# Cocoa Cycles

## The Economics of Cocoa Supply

Edited by François Ruf and P S Siswoputranto

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# 1

# FROM FOREST RENT TO TREE-CAPITAL: BASIC "LAWS" OF COCOA SUPPLY

**François Ruf**

After several years of research in Côte d'Ivoire and Indonesia and periodic observations in Cameroon, Ghana, Togo, Brazil, Ecuador, Malaysia and the Philippines, I have developed a model that demonstrates how cocoa price and supply cycles work and that explains the geographic shift in cocoa production centres at the farm, region, country and global level.

The model is set against a backdrop of steady growth in both cocoa production and consumption. Figure 1 shows that production shifts are only relative and not very pronounced between continents. At a country and regional level, increases in cocoa supply or sustained levels of aggregate supply observed at first glance actually mask an underlying geographic shift in production areas occurring within the country or region; these shifts involve sharp output falls in some countries or regions compensated by sudden output booms in others.

Based on the theory of production dynamics, the model relies heavily on concepts such as "forest rent", "tree-capital", "non-tree" capital, "migration and labour rent", "life cycles" and "establishment of private property". It takes into account the dualism of smallholdings and corporate plantations. The analysis incorporates to a lesser degree "models" or "cycles" of sales activities and state interventions and regulations which interact with cocoa supply cycles. These factors of course all operate as part of the overall process. The model is still very much a qualitative model and has yet to be rendered mathematical. It has nevertheless proven in several instances its effectiveness in analyzing situations and making medium-term forecasts for various producer countries.

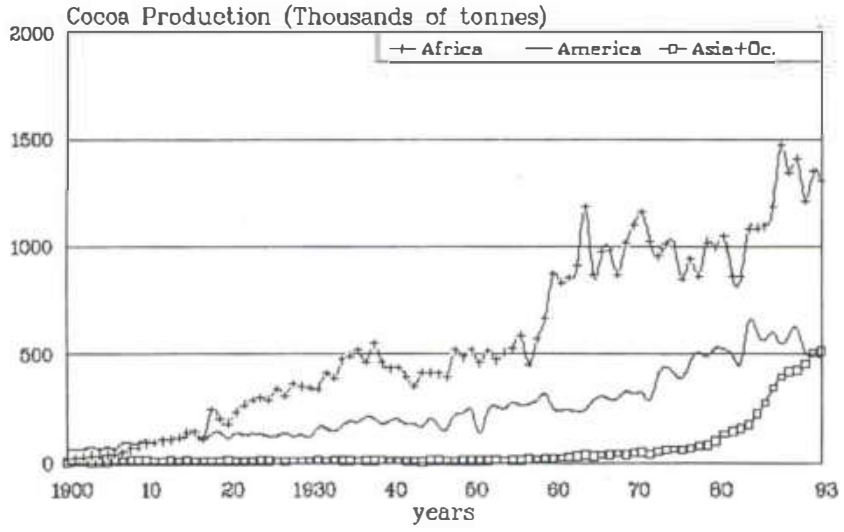


**Figure 1 Cocoa production in three continents from 1900 to 1993.**

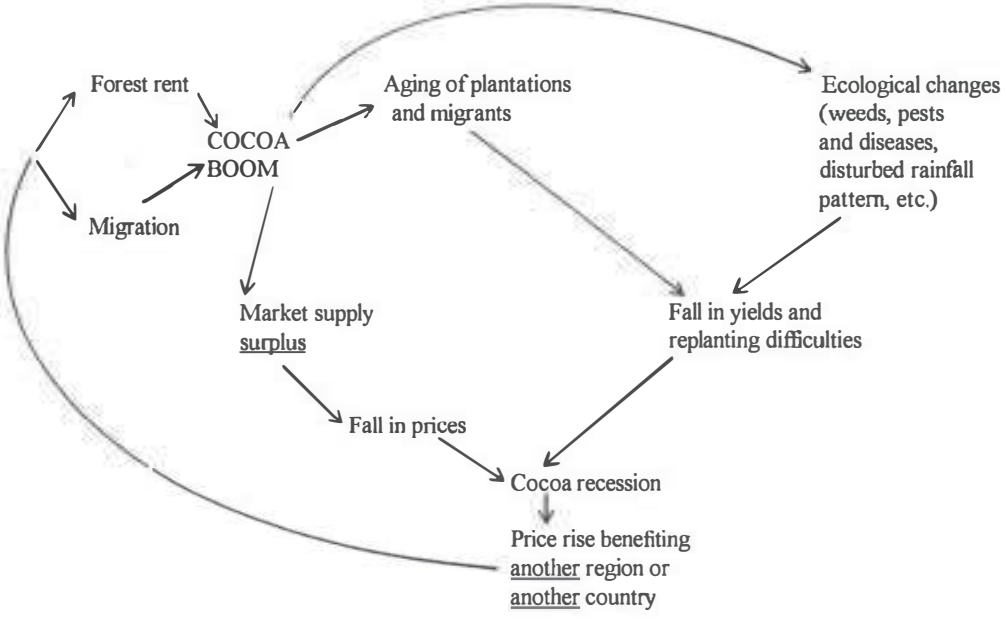


**Figure 2 An endogenous model of cocoa cycles.**

One of the model's limitations is that it does not account for the role of demand and speculation in establishing supply cycles. In anticipating variations in supply or demand, speculation horizons involve relatively short periods of a few days to a few months (Chapter 2). The cycles we are concerned with in our model last from 10 to 25 years.

In spite of several unforeseen events such as the recent weakening of demand in Russia and former Eastern bloc countries, chocolate demand is still fairly well correlated with consumer income levels and therefore fairly predictable. It is true that accelerated or sluggish consumption related to the general state of economies in rich countries affects cocoa prices insofar as supply does not adjust "instantaneously". Thus, the return to an annual 3% increase in demand after relative stagnation in the 1970s helped to raise prices, but the increase in prices was not felt until 1993. Prices will probably skyrocket in about year 2000, the likely peak of a new price cycle. Most experts may interpret this rise as a demand-side effect, similar to that which occurred after the Second World War.

However, has the demand for cocoa beans (used almost exclusively for making chocolate) historically been the determining factor in stimulating continuous growth of supply? One might also use the opposite reasoning: chocolate consumption has increased considerably because producers, and especially African smallholdings, have been able to produce beans at very low cost.

The question of why supply does not adapt immediately to either a rise or a fall in price is analogous to the question of, "which came first? The chicken or the egg?" We may ask, "how do supply cycles contribute to determining prices?" Cocoa supply behaves according to an endogenous model which extends beyond a simple cobweb theorem[1]. Future price rises between 1993 and early 21st century will be determined to a great extent by strong supply-side factors. One of the main limitations in demand-side explanations of price cycles is their inability to account for geographic shifting of production centres.

The main aim of our model is therefore to gain better understanding of shifting supply centres, "very low" production costs, cocoa price and supply cycles and the linkages between these phenomena. The model may be helpful as a decision making tool for policy makers. A second aim of the model is to contribute and expand certain

[1] In the cobweb theorem applied to an annual crop, the high price of produce in year n draws the attention of farmers who decide on a considerable increase in the area under the crop in year n + 1, resulting in a fall in prices in year n + 2 and a decrease in planted area in year n + 3. This was discovered in the context of the pork market and is particularly suited to perennial crops requiring a certain start-up period. Price, investment decision (planting the trees) and supply response are therefore staggered, resulting in a longer cycle.

theoretical approaches to agricultural development and economic cycles. The model integrates 15 main components of cocoa supply dynamics which are outlined in this paper as follows[2]:

1. Tropical forest, "forest rent" and cost of replanting
2. Interaction between forest rent and other natural resources
3. Monoculture
4. Labour and "labour rent" supplied by migration
5. "Tree capital" and life cycle of trees
6. Monetary capital
7. "Accumulators" and family support
8. Institutional factors
9. Information, plant material and pre-conditions for a boom
10. Farming household life cycles
11. Price
12. Establishment of property and "land holding rent"
13. Economic sales cycles
14. Dualism of corporate plantations and smallholdings
15. State intervention and policy cycles

In this chapter's concluding section, the model's contributions are briefly compared with other theoretical approaches explaining booms in smallholding agriculture. In contrast to econometric models which attempt to explain cocoa supply behaviour based on price as the main determinant in producer decisions, this model does not take price as the starting point[3].

Instead, the model attempts to demonstrate that price cycles lasting about 25 years (Figure 2 and 3) are predetermined largely by inherent natural "laws" of cocoa supply that are closely related to environmental, ecological and institutional factors.

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[2] In other publications describing the model - especially those in French - the number of components may vary according to the degree of detail sought and the presentation. For example, the factor "Interaction of forest rent with other natural resource rents" is mentioned here as a specific factor. Cf "*Les déterminants de l'offre de cacao*" (Ruf 1990), "*Les crises cacaoyères, la malédiction des âges d'or*" (1991), "*Compétitivité et cycles du cacao. Vrais et faux problèmes sous l'éclairage indonésien*" (1993).

[3] Authors to be mentioned include Bateman (1965, 1989), Weymar (1968), Behrman (1968), Brandt *et al.* (1974), Akiyama & Duncan (1982), Gbetibouo & Mehta (1988) whose research is the subject of an excellent bibliographical analysis by F. Jarrige (1994). This view in which price is stressed as a determinant of supply was strongly criticized by S. Berry (1976) who demonstrated the role of accumulated income. This is further discussed in the sections on "Accumulators and family support" and on "prices".

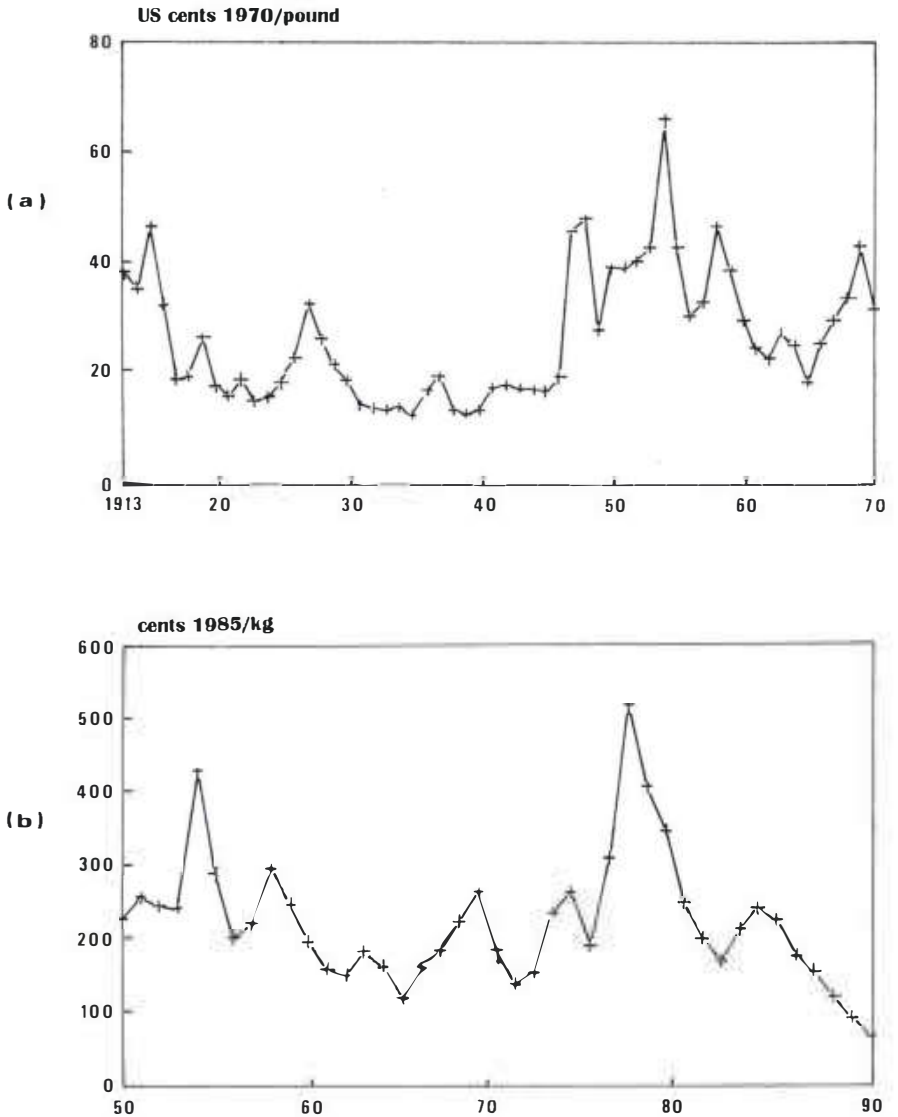


**Figure 3 International spot price cycles on the New York market**
**(a) 1913 to 1970: in 1970 cents/lb *(source: Koffi 1973)***
**(b) 1959 to 1988: in 1985 cents/kg *(source: Min Coop 1990).***

BASIC "LAWS" OF COCOA SUPPLY

The model presents the main components of a cocoa boom which can be summarized in the following equation:

*land + forest rent + labour = plantation capital*[4]
*labour = migration*

The need for monetary capital to substitute "forest" capital emerges at the replanting stage, at the same time when labour supply becomes scarce due to a decline in or an end to migration and even emigration.

*plantation capital + monetary capital + labour = replantation capital*
*labour = local population (next generation)*

The model shows that for each "law" or component, the producer moves from a situation of relative ease or abundance during the boom, to one of severe limitations during the recession which follows. The model illustrates a naturally programmed cycle for each component of cocoa supply: the curse of golden ages (Figure 2).

## 1. FROM TROPICAL FOREST TO DEFORESTATION

Tropical forest perfonns at least two functions in relation to cocoa supply. First, the existence of forest in an area implies a low initial population density. Land is thus unoccupied or "vacant" and open to settlement and exploitation by migrants. In economic terms, "vacant" land can be defined as possessing a "**land rent**" of approximately zero value. From a socio-economic point of view, the existence of incomparably low land rents in forested areas provides a cheap resource which greatly facilitates the cocoa planting process.

Forest also has the function of possessing **"natural environment" rent** through its ecological setting which greatly facilitates cocoa planting from an agronomic point of view. The effects of deforestation have been measured in terms of a "differential rent" as defined by Ricardo (1815) for wheat. Farmers usually grow wheat on the most suitable soils; however, as population and demand increase, less suitable soils are increasingly put under wheat. This leads to a cost difference between varying ecological settings and among farmers.

The same principle of differential rent can be adapted to cocoa with only one major change. Those who benefit from the "differential rent" typically move on to set up new plantations once the initial forest rent has been exhausted. "Forest rent" may be defined as the difference in cost between a tonne of cocoa produced on a plantation created after forest clearance and a

[4] Basic "equations" drawn for Côte d'Ivoire (Ruf, 1988), subsequently verified for almost all the cocoa booms studied.

tonne of cocoa produced by replanting on fallow land or after felling of the first plantation. The cost difference is directly related to ecological changes or reduction in the following agronomic benefits provided by the forest[5]:

- weed control,
- soil fertility,
- protection again erosion,
- moisture retention for soil and plants,
- protection against disease and pests,
- protection against drying winds,
- provision of food and miscellaneous forest resources,
- stabilizing effect on precipitation.

This "differential rent" may vary with the level of technical progress and skill of cocoa farmers. "Forest rent" exists because smallholders know how to use it. Some corporate plantations do not possess these same skills; they may use mechanical clearing methods which are more expensive (and more demanding on the environment). This lack of skill in exploiting forest rent is one of the reasons why corporate plantations are less efficient than smallholdings (Chapter 17).

An example of forest rent and skill in its extraction is best seen in the direct sowing and nursery techniques practised in West Africa. Direct, shallow sowing of a large number of cocoa beans (5,000 or more per hectare) at the base of yam ridges (which serve as tillage) is an extremely effective technique when applied after forest clearance. It was the most common technique applied in Côte d'Ivoire until the 1980s, despite extension officers teaching a different and more standard nursery technique using beans germinated in plastic bags buried in soil. Such standard techniques also involved planting in a line with a staking system, hole digging and transplanting from nursery to field. These techniques required much more labour than direct sowing and did not produce better results, at least in the early years.

However, when the Ivorian forest began disappearing locally, and especially after years of major plantation fires (in 1983 and 1986), producers ran into difficulty when they attempted replantation. The direct sowing technique is more risky and less efficient[6]. All of the components of the forest rent had disappeared by then. The soil no longer contained sufficient, valuable water reserves; weed growth was so rapid that cocoa plants were overrun as soon as they had germinated. Damage by rats

[5] The "forest rent concept" and its components are discussed in Ruf 1987, 1993.

[6] More information on direct sowing techniques in Côte d'Ivoire in the boom phase can be found in Ruf 1984. For the transformation of these systems during the deforestation/ replantation phase, see Ruf 1991. These direct sowing techniques are found in the history of several "cocoa countries" such as Brazil (Zehntner, 1914; Monbeig, 1937; Leeds, 1957).

increased and insects such as *Earias* quickly attacked seedlings. Without the forest, young plants were also exposed to harsh, damaging winds.

Some planters tried to modify the system by sowing even more beans, but most switched to the standard nursery system mainly to give cocoa seedlings an advantage over weeds and to enable them to draw water from greater soil depth. Row planting also became more useful for weed management. These techniques subsequently became widespread in the late 1980s when SATMACI[7], the extension agency, collapsed from lack of funding and no longer had influence in the field.

In analyzing the forest rent cycle, we can see that plantation fires do not occur at random. Plantation and forest fires are a symptom of the radical ecological change that has taken place through deforestation. Plantation fires are thus incorporated into our model. Likewise, the end of a forest rent cycle can be signalled by a weakening in extension services, typically brought on by declining "cocoa rents" which translates into lower state revenues and a cutback in state interventions. (See "State Intervention and Policy Cycles"). This example leads us to look at innovation mechanisms and replanting techniques.

In terms of innovation, the above example shows that not all information disseminated to planters by researchers or extension agents is lost. Planters apply such information only when it meets their felt needs and requirements, not because they have received repeated promotional messages.

The example also shows that a crisis can induce beneficial changes and innovations. Plantation fires triggered a replanting reflex in Ivorian cocoa cropping. By destroying cocoa capital, fires remove any hesitation on the part of the farmers to felling built-up tree capital. As a consequence, farmers discover the advantages of total felling before replanting as compared with progressive replanting under old cocoa trees, an extremely delicate and risky operation (cf. Oladokun, 1988, chapter Petithuguenin). The dynamics of "forest rent" therefore are governed by natural laws whose impact may be manipulated by technical, ecological, economic and even social processes.

Another example of the linkage between forest rent and environmental change is seen in the proliferation of a new "weed", *Chromolaena odorata*, found in West Africa (especially Ghana and Côte d'Ivoire) since 1980, and which is causing profound changes in the ecology and landscape of the region. Farmers have been complaining of it for 10 years; controlling the weed considerably increases the amount of maintenance work required on young plantations. Manual clearing of one

[7] "Société d'Assistance Technique pour la Modernisation de l'Agriculture de Côte d'Ivoire". The company ceased operations in 1994 after accompanying the major part of the cocoa cycle since the independence of the Ivory Coast. Its demise is symbolic.

hectare infested by *C. odorata* can take 30 days and require at least two 15-day weeding periods during the subsequent year to control new growth from rhizomes. In the present situation where manual techniques are heavily used on plantations, replanting after clearance of *C. odorata* is longer, more risky and hence more expensive than planting after clearing primary forest (Tables 1 and 2).

**Table 1 Estimate of number of days of manual labour in a plantation after clearing primary forest in Côte d'Ivoire (excluding labour for companion crops)**

| Plantation activity and type of inputs | Number of days per hectare |
|---|---|
| Clearing primary forest, felling and burning | 33 |
| Direct sowing of beans | 10 |
| Complementary planting by planting out nursery seedlings | 10 |
| Transport and planting of banana plants (200 to 500) | 14 |
| Weeding around seedlings | 3 |
| Replacement of dead seedlings | 4 |
| Complete weeding | 12 |
| Total for the first year | 86 |

*Source: Ruf, 1988, Vol. 2, annexes*

**Table 2 Estimate of number of days of labour in manual replanting in Côte d'Ivoire (excluding annual companion crops)**

| Plantation activity and type of inputs | Number of days per hectare |
|---|---|
| Clearing *Chromolaena odorata* from fallows | 30 |
| Nursery + nursery maintenance | 20 |
| Digging holes and transplanting nursery seedlings | 55 |
| Transport and planting of bananas (400-500 plants) | 20 |
| Weeding | 16 |
| Replacement of dead plants | 11 |
| Weeding at end of year | 16 |
| Total for first year | 168 |

*Source: Ruf, 1988, Vol. 2 annexes, adapted in light of the results of surveys concerning replanting (1991)*

In the past year or so, spontaneous technical innovations have appeared here and there lending hope to control of this ecological problem. Planters have come to understand that they should leave the *C. odorata* cover for at least 5 years to allow proper formation of a ligneous, organic mass enabling soil recovery and enrichment. In Ghana and Côte d'Ivoire, smallholders have discovered that the best way to manage this "fertilising weed" is to cut it **without burning** it later[8]. The elimination of forest burning practices represents a major technical change in the humid tropics and reflects the nature of post-tropical forest agriculture.

With regard to innovations in nursery management, planters are also inventing new techniques by adopting plastic bags normally used in selling water and which are cheaper and smaller. Transport of full polybags from the nursery to the field has thus become cheaper and easier. Other examples of spontaneous innovations exist.

If such adaptation of cropping techniques progresses, it may no longer be necessary to include the effects of *C. odorata* in the "differential rent" when forest rent is exhausted. However, this will depend upon the capacity for technical innovation on the part of planters confronted with ecological and social change. It will also depend upon the ability of the state to help farmers in their search for solutions.

While awaiting such possible progress, the loss of forest rent is meanwhile felt in terms of additional labour costs. Tables 1 and 2 show that the first year of "replantation" requires 150 to 170 days of labour compared to less than 90 days during the first year of planting. The cost of possible inputs (polybags and insecticide) is also added to the extra 60 to 80 days of work required.

Despite the extra work, there is certain to be a higher rate of seedling loss than with a first-time planting cycle, leading to more labour for less production. The investment cost in the first year may be 50% higher accompanied by guaranteed lower production. In this context, we can well understand why planters decide to abandon old plantings and move to create new plantations rather than attempt replanting.

Planters and researchers continue to be surprised by replanting yields that are much lower than those of planting after land clearance. Voelker however understood this problem very clearly in 1955 with reference to Nigeria: "The yield of a cocoa plantation succeeding an old plantation has never, to my knowledge, equalled and even less exceeded that of the first. Cocoa planting must be carried out in new regions in order to increase the volume available." (Voelker 1955). Thirty years later, Card (1983) confirmed that yields of new plantations are greater than those of replantation operations (see Chapter 10).

[8] Observed in southwest Ghana and in central western Côte d'Ivoire in December 1992.

The availability of tropical forest has for centuries been one of the main factors dictating the geographic shift of supply centres and cocoa market cycles. The availability of tropical forest will continue to be a major factor in competing supply between Southeast Asia and West Africa in the next few years. Côte d'Ivoire, Ghana (except for the southwest) and Nigeria seem to have "consumed" their capital-producing forest rent. Meanwhile, Sarawak in Malaysia and especially Indonesia possess thousands of square kilometres of forest -- representing rents waiting to be exploited by migrant planters.

In cocoa cropping, the **tropical forest** takes on a historical and economic role which can best be described as a "**cocoa mine**". Does a cocoa mine have a finite end or is it a renewable resource? Planters' innovations, adaptation to ecological and social change, technical progress and capital can all help modify this apocalyptic pattern of a non-renewable mine. However, until recently, the sluggishness and inefficiency of the replanting process observed in all countries point to the technical, economic and social difficulties of replanting.

History seems to continue to repeat itself. When a "new" country starts to produce cocoa and begins exploiting its forest rent, an "old" producer country soon finds it difficult to adapt and compete in the international market. The new country can withstand falling prices thanks to its low costs of production provided by available, unpriced forest rent, while the older producing country gradually weakens. This is the main factor explaining all the geographic shifts in supply centres throughout history. The fall of Ecuador in cocoa production benefited Brazil and Ghana. Ghana's decline benefited Côte d'Ivoire, Brazil and Malaysia. Since the early 1990s Brazil and Malaysia have, in turn, weakened only to be surpassed by Indonesia. Côte d'Ivoire has managed to further delay its decline by opening up "listed" forests and by building a coastal road which makes the last forests in the country accessible to migrants' appetites.

Indonesia is now in a full boom stage and shows signs of exceeding 400,000 tonnes/year of production by the year 2000. However, it is already being affected by the return of one of cocoa's old enemies -- the pod borer (*Conopomorpha cramerella*) (Figure 4). Representing some of the world's fastest cocoa booms in history, Malaysia and Indonesia might also experience equally rapid regional recessions in the Malaysian peninsula, Sabah and the first production centres in Sulawesi, Indonesia. Will these receding regions be replaced by new cocoa booms at the expense of the last remaining forests in Southeast Asia, such as those in Irian Jaya?

The next cocoa recession appears to be "waiting around the corner" just as the next up and coming producer country remains to be identified. Such is the "linear" model dictated by the forest rent concept. Nuances and divergence from this basic model will be observed when other factors intervene to interact with forest rent. The first of these intervening factors are of an ecological nature.


(1980) Period of pod borer appearance in the region.

O Pod borer foci.

Possible dispersal routes in the 19th and 20th centuries from probably endemic foci in Central and North Sulawesi, Halmahera and Mindanao.

Probable dispersal from Sabah and the Sebatik Islands (and East Kalimantan) to Toli Toli between 1983 and 1990.

Possible dispersal to South Sulawesi and Southeast Sulawesi between 1994 and 2000?

*Sources: author's observations and hypotheses in 1993*

**Figure 4 Map of possible pod borer dispersal in the cocoa plantations of Sabah (Malaysia), Mindanao (Philippines), Sebatik Islands, Moluccas and Sulawesi (Indonesia).**

## 2. FOREST RENT AND OTHER "NATURAL RESOURCE" RENTS

In Brazil, the cocoa producing region of Bahia has benefited from absence of serious disease and major pests for more than a century. One of the likely reasons for this advantage is the existence of a "location rent", since Bahia is favourably located farthest from the equator[9].

In contrast, the existence of an endemic disease, cocoa pests or shallow soil in less favorable locations make deforestation all the more dangerous. The duration of the first plantation cycle may be severely shortened, making replantation almost impossible. Thus the rationale and need for geographic shifting of production centres is reinforced. This has been the case with cocoa production zones in central Sulawesi and the Moluccas that have been attacked by pod borer[10]. It is also the case in several regions of southwest Côte d'Ivoire where shallow, gravelly soils have made cocoa trees vulnerable to attack by mirids (insects which mainly attack the leaves of the cocoa plant). Compared to the Cameroonian cocoa sector which has been hampered by the pod rot, Côte d'Ivoire also benefits from a phytosanitary rent.

These additional natural resource or locational rents enhance the existing base of forest rent; together these rents make up the biological resource base of our cocoa supply model. With this base of natural forest and resource rents, monoculture then becomes the primary technical means used by planters to exploit this overall forest rent.

## 3. FROM MONOCULTURE TO AGROFORESTRY

In numerous observations, ranging from Côte d'Ivoire to the M'Bam in Cameroon, from Sabah in Malaysia and Sulawesi in Indonesia to the Sawata region in Mindanao in the Philippines, cocoa booms are associated with an almost universal cropping system: monoculture after forest clearance. Monoculture is primarily practised during the advanced stages of plantations. In the early years, smallholder cocoa farms are almost always intercropped with food crops which help "optimize" the exploitation of forest rent. Monocropping exploits forest rent rapidly at the cost of permanently

[9] This absence of serious diseases (until the explosion of witches broom disease at the beginning of the 1990s) enhanced the legendary longevity of the Bahia plantations, which were cropped for at least 40 years. However, Bahia has escaped neither exhaustion of forest rent nor its effects, as is well demonstrated by the descriptions of Zehntner (1914), Monbeig (1937), Leeds (1957). For deeper analysis of the "false exception" of Brazil in the context of our "forest rent/cocoa cycles" model, see in particular Ruf/Forget/Gasparetto, 1994.

[10] Pod borer in Sulawesi: See the map enclosed, Chapters 16, 17, and "Will Côte d'Ivoire give up its position of world leading cocoa producer to Indonesia? and "Innovations et gestions paysannes face aux maladies et ennemis du cacaoyer" (Ruf, 1993).

destroying such rent. Sustainability of natural resources and agrarian systems do not appear at all as a priority to consider in the strategy of migrants whose prime concern is to gain quick cash returns.

The more elaborate plantation systems such as agroforestry may represent a more progressive response by producers, however this usually occurs several years after migration or with the next generation of planters[11].

A few sustainable agroforestry "exceptions" have been observed, such as cocoa growing under adult coconut trees in several regions in Asia and the Pacific, and especially on the Malaysian peninsula where the method has been developed on a national scale[12]. In fact, these methods are not exceptions. Cocoa is a diversification crop often introduced in regions that are already densely populated and cultivated; cocoa is a very useful crop in the evolution from a monoculture system (coconut in this case) to a more balanced system of an agroforestry nature. These sustainable cropping systems may result in cocoa production, however they do not appear in the midst of strong cocoa booms which depend on a massive influx of labour.

## 4. FROM LABOUR MIGRATIONS TO LABOUR SHORTAGES

Since the first documented Sonocusco cocoa boom of the 16th century[13] to today's boom in Sulawesi, cocoa booms are generally the cause and result of a population boom created by accelerated migration.

### STAGE 1: PRE-COCOA MIGRATION

Cocoa migrations are generally preceded by "pre-cocoa" migrations. In Sulawesi, the first migrations were mainly the result of migrants' search for free land and of a tobacco boom. Logging companies frequently play a role in accelerating migration since they bring workers into a new forest region and facilitate their travel along

[11] Comparison of cocoa dynamics also leads to the hypothesis of a strong correlation between "autochthons" (indigenous groups) and agroforestry on the one hand and migrant groups and monoculture on the other. This hypothesis, based on agroforestry as a strategy for reconstituting rent (Ruf, 1989) is the subject of a work in progress.

[12] For Malaysia, cf. Chapter 13, Teoh *et al.* (1977), Shaaban Sahar (1982), Jarrige (1994); for Indonesia, cf. Chapter 16, 17; for the Philippines, cf. Ruf/Ardhy, 1994.

[13] For more information about the Sonocusco and Central American booms, see McLeod (1973) and more recently Touzard (1993), who researched the applicability of the model in past cocoa history by visiting libraries in Salvador and Guatemala. Central southern Cameroon is an exception (see Chapter 8 and references in this chapter). There have in fact been seasonal labour migrations, especially from Bamenda country. In addition, the M'Bam region follows the forest rent + migration rules of the model.

forest tracks built for logging. (This phenomenon has been seen in Côte d'Ivoire, Sabah, Sulawesi, the Moluccas, Mindanao, etc.) The search for gold has also sometimes led to cocoa development. This was the case with Spanish colonists in Central America who "sought gold and found cocoa" (Touzard, 1993). Similarly, in some parts of Côte d'Ivoire, the search for gold or other natural resources led to migration to rivers and forests. It seems that all it takes is for people to see money from the first sale of a crop in the hands of the first migrant planters before a cocoa migration and boom is triggered[14].

## STAGE 2: COCOA MIGRATION

The chance to make money from cocoa attracts thousands of migrants. In the boom phase, smallholdings and corporate plantations do not function very differently. They are both based on easy, "cheap"[15] access to land and labour from outside the region or even from outside the country.

## STAGE 3: THE SLOWING OF MIGRATION AND START OF EMIGRATION

As for the "land/forest" factor, Malaysian and Ivorian plantation economies contain internal contradictions in terms of their labour supply. Various processes require the labour resource to shrink, at least during a certain phase. J. P. Dozon (1975) identified one of these contradictory processes at work in Côte d'Ivoire. As all new migrant workers aspire to settle as planters, their availability to provide labour to other planters lessens. Here, we further analyze the slowing of agricultural migration and the unavoidable labour constraint that emerges during a cocoa recession.

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[14] See "Compétitivité et cycles du cacao. Vrais et faux problèmes sous l'éclairage indonésien" (Ruf, 1993) for an accurate description of the transition from pre-cocoa migration to cocoa migration in Sulawesi.

[15] The low cost of these factors is not explained by their under-use (according to the "vent for surplus" theory) or by a zero opportunity cost of labour in systems preceding the arrival of cocoa (and migrants) but rather by forest and labour rents leading to non-renewal of these resources. As for labour rent, a cocoa boom capitalizes on the desire of migrants to sacrifice several years of consumption with the prospect of accumulating plantation capital. Is this the beginnings of validation of the "vent for surplus" theory with regard to labour at the expense of leisure? The reply is mitigated since the migrants could also work where they come from. In addition, this sacrifice of consumption and leisure only lasts for a few years while land property and labour investment are consolidated in plantation capital. The same principle can be seen in Indonesia in the rubber planting booms at the beginning of the century (Anon, 1926, Chapter 15) or in cloves or coffee (Ruf, 1994). See the debate about the vent for surplus theory at the end of this chapter.

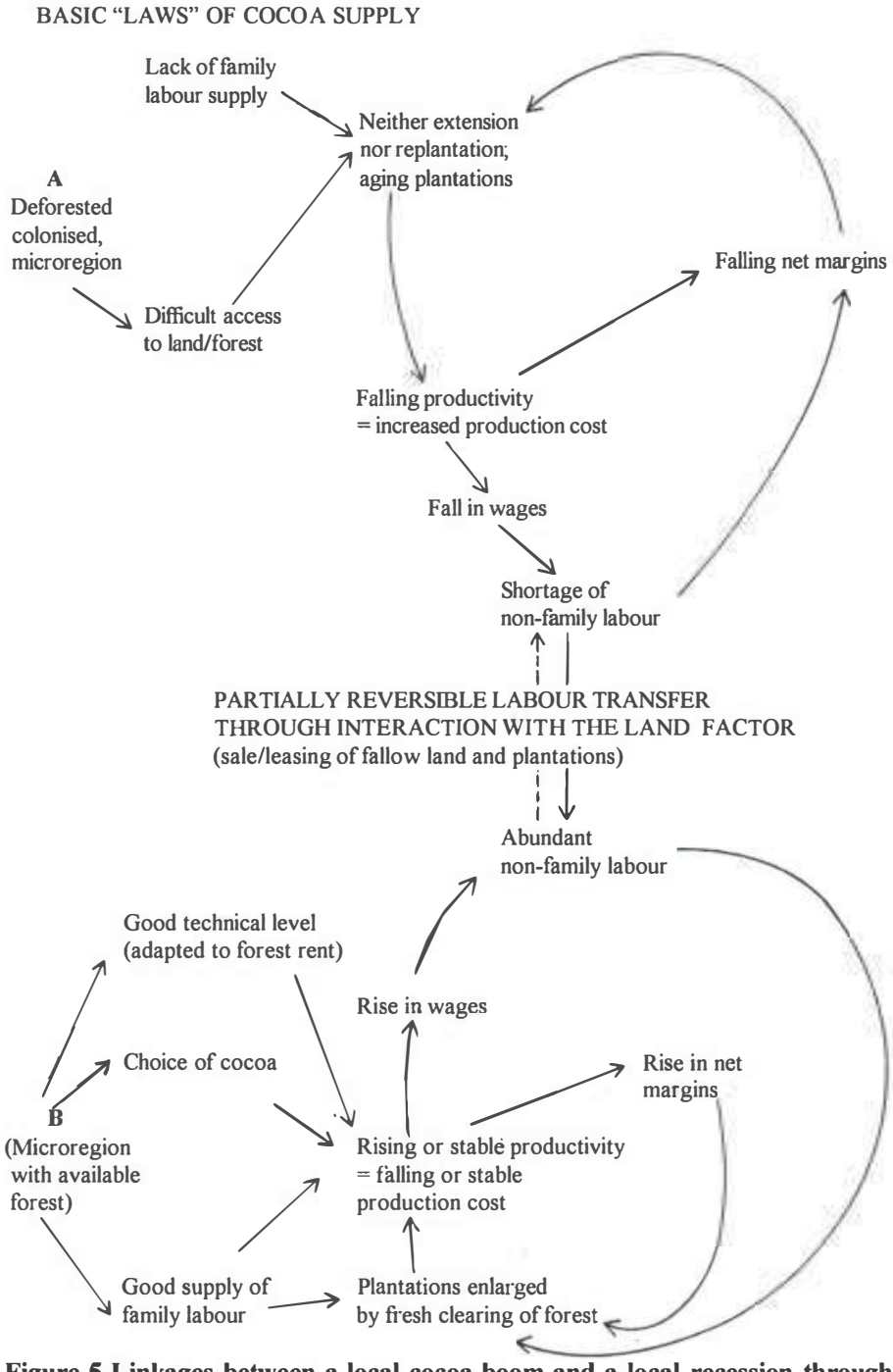
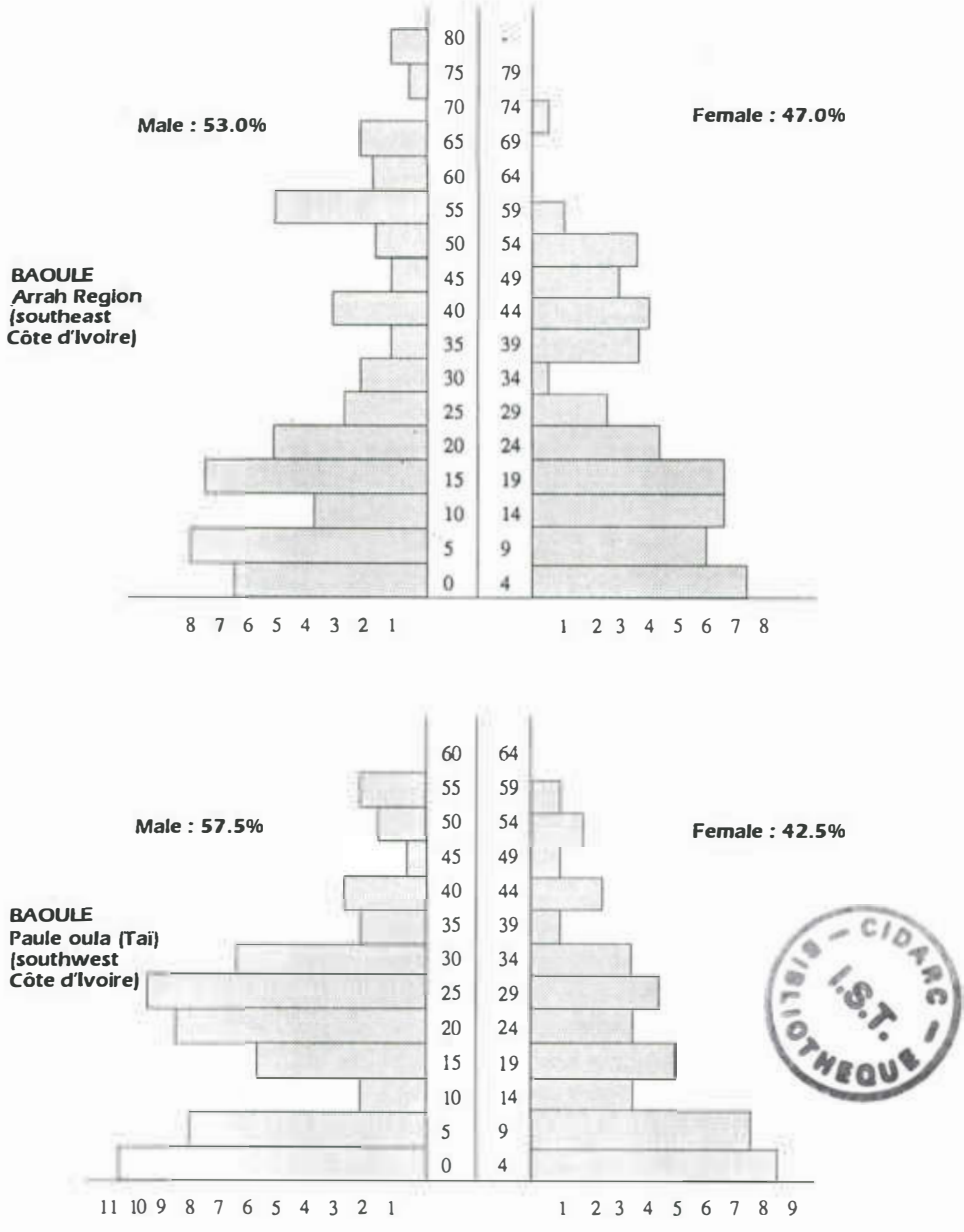



**Figure 5 Linkages between a local cocoa boom and a local recession through aging plantations, labour transfer and the land factor. Schematic view of central western Côte d'Ivoire in the 1980s (after Ruf, 1988, Vol. 2, p 315, modified).**






*Sources: survey 1984, Ruf, 1988, Vol.5*

**Figure 6 Movement of populations from old cocoa producing areas to new ones: comparison in age distribution of Baoulé migrants in Arrah (old cocoa producing area, southeast Côte d'Ivoire) and Taï (new cocoa producing area in southwest Côte d'Ivoire).**

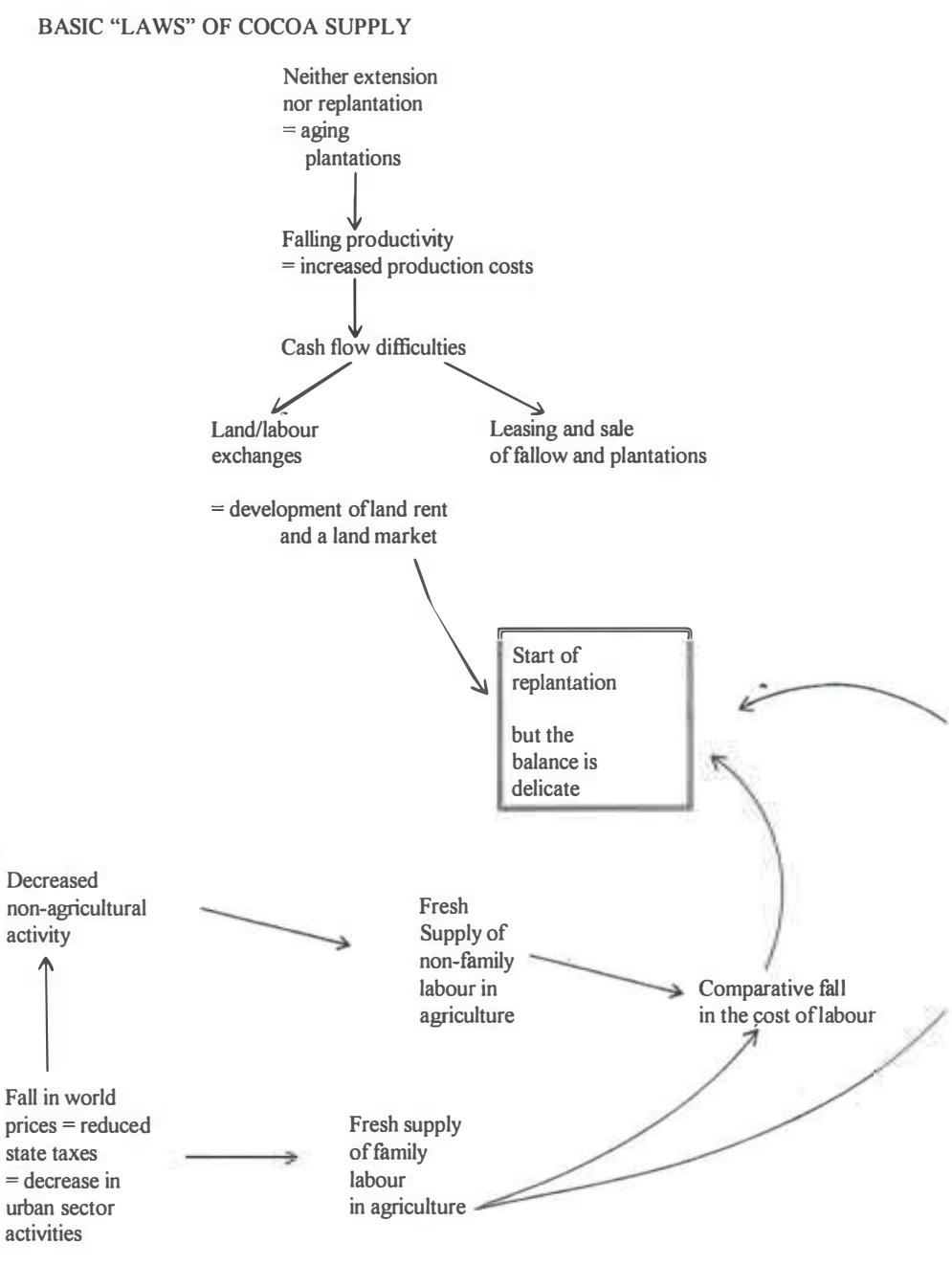



**Figure 7 Recession in a cocoa economy and features enhancing replanting in a country where cocoa growing is the main activity. Schematic view of Côte d'Ivoire cocoa regions undergoing recession (after Ruf, 1988, Vol. 2, p 313, modified).**

First, the slowing of migration and start of emigration are strongly related to the aging process of plantations and dwindling of forest land. We attempt to express diagrammatically the linkage between central-western Côte d'Ivoire's boom/ recession in the 1980s with the aging of plantations and labour shift from the recession zone to the growth zone (Figures 5 and 7). Figure 6 also shows the interaction between "land" and "land holding" factors. For producers in a recession area, letting go of land makes it possible to conserve or attract labour again, at least for a period.

Beyond the small regional level, this model may be similarly applied on a larger scale. In the late 1960s, labour from former Upper Volta left plantations in Ghana for Côte d'Ivoire. Thus, labour shifted from one producing country to another. In this case, policy interventions also played a part in the shift. By expelling foreigners, the 1969 "Aliens Compliance Order" in Ghana accelerated the transfer of labour from one country to another, contributing to cocoa recession in the first country and a boom in the second.

Second, this slow down in migration results in surplus labour supply in one or two countries and a shortage of labour in others. A distinct labour cycle therefore emerges, similar to the cyclical pattern of other cocoa supply components.

The relative decrease in availability of labour varies according to country. In Malaysia, available migrant labour is absorbed by the industrial sector which competes with private plantations in difficulty, representing a migration from one sector to another. In Côte d'Ivoire, outside labour is once again migrating and shifting, either to neighbouring countries, other economic sectors, or returning to their native country.

## STAGE 4: A RETURN TO FAMILY LABOUR

A fourth stage marks the evolution of the labour factor, at least in countries where exports of smallholding cocoa dominate the national economy. Here, the impact of international price may vary according to the position of cocoa and smallholdings in each country. Since the early 1990s, Côte d'Ivoire has seen a "return to the village" by former urban migrants. Family labour has been diverted from the public sector and urban centres by the economic crisis; as a result, it is slowly replacing a dwindling supply of migrant labour. This represents a radical social change bringing about a true "spontaneous structural adjustment" accelerated by the country's economic crisis (see Ruf, 1994, "Crises et ajustements structurels spontanés..." and Chapter 6). Cote d'Ivoire's crisis was brought on by nothing other than the fall in the international price of cocoa (and coffee), accompanied by policy "errors" such as excessive govemment debt -- a classic government response to sudden earnings and excitement enjoyed from a boom.

BASIC "LAWS" OF COCOA SUPPLY

The national and international economic environment impacts labour employed in agriculture. Figure 7 shows how in such a context the fall in world cocoa prices can stimulate the renewal of plantations through contributions by family labour[16]. This is true at least in a country like Côte d'Ivoire where lack of economic alternatives leads young people to farming, and where in this fourth phase of cocoa development they are led to smallholding plantation economies where paid labour is substituted by family labour.

Twenty years earlier, under the policy effect of labour expulsion from former Upper Volta, Ghana appeared to have gone through a similar labour shift. Ghana paid a price for the collapse of production in the 1970s[17] before partial recovery took place in the late 1980s and early 1990s. Will Côte d'Ivoire pay the same price in social adjustment?

In 1991/92, a day's labour cost some 700 cedis in Ghana or the equivalent of 2.8 kg of cocoa (with 255 cedis/kg paid to producers). In nominal prices, the cost of labour was stable in Côte d'Ivoire from 1984 to 1988 in spite of a rise in producer prices. In 1988, a day's labour (800 CFA francs) represented only 2 kg of cocoa. It rose to the equivalent of 2.5 to 3 kg of cocoa in 1992. There has therefore been a relative increase in the labour cost : cocoa price ratio. Even in countries like Ghana and Côte d'Ivoire which "benefit" from forced or spontaneous adjustments in labour cost (which further corresponds to impoverishment of the country), the relative cost of labour from outside the family remains a handicap[18].

Compared with Ghana, will Côte d'Ivoire be able to shorten its adjustment period and conserve its market share[19] when labour costs cause plantation labour to become increasingly dominated by family labour? The answer lies partly in the technical, financial and social capability of family workers in replanting and hence in overcoming the natural aging process of cocoa plantations.

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[16] The notion of family labour is used here for established family holdings regardless of geographical origin of the families concerned.

[17] This demonstration cannot be developed here. Ghana's fall as a cocoa-producer is partly based on the exclusion of Burkina Faso labour in 1969. This is an illustration of the principle according to which a policy may aggravate problems instead of alleviating them. In spite of good studies such as that of Addo (1970, 1972), this factor is often ignored or forgotten in analyses of cocoa in Ghana in the 1990s.

[18] See Ruf, 1991 for analysis of family food and other costs. The impact of the disappearance of game and natural animal protein resources is, for example, strongly felt in Côte d'Ivoire and Ecuador and less so in Malaysia and Indonesia.

[19] The more important priority is to conserve the incomes that are generated from cocoa instead of market share.

## 5. TREE-CAPITAL: FROM SEEDLINGS TO AGING TREES

Migration does not only help to productively combine land and labour factors; it also allows forest and plantation tree capital to adapt to labour. Farmers face the challenge of replanting at a time when both their cocoa trees age and when demand for and supply of labour decreases. Planters' incomes fall as plantations age and fewer labourers are sought.

This natural "cocoa deflation" process itself is independent of market cycles (although it undoubtedly affects market cycles) and results in an unavoidable cycle of increasing production costs on plantations as time goes by. As trees grow older, they produce less in spite of a constant amount of labour. The mortality rate of cocoa trees also increases, tightening the "noose" created by decreased output and increased labour requirements, especially for weed management (see also Chapter 4). The obstacles to replanting - partly related to deforestation - exacerbate the situation (Figures 5 and 7).

Independent of ecological changes (such as deforestation, microclimatic changes, effects of wind, flora, fauna, cocoa pests and disease) and economic changes such as price collapses, the decision to fell cocoa tree capital and replace it is always a difficult one, for both smallholdings and company plantations. A fall in income must be accepted and there is also a risk factor involved. The farmer's reluctance to fell trees reduces the economic optimum of an established plantation (Boussard, 1991), delays the so-called "optimal" felling/replantation decision and lengthens the economic life of tree-capital (Ruf, F., Ruf, T., 1989). Our observations in Côte d'Ivoire, Togo and Indonesia show that tree-felling is risked when output is at a minimum (i.e. when the plantation hardly produces any yields) and no alternatives exist, i.e. when there is no forest to clear.

The inevitable increase in production costs as trees age, combined with reluctance to fell trees and replanting difficulties, produces a strong correlation between competitiveness and cycle. There is an economic dimension to geographic shifts in production areas, reflecting a classic economic theory at work: displacement of a high-cost production zone by one with lower costs. Even if falling cocoa prices were to lower labour costs and cushion the effects, the three factors discussed above - forest rent, labour and tree-capital - will have an overall effect of encouraging displacement of production areas.

This displacement process is currently at work in Brazil. The fall in prices is already aggravating the phenomenon in Malaysia. Côte d'Ivoire is experiencing the same process but is showing more resistance by clearing new forest areas. Ivorian labour costs are also falling in an economy where the price of cocoa plays an alternately inflationary and deflationary role. Meanwhile, several tens of thousands of hectares of cocoa are being planted each year in Indonesia, the present "new" producer country. However, some parts of Indonesia are already being affected by the cycle of increased costs and shifting production zones.

In the provinces of central Sulawesi and the Moluccas in Indonesia, the emergence (or rather the return) of the pod borer (*Conopomorpha cramerella*), the Southeast Asian cocoa pest, has dropped yields from 1,500/1,000 kg to 500/100 kg/ha[20]. This obviously means higher production costs. But planters are not discouraged as long as untapped forest is available. They simply stop maintaining the first cocoa trees, abandon the plot and move on to plant new ones a few kilometres away. Thus, planters save in monetary outlay for treating affected trees and draw income from new cocoa trees (without any cash outlays) by exploiting available forest rent (see also Chapter 16).

Planters in central Sulawesi and the Moluccas exploit the biological nature of tree capital to an extreme. It appears that with the disappearance of the forest rent function of "plant pathology protection", displacement of production areas has now accelerated.

## 6. MONETARY CAPITAL "BEFORE AND AFTER" COCOA TREE CAPITAL

Why do planters in Indonesia and many other countries adopt a strategy which accelerates displacement of production areas? When farmers performed their first planting after clearing forest (or even through agroforestry planting under existing trees), they were able to establish cocoa plantations without much cash investment. Cocoa trees form the major part of investment capital, consisting of accumulation of labour and use of natural resources (through consumption of forest rent and destruction of forest capital).

Although the absence of monetary capital was understood, demonstrated in Ghana by P. Hill (1963), and observed again in Côte d'Ivoire, many preconceived ideas remain that need to be put into perspective. For example, the 1990 UNCTAD study still defends the following opposing principle: "Producers have to make an investment that can reach thousands of dollars per hectare before starting to receive any return for their efforts" (UNCTAD 1990, p. 16).

We have observed just the opposite in all countries in first plantings and in smallholding plantations. On the contrary, we observe planters making a sacrifice in family consumption and using natural resources to establish plantations; little monetary capital is required. However, it should be stressed that the situation is quite

[20] Surveys were taken in 1991/93 in several cocoa growing zones affected by pod borer; Sahu/Jailalao at Halmahera (northern Moluccas), the small islands of Bacan, Sanana, Taliabu and Mangole (also within the administrative jurisdiction of Halmahera *kabupaten*) and the Toli Toli region in central Sulawesi.

different for replanting. The amount of capital required for replanting and for family and labour subsistence is considerably greater[21].

## 7. "ACCUMULATORS" AND FAMILY SUPPORT

With regard to cocoa booms in Nigeria, S. Berry (1975, 1976) has been one of the researchers who has best understood the role of accumulated incomes and the role of family and ethnic support as a partial substitute for lack of capital and official credit institutions. Migrations have been less significant in Nigeria than in other producer countries. However, migrants have been quite successful cocoa farmers. Berry states, "Indeed one gets the impression that the migrant farmers' explicit reliance on one another for assistance in their farming activities may actually have contributed to their success as cocoa farmers, by facilitating the expansion of their cocoa farms and fostering a sense of pride in and dedication to their agricultural achievements" (Berry, 1976 p. 14).

### SELF-SUPPORT AND MUTUAL HELP IN PIONEER SETTLEMENTS

The principle of mutual support is more noticeable in Côte d'Ivoire and Indonesia than in Nigeria, but it appears to hold true for all migrant frontiers and not only cocoa frontiers.

I define "**self-support**" as the principle of saving cocoa incomes from a pre-existing cocoa farm to invest in a new one. As long as the migrant can plant cocoa on the same plot of forest, the investment in new cocoa planting is limited to labour (mostly family labour). As soon as the last hectare of forest has been converted to cocoa, he may decide to buy a new plot of forest. By that time, the surrounding hectares have usually been completely planted by other migrants and he has generally to move to a new pioneer area to buy new forest land. Where cocoa incomes are insufficient, farmers may even pawn part of their old plantations. The cost of searching for a new area, of contacting native people and buying a plot of forest represents a real new investment. These migrants who own two or three cocoa farms in various regions may be called "**accumulators**".

One of the most visible types of **family support** is the sharing of dwelling and accommodations with newcomers by a previously settled migrant. Other important means of help to a newcomer are information and donations of small sums of money from family members to help the migrant find a few hectares of forest. This kind of

[21] Detailed examination of the process requires clearer reference to locals and migrants. The innovators among Baoulé migrants - the biggest "winners" in the 1970s and 1980s cocoa boom and who may become the biggest "losers" in the crisis - were mainly older people. The innovators native to the central western region (the "bété" area) are mainly younger people.

monetary support is the most obvious point of overlap between family support and capital.

A 1983 survey in southwest Côte d'Ivoire enabled us to quantify the interaction between pre-existing cocoa farms, capital and family aid. Over 35% of Baoulé migrants already owned cocoa farms in the central western or eastern regions, some of which were 250 to 400 km away from the new plantation. Over 50% of Baoulé migrants benefited from partial monetary assistance. Such assistance may consist of final instalments or reward for one to three years of labour in another region *(most of the 22.3% mentioned in Table 3)*. In spite of difficulties classifying individuals according to their migration status and in separating aid in the form of cash or services, the survey clearly shows that accumulator strategies and family support enhance access to large areas of forest.

**Table 3 Forest area acquired by Baoulé migrants in Tuih (sw Côte d'Ivoire)**

| Status of migrants and source of capital enabling acquisition of forest | Repartition of smallholders (%) | Forest reserve acquired (ha) [22] |
|---|---|---|
| "Cumulative" savings from cocoa income from another holding in another region | 37.3 | 57 |
| Urban-based savings | 5.4 | 60 |
| Savings after working as a "labourer" in cocoa plantations in another region | 22.3 | 23 |
| Help from family | 33.0 | 29 |
| Average area acquired by Baoulé migrants | | 40 |

*Source: Ruf, 1988, Vol. 5, pp.14-15*

Family aid does not only take the form of monetary support but involves an entire network of information on accessible land, relations established with locals, accommodation, food and mutual help on plantations.

The same support system and information network are observed in Sulawesi, where it is further enhanced by Bugis history and cultural practices. Every Bugis dwelling is typically shared by two families or by one or two unmarried relatives of the head of the family during the early stage of land colonization. These adults may either be searching for land or they already own a plantation but do not yet have a house.

[22] The figures may seem high. They are declared hectarages but relatively close to the reality (checked by randomised sampling). However, surfaces per migrant rapidly decrease as they must share land with relatives or exchange it for labour.

These "newcomer" adults and their families eventually build their own houses when their plantations start producing cocoa. The "accumulator" process can also be observed with migrants saving incomes or pawning (see Chapter 17) or even selling part of their first plantations to create new farms in new pioneer areas.

Such "accumulator" process and family aid act as leverage or "**investment enhancers**" accounting for the strength of cocoa booms. Such self-support and mutual support are largely **independent** of international cocoa price movements, with the exception of the effect of the "trigger price" which originally sparked the "cocoa fever".

## DECLINE AND RENEWAL OF FAMILY SUPPORT?

In spite of traditions, the intensity of family support declines with the gradual phasing out of pioneer settlements. Five to ten years after major waves of migration, men and women interviewed on the subject reminisce over the community solidarity they felt in the past with a touch of nostalgia. For example, an old Bugis woman who was interviewed told of the difficult times when wives planted vegetables together and helped each other, sharing the meagre light of one oil lamp. Next to her sits a young Bugis woman who today, can buy gold jewellery and lipsticks -- traditional and modern symbols of success. She expresses having few regrets. We have heard the same kind of story repeated in all post-pioneer settlement countries.

However, it remains to be seen whether new family relationships will appear with the new generation of planters and their problems of access to land and plantation through inheritance or other means (such as *abusan* or *bagi hasil* and *bagi tanah* forms between father and son).

## COCOA CYCLES AND "ETHNIC GROUP CYCLES"

In Côte d'Ivoire, from the 1960s to the late 1980s, the "winners" of the game of forest consumption and cocoa were the Baoulé. In the early 1990s, they are losing part of their dominance. In the meantime, the foreign group, the Mossi, who come from neighbouring Burkina Faso, are on the way to monopolizing labour and fallow land markets. They are assuming greater economic importance as planters and not only as workers (see also Chapters 5 and 6). The process is not new and grew in the late 1970s and 1980s (Léna, 1979, Ruf, 1988). However, it is accelerating in the 1990s, during the cocoa price slump and subsequent labour crisis suffered by Côte d'Ivoire since 1989. As put forward by J.P. Chauveau (Chapter 5), this "Baoulé" decline may be interpreted as an "ethnic cycle". How would economists interpret this ethnic cycle?

In the 1980s in Côte d'Ivoire, Baoulé migrants earned a reputation for individualism compared to local and other migrant groups. This reputation of the Baoulé results partly from their achievement and ability to reach a self-sufficient point in their "cocoa

development cycle". There are two elements of truth to this insofar as the Baoulé are the least hesitant to go into the remote forest, build isolated makeshift houses, and devote themselves entirely to clearing and planting activities:

1/ They took advantage of their decreased need for mutual aid and family support to gain greater personal freedom[23]. In a sense, migration to the forest offers the Baoulé an escape from the "negative" effects of strong family control; there is a drain felt in time and money devoted to social obligations and ceremonies, and redistribution, etc. Savings and wealth accumulation are therefore more rapid without the added drain on a farmer's assets.

2/ They were far enough from their native village to escape social duties but close enough to attract young Baoulé "brothers" to help build cocoa plantations.

However with time, the wheel has turned:

1/ As they were obliged to help these "brothers" to get land for themselves, they became trapped in a "classic" paradox of the cocoa boom: as their plantations age and as they have no more forest to offer, their supply of labour also vanishes.

2/ As farmers get older along with their plantations, the migrants face more responsibilities in the native village.

3/ As a result, they are faced with another "classic" paradox of a cocoa cycle: fewer revenues, fewer labourers and less time is available for greater responsibilities and greater duties (see infra, "household cycle").

On the other hand, Mossi migrants (who are "foreigners" from Burkina Faso) began their "cocoa development cycle" later as both landowners and planters:

1/ Lacking political support, the Mossi had a greater need to maintain solidarity among their group.

2/ Since most foreign workers left Côte d'Ivoire after 1989, the Mossi benefit from a quasi-monopoly on the foreign labour force brought by their own relatives who come to visit them.

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[23] Although they never cut themselves off completely, they often return to their home village and participate in both social expenditure (funerals) and family expenses (houses). Radio is a powerful means of communication between Baoulé communities who come from the same village or region. In addition, if there is conflict with locals on the pioneer front, individual houses are very rapidly grouped into camps. Finally, it is remembered that with a Baoulé president, the state generally supports Baoulé migrants, thus reducing their need for family help.

3/ As their families are still limited in size, as they do not send many children to school, and as they are quite far from their native village, their family and social obligations are still minimal.

In short, in the 1990s, most Mossi were in a situation similar to that enjoyed from 1960 to 1990 by most Baoulé. By then, the Baoulé's main symbol and protector, the president Houphouët Boigny, had also passed away. This contributes to justify the concept of an "ethnic cycle". The cocoa cycle from 1960 to 1990 was clearly a "Baoulé cycle" just as the period 1910 to 1940 was more of an "Agni cycle". It is now too early to be certain that a "Mossi cycle" is imminent. Compared with the "Baoulé cycle", three differences may be observed.

1/ The Mossi's lack of political support can prove to be harmful, especially if their success is too obvious.

2/ The 1990s cycle will be a non-forest cycle, which will be less efficient than the forest cycles.

3/ Up to 1993/94, Mossi have not been very technically adept, while the Baoulé had optimised the "forest rent" by applying specific techniques (quick clearing, direct sowing, efficient intercropping with yam and various annual crops, etc.).

Despite these differences, the Ivorian example shows that through historical and political developments, an ethnic or social group can dominate a "cocoa cycle" only to be replaced by another ethnic or social group in the next cocoa cycle.

### WHAT NEXT IN THE STAGES OF THE FAMILY SUPPORT CYCLE?

It is too soon to analyze the effects of the cocoa crisis on family solidarity in Côte d'Ivoire, and especially in Indonesia. Little information is available from other countries. Generally speaking, the crisis appears to have resulted in greater antagonism among families, including separation between generations with young people becoming the "new migrants" but with little access to land. However, the trend of returning to the village indicates greater importance attached to the family (see Chapter 5).

## 8. INSTITUTIONAL FACTORS: LABOUR CONTRACTS

A bibliographical review of work on cocoa economies and direct comparison of cocoa booms in Côte d'Ivoire and Indonesia lead to a singular conclusion: the surprising similarity in "labour contracts" of the two countries. These include daily payment or piece work, forms of monthly or semi-annual employment, and pseudo sharecropping as in *abusan* in West Africa and *bagi hasil* in Indonesia.

Another striking similarity in labour contracts exists. As understood by Robertson (1982), *abusan* or labour contracts in West Africa enhance access to land and are a fonn of credit

management. Examples of such contracts designed to speed up planting without funding are observed in all countries as follows: the *contratrista* system in Brazil and Ecuador at the beginning of the century whereby labourers were paid per cocoa tree planted during the productive stage; various forms of *diby-ma-diby* in Togo; *partager-travailler* in Côte d'Ivoire; and *bagi tanah* in Sulawesi whereby the labourer is paid by owning half of the land and trees planted when production begins.

Credit contracts using plantations as loan guarantees as found in Côte d'Ivoire and Indonesia (cf. Chapter 17) also govern labour and future access to land. S. Berry's observation of the interaction between family support and institutional factors is pertinent. In Sulawesi, the Bugis give priority to a related family member whenever a plantation must be pledged.

Institutional factors established by producers work endogenously and are closely linked with their system of family support. Such endogenous factors are partly or entirely independent of cocoa prices and official rates of interest are thus powerful investment tools during cocoa booms.

## 9. INFORMATION AND PRE-CONDITIONS FOR A COCOA BOOM

The Sulawesi cocoa boom is a remarkable case study in that it enables us to directly observe how information gets diffused among planters. The dissemination of "cocoa information" in the provinces of Sulawesi Selatan and Sulawesi Tenggara was successful partly due to the Bugis tradition of opportunism (in the best sense of the word), their proximity to Malaysia and a short-lived political separatist movement. Local government and extension services played a role though no different from other Indonesian provinces.

Part of the reason why the cocoa boom took hold in Sulawesi rather than elsewhere lies in the build-up of prior information which was demonstrated by Bugis planters and in the availability of plant material. In the 1950s, the leaders of the separatist movement viewed cocoa as a means of funding their operations. They sent a handful of men to Sabah (under British rule at the time)[24]. Two plantations totalling more than 10 ha were created in Sulawesi Selatan in the late 1950s and a few trees were planted in Sulawesi Tenggara in the early 1960s. However, the situation was normalized in 1962 and cocoa was almost forgotten or even avoided as a sign of belonging to the movement.

When news of rising international cocoa prices arrived from Malaysia in the 1970s (thanks to traders and others), the stage was already set for rapid diffusion of technical information and its application in cocoa planting. Several former movement

[24] The map of the spread of pod borer also shows the pattern of movement of people and goods.

leaders and traditional chiefs became leaders of migrant groups. They possessed valuable cocoa cropping information and experience which they readily accepted and shared. These leaders were well-trusted by other villagers and they could encourage people to migrate and plant cocoa before a market was even identified. Previous plant material existed from earlier attempts at cocoa planting and a lucrative semi-informal trade in pods[25] from existing plantations developed (see above). Pod sellers became the best promoters of the crop. Increasing attention was paid to cocoa in the 1980s when the prices of soya, cloves and copra grew stagnant or fell altogether.

Although this specific pattern cannot be generalized, cocoa information is often disseminated through effective pre-existing informal, local, and traditional channels. For example, Groff (1987) describes the mode of diffusion of cocoa information in the Agnibelikrou region of Côte d'Ivoire in the early 20th century -- a process which relied on similar endogenous channels. In Cote d'Ivoire, information was spread through family and ethnic information networks between the Agni ethnic groups in Ghana and those in Côte d'Ivoire. Leaders or traditional chiefs were capable and active in persuading villagers to plant cocoa before a market emerged. (In Sulawesi and other booms the locally recognized leaders had to first persuade people to migrate before getting them to plant cocoa.) In Ghana, plant material was available nearby and was handled by local traders. Cocoa was seen as a good substitute for natural rubber which was generating less and less of an income for planters. The initial relative price sparked interest in cocoa cropping; traders therefore played a role in switching to cocoa. Finally, government agencies lent further support to the process by providing technical information and plant material[26].

Two major points can be noted in relation to the pre-conditions needed for cocoa migration and boom. A cocoa boom requires that plant material be ready and in place for when overall conditions are ripe for a boom to occur. A body of cropping information disseminated through pre-existing family or ethnic networks is also necessary for a cocoa boom. Subsequent information provided by government and its extension services is only effective when there is a pre-existing base of information and plant material.

[25] The authorities in the area were informed and requested by some people to become involved to avoid any ambiguity with regard to the history of the uprising.

[26] However, in the case of the French colonial administration, the first impact was unfavourable as it was of an obligatory nature, almost necessarily provoking refusal. Old planters in Côte d'Ivoire recount the beginnings of cocoa when they and their fathers scalded cocoa beans in secret before sowing them while appearing honest and loyal to colonial administrators. Groff refers to this as a legend but it is probably true (before cocoa planting became widespread when the first planters started to make purchases with cocoa money).

## 10. AGING OF COCOA PRODUCERS: THE FARM HOUSEHOLD CYCLE

In migration-based smallholdings (the most common case in cocoa planting), the life cycle of the plantation is closely intertwined with the life cycle of the farming family. Typically, a 25-year-old migrant arrives in a "new" cocoa area and devotes all of his physical and mental efforts to establishing a new plantation. He willingly accepts and makes consumption sacrifices. His family is small or absent and consumes little. Twenty or thirty years later when the tree capital has aged and declined such that the farmer is confronted with replantation difficulties, the family has also grown in size causing family consumption to increase considerably. There are educational expenses of children which divert replantation funds and capacity away from the plantation holding (Figure 8).

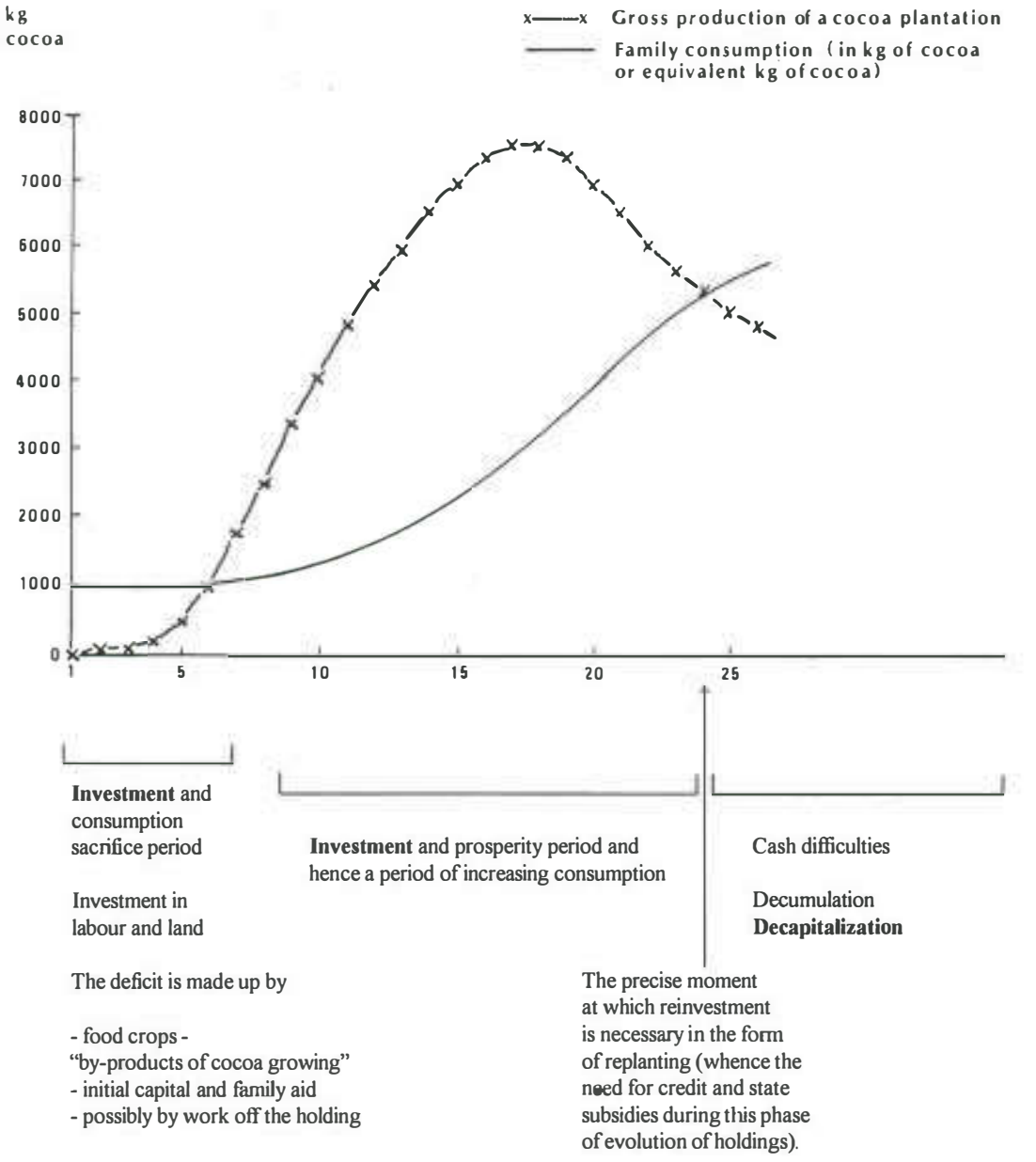
By then, the head of the family may have also gotten used to doing less work in the field while enjoying profits from the capital he has built up over the years. This is typical behavior of a successful cocoa entrepreneur (Ruf, 1987).

However, it is precisely at this stage that plantation income also decreases because of the aging and death of trees. The proverbial "goose that lays the golden egg" begins to age and produce less just when the planter needs precious capital to tackle the difficulties and cost of replanting. Figure 8 summarizes well this cyclical production pattern throughout 400 years of cocoa history.

Analyzing cocoa plantation cycles leads us to Chayanov's theories on family life cycles and Schumpeter's theories on the behaviour of entrepreneurs and supply cycles. It seems that the parallel linkage between **family life cycle** and **"cocoa tree capital" life cycle** further supports the fact that technical knowledge determines the cocoa supply cycle, which in turn determines price cycles on the international market. All of these cycles - cocoa tree, human generation and market cycles - have a similar duration of about 25 years. In comparison to other perennial crops, specific endogenous features of cocoa cropping clearly contribute to explaining supply and market cycles.

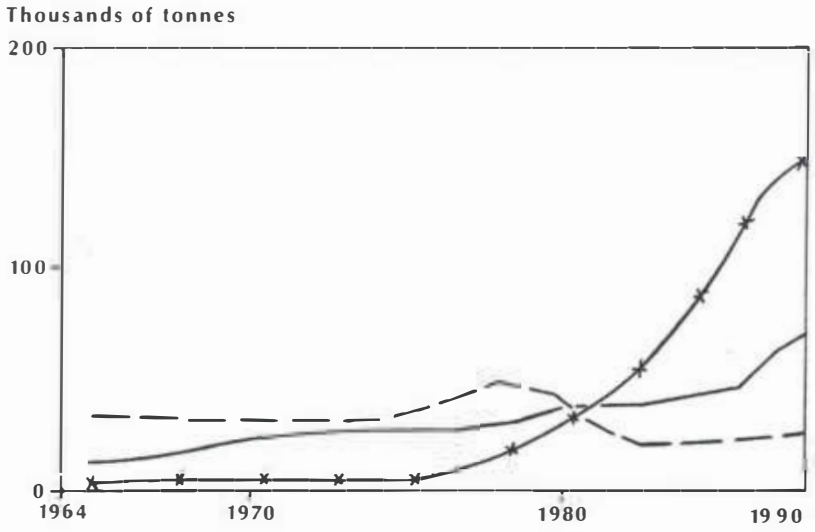
We have analyzed the evolution of cocoa in the case of Côte d'Ivoire over a 14-year period. Within the general cyclical pattern mentioned above, there are of course, nuances in innovation practices and theories. These nuances deserve more in-depth study.

The cyclical model of cocoa plantation production worked very well in the 1980s (Ruf, 1988). The combination of ecological and economic crises since 1990/91 have induced new responses from many planters: young people returned to their villages; "older" migrants started to work again and were among the first to attempt replanting and adopt technical innovations to succeed (Ruf, 1991).




*Sources: Ruf, 1988, Vol. 2 and 1993 p. 295*

**Figure 8 Simple modelling of the evolution of production and consumption of a family cocoa farm set up over a 12-year period on 12 ha of land.**




*Dimbokro includes the Dimbokro Daokro and Bongouanou sub-prefectures.*

*Gagnoa combines the present Gagnoa prefecture and Oumé prefecture, the former Gagnoa sub-district (sous-préfecture).*

*"South-West" covers the present prefectures of Sassandra, San Pedro and Guiglo.*

**Figure 9 Moving averages of cocoa production in three regions in Côte d'Ivoire from 1964-65 to 1989-90. Calculation and plotting for 1964-65 and 1989-90 were performed using the data on Volume II of the *Annuaire rétrospectif de statistiques agricoles et forestières 1900-1983* (*République de Côte d'Ivoire*, n.d.). The data for the periods 1986-87 and 1989-90 were obtained from the *Direction du contrôle des grands travaux de la République de Côte d'Ivoire*. They have not been published. Data were missing for the three intermediate seasons (1983-84 to 1985-86) and were estimated by the author.**

Young people followed in the footsteps of older planters (assuming they had access to land[27]), adding a social dimension to the cocoa cycle.

Indeed, we can observe the convergence of three distinct crises: the "ecological crisis" (corresponding to the 1983 drought in Côte d'Ivoire, Figure 9), the "social crisis" (marked by difficult access to land for young people) which became more extreme in the late 1980s, and the "economic crisis", the first signs of which appeared in 1983 (Figure 9). How does the cocoa "price" factor fit into the supply cycle and how does it relate to the above "triple crises"?

## 11. PRICE

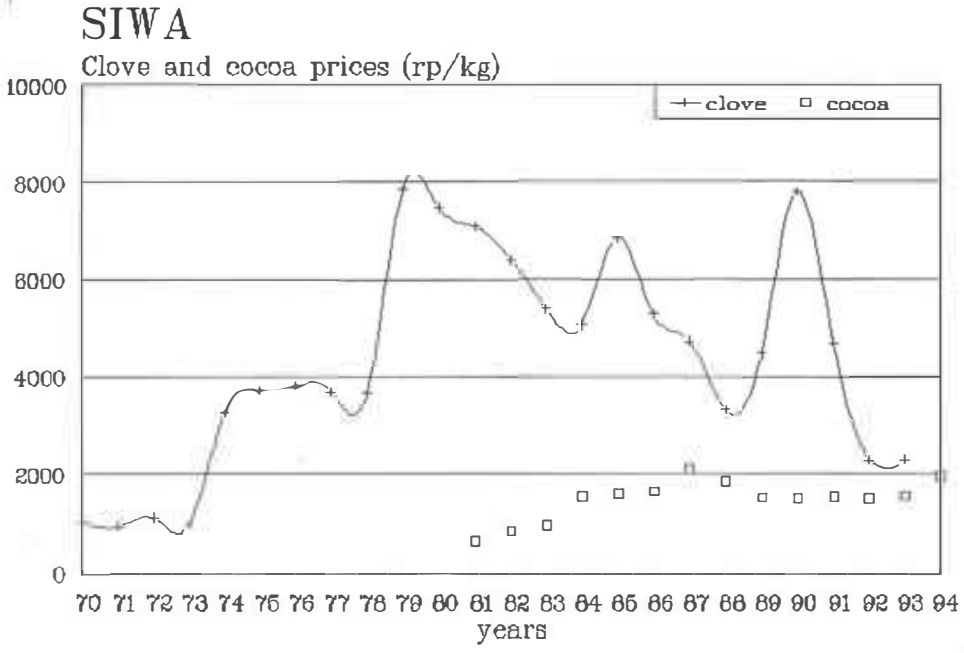
Figure 5 shows what a "recession/boom" production cycle would look like without the price variable. Figure 7 shows how a fall in prices can exacerbate a supply recession yet trigger a replanting reflex. The figures clearly show how price does play a role in producers' decisions.

But which price is significant? Galleti *et al.* (1957) argued that in Nigeria it was the ratio between the real price and imported consumer goods which mattered. The question has been discussed at length in recent work based on econometrics. It is generally accepted that the real cocoa price anticipated or hoped by producers is the best criterion. Our surveys in Côte d'Ivoire and Indonesia show that the simplest and most pertinent price is the "comparative price".

### "INITIAL COMPARATIVE PRICE"

The comparative price is the price of cocoa as compared with an alternative product such as coffee in Côte d'Ivoire or copra, cloves or tobacco in Sulawesi and the Moluccas (Figure 10). The movement of comparative prices in time affects producer decisions and can be measured by cross-referenced price flexibility. The initial cocoa price both awakened interest in cocoa and triggered the first wave of migration. Once cocoa migration is underway, even an enduring drop in price will not make migrants retreat, as long as they can still extract forest rent.

[27] Land ownership is also "insufficiently established" insofar as the small degree of recognition by the state may hinder a planter's decision to invest in replanting. It is difficult to come to a conclusion as we have also observed in SE Côte d'Ivoire (minority) cases of large, poorly defined estates where replanting work (mainly in coffee plantations) enabled the young members of the family to gain personal ownership of the plot.




*Source: survey Ruf/Jamaluddin, 1989 - 1992*

**Figure 10 Clove and cocoa prices in Siwa, Sulawesi.**

## PRICE AND NON-PRICE FACTORS

Price cycles are both the cause and effect of supply cycles. We have demonstrated the importance of environmental and institutional factors such as forest, labour rents, and labour/land/credit contracts. Without these structural factors and without technical progress which remains to be defined, a rise in price will not create an immediate supply response. This is one of the principles underlying the continuous geographic shifting of cocoa supply centres.

A rise in price benefits a new country or region possessing both available forest and migrant labour. This was the case in southwest Côte d'Ivoire in the 1970s when it represented a new cocoa region for the country. Later, after several years of falling or even rising international prices, dominant cocoa producer countries and regions no longer have the resource base to assemble their factors of production; these resources have been partly consumed and hence lost.

Apart from political reasons, this was the case of Ghana in the 1970s. It was also the case of Ecuador, the world's leading producer in 1910-1920, which collapsed in the 1920s and re-emerged only in the 1940s and 1950s, due to a geographic shift in its production areas. If the drop in production in Bahia (Brazil) and Malaysia is confirmed in 1993-1995, neither region will show much supply response to a very probable price recovery in the 1990s. Without technical progress and political stability, Côte d'Ivoire and its southwest region may well follow the same pattern, evolving in a 20-year span from being a new region to that of an old cocoa-producing zone (Ruf, 1988, Vol. 6).

It is thus a mistake in both method and pedagogy to assign too important a role to price in cocoa supply simulation models. Price merely catalyses a pre-programmed natural process. The power and rapidity of cocoa booms (0 to 200,000 tonnes/year in less than 10 years in Malaysia and 300,000 to 800,000 tonnes/year in less than 10 years in Côte d'Ivoire) is such that each boom contains the seeds of a crisis.

On a micro-economic scale, price of course has very different impacts depending on the availability of production alternatives (cost and margin comparison). If alternatives are available, price elasticity of supply may be fairly low but positive. If there are few alternatives - as in West Africa - a decrease in price triggers varied decisions with opposing effects.

## PRICE ELASTICITY AND FOREST RENT

Price and price-elasticity theories are not discussed here; they frequently favour the object of analysis and thus attribute price to factors that are not directly related. Little research on supply price elasticity is based on the realities of farming systems. The rare research based on fieldwork of this type includes that of Trivedi (1988) in Brazil

who showed that a rise in price stimulated new planting but delayed replanting decisions. However, the author made no mention of replanting difficulties.

In Côte d'Ivoire, a fall in price causes three types of farmer responses:

1. Production of mature plantations falls due to lack of maintenance and inputs. Yields fall immediately.

2. Search for forest to establish new plantation occurs. Production increases three years later.

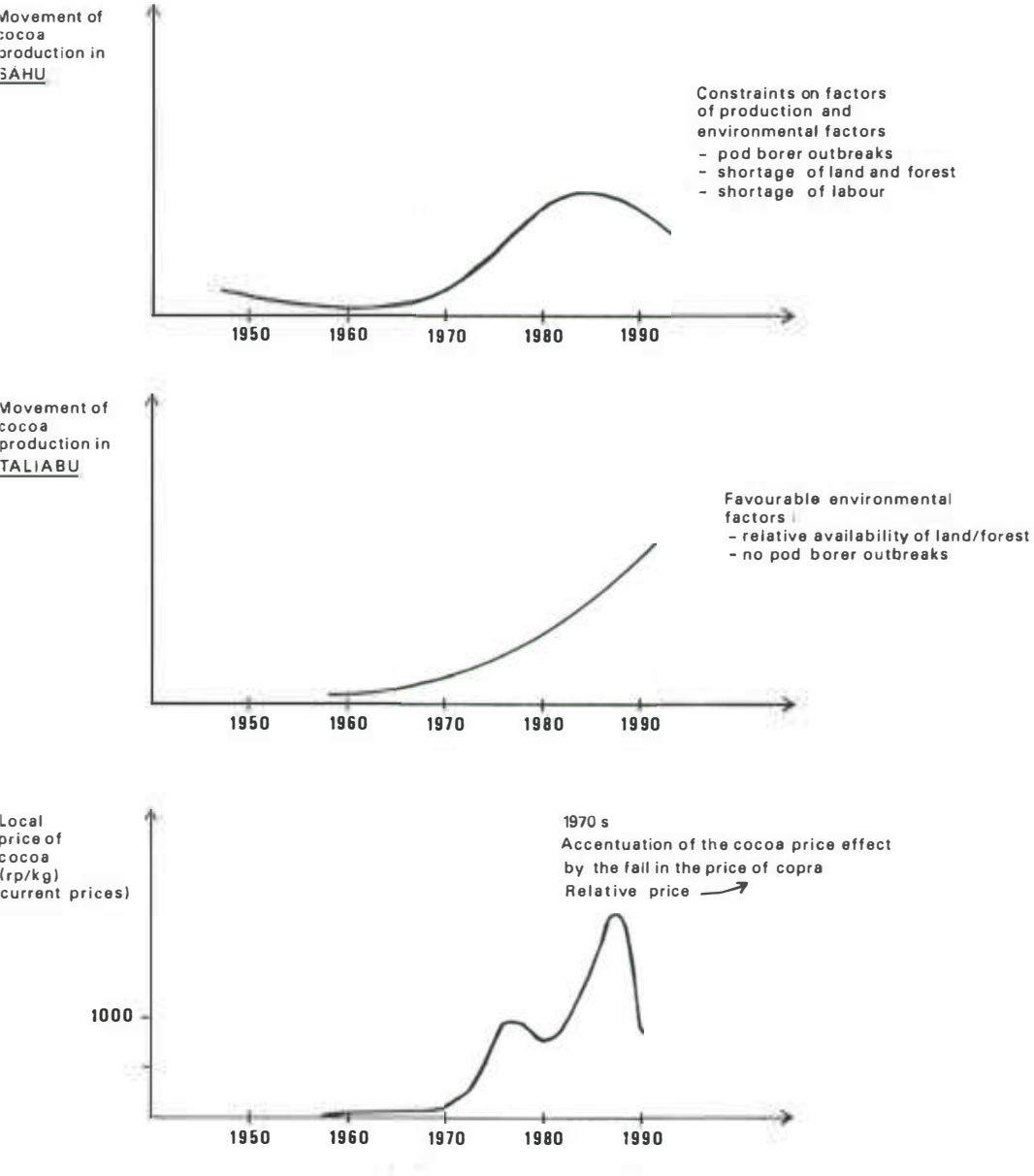
3. If no forest seems available, a price fall results in attempts at replanting and hence in technical innovation. Production falls and then increases.

In Indonesia, the small regions Sahu (south-west of Halmahera) and Taliabu (one of the Sula islands east of Sulawesi) illustrate well the symmetry in supply responses of planters to price according to environmental factors (Figure 11).

Most research does not identify these responses which produce quite different results. These three basic responses should nevertheless form the basis of any serious attempt at modelling cocoa supply. In addition, although the effects on supply are conflicting, they are perfectly rational at the holding level. Modelling the supply responses of cocoa planters is yet another way of looking at the same ever-present phenomenon of shifting production areas. Falling prices trigger a planter reflex making less use of inputs and relying more on forest rent and cocoa tree capital. The price variable thus appears only to exacerbate and accelerate the cyclical process of cocoa supply.

This view also supports the important role of technical progress and innovation in adapting to ecological and economic change. The fall in price or "economic crisis" combined with the ecological crisis (deforestation) triggers a replanting response, representing a true innovation. Solving the crisis requires looking at a number of other dimensions, particularly the social dimension[28] involving access to land for a new generation or a new cycle of producers.

[28] Hence the notion of "triple crisis".




*Source: survey Ruf/Ardhy 1991/92*

**Figure 11 Symmetry in supply responses of planters to price according to environmental factors. Sahu (south-west of Halmahera) and Taliabu (one of the Sula islands, east of Sulawesi), Indonesia.**

## 12. THE ESTABLISHMENT OF PROPERTY

One of the problems of the post-cocoa-boom period lies in the difficulty in adjusting land (forest) and labour factors. During the boom phase - whether in the foothills of the Andes in Ecuador, in southern Côte d'Ivoire or in Sulawesi (formerly Celebes) in Indonesia - cocoa follows the pattern of the development model described above. The relationship between locals and migrants in Côte d'Ivoire can be summarized as follows: a cocoa boom can be described as the convergence between initial owners of the land/forest factor of production, i.e. the native people, and those who control the labour factor, i.e. migrants (Ruf 1982, 1988). This uniting of two crucial factors creates a plantation economy whose social stratification varies according to the social and political context.

The forest factor is exhausted after deforestation; by then the land factor is also almost completely appropriated. Some migrants' sons find themselves in a similar position as the sons of natives. The cocoa post-boom stage can be defined as the uniting of owners of the land/plantation factor of production, i.e. the parents, with the new possessors of the labour factor, i.e. younger people. However, these two groups do not always converge very smoothly since private property has already been established. Property rights can become the subject of conflicts which are at least as serious as those during the cocoa boom. A group of absentee planters will have also likely emerged through the planters' children who are heirs to the land but who live in cities away from the plantation.

To summarize, the existence of established property and difficulties in matching land and labour needs together create conditions for possible cocoa recession.

During a cocoa recession, falling cocoa prices interfere with both the land/plantation and labour markets but in a more complex manner. It is true that the crisis only modifies a land market formation process already in existence before the economic slump. Our 1981 and 1991 surveys in the small Nekeide region in central western Côte d'Ivoire gave the following results (Table 4).

The price in cocoa equivalent (per ha/producer price of cocoa during the same period assuming 300 CFAF/kg in 1981 and 200 CFAF/kg in 1991) accentuates differences which would be negative in constant francs. It is interesting to note that the only noticeable increase is in annual rental which was growing strongly by the late 1980s. This appears to be in accordance with the goal of land rentals, i.e. for cultivating food crops whose value had increased in relative terms with the fall in cocoa prices.

**Table 4 Land and forest prices in 1981 and 1991 in current francs and in terms of the purchasing power of the price paid to producers for cocoa**

| | Sale of forest | Sale of fallow | Rental of fallow |
|---|---|---|---|
| 1981 price (1981 CFAF per ha) | 100,000 | 70,000 | 5,000 |
| 1991 price (1991 CFAF per ha) | 140,000 | 100,000 | 15,000 |
| 1981 price per ha in equivalent kg cocoa | 333 | 233 | 17 |
| 1991 price per ha in equivalent kg cocoa | 700 | 500 | 75 |

*Sources: Ruf, 1984, 1988 and surveys 1981, 1991*

Many forms of regeneration and replantation appeared in Côte d'Ivoire in 1985-86; these were partly accounted for in the land rent (through regeneration of old coffee plantations and a few old cocoa plantations). Landholders seemed to use land rent as a means of financing replanting thereby compensating for the loss of forest rent (Ruf, 1988, Vol. 4). This analysis was revised in 1992 with the nuanced addition of "to compensate the fall in cocoa prices". The land market should enhance replanting through income provided by land rental and through innovations induced among those who pay the rent[29]. However, the cocoa market must be sufficiently reliable.

## 13. ECONOMIC SALES CYCLES

The Indonesian cocoa boom provides valuable information on the possible role of cocoa sales sectors which interact with production. Sales are initially based on the cocoa cycle principle.

In a cocoa sales cycle, the sales sector develops as cocoa production increases; this occurs at an exponential rate during the cocoa boom phase. A new crop and a new market are always the source of surplus profits for the first arrivals of producers. We observed net margins as high as 100% in producer prices during the first years of the Sulawesi cocoa boom. Once the production volume stabilized at small regional levels, the influx of middlemen and subsequent competition brought down the margin to less than 10% with a risk of loss involved. These falls in income were, of course, accompanied by profound changes in the middlemen population. The long-term trend

[29] See examples of innovations in regeneration and replanting in Ruf, 1988, Vol. 4.

is for activity and control to eventually concentrate around the owners of capital. The latter are often exporters and middlemen.

Up to this point, this analysis would seem to fit numerous crops. However, cocoa sales possess a special feature related to cocoa production. As with cocoa production, cocoa sales also do not require much capital, at least in the early stages. Middlemen interviewed on this point in Sulawesi clearly emphasize the advantages of marketing cocoa in comparison with two other local crops: vegetables and cloves. The risk in marketing vegetables is that they are perishable and vulnerable to the uncertainties of local demand. Cloves have a high unit value[30] but require more capital per unit sold.

With cocoa, the crop appears to be dry enough to withstand transport without problems of deterioration. Cocoa is sufficiently heavy in weight which limits the relative cost of transport; it is also sufficiently lightweight to require limited use of capital. The crop's ideal weight facilitates marketing of cocoa and attracts entry-level marketers.

Another interesting parallel can be drawn between the sale and production of cocoa. Cocoa production does not start "from scratch" but from a base of knowledge and capability built up by migrants who were previously engaged in other economic activities[31] (either as share-croppers in the Sulawesi rice fields in 1990 or wage-earners in the Nordeste in Brazil in the 19th century). The sale of cocoa therefore initially develops as a supplemental trading activity alongside various existing activities and sectors. Cocoa middlemen, in fact, are typically traders of rice, cloves or grocery staples who have adapted and converted to cocoa. Migrant producers also start in sales, drawing their commercial capital from income from cocoa production (Faivre and Ruf, 1994).

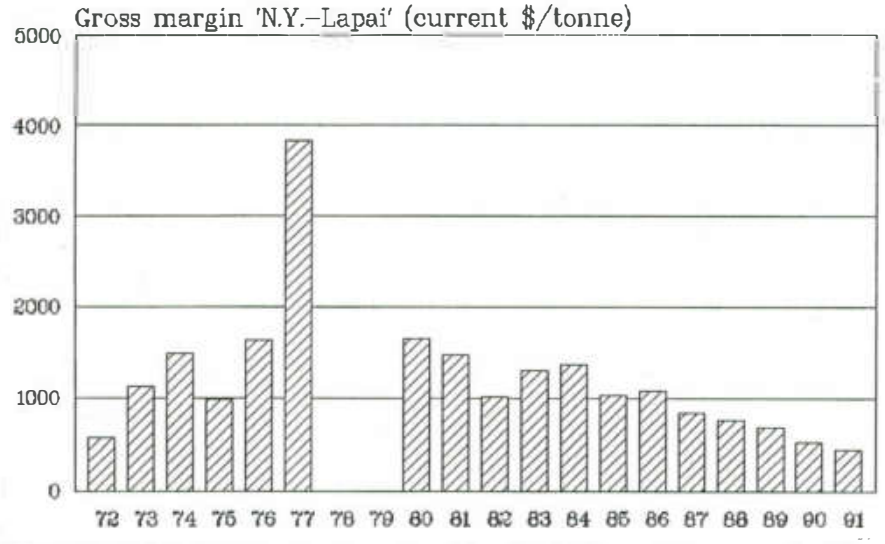
The stiff competition between middlemen has a positive effect on producer prices, at least for a few years. We have shown that in Sulawesi such start-up dynamics and competition help account for the increase in local prices in 1987/88 and their subsequent stabilization from 1989 to 1992 during a period when the international price hit an all-time low[32].

[30] In 1989/90, the price of cloves was still five times as high as that of cocoa. Since then, certain disturbances in the sector combined with an attempt at regulating the market and over-production have caused a fall in prices. The kg : kg price ratio of cloves and cocoa has fallen to about 1.5 to 2.

[31] J. P. Chauveau discussed this in his work on West Africa (1993) and stressed the "reconversion" aspect of cocoa booms in W. Africa. The reconversion principle can be applied well beyond Africa.

[32] The effect of installation of the sector and competition supports the "devaluation/monetary policy effect" and interacts with market demand.

One can thus clearly understand the role of national sales sectors in connecting booms between countries and in shaping international market shares. When buyers in an older cocoa-producing country like Côte d'Ivoire are faced with less competition which helps reduce producer prices, their more competitive counterparts in "newer countries" contribute to increase or at least stabilize producer prices and decrease export prices (Figure 12).




*Source: Ruf, 1993 (As the New York price is for Bahia cocoa, the movement over 20 years should be judged in relative and not absolute value)*

**Figure 12 Movement of the gross margin in the sale and export sector between the price in New York and the price paid to producers in the village of Lapai from 1972 to 1991.**

Other segments of the sales sector are involved in determining producer prices. Exports of *Sanchez* cocoa from the Dominican Republic to the USA in the 1980s were handicapped by high shipping costs which were propped up by the sector syndicate. As this example shows, a cycle effect can be observed with the introduction of protectionism and monopolistic behaviour when a sector first develops. From 1989 onwards, what we may call "aging of the sector" occurred in conjunction with aging of plantations or "sector cycles" and supply cycles. The aging of Dominican Republic's cocoa sector benefited Indonesia's sector by opening a part of the US market share to this "new" cocoa country[33]. In fact, as an illustration of the

[33] Up to now Sulawesi produces cocoa of a similar grade to *Sanchez* (little-fermented). It is reminded here that there were small cocoa cycles in the 19th century in Indonesia, especially in northern Sulawesi. I use the term "new" country for reasons of convenience.

model, shipping costs from Indonesia to the USA fell by 20% as a result of pressure from US importers and increased competitiveness.

## 14. SMALLHOLDINGS AND CORPORATE PLANTATIONS

Defining the terms "smallholding" and "corporate plantation" merits an entire article. Many researchers, including Hill, Gunnarson and Gastellu, have run up against the problem of distinguishing and interpreting cases of "large estates" in Ghana and Côte d'Ivoire. The entrepreneurial behaviour of African heads of families who recruit labour with the aim of accumulating wealth through plantation capital seems very close to the behaviour of a private firm. In Malaysia, dynamic 40-ha plantations are considered as smallholdings because they are family concerns although their shares are quoted on the stock exchange. They function as corporate family plantations in the same way as corporate family enterprises.

I will adopt the following debatable definition: apart from looking at land area and yields, a smallholding is one in which family labour performs over 50% of the agricultural work in an average year. This work of course includes work on crops other than cocoa, especially food crops. This automatically puts 90 to 95% of holdings in Côte d'Ivoire and Ghana in the smallholding category. The definition is incomplete, especially for analyzing cases of absentee planters who have inherited their plantations. Family relations overlap with work contracts, making the definition of "family" and "external" labour just as difficult. The main aim of our definition of "smallholding" is to show how family enterprises are surviving and innovating within the context of the cocoa crisis.

During a recession, when ecological and economic environments deteriorate to lower incomes from cocoa cropping, corporate plantations are even more hard-hit than family smallholdings. The two main means of resistance available to large estates are income from sources other than cocoa (palm oil and latex in Malaysian estates, industrial operations for some conglomerates such as Sime Darby, and professional incomes in Brazil). Large company estates also may resort to dismissing little-protected labour at will (Brazil)[34], especially if it is foreign and partially illegal labour (Sabah).

In spite of these "advantages" of corporate firms, as technology has not made it possible to substitute sufficient capital for labour, these firms' dependence on the labour factor has inescapable consequences which have been proven by history. During a market crisis when prices are falling in a lasting manner, corporate plantations lose out to the superior efficiency and sustainable quality of family-run plantations. For example, Brazil and Malaysia, the two countries experiencing the

[34] Labour management in large estates is analyzed by Ruf/Forget/Gasparetto, 1994.

most difficulty during the prevailing market crisis, are both dominated by large private estates. In Indonesia, where small planters had little or no access to financial aid, the corporate sector is stagnating in comparison to dynamic family smallholdings.

In the early 20th century, cocoa recessions in some South American countries benefited booms in countries elsewhere such as Brazil and Ghana; apart from a geographic shift, there was also a shift from corporate plantations to smallholdings (this includes Brazil at the turn of the century). In the 1980s, a distinct dichotomy could be observed between family smallholdings and new corporate estates. This is one of the reasons for the strong resistance of African planters. Similarly, tens of thousands of smallholdings in Indonesia are today influencing the pattern of cocoa production for the 1990s.

Today, the four major world cocoa producers - Côte d'Ivoire, Brazil, Ghana and Malaysia - are affected to varying degrees by the first thirteen interacting factors described in this paper including: deforestation and its effects, wage-earning labour constraint and dependence on foreign labour, aging of plantations and farmers, increased dependency on monetary capital, falling international prices, establishment of private property, and trends in marketing sectors.

In addition, Brazil and Malaysia are seriously affected by a fourteenth factor: a dominant corporate estate structure. All of these factors drive up production prices and FOB costs. However, if there is a prolonged crisis in the "eleventh factor" i.e., international prices, the "fourteenth factor" (dominant corporate estate structure) becomes very difficult to overcome. With low cocoa prices, no country can support such a rigid cropping system. Without a technological revolution in cocoa and without prolonged financial support from public funds, the market shares of Brazil's and Malaysia's plantation models will certainly dwindle. To some extent, the large plantation model in the Abengourou region in Côte d'Ivoire already appears outdated (Ruf, 1992).

Despite what appear to be short-lived political endeavours, such as the re-launching of corporate estates in Ghana, and despite the concentration of landholding that benefits traders during cash-flow crises, the underlying trend in the development of cocoa appears to be towards family smallholdings. I am certain of this analysis to the point that I can see only one way available to Malaysia for saving its cocoa sector in the future: Malaysia must change its policy concerning the settlement of Indonesian migrants, enhance their access to land, and encourage smallholding structures in Sabah and Sarawak. This seems to be a viable scenario for the long term, assuming it is politically acceptable. A similar strategy can be recommended for Brazil.

## 15. REGULATORY AND POLICY CYCLES

The "fifteenth factor", the policy framework, remains to be identified and its impact assessed. In particular, its monetary component or the exchange rate policy is a

significant factor in determining production costs. In Asia, exchange rate variations contribute to defining production cost ranges.

The hypothesis - not original nor specific to cocoa - is that without support from public funds (which is still rare in developing countries), government policies have little capability to intervene in self-determined supply cycles, especially during periods of crisis.

With regard to price factors, the unfortunate attempt to withhold cocoa stocks by Côte d'Ivoire in 1989 proved once again that control of over 30% of a commodity supply like cocoa does not make a country a price-maker[35]. On the other hand, endogenous factors such as deforestation, lack of labour influx from outside, and parallel aging of cocoa plantations and their planters are extremely difficult barriers to overcome.

I have mentioned the positive effect of Indonesian monetary, price, tax and other policies. The undervaluing of the rupiah is helping accelerate the Indonesian cocoa boom (Ruf, 1991, Pomp, 1992). How can such national policies and their impacts be analyzed? How does policy affect production cycles?

A distinction must be drawn between periods of booms associated with migration and young plantations, and periods of aging plantations associated with aging farmers. Available economic analyses on the behaviour of planters and governments in response to price do not account for the fact that both cocoa start-up and aging processes can occur simultaneously in one country. If overlooked, this phenomenon can obscure the analysis and make it irrelevant.

## BOOMS

Government regulation and policies do not determine whether a boom will occur but they can affect the magnitude of one. Landholding policies, policies which encourage or discourage migration, price policies, and monetary policies may catalyze or restrain booms. A comparison of Côte d'Ivoire and Cameroon illustrates well the impact of such policies.

Upon independence in 1960, the government of **Côte d'Ivoire** encouraged migration (already well underway) to an extreme. Raulin's analysis (1957) clearly shows that in the 1950s an unsure French colonial administration attempted to arbitrate emerging conflicts between natives and migrants by acknowledging land ownership of native groups (Ruf, 1988, Vol. 4). When independence was gained in 1960,

[35] As stressed in the text, the price is only partially exogenous as individual national supply components, migratory movements and farming systems exert their weight on the international price.

President Houphouët-Boigny switched state support over to benefit migrants. The principle of "land belongs to him who cultivates it" was conscientiously applied by the courts, thereby accelerating migration.

Producer prices were higher in Cote d'Ivoire than in Ghana, attracting labour from former Upper Volta, with whom the country had an open border policy. Other examples of such regulation of migration are more informal and more difficult to document. In the (Baoulé) villages in the Yamoussoukro region, several older people recounted that emissaries of the (Baoulé) President visited villages in the 1960s to encourage migration to forest zones and promote cocoa planting.

The large waves of migration in the 1970s were relatively free of any state control. Serious uprisings occurred in the central/western parts of the country in 1970. The army put down a movement started by the region's native population partly in reaction to state arbitration in favour of immigrants. After these events and according to our surveys in the villages, President Houphouët-Boigny is said to have summoned Baoulé chiefs and asked them to slow down their westward migration. However, the Baoulé did not listen to him. The waves of migration continued from 1971 to 1985 and took on tremendous numbers and force. From various examples around the world, one thing stands out in the politics of cocoa booms: once the first migrants "strike gold" in cocoa and demonstrate their financial success, revenues from the boom seem to become so attractive for the State that it loses the political will to slow down oncoming waves of migration.

In contrast, when **Cameroon** gained independence, the state helped contain migration to the central south region. However, there was hardly any migration to this area while the movement was already in full swing in Côte d'Ivoire. The Cameroon policy of slowing migration was possible because there was no nearby reservoir of labour equivalent to the labour supply formerly represented by Upper Volta in Ghana and Côte d'Ivoire[36].

In Indonesia, the migration process in the major cocoa-producing region of Sulawesi is even more spontaneous than in Côte d'Ivoire. At least 500 years of history mark the Bugis society's opening to the sea, with trade and migration spreading throughout the archipelago (Curtin, 1984). More recently, the local history of the separatist movement played a role in accelerating the arrival of cocoa plant material. One or two small development projects have helped consolidate the initiatives of the migrants. The policy of undervaluing the rupiah, and especially the 1986 devaluation, particularly helped boost agricultural exports and accelerated the fledgling cocoa boom.

[36] For a comparison of Côte d'Ivoire and Cameroon, see also Chapter 8, Leplaideur/Ruf, 1981, Ruf, 1985 and the proceedings of the debate on the subject at the CIRAD seminar and especially the contributions of P. Couty (CIRAD, 1985).

Infrastructure development is a factor not entirely controlled by the state and whose role can be made a component of the model. Although migrants can travel on rivers and although Bahia cocoa in Brazil was transported by mules for decades, state investment in roads, bridges or railway lines can speed up migration and hence cocoa booms. In SW Côte d'Ivoire, forest tracks and government roads undoubtedly contributed to the extra 400,000 to 500,000 tonnes/year of cocoa put on the market by the country, when production increased from 300,000 tonnes in 1977/78 to over 800,000 tonnes in 1988/89.

In short, state policies can have an accelerating or decelerating impact[37] during a cocoa boom phase. However, once a boom is well underway, unless there is complete lack of organization in a country, the boom will come to a halt only when there is no more accessible tropical forest.

## RECESSIONS

During crisis periods, state policies can worsen and quicken the recession. Côte d'Ivoire and Ghana are good examples of how recession can affect states which are overly dependent on cocoa. There is a strong temptation to continue tapping cocoa production as much as possible for state funds. First, there are official levies through producer prices. Among other studies, recent investigations by Losch in Cameroon and Côte d'Ivoire and my research in Côte d'Ivoire show clearly that the "regulation" adopted by African states actually lowers producer prices (see also Chapter 5 and 6). This type of adjustment was also used in Ghana and Nigeria and contributed to their fall in cocoa production in the 1970s. Indirect levies of all kinds may also be imposed. In Côte d'Ivoire in 1991, "informal" roadside levies by police and customs officials did not fall as fast as the price of cocoa. Such levies have been reinforced by a recent law requiring foreigners to possess valid papers. This type of control has a strong economic and psychological impact especially on the poorest of producers and on migrant labourers from Burkina Faso. From a historical and scientific point of view, the phenomenon is comparable to the 1969 Aliens Compliance Order in Ghana.

These types of government behaviour can be observed in the policies of Malaysia, a country experiencing the same contradiction of economic dependence on foreign labour (Indonesian or Filipino) and fear of weakening political and demographic

[37] In their theoretical approach to plantation agriculture, Barlow and Jayasuriya (1986) rightly mention the relative absence of the state during the first phase of such agriculture. The most it does is to slow small farmer dynamics. This is true in particular in Malaysia where the state is constraining access to land by migrants (see the chapter by F. Jarrige). However, mention should also be made of cases in which the state discovers small farmer dynamics (but always late), jumps on the bandwagon and provides extra incentives, as in Côte d'Ivoire. See Ruf, 1995 for a more detailed analysis of the role of the state in cocoa cycles.

control. During a period of relative crisis, political fears seem to outweigh economic necessities despite the fact that economic dependence is now more necessary than ever. In the 1980s and 1990s, Brazil similarly set up monetary policies (and labour laws to a certain extent, but these were rarely applied) which increased barriers for agricultural exports including cocoa.

## THE POLITICS OF COCOA CYCLES

Coincidentally, state policies and regulations regarding cocoa also operate in cycles. This is especially apparent in countries like Ghana and Côte d'Ivoire. A country's dependence on the commodity can be such that a cocoa recession will cause a national recession. Cocoa cycles follow the economic and political cycles of the country and vice versa, making cocoa a textbook case in recent analyses of trade shocks. In the 1970s and 1980s, Côte d'Ivoire's cocoa boom clearly resulted in the country becoming dangerously steeped in debt (along with investors who shared the responsibility). Excessive foreign debt unrelated to the goods accumulated in the country inevitably led to deeper recession, as clearly described in economics textbooks. This was the case with the 1990s recession in Cote d'Ivoire.

Caution is therefore required in analyzing state regulation and policies. The endogenous constraints of a cocoa cycle may have more bearing on a policy choice than the state has in influencing cocoa supply. During certain points in their histories, neither Ghana nor Côte d'Ivoire had any viable alternative other than imposing a relative increase on levies in the cocoa sector. In Côte d'Ivoire, the "life cycle of the President himself" coincided with the country's cycle of large cocoa migration waves, symbolizing the intimate linkage between the dynamic Baoulé migrants, the state, and cocoa development. In the same vein, when a declining life cycle converges with a declining national production cycle, it logically leads to a new political cycle in which cocoa may acquire less economic and social importance.

As time goes by, plantation economies therefore become less important in countries like Malaysia or Brazil. Social upheavals which transform groups of agricultural labourers into industrial or service workers ultimately are accompanied by political changes.

Although the context and motives of state decisions may vary with countries, it should be emphasized that history still manages to repeat itself. Countries like Ghana, Côte d'Ivoire and Malaysia deal with the contradiction between their dependency on foreign labour and their concern for political and demographic control in similar ways. This leads us to identify yet another factor in the functioning of cocoa market cycles and shifting of production centres: the policy framework of a country. With few exceptions, governments during a cocoa recession seem to react by adopting policies which only exacerbate problems for producers, thus accelerating the crisis instead of alleviating it.

## 16. BRIEF REFERENCE TO TWO THEORETICAL APPROACHES

In addition to supporting theories stressing price as a determinant of supply, the cocoa cycle model contributes to studies adapting the vent-for-surplus theory[38] by Myint (1958, 1967) along with other researchers. First we will explore the plantation model proposed by Barlow and Jayasuriya (1986).

### PLANTATION AGRICULTURE IN THREE STAGES

The role of credit - frequently a limiting factor - following the adoption phase and spread of a crop, is an important aspect of Barlow and Jayasuriya's three-stage plantation model. The impact of the model goes beyond the academics since its analysis can be used directly in agricultural policy making. The authors show that replanting has only succeeded where the state has intervened through funding research and extension, and through direct aid.

Our cocoa cycle model arrives at a similar conclusion to some extent, although the methodology for arriving at such a conclusion differs. At least in the case of cocoa, the main factor dictating the renewed need for capital is the exhaustion of forest rent which must be replaced with labour, inputs and new techniques. Barlow and Jayasuriya maintain that this need for capital is related to new and expensive plant material that requires additional inputs.

In the case of cocoa, limited technical progress has been made in the breeding of plant material. It is true that yields of hybrids are improved by fertilizer, but good *Upper Amazon* varieties will do as well given the same cultivation conditions. The strong correlation between the need for capital and the dwindling of forest rent will apply to any farming (crop or livestock) activity substituted by planters to replace cocoa.

However, one point of departure exists concerning prices. Barlow and Jayasuriya view prices in a classical manner as being exogenous insofar as they are determined by economic mechanisms outside producer countries. In our model of cocoa cycles, prices and price cycles are considered to be largely determined by supply cycles and are hence endogenous to the model. However, exogenous forces such as speculation and increase in demand caused by economic recovery in rich countries are not ignored.

[38] There is insufficient space here to summarize the main contributions of these theories and the criticisms made of them. See in particular Gunnarson (1978) Ingham (1981) Hopkins (1990) and Ruf/Forget/Gasparetto (1994) for critical analysis of the vent-for-surplus theory and adaptations.

## THE VENT-FOR-SURPLUS THEORY

Adam Smith's vent-for-surplus theory, adapted by Myint to explain the booms of agricultural products such as cocoa in West Africa at the beginning of the 20th century, is based on several hypotheses, including the absence of technical progress and a lower rate of increase in population than agricultural growth. The main theme of the theory is that local labour and land resources are under-utilized before the boom and subsequently benefit from value-added use by the entry of the region or country into the international market through the new crop. I shall just examine these two suggested types of under-utilization here.

### Under-utilization of the land factor

Land and natural resources are in fact under-utilized before the advent of a cocoa boom, but the problem lies less in the under-utilization before the boom than in over-utilization during and after a boom. In addition to the use of the "land" factor, natural forest resources are used and consumed. The loss of forest rent remains an external cost imposed on future generations; the extraction of forest rent lies at the very foundation of a successful cocoa boom.

In the post-cocoa boom and decline phase, recovery and growth do not necessarily re-emerge in a region through either cocoa or any form of agricultural or economic activity. This is a fundamental economic and human problem of cocoa booms. In his work on the economic history of cocoa in Ghana, Gunnarson (1978) predicted such problems when he observed that the monoculture concept is absent from the vent-for-surplus theory. He considered this omission to be a major weakness of the theory. Gunnarson's intuition was correct but little research on the topic has been pursued. In everyday but graphic terms, monoculture is a way of "pumping out" forest rent as rapidly as possible. The fact that external costs are not internalized by producers in the process reveals the extreme wealth generated by a cocoa boom. The real aspects of this ecological cost (degradation of soil, micro climate, phytosanitary environment of plants, etc.) point to inevitable "downstream" problems and possible "negative growth" or growth that is unsustainable.

### Under-utilization of local labour resources

Another weakness of the vent-for-surplus theory is its explanation of under-utilized local labour resources, particularly where an influx of migrants forms part of the local labour pool. Migrants can also come from neighbouring countries (e.g. from Burkina Faso to Ghana or Côte d'Ivoire and from Indonesia and the Philippines to Malaysia). These waves of migration attracted by cocoa booms constitute radical geographical and sectoral re-allocations of labour.

Migrants are often from poor families but neither their labour costs nor productivity can be said to approach zero. In the beginning stages of migration, migrants simply have to work more than if they were in their places of origin because they hope to make their fortunes and purchase land and capital, i.e. to establish a plantation.

Migrations involve massive flows of labour and entrepreneurial spirit from outside of a region or country, represented especially by poor families who are already highly occupied in other economic activities and other regions. For example, many migrants came to Bahia from the sugar plantations in north-eastern Brazil, where they had little leisure. In contrast, those who gained possession of land between 1860 and 1900 were able to enjoy leisure for the first time and make the first "luxury expenditure" of their lives. This is also the case with the cocoa booms in Côte d'Ivoire and Sulawesi. These observations go against the theory of under-employment before entry to the international market.

## SCIENTIFIC CONCLUSION

All of these observations lead to technical, ecological and social change. Such changes are sometimes sudden when they occur in the ecological and technical fields. An example is attacks by pod borer causing a sharp increase in production cost. Some changes occur more gradually, such as when a crisis encourages "spontaneous structural adjustment" requiring less dependence on outside labour (an adjustment which lowers the cost of cocoa production). These changes demonstrate the futility and erroneous scientific claims of establishing singular "cocoa production costs" and "comparative and competitive advantages" without in-depth study of the dynamics of farming systems.

In our model described, each of these factors and the linkages between them take on a real-life dimension as a component in the overall process of cocoa supply and demand cycles. Some of these factors have received partial mention in scientific literature, but to the best of our knowledge such factors are neither integrated at international market level nor incorporated into supply models.

This paper contributes to defining each of these supply factors and the process of their evolution. In particular, I have redefined the concept of forest rent and helped to identify how both African and Asian family smallholdings take advantage of such forest rent and tree capital (see also Chapter 17). It has been shown that the hidden and externalized costs of deforestation may represent 80% to 100% of the establishment cost of the plantation in the first year. By applying Baoulé smallholder techniques, to clear the jungle and to plant require only 80 to 90 days of labour in the first year. Thirty years later, to clear the old declining plantation or to clear what became a *Chromolaena odorata* fallow and replanting requires about 160 days of labour.

I have also mentioned the capacity of smallholdings to innovate and the prospect of a new and unexploited rent from *C. odorata*, which at this stage is still hypothetical but likely to cause great changes in African agriculture. I would also like to stress here the strong linkages between a one-generation farming family cycle, the life cycle of a cocoa plantation, and market cycles which last for 20 to 25 years. This analysis probably deserves more research which can compare cocoa cycles with those of other perennial crops. Research should also be combined with statistical approaches to the response of supply to price.

The dualism of corporate plantations and smallholdings also deserves considerable research attention. Nevertheless, the few data assembled here show little doubt about the vulnerability of large cocoa estates during periods of crisis.

Like forest rent, family and mutual support among migrants and institutional factors such as "labour/credit" systems all act as investment multipliers in our theory of cocoa cycles. They accelerate new planting activity quite independently of cocoa prices and interest rates. The historical role of infrastructure development such as forest tracks and state investments (usually for purposes other than cocoa) has been observed to accelerate cocoa booms from the 1960s to the 1990s.

This model also helps show the weight of institutional factors and the way in which infrastructure development speeds up economic cycles. It goes far beyond the explanations of a simple mechanism based on price, or a rate of interest or cobweb theorem effect. As a complement to the macroeconomic approaches of Repetto *et al.* (1991) in evaluating the losses of natural resources in terms of national accounts, our microeconomic approach to forest rent helps measure the effects of deforestation. The impact of forest rent on cocoa supply necessarily has an impact on price. The influence on the ranges of price cycles is shown in Figure 13. Without ruling out the role played by demand and speculation, the broad range of cocoa price cycles appears to be endogenously determined.

Although I have not been able to make a detailed examination of the main theories of economic cycles, the old vent-for-surplus theory, the macroeconomic contribution of Repetto, or C. Barlow's microeconomic discussion of plantation agriculture, I hope to have at least partially attained the two objectives of my model:

1) better understanding of cocoa cycles

2) a contribution to the theory of cycles and the age-old question of price elasticity of supply. Figs. 2, 8, 11 and 13 graphically summarize the total "forest rent/cocoa cycles" model.

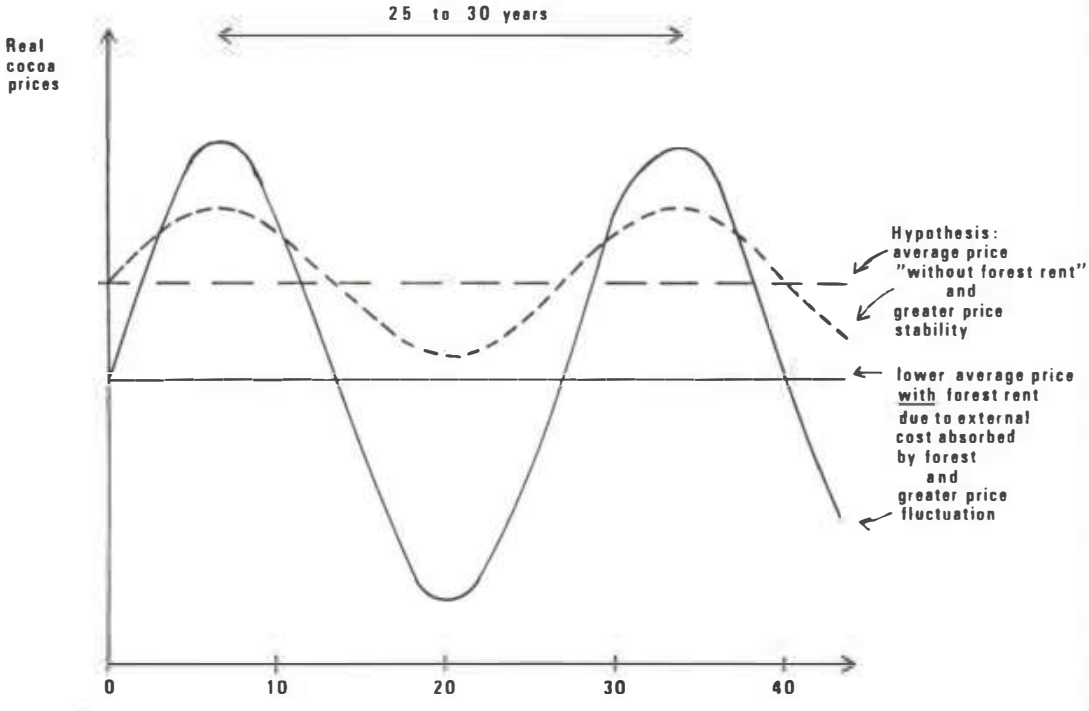



**Figure 13 Cocoa price cycles and external costs absorbed by tropical forest.**

## THE POLITICAL ECONOMY OF COCOA: A CONCLUSION

The relatively small impact of policies in any country entering a cocoa cycle recession phase has been demonstrated historically. Almost all cocoa producing states are developing countries which do not possess or have not acquired sufficient resources to subsidize agriculture. Stabilization funds and marketing boards hardly fulfil their supposed role of stabilizing producer prices. Above all, each country seems to learn of the problem of replanting "too late"; countries also approach only the technical aspects of replanting without perceiving the importance of social dynamics involved. Governments also ignore producers' know-how in their policy making which further handicaps attempts at replanting. The problem is discovered much too late as long as the state reacts only when its coffers are hard hit by the declining cocoa cycle. Ignorance of the microeconomic aspects of cocoa cycles

partly accounts for this incapability or rather constant tendency of policy makers to make things worse. At the risk of being controversial, we may even conclude that a better policy might be to leave matters alone and do nothing to dissuade production. However, even such a policy option is rarely adopted.

As long as funding is available for policy studies, in-depth microeconomic analysis can contribute to policy making and constructively limit recession. Otherwise, "production policies" will continue to remain illusory and counterproductive, ultimately resulting in confusion and weakness in international cocoa negotiations.

**References** (see Chapter 17)