 percent per year[47]; 2) phosphate (271.3), which had a growth rate of nearly 18 percent; and 3) copper (682), which had a growth rate of nearly 30 percent.

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[45]The relevant F statistics:

Independent Variables	F	F(95%)	Degrees of Freedom Used	Degrees of Freedom Left
Destination set alone	9.58	2.90	4	115
Addition of Product set	7.78	2.25	9	106
Addition of Source set	1.21	2.20	10	96

[46]Which included Belgium-Luxembourg (2 times), Italy (12 times), Japan (4 times), and the Netherlands (3 times).

[47]And hence, quite negative for France, West Germany, United Kingdom and United States.

With respect to the residual growth rate, only the source dummies contribute significantly to its explanation.[48] Incorporating the constant term into the source-dummy coefficients yields the following regression:

$$r = \begin{cases} -10.45\% & \text{for Algeria} \\ +\ 7.41\% & \text{for Cameroun} \\ -\ 6.21\% & \text{for Ghana} \\ +17.02\%^{*} & \text{for Ivory Coast} \\ -\ 3.83\% & \text{for Morocco} \\ +\ 0.02\% & \text{for Nigeria} \\ -\ 7.16\% & \text{for Tunisia} \\ +\ 2.76\% & \text{for U.A.R.} \\ -\ 1.49\% & \text{for Zaïre} \\ +11.05\% & \text{for Zambia} \\ +\ 6.93\% & \text{for "all other" sources} \end{cases} \qquad (5)$$

Notes: * indicates significantly different form zero at 95%.

$R^2 = 0.21$

There are five countries with negative residual growth rates: Algeria, Tunisia, Ghana, Morocco and Zaïre. There is a small positive growth in the residual for Nigeria and the United Arab Republic. There is a sizeable positive growth for "all other" sources, Cameroun and Zambia. And there is a highly significant, rather astonishing growth rate of 17 percent for the Ivory Coast. The share movements for the 13 Ivory Coast observations are shown in Table 4; for only three observations did the share decline, and for five, it doubled within the five-year span.

The sets of dummy variables which prove significant in "explaining" the expansion and residual growth rates give empirical support to the theoretically questionable practice of viewing the expansion effect as essentially exogenous (i.e. from the viewpoint of the African export source). Products and destinations appear related to expansion effects, while the export source appears related to the residual. Whether "related to" reflects, and to what extent it reflects, causation is of course another question, and one that is unanswerable here.

[48]The relevant F statistics:

Independent Variables	F	F(95%)	Degrees of Freedom Used	Left
Source Set alone	2.92	2.18	10	109
Addition of Product set	0.61	2.26	9	100
Addition of Solution set	1.23	2.92	4	105

Table 4

Changes in the Ivory Coast Market Shares

PRODUCT (SITC)	DESTINATION	Market Share in 1960-1964	Market Share in 1965-1969
Bananas (051.3)	France	23%	21%
Bananas (051.3)	Italy	12	8
Coffee (071.1)	France	36	29
Coffee (071.1)	US	2	4
Cocoa (072.1)	France	42	53
Cocoa (072.1)	West Germany	9	21
Cocoa (072.1)	Italy	10	23
Cocoa (072.1)	US	7	8
Wood Products (242.9)	France	31	36
Wood Products (242.3)	West Germany	11	21
Wood Products (242.3)	Italy	9	24
Wood Products (242.3)	UK	13	25
Wood Products (243.2)	UK	3	9

Appendix: The Sample

The data have all been collected from various issues of the United Nations Commodity Trade Statistics. Since it proved difficult to find comparable export data from African sources for the ten-year span (1960-69), it was decided to work from the data of the importing countries. These, of course, are CIF values and hence do not present the precise (FOB) earnings of the African exporting source, but the difference is not serious for our purposes.

The sample itself is neither random nor based upon very precise criteria. Essentially, for each African source, products which usually accounted for more than one fifth of the country's export earnings were identified, and several destinations were recorded for these products. For other less important products, only the one or two main destinations were sought.

In most cases, for important export products, all (and only) those destinations were recorded for which the particular African source provided at least one tenth of the total import value of that product in the destination country. Exceptions arose, however, when an African source would have been entirely excluded from the sample by consistent use of such a criterion. One of the principal determinants of the selection was, arbitrarily but beyond our control, the manner of presentation of the U.N. data. Whenever the imports were reported as being from "other" African nations, the collection of the source/product/destination observation was rendered impossible (from published sources), and hence the one-fifth and one-tenth criteria became inapplicable.

Data have been collected at both the three-digit and the four-digit levels. If collected at the three-digit level, a full series (i.e., from 1960-1969) could be constructed. If taken at the four-digit level, the series would run only from 1962 to 1969. Had we used the data of the exporting country there would have been no major problem since, for the export products of most African sources, the two levels are identical. For example, copper appears under SITC 682 and copper alloys, unwrought under 682.1; in the case of Zaïre and Zambia, 682.1 has always constituted more than 95% of 682 so that we can readily assume that for the data before 1962, 682 refers to copper alloys, unwrought (682.1) and not to copper alloy, worked (682.2).

But from the side of the importing country, which is the source of our data, the relation between the three-digit and the four-digit data is often less clear. For example, under fresh fruits (SITC 051), France imports oranges (051.1) from Algeria but bananas (051.3) from the Ivory Coast.

The rule followed in these cases was: whenever, for four years after 1961, a specific four-digit category constituted 85 percent of the total value of the import at the three-digit level, the three-digit and four-digit product would be considered identical; the 1960 and 1961 three-digit data were then included (along with the 1962 through 1969 four-digit data). In all other cases, the four-digit series from 1962 to 1969 was used.

Finally, if data were not available for at least three of each of the five-year periods (i.e., 1960-1964 *and* 1965-1969), the observation was excluded. The search for observations ceased at 120.

The source/product/destination observations, and the expansion, residual and overall growth rates are recorded below:

LIST OF SAMPLE PRODUCTS, SOURCES AND DESTINATIONS

SITC	PRODUCT	SOURCE	DESTINATION	Market Shares 1960/64	Market Shares 1965/69	Growth Rate: EXPANSION EFFECT (e)	Growth Rate: RESIDUAL EFFECT (r)	Growth Rate: OVERALL (g)
051.1	Oranges	Morocco	France	.30*	.34	2.31	2.84	5.15
051.1	Oranges	Morocco	West Germany	.16*	.12	2.13	-6.21	-4.08
051.1	Oranges	Algeria	France	.35	.16	2.29	-14.96	-12.67
051.1	Oranges	Tunisia	France	.04*	.04	2.37	-0.43	1.94
051.3	Banana, Plantain	Ivory Coast	France	.23*	.21	6.77	-2.06	4.71
051.3	Banana, Plantain	Ivory Coast	Italy	.12	.08	26.47	-14.01	12.46
051.3	Banana, Plantain	Somalia	Italy	.61	.24	29.99	-30.15	-0.16
051.9	Fresh Fruit	Algeria	France	.35*	.22	12.15	-14.21	-2.06
053.5	Fruit & Vegetable Juice	Algeria	France	.27*	.10	10.87	-23.39	-12.52
053.5	Fruit & Vegetable Juice	Morocco	France	.27*	.26	11.22	-0.56	10.66
054.1	Fresh Potatoes	Algeria	France	.22*	.17	-1.18	-5.41	-6.59
054.1	Fresh Potatoes	Morocco	France	.34*	.36	-1.33	1.27	-0.06
054.2	Leguminous Vegetables	Morocco	France	.34*	.30	1.81	-3.35	-1.54
054.4	Fresh Tomatoes	Morocco	France	.65*	.64	4.88	-0.19	4.69
071.1	Green Coffee	Angola	US	.02*	.02	0.34	11.80	12.14
071.1	Green Coffee	Cameroun	France	.12	.12	4.02	0.21	4.23
071.1	Green Coffee	Cameroun	US	.00	.00	3.88	63.15	67.03
071.1	Green Coffee	Central African Republic	France	.03	.03	4.10	1.59	5.69
071.1	Green Coffee	Zaïre	Italy	.11	.11	9.30	-.18	9.12
071.1	Green Coffee	Zaïre	West Germany	.01	.02	5.74	29.45	35.19
071.1	Green Coffee	Zaïre	US	.02	.01	0.28	-14.96	-14.68
071.1	Green Coffee	Ethiopia	US	.03	.04	0.37	8.70	9.07

SITC	PRODUCT	SOURCE	DESTINATION	Market Shares		Growth Rate		
				1960/64	1965/69	EXPANSION EFFECT (e)	RESIDUAL EFFECT (r)	OVERALL (g)
071.1	Green Coffee	Ivory Coast	France	.36	.29	4.12	-4.80	-0.68
071.1	Green Coffee	Ivory Coast	US	.02	.04	0.34	14.73	15.07
071.1	Green Coffee	Kenya	West Germany	.09*	.06	6.27	-8.13	-1.86
071.1	Green Coffee	Malagasy	France	.14	.09	4.11	-8.68	-4.57
071.1	Green Coffee	Malagasy	US	.00	.01	0.35	48.52	48.87
071.1	Green Coffee	Tanzania	West Germany	.02*	.02	6.28	-1.78	4.50
071.1	Green Coffee	Tanzania	UK	.02*	.03	2.68	4.89	7.57
071.1	Green Coffee	Togo	France	.03	.03	4.07	0.90	4.97
072.1	Cocoa Beans	Cameroun	US	.02	.02	0.88	0.31	1.19
072.1	Cocoa Beans	Cameroun	France	.34	.24	5.27	-7.89	-2.62
072.1	Cocoa Beans	Cameroun	Italy	.07	.02	7.28	-19.17	-11.89
072.1	Cocoa Beans	Cameroun	Netherlands	.23	.24	12.19	1.17	13.36
072.1	Cocoa Beans	Cameroun	West Germany	.09	.11	5.89	7.10	12.99
072.1	Cocoa Beans	Ghana	US	.29	.26	0.92	-2.16	-1.24
072.1	Cocoa Beans	Ghana	Netherlands	.20	.13	9.36	-10.01	-0.65
072.1	Cocoa Beans	Ghana	UK	.34	.35	0.74	0.18	0.92
072.1	Cocoa Beans	Ghana	West Germany	.42	.23	5.80	-11.83	-6.03
072.1	Cocoa Beans	Ivory Coast	US	.07	.08	0.90	2.08	2.98
072.1	Cocoa Beans	Ivory Coast	France	.42	.53	5.29	6.63	11.92
072.1	Cocoa Beans	Ivory Coast	Italy	.10	.23	7.35	35.93	43.28
072.1	Cocoa Beans	Ivory Coast	West Germany	.09	.21	5.85	36.83	42.68
072.1	Cocoa Beans	Nigeria	US	.14	.15	0.95	1.64	2.59
072.1	Cocoa Beans	Nigeria	Netherlands	.23	.24	6.13	0.92	7.05
072.1	Cocoa Beans	Nigeria	UK	.30	.30	0.55	0.19	0.74
072.1	Cocoa Beans	Togo	France	.06	.05	5.35	-4.92	0.43
074.1	Tea	Kenya	UK	.03*	.07	-5.39	28.47	23.08
074.1	Tea	Kenya	US	.06*	.07	-0.33	3.54	3.21
074.1	Tea	Tanzania	UK	.01*	.02	-5.41	15.73	10.32
074.1	Tea	Uganda	UK	.01*	.02	-5.45	27.71	22.26
075.2	Spices	Malagasy	US	.41*	.33	10.34	-6.60	3.74
112.1	Wine of Fresh Grapes	Algeria	France	.74	.55	-7.26	-3.15	-10.41
112.1	Wine of Fresh Grapes	Morocco	France	.07	.07	-7.19	-0.07	-7.26
112.1	Wine of Fresh Grapes	Tunisia	France	.08	.04	-7.34	-6.28	-13.62

SITC	PRODUCT	SOURCE	DESTINATION	Market Shares 1960/64	Market Shares 1965/69	Growth Rate EXPANSION EFFECT (e)	Growth Rate RESIDUAL EFFECT (r)	Growth Rate OVERALL (g)
221.1	Green Peanuts	Nigeria	France	.21*	.34	-0.03	15.38	15.35
221.1	Green Peanuts	Nigeria	UK	.62*	.34	-9.88	-6.97	-16.85
221.1	Green Peanuts	Nigeria	Italy	.38*	.51	4.43	9.60	14.03
221.1	Green Peanuts	Senegal	France	.49*	.30	-0.13	-9.94	-10.07
221.1	Green Peanuts	Niger	France	.17*	.24	-0.04	10.38	10.34
221.3	Palm Kernel	Nigeria	West Germany	.69*	.51	-3.64	-5.59	-9.23
231.1	Natural Rubber	Liberia	US	.09	.10	-1.34	1.61	0.27
231.1	Natural Rubber	Nigeria	UK	.09*	.10	-6.48	1.13	-5.35
231.1	Natural Rubber	Nigeria	US	.04	.04	-1.35	-3.01	-4.36
242.3	Rough Wood	Congo	West Germany	.09*	.11	1.08	3.03	4.11
242.3	Rough Wood	Gabon	France	.31	.30	7.47	-1.57	5.90
242.3	Rough Wood	Gabon	West Germany	.08*	.07	1.04	-3.06	-2.02
242.3	Rough Wood	Ivory Coast	West Germany	.11	.21	1.14	19.27	20.41
242.3	Rough Wood	Ivory Coast	Italy	.09	.24	4.74	43.30	48.04
242.3	Rough Wood	Ivory Coast	UK	.13*	.25	1.11	56.81	57.92
242.9	Rough Wood	Ivory Coast	France	.31	.36	7.68	4.36	12.04
243.2	Shaped Lumber	Ghana	UK	.19*	.14	1.04	-7.22	-6.18
243.2	Shaped Lumber	Ivory Coast	UK	.03*	.09	-2.07	22.15	20.08
263.1	Raw Cotton	Cameroun	France	.03	.05	-2.88	10.90	8.02
263.1	Raw Cotton	Central African Republic	France	.03	.03	-2.85	2.58	-0.27
263.1	Raw Cotton	Chad	France	.06	.07	-2.84	4.34	1.50
263.1	Raw Cotton	UAR	Japan	.03	.04	0.37	8.95	9.32
263.1	Raw Cotton	UAR	US	.53*	.40	-7.20	-4.24	-11.44
263.1	Raw Cotton	UAR	France	.06	.07	-2.86	1.89	-0.95
263.1	Raw Cotton	UAR	West Germany	.06	.08	-2.83	5.86	2.85
263.1	Raw Cotton	UAR	Italy	.09	.10	-0.43	1.49	1.06
263.1	Raw Cotton	Uganda	Japan	.00*	.01	1.66	32.73	34.39
263.1	Raw Cotton	Uganda	UK	.01*	.01	-5.47	24.01	18.54
263.1	Raw Cotton	Sudan	France	.03	.03	-2.86	1.55	-1.31
263.1	Raw Cotton	Sudan	West Germany	.07	.10	-2.63	7.25	4.62
263.1	Raw Cotton	Sudan	UK	.12	.07	-4.93	-5.39	-10.32
263.1	Raw Cotton	Nigeria	UK	.06	.02	-4.92	-8.78	-13.70
265.4	Agave	Tanzania	UK	.87*	.80	-14.04	-0.93	-14.97

SITC	PRODUCT	SOURCE	DESTINATION	Market Shares 1960/64	Market Shares 1965/69	Growth Rate EXPANSION EFFECT (e)	Growth Rate RESIDUAL EFFECT (r)	Growth Rate OVERALL (g)
271.3	Natural Phosphates	Morocco	UK	.54	.50	2.80	-1.47	1.33
271.3	Natural Phosphates	Morocco	France	.59	.54	15.56	-3.80	11.76
271.3	Natural Phosphates	Morocco	Italy	.43	.49	8.20	0.08	8.28
271.3	Natural Phosphates	Morocco	West Germany	.45	.51	6.67	-14.12	-7.45
271.3	Natural Phosphates	Morocco	Bel-Lux.	.73*	.68	36.53	-16.89	19.64
271.3	Natural Phosphates	Morocco	Japan	.10	.15	9.52	16.45	25.97
271.3	Natural Phosphates	Senegal	France	.07	.06	8.78	-2.55	6.23
271.3	Natural Phosphates	Togo	West Germany	.12*	.15	7.64	7.80	15.44
271.3	Natural Phosphates	Tunisia	France	.18	.15	12.62	-5.52	7.10
281.3	Iron Ore	Algeria	UK	.08	.02	-1.28	-15.91	-17.19
281.3	Iron Ore	Algeria	West Germany	.02	.03	1.61	3.85	5.46
281.3	Iron Ore	Liberia	West Germany	.06	.18	1.32	46.51	47.83
281.3	Iron Ore	Liberia	UK	.06	.08	-1.44	10.38	8.94
281.3	Iron Ore	Morocco	UK	.03	.01	1.37	-16.55	-17.92
281.3	Iron Ore	Morocco	West Germany	.01	.01	1.13	-8.56	-7.43
281.3	Iron Ore	Tunisia	UK	.03	.01	-1.33	-16.75	-18.08
283.4	Lead Ore	Morocco	France	.55*	.39	8.74	-10.11	-1.37
283.7	Manganese	Zaïre	West Germany	.09	.09	4.90	-2.31	2.59
283.7	Manganese	Gabon	West Germany	.11	.23	3.97	32.79	36.76
422.2	Palm Oil	Zaïre	West Germany	.50	.43	5.19	-4.40	0.79
422.2	Palm Oil	Zaïre	Italy	.62	.51	14.69	-6.89	7.80
421.4	Peanut Oil	Nigeria	UK	.88*	.80	28.94	-4.79	24.15
421.4	Peanut Oil	Senegal	France	.96*	.89	25.43	-3.38	22.05
421.5	Olive Oil	Tunisia	France	.83*	.63	3.88	-6.83	-2.95
682.1	Copper Alloys	Zaïre	Italy	.15	.15	16.58	-0.53	16.05
682.1	Copper Alloys	Zaïre	France	.13	.09	25.13	-12.19	12.94
682.1	Copper Alloys	Zaïre	Bel-Lux.	.67	.64	18.13	-1.39	16.74
682.1	Copper Alloys	Zambia	France	.14	.17	25.36	8.10	33.46
682.1	Copper Alloys	Zambia	UK	.44	.37	13.61	-5.52	8.09
682.1	Copper Alloys	Zambia	Japan	.29	.47	65.56	55.17	120.73
682.1	Copper Alloys	Zambia	West Germany	.16	.14	18.78	-5.78	13.00
682.1	Copper Alloys	Zambia	Italy	.20	.22	16.58	3.26	19.84

* 1960/64

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