ANALYSIS OF WORLD COCOA PRODUCTION TRENDS AND THEIR PRODUCTION SHARE COEFFICIENTS (1975-1996)

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ABSTRACT

World cocoa production trend is influenced by a number of domestic policies, which in turn impact on permanent production shares of producing countries. Overtime, this trend will affect these countries foreign earnings capacities. It is on this basis, that this study attempts to analyze cocoa production trends as well as determining the sources of the world cocoa production growth trends between 1975 and 1996. A linear regression function, of the terminal and initial year production shares was first estimated to obtain the B_1 coefficient which was further decomposed into its correlation coefficient and standard deviation. The results show that on the average, the world cocoa production trend and the contributions of the seven leading producers have all been on the increase. The permanent cocoa production share trends on a country-by-country basis show slightly different results. For instance, while the permanent production share for Ivory Coast was on the increase, those of Brazil and Ghana were on the decline. From the decomposed coefficient, the overall result shows that the large (major) producers had expanded their production shares among the leading producers and the new cocoa entrants as well as the relatively small ones. The countries, which tended to lose shares among the major producers, were Nigeria and Cameroun even though the trend for Nigeria is changing positively. The sources of world cocoa growth production over the period were from the new small and very large producing countries. In the area of market control, the study found the cocoa export market to be competitive because even the very large cocoa producing countries as a group would be unable to foreclose or influence the world prices.

INTRODUCTION

Gyrations in export earnings of most developing nations are the consequences of either wide fluctuating prices from year to year, large production changes from season to season or a combination of the above factors. The commodities exported by these developing countries are mainly consumed in the developed ones. For example, Okorie et al (1979), found that between the period 1961-1975, the United State of America (U.S.A.), Union of Soviet Socialist Republics (USSR) and Japan accounted for nearly 79% of the total world imports of cocoa bean. This situation does not only apply to cocoa, but also to other export crops as buttressed on Table 1. From the table, it can be seen that

the major exporters of cocoa, coffee, banana, etc. are developing countries while the major importers of these commodities are the advanced ones. These advanced countries also rank very high in terms of income per capita and to a large extent are

Table 1: Major exporting and importing countries of selected primary commodities (1978)

Cocoa	Coffee	Rice	Maize	Bananas
Major Exporters				
Ghana	Colombia	United States	United States	Ecuador
Nigeria	Brazil	Thailand	Argentina	Costa Rica
Brazil	Ivory Coast	China	France	Honduras
Cameroun	Angola	Burma	S. Africa	Panama
Ivory Coast	Uganda	Italy	Thailand	Guatemala
Major Importers				
France	United states	India	Japan	United State
USSR	FR Germany	Indonesia	Italy	Japan
Netherlands	France	Bangladesh	FR Germany	FR Germany
United States	Italy	Vietnam	United Kingdom	France
United Kingdom	Netherlands	Korea	Netherlands	Italy

Source: (1) Adams, Gerard F., Stabilizing World Commodity Markets, p. 8, 1979. Also computed from F.A.O. Commodity Year Book, 1981, p. 105, 2 Food Agricultural organization of UN (1990) Agricultural Commodity Projections 1970-1995. Vol I, II III and IV, Rome

capable of influencing the market for these primary commodities.

Internal policies, political and economic instability among developing countries, weather conditions, etc also affect production and growth trends of these commodities domestically. Another factor, which could affect their production, is the facilitative organization designed to transfer the commodities from producers to the final consumers in the individual countries where production is taking place. For instance, the various policy shifts, (micro and macro) affecting agriculture since Nigeria's independence have been accused of being responsible for the slow and sometimes declining productivity of these export commodities. As such, when the structural adjustment programme (SAP) was introduced in 1986, with the aim of altering and restructuring the production and consumption patterns of the economy through the elimination of consumed in the developed ones. For example, Okorie et al (1979), found that price distortions and heavy dependence on oil, it was the contention that these policy measures could change the nation's declining productivity trend. In fact, the SAP programmes specifically scrapped the commodity boards, which had hitherto fixed prices of these export commodities for domestic producers and allowed them to face the export markets directly through various private export channels. These programmes were, therefore, expected to influence resources inflow and outflow of these primary producers. Similar restructuring programmes were known to have taken place in Ghana, Ivory Coast, and Malaysia since independence. An analysis of these production trends, will determine the effect of these domestic policies generally, and external pressures on the growth of this export commodity. As such, this paper's objectives are to estimate the permanent production shares and analyze the sources of the world's cocoa production growth trends.

For ease of exposition, the paper is divided into four parts. Part I is a general introduction of the world cocoa market. Part II, discusses the methodology and theoretical basis of the paper. Part III, is the analysis of world production trends of the major cocoa producers between 1976 and 1997 as well as the sources of world cocoa production growth trend, while part IV presents the summary and conclusions of the study.

II METHODOLOGY

Secondary time series data of world and major cocoa producing countries (Ivory Coast, Ghana Cameroun, Nigeria, Brazil, Indonesia, Malaysia) from 1975 to 1996 were collected from three main sources. These are, the quarterly bulletin of cocoa statistics, produced by the International Cocoa Organization (ICCO), Food and Agricultural Organization (FAO) reports and the reviews of external trade and abstracts of the Federal Office of Statistics, Lagos.

These data were detrended using the five-year moving average technique so as to eliminate transitory components of production trends. This elimination is based on the concept that short-term trends in production are the result of producers' speculative motives, short-term price movements and weather. While the long-term changes in production trends are more fundamental and arise as a consequence of new plantings, changes in age of stock and producer price policies (Simmon, 1976). It is the latter factors, which, therefore, have long-term implications on the growth of permanent production shares. Several techniques have been adopted to measure growth trends and production/market shares. Of these techniques, the most common and adopted in this study are the Herfindal and the Grossack measures. The Herfindal Index (HD) is estimated by the summation of squares of the production shares of the major producing/marketing countries. In the present study the share of the seven countries identified above were used. The formula for its estimation is as presented in the equation below:

$$HD = \sum_{i=1}^{n} mi^2 \quad \text{--------------Equation 1}$$

Where HD = Herfindal Index

n = number of countries

Σ = summation

mi = production share of each country

$i = 1,2,3,...., n$

For the Grossack measure a linear regression of the detrended data of initial and terminal years were adopted. Grossack (1976), had utilized a similar concept which he had adapted from Kuznet and Friedman's notions of transitory and permanent components of market concentration.

The detrended data were used to estimate initial and terminal years' permanent production shares for the seven major Countries above. From here, a linear regression of terminal year production share of each country was undertaken and aggregated. The algebraic representation of the above linear function without regard to the signs of the coefficients is as indicated below.

$$TPS = B_0 + B_1 IPS_0 + U_1 \quad \text{...Equation 2}$$

Where:

TPS = The terminal year permanent production share for the seven countries.

IPS_0 = Initial year permanent production share for the seven countries.

B_0 and B_1 = Coefficients of the constant and independent variable respectively.

U_1 = Error term

The B_1 coefficient, obtained above, was disaggregated/decomposed into two parts.

(1) The correlation coefficient and

(2) The ratio of the standard deviation of the terminal year permanent production and initial year shares.

This decomposed B_1 coefficient is represented algebraically below as follows:

$$B_1 = \frac{P\,TPS_0}{IPS_{0D}} \quad \text{--------------Equation 3}$$

Where TPS_D = Standard deviation of the permanent production shares in the terminal years.

IPS_{OD} = Standard deviation of the permanent production shares in the initial year and

P = The simple correlation coefficient between the terminal and initial year production shares

The essence of the decomposition of the BI coefficient is for the determination of the sources of changes/growth of the world cocoa permanent production trends. Theoretically, the values of the correlation coefficients and the ratios of the terminal and initial year permanent production shares form the basis for deciding the direction of changes of permanent production shares. Relatively high correlation coefficients accompanied by low ratios of the standard deviations of the terminal and initial year production shares; for instance, imply that the source of world production growth trend was from either the very small country producers in the initial period or from the new entrants. Conversely, this would also imply that the large producers in the initial year had lost some of their production shares to the small/new cocoa entrants. A similar interpretation is made when the ratio of the terminal and initial year production shares is highet than its correlation coefficients. Low correlation coefficients and low ratios of standard deviations of the terminal and initial year production shares imply that the large cocoa producers in the initial year have tended to lose their shares to others within the group and to new entrants.

The inference here is that the large producers have tended to compete for each other's production shares and the growth trend was caused by internal production share shifts among the large and new entrants. Finally, the case with high and equal correlation coefficients versus high ratios of terminal and initial year production shares, imply that the large and small producing countries have tended to compete for each other's production shares and the growth trend was caused by internal production share shifts among the large and new entrants. Finally, the case with high and equal correlation coefficients versus high ratios of terminal and initial year production shares, imply that the large and small producing countries have tended to maintain their initial year production shares.

III. RESULTS AND DISCUSSION

World Cocoa Production Trend Analysis

Fig. I presents the permanent cocoa production trends of the seven major producers.
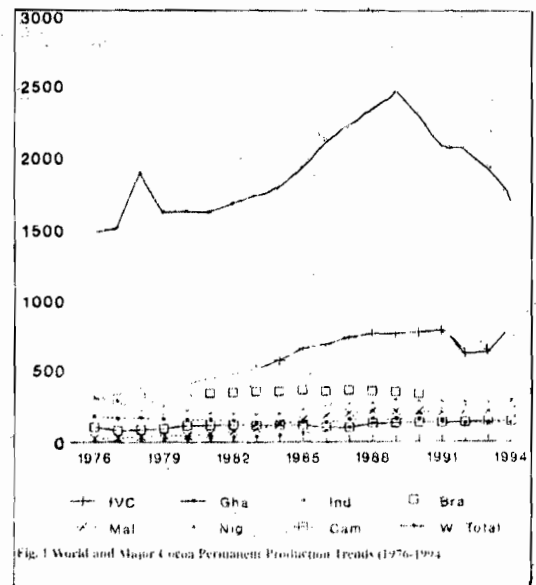

Fig. 1 World and Major Cocoa Permanent Production Trends (1976-1994)

From the figure, it can be seen that, Ivory Coast, Ghana, Indonesia, Brazil, Nigeria and Cameroun produced a combined total

of 1.08 million metric tones between 1976/77 production year and by the

1994/95-production year, the figure had increased to 1.97 million metric tones. In fact, as a group, these countries had increased their percentage contributions to

world production form 79.9 to 94.7 On a country by country basis, however, the trend is relatively upward for Ivory Coast except for a brief period during the 1979/80 season when the trend showed its all time low and lagged behind Brazil and Ghana. Malaysia and Indonesia witnessed steady production growth trends. In the 1976/77 production growth trends In the 1976/77 production season in Malaysia, for instance, it was ranked 6th but by the end of the 1996/97 production year, it had increased its production and became the 5th largest producer. A similar trend is explicated for Indonesia, which was 7th in the 1976/77 production season but was ranked 4th by the end of the 1976/77 production season. Overtime, Brazil and Ghana's production trends have fluctuated. For instance, Ghana which was ranked 1st in the 1976/77 production season had lost its position to Ivory Coast and Brazil by the end of the 1996/97 production season. For Brazil, which was 1st in the 1979/80-production season, it had become 2nd by the 1996/97-production season. In the case of Nigeria and Cameroun, minimal fluctuations are observed.

While the trend in world cocoa production is on the increase, the permanent production shares of many of the major producers are on the decrease. Apart from Ivory Coast, Indonesia and Malaysia, as indicated in Fig 2, which have their cocoa production shares on the increase, the other four countries (Brazil, Ghana, Cameroun and Nigeria) show declining trends.

These changes in permanent production shares can be hypothesized to be the result of internal policies in each country. The fluctuations in permanent shares are a function of the production risks and other internal policies as shown on table 2.

The essence of the table is to determine the effect of individual domestic policies on their production shares since world prices would tend to affect all the producing countries homogeneously.

Adegboye (1988) found a strong positive relationship between domestic policies designed to improve domestic agricultural

TABLE 2: PERMANENT SHARE INSTABILITIES AND PRODUCTION RISK FOR MAJOR WORLD COCOA PRODUCING COUNTRIES

S/N	COUNTRY	INSTABILITY	PRODUCTION RISK
			%
1	Brazil	5.7	10
2	Caneriyb	1.1	20
3	Ghana	7.2	20
4	Indonesia	23.4	90
5	Ivory coast	55.9	30
6	Nigeria	2.6	20
7	Malaysia	11.4	50

prices and supply response of farmers and concluded that internal policies which create price enhancing programmes would make farmers to respond by expanding production through the introduction of new plantings even on marginal hectarages, better management through re-stocking and will make them to introduce other techniques which will generate higher and sustainable permanent production shares in the future. Instability in permanent shares, therefore, is an indication as to how stable government policy initiatives have been to the economy and in this case the cocoa production sub-sector. From the table, it can be seen that, instability ranked from as in Ivory Coast. A close look at these domestic instabilities would tend to reveal that the very large cocoa production share countries had higher instabilities than the relatively smaller ones within the major cocoa producers. For example, Ivory Coast, which has the highest permanent cocoa production share, has instability of 55.9. On the other hand, Indonesia and Malaysia that have fast growing permanent production shares have instabilities of 23.4 and 11.41 respectively. Nigeria and Cameroun that can be regarded as countries with slower growing permanent production shares have instabilities of 2.6 and 1.1 respectively.

Domestic production risk measured by the coefficient of variation and presented on table 2 ranged from as low as 10% to as high as 90% for Brazil and Indonesia respectively.

Again, the high domestic production risks are peculiar to countries with fast growing production shares such as Malaysia and Indonesia. The other countries have relatively similar production risk, ranging from 20% to 50%

Source of World Cocoa Production Growth Trend

Table 3, contains the result of the linear regression of the terminal and initial years' production shares of the major cocoa producers, the ratio of the standard deviation of the terminal and initial year production shares and the Herfindal Index, which is a measure of the production concentration for the seven major cocoa producing countries.

Even-though the coefficient of determination is low, 25%, the parameter of interest, B_1, is statistically significant at the 95% level. The purpose of the linear regression was to enable the determination of the B1 coefficient, which would be decomposed or disaggregated into two component parts: (i) the correlation coefficient and (ii) the ratio of the terminal and initial year production shares. It is this result, which is used to ascertain the sources of growth of the world cocoa production trend. The value of the correlation coefficient was 0.5 while that of the ratio of the terminal and initial year production shares was 0.98. Based on the discussions in part 1 above, it can be inferred that the source of growth in world cocoa production trends over the period was from the small producers among the large ones in the initial period and from new countries entering the cocoa production sub-sectors of agriculture.

Another source of growth was from the extremely large cocoa producers within the leading producers. In spite of these shifts in production shares, the Herfindal Index was very low (25) implying the absence of any form of market control from these cocoa-producing countries. The ability of these countries, even as a group, to influence or control the cocoa market is a far cry from reality.

IV SUMMARY AND CONCLUSION

This paper set out to analyze world cocoa production trends with a w to determining the sources of permanent production share growth trends. The motive behind the determination of the sources of production share trend was

TABLE 3: Parameter Estimates of the Linear Regression and the decomposed coefficients of the permanent Cocoa Production Shares.

S/N	ITEM	PARAMETER	SE	SEM
1	Equation 2 Dependent variable (TPS)			
2	Constant	4.25	75	
3	Independent variable (IPSo)	49	3.2	6.8
4	r^2 Equation 3	25		
5	Ratio of standard deviation of permanent terminal year shares and initial year shares.	.98		
6	Correlation Coefficient (e)	.50		

SE= Standard Error of Estimate; SEM *Significant at 95% confidence level; TPS=Terminal year permanent production share for the seven countries; IPSo= Initial year permanent production share for the seven countries

based on the postulate that permanent production shares can only be influenced by policy changes of the domestic producing countries. Therefore, countries with favourable agricultural production policies, which affect cocoa production, will witness improved/expanded cocoa production shares and vice-versa.

The study found that world cocoa production trend has generally been on the

increase. Some major producers of cocoa have, however, witnessed differential contributions to this trend while in some cases their contributions have declined. Permanent production shares seem to show a more stable but declining producers' shares for Brazil and Ghana while Ivory Coast, Indonesia and Ghana have witnessed relatively higher production share growths. Nigeria and Cameroun have shown relatively slimmer growth in production shares than those of others. In terms of production instability, the study found that Ivory Coast and Indonesia have the highest instability while Cameroun and Nigeria have the lowest production risk and these production risks were similar for all the countries except for Indonesia and Malaysia. The sources of world cocoa production growth was determined to be from Ivory Coast, Malaysia and Indonesia, as well as from other relatively smaller/new entrants into the cocoa production sector.

It is, therefore, concluded that countries which have better internal policies which encourage domestic prices to reflect competitive world prices would tend to have their permanent cocoa production shares on the increase as is the case of Nigeria where the SAP policies of the middle 1980 decade has reversed its down ward trend in permanent production shares.

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