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Macro and microeconomic models of investment of rural development in the Tshikapa diamond producing areas of Zaire

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development in the Tshikapa diamond producing areas of Zaire

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TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

CHAPTER 1. INTRODUCTION

Sub Saharan African countries have faced a general problem of stabilizing and restructuring their economies since the mid 1960s. In some countries stabilization and structural adjustment programs (SAPs) have been successfully implemented. These African economies have been experiencing internal dynamic processes of macro and microeconomic reforms. They have promoted agriculture for smallholders and applied a pricing system in favor of export crops to generate foreign exchange. Some efforts have been made in the mining sector for the same purposes. They also have promoted exports by using export compensation schemes, devaluing their national currencies or gradually adjusting exchange rates. Most have adopted import substitution as a policy to induce private investment in activities to replace imports.

In other African countries like Zaire, results have been disappointing. Implementation of SAPs has been so ineffective that both institutions and Western banks suspended their interventions in 1990. In spite of massive investments by Western banks and private foreign investors in late 1960 and in early 1970s, and financial aid from the governments of the US, Japan, France, Germany, Italy and Belgium, the Zairian economic growth (GNP per capita) and investment growth have been declining since 1975 (with the exception of some slight improvement in 1983-84).

Research Question

In order to understand the Zairian crisis and hypothesize a solution in this study, the following policy questions will be answered. Why have both the government of Zaire and the two international institutions (IMF and World Bank) been concerned with the restructuring of the Zairian economy? Policy distortions that have constrained growth will be addressed to answer this question. Internal policies and external shocks may justify implementation of stabilization and structural adjustment programs.

Sectoral dualism characterizes the Zairian economy in the traditional sector on one hand, and in the modern or industrial sector on the other

hand. Which sectors should receive available scarce resources? Whichever sector receives allocations, would economic growth come from private or state-owned companies? Micro reforms are perhaps the cornerstone of economic growth because they aim to improve efficiency in production. The more national innovative entrepreneurs participate in strategic sectors of the economy, the more can be expected in terms of increased efficiency in production.

Resource allocation between sectors has been the main concern of *structuralist* economists involved in stabilization and structural programs. Resources may be reallocated by a central authority or by market forces. The Zairian government may use monetary and fiscal policies; likewise, the Central Bank of Zaire and the Department of Finance may use financial techniques to stimulate savings, investment and growth. What are the sources of funds needed to finance these sectors? What roles have The World Bank and the IMF played in the provision of foreign resources needed by the Zairian economy? If market forces can efficiently reallocate scarce resources between sectors, isn't it right to believe that like licensed exporters, peasant diamond producer should directly get access to foreign exchange instead of selling their diamonds in a national currency that depreciates continuously? Macro policies which do not permit such opportunities to diamond miners would constitute the most important policy distortion.

In the process of stabilization and structural adjustment of the Zairian economy, policy makers have chosen some key sectors or industries of the economy to be promoted. Did they emphasize export sectors, or import substitution industries? Or did they emphasize the mining sector more than the agricultural sector? And, whatever the choice, what are the backward and forward linkages of the chosen leading industries or sectors?

To address the issue of policy distortions, what macroeconomic policies were undertaken under stabilization and structural adjustment programs from 1967 to 1991, and what may be said about their performance? In order to achieve their objectives, policy variable instruments which were chosen should act on other exogenous variables pushing the system toward desired targets. Why did macroeconomic policies partially or

completely fail to achieve their objectives? Possibly because of
inappropriate macroeconomic policies, external debt has reached alarming
levels, such that the Zairian government could no longer service it. This
situation has undoubtedly affected socioeconomic indicators. The standard
of living of the Zairian people may have been seriously affected. In 1991,
under pressure of the IMF and the World Bank, the international community
halted its financial support to Zaire. Has the situation been worsening or
not since the suspension of financial support by IMF , World Bank and
USAID? Can this country solve its economic crisis by itself or, as it is
believed, must Zaire rely continuously on external financial support from
the international community in order to find a means for continuing its
development?

Under these considerations, what are the best alternatives for
macroeconomic policies? If investment is the main source of growth, what
are investment determinants in the leading industries or sectors?

In this study a new structure of a macroeconomic model is visualized to
see how inefficiency in domestic savings mobilization have affected
investment and economic growth. In the revised model either former
variables are excluded or new variables are introduced. Is there any
significant impact of new variables on targets after controlling for other
variables?

Assuming that microeconomic reforms are necessary to improve
efficiency in production, it is important to identify the types of policy
measures which best fit the Zairian case. To do this, it will be useful to
determine the structure of the microeconomic model in the leading industry
or sector.

A leading industry or sector may have backward and forward linkages.
What are they in the case of the diamond industry? One would think, as
the IMF and the World Bank do, that the agricultural sector should be the
focus of attention because it has been essentially neglected in food crop
production. Did capital dualism provide excess credits to the modern
sector? Some financial support has been given to smallholders but for what
farm size and for which crops?

Most African countries have seen irrigation as a mean towards food
self-sufficiency, or a source of foreign exchange earnings from export

crops. In which areas and under what conditions would it be economically feasible to promote irrigated agriculture in Zaire?

For investment to be undertaken there are some requirements. With respect to savings, after the collapse of the official banking system, what could be the role of a new financial development enterprise in the process of savings mobiliztion? The key question this study intends to answer what will determine the best savings mobilization process that can shift upward the Zairian private investment schedule and promote socioeconomic growth?

Before proceeding in the direction of these difficult issues where the Zairian government and the international institutions have together failed to find appropriate solutions to the Zairian crisis, one must be reminded that Zaire, as a developing country, is well endowed with unskilled people, natural agricultural and mineral resources, and with existing extracting and manufacturing industries, most built during the colonial era. Given these endowments, along with an increasing number of well educated people who have graduated from national and western undergraduate and graduate colleges and universities, and finally the financial help from the international community, Zaire should have achieved a good performance rather than a display of poor results. This study points to policies and institutional reforms that could improve the country's economy.

Geographic Situation and Climate

Zaire, located in the Central African region, is the second largest sub-Saharan country and the largest Central African country in geographic area. It lies across the Equator, with coastal access, and is bounded by the Congo, the Central African Republic, Sudan, Uganda, Rwanda, Burundi, Tanzania, Zambia, and Angola. The country consists of the vast Congo Basin. The river now renamed the Zaire, drains water from the Ubangi River in the North, the Uele and Aruwimi in the East, and the Lualaba and Kasai in the South. Above the basin, the land levels into the Kwilu-Kwango plateau, the Kasai plateau (altitude between 500 and 1,000 m), the Shaba plateau,

altitude between 1,000 and 1,500 m) and the Zaire Nile ridge (altitude > 1,500 m) (Hodd, 1991, p. 342).

The climate is equatorial in the Center and West with hot and humid conditions and temperatures reaching average 26° C. The East and South are cooler and drier with temperatures in the mountains averaging 28° C. Rainfall is plentiful in the North all year round, especially in September and October. In the western part of Zaire, it is heaviest from October to March, with some areas in the Bas Zaire province only receiving 80 cm per annum. Since the country straddles the Equator, the North has a drier Winter from November to February, while the South is drier in the months of May to August (in the Bas Zaire, the Bandundu, the Kasai Occidental, the Kasai Oriental provinces, and the northern area of the Shaba province). From the Kahemba area in the southern province of Bandundu to the South of the Shaba province the drier season goes from May through October. Dry seasons last from one month in the Isiro area in the Haut Zaire province, to six months in the Shaba province in the south. In the Tshikapa area, the dry season lasts from May to August. Diamond activities are well carried out during dry seasons than in wet seasons. Natural vegetation consists of a dense evergreen rainforest in the North and a tropical forest with grassland and shrub Savannah in the South which covers half the total land area.

Transportation Infrastructure

Zaire's transportation network is made up of a series of regional road networks connected by a combination of navigable rivers and railways that form the country's major transport arteries, extending from the port of Matadi, through Kinshasa and then to the North, East, and South. In colonial days, the transport system was mainly set up to facilitate import and export, not to promote regional integration. Thus, the North-South transport systems are poorly developed.

The Zaire and Kasai Rivers are navigable for 14,000 kilometers and are important national waterways although they are not navigable as far as the coast because of rapids and waterfalls (INGA on the Zaire River, between Matadi and Kinshasa). Goods have to be transshipped overland to the

port of Matadi, by road or by railway. Matadi is the most important national port of Zaire for export of minerals from the Shaba province. Ilebo, located on the Kasai River, is an import port because goods hauled by trains from the South have to be transshipped by boats from Ilebo to Kinshasa. In Kinshasa, goods have to change transportation means again from boat to trains and trucks, to proceed to the port of Matadi. In the East, goods must cross Lake Tanganyka at the port of Kalemie. From Udjiji in Tanzania, exports are hauled by trucks and trains up to Dar Es Salam. Thus, the main ports for import and export of goods are Ilebo, on the Kasai River, Kalemie on Lake Tanganyka Lake, Kinshasa and Matadi on the Zaire River, and Boma and Banana on the Atlantic Ocean. The biggest hydroelectric-electric power plant is located at Inga on the Zaire River between Matadi and Kinshasa.

The national railway linking the Shaba Province to Ilebo in the Kasai Occidental Province is about 1,800 km long. Kalemie, on Lake Tanganyika, is another national port for export of minerals from the South. In Tanzania, minerals are hauled by trucks or trains up to Mombasa. Unlike the longest railroad route from the Shaba province to the South African port of Durban, the railway from Dilolo in the Shaba province to the port of Lobito in Angola is the cheapest route for imports and exports from or to the Shaba province. However, since the Angolan Civilian War, the cheapest route has been closed forcing Zaire to export its products through the costly route within Zaire and through Zambia, Zibambwe, Botswana and the Republic of South Africa to Durban. In general, the infrastructure is crumbling. About 85 percent of the 85,000 miles of roads that existed at independence in 1960 have reverted to bush (Darton, 1993, p. 1).

Agriculture and Mineral Resources

Mineral resources include copper, cobalt, diamonds, gold, oil, manganese, silver, tungsten, uranium and zinc. Zaire is the world's top producer of industrial diamonds, annually producing about 14 million carats of which 2 million are gem stones, and cobalt (15,000 metric tons). It is the world's sixth producer of copper (470,000 metric tons in 1986). The general trend has been characterized by stagnation, or more, a decline in

the production of the mining sector. The economy has been relying
excessively on copper as its single major export product.

Agricultural production in Zaire is carried out by two very distinct
sub-sectors: the traditional sector, consisting of millions small family
farms, practicing slash and burn agriculture on cultivated areas averaging
1.5 hectares (ha) or less; and the modern sector, which includes perhaps
nine hundred larger plantations (averaging 300 ha in size) and other
agribusiness enterprises using modern production techniques down from 1,200
in the 1970s. Broadly speaking, the traditional sector is predominantly
oriented toward production of food crops (maize, manioc, beans, rice,
banana, groundnuts, wheat, sweet potato, and potatoes), although
smallholder coffee and cotton production are significant in certain areas
of the country. The modern sector is oriented principally toward the
production of industrial and export crops (coffee, tea, cocoa, rubber,
cotton, palm oil, tobacco, sugar, quinine, timber). It also includes
commercial maize production in the Shaba province. During the past decade
or so there has been increasing involvement of smallholders in production
of industrial and export crops.

Population and Standard of Living

The map of Zaire shows us its administrative subdivisions by
provinces which are: Bas Zaire, Bandundu, Kasai Occidental, Kasai Oriental,
Shaba, Kivu, Haut Zaire, and the Equateur province (see Figure 1). In 1990,
the Kivu province was broken down into three provinces: Nord Kivu, Sud Kivu
and the Manieama province.
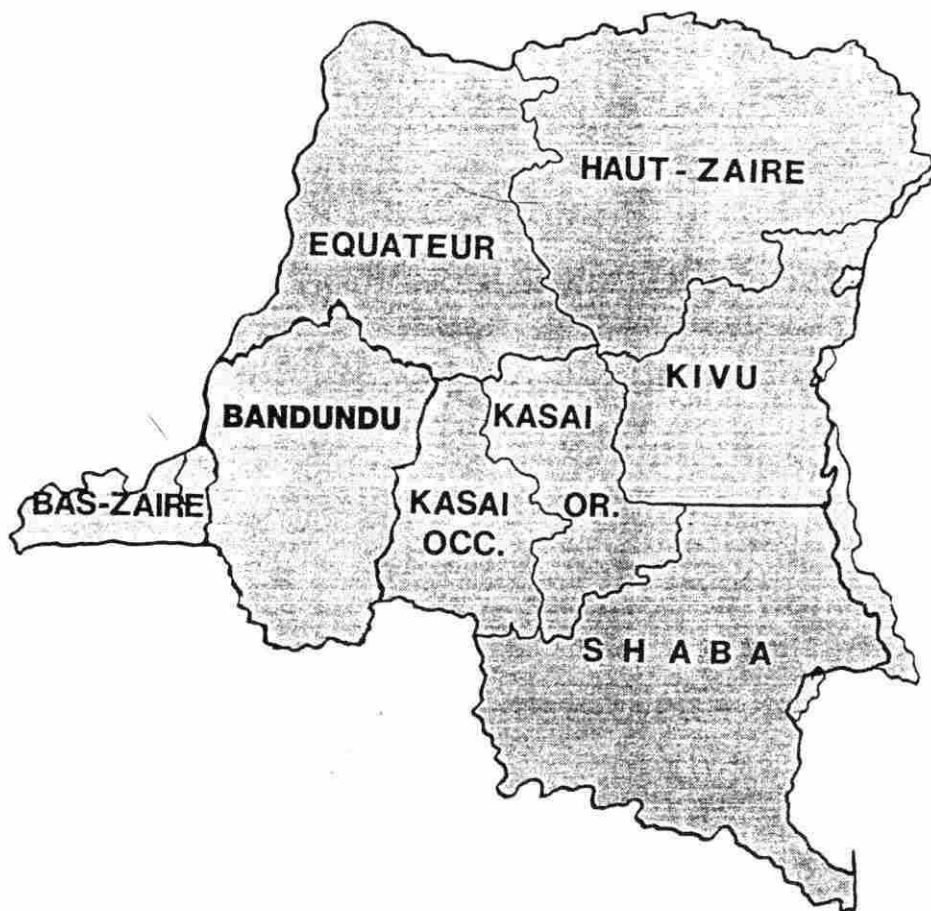
Scale: 1/12.000.000

Figure 1.   Map of Provinces of Zaire

Zaire is among the 10 largest African countries. Estimates for 1994 suggest a population of 40 million inhabitants. With an area of 2.3 million square kilometers, the population density is 17 persons per square kilometer, and varies from 100 per square kilometer in the Bas Zaire province to between 1 and 3 per square kilometer in the South. Urbanization was about 38 percent in 1987. The rate of population growth was 3.1 percent over the period from 1980-87, above the average African rate.

In 1987, while the large African country group had the lowest GDP per head of US $213, Zaire had the lowest standard of living in the central African region with a GNP per capita of only US $150, one of the lowest in Africa. However, with a GDP of US $5.770 billion in 1987, Zaire was among the nine African countries with GDP above US $5 billion. It was the second largest economy in the Central African region, after Cameroon. Its agricultural sector is proportionately smaller than most other countries in Central Africa, generating a GDP only 32%. Its industrial sector accounted for 33%, while the service sector generated 35% (below the regional average of 43%).

In the same year, Zaire was among 34 low-income countries, with a GDP per head under US $480. Private consumption was 73% of GDP, with government consumption of 17%. The level of investment, low compared with the rest of Africa, was 13% of which 10%, was contributed by domestic saving. Exports were equal to 33% of GDP with imports of 36%. The main exports were copper (42%), coffee (13%) and diamonds (9%), while main imports were machinery 40%, food 29%, and fuel 24% (Hodd, 1991, p. 344).

With respect to its economic stability, in 1987 Zaire was considered to be one of the nine fairly stable countries. It was said that President Mobutu had been able to create a strong security network which had, together with frequent government reshuffles, prevented the growth of opposition within the country and pre-empted any coup attempts. However, since 1990, central authority has been dissolving, and opposition is open and well established within Zaire. The Shaba Province of Zaire was invaded in 1976 and 1978, by Zairian rebels based in Angola, organized in a so-called FNC (National Force of Liberation of Congo). Their objective were to create political instability in copper and cobalt production such that the government would suffer from critical foreign exchange shortages.

Nevertheless, what rebels and other opponents were looking happened from 1988 to 1993. Some copper mines collapsed reducing productions and exports from about 470,000 tons metric of copper in 1987 to less than 60,000 tons metric in 1993. In addition, frequent riots since 1991 and violence ethnic conflicts between Zairian originated from the Kasai Provinces and those originated from the Shaba Province have created an uncontrollable situation such that the investment climate is no longer attractive to foreign investors, especially in the Shaba Province.

Poor Economic Performance

Stabilization and structural adjustment programs in Zaire had been implemented in four periods: (1967-75, 1976-82, 1983-86, and 1987-90). Internal and external shocks have justified implementation of these programs. The performance of the economy, even after implementation of the structural adjustment measures, was disappointing in several respects. In early 1990-91, both the IMF and the World Bank suspended disbursement of their principal operations in Zaire and the adjustment effort ceased completely. The economy continued to deteriorate and inflation was estimated to run as high as 3,000 percent in 1992, and about 7000 percent in 1993.

Darton (1993) found that after four years of turmoil, government authority is simply dissolving, leaving the cities and the countryside to pillaging soldiers and roaming gangs of thugs and bandits. For more than three decades, Zaire's 40 million people have seen their living standard drop every year. The economy is in shambles, with an external debt of more than US 10 billion dollars. Prices rise many hundredfold yearly and there is virtually no new investment, namely the construction of paved roads and plants.

Lack of Foreign Exchange

In sum, one of the major constraints for restoring macroeconomic balances and restructuring the Zairian economy is the availability of foreign exchange and its wise use in infrastructure, productive, and human

development projects. In order words, the lack of private savings and mobilization of foreign exchange is a major constraint for economic growth in Zaire.

Instruments for Domestic Savings Mobilization

Zaire has rarely experienced a positive current account balance. Likewise domestic savings has hardly ever matched investment demand. Credit expansion that has deepened the government budget deficit has aggravated Zairian twin deficits. The study will analyze both government, the IMF and World Bank instruments for domestic savings mobilization and analyze the reasons why *Mobutu plans* could not fully be implemented. The 1969 Investment Code is another instrument to attract direct foreign investments but did not achieve its goals.

Development Grants and Humanitarian Programs

Western government grants and humanitarian programs are other financial supports received by Zaire. However, given the low level of amounts made available, and also given their nonutilization by targeted groups,(e.g., peasants), Western donors have limited their interventions to such as displaced people from the Shaba Province due to ethnic violence. Public and private investment demand could not be satisfied by humanitarian grants.

Marketing of Precious Stones

In 1991, the government of Zaire enacted a law allowing the sale of precious stones in foreign currencies within Zaire. Instead of only allowing licensed exporters to earn foreign exchange, peasant diamond and gold producers can earn their revenues in the US dollars for example. The study will analyze the impact of such measures on other macroeconomic variables and on the productivity of diamond miners.

Tshikapa, a Study Area

Three maps of Zaire show where diamonds are extracted (Figure 2, 3, and 4). The diamond shape shows diamond producing areas in the Kasai Occidental, Kasai Oriental and the Bandundu provinces. We have chosen the Tshikapa area because of its historical importance in the production of gem diamonds. Another reason is the fact that in spite of being a major producer of gem diamonds, the city of Tshikapa suffers from a lack of paved roads, electricity, and improved drinking water services, a lack of telecommunication systems. The cost of living is the highest in Tshikapa and in Mbuji Mayi as well where is located the state-owned diamond mining company.

Eric Bruton (1978, p. 93) reported that when diamonds were found in Belgium Congo (now Zaire), in 1910, in the shorebeds of the Kiminina River near the Mayi Munene in Western Province of Kasai, few suspected that this small cache would lead to the discovery of the world's largest source of diamonds. The estimated size of the field which includes many ancient river beds, is 150,000 square miles (approximately 384,000 sq. km). Up to the 1980s, there were two centers of organized mining: around Tshikapa in the Western province of Kasai, and Mbuji Mayi in the Eastern province of Kasai. The first center, including 37 separate diamond areas, has been mined by licensed individual diggers who sell gem diamonds to buying offices in Tshikapa or in Kinshasa. The other center and by far the richest, in the Mbuji Mayi area, has been mined by the *Societe Miniere de Bakwanga* (MIBA), of which 80 percent is owned by the government.

Until 1982, private diamond digging was prohibited in the Mbuji Mayi area. The 1982 diamond and gold digging liberalization led MIBA to reduce the area of its concession in favor of individual miners. Prohibition of diamond digging had led to smuggling of production to other countries such as Congo and Burundi. Nzongala (1987, p. 150-151) reported that diamond smugglers and clandestine producers pillaged the diamond beds in Kasai. By the end of 1961, trade was organized in stages to Brazzaville in Congo, and

LEGENDE

⊥ ⊥ ⊥	Limite d'Etat
▲·—··—	Limite de Region
— ·· —	Limite de Sous-Région
— ·· — ·	Limite de Zone
——	Route nationale
——	Route d'intérêt local
++++	Chemin de fer
	Barrage
	Rivière
▥	Chef-lieu de Region
⊙	Chef-lieu de Sous-Région
•	Chef-lieu de Zone
■	Ville
▲	Hévéa
⁊	Manioc
⌒	Arachide
•	Café
▬	Essences exploitées
♉	Bovin
⁒	Ovin
ⱴ	Caprin
⌐	Porcin
⁘	Riz
↓	Maïs
↓	Tabac

	⌐	Sources thermales
	♦	Diamant
Co	Cobalt
U	Uranium
Ni	Nickel
Mn	Manganèse
Ag	Argent
Pb	Plomb
Zn	Zinc
C	Charbon
≺	Carbonatite à pyroclore
V	Vanadium
Al	Bauxite
≡	Roche bitumeuse
Na	Sel gemme (NaCl)
P	Phosphate
K	Sylvite (KCl)
Ba	Baryte

	Haricot		
◗	Patate douce		
◖	Banane		
⟿	Pêche	▬	Forêt
↓	Sorgho		Savane
✦	Coton	Cu	Cuivre
⌐	Petit pois	ⱴ	Indice de pétrole
木	Quinquina	Au	Or
₸	Thé	Sn	Etain
∞	Pomme de terre	Fe	Fer
⁙⁙⁙	Cultures maraîchères	W	Wolfram
⁑	Palmier	Ta	Tantal
⁌	Canne à sucre	Mz	Monazite
⌢	Soja	♍	Gaz Méthane
↟	Fibres	Pr	Carbonatite
⌒	Cacao	Be	Beryllium
■	Parc national	Ce	Cerite
		No	Nobium

Figure 2.   Province of Kasai Occidental

Figure 3.   Province of Kasai Oriental
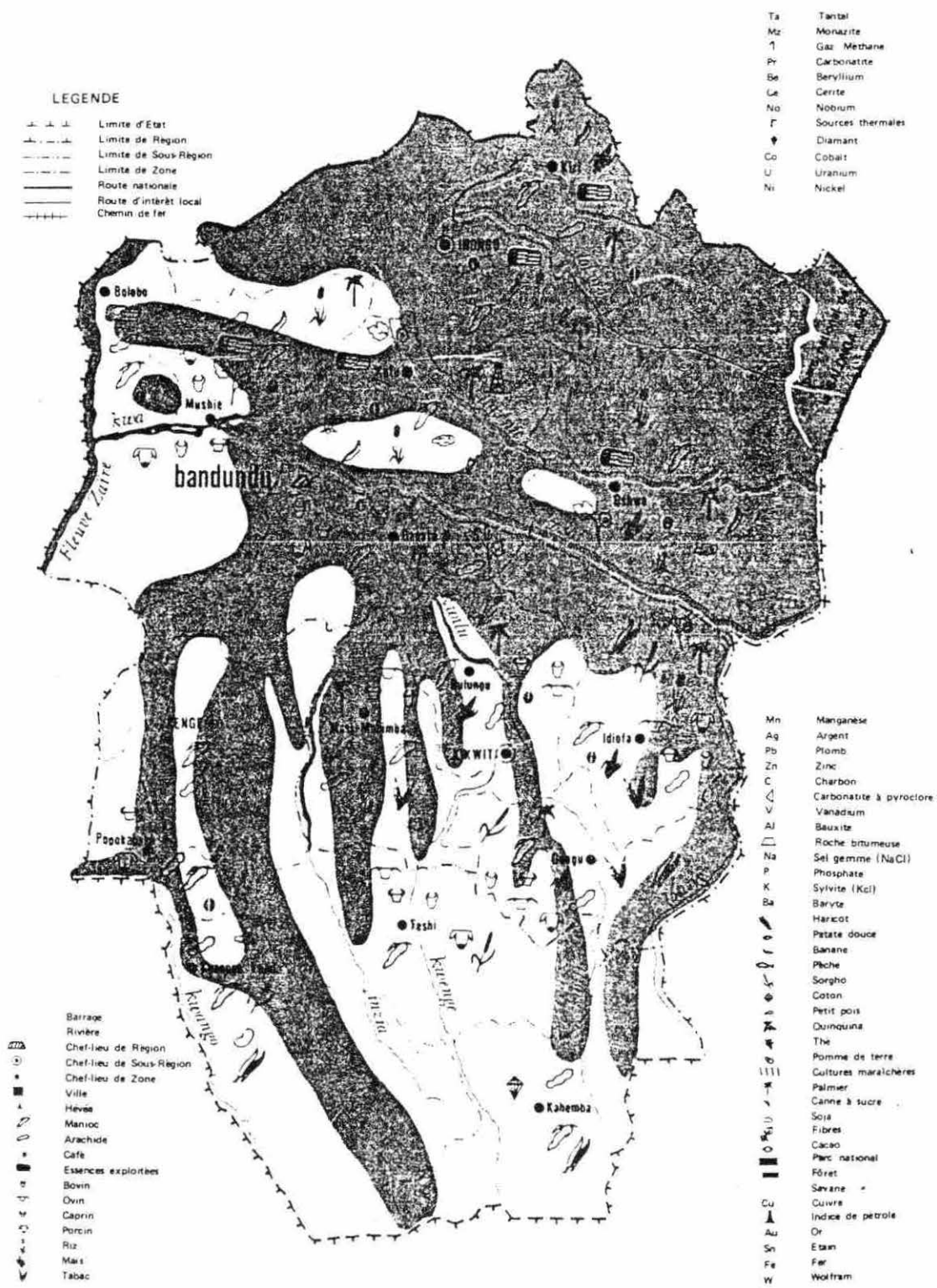
Figure 4.   Province of Bandundu

in the Central African Republic which expanded in 1962. The figures on export of diamonds from Congo, a country which itself has no diamonds, indicate the quantity of diamonds smuggled out of Zaire - in November-December 1961, 89,500 carats, valued at 209,003,000 Congolese francs. At the exchange rate of 130 C.F. for B.F 100 (Belgium francs), this represented 160.77 million Belgium francs. In January-April 1962, 642,016 carats, valued at 252,381,000 Congolese francs, equivalent to 194.14 million Belgium francs. In 1979, 5.5 million carats of diamonds were exported from Brazzaville (in Congo) and Bujumbura (in Burundi) while the official exports only were 8.06 million carats, representing US $59 million. Most of these diamonds had been produced in the Tshikapa area.

In 1994, (USAID/Zaire, p. 39), reported that the Kasai provinces became a focus for international attention in late 1992, when political elements in Shaba (Katanga) province provoked the native Katangese to violently attack resident Kasai populations. Hundreds of lives were lost and an estimated 400,000 people have fled into East and West Kasai since August 1992. Since independence, the Kasai provinces have been systematically neglected and isolated by the central government in an effort to retard development. Paradoxically, the region also contains the richest diamond mines in Zaire. The major centers are very localized and only a fraction of the population benefits from mining activities. Almost none of the revenue is re-invested into the region and profits are exported discretely. The diamond trade is extraordinarily profitable and is estimated to generate well over one million dollars per day in Mbuji Mayi alone. More than half of the activity is outside the control of MIBA, the state-owned diamond extracting company, and official diamond buyers. Mbuji Mayi, the capital of the Kasai Oriental province is the city where is located the state-owned diamond mining company. Though the ownership of this company belongs to the Zairian state, the control over its production has been discussed many times because of illegal interventions of the ruling elite. The Parliament used to ask the government to justify the reasons why revenues from diamonds had not been in the government receipts.

The report does not say anything about gem diamonds produced in the Tshikapa areas and whose average price for one carat is about US $1,000, and average annual production of gem diamonds is over 5 million carats.

This would represent US $5 billion per year of gross revenues. In 1994, the outstanding external debt of Zaire is over US $ 10 billion. Even if Tshikapa would produce from 1 to less than 5 million carats of Gem diamonds, yet a US $ 1 to 5 billion may be expected to be earned. This is one reason for choosing Tshikapa as a study area. Due to the region's physical isolation and the absence of a viable transportation infrastructure, most goods are flown into the region from Kinshasa, Lubumbashi and North Kivu. Thus, the price of basic commodities are exorbitantly high by any standard. In urban areas, where much of the population is concentrated, most people survive on the prolific commerce and trading that feeds the diamond industry, and they are dependent on food inflows from the rural areas for their survival.

There is little economic activity beyond subsistence farming in rural areas. Consequently, the Kasai provinces traditionally are net importers of grain, bringing in an average of 140,000 metric tons per year. Areas of western and southern Kasai produce some local surpluses of maize, soya and manioc, but a dilapidated transportation infrastructure limits market access and distribution of surpluses within the region. In areas directly surrounding the towns of Mbuji Mayi and Mwene Ditu, where most displaced people are concentrated, the soil is infertile and, without applications of fertilizer or use of improved seed varieties, yield only 300-500 kg per hectare. This figure is similar to the situation in the Tshikapa and the Kahemba diamond producing areas in the Bandundu province.

When Shapiro and Tollens (1992, p. 154) asked the question *where is economic growth going to come from in Zaire*, they reported that, traditionally, the view has been that rapid economic growth will have to come from the extractive sector for which Zaire is well-endowed. But the market for raw materials of interest to Zaire such as copper, diamonds, cobalt, or any of the other extractive products in which Zaire is so abundant has been depressed for over a decade in spite of a marked upturn of the world economy in the second half of the 1980s. Overcapacity of copper extraction on a world scale, recycling and substitution induced by technological advances such as the replacement of copper wire by fiber optics all indicate that there are limited possibilities to increase either production, market share, or world prices of these raw materials. In

addition, severe damage was done in October 1991 to the mines in Shaba and particularly to the new infrastructure at the Fungurume mine. Hence, the large investments required and the long lead times needed to restore and eventually expand extractive capacity, further reduce the scope for the extractive sector to become an engine of growth in the 1990s.

According to Shapiro and Tollens (1992, p. 155), the only major area that has good short and medium term prospects of accelerated economic growth with improved equity is agriculture. They have ignored USAID/Zaire (1994, p. 39) findings that, in Mbuji Mayi only private diamond activities generate per day about one US million dollars, and that diamond trade is extraordinarily profitable. The findings of this study may also convince readers. In addition, overall investments in agricultural sector may involve more than one billion US dollars which is hard to get from Western Banks and private foreign investors, who traditionally are not interested in food crop production. Investing in export crops would meet the same deterioration of trade problem faced by mineral exports. Luckily, Zaire has the largest market share in the diamond world market and is, in effect, the top producer of industrial diamonds as well.

In addition, 20 percent of the diamond world market is not controlled by De Beers (Bruton, 1978, p. 170). With a minimum US $2,500 selling price per carat in New York, one can say that US $1,000 per carat in Tshikapa is sufficient enough to make profitable any investment project in diamonds provided that the expected production is maximized with respect to input costs and the probability of finding diamonds. According to geologists, 0.9 to 5 carats may be found per cubic meter in the Kasai diamond producing areas (Vingt ans du MPR, 1987, p. 203).

Therefore, under such circumstances, this study suggests that the inception of a policy investment model could be a mechanism which will mobilize earnings from sales of diamonds and gold in foreign exchange within the Zaire, to finance social, infrastructure, and productive social investments projects.

Hypothesis

The domestic investment demand is a function of domestic private and public savings, external savings, domestic credit, and foreign loans and direct foreign investment.

$$I = SP + SG + SX + DP + DG + FP + FG + FD$$

where I is investment, SP is domestic private savings, SG is domestic government savings, SX is external savings, DP is domestic private borrowing from the banking system, DG is domestic government borrowing from the banking system, FP is foreign private loans, FG is foreign government loans and grants, and FD stands for foreign direct investments.
GDP growth is a function of savings, assuming that savings equals investment.

$$g = \frac{S}{ICOR}$$

where g stands for GDP growth rate, S for savings, and ICOR is the incremental capital output ratio.
Our null and alternative hypotheses are expressed as follows:

HO: government of Zaire, IMF, and World Bank instruments could mobilize savings in the context of the Zairian socioeconomic and political environment.

HA: These instruments cannot mobilize savings with efficacy; Instead, new variables included in the extended model can do better.

Objectives of the Study

Economic growth depends on factors such as managerial skill, investment growth, and productivity growth. In addition, managerial skill and productivity growth depend on investment in human development and in technology and innovations, while investment will also depend on managerial skill and productivity growth. A country needs money (foreign exchange and

local currency) to finance investment projects (in infrastructure, productive and social sectors). At the same time, this country needs innovative entrepreneurs (skilled people, managers and workers) to make appropriate investment decisions and realize actions. Practical and applied skills are more productive than exclusively theoretical ones. In addition, a stable political environment inducing investments is a necessary condition for economic growth.

Therefore, the three major objectives of this research are (1) the inception of macroeconomic models of the Zairian economy; (2) the analysis of microeconomic conditions of profit maximization of investment projects in diamonds and (3) an institutional reform to mobilize savings and increase investment levels.

Macroeconomic Objectives

The study aims to utilize a macroeconomic policy model of the Zairian economy in order to determine the value of policy variable instruments which may push the economy toward specific targeted levels of GDP with balance of payments Regression analysis will determine all parameters of the model framework.

The model seeks to increase foreign exchange within Zaire through the sale of diamonds. With adequate financial development, the model will be used to define savings incentives that can help economic agents involved in diamond activities to make bank deposits. In addition to its role of collecting savings and organizing loans, the institution will collect taxes and rights to pollute and damage the environment to be paid by diamond miners and diamond dealers. Finally, this institution will solve the problem of public goods in diamond producing areas. In order to increase consumption levels of diamond producers and dealers, the model will define consumption incentives, diamonds and agricultural marketing innovations.

In order to make investment again a function of interest rate, a decreasein the nominal interest rate is another objective of the model. In order to attract direct foreign investments, financial development will lead to the unification of official and parallel exchange markets, and to

an appreciation of the exchange rate of the Zairian currency, in order to attract direct foreign investments.

Microeconomic Objectives

This part intends to determine conditions of profit maximization in the diamond industry. Increase in productivity implies the use of new technologies and their appropriation by peasant diamond producers.

Institutional Reform

In order to solve macroeconomic imbalances and microeconomic inefficiency in production, the study will show the importance to micro-enterprise of a financial development institution.

Organization of The Study

Chapter one, the study has introduced the reader to the research questions and the objectives of the research. The empirical study of investment models is based on time-series data presenting the trend of economic indicators (regressors). Chapter two will concentrate on the analysis of macroeconomic indicators in Zaire and the economic performance from 1967 to 1993, depending on availability of data. The analysis of macro and micro economic reforms under the International and the World Bank will take place in chapter three. In other words, an analysis of the IMF and the World Bank model in the process of stabilizing and restructuring the Zairian economy will be undertaken. Then a revised macroeconomic model including new regressors will be suggested. In chapter four, the study will focus on microeconomic reform dealing with investment in diamond production. Finally, in chapter five, an examination of a financial development institution will be developed . A brief discussion will lead to a conclusion and suggest some recommendations.

Methodology of the Research

The researcher has been thinking about an economic model for rural development in Zaire since 1985 when he was working for the Governor of the province of Bandundu as economic adviser. He was in charge of preparing the 1986-1990 first Zairian macroeconomic economic plan related to the Bandundu province. In Bandundu, regional tax on diamonds from Kahemba was his main concern because most official diamond buying offices located in Kahemba used to not pay required taxes. Traveling through diamonds mining areas in the Kasai province from 1985 to 1989 gave the researcher the opportunity to observe diamond activities in the Tshikapa and Mbuji Mayi areas.

In addition to observations on the ground, the researcher read documents related to diamond activities at the Ministry of Planning in 1986 where he worked as Consultant Official published documents and unpublished documents were read not only in different libraries in Zaire, but also in the libraries at Iowa State University.

From May 1993 to January 1994, the researcher was on the ground in Zaire observing and interviewing persons concerned with the topic (diamond miners, and dealers, farmers, officials and others). With statistical data collected in different libraries, the research undertook regressions analyses and interpreted regression coefficients obtained from various sources (Brittain, 1978; Gould, 1982; Huybrechts et al., 1982; Jaycox, 1993; Leslie, 1987; Lungwangu, 1971; Nathan, 1989; UNDP, 1990; USAID, 1994; World Bank-East Africa Regional Office, 1979). Because the IMF and World Bank models use reduced form equations to determine instrument variables of the policy model (Boland, 1989; Neal & Shone, 1976), the researcher uses the same technique in this study. So, the null hypothesis that macroeconomic polices undertaken under stabilization programs by the government of Zaire could not be verified by statistic tests. Most of the tables included in this study were elaborated by the researcher for the 1973-90 period. Supplementary data used to develop the regression model are shown in the Appendix.

Limitations

Most statistics were collected in the US libraries because of some difficulties to collect data in Zaire. Parameters used in the revised macroeconomic model were computed based upon regression equations using these data. About the microeconomic model, the researcher uses expectations to determine quantities of diamonds produced and revenues based on information given by geologists. However, the cost of equipment and the selling price per carat of diamonds are true prices.

CHAPTER 2. ECONOMIC REFORMS AND PERFORMANCE OF
THE ZAIRIAN ECONOMY FROM 1967-1991

The major objective of this research is to define an economic policy model of Zaire in order to build an economic model. Relevant variables and parameters describing the economic situation will be chosen among economic indicators to depict macroeconomic indicators of the Zairian economy. Leading economic indicators and other indicators used in the International Monetary Fund and the World Bank models will be examined. Variables used by Tshibaka will also be examined. These variables may be used as exogenous and/or endogenous instruments or targets to develop the model.

Macroeconomic Indicators

Aside from the gross domestic product (GDP), the economic indicators used in this study are those having a macroeconomic policy impact such as money supply, inflation rate, exchange rate, fiscal deficit, domestic credit, government tax revenues, government spending, exports, imports, current account, investment (public and private), foreign exchange, foreign debt and debt service, private consumption and savings. The leading indicators, are shown in Figures 5 and 6, and Table 1 (Hodd, 1991, p. 348-349), will be discussed in each of the following sections. In addition, Table 2 gives the World Bank's indicators for the years 1971-1986 (Leslie, 1987, p. 174). Finally, Table 3 gives basic data of Zaire from Tshishimbi et al. (1994, p. 106) which helps one to understand the economic situation when viewed along with the preceding figures and tables.

Gross domestic product (GDP)

The GDP grew by 6.4 percent, and then by 4 to 5 percent during the period 1967-74; then it declined an average of 2 percent annually from 1974-1980. During the period 1976-82, the real GDP declined by about 1 percent per year, largely as a consequence of the stagnation in Zaire's terms of trade (the falling price of copper, the main Zairian export mineral). During the period 1976-82, the real GDP delcined by about 1
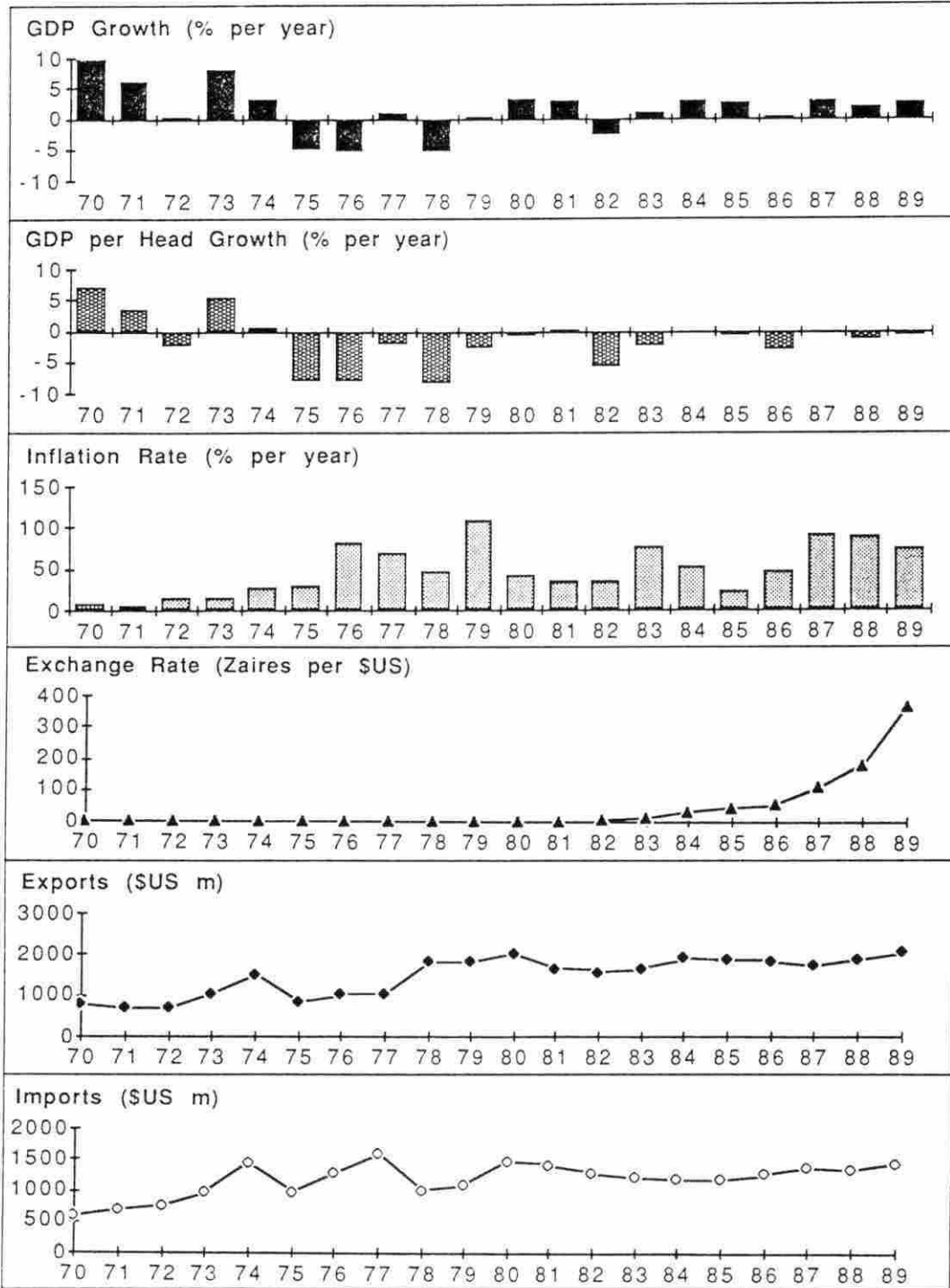
GDP Growth (% per year)

GDP per Head Growth (% per year)

Inflation Rate (% per year)

Exchange Rate (Zaires per $US)

Exports ($US m)

Imports ($US m)

Note: Leading indicator data for 1989 are based on the first half of 1989. 1989 exchange rate is for mid-1989.

Figure 5.   Leading indicators for Zaire (Hodd, 1991, p. 348)

EXPORTS
Composition 1987

Other 25%
Cobalt 4%
Oil 7%
Diamonds 9%
Coffee 13%
Copper 42%

IMPORTS
Composition 1984

Chemicals 7%
Fuels 24%
Machinery 40%
Foodstuffs 29%

EXPORTS
Destinations 1987

Other 23%
Italy 11%
W Germany 11%
USA 18%
Belgium 37%

IMPORTS
Origins 1987

Other 32%
W Germany 7%
France 8%
Belgium 16%
China 37%
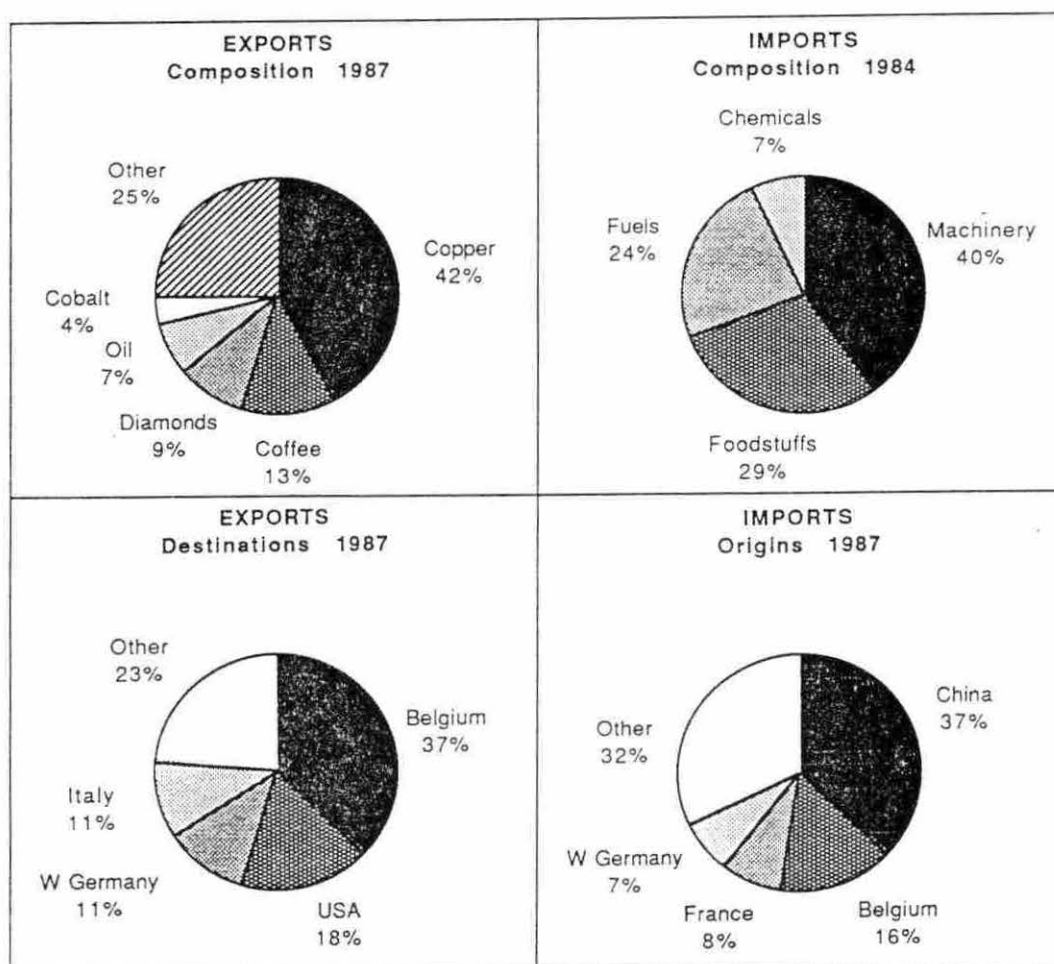
Figure 6.   International trade of Zaire (Hodd, 1991, p. 349)

Table 1.   Summary of leading indicator data of Zaire
            (Hodd, 1991, p. 349)

	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
GDP growth (% per year)	2.2	2.9	-2.6	0.8	2.7	2.5	0.1	2.7	1.8	2.5
GDP per head growth (% per year)	-0.8	-0.1	-5.6	-2.3	-0.4	-0.6	-3.0	-0.4	-1.4	-0.7
Inflation (% per year)	42.1	34.9	36.2	77.1	52.2	23.8	46.7	90.4	90.0	75.0
Exchange rate (Zaires per $US)	2.8	4.4	5.8	12.9	36.1	49.9	59.6	112.4	187.1	375.0
Exports, merchandise ($US m)		1678	1601	1686	1918	1853	1844	1729	1900	2050
Imports, merchandise ($US m)	1472	1421	1297	1213	1176	1187	1283	1390	1350	1450

Note: Leading indicator data for 1989 are based on the first half of 1989. 1989 exchange rate is for mid-1989.

Table 2.   Economic indicators in Zaire, 1971-1986 (Leslie, 1987, p. 174)

	1971	1975	1978	1979	1980	1981	1982	1983	1984	1985	1986
GNP per capita ($) (1980 market prices)	242	228	195	195	190	189	183	170	140	-	-
Exchange rate - $/Z[a] (end of period)	.500	.500	1.007	2.025	2.985	5.465	5.746	30.120	40.450	55.793	-
Fund quota (mil. of SDRs)	113.00	113.00	152.00	152.00	228.00	228.00	228.00	291.00	291.00	291.00	291.00
Consumer prices (1980=100)	3.38	7.44	33.74	70.38	100.0	134.91	185.11	325.54	495.56	700.94[b]	845.64[c]
Exports (Z mil.)	343.5	432.4	778.2	2,342.2	4,553.8	2,836.1	3,265.9	13,921.0	36,299.7	47,372.0	-
Copper	207.8	216.4	322.7	853.6	1,966.1	1,328.6	1,321.6	5,856.5	-	-	-
Cobalt	23.1	48.4	180.7	1,067.0	962.6	456.1	214.3	562.0	-	-	-
Diamonds	16.0	27.6	103.2	171.2	191.6	188.6	380.9	2,100.1	6,384.6	7,263.4	-
Coffee	24.6	27.1	138.2	243.4	458.5	420.1	617.8	1,811.6	7,206.8	8,482.1	-
Imports (Z mil.) (fob)	262.3	392.0	423.0	902.5	2,006.7	2,543.7	2,371.1	5,877.8	21,332.2	34,033.0	-
Current account bal. ($ mil.)[d]	-102.0	-542.7	453.1	146	-154	-424	-433	-310	377	-	-
Government deficit(-) or surplus (Z mil.)	- 76.2	-214.6	-595.5	-548.6	-331.6	-2,157.8	-3,504.9	-1,681.0	-3,764.5	-	-
Debt outstanding & disbursed - DOD ($ mil.)	363.6	1,718.4	3,578.8	4,067.5	4,288.0	4,213.1	4,083.0	4,379.6	4,236.2	4,821.0	-
Debt Svc. Ratio DOD/GNP	18.3	25.0	56.3	65.6	42.8	47.5	46.9	61.4	95.9	111.8	-

a. market rate

b. average for 4th quarter 1985

c. average for 2nd quarter 1986

d. - sign indicates debt

Source: World Bank Debt Tables 1981-1987; World Bank, World Development Report 1986; IMF, International Financial Statistics.

27

Table 3.   Basic data of Zaire (Tshishimbi et al., 1994, p. 116)

	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
Annual rate of growth										
GDP (1970 prices)	2.4	2.9	−3.0	1.3	2.7	2.5	2.7	2.6	2.2	−2.0
Consumer price index[a]	46.7	53.0	41.0	101.0	14.5	39.0	38.3	106.5	93.7	100.0
Money supply[b]	61.5	37.9	73.5	73.8	84.2	27.3	58.8	96.7	127.3	75.4
Population	3.0	3.0	3.0	3.0	3.0	3.1	3.1	3.2	3.2	3.0
Terms of trade	−8.1	−16.5	−5.5	5.7	1.3	−2.4	−2.3	−8.2	19.6	—
Percentage of GDP										
Consumption	86.0	92.3	91.3	91.8	82.6	81.9	87.8	90.8	91.5	92.0
Gross domestic investment	15.0	15.0	14.4	10.9	13.9	13.5	11.2	11.9	11.0	10.0
Resource balance (gap −)	−1.0	−7.3	−5.7	−2.7	3.5	4.6	1.0	−2.7	−2.5	−2.0
Gross domestic savings	16.2	15.8	11.3	13.2	18.8	16.9	16.4	10.0	9.8	15.7
Budgetary deficit (−)	−2.7	−7.2	−10.5	−4.0	−3.8	−1.5	−5.2	−9.7	−21.2	—
Long term public debt	41.5	46.3	45.8	58.0	101.6	120.4	111.1	137.2	118.0	120.0
Debt service[c]	22.5	21.9	13.2	13.7	20.8	25.7	22.0	22.7	15.9	16.0

Source: Tshishimbi and Glick, forthcoming, courtesy of Cornell Food and Nutrition Policy Program.
[a]Kinshasa CPI (end of period).
[b]Broad money.
[c]Debt service (after rescheduling) as percentage of exports of goods and services. Includes payments to IMF and on short-term debt.

percent per year; however, the GDP grew by 1.6 percent a year over the period 1980-87, while it declined at a rate of -1.5 percent yearly per head. From 1973-89, the least square estimate of the growth for GDP was -1.5 percent per year. The estimated equation is

$$\log GDP = 8.449966 - 0.01513$$

For the periods of 1975-79, 1980-83, 1984-85, 1986-87, and 1988-89, the percentage change of GDP growth rate were: -2.9, 0.9, 2.6, 2.7, and 0.5 percent, respectively. Hodd (1991) found that GDP grew by 1.6 per cent a year from 1980 to 1987, while GDP per capita declined at -1.5 percent a year. The percentage change in the GDP per capita growth rate for the same periods were: -5.6, -2.0, -0.6, -0.3, and -.05, respectively. Tshishimbi et al. (1994, p. 116) reported the following results as shown in Table 4:

Table 4.   Contribution of agriculture to growth in GDP, (percentage)

	1965-73	1974-80	1981-88
Real rate of growth of GDP	3.9	-2.0	1.6
Real rate of growth of agriculture	-1.7	1.1	3.4
GDP caused by agriculture	-	-	42.0

Source: Tshishimbi (1994, p. 106)

During the 1981-88 period, improvements in the overall growth rate came from liberalization measures and in the production of coffee, maize and rice. However, the real GDP growth rate for the 1973-90 period is -1.5 percent per year.

When analyzing the structure of the GDP by economic sector, Tshibaka (1986, p. 121) reported that during 1966-70, the output of staple food crops grew at an annual average rate of 4.0 percent while major export crops grew at 8.9 percent (Table 5). From 1971 to 1982, the annual average growth rate of staple food crop output dropped to 1.6 percent, much lower than the estimated population growth rate of 2.8 percent. The average major export crop output (palm kernels, natural rubber, cocoa beans, and palm oil) dropped to 0.8 percent. Coffee growth rate fell from 7.1 percent during 1966-70 to 2.4 percent from 1971 to 1982. While coffee grew by 3.5 percent, palm oil production decreased by 3.43 percent per year over the same period.

Hodd (1991, p. 344) found that the agricultural growth rate for the 1980-87 period was 3.2 percent. The regression coefficients for the 1967-89 show a declined growth rate for cotton production (-6.28%). During the period of stabilization and structural adjustment programs, maize production had increased by 4.3 percent per year, groundnuts by 3.4 percent, and paddy (rice) by 4.4 per year. The estimated equations are:

$$\text{Maize} \qquad \log \text{Prod} = 5.782536 + 0.042608 \text{Year}$$
$$\text{Cotton} \qquad \log \text{Prod} = 4.044902 - 0.062867 \text{Year}$$

Table 5.   Contribution of different sectors to GDP (percentage
            distributions of value added by sector) (Shapiro, 1992,
            p. 39)

				Year				
Sector	1982	1983	1984	1985	1986	1987	1988	1989
Agriculture: commercial	13	13	14	11	13	13	10	10
: subsistence	22	21	18	16	16	18	17	15
Total agriculture	36	35	32	27	28	31	26	26
Mining, extraction	12	19	25	31	33	24	21	19
Manufacturing	2	1	2	2	2	1	2	1
Other goods	4	4	3	3	3	4	4	3
Commerce (trade)	21	20	19	17	16	18	17	15
Other services	20	17	16	15	14	17	23	27
Misc. other*	5	4	4	4	4	5	7	9
Total	100	100	100	100	100	100	100	100

*Includes import duties and noncommercialized construction.

Note: Component percentages may not add up to corresponding totals due to rounding.

Groundnuts	log Prod = 5.328502 + 0.034193Year
Paddy (rice)	log Prod = 4.857316 + 0.044278Year
Coffee	log Prod = 4.010759 + 0.035052Year
Palm oil	log Prod = 4.943760 − 0.034314Year

From 1980 to 1987, the industrial sector, which is largely dependent
on mining, increased by 3.6 percent per year, while services fell by -1.2
percent a year. In particular, diamond production increased by 2.05 percent
per year between 1971 and 1987. The estimated equation is

Diamonds	log Prod = 9.24 + 0.020564Year

There has been an encouraging increase in diamonds marketed through official channels with the end of the government monopoly in 1982 and the depreciation of the currency has discouraged smuggling although this had begun to increase again by 1987. Diamond sales rose by 80 percent in 1983 and 55 percent in 1984 and continued to rise in 1987.

The least square estimate of the growth rate for diamonds since diamond digging liberalization measures is 12 percent. The estimated equation is expressed as

$$DIAM83-89 = 7.901 + 0.127862Year$$

Before the 1982 liberalization of gold and diamond digging, the estimate regression of the growth rate for diamonds was negative (-0.065). The estimate equation is

$$DIAM71-82 = 9.69 - 0.065009Year$$

Exports

From 1966 to 1970, crop exports increased, then decreased during the 1970-82 period. Palm oil and palm kernel oil exports declined at a rate of 25.8 percent and 9.2 percent, while exports of natural rubber decreased at an annual rate of 4.5 percent and cocoa bean exports at 2.3 per cent. Cotton disappeared completely from the export list in 1977. Export volumes fell by 3.4% a year during the 1980-87 period.

The output of food crops increased at an average annual rate of 3 percent in 1982-86. However, production of industrial and export crops continued to stagnate or decline. In 1987, exports were 33% of the GDP. The main exports were copper 42%, coffee 13%, diamonds 9%. In 1991, copper exports drastically decreased because of the collapse of a major mine shaft at Kamoto due to a lack of maintenance and replacement of equipment at Gecamine. This large copper parastatal earns more than half of the foreign exchange and is a major source of tax receipts. As a result, copper production in 1991 was expected to be only one-half that of 1959, the last year before independence.

In 1993, because of ethnic violence in the Shaba province, copper production had fallen from 470,000 metric tons to about 60,000 tons a year. By contrast, diamond production has increased over 20 million carats yearly, becoming the main Zairian export.

Regression coefficients for the 1973-1989 show a decline of -0.12 percent a year under the stabilization and structural programs, while the trend of exports shows a positive correlation with increased exports of diamonds from 1983. The estimated equation for export growth is

$$\text{Exports: log Export} = 6.947497 - 0.001287\text{Year}$$

A combination of falling prices for Zaire's main mineral exports and poor production performance has resulted in falling export earnings. However, from 1973 to 1982, the least square estimate of the growth for exports was -0.03705, when diamond digging by private persons was prohibited. The estimated equation is

$$\text{EXP73-82} = 7.096264 - 0.03705\text{Year}$$

Whereas exports have grown by 1.83 percent since the 1982 diamond digging liberalization measures, the least square estimate of growth for exports is 0.018055.

From 1983 to 1989, estimate coefficient for export is seen in the following predicted equation.

$$\text{EXP83-89} = 6.902490 + 0.018055\text{Year}$$

Leslie (1987, p. 81) found that the percentage share in total exports rose from 4% in 1980 to 17.6% in 1984, largely attributable to measures taken by the government in 1982 to liberalize diamond digging.

Imports

Because the growth of food crops was less than that of the population and lagged far behind the growth in demand from Kinshasa and other urban areas, massive amounts of food were imported during the 1970s and 80s. From

1967 to 1974, the volume of food importation increased at an annual rate of 2.1 percent, and the rate jumped to 7.2 percent from 1974 to 1982. From 1980 to 1987, importation volumes only declined by -0.4 percent. For example, in 1980 the importation of maize totaled 147,000 metric tons, about 44 percent of total domestic consumption (excluding consumption of nonmarketed output); imports of wheat, which was not produced domestically, totaled 103,000 metric tons; meat and fish imports each amounted to the third of domestic consumption.

Together with low mandated prices, the government policy of providing cheap imports to keep retail prices low in urban markets depressed food crop prices and discouraged domestic production. With the rising cost of oil, the price of imports started to increase in 1974. By 1975, a shortage of foreign exchange, largely due to decreased returns from copper and a falling off of other exports, had a dramatic impact on importation of intermediate goods. To make them cheaper, the government had chosen to overvalue the currency. Importation also decreased under stabilization due to cuts in import levels as recommended by the IMF. The shortages of imported inputs explain, in part, one of the most striking aspects of Zaire's economic experience, namely, the failure of investment to make a mark on aggregate output. At the end of 1987, imports were 36% of GDP. The main imports were machinery 40%, food produce 29% and fuels 24%. From 1973 to 1989, the regression coefficient shows a decline in imports of only - 0.08 percent per year. The estimated equation for imports is

$$\log Import = 6.577706 - 0.000839 Year$$

Terms of trade

Since 1975, the Zairian crisis has also contributed to and/or sustained by the deterioration of the terms of trade, largely due to the depressed level of copper prices throughout most of the crisis. Over the period 1975-82, the terms of trade continued to deteriorate with the ensuing balance of payments deficits, shrinking the GDP, and raising the debt burden. From 1983-89, the terms of trade deteriorated by 20 percent yearly. The terms of trade were 104.5, 86.5, 83.5, 81.6, and 75.9 for the

years of 1975-79, 1980-83, 1984-85, 1986-87, and 1988-89, respectively. While exports of copper, coffee and diamonds have increased over the periods, overall terms of trade have moved in opposite direction. Under the stabilization and structural adjustment programs, macroeconomic policies encouraged an increase in the traditional exports of copper, cobalt, coffee, and diamonds, while export earnings decreased continuously. Adding the fact that large portions of exports earnings were stocked in Western banks, the government of Zaire had a great difficulty to fully implement its commitment toward its people.

Current account

The external accounts deteriorated in 1975. Despite a sharp contraction in the volume of importation, the current account showed no improvement, largely because of a decline of 38 percent in the terms of trade. In 1977, the account deficit rose to US $1.45 billion. In addition to declining copper prices, a failure to fully repatriate exportation earnings, especially from coffee, and a sharp decrease in net capital inflows contributed to this deficit. In 1978, despite a slight improvement, the overall balance of payments deficit appears to have remained approximately US $500 million.

The regression equation of current account against imports, exports and the exchange rate from 1973 to 1989 is espressed as

$$CA = -544.59 - 0.58IMPORTS + 0.49EXPORTS + 22.68EXCHRATE$$

With a one percent increase in the cost of imports, the current account deficit will increase by 58 percent, while a one percent increase in the value of exports will improve the current account by 49 percent. If the exchange rate appreciates by one percent, the current account balance will improve by 2200 percent.

Foreign exchange

In order to finance the large deficit (negative current account and balance of payments), in 1975, Zaire drew on its remaining international reserves (reserves became negative by about US $320 million) and accumulated arrears on external payments rose about US $320 million from merchandises imports, debt service and invisibles totaling. Pending a renegotiation of Zaire's external indebtedness with both official creditors and private banks, Zairian authorities suspended most debt service payments, and external creditors and suppliers became increasingly reluctant to extend credit to Zaire. As a result, the authorities introduced new foreign exchange restrictions.

However, under a standby arrangement, the IMF and the World Bank approved and enlarged credit to Zaire. At the end of 1976, additional external payments in arrears of approximately US $130 million raised the outstanding arrears to about US $450 million. This process (foreign exchange shortage, restrictions on foreign exchange, accumulation of arrears, negotiation of external interest payment reschedulings, new standby arrangement and so on) has been repeated yearly and has raised the external debt to approximately US $10 billion by 1994.

Exchange rate

During most of the 1970s and the early 1980s, the national currency—the Zairian currency—was grossly overvalued and the exchange system was characterized by a multiple-rate regime. Whereas the 1967 devaluation of the currency corresponded to a 201.8 percent increase in the official exchange rate (expressed as number of units of local currency per unit of foreign currency), the Congolese franc was changed into the Zaire, and was set at US $2 for 1Z.

The real exchange rate increased 0.8 percent annually during 1966-70 but fell 0.6 annually during the 1971-82 period, which contributed to the declining performance of the farm sector and the overall economy. In terms of foreign currencies, the real value of the Zaire began to deteriorate in

1969, resulting in the progressive reimposition of restrictions on imports and foreign exchange transactions.

From 1970 to 1975, the difference between the parallel market and the official exchange rates grew at an average rate of 70.8 percent per year. Before the 1983 exchange rate reform, the economy operated under several exchange rates: one legal and official rate, and several semiofficial rates as well as a multitude of unauthorized rates. The latter were related to transactions taking place outside the official banking system. The official rate was used for all official foreign transactions except certain mining transactions. The semiofficial rates were applied to purchases of gold and diamonds by specialized marketing agencies. Both the official and semiofficial rates were determined and regularly published by the central bank.

In the 1980s, The currency steadily depreciated, first by devaluation, and then, after 1983, by a floating exchange rate. The September 1983 reform unified the rates in the official and semiofficial markets and gradually eliminated the spread between the official rate and the parallel markets. This has seen the exchange rate for Zaire depreciate from Z2.8 = US $1 in 1980 to Z131.5 = US $1 in August 1987, and to Z274 = US $1 in 1988. Further devaluations brought it down to Z435, Z1,000, Z1,000,000, Z3,000,000, Z6,000,000 and to Z9,000,000 by the end of 1993. In December 1993, a new reform introduced a new Zaire 1NZ equaled to Z9 million, equaled to US $1. In May 1994, the exchange rate had already depreciated, with 456 NZ equal to US $1. The regression coefficient for the 1973-1989 period shows that the Zaire had depreciated by -44.34 per year during the period. The estimated equation is

$$\log EXCHRATE = 2.099391 - 0.443462Year$$

From 1973 to 1989, the response of imports to variations in exchange rates (US 1$ for Z) shows a positive correlation between imports and exchange rates. A one percent change in exchange rate (depreciation of the zaire vis-a-vis the US $), will increase the cost of importation by 8.33 percent. The estimated equation is

$$IMPORTS = 6.519 + 0.08334EXCHRATE$$

Inflation rate

From 1975 to 1983, inflation averaged 60 percent annually.
From 1980 to 1987, inflation in Zaire was 53.5% a year.
Inflation performance has been variable, with annual rates of price
increases in the 1980s between 20% and 75%. During the 1983-85 period, the
inflation rate fell from 77 to 24 percent, but the rose again to 47 percent
in 1986. From 1986 to 1988, the exchange rate was again seriously
overvalued, and inflation surpassed 100 percent. Inflation was over 100
percent by 1989. In 1990, the government abandoned the IMF/World Bank
economic stabilization program and public expenditures soared at the same
time that bilateral and multilateral donors cut their economic and
financial assistance. By the end of the year, hyperinflation followed by a
series of devaluations and runaway public expenditures had put the economy
into an unprecedented dive. Since 1992, Zaire's macroeconomic environment
was more unstable than ever, with runaway inflation of from 20 to 50
percent a month (over 2,000 percent in 1993), and successive devaluations.
From 1967 to 1987 the least square estimate of the growth rate for
inflation was 35% per year. The estimate equation is

$$\log INFLA = 1.863668 + 0.351454Year$$

Fiscal deficit

The Zairian government's expenditure and credit policies have been
financed by an increasingly large fiscal deficit. From 1967 to 1970 the
deficit was 10.7 million a year. Then it increased to 400.8 million a year
during 1971-81. As a percentage of the GDP, the government budget deficit
was -5.8, -6.1, -2.6, -7.4, -21.0 for the 1975-79, 1980-83, 1984-85, 1986-
87, and 1988-89 periods, respectively. As in the past, these deficits were
financed by increased money supply by the Bank of Zaire, and the credit
expansion to the light import susbtitution industries, and for the purchase

of coffee and diamonds. From 1977 to 1988, the government expenditure and
lending minus repayment, as a percentage of the GDP, were:

1977	16.9
1978	16.4
1979	16.1
1980	12.1
1981	13.5
1982	12.9
1983	11.8
1984	15.9
1985	15.3
1986	16.7
1987	20.0
1988	17.5

The regression coefficient for the period 1973-89 shows that
government budget deficit grew 36% per year. The predicted equation is

$$BUDEFIC = 1.37 + 0.369574Year$$

Money Supply and Domestic Credit

The Bank of Zaire has expanded domestic credit and the money supply
by creating claims on government. During 1966-70, domestic credit and the
money supply increased at annual rates of 10.1 percent and 20.2 percent,
respectively, while claims on governmemt rose at an annual rate of 20.8
percent.

Between 1971 and 1982, when the deficit in the government account
increased rapidly, the Bank of Zaire expanded the claims on government at
an annual rate of 34.2 percent. Domestic credit rose at an annual rate of
33.7 percent and the money supply by 30.2 percent.

From 1975 to 1983, money supply grew an average of 40 percent
annually. Zairian budget deficits have been almost entirely financed by the

Central Bank and, to a large extent, have been responsible for increases in the money supply.

From 1967 to 1989 the least square estimate of the growth rate for money supply was 33% per year. The estimated equation for money supply is

$$\text{Money supply: } \log \text{MONEY} = 3.62378 + 0.336685 \text{Year}$$

From 1973 to 1983, the least square of the growth rate for public domestic credit was 37.6 percent. The estimatee equation is

$$\log \text{DEMCRED} = 3.699082 + 0.376339 \text{Year}$$

Investment and Savings

Although the investment rate averaged 30 percent in the period 1970-73, this was not matched by an increase in domestic savings, and as a consequence a resource gap developed. Only one-fourth of government capital expenditures was financed through government savings in 1973. From 1967 to 1974, the bulk of investment was allocated to the modern sectors (mining and manufacturing) and to services benefiting mostly the urban centers, which expanded considerably during this period. The gross fixed investment nearly doubled in real terms between 1970 and 1974 to achieve an extraordinary rate of 36.4 percent of GDP. However, GFI has declined every year since then.

In 1987, private consumption was 73% of GDP, with government consumption 17%. The level of investment was the lowest compared with the rest of Africa, at 13%, of which 10% was contributed by domestic saving.

From 1973 to 1983 the least square estimate of the growth rate for private consumption is 9% per year. The estimated equation for private consumption is

$$\log \text{CONS} = 7.221823 + 0.098909 \text{Year}$$

Private savings

From 1973 to 1983, domestic private savings grew by 0.12 percent per year. The predicted equation is

$$PRIVSAV = 7.577137 + 0.001282Year$$

From 1973 to 1989 domestic investment decreased by -3% a year. The estimated equation for domestic investment is

$$\log INV = 7.251451 - 0.032666Year$$

External Debt

Since 1975, the Zairian crisis has been also brought about and/or sustained by heavy external borrowing in the years immediately preceeding the crisis for projects and at terms not always consistent with Zaire's economic needs and capabilities. It increased by 50 percent in 1974, and foreign exchange reserves declined by 40 percent. Zaire's external debt was estimated at US $7,800 million, of which 28 percent is with commercial banks. The level of financial commitment from the World Bank in support of reform programs was in US million dollars, 135.0, 170.0, 220.0, 336.5, 818.2, 299.9, 1,023.3, 1,221.4, 1,005.6, 1,544.7, respectively, in 1980, 1981, 1982, 1983, 1984, 1985, 1986, 1987, 1988, and in 1989, giving a cumulative of 6,774.6 million US dollars. Table 6 displays trends in external financing in Zaire, 1971-85.

From 1973 to 1989, the least square estimate of the growth rate for external debt (capital plus interest payments) is 17.7 percent per year. The estimated equation is

$$\log Etdeb = 6.617572 + 0.1777415YEAR$$

Table 6.   Trends in external financing in Zaire, 1971-1985 ($ millions)

	1971	1975	1980	1981	1982	1983	1984	1985
Commitments	156.1	480.8	369.7	153.8	178.0	158.9	163.9	143.6
IBRD	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0
IDA	23.5	52.0	29.5	29.3	100.8	88.5	81.5	91.4
Bilateral	26.0	117.5	216.1	94.6	54.5	63.9	82.4	36.1
Private creditors	106.6	211.3	124.1	29.9	22.7	6.5	0.0	16.1
Suppliers	44.2	76.8	15.2	10.7	17.1	0.0	0.0	16.1
Financial markets	62.4	134.5	108.9	19.2	5.6	6.5	0.0	0.0
Disbursements[a]	197.8	512.8	430.5	285.6	151.4	154.1	128.9	105.0
IBRD	0.0	11.8	23.3	0.1	0.0	0.2	0.0	0.0
IDA	2.1	11.5	19.7	17.3	38.4	49.8	51.0	55.9
Bilateral	11.8	163.6	138.7	212.3	89.0	85.4	77.9	49.1
Private creditors	183.9	325.9	248.8	55.9	24.0	18.7	0.0	0.0
Suppliers	96.2	88.9	96.6	10.5	22.5	0.0	0.0	0.0
Financial markets	87.6	237.0	152.2	45.4	1.5	18.7	0.0	0.0
Net flows[b]	170.8	425.0	324.8	230.3	111.1	112.4	34.1	26.6
Use of IMF credit	0.0	85.8	233.1	345.7	422.6	510.1	579.4	721.0

a. Includes disbursements of previously committed funds

b. Disbursements less debt service payments, calculated based on credits from all sources

Source: World Bank, World Debt Tables 1981, 1986-87; World Bank Annual Reports.

41

Debt service ratio

The debt service ratio (debt service/government expenditures) moved
up from 4.5 percent in 1970 to 12.9 percent in 1974. Because of default in
interest payments, arrears have accumulated. The shortage of foreign
exchange associated with ever-increasing foreign debt servicing obligations
and continued high demand for imported consumer goods led to a contraction
of imports for investment and productive purposes. The result is a further
deterioration of the nation's capital and infrastructural stocks. Since
1989, foreign debt servicing has averaged nearly 40 per cent of current
government expenditures and was more than four times the Zairian
government's investment budget.

In 1988 and 1989 major bilateral donors canceled part of the
outstanding foreign debt, first Canada followed by France, Belgium, the
USA, and Germany. Such cancellations were conditional on strict adherence
by Zaire to the IMF program. For 1990, the budget savings because of the
debt forgiveness and reduced interest payments amounted to about US 30
million dollars, about half of the total investment budget of the
government of Zaire in 1989.

Taxes

With the exception of rice and palm oil, other major crops were taxed
during 1971-82 period. Rates of taxation were, in decreasing order, highest
for cotton, coffee, groundnuts, and maize. Overall, export crops were
discriminated against more than food crops. In 1977, an increased new tax
on coffee had resulted in substantial underreporting and smuggling.
The average share of taxes on imports and exports was about 52.6 percent of
total government budgetary revenue during the 1970-78 period against 63.9
percent in 1970.

In 1978, the average share of taxes dropped to about 28.5 percent.
The drop was due to a growing weakness in tax administration and tax
collection, and an increase in tax evasion. The ratio of import taxes to
import value declined from 25 percent to 20 percent and that of export

taxes to export value from 34 percent to 114 percent during 1970-77. The
fall in the share of export taxes was more pronounced, largely because of
Gecamine's financial problems and the tax rebate the company received. The
ratio of export taxes to export value dropped from 32 percent in 1974 to 14
percent in 1977.

In early 1977 the Zairian government increased the taxes on other
exports than those of Gecamine's in order to reduce the budget deficit from
Z310 million to Z175 million. From 1973 to 1983 the least square estimate
of the growth rate for total tax revenues was 2.2 % per year. The estimated
equation is

$$\log TAX = 6.55683 + 0.022985 Year$$

While taxes on goods and services showed an increase of 10.7% per year from
1973 to 1983, there was a decrease of -1.6% in taxes on international
transactions. The estimated equations are

Taxes on goods & services:

$$\log TAX = 4.256353 + 0.10785 Year$$

Taxes on international transactions:

$$\log TAX = 5.984591 - 0.016934 Year$$

During the same period, the least square estimate of the growth rate for
government revenues was 5.6% per year. The estimated equation is

$$\log REV = 6.351856 + 0.055999 Year$$

Macroeconomic Reforms in Zaire

Macro and microeconomic reforms are undertaken in order to achieve
macroeconomic balances, to increase efficiency in production and
distribution, and to promote economic growth. The general objective of

reforms would consist of mobilizing domestic savings to make it match investment requirements. Specifically, the aim of reforms would involve:

- the increase of the availability of foreign exchange in order to achieve balance of payments equilibrium and meet investment requirements;
- the removal of anti-export bias and introduction of export promotion and/or ultra export promotion policy;
- the promotion of neutral openness of the economy, with selective protection of import substitution industries, and at the same time, with export promotion policy being applied;
- the increase in domestic savings (private, governmental and external); and
- a look to increase efficiency in production and distribution of the national income.

Reforms of 1967-1974

Objectives   In June of 1967, Zaire requested and obtained a standby arrangement from the IMF in the amount of US $27 million to finance a stabilization program (Leslie, 1987, p. 61). The program consisted of monetary reforms, including a major depreciation of the currency and the introduction of a new monetary unit, the zaire. The objectives of the reform were to:

- increase domestic savings (government savings)
- eliminate the effective rate of protection due to exchange rate overvaluation;
- increase efficiency in allocation of foreign exchange;
- increase efficiency in production; and
- promote an equilibrium of balance of payments.

Policies   The reform policies were:

- Exchange Rate Policy - A tremendous devaluation was decided;
- Contractionary Fiscal Policy - The government decided to reduce its budget deficit and to limit increases in salary;

- Foreign Exchange Control - A relaxation on exchange controls for more efficient foreign exchange allocation was to be applied; and
- Contraction of Domestic Credit - The government decided to restrict increase in credit toward the private sector.

Instruments   The instruments developed to achieve reform were:
- Devaluate the currency by creating a new currency, the Zaire, to replace the old "Congolese franc". The exchange rate was set at 1Z for US $2, representing 1,000 old Congolese franc. This represented a 201.8 percent devaluation.
- Increase domestic public savings by reducing the government budgetary deficit (public expenditure cuts, limitation of salary increases), and increasing tax revenues.
- Achieve efficiency in production by the elimination of effective rate of protection and the encouragement of export by devaluing the currency.
- Achieve efficient foreign exchange allocation by reducing exchange controls.
- Reduce investment by restricting the increase in credit accorded to the private sector in order to reduce imports and achieve the equilibrium of the balance of payments.

Performance   The performance plans were:
- substantial increase in foreign exchange from both the farming and mining sectors;
- increase in foreign exchange reserves;
- during 1967-74, increase in GDP output (6.4 percent);
- increase in staple food crops output (4.0 percent);
- increase in major export crops output (8.9 percent);
- a substantial rise in government revenue and thus a considerable improvement in the budgetary and balance of payments performance;
- a substantial reduction in inflation through 1971;

In 1969, distortions, or progressive reimposition of restrictions on imports and foreign exchange, resulted in deterioration of the zaire currency in terms of foreign exchange. In general the program's objectives

were achieved mainly through unexpected revenue increase rather than through expenditure cuts or revenue policies contained in the standby arrangement.

From 1970 to 1975, the increasing negative current account balance was estimated at 60.0 per year. The current account deficit rose to US $592.7 million in 1975 due to the Zaire terms of trade deterioration. Gould (1980) mentioned that the Zaire crisis cannot be exclusively attributed to governmental expenses. Other factors had significant impact on macroeconomic level, namely the decreasing price of copper (the main source of foreign exchange for Zaire) on the international market. The average price per metric ton had fallen from 80,384 Belgian Francs in 1975 to B.F. 45,367, and reached its lowest level in 1976 (B.F. 37,416).

Falling copper prices, the disruption of the economy caused by the closing of the Benguela railroad during the Angolan civil war, the rising cost of oil and other crucial imports, and the disastrous reduction in levels of economic production and distribution caused by the Zairianization of many foreign-owned businesses in key sectors starting in 1973, plunged the country into economic crisis.

While the levels of investment remained high (about 35 percent of commercialized GDP, mostly allocated to mining), imports increased almost twice as much as exports, pushing the current account deficit to about $650 million, more than double that of 1973.

By 1975, the government budget deficit was 73 million zaire, the first since 1965. Overall, aggregate output as measured by GDP fell from a high of 1,069.9 million zaire in 1974 to 996.7 million zaire in 1975.

Reforms of 1976-1981

Objectives   The first attempt at stabilization took place in 1976. To resolve the balance of payment crisis after the fall of copper revenues of 1975, the government of Zaire introduced, and the IMF approved (in March 1976), a request for financial assistance for US $ 150 million. This was the first of four programs, including an extended financing arrangement for

more than US $ 1 billion, which was negotiated with the IMF (in 1976, 1977, 1979, and 1981) and resulted in total drawings of SDR 339 million.

The packages generally combined demand management, supply incentive measures, and actions designed to rehabilitate infrastructure in the agricultural, transport, and energy sectors. Public debt was rescheduled by the Paris Club, while private banks met in London Club to discuss commercial debt, reported to be somewhere in the range of $750 to $900 million. The objectives of the 1976 reform were:

* increase domestic saving (public savings);
* eliminate the effective rate of protection due to overvaluation of the currency;
* increase efficiency in foreign exchange allocation; and
* increase efficiency in production

Policies   The policies were:
* Exchange Rate Policy
* Contractionary Fiscal Policy
* Producer Prices Policy
* Foreign Exchange Control
* Tax Revenue Policy

Instruments   The instruments developed were:
* Achieve efficient foreign exchange by imposing new foreign exchange restrictions;
* Increase domestic savings by applying contractionary fiscal policy (the 1977 cut backs in imports), and increase government tax revenues (the 1977 increase in taxes on exports other than those of GECAMINES in order to reduce the government budget deficit). In addition, there were efforts to improve tax collection, and the administration of the government payroll. The reorganization of the customs service and public corporation measures aimed to increase government revenues.
* Eliminate the effective rate of protection by devaluing the zaire in 1976 (58.4%), 1978 50% between November 1, 1978 and January 2, 1979), and 1979 (25% on August 24, 1979).

- Achieve efficiency in production by reducing the impact of the government to control all agricultural prices, and to set official prices.
- Improve the investment selection process.

Performance   With the euphoria of foreign exchange (high export earnings, and inflows of Western capital), Zaire embarked beginning 1970s in expansionary fiscal policies of government over-spending coupled with a strategy of reliance on external borrowing to finance investments of questionable economic justification. Such investments served merely to increase Zaire's dependence on developments in foreign trade. A few examples include (a) the costly Inga-Shaba project about $800 million); (b) a $200 million steel mill at Maluku; (c) the construction of the Voix du Zaire, the country's radio and television station at an estimated cost of $100 million; and (d) the construction of an International Trade Center in Kinshasa, a replica of the New York World Trade Center.

The economy had shown no signs of improvement when the Shaba province was invaded in March 1977. Shaba I (The War of Eight Days) struck at the life-line of the economy, the copper belt, worsening an already serious economic situation. The current account deficit rose from US $592.7 million in 1975 to US $803.2 million in 1976, and to US $1,451.3 million in 1977. The government budget deficit reached a record of Z 310 million in 1976. As a result of tax increase on export crops, substantial underreporting and smuggling of coffee were recorded.

The terms of trade deterioration due to declining world prices of copper.   Foreign exchange shortages also were due to the nonrepatriation of export earnings from coffee to the Bank of Zaire. GDP was about 17% below 1974 levels; import volumes were about 50% below 1974 levels, and 20% below 1970 levels.

The transport sector continued to suffer from a lack of fuel, a shortage of equipment and spare parts, as well as inadequate maintenance of infrastructure. Agricultural production maintained a steady decline relative to population growth, registering 15 percent less per capita than in 1974.

The consumer price index climbed to 935.8 from 229.7 in 1974, while real wages were more than 50 percent below 1974 levels. During 1977-78 period inflation rate averaged 100 percent. From 1975 to 1983, domestic inflation averaged 60 percent.

During 1970-78, average annual share of taxes on international trade and transactions was about 52.6% of the total government budgetary revenue. It represented 63.9% of the budgetary revenue in 1970 but dropped to about 28.5% in 1978 due to government weakness in tax administration, an increase in tax evasion, and GECAMINES financial problems and the rebate the company received.

The budget deficit moved from Z 10.7 million a year during 1967-70 to Z 400.8 million a year during 1971-81. In 1976, the budget deficit reached a record of Z 310 million (9% of commercialized GDP). Budget deficits increased, financed by credit expansion. Government consumption rose from Z 150.8 million a year during 1966-70 to Z 1,218.2 million a year during 1971-81.

During 1966-70, domestic credit and money supply increased at annual rates of 10.1 percent and 20.2 percent, while claims on government rose at an annual rate of 20.8 percent. From 1971 to 1981, claims on government increased at an annual rate of 34.2 percent. Domestic credit rose at an annual rate of 33.7 percent and the money supply by 30.2 percent. Money supply grew an average of 40 percent annually from 1975 to 1983. By 1980, the government was allocating some 40 percent of the budget to service the debt inherited from the previous years of heavy borrowing.

In general, the IMF-supported programs did not restore budgetary and external balance and reduce inflationary pressures mostly due to a lack of commitment on the part of the Zairian authorities to an effective implementation of the prescribed policies. Therefore, the 1977 standby and the 1981 extended fund facility were both canceled because of the country's lack of compliance. Most of the funds made available by the IMF remained undrawn (SDR 737 million out of a total SDR 912 million in the case of the extended fund facility).

Over the period 1975-1982, the terms of trade continued to deteriorate with ensuing balance of payments deficits, shrinking GDP, and a

mounting debt burden. Beginning in the early 1970s a number of parastatal organizations responsible for promoting production and marketing of various agricultural products were created. These 'Offices Nationaux" were for coffee, cotton, livestock, wood, sugar, rubber, and fish, among others. Most of these parastatals were dismantled in 1978, although some have survived (e.g., OZACAF for coffee).

Reforms of 1982

Objectives From independence until early 1980s, Zaire undertook a set of macroeconomic policies that had adverse effects on the agricultural sector. These policies included among others, maintenance of an overvalued exchange rate, low official producer prices for food crops, high export duties and cumbersome bureaucratic procedures for agricultural commodities, numerous internal local taxes on production and marketing of agricultural goods, and substantial public borrowing leading to a heavy debt service burden which in turn severely limited the availability of foreign exchange.

Ideally, macroeconomic policy should seek to create conditions favorable to investments and to growth of the agricultural sector (control of inflation, availability of foreign exchange, fiscal policy that provides investment incentives, tariff policies and procedures that encourage exports and the development of local enterprises, and an efficient public administration).

Beginning in the early 1980s, Zaire implemented a number of macroeconomic policies to promote market liberalization. It has been demonstrated that a high GDP growth rate is associated with a high degree of liberalization (outward orientation).

Before Zaire's most significant adjustment effort in 1983, the government of Zaire took in 1982 several actions, particularly with regard to the reduction of the public sector's deficit, as a precondition for IMF support.

The most important reform was the liberalization of gold and diamond digging and the policy of price liberalization including interest rates liberalization. Gold and diamond digging liberalization was expected to

increase export earnings. Price liberalization was expected to increase agricultural produce (food and export crops productions). Interest rate liberalization was expected to encourage domestic savings while discouraging consumption and capital flight. Making interest rates positive would stimulate domestic savings and increase investment.

Policies   The policies were:
- Interest Rate Policy
- Producer Price Policy
- Encourage private enterprises in gold and diamond activities

Instruments   The instrument was:
- interest rate

Performance   By the end of 1982, Zaire was again on the verge of default. In spite of two further Paris Club rescheduling (1979 and 1981), an IMF Stabilization Plan (1979), an Extended Fund Facility (EFF) for 912 million SDRSs in 1981, a London Club rescheduling (1980) and five devaluations of the zaire, the country's economy showed no signs of improvement. With Zaire's failure to meet IMF criteria, the EFF was officially suspended in July 1982.

The economic indicators remained discouraging. The 1982 budget deficit was estimated at Z3.00 billion. Copper prices were averaging $0.69 per pound compared to $0.99 in 1980 and $0.79 in 1981. Further, in the face of weak market demand for cobalt, Zaire had to reduce its selling price from $17.50 per pound to $12.50. By June 1982, Zaire had accumulated arrears of some $863 million in Paris Club debt, and by October was unable to make payments on London Club debt for the second time that year.

Reforms of 1983-1985

Objectives   By mid-1983, after following a year-long "shadow program," Zaire and the IMF agreed on the terms of a new standby agreement. The formal agreement with the IMF was signed in December and included a

fifteen-month standby agreement for $237 million and another $119 million from the Compensatory Financing Facility. Official debt was rescheduled by the Paris Club for a fifth time. The IMF program stressed economic liberalization and included measures such as decontrol of producer prices, particularly in the agricultural sector; strict controls on public spending; liberalization of the trade system; and revision of customs duties.

Because of tentative signs of recovery showed by the economy in 1984, a new one-year arrangement was approved by the IMF in April 1985. The $160.4 million arrangement aimed to support the government of Zaire's 1985 austerity program to achieve a viable economic position in the medium term. Ninety-five percent of Zaire's payments of interest and principal due in 1985 and the first quarter of 1986, totaling approximately $500 million, was rescheduled. Monthly payments were raised from $4 million to $4.5 million for the period of May to December 1985, and to $6 million from January to April 1986 (Tshishimbi, 1994).

Policies The policies of this period are discussed in the form of reforms in the exchange rate, exchange rate and trade system, monetary and credit policies, fiscal and institutional reforms, and Price and marketing reforms in agriculture.

Exchange rate reform A massive 77.5 percent devaluation of the zaire was decided in order to narrow the gap between the official rate and the parallel market rate. Following the 1983 devaluation, the zaire's link with SDR was scrapped. Under the new system, the Bank of Zaire and commercial banks would meet weekly to fix a rate for the zaire against the US dollar, based on recent transactions among themselves. Outside this, the banks were free to set their own rates and allocate their own foreign exchange according to the market.

In September 1983, the government started unifying multiple exchanges rates. The complete unification was achieved on March 1, 1984. Subsequently, the unified rate was to be determined in much the same way as the free market, reflecting the interaction of market forces.

Reform of the exchange rate and trade system   The government
decided on the abolition of a provision that required commercial banks to
surrender 30 percent of their foreign exchange receipts to the central bank
within a period of three months following the export of goods or services.
Gradually the government liberalized the system of foreign exchange
allocation applicable to the commercial banks. Also mentioned is the
elimination of the system of retention of exports proceeds, except those
specified under international credit arrangements and for the state
company, GECAMINES.

In July 1984, the government decided to remove the prohibition
against transfers of dividends by companies with foreign participation.
Also decided was the liberalization of the overall import licensing
procedures. The old system of "licenses sans achat de devises", that is,
licenses concerning import financed without rescourse to the country's
official foreign exchange reserves, was abolished. The government reduced
the number of tariffs from four to two. It also reduced the rate on raw
materials and essential food and nonfood products from 10-20 percent to 3
percent. However, it was decided to increase tax rates on luxuries up to
200 percent.

Monetary and credit policies   One of the major points of the
1983 reforms was to improve the credit structure and money and financial
markets through the creation of institutions such as an effective interbank
market and market for treasury bills. In the early 1980s the Bank of Zaire
began to use, actively and increasingly, interest rates to control monetary
expansion and the allocation of credit to the economy. Initially, credit
was regulated exclusively through quantitative limitations. Gradually,
credit allocation relied partly on ceilings and increasingly on mandatory
reserve requirements and interest rate policy. With the introduction of
treasury bills, the Bank of Zaire started paying interest on reserves
requirements of the commercial banks held by the bank. Starting in 1981,
commercial banks were asked to freely set lending rates, except for
interest rates on loans to noncoffee agriculture. The 1983 reform measures
liberalized most of the remaining interest rates. In addition, a market for

short-term treasury bills was created, designed to provide incentives for holding zaire instead of foreign exchange.

Fiscal and institutional reforms   Under the 1983 SAP, the government was asked to reduce its budget deficit by cutting public expenditures, increasing taxes, improving tax collection and rationalizing the regime of exemptions. Another condition was a comprehensive reform of public enterprise (the layoff of thousands workers), including the closing (but not the privatization) of unprofitable units and large-scale privatization. The 1983 reform also decided to make selective public investments in a few key sectors that needed to be revamped, such as education and health (human development investment). In 1983, the government introduced important changes in GECAMINES' tax regime to allow the state-owned copper company to be more responsive to fluctuations in revenues. In 1984, the government adopted a reorganization recommended by the World Bank and designed to reduce the operating costs of the copper-mining industrial complex and to ensure greater transparency.

Price and marketing reforms in agriculture   In 1982, the government began implementation of a three-year agricultural recovery plan designed to correct distortions and government neglect of the agricultural sector of previous years. Actions considered essential to agricultural recovery included price, marketing, and exchange rate reforms to restore incentives to agricultural productions; strengthening of agricultural training, research, and extension services; increasing the availability of credit for crop marketing; restoring incentives to agricultural investment by the private sector; and institutional reorganization to improve planning and programming capacities. Some of these measures were , to a large extent implemented. Price controls on most agricultural products were removed by May 1982, and the right of local authorities to intervene in marketing was abolished. In 1983, price controls on all remaining crops were removed. The 77.5 devaluation was expected to give a boost to the export crop sector.

Some restrictions remain on the domestic prices of manufactured goods, which can be adjusted freely but must conform to the cost of

production plus 20 percent formula and are subject to ex-post price controls. The government continues to intervene directly in price determination only for petroleum products, public utilities, and domestic public transport.

Instruments   The instruments were:

- The 1983 devaluation (77.5%);
- Introduction of a transitional dual exchange rate regime, leading to the unification of the two rates in February 1984;
- The floating of exchange rate;
- A substantial liberalization and simplification of the exchange and trade system, including a comprehensive revision of customs duties; and
- Decontrol of most prices, including agricultural producer prices, and interest rates.

Performance   Following a 2 percent decline in 1983, real GDP increased by 2.8 percent in 1984 as a result of some recovery in mining production, particularly diamonds and petroleum. Several sectors registered positive growth in 1984.   For example, oil output rose by 24 percent. In the mineral sector, diamond production rose from 430,000 carats in 1982 to 6.2 million in 1983 and to 11.6 million carats in 1984. The percentage share in total exports rose from 4 percent in 1980 to 17.6 in 1984, largely attributable to measures taken by the government in 1982 to liberalize diamond digging.

The budget deficit decreased by 4 percent of the marketed GDP. In the first two years of implementation of treasury bills, the sale target was successfully met and real interest rates became positive for the first time. However, achieving positive real interest rates became a wrong policy when the inflation rate drastically increases. Under conditions of hyperinflation, only prohibitive nominal interest rates can bring about positive real interest rates. In 1978-88 the inflation rate rose above 100 percent. In 1990-93 it was about 300 percent (1990), 1,000 percent, 2,000 percent, 3,000 percent (1992) and 7,000 percent (1993). The staggering inflation comes largely because the Bank of Zaire simply prints the money

whenever more is needed, entailing the depreciation of the zaire. At one point, $1 fetched 4.5 million zaire, then 7.2 million zaire, then 9 million at the end of 1993.

In 1984, the inflation rate was reduced. The Kinshasa CPI, which had risen over 100 percent 1983, increased less than 20 percent. This decline in inflation, together with the nominal devaluation, brought about a substantial depreciation of the real effective exchange rate for 1984 as a whole.

Despite the depressed export prices for coffee, total export earnings increased substantially due to higher than anticipated exports of diamonds, crude oil, cobalt, and coffee. As a result the balance of payments improved markedly and Zaire met its external debt service commitments through the year. However, from 1982 to 1985, a growing debt burden rose from 11 percent of total government expenditures in 1982 to 56 percent in 1985, in the face of reduced funds from creditors, had resulted in a net resource outflow in 1984 and 1985.

The government budget deficit was restrained within the limits laid down by the adjustment program. GDP grew by some 3 percent in 1984, not greater than the growth of population. Growth was led by the mining sector, which expanded by almost 7 percent. Commerce, services, and manufacturing also picked up.

In the agricultural sector, real producer prices increased substantially over 1981 levels. Overall, the growth in aggregate food crops increased slightly after 1982, but was still less than population growth. As a result of the removal of agricultural price controls, output of food crops increased at an average annual rate of 3 percent in 1982-86. Chronic transport problems were a major factor in the poor aggregate supply response of agriculture. These problems, including the deteriorated state of the rural network, the high cost of fuel, and difficulty in getting spare parts for vehicles, add up to very high transport costs which depress farmgate prices.

With regard to industrial and export crops, price liberalization combined with the 1983 exchange rate devaluation resulted in significant gains in real producer prices of export and industrial crops. In spite of

improvements in prices after 1982, production of industrial and export crops continued to stagnate or decline, due to the deterioration of transport infrastructures, regulation and taxation on the plantation subsector. For both industrial and export crops, exchange rate reform has given Zaire the potential to be competitive at current world prices. A 1986 study by ZTE/SOCFINCO showed that the costs of domestic resources used to produce rubber, tea, chinchona, coffee and cocoa for export and palm oil and cotton for domestic use are less than the world prices, indicating that the country has a comparative advantage in the production of these crops; only sugar appears to be uncompetitive.

The reorganization and changes in the tax regime of GECAMINES, together with the 1983 devaluation, resulted in a substantial improvement of the company's financial position in 1984 and 1985. The net loss of Z1.5 billion recorded in 1983 was transformed into a net profit of Z1.5 billion in 1984 and Z2.2 billion in 1985.

In 1986, program implementation encountered a number of difficulties. Because of terms of trade deterioration, net outflow of foreign exchange to servicing external debt without being accompanied by increased foreign investments, the government decided to limit payments on its external debt to 20 percent of its national budget and 10 percent of its export revenue. In addition, the government budget deficit sharply increased (40 percent increase in wages and salaries of civil servants, and increase in public domestic credit from the banking system). In turn, this induced a sharp expansion of money supply and an acceleration of inflation from 50 to 60 percent (partly because of shortages of foreign exchange). Exchange controls emerged.

This signaled noncompliance with the end-of-June criteria for drawing down the second tranche (installment) of the twenty-two-month standby. Hence, by the beginning of 1987, the reform process in Zaire had once again broken down. From 1986 to 1988, the exchange rate was again seriously overvalued, inflation surpassed 100 percent, and the economy performed poorly.

Reforms of 1987-1990

The reforms of 1987-90 are discussed in terms of structural adjustment. In 1987-88 the government entered into a lengthy discussion with the IMF, the World Bank, and bilateral donors in which in the end it reaffirmed its commitment to its economic liberalization program. Zaire's debt servicing obligations were rescheduled and fresh donor funding was made available.

In 1986, the government began implementation of several structural measures with the support of an industrial sector adjustment credit of US $80 million, consisting of a World Bank credit of $20 million and an IMF special facility for Africa credit of $60 million.

In 1987, the government adopted a structural adjustment program, financed partly by a World Bank structural adjustment credit of US $ 165 million and by an IMF structural facility of US $ 75 million. The structural adjustment credit consisted of a World Bank credit of $55 million, an IMF special facility credit of $94.3 million, and a special Japanese joint financing of $15.7 million. The aim of the new policies was to lay the basis for long term growth and a sustainable external financial position through improvements in macroeconomic management, reform of agricultural and transport sector policies, and enhancement of incentives for the private sector. The major production increase was to come from the private sector, particularly nontraditional tradables, which were viewed as a means of eventually achieving external balance

Instruments The instruments were:
- Tax Reforms - In 1986, export taxes were abolished on all manufacturing exports. The only remaining export taxes were on mining products, wood, and coffee, with rates for these items ranging from 3 and 4 percent (arabica and robusta coffee, respectively) to 40 percent (copper).
- Tariff Reforms - The tariff schedule was also rationalized in 1986, narrowing the range of rates to a minimum of 10 percent and a maximum of 60 percent. Exceptions were permitted at both ends of the range : 5 percent tariffs were required on some basic consumer goods (e.g.,

sardines, smoked and salted fish) and agricultural inputs (e.g., tractors, fertilizer, animal fed), but luxury cars, tobacco, textile products, and alcohol tariffs remained above 60 percent. These exemptions were eliminated progressively starting September 1987, and the range of tariff rates narrowed.

- Fiscal Reforms - The 1986-89 public investment program (PIP), revised in 1987 in consultation with the World Bank, emphasized infrastructure rehabilitation, improvement of basic services to agriculture and industry, and improved productivity of major parastatals. Reforms of the civil service were also implemented, resulting in the removal from the payroll of some 25,000 fictitious workers since 1987. Also included in the PIP was an emergency rural roads rehabilitation program, financed in part through revenues received by the Office des Routes from increased taxes, to alleviate constraints on the provision of agricultural inputs and evacuation of products.

- Agricultural Reforms - In order to benefit the agricultural sector, reforms included a revision of the tariff structure to eliminate disincentives to the production of agricultural tradables (coffee, cotton); reduction of duties on agricultural exports except coffee and wood, and simplification of export procedures; and measures to remove institutional and infrastructural constraints regarding marketing credit, public investment projects, transport, and agricultural research services. In this regard, the Bank of Zaire removed commercial bank's interest ceilings on agricultural credit. In addition, the PIP allocated 10 percent of the funds (Z 9.7 million = US $ 1) to agriculture.

Performance   With tight monetary policies and renewed budgetary restraint, the exchange rate stabilized and inflation declined in 1987. In 1988 and 1989, major bilateral donors canceled part of the outstanding foreign debt. Such cancellations were conditional on strict adherence by Zaire to the IMF program. For 1990, the budget savings because of the debt forgiveness and reduced interest payments amounted to about 30 million dollars, about half of the total investment budget of the government.

Overall, the performance of the economy after implementation of the structural adjustment was disappointing in more than one respect. Because of the stagnation in production of the mining sector (copper), GDP only grew by 2.6 percent. Implementation of investment geared toward increasing the capacity of the Office des Mines d'Or de Kilo-Moto (gold production) was delayed. In contrast, the manufacturing sector, helped by domestic credit policies and disbursements of foreign exchange under the industrial sector credit, recorded substantial growth in 1987.

Despite small positive effects, the overall performance of the economy has been poor due mainly to the irresponsible conduct of fiscal policy, and a decline in government revenue. The anticipated increase in revenues resulting from changes in the tariff failed to materialize due to collection inefficiency and excessive investment code exemptions. The increase in revenues from import duties was limited to 60 percent. As a result of these developments, the government budget deficit was close to 10 percent of GDP in 1987, nearly doubling from the previous year. Inflation greatly increased (over 100 percent) due to an expansionary monetary policy. As a result, only US $82.5 million were released by the IMF and the World Bank because the government has shown its inability to control public expenditure, and has continued the creation of money to finance its budget deficit. Inflation soared again at high levels.

In 1990, because the IMF, the World Bank, and other bilateral and multilateral donors suspended financial support, Zaire responded to the reduction in balance-of payments assistance by suspending its debt service and accumulating a substantial amount of arrears. In April 1990, in response to substantial internal pressure, the President of Zaire announced a move towards a multiparty political system and democratic elections. A transitional government was set up, with the responsibility to prepare for the creation of more democratic institutions, the holding of a national conference, and the revision of the constitution. With the creation of hundreds political parties, and strike after strike of civil servants and private sector workers, the economy was completely destabilized. The government abandoned the IMF/World Bank economic stabilization program and public expenditures soared at the same time that

bilateral and multilateral donors cut their economic and financial assistance. By the end of the year, hyperinflation followed by a series of devaluations and runaway public expenditures had put the economy into an unprecedented dive. This was exacerbated by the collapse of a major mine shaft at Kamoto because of lack of maintenance and replacement of equipment in GECAMINES. As a result, copper production in 1991 was expected to be only half that of 1959, the last year before independence. In 1993, GECAMINES produced only about 60,000 metric tons of copper against 470,000 in the 1980s.

Results of these analyses push us to ask the question about the structures of stabilization and structural adjustment programs. The next chapter will discuss how the IMF and the World Bank determine the values of intrument variables that can push the economy at targeted levels of real GDP, and balance of payments. However, since the observed results show us that the current account deficit has been deepening while real GDP has been decreasing, one can conclude that the targets fixed by these international institutions were not attained. If they were not achieved because of the negative socioeconomic and political environment, and given the assumption of any change in the political situation in Zaire, our concerns remains the question to know what can be done to improve the country's economy with President Mobutu in power. The assumption is made that, by introducing new variables in the IMF and World Bank models, one can achieve the targets and generate foreign exchange needed to satisfy the investment requirements.

CHAPTER 3. MACROECONOMIC INVESTMENT MODELS

In this chapter, attention is focused on polciy distortions that led to macroeconomic polices under stabilization programs. Then, by introducing new instrument variables we will see how high level of real GDP may be achieved.

Policy Distortions

From 1967 to 1991, macroeconomic policies used by the Zairian government under stabilization and structural adjustment programs aimed to remove some distortions limiting economic growth. The major types of policy distortions are described as follows.

Exchange rate distortions

The exchange rate distortion is related to the overvaluation of the currency; while trade distortion refers to the nominal and the implicit rate of protection. Tshibaka (1986, p. 21-32) reported Cassel's law that producer prices can be related to the world prices as follows:

$$P_X = P_X^* E_0 (1 - t_X)(1 - d_X) = P_X^* E_0 T_X$$

where

P_X = price paid to the exportable crop producer in domestic currency,

P_X^* = exportable crop world price in foreign exchange,

E_0 = official exchange rate expressed as a number of units of domestic currency per one unit of foreign exchange,

t_X = export tax,

d_X =domestic parallel market price distortion, and

T_X = price-distorting policy adjustment factor for exports.

The price paid to farmers in the parallel market is related to the world price as follows:

$$P_m = P_m^* E_0 \left(1 + t_m\right)\left(1 + d_m\right) = P_m^* E_0 T_m$$

where

P_m = price paid to importable crop producers in domestic currency,

P_m^* = importable crop world price in foreign exchange,

t_m = import tariff rate,

d_m = domestic parallel market price distortion, and

T_m = price-distorting policy adjustment factor for imports.

The structure of relative prices between traded and nontraded commodities is represented by

$$\left(\frac{P_X}{P_h}\right) = \left(\frac{E_0}{P_h}\right) P_X^* \left(1 - t_X\right)\left(1 - d_X\right)$$

$$\left(\frac{P_m}{P_h}\right) = \left(\frac{E_0}{P_h}\right) P_m^* \left(1 + t_m\right)\left(1 + d_m\right)$$

These expressions show that the real exchange rate $\dfrac{E_0}{P_h}$ plays a crucial role in both export-oriented and import-oriented competing farm and nonfarm activities. It provides a measure of the relative prices of importables and exportables to home goods in the economy.

$$\left(\frac{P_m}{P_X}\right) = \left(\frac{P_m^*}{P_X^*}\right)\left(1 + t_m\right)\left(1 + d_m\right) / \left(1 - t_X\right)\left(1 - d_X\right)$$

This expression implies that the domestic price of importables relative to exportables is a function of world prices, trade regime, and other price policy measures. The implicit rate of taxation is measured as the wedge between the average price received by local producers and the relevant world price, c.i.f. or f.o.b.

$$\Delta P = \left(\frac{P^* E_0 FPI}{CPI}\right) - \left(\frac{P}{CPI}\right)$$

where ΔP is the producer price wedge in local currency,

P^* is the world price in foreign exchange,

P is the local producer price,

FPI is the consumer price index of Zaire's principal trading partners (the U.S. the European community and Japan), and CPI is the domestic consumer price index. The implicit rate of taxation or subsidy of an individual product would be:

$$\Delta P \left/ \left(\frac{P^* E_0 FPI}{CPI} \right) \right. = 1 - \left(\frac{P}{P^* E_0 FPI} \right)$$

Trade distortions

The nominal rate of protection of agricultural products for example is defined to be the difference between agricultural producer prices and world prices, expressed as a percentage of world prices (in domestic currency at the official exchange rate). The nominal rate of protection also indicates the size of the direct taxation of a commodity relative to the world price.

The nominal distortion introduced in the economy by the trade policy is measured as the difference $\left(t_m - s_X \right)$, which is decomposed into two terms:

$t_m - s_X = \left(t_m - d_h \right) + \left(d_h - s_X \right)$, interpreted as follows: producers in the importable goods sector receive an implicit subsidy given by $\left(t_m - d_h \right)$ rather than the nominal tariff $\left(t_m \right)$, whereas producers in the export sector are implicitly taxed to the extent of $\left(d_h - s_X \right)$.

$d_h = s_X + w \left(t_m - s_X \right)$

where

d_h = increase in the price of nontradables,

t_m = import tariff,

s_X = export subsidy,

w = incidence parameter.

In the case of Zaire, the demand for exportables in the domestic market rises while production contrasts as resources move toward importables (maize, rice, groundnuts) and home goods (cassava). Tshibaka (1986, p. 24) reported that maize was taxed about 2.3 percent during 1971-74 and 27.3 percent during 1980-82 but was protected only 1.1 percent during 1975-79. For all of 1971-82, maize growers sustained an average direct tax of about 12.4 percent per year. In contrast, rice was protected during the entire period. The average direct rate of subsidy to producers was about 32.5 percent during 1971-82. Groundnut producers bore the highest burden of direct taxation.

For export crops, palm oil production was subsidized at an average annual rate of 51.1 percent during 1971-74 and about 32.5 percent during 1975-79, and was taxed only 16.3 percent during 1982-83. Coffee and cotton were directly taxed during the entire period at an average annual rate of 55.1 and 87.7 percent.

The period 1971-82 was marked by the direct intervention of the IMF into the Zairian economy. Before the IMF intervention (1971-74), cotton, groundnuts, coffee, and maize were taxed but rice and palm oil were not. Direct IMF intervention in the economy (1975-79) coincided with a reversal in government policy. Rice was highly protected, the level of direct taxation of maize production was maintained, and tax burden on groundnuts was significantly reduced. Rates of taxation of coffee and cotton were increased, while the subsidy rate of palm oil was lowered. Export crops as a group were discriminated against even more during 1975-79 than during 1971-74. Importable food crops were subsidized during 1975-79. During 1980-82 (no IMF intervention), the rate of taxation of the export crops was increased, while food crops were no longer subsidized but taxed. Results obtained by Tshibaka suggest that the protection of one sector, say the importable goods sector, causes damage to other sectors. The extent of this damage depends on the degree of substitution between sectors in production and demand. An import tariff meant to protect an import competing sector

may end up being partly or totally transformed into a tax on exportables,.
An export subsidy may become partly or totally an import subsidy.

Tshibaka used the following regression equations:

Model 1 : $lnY = a + b1(lnP_h/P_X) + b1(lnP_h/P_{XA}) +$

$$b3(lnP_h/P_{NXA})$$

Model 2 : lnGIE = the same regressors
Model 3 : BOT = the same regressors
Model 4 : T = the same regressors

where the dependent variables are respectively lnY (real GDP), lnGIE (real
government capital expenditures), BOT (balance of trade), and T (trend);
while regressors are, respectively,

lnP_h/P_X (terms of trade between home goods and exportables),

lnP_h/P_{XA} (terms of trade between home goods and agricultural
exports),

lnP_h/P_{NXA} (terms of trade between home goods and
nonagricultural exports).

Table 7 shows the regression results for total, agricultural, and
nonagricultural exports, for the 1970-82 period (Tshibaka, 1986, p. 34).
The regression coefficients for the BOT, GIE, and T were not significant.
The estimated coefficients for the Y were significant and negative,
implying that a positive growth of real income leads, other things being
equal, to decrease in the domestic price of home goods relative to
exportables. The regression coefficient for the price of nonagricultural
exports relative to agricultural exports is positive and significant. This
implies that the domestic price of home goods is positively and
significantly affected by changes in prices of nonagricultural exports
relative to agricultural exports.

The estimated numerical values for the incidence parameters are
significant for all the categories of tradable and home goods. For total
exports, an estimate of the incidence parameter is about 0.52. In practical

Table 7.　　Regression results for nonagricultural exports, 1970-82

Independent Variables	Dependent variables		
	All Exports	Agricultural Exports	Nonagricultural Exports
	$\ln {}^{P_h}\!/_{P_X}$	$\ln {}^{P_h}\!/_{P_{XA}}$	$\ln {}^{P_h}\!/_{P_{NXA}}$
Constant	9.079 $(3.493)^a$	7.850 $(2.655)^b$	7.984 $(2.598)^b$
$\ln {}^{P_m}\!/_{P_X}$	0.5222	... ..	$(5.017)^a$
$\ln {}^{P_m}\!/_{P_{XA}}$		0.407	$(3.369)^b$
$\ln {}^{P_{NXA}}\!/_{P_{XA}}$		0.736	$(4.606)^a$
$\ln {}^{P_m}\!/_{P_{NXA}}$			0.721 $(2.234)^b$
$\ln {}^{P_{XA}}\!/_{P_{NXA}}$			0.172 (0.831)
lnY	-2.065 $(-3.461)^a$	-1.858 $(-2.736)^b$	-1.671 $(-2.453)^b$
ln GIE	0.087 (0.865)	0.143 (1.305)	....
BOT	-0.000 (-0.447)	0.004 (1.772)	0.001 (0.365)
T	.....	....	-0.029 (-1.017)
R^2	0.904	0.926	0.949
Deg. of freedom	5	4	4

[a] Significant at the 1 percent level

[b] Significant at the 5 percent level

terms, the domestic price of home goods relative to exportables would increase by 0.52 as a result of a 1 percent rise in the domestic price of importables relative to exportables.

The implication is that a price distortion (from tariffs, quantitative restrictions, domestic pricing and marketing policies, and so forth) that leads to an increase in the domestic price of importables falls partly as a tax on producers of exportables.

Capital distortion

When Zaire maintained a negative interest rate, one could conclude that there was capital distortion. It consists of lowering the user cost of capital. The profit maximization rule requires, first, the selection of the most profitable investments, those having the highest internal rate of returns, or having the highest positive discounted present values (DPV). Then, firms will keep investing in low profitable projects until the marginal efficiency of investment equals the market interest rate. So, with negative interest rate, there was a tendency to invest in projects with low internal rate of returns. Authorities and entrepreneurs did not make a good selection of investment projects.

Labor distortion

The labor distortion consists of government intervention in the labor market. The fixation of minimum wages has resulted in making the labor more and more expensive. Hence, there was a tendency to invest in capital intensive industries to emerge (Leyland, Fiat, Peugeot for assembling cars, trucks and tractors; Good Year, for the production of tires; etc.).

Service sector distortion

Distortions related to the service sector consist of subsidizing public transportation, electricity, water services in urban areas. This has resulted in increasing government budget deficits.

Monetary policy distortion

With the frequent printing of money, variations of inflation have affected investments, because inflation is related to interest rate, which in turn affects the user cost of capital. In order to stimulate domestic private savings, the Bank of Zaire used the treasury bills mechanisme that led to positive interest rates, but at prohibitive nominal interest rates.

Population growth distortion

Population growth rate is another type of economic growth distortion. In a model describing output, saving, and investment per worker, investment per worker is a function of n (labor force growth rate, d (depreciation rate of existing capital stocks, and k (capital-labor ratio):

investment per worker = (n + d)k

An increase in labor force rotates up investment per worker line, decreasing production per worker. Zaire is among the African countries with a high population growth rate. Its agriculture has been growing (about 1.3 to 2.8 percent per year), behind population growth rate (around 3.1 percent per year).

In general, political stability is favorable for sustained economic growth. However, with the rent-seeking habit characterizing the Zairian ruling elite, and institutionalized corruption, the dictatorship regime that has been ruling the country for 29 years, under a unique political party, the Popular Movement for the Revolution (MPR), has been in more respects acting against economic growth.

Policy Implications

From the preceding observations, one may state that economic growth depends on internal and external policies.

Internal policies

    Export promotion policy   Some cross country studies have shown
that the highest growth is associated with high levels of exports.

    g = f (exports, import substitution industries)

    e,   the residual represents TFP (total factor productivity)

GDP growth is positively related to exports, and negatively related
to light import substitution industrialization policy, encouraging the
production of manufactured goods for a small domestic market. In Zaire, for
example, light import-substitution industry relies on imported intermediate
goods. The steel mill in Maluku was supposed to use imported scraps from
Italy, while Midema (Minonterie DE Matadi), the wheat mill company imports
wheat grains from the US.

    Under stabilization and structural adjustment programs, with the
financial support of bilateral donors, the IMF and the World Bank, Zaire
has been involved in import substitution industrialization policy. With
high effective rate of protection, this policy had led to the
overvaluation of the currency. Since 1975, the effective exchange rate for
exports was less than the effective exchange rate for imports. Table 8
shows the average domestic relative prices and real exchange rates for
1966-82 Tshibaka (1986, p. 28).

    It was believed that protecting infant industries would encourage
industry to become a leading growth sector. However, is it true that
producing canned tomatoes at the Presidential farm of Nsele, Good Year
tires, assembling cars and Fiat tractors, and milling imported wheat grains
from the US, for example, would generate economic growth? Only to a limited
extent because these import substitution industries were producing only for
the domestic market.

Table 8.   Average domestic relative prices and real exchange rates,
            1966-82

Period	Relative price for exportables $\left(P_X/P_h\right)$	Relative price index for importables	Real exchange index $\left[\dfrac{(FPI)E_0}{P_h}\right]$	Rate of change of real exchange
1966-70	264.6	59.9	120.6	0.8
1971-74	130.2	70.8	106.1	
1975-79	96.9	132.1	87.2	
1980-82	83.5	118.6	84.6	

Export promotion during the colonial era and after independence

In Zaire, during the colonial era, economic policy mainly consisted of
promoting export of minerals and agricultural products (coffee, rubber,
tea, cotton, palm oil, tea). After independence in 1960, traditional
exports had been also promoted, especially for coffee, copper, cobalt and
diamonds. However, because of inappropriate macroeconomic policies,
economic performances were poor. The production of copper has decreased
from 470,000 metric tons in 1980s to 60,000 tn in 1993; cotton and palm oil
are no longer exported. Only coffee and timber (logs plus sawn) exhibit
positive growth rate.

In addition, because of increased urban population growth rate,
demand for food has increased over time. There was a need to increased food
products to feed explosive urban populations. Though investments in light
import substitution industries produced goods for final demands (wheat
flour, tires, and others) food shortages have remained a major constraint.
Government policy bias against agriculture, neglect of government
agricultural budget, frequent devaluations and other inappropriate

macroeconomic measures, have caused a shift of scarce available resources
from tradable (cotton, palm oil,) to nontradables (maize, groundnuts,
cassava). However, the purchase of coffee beans and diamonds has absorbed
most of available funds. Meat food and fish experienced low growth rates.
Though increasing maize production, imports of foodstuffs and investment
goods have been of great concerns. However, until the 1982-83
liberalization measures, the nominal protection of imports against domestic
agricultural productions (taxes and tariffs discrimination on imported raw
materials and intermediate goods) did not solve the issue. This had led to
overvaluation of the zaire, the national currency.

The implicit rate of taxation which is a wedge between the average
price received by producers and the relevant world prices, c.i.f. or
f.o.b., at market exchange rates, adjusted for purchasing power parity, was
also high. Light import-substitution industrialization policy has a
negative impact on GDP growth:

$g = f$ (import substitution producing for domestic market)

where g is GDP growth rate.

In Zaire, GDP growth has been negatively related to investment in
import substitution industries producing for final demand. Light import
substitution manufactured industries have been producing low value added
products.

Assuming that at the same time, neutral openness policy is practiced
(both imports and exports are subsidized), the overvaluation of the local
currency would be avoided. As we said before, Zaire has been promoting at
the same time its traditional mineral exports (copper, cobalt, zinc, stain,
gold, and diamonds), and coffee exports, and protecting its import
substitution industries. This neutral openness policy did not give good
results because of wrong choice of import substitution manufacturing
industries. We are inclined to say that instead of producing manufactured
goods for the domestic market, Zaire would be better off producing
manufactured goods for international markets. This would be true without
any institutionalized corruption and rent-seeking habit of the corrupted

ruling elite.   In addition, producing manufactured goods for export
requires as prerequisite "selected heavy import substitution industries,"
generating technologies.

Heavy import-substitution industries   If GDP growth is negatively
correlated with light import substitution producing goods and services for
a small domestic market, it in contrast highly correlated with heavy import
substitution industries producing machine-tools, that can enable the
production of manufactured goods for export. Thus, by exporting
manufactured goods, Zaire, for example can improve inflows of foreign
exchange.

$$g = f \text{ (heavy import substitution industries, manufactured export industries)}$$

First, a country may get involved in heavy import substitution
industries (machine tools), generating technology. However, Zaire did not
use this kind of growth policy, not only because of inappropriate
macroeconomic policies, but also because a lack of investments in applied
research and development linking universities and colleges to the business
sector. Heavy import substitution industries require skilled labor force
and innovative entrepreneurs.

In the second step, the country will be able to develop light
industries producing for the domestic market. Again if the domestic market
of outputs produced by light industries is protected (discriminated taxes
and tariffs on raw materials and intermediated goods against other
products), then effective rate of protection and overvaluation of the local
currency may appear. These type of light industries will not necessarily be
producing low value added products. These light import substitution
industries using high skilled labor force, will rely on domestic produced
intermediate goods.

Assuming that a neutral openness policy is applied (imports and
exports are both subsidized), then effective rate of protection and
overvaluation of the local currency may be reduced.   Equilibrium GDP growth
rate will appear at the point where the predicted GDP growth rate explained

and predicted by exports growth rate intersects the predicted GDP growth rate explained by import substitution growth rate (Figure 7).

In a third step, this country will be able to invest in light industries producing for international markets. Should the country invest first in light manufactured industries producing for the domestic market, or should it invest in manufactured industries producing for international markets? Advocates of export promotion policy would prefer first the implementation of light industries producing for export because of increased foreign exchange expected to be generated,

$$g = f \text{ (other exports, exported manufactured goods produced by import substitution industries)}$$

The GDP growth rate will be positively related to all exports. So, import substitution industry policy has both positive and negative impacts. Positive impact consists of the generation of foreign exchange, while negative impact is related to shortages of foreign exchange, restrictions on foreign exchange, licensing of all imports, high effective rate of protection, overvaluation of the national currency, and a lack of competitiveness and efficiency in production, due to overprotection of the local market.

Producing domestically raw materials and intermediate goods needed by highly protected import substitution industries will be expensive compared with subsidized raw materials and intermediate goods. Thus, both exchange rate overvaluation and high cost of domestically produced inputs will be a disincentive to exports. The country will experience foreign exchange shortages. In addition, because growth of import substitution industries is not accompanied by significant growth of employment, private savings may not increase significantly.

With increased physical capital-labor ratio due to increased investments, if the labor force does not increase quantitatively, but increases qualitatively, total factor productivity will increase, rising salaries and wages. This may reduce profits for capitalists, and industrialization growth may be slowed.
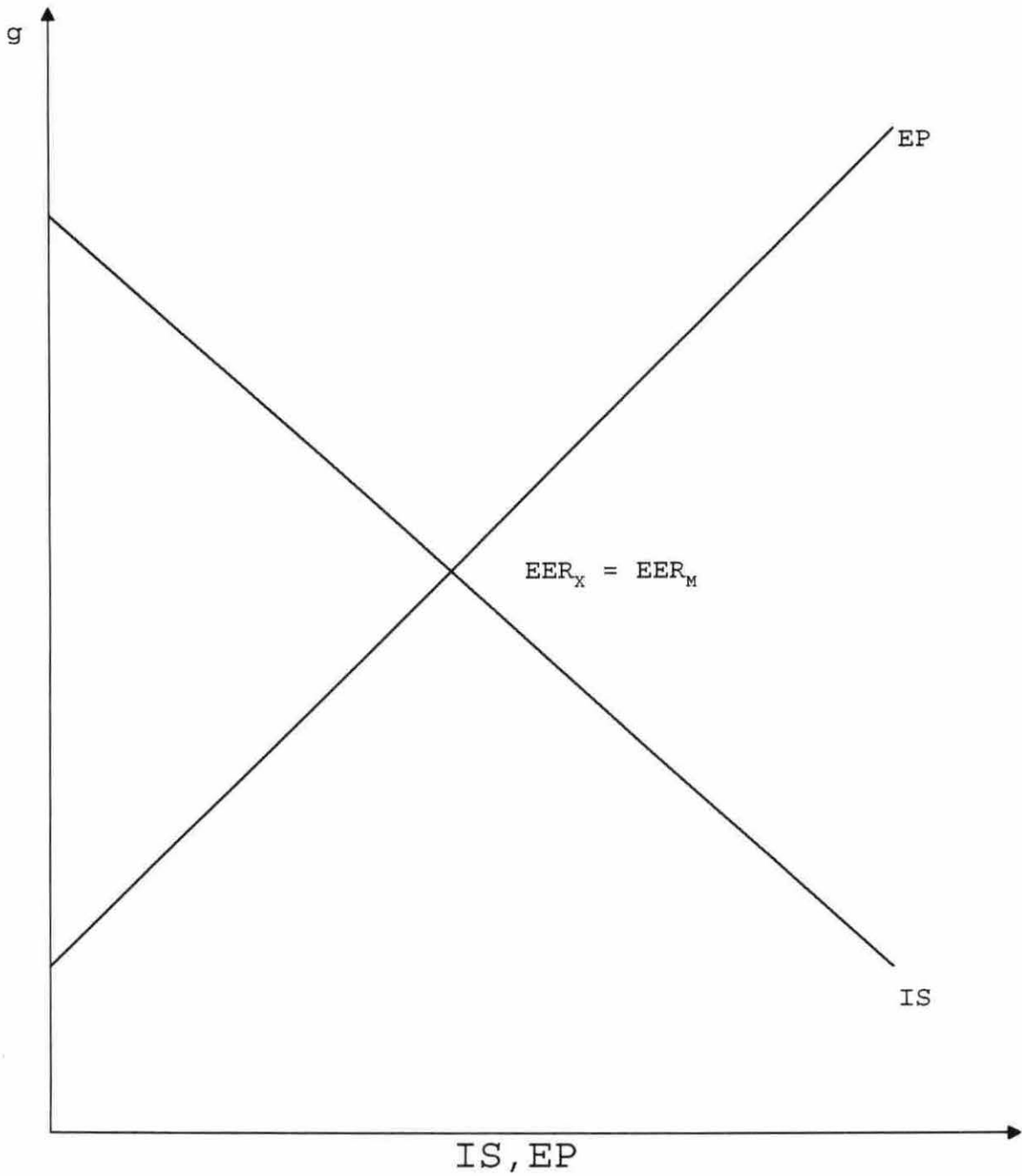
Figure 7.   Predicted GDP growth rate explained by import substitution
             growth rate

Depending on the size of domestic market, outputs from import substitution industries may increase. Under condition of large size of domestic market and economies of scale, ICOR (incremental capital-output ratio) will decrease with faster increased import substitution industry productions, compared with increase in physical capital.

$$ICOR = \frac{\Delta K}{\Delta Q}$$

$$g = \frac{S}{ICOR}$$

High growth rate of GDP will be associated with low ICOR, meaning that output increases faster than investment growth. When investment grows faster than output, ICOR will tend to increase, requiring more domestic savings for maintaining constant GDP growth rate.

With the import substitution industrialization policy In Zaire, in the early 1970s, investment had increased faster than output, increasing ICOR, and requiring more domestic savings. Domestic savings (10% of GDP), did not match investment demand. Lack in domestic savings was compensated with foreign loans. Unfortunately, over time, inflows of foreign assets have decreased, while output has decreased as well, due to a lack of basic infrastructure (inter-provincial highways, paved rural roads, and a lack of road maintenance throughout the country); declining investment; accelerate population growth; declining return of investment; failure to make good use of investment; inappropriate macroeconomic policies (imbalances, erosion of incentives in agricultural, overprotection of industry, expansion of the public sector, neglected of community activity, neglect of the private sector, poor project selections, inefficient organization of marketing). One may claim that in the Zairian economy, GDP growth is strongly related to export of copper, coffee, and diamonds:

GDP growth = exports + e

where e is the residual is total factor productivity.

What is wrong in this model is the fact that the *exports* variable is in both sides of the equation.

Export promotion and neutral openness   This implies that both exports and imports are equally protected and promoted:
- subsidizing imports (domestic market : still protected)
- subsidizing exports

The effective exchange rate for exports is equal to effective exchange rate for imports:

$$EER_X = EER_M$$

Ultra export promotion—free market   With ultra export promotion policy, all anti-export biases must be removed. Import must be liberalized. In 1983, Zaire embarked in the most structural and adjustment reforms, it ever had liberalized, not only imports, but also all agricultural prices and interest rates. Some tariffs and taxes were reduced. The most liberal 1969 investment code was modified increasing profit opportunities to investors. Did economic growth come? We know that except light improvements after 1983, overall economic performance was the poorest in Africa.

One may join Japan's view in this matter. Japan's view of industrial policy is consistent with its belief in the protection of immature industries. An important recent paper by Japan's aid agency, the Overseas Economic Cooperation Fund (OECF), challenges the conditionality of rapid trade liberalization in structural adjustment loans.

If imports are liberalized too quickly, is it possible to develop industries that will play leading roles in the next stage of economic development? Is it not necessary to protect domestic industry to some extent for a certain period of time in order to allow a viable export industry to develop? (Jayawardena, 1992, p. 51-56). The paper argues that conventional trade liberalization is limited to capturing the state comparative advantage typical of a developing country, which is to be found in primary products and light industry with low value added. Since the objective of developing countries is to move toward high value added production, with more sophisticated technologies and a more substantial

growth potential, the OECF concludes that "sticking to simple trade liberalization based on static comparative advantage may have a negative impact on the possibility of economic development." The study argues that it is too optimistic to expect that industries with high value added will automatically emerge from the private sector in the absence of deliberate measures to foster such industries, including protection. The OECF's preferred policy prescriptions is to protect chosen industries for a specified period, taking precautions to avoid the harmful effects of protection.

The way is open for us to suggest good selective heavy import substitution manufactured industries in Zaire. However, one does not disagree with advantages of export promotion policy:

- Increased competitiveness
- Increased foreign exchange (if fully repatriated)
- Access to more capital and technologies, acquisition of technology can be financed
- Increased productivity
- Increased efficiency in production due to increased international competition with local products.

One can formulate that productivity depends positively on exports.

productivity = f(exports)

Studies that had regressed GDP growth against income per capita, have shown that a technology gap exists between developed and developing countries.

GDP growth = f(income per capita)

To fill the technology gap, developing countries have to invest in increased factor inputs, applied research and human development. These empirical studies have found that high income countries were associated with high level of technologies, high level of investments in physical capital, and the learning effect induced by transfer of technologies. Therefore, we believe that the best macroeconomic policies are also those that induce transfer of appropriate technologies, and increase total factor productivity.

- GDP growth = f(income per capita, investment, education)

According to neoclassical theories of economic growth, sources of growth are:

• Capital accumulation (savings-investment);

• Increased labor force participation in quantity and in quality;

• Increased domestic production of raw materials, and intermediate goods; and

• Increased total factor productivity.

The GDP growth is a positive function of factor inputs.

g = f(factor inputs)e = TFP

Solow (1956) argued that aggregate savings finance additions to the national capital stock (see Romer, 1994, p. 25). An economy with an initially low capital-labor ratio will have a high marginal product of capital. Then, if a constant fraction of the income generated by a new piece of equipment is saved, the gross investment in new capital goods may exceed the amount needed to offset depreciation and to equip new members of the workforce. But a rising capital-labor ratio means falling returns on investment when technology is characterized by constant returns, so the incentive to accumulate capital might vanish over time (Scott,1989, p. 1-19).

During a transition period, autonomous investment in machinery and equipment would be a primary force behind rising incomes, and policies that altered the savings rate could be used to accelerate growth. But even when the transitional phase would come to an end, economic growth could proceed unabated if technical knowledge were to expand over time. Solow showed that advances in technology- which he took to augment the productivity of labor at an exogenous and constant rate, the marginal product of capital need not decline as capital per worker increased.

With its economic plans, Zaire tried to practice a balanced growth with the help of the Planning Department (Ministry). However, this policy was not well performed because GDP growth depends on a wave of investments.

This involves huge available funds (foreign loans and domestic credit). This is the concept of balanced growth:

g = f(massive and integrated investments, at the same time)

The industrialization process did not make appropriate reallocation of resources (capital and labor) from low productive uses (traditional agriculture) to high productive uses (industrialization, and high value added agricultural productions). The 1976-81, the 1983-85, and the 1986-90 economic plans relied on availability of external financing. Though the support in 1986-87 of an industrial sector adjustment credit of US $80 million, consisting of $20 million and an IMF special facility credit of $60 million, balanced industrial growth did not come. Evidently, with light import substitution industries policy, and export promotion of traditional exportables (copper, coffee, cobalt, diamonds produced by the state-owned company, before the 1982 diamond digging liberalization), the process of absorbing rural labor force by the modern sector has failed, as stated by structuralists. The structural adjustment in industrial sector itself did not operate as planned.

GDP growth = total factor productivity growth + capital growth*share of capital + labor growth* share of labor.

Without any empirical studies, one may guess that the share of total factor productivity has been insignificant in Zaire with respect to the modern sector contribution to growth. In addition, rural population migrations to urban areas are not caused by the absorbing rural labor process of the modern sector. Rural-urban areas migrations are due to the worsening of standard of living in rural areas, where villages are almost returning to bush because of lack of rural road maintenance. However, in the diamond mining areas, diamond digging activities have been absorbing increased rural labor force. Macroeconomic policies should also think about efficient resource reallocation as pretend structuralists. Therefore, structural adjustment programs should also take in account variables allowing efficient resource reallocation between industries, between sectors, between regions.

Structural adjustment   Given constrained markets plus lags in adjustment; potential transformation of productive structures producing disequilibria in factor market; sources of growth are:

- capital accumulation (savings-investment);
- increased labor force participation, in quantity and quality;
- increased local production of raw materials and intermediate goods;
- increased total factor productivity;
- reallocation of resources from low productivity to high productivity;
- economies of scale; and
- reduction of internal and external bottlenecks.

Change in GDP = change in Agricultural production + change
in industrial productions + change in services

So, GDP growth = agricultural growth*share of agricultural sector + industrial growth*share of industrial sector + service growth*share of service sector.

investment = f(expected profits)

Investment opportunities undoubtedly come from inventions, and are a response to economic factors similar to investments themselves.

research + development = f(expected profits)
TFP = f(investment)

As markets develop and expand, as exchange opportunities increase there will be a tendency for increased human capital specialization. specialization in the diamond industry requires more education, more investment in research and development projects.

GDP growth = f(well integrated markets, human capital
specialization, diversification in all sectors)

To summarize, one can say that growth is a function of investments physical capital, labor force education and professional training,

inventions, and in marketing organization. Investment projects may be of intensive capital use or of intensive labor use. In Zaire, within the primary product category, one may distinguish modern agriculture, traditional agriculture, and mineral extraction. Large scale operations characterize the modern sector (industrial sector), while small scale operation characterize the traditional sector in agriculture and in mining.

The traditional sector in mining consists of gold and diamond extraction by peasants. While both traditional agriculture and diamond digging use low skill labor force, the traditional agricultural sector produces low value added products, whereas traditional diamond digging produces high value products. Therefore, reallocation of economic resources from low productivity uses (traditional agriculture) to high productivity uses (industrial sector) would be unnecessary and maybe unproductive in the case of traditional digging of diamonds and gold. In addition, investment in industrial and export crops have some lags (shorter variety crops and perennial variety crops). In contrast, investment in diamond digging may yield very high value added products within a month. So, macroeconomic policies should address not only agricultural export crops, but also export of diamonds and gold according to the comparative advantage of natural endowments. Zaire is not only well endowed with low skill labor force, land surplus, but also with abundant mineral resources (diamonds, and gold) exploitable by low skilled peasants. Investment in traditional diamond digging may be more profitable than those in modern agriculture or in some industries, even if these industries use high technologies. Total factor productivity may result from low skill labor force combined with small capital of simple techniques, whose total cost may not exceed $65,000. However, such an investment in diamond mining may generate billion of dollars within a month.

Aware of these observations, let us see the IMF and World Bank investment strategies for achieving economic growth and macroeconomic balances, as expressed in terms of macroeconomic policy models.

External policies—The International Monetary Fund and the World Bank models

    The International Monetary Fund model Any country should be careful when using the IMF and World Bank models for stabilization and structural adjustment programs because of some weaknesses that appear in the models. First, in the simple Fund model, real output is essentially determined outside the system, whereas in the World Bank model prices and monetary variables do not play any direct role. In the linking of these two models, growth becomes formally endogenous, along with inflation and the balance of payments, and the policy instruments include monetary variables, fiscal variables, and the exchange rate. The merged model retains many of the other limitations of its two components. Such limitations have to be recognized and taken into account if this model is to be used for designing adjustment programs or for projection purposes.

    With reference to Khan et al. (1990, p. 176-177), one should think about the monetary sector in order to introduce more realism into the model in the case of Zaire. Indeed, for the IMF and the World Bank, *foreign exchange* is generated by exports. It can be introduced in the Zairian economy through foreign loans, direct investment (participation of foreign multinational firms) and development grants.

    Khan et al. (1987) said that the monetary sector is itself quite rudimentary. Money, credit, and foreign reserves are the only financial assets in the system, and no mention is made of other assets such as bonds or treasury bills (domestic and foreign), foreign currency, or equities. Furthermore, in many developing countries, curb markets have a significant role in the intermediating process, and their influence on monetary policy has to be taken into account. The most important exclusion from the model on the monetary side is the interest rate. In both Fund and Bank programs, interest rate policies - raising nominal interest rates to obtain positive real rates - are key measures to influence private savings. While this extension in itself is not too difficult, the expansion of the menu of financial assets or the introduction of a transmission mechanism via interest rates would very quickly increase the complexity of the model.

Second, the model assumes that prices adjust continuously to maintain flow money market equilibrium. The introduction of short-run dynamic behavior, say through lags in adjustment of prices to monetary disequilibrium, or through slow revision of expectations of future inflation, while perhaps not changing the overall conclusions, would nonetheless yield useful insights on the time path of prices and thereby the adjustment process. In addition, one may wish to bring cost factors, particularly wages, into the picture. In programs involving devaluation, controlling factor costs, i.e., wages, is essential if a desired real exchange rate is to be achieved. Without such policies in place, be they fiscal or monetary restraint, or control over public sector wages, or elimination of indexation schemes, a devaluation will only have a transitory effect on the real exchange rate. In the long run, domestic wages and prices will rise by the full amount of devaluation and the real exchange rate would return to its original level. An obvious extension of this model, would involve the explicit treatment of wages in order to have a more complete wage price determination process, and also be able to explain unemployment.

As is evident from the above examples, the merged model has a number of shortcomings. Some of these can be corrected relatively easily, but others would require serious theoretical and empirical study. As we know, GDP growth rate is a function of savings divided by ICOR (incremental capital output ratio).

$$g = s/ICOR$$

This means that as savings (numerator) grows, GDP growth rate increases; it decreases when ICOR increases. Remind that ICOR increases when investment increase faster than output. However, when investment growth rate is kept constant over time, ICOR may increase if output decreases for following reasons: deterioration of basic infrastructures (lack of road, waterways and railways maintenance), lack of maintenance of existing investments (equipment and machinery), lack of managerial skills, diversion of profits generated by existing investments, nonrepatriation of export earnings and profits, excessive debt servicing absorbing large portions of export

earnings. Finally, ICOR may even increase more rapidly if output growth decreases faster than declining investment growth.

Over time, Zaire has been facing what economists call *twin deficits*, which means government budget deficit and current account deficit. At equilibrium, the sum of savings + investment must equal next export (the difference between exports and imports).

$$S - I = X - Z$$

where S is domestic savings, I investment demand, X is exports, and Z is imports; assuming that X > Z, and S > I.

Assume that X < Z, the economy is experiencing a negative trade balance. If a negative services balance is added to a negative trade balance. the economy is experiencing a negative current account balance.

The budget deficit increases the difference between national savings and investment

$$S_N - (S_P - I) = X - Z$$

where S_N is national savings, and is lesser than S_P, private savings. The budget deficit decreases private savings from S_P to S_N.

In an open economy, when S < I, foreign assets (F) may be lent to the Zairian economy, such as S + F = I, and S + F will be equal to the negative current account. So, for the current account deficit to be totally absorbed, inflows of foreign assets must be equal to the current account deficit. Ideally, inflows of foreign assets should be greater than the current account deficit, in order not only to cover the balance of payment deficits, but also in order to restructure the economy and expand growth.

In the absence of sufficient foreign assets, the government of Zaire used to increase its budget deficit financed by domestic credit and increased money supply. The Fund model explains balance of payments disequilibria, and emphasis on the real sector, while the World Bank approach aims to determine medium-term growth. Therefore, one would expect that the IMF remedies to the Zairian balance of payments disequilibria

would consist of substantial inflows of foreign assets necessary to cover each annual balance of payment deficit under the stabilization programs.

Ideally, the policy variable instrument should be a specific amount of foreign assets enabling the elimination of a given annual balance of deficit. Otherwise, inflows of foreign assets must enable Zaire to generate enough foreign exchange in the next period, such as the balance of payments deficit is totally absorbed or substantially reduced. After implementation of IMF stabilization programs, we would expect economic performance reflected by improvements in balance of payments deficits.

Structural equations   In the IMF model (see Table 9), the economy of a country, say Zaire, is divided into four sectors: the private sector, the public sector, the foreign sector, and the domestic banking system, which is assumed for simplicity to consist solely of a central bank. The private sector is assumed to own all factors of production. The sale of current output yields nominal income (Y) to the private sector, which it uses to pay taxes (T), purchase goods for consumption (C_p) and investment (ΔK), and accumulate financial assets. To keep matters simple, interest payments and receipts are ignored, as is the distribution of central bank profits. All variables are measured in nominal domestic currency terms. The private sector's net accumulation of financial assets consists of money (ΔM) and foreign assets (ΔF_p), minus borrowing from the banking system (ΔD_p) The private budget constraint is

$$Y - T - C_p - \Delta K \equiv \Delta M + \Delta F_p - \Delta D_p \qquad (1)$$

Where
Y = Nominal Income
T = Tax
C_p = Disposable income minus Private consumption
S_p = Private savings
ΔK = Investment
ΔM = Private sector's net accumulation of financial assets
ΔF_p = Foreign assets
ΔD_p = Borrowing from the banking system

Table 9.   Structure of the IMF model

Targets	Endogenous Variables	Exogenous variables	Instruments	Parameters
ΔR	ΔY	Δy	ΔD_P	v (velocity of money
ΔP_D	ΔM	P_F	ΔD_G	(share of importables in the price index)
	ΔP	X_{-1}	Δe	a (marginal propensity ty to import)
	Z	Z_{-1}		b (coefficient of response of imports to relative prices)
		ΔF_P		c (coefficient of response of exports to relative prices)
	ΔF			
	$T-C_G$	ΔF_G		

Khan, 1987, p. 163

The public sector receives taxes and uses the proceeds for consumption (C_G). It does not engage in any investment. this assumption of inexisting public investment does not hold in the case of Zaire where the country not only owns factors of production, and financial assets, but intervenes in investment process. Any surplus is devoted to accumulation of financial assets in the form of foreign assets (ΔF_G) and borrowing from the banking system (ΔD_G). This produces the public budget constraint.

$$T- C_G \equiv \Delta F_G - \Delta D_G \qquad (2)$$

Where   T = Government taxes revenues

C_G = Government expenditures

S_G = Government savings

ΔF_G = Accumulated foreign assets

ΔD_G = Public domestic credit

The foreign sector receives revenues in the form of imports purchased by the domestic economy (Z), and it spends on domestic exports (X). To the extent that its revenues exceed expenditures, i.e., a current account deficit, it buys back its liabilities from the domestic private and public sectors acquires reserves from the domestic banking system (ΔR), so that its actions obey the constraint

$$Z - X \equiv - (\Delta F_P + \Delta F_G + \Delta R) \tag{3}$$

This means that (S_N) which is equal to private savings in foreign exchange (ΔF_P) plus public savings in foreign exchange (ΔF_G) plus reserves from the domestic banking system (ΔR), is identical to positive net export (X - Z).

Finally, the central bank is simply a financial intermediary which acquires assets in the form of international reserves and claims on the domestic private and public sectors and supplies its own liabilities in the form of money to the private sector. These transactions must satisfy the balance-sheet constraint

$$\Delta M \equiv \Delta R + \Delta D_P + \Delta D_G \tag{4}$$

This means that private savings (ΔM) is identical to the sum of the domestic total debt (public debt ΔD_G + private debt ΔD_P), plus reserves from the domestic banking system.

Summing equation 1 to 4, yields

$$Y - C_P - \Delta K - C_G - X + Z \equiv 0 \tag{5}$$

which is the familiar national income accounting identity. Put differently in terms of supply side and demand side, we have

$$Y \equiv C_P + \Delta K + C_G + X - Z$$

As mentioned above, because the Zairian public sector owns factors of production (state owned companies and parastatals) and is involved in public investments, to be realistic, the IMF model must take these variables in account.

The real GDP is taken to be exogenously determined, i.e.,

$$Y = Py \tag{6}$$

Where   P   =   domestic price level
         y   =   real GDP, regarded as exogenous.

The change in nominal output can be approximated as

$$\Delta Y = \Delta Py_{-1} + P_{-1} \Delta y \tag{6}$$

In this equation, both last period's real GDP, y_{-1}, and last period's price level, P_{-1}, are predetermined. The change in real GDP, given by Δy, is exogenous, and ΔP, the change in the domestic price level, is the endogenous variable.

The velocity of money is assumed to be constant:

$$\Delta M^D = v\Delta Y \tag{7}$$

where v is a constant which represents the inverse of income velocity of money, and M^D is the demand for nominal money balances.

The velocity is meant to convey the speed at which the money stock is turned over from one individual to another during a period of time such as a year. In practice velocity is usually calculated by dividing the money stock - in the case of M_1, currency plus checking deposits, into nominal GNP.

$$velocity = \frac{Nominal\_GDP}{M_1}$$

If the value of this ratio is 6, for example, then one might be tempted to say that the money stock has turned over six times in spending on a year's GNP. However, since total GNP is only a small fraction of the total number of transactions in the economy, all transactions in intermediate goods and all financial transactions are excluded, money really turns over much more frequently than six times in a year.

Velocity is best thought of in terms of the demand for money. If the demand for money shifts up, velocity shifts down, and vice versa. The inverse relationship between velocity and money demand shows the ratio of currency to GNP and checking deposits to GNP, respectively. The sum of these two ratios is simply the ratio of M_1 to GNP, which is precisely the inverse of velocity. When the sum of the currency and checking deposit ratios declines, velocity must increases.

The money market is assumed to be in flow equilibrium. Therefore,

$$\Delta M^S = \Delta M^D = \Delta M \tag{8}$$

where M^S is the supply of money. This equilibrium condition does not imply that the public holds the stock of money it desires at each instant, but rather it will succeed in adding to its cash balances at the desired rate during the programmed period.

These equations, together with identity (4), permit the balance of payments (ΔR) to be expressed as a function of exogenous and policy variables. This can be shown by taking first differences in eq. (6) and substituting successively into (7), (8), and (4), where ΔM in (4) is to be interpreted as the flow of money. The resulting expression is written as

$$\Delta R = v\Delta Py_{-1} + vP_{-1}\Delta y - (\Delta D_P + \Delta D_G) \tag{9}$$

By monitoring the expansion in domestic credit it is possible to determine if the program is on track in achieving the targeted increase in reserves. The demand for money increases with income, increases with the price level, and decreases with interest rate, as in the following algebraic expression

$$M^D = (kY - hr)P$$

where M^D is demand for money, Y is nominal income, r is market interest rate, and P is the general price level.

Eq.(9) is a straight line in $\Delta R - \Delta P$ space, denoted MM, with intercept $vP_{-1}\Delta y - (\Delta D_P + \Delta D_G)$, and a positive slope vy_{-1}. A reduction in the rate of expansion of domestic credit will shift this line upwards, so an improvement in the balance of payments will be associated with any given rate of inflation ΔP.

We will see in the following section how instrument variables are determined in both the IMF and the World Bank models.

A Revised Macroeconomic Model

In the revised model, we deal with the production and export of diamonds as a leading industry that may have strong backward and forward linkages. We believe that the *big push* to economic growth in Zaire may come from the diamond industry because diamonds can generate foreign exchange within the country, without relying on any conditional IMF and World Bank loans. In the original IMF and World Bank stabilization and structural adjustment models, foreign exchange is provided under specific conditions and is exogenously treated.

Foreign exchange is generated by economic activities within Zaire. It is endogenous to the model. Foreign exchange needed to promote growth is no longer a loan or a development grant, but it is induced by economic activities. Assuming the state of institutionalized corruption, the weakness of government tax administration and collection, that foreign investors hardly reinvest profits earned from economic activities in Zaire, that the corrupted ruling elite diverse public wealth and hide large portions of official and private export earnings outside Zaire, in Western banks, that villagers can earn foreign exchange from sale of precious stones, mainly diamonds, within Zaire, assuming that exports of diamonds by buying offices (official and unofficial) may not fully be repatriated, economic growth of the Zairian economy is not only possible but also

feasible. Economic growth will come from unskilled villagers who extract diamonds and gold and sell them within Zaire in foreign currencies.

New instrument variables

New macroeconomic instruments that can be controlled by the government must be included in the model, allowing the economy to achieve high level of targets variables within short periods of time and most policy distortions will be removed and forgotten. That policy variables are:

1. The organization of international tourism allowing diamond miners to travel abroad and foreign tourists to visit diamond producing areas;

2. The sale of passports by a private organization playing the role of intermediate between diamond miners and the state;

3. The creation of a private diamond bank;

4. The imposition of traveler check system throughout the country and outside Zaire;

5. The obligation for importers in diamond producing areas to use the services of the new private diamond bank;

6. The obligation for diamond miners to pay in kind (in diamonds) the rights to pollute water and damage the environment through the private diamond bank;

7. The construction in diamond producing areas of private groceries and stores equipped with computerized systems, inked with the private diamond bank;

8. The obligation in diamond producing areas to use a computerized bank card in stores;

9. The construction of teller machines linked with the private diamond bank;

10. The construction of wholesale groceries for agricultural products in diamond producing areas equipped with computerized systems. This implies the supression of open air public markets.

11. The installation of sophisticated systems of control detecting diamonds in luggages in all airports and custom services in Zaire;

12. Reduction of export taxes and tariffs on diamonds;

13. Reduction of import taxes and tariffs in diamond producing areas;

14. Maintaining the sale of diamonds and gold in foreign currencies;

15. Moving gradually to the dollarization of the Zairian economy, that is the use of the US dollar as national currency, first in diamond producing areas, then in Zaire as a whole.;

16. The liberalization of export licences for diamonds to foreign tourists. But if quantities to be exported exceed 50 carats, exporters are required to export diamonds via the private diamond bank.

17. The building of a diamond cutting industry within Zaire.

18. The obligation for the private diamond bank to make different types of loans not only to investors in diamond producing areas, but also to other investors in agricultural zones.

These variables instruments will be examined later.

Assumptions of the revised macroeconomic model

The selling price of diamond is a positive function of quality stones. The flow chart below shows that village diamond miners extract diamonds, sell to official and unofficial diamond buying offices, and are paid in the US dollars. Buying offices export diamonds, sell in Western countries at highest prices, and return again to Zaire in order to buy more diamonds, as long as variations in international demand for diamonds allow dealers to make profits. However, in the case of Zaire, assuming a decrease in average international price of diamonds, as long as the price of diamonds is determined by the quality of the stones, Zairian producers will still make enough profits needed to sustain economic growth, because of low producing cost of diamonds. In addition, a $65,000 initial investment cost in diamond dredge may generate millions of dollars, even billions of dollars, because of the richness of its mines. Lack of bank deposits characterizes households in diamond producing areas.

Production ← Foreign ← Buying → Export rough ⇔ Foreign
              exchange   Offices   Diamonds   exchange

Villagers' incomes from sale of diamonds are used for:

- consumption expenditures;
- savings;
- investment; and
- importing goods without going through the official banking system.

However, because of the political situation created by the ruling elite which wrongfuly sees the emergence of wealthier peasant diamond producers, villagers do not make any bank deposits in foreign commercial banks (Banque Commerciale Zairoise, Union Zairoise des Banques, City Bank) nor in the "Bank de Kinshasa" and "Banque du Peuple", both national banks.

Because savings and commercial banks are not trusted by households, a parallel exchange market functions along with the official exchange market in Tshikapa, Mbuji Mayi, Kahemba, Kisangani and Isiro where diamonds are produced. In diamond producing areas three different types of currencies are in circulation. Inflows of foreign currencies is made via diamond trade. In addition, three types of currencies officially circulate throughout Zaire, the old zaire, the New zaire, and foreign currencies, mainly US dollars.

While prices of diamonds and gold are expressed in the US dollars, local agricultural production is sold in the national currencies. What macroeconomic policies may be used in the current context of the Zairian economy? What levels of target may be considered? What are the new policy variable instruments expected to push the economy to higher levels than did IMF and World Bank original models?

First, diamond mining is the main economic activity - Assuming the selling price per carat of gme diamonds is US $1,000 in Tshikapa and Mbuji Mayi, that the average production of GEM diamonds varies between 1 to 5 million carats per year, expected income from sale of diamonds will be from US $1 billion to US $ 5 billion, regardless of other productions. We will assume that Zaire only produces diamonds (tradable), maize and cassava (nontradables), and coffee (tradable).

Second, relevant alternative growth policies may be performed in diamond producing areas.

Export promotion policy   Growth is a positive function of trade (exports). The main objective would consist of exporting high value added goods. When comparing coffee to diamonds, diamonds is the highest value product, as seen in Chapter 4.

We may formulate different steps of investment growth, starting with diamonds activities.

Step 0   Investment in financial development institution objectives:

- purchase of diamonds
- export of diamonds
- tax collection and rights
- savings institution
- tourism promotion overseas

Step 1   Organizing heavy manufacturing (polishing + cutting diamonds). The objective is to export polish and cut diamonds to generate more foreign exchange.

Step 2   Organizing industries producing synthetic diamonds objective: export of synthetic diamonds and generation of more foreign exchange.

Step 3   Organizing industries producing jewelry objective : export of jewelries (rings, necklaces, and so on) and the generation of more foreign exchange.

Step 4   Organizing industries with backward linkages and with forward linkages with the diamond industry.

Step 5   Infrastructure investments (roads, rural electricity, improved water services, communications, irrigation systems, human capital, social investments, research and development).

Step 6   Organization of agricultural loans

- building storage facilities
- import of agricultural equipment

- agricultural marketing channels
- agricultural productions
  - food crops
  - industrial crops
  - export crops
  - livestock
  - fisheries
- treatment of agricultural products

Savings policy   In order to promote the diamond industry, the Zairian government should adopt a tax cut policy on export of diamonds.

Tax cut policy:

$$S = (Y - T) - C_p$$
$$T = tY$$

A decrease in t, decreases T, and increases disposable income. Savings increases if C_p remains constant.

$$S = Y^D - C_p$$
$$S = sY$$

Savings is a positive function of output per worker

With its low value of capital used in diamond digging, and the large number of workers involved in this sector, diamond activity is *a labor intensive business*. Potential savers are in large proportion compared to agricultural sector. The more diamonds produced, the more output per worker, the more savings per worker, the more investment per worker in the next period. However, workers must be stimulated in order to increase savings.

$$Y = f(K,L)$$

$$\frac{Y}{L} = f\left(\frac{K}{L}, \frac{L}{L}\right) = f\left(\frac{K}{L}, 1\right) = f(k)$$

$$S = sf(k)$$

As output per worker increases, savings rate per worker increases, given appropriate incentives.

Savings is positively related to output growth, but negatively related to ICOR (incremental capital output ratio). GDP growth rate is a positive function of factor inputs.

$$g = f(K,L,m) = (factor\ inputs)$$

$$g = \frac{S}{ICOR}$$

$$S = g*ICOR$$

As GDP growth rate increases, savings increases. As ICOR increases, savings must rise in order to maintain sustained GDP growth. However, we know that increases in ICOR result from falling output growth compared to a faster increase in investment non-accompanied with rapid output growth. In the equation above, when g increases, this implies that ICOR has decreased. If ICOR increases, savings decreases because an increase in ICOR implies a slow employment growth, meaning that a small number of workers are earning income, and they cannot expand savings. As said before, this happens when the country had get involved in import substitution industrialization policy based on the production of goods and services for final demands.

Saving is positively related to payment of interest on savings account, checking accounts, and medium and long term bank deposits. Positive real interest rates stimulate private savings, while decreased and negative interest rates lower the cost of capital and investors are stimulated. As stated in previous chapters, investors invest in project with higher internal rate of returns (IRR > r : internal rate of returns greater than market interest rate). They keep investing in less profitable projects until internal rate of returns or marginal efficiency of investment equals the market interest rate. This is the profit maximization condition for investment.

If market interest rate decreases, investment will expand more due to a decrease in the user cost of capital, which depends on the real price of new equipment, the real interest rate, and the rate of depreciation:

$$R^K = (r + d)P^K$$

where R^K is the rental price of capital, r is the market real interest rate, is the rate of existing capital depreciation, and P^K is the price of new equipment.

User cost also decreases with a decrease in rate of capital depreciation, or when the price of new equipment declines.

$$I_g = I_n + dI$$

Gross investment equals to new investment plus depreciation on existing investments.

Desired capital stock by firms is a function of wages (W), rental price and income.

$$K^* = k\left(\frac{W}{R^K}\right)Y$$

New investment in a specific year is the difference between desired capital stock (K^*) and existing capital stock (K_{-1}).

$$\Delta K = I_n = K^* - K_{-1}$$

Increased income, low wage rates and low user cost increase the desired capital stock.

According to new economic theory of growth, the depreciation of existing capital is not due to physical depreciation, but to decrease in prices of output produced and sold.

$$I_g = I_n + dI$$

where Ig is gross investment, In is new investment, and   is the depreciation rate of existing investment (is incorporated in the selling price of output, and constitutes part of business savings). If the price of output decreases, existing investments risk being scrapped. So, gross investment is equal to accumulated gross investments minus scrapped investments (Scott,1990, p. 1-19).

Ig = Igo - scrapped investments

Therefore, terms of trade deterioration scraps existing investments, decrease profits, decrease business savings. Thus, macro economic policy to increase or maintain constant business savings, will consist of avoiding terms of trade deterioration, or will consist of creating economic environment that allow the private sector to increase the quantity of output produced, by increasing the size of firms (economies of scale), and lowering producing costs. Tax cut on investment projects may be an example of such policies. Tariff and tax reductions on imports, not only decrease domestic inflation, but also reduce the price of new equipment (P^K) in terms of local currency.

Private savings is negatively related to inflation. Thus investment is also negatively related to inflation.

$$S = f(p)$$

where π is inflation rate. As inflation rate decreases, saving increases. However, because negative interest rates are disincentive for private savings, commercial banks will not have enough resources to make substantial loans to potential investors. So, negative interest rates do not practically stimulate investment; but positive real interest rates encourage private savings who increase the volume of bank deposits.

$$= i - \pi \; r$$

As inflation rate decreases, real interest rate increases, and may become positive, and stimulate private savings. Commercial banks will get enough money to make loans.

$$S = f(r, r_0)$$

where S is savings, r is the market positive interest rate, and r_0 is charges on bank deposits. As positive market interest rate increases, bank deposits increase, savings increase. But savings decrease as charges on bank deposits increase because this disincentives bank deposits.

Demand of money for bank deposit   Demand of money for bank deposit decreases with increase in inflation rate. As the general price level increases, households need more cash (currency), and make less bank deposits.

1.   Payment of interest on saving accounts

2.   Payment of interest on checking accounts

An important motive for holding checking account balances is to pay the bank for the services it provides. With most checking accounts, you can eliminate service charges by keeping a high enough balance. Instead of paying you interest and then charging you for the services you use, the bank offsets one against the other. In effect, you are earning a reasonable return on your wealth, but the return is paid in banking services rather than in cash.

3.   Payment of interests on medium and long term deposits

For business customers, banks have traditionally linked loans and deposits. A business is likely to get a loan if it has kept large deposits with a bank. Some loans require explicitly that part of the proceeds be kept as *compensating balances*, which are inactive, non-interest-bearing balances in checking accounts. The bank charges for its services by paying its depositors less than market interest rates on their deposits.

The demand for currency depends negatively on the interest rate and positively on income and the price level. The demand for checking deposits depends negatively on the difference between the market interest rate and the rate on checking deposits, and positively on income and the price level.

$$CU = CU(r, Py)$$

$$BD = BD(r_o, Py)$$

where CU is currency, BD is checking deposits.

The first equation shows that the demand of currency is a function of the market interest rate r and nominal income PY (the price level times real income y). The second equation shows that the demand for checking deposits is a function of the opportunity cost of checking deposits r_o and nominal income. Total money demand is the sum of these two demands.

Demand depends negatively on the costs of holding currency and checking balances. In the case of currency, the cost is just the interest rate, r. In the case of checking deposits, the cost is the difference between the market interest rate and the rate on checking deposits, less the reduction in services charges obtained by having a larger balances.

Political stability and the degree of corruption and diversion of public resources have also an impact on currency and checking deposits.

$$CU = f \ (PU, \ COR, \ DIV)$$
$$BD = f \ (PU, \ COR, \ DIV)$$

The first equation shows that households hold more cash when politically the country is unstable, corruption is institutionalized, and diversion of public resources is very high. So, checking deposits decrease, savings through official saving institutions and banking system decrease as well.

Savings mobilization is a positive function of initial investment in spiritual activities. Thus, macroeconomic policy that can reduce the degree of corruption and diversion of public wealth may consist of allowing people to build more churches, to provide more religious programs on television and radios throughout the country, in cities and in rural areas as well.

$$S = f(Mo)$$

where S is savings, and Mo is expenditures on churches, and programs related to morality.

The government may subsidize large churches able to contain thousands of people, social community agencies, and religious programs on TV. The government should create a favorable environment to a cohesive community, spiritual restoration and reformation (churches and community activities).

Savings mobilization is a function of demand for imports through official banking system. Increase in imports demand through the official banking system increase bank deposits, and stimulate private savings.

$$S = f (Z^D)$$

Import liberalization will give incentives to a large number of private diamond miners to import more goods. If they address their demands through the official banking system, they must make bank deposits in order to allow commercial banks pay for transactions to the banks of their foreign suppliers. Commercial bank revenues increase, as well opportunities to increased loans.

Savings mobilization is a function of tourism activities overseas. Savings is also positively related to expenditures on passports and travelers' checks. The promotion of tourism activities outside Zaire will give incentives to bank deposits.

Savings is positively related to the organization of games and sports activities to a large extent. The construction of large stadiums for all possible types of games.

$$S = f \text{ (expenditures on sports)}$$

Savings is related to dowry, baptism, marriages, graduation, and mourning ceremonies

$$S = f(\text{expenditures on cultural ceremonies})$$

In Zaire marriage requires the payment by the man of a dowry to the family of the fiancee. The more young men are encouraged to get married, the more they save money in order to pay for the bridal gift. Parents have also to save money in order to organize the baptism or graduation nceremonies of their children. To be able to face expenditures required by a mourning

ceremony, namely the removal of dark clothes worn by members of the family who had lost a relative, some relatives have to save money.

The *likelemba* is a practice consisting of giving a membership of a group, a fixed amount of money when his turn comes. Assuming that 10 diamond sellers agree on a *likelemba*. Each of them will give to others US $1,000 every month until everybody in the group will receive its US $9,000 from others.

S = f (likelemba)

Saving is also positively related to sale of diamonds and gold in foreign currencies within Zaire. The sale of precious stones within Zaire in foreign currencies increase potential savings because incomes received are in strong money, namely the US dollar, that hardly devalue, compared with frequent devaluation of the zaire. With a stable currency, households can save a constant portion of their incomes. With a depreciated zaire, households have a tendency to spend all their income in goods, as soon as they receive it.

S = f (sale of diamonds + gold in US $ within Zaire)

Saving is positively related to export of manufactured goods from the diamond industry. Macroeconomic policy promoting manufacturing industries producing for international markets, will increase opportunities of more profits from export earnings. The propensity of capitalist to save is high.

S = f(manufactured goods in diamond)

Saving is related to the payment of rights to pollution and depletion of environment by diamond and gold miners. These payments should be in kind. One can argue that right now diamond diggers pay some taxes for the damage caused to the environment. However, these taxes are mostly diverted as we said before. The revised IMF/World Bank model suggest the organization of rights for polluting and damaging the environment. In

addition, their payments should be through the private financial institution organized in Chapter 5 of this study.

$$S = f \text{ (rights for polluting and damaging environment)}$$

Savings is related positively to the promotion of art, dancing and musical activities.

- dancing bar and music promotion
  - public building lent to privates
  - increases consumption of drinks (taxes on alcohol and cigarettes)
- promotion of Television in rural areas
  - regulation of public goods (public T.V room managed privately (small fees)
  - TV increases consumption of power
  - people stay home and spend less time outside their houses
  - learning effects

$$S = f \text{(expenditures on art, dancing, + musical activities)}$$

Saving is related to the organization of marketing channels with computerized stores and the use of banking cards:

- wholesale of agricultural products or computerized grocery stores) which proceeds to packing and sell to retail computerized stores.

$$S = f \text{ (computerized stores)}$$

Saving is positively related to enthusiasm given to value the Zairian family and clan:

- Each tribe, each clan, as well each family, must hold a album or a film of all memberships for the history of the clan.

$$S = f \text{ (family value)}$$

Saving is positively related to a compulsory saving system: every citizen must have a saving account (1Z per capita, per month).

$$Sn = f \text{ (compulsory saving)}$$

The struggle against deforestation, erosion and desertification requires a compulsory planting system of trees (lumber, and fruit trees).

Net GDP material product = f (replanting expenditures)

Research and development must be encouraged by subsidizing university and college professors.

(R+D) = f (subsidy)

Savings is positively related to trade policy

S = f (trade policy)

The more economic agents within a country export and import, the more they have incentive to save money.

Determination of the values of instrument variables in the IMF model

In the IMF model, ΔR^* (balance of payments), ΔP^* (inflation rate) are the targets. The IMF model deals with the way to determine the values of instrument variables which are Δe (exchange rate), ΔD_P (domestic private debt), and ΔD_G (domestic public debt) which would lead the system to a specific target levels of balance of payments, given a specific level of inflation rate.

1. OLS of export against the exchange rate to see how exports respond to changes in price due to variations in the exchange rate.

$$X = \beta_o + \beta_1 e + u_t \quad \text{where} \quad u \sim NID\ (0, \sigma^2)$$

where u (unexplanatory variation) is the residual; it shows the contribution of international demand expressed in terms of international prices.

The regression coefficient $+\beta_1$ shows that if more zaire are required per US $, meaning that the zaire exchange has depreciated, export crops for example cost less in term of zaire than international prices. Zairian products are more competitive, and exports increase.

2. OLS of imports against the exchange rate to see how imports respond to changes in prices due to variations in the exchange rate.

$$Z = \beta_0 + \beta_1 e + u_t \quad \text{where } u \text{ } \tilde{} \text{ NID } (0, \sigma^2)$$

where u (explanatory variation) is the residual; it shows the contribution of international demand expressed in terms of international prices.

The regression coefficient $-\beta_1$ shows that if more zaire are required per US $, meaning that the zaire exchange rate has depreciated, imported goods and services cost more expensive in terms of the local currency, the zaire; volume of imported goods and services decrease.

3. The World Bank determines the value of its target Δy^*. So, output is exogenously determined in the IMF model.

4. The domestic private debt is used as a target in the expansion credit function

$$\Delta D_P^* = \left(\frac{\Delta P}{Y_{-1}} \right) \Delta Y$$

5. The domestic public debt is determined as the difference between total debt and domestic private debt.

$$\Delta D_G = \Delta D - \Delta D^*_P$$

or $\quad \Delta D_G = T - C_G - \Delta F_G$

6. The targeted balance of payment is determined by

$$\Delta R^* = vy_{-1}\left(1-q\right)\Delta P_D^* + \left(vy_{-1}\theta - R_{-1}^f\right)\Delta e + v\Delta y + \left(\Delta D_P^* + \Delta D_G\right)$$

$$\Delta R^* = (X_{-1} - Z_{-1} - \Delta F) + [X_{-1} - Z_{-1} - \Delta F + (b+c)]$$
$$\Delta e - a\Delta y - (b+c)\Delta P_D$$

7. The last instrument, the exchange rate Δe is determined

$$\Delta e = \frac{\Delta R^* - \left(X_{-1} - Z_{-1} - \Delta F\right) + \Delta y + \left(b+c\right)\Delta P_D^*}{X_{-1} - Z_{-1} - \Delta F + \left(b+c\right)}$$

Assuming that diamonds are sold in foreign currencies, namely the US dollar; assuming also that Zaire exports various manufactured goods using diamonds as inputs, export earnings would increase. As a result, the zaire exchange rate will appreciate, and external purchasing power will allow Zaire to imports more consumer goods, more new equipment and appropriate technologies. Both productive capacity and total factor productivity will increase, output will continue to increase as long as the socioeconomic environment will be stable.

Advocates of exchange rate depreciation policy would argue that because of appreciation of the Zairian currency, Zairian exports may be less competitive in international markets. We do not think so because Zairian products were more competitive in international markets during the 1967-70 period when its exchange rate was set at 1Z for US $2. Exports increased during that period. In addition foreign   investors were attracted by that strong currency. Next, with import of export manufacturing industries, Zaire will be able improve the quality of its exports and be competitive in world markets.

In order to promote economic growth Zaire needs a strong currency, but not a weak currency that must always need to be rescued by the international community that could not make positive the balance of payments at any time.

Determination of the values of instrument variables in the World Bank model

In the World Bank model, ΔR^* (balance of payments), and Δy^* (output) are the targets. Instruments to be determined within the model are C_G (government spending), or T (government tax revenues), and ΔF (foreign assets). With those calculated values of instruments, the government would lead the system to achieve specific targets.

1. Change in real GDP (Δy^*) is a function of change in investment divided by ICOR (k : incremental output-capital ratio).

$$\Delta y^* = \frac{\Delta K}{k}$$

2. The ordinary least square estimation of the marginal propensity to import is given by regressing imports (Z) against real GDP (y).

$$Z_t = ay_t + u_t$$

where u_t (unexplained variation) is the residual and shows the contribution of other factors such as exchange rate.

3. The ordinary least square estimation of the marginal propensity to save is obtained by regressing savings against income.

$$S = ay + u_t$$

where u, the residual (unexplained variations) expresses the contribution of other factors such as positive real interest rate.

4. $\Delta K = sy^* - sT + T - C_G + ay^* - X$

    $\Delta K - (s + a)y^* + X = (1 - s)T - C_G$

5. If we assume that T is a target, and C_G an instrument, and given the value of private consumption

$$C_P = (1 - s)(y^* - T) = (1 - s)y^* - (1 - s)T$$

6. The value of government tax revenues is given by

$$T^* = \frac{(1-s)y^* - C_P}{(1-s)}$$

7. Then we can determine the value of C_G, the instrument

$$C_G = s(y^* - T^*) + T^* + ay^* - X - DK$$

Next we introduce into the model defining the current account new variables, namely (VS) which stands for revenues from sale of passports and document related to trips abroad, r_{Z2}, representing all revenues earned by the financial institution described in chapter 5 (interests on loans, financial charges on travelers' checks and on imports), RT_{PDE}, representing the rights to pollute and damage environments. Those three variables are our instrument variables that we include in the IMF and the World Bank model. However, instead of computing least square estimates, we will use the reduced form equation for their determination.

Determination of the values of instrument variables in the revised model

We distinguish two economic models, one describing areas of Zaire that do not produce diamonds; and another describing the economy of diamond producing areas of Zaire.

Zaire1: Non producing diamond areas Za_1, equivalent to the state of Iowa.

Zaire2 : diamond producing areas Za_2, equivalent to the state of Colorado.

$$Za_1 + Za_2 = Zaire, \text{ equivalent to the USA.}$$

Case 1. Economic model for Zaire 1:

$$C_1 = a_1 + b_1\left(Y_1 - T_1\right) \qquad\qquad : \text{private consumption}$$

$$T_1 = g_1 + t_1 Y_1 \qquad\qquad : \text{government tax revenues}$$

$$Z_1 = z_0^1 + m\left(1 - z_{TF1}\right)Y_1 - h_1\hat{e} \qquad\qquad : \text{imports}$$

$$B_1 = \left(1 + x_{TF1}\right)X_1 - Z_1 - n_1 r + c_1\hat{e} + \left(vs_1\right) + r_{Z1} \qquad : \text{net exports}$$

$$I_1 = I_0^1 - dr \qquad\qquad : \text{investment}$$

$$Y_1 = C_1 + I_1 + G_1 + B_1 \qquad\qquad : \text{aggregate demand}$$

$$Y_1 = a_1 + b_1\left[Y_1 - \left(g_1 + t_1 Y_1\right)\right] + I_0^1 - d_1 r + \left(1 + x_{TF1}\right)X_1 - z_0^1 - m_1\left(1 - z_{TF1}\right)$$

$$Y_1 + h_1\hat{e} - n_1 r + \left(vs_1\right) + r_{Z1} + G_1 + c_1\hat{e}$$

Reduced form equation for $\overline{Y}_1$

$$\overline{Y}_1 = \frac{a_1 - b_1 g_1 + I_0^1 - \left(d_1 - n_1\right)r + G_1 + h_1\hat{e} - z_0^1 + \left(vs_1\right) + r_{Z1} + \left(1 + x_{TF1}\right)X_1 + c\hat{e}_1}{\left[1 - b_1 + b_1 t_1 + m_1\left(1 - z_{TF1}\right)\right]}$$

Determining values of policy variable instruments

Let L_1 be the sum of values of variables instruments

$$L_1 = \left(vs_1\right) + r_{Z1} + \left(1 + x_{TF1}\right)X_1$$

Setting G_1, z_0^1, I_0^1, $\hat{e}$, and $r = 0$, and taking in account the values of targets $\overline{Y}_1 = Y_1^*$

Therefore,

$$L_1 = \left[1 - b_1 + b_1 t_1 + m_1 \left(1 - z_{TF1}\right)\right] Y_1^* + \left(1 + x_{TF1}\right) X_1$$

Knowing the value of L_1, we can either determine the number of Zairian tourists to stimulate to make a trip to the US. Current imports are positively related to autonomous imports (which do not depend on income, i.e., grants), and on income. They are negatively related to tariffs and taxes on imports, and on exchange rate.

$$Z = Z_0 + a(1 - z_{TF})Y - b\hat{e}$$

Differentiating with respect to

a) Z_0 : $\dfrac{\partial Z}{\partial Z_0} > 0$,   An increase in autonomous imports increases current imports.

b) Y : $\dfrac{\partial Z}{\partial Y} > 0$,   An increase in income, increases current imports.

c) z_{TF} : $\dfrac{\partial Z}{\partial z_{TF}} < 0$,   An increase in imports' tariffs, decreases imports.

d) $\hat{e}$: $\dfrac{\partial Z}{\partial \hat{e}} < 0$,   When exchange rates depreciate, i.e., the Zairian

currency costs less, in terms of foreign currencies, imports become expensive in terms of zaires, imports decrease.

Exports are positively related to quantity of goods and services demanded by foreigners (g_2 is gold and diamonds; g_1 is other goods and services), and on exchange rate. But they are negatively related to exports taxes and tariffs, and negatively related to interest rate. Visa and passports are considered as goods. Exports are positively related to passports and visa sold to Zairian tourists traveling abroad. An increase in imports through the banking system means an increase in commercial bank revenues on imports. The trade balance will increase.

$$X = (1 - x_{TF1})y_1 P_1 + (1 - x_{TF2})y_2 P_2 + c\hat{e} - nr + Vs + r_Z$$

Differentiating with respect to

a) y_1 : $\dfrac{\partial X}{\partial y_1} > 0$, An increase in quantity of other goods and services

exported, the value of exports.

b) y_2 where v is a constant which represents the inverse of income

velocity of money, and M^D is the demand for nominal money balances.

The velocity is meant to convey the speed at which the money stock is turned over from one individual to another during a period of time such as a year. In practice velocity is usually calculated by dividing the money stock - in the case of M_1, currency plus checking deposits, into nominal GNP.

$$velocity = \frac{Nominal\_GDP}{M_1}$$

: $\dfrac{\partial X}{\partial y_2} > 0$, An increase in quantity of gold and diamonds exported,

increases value of exports.

c) $\hat{e}$: $\dfrac{\partial X}{\partial \hat{e}} > 0$, When exchange rates depreciate, the zaire costs less in

terms of foreign currencies, goods and services exported by Zaire become less expensive, international demand for Zairian goods and services increases, exports increase.

d) x_{TF1} : $\dfrac{\partial X}{\partial x_{TF1}} < 0$, An increase in taxes and tariffs on exports

decreases exports of other goods and services.

e) x_{TF2} : $\dfrac{\partial X}{\partial x_{TF2}} < 0$, An increase in taxes and tariffs on export of gold

and diamonds purchased in foreign currencies within Zaire decreases exports, while a decrease will increase exports.

f)   R   : $\dfrac{\partial X}{\partial r} < 0$, An increase in domestic interest rates, decreases

investment, decreases output, decreases exports.

g)   vs : $\dfrac{\partial X}{\partial Ns} > 0$, an increase in number of passports and visas

delivered, increases exports.

h) r_{TCK} : $\dfrac{\partial X}{\partial r_{TCK}} > 0$, An increases in Vs, implies an increases in

traveler checks delivered, meaning an increase in commercial bank
revenues on traveler checks. This increases exports.

I) r_Z : $\dfrac{\partial X}{\partial r_Z} > 0$, An increase in imports through the banking system,

increases the balance of service surplus.

Case 2. Economic model for Zaire 2.

In the second case we deal with areas of Zaire which mainly produce
gold and diamond. These areas are characterized by water pollution and a
high degree of depletion of the environment. In another study we will see
how the supply and demand for rights to pollute and to damage the
environment will be organized. At this level we assume that miners must pay
for these rights to consumers who had received them from the government.
During the time miners cannot extract diamonds they may sell their rights
to other producers or consumers. This mechanism will lead to the
determination of a market rate for damaging and polluting the environment.
Payments for these rights may be in cash or in kind. An institution should
be created in order to link polluters and consumers who hold rights.
Assuming that the government issue to consumers one billion US dollars of
rights, consumers may sell them for two billion US dollars. This will
represent the domestic savings generated from the market of rights for
damaging and polluting the environment.

The government will get back its billion in cash through the
financial institution. With these revenues the government can finance

through the financial institution the instrument variables described in previous paragraphs (computerized groceries, rural electricity, and so on). Government revenues (T) becomes a positive function of taxes on revenues and rights for polluting and damaging the environment.

$$T = tY + RT_{PDE}$$

where $RT_{PDE} = (1 + rt_{PDE})P_2y_2$. The rights for polluting and damaging the environment is related to incomes earned by miners.

Differentiating with respect to

a) rt_{PDE} : $\dfrac{\partial RT_{PDE}}{\partial rt_{PDE}} > 0$, An increase in the rate of right for polluting

and damaging the environment increase the amount of rights collected, and increase government revenues.

If part of rights is paid in imported investment goods, the level of investment will shift upwards. For example, polluters will be required to pay in kind (water wells pumps, water well drilling equipment, gold and diamond dredging equipment, mini power station equipment, agricultural equipment, medical equipment, scientific and laboratory equipment, export industries, import substitution industries, transportation means, paving roads equipment and materials). A new financial institution in charge of importing these investment goods ,should be created, and act as a bank.

Investment becomes related to private, government and external savings, and to the value of instrument L_1 in case 1. Instrument L_1 comprises r_{Z1} which represents all financial charges and interest payments collected by the new financial institution in areas not producing diamonds, but that will benefit credit allowances from the financial institution.

$$\Delta K = \left[\left(y_1 + y_2^* \right) - \hat{T} - C_P \right] + \left(\hat{T} - \hat{C}_G \right) + \left(Z_1 - X_1 \right) + L_1$$

where $\left[\left(y_1 + y_2^* \right) - \hat{T} - C_P \right]$ is private savings

$\left[\hat{T} - \hat{C}_G \right]$ is government saving, and

$[z - x]$ is the rest of world saving in Zaire.

However, when we include domestic debt and foreign loans in the equation above, we have the value determined by the IMF model

$$\Delta K = \left[\left(y_1 + y_2^*\right) - \hat{T} - c_P\right] + \left(\hat{T} - \hat{c}_G\right) + \left(z - x\right) + \left(\Delta D_P + \Delta D_G\right) + \Delta F$$

If we replace foreign loans by the value of instrument L_1, we get an expression defining the revised investment model, where foreign exchange is generated within the country from sale of diamonds and gold in the US dollars, for example

$$\Delta K = \left[\left(y_1 + y_2^*\right) - \hat{T} - c_P\right] + \left(\hat{T} - \hat{c}_G\right) + L_1$$

We find that

Investment = private savings + government savings + external savings + foreign direct investment (F)

$$\Delta K = (HHS) + (BSS) + S_G + S_X + F$$

Private savings = household savings + business sector savings

$$S_P = (HHS) + (BSS)$$

HH savings = HH savings in foreign exchange + HH savings in zaires

$$HHS = (HHS)_S + (HHS)_Z$$

Household savings will include the margin on the government price of rights for polluting and damaging the environment.

BS savings = BS savings in foreign exchange + BS savings in zaires

$$BBS = (BSS)_S + (BSS)_Z$$

Business savings in foreign exchange (investors in the diamond industry) equals to retained profit + depreciation allowances

$$BSS_S = \pi_{RET} + \delta K_{-1}$$

Household savings in foreign exchange (savings of individuals involved in diamond activities)

$$HHS_S = sY_S^D + (ZUDB)_S^R + BSS_S$$

Financial development enterprises' revenues equal to revenues on sale of passports, plus revenues on travelers' checks, plus interest received on loans.

$$(ZUDB)_S^R = vs + r_Z + r \text{ (Loans)}$$

We will see in chapter five categories of loans to be promoted. It seems useless to try to statistically reject the null hypothesis that macroeconomic and government of Zaire policy measures could not increase domestic savings under stabilization and structural adjustment programs. Chapter two gave us an illustration of economic performance of the IMF, World Bank and Government of Zaire macroeconomic policies. Investment growth rate is the lowest in Africa (13% to 16%), while only 10% had been financed by domestic savings.

IMF and World Bank instruments had been offset by Government of Zaire macroeconomic policies. Reducing credit expansion and imports did not increase private savings, neither in zaires nor in foreign exchange. In addition, balance of payments never became positive at any time. On the other side, by reducing government spending, the World Bank model did not give any incentive to private savings mobilization. Government savings did not increase substantially especially in foreign exchange. The crowding in effect did not appear.

We assume that when new variable instruments are included in the model, whatever the political environment and attitude towards development, new policy measures will mobilize more domestic savings and push the

country's economy to targeted real GDP growth rate, and balance of payments equilibrium.

(1) Instead of decreasing imports, the revised model encourage imports in diamond producing areas.

(2) Instead of maintaining high tax on export of gold and diamonds, the revised model favors decreases on import and export taxes related to diamonds.

(3) Instead of discouraging tourism abroad, the revised model encourage tourism outside Zaire for people working in the diamond industry.

(4) Instead of making financial institution untrusted organization, the revised models encourage the creation of a private financial bank by diamond miners in the Kasai provinces.

(5) Instead of giving massive credit to selected group of firms namely, foreign owned enterprises, the revised model would like to expand credits to diamond miners, and to activities that can further mobilize private savings.

(6) Instead of neglecting traditional agriculture, the revised model favors agricultural credit using irrigation systems.

(7) Instead of asking miners to pay in cash some taxes related to diamond activities, the revised model would like diamond miners to pay taxes in kind (in diamonds) to the private financial institution that will be an intermediary between diamond miners and sellers and the government of Zaire. A free market of rights for polluting and damaging the environment will generate private and government savings needed to satisfy investment demnds.

(8) Instead of discouraging private investments in electricity, and improved water services in rural areas, the revised model would like the financial development enterprise to provide some public goods such as rural electricity and improved water services, including the paving of road linking cities producing diamonds.

(9) Instead of discouraging external donors, Western banks and foreign investors to operate in Zaire, the revised model will appreciate the Zaire currency (no more devaluations), in order to attract foreign investors. In addition, the revised model is in favor of the

progressive dollarization of the Zairian economy, meaning the
suppression of the national currency in favor of the US dollar as
national currency.

(10) Instead of discouraging import substitution industrialization policy,
the revised model favors sequentially, heavy import substitution
industries, then light export manufacturing industries using diamonds
as inputs. Let's summarize these ideas in three instrument variables
in foreign currencies earned within Zaire and related to diamond
activities. $\left(VS_2\right)$ will stand for the value of passports sold in
diamond producing areas by the new financial instituiton; r_{Z2} will
stand for all financial revenues earned by the new institution, and
RT_{PDE} will stand for private and government savings in foreign
currencies generated by the rights for polluting and damaging the
environment.

Structural equations for the real sector of the economy for the
second case are presented as follows:

Economic model for Zaire2: Diamond producing areas

$$C_2 = a_2 + b_2\left(Y_2 - T_2\right)$$: private consumption

$$T_2 = g_2 + t_2 Y_2$$: government tax revenues

$$RT_{PDE} = \left(1 + rt_{PDE}\right)P_D Q_D$$: rights for polluting water and for damaging the environment.

$$Z_2 = Z_0^2 + m_2\left(1 - z_{TF2}\right)Y_2 - h_2\hat{e}$$: imports

$$B_2 = \left(1 + x_{TF2}\right)X_2 - Z_2 - n_2 r + c_2\hat{e} + \left(VS_2\right) + r_{Z2} + RT_{PDE}$$: Net exports

$$I_2 = I_0^2 - dr$$: investment demand

$$Y_2 = C_2 + I_2 + G_2 + B_2$$: aggregate demand

Considering interest rate r, exogenously determined, and solving
for Y_2

$$Y_2 = a_2 + b_2\left[Y_2 - (g_2 + t_2 Y_2)\right] + I_0^2 - dr + RT_{PDE} +$$

$$\left(1 + x_{TF2}\right)X_2 - z_0^2 - m_2\left(1 - z_{TF2}\right)Y_2\ h_2\hat{e} +\ c_2\hat{e} - n_2 r + VS_2 + r_{Z2}$$

$$Y_2 = \frac{a_2 - b_2 g_2 + I_0^2 - dr + G + X_2 - Z + (c + h)e - nr + (VS)_2 + r_{Z2} + RT_{PDE}}{(1 - b_2 + b_2 t_2 + m)}$$

The major difference between the IMF and World Bank models and the revised model is the inclusion in the model of these three variables which appear clearly in the numerator of the reduced equation for Y_2. Indeed in the logic of the IMF and World Bank models, the reduced form equation Y would be given by this expression

$$\overline{Y} = \frac{a_2 - b_2 g_2 + I_0^2 - \left(d_2 + n_2\right)r + G_2 + \left(1 + x_{TF2}\right)X_2 + \left(c_2 + h_2\right)\hat{e}}{1 - b_2 - b_2 t_2 + m_2\left(1 - z_{TF2}\right)}$$

In the revised model, L_2 is the sum of the values of three variable instruments in foreign currencies earned within Zaire peasants and other investors (value of passports sold in diamond producing areas by the financial instrument, the revenues gained by the financial institution on traveler's checks, and on import-export services, interest received on loans, savings on rights for polluting and damaging the environment, and export taxes and tariffs related to diamond operations).

$$L_2 = \left(vs_2\right) + r_{Z2} + \left(1 + x_{TF2}\right)X_2 + RT_{PDE}$$

Setting I_0, G , Z, a, γ , r, and e = 0, we determine the value of instrument L_2 as follows

$$L_2 = \left[1 - b_2 + b_2 t_2 + m(1 - z_{TF2})\right]Y^*$$

From 1973 to 1989 the regression equations in chapter 2 give us the values for the following parameters:

marginal propensity to consume $b = 0.89$

                                        $t = 0.000084$

marginal propensity to import $m = 0.048$

import taxes $z = 0.30$

autonomous consumption $a = 150$ million US $

response of import to exchange rate $h = 0.096$

response of exports to exchange rate $c = 0.016$

Assuming that the target level of real GDP is 1 billion US dollars, that interest rate does not account in the model because it does not exist, the value of the instrument L is

$$L = [(1 - 0.89 + 0.89(0.000084) + 0.048(1 - 0.30)]Y^*$$

$$L = (0.14367476)1,000,000,000 = 143,674,760 \quad US \$$$

By promoting giving incentives to domestic savings in foreign currencies, as described in this chapter and in chapter 5, and to travel abroad, and by helping diamond miners to import through a financial development enterprise, and by organizing the market for rights for polluting and damaging the environment, we can collect that amount of money within few days. Investing that amount in the diamond industry and in other sectors, real GDP will increase more rapidly and reach the level of 1 billion US $ within less than one year.

If we increase the level of the target from one to four billion US dollars, which represents the sale of 4 million gem carats by villagers and other producers per year, at the selling price of US $1,000 per carat, the value of our instrument variable L will become 574,699,040 US dollars. By investing a 500 million dollars, which are generated within a short period of time in the diamond industry, rural electricity, improved water services in rural areas for human and animal consumption and for irrigation purposes, social and human development activities, in computerized stores

and in paving rural roads, the Zairian miracle may possibly become feasible within less than one year.

The Zairian economic miracle is based upon profit maximization of villagers and firms extracting diamonds. Villagers, mostly unskilled people invest their physical energy associated with low level of capital to produce million carats of diamonds. In Western countries, skilled people associated with high level of capital produce high value products. While in Zaire, unskilled people with low level of capital extract millions of precious stones worth about 5 billion US dollars per year on average. What would be the profit maximization rule of people producing high value products with low level of capital, with low level of labor quality, and without any notion of discounted present value of revenues, and where the capital market does not exist such that interest rate does determine neither future consumption, nor investment level? With the introduction of new technology in diamond activities able to increase production and reduce important man hours used, we expect that an employment shift may result from diamond to agriculture, to schooling and administrative functions in diamond producing areas. In Zairian agricultural zones, the introduction of small scale irrigation systems, involving new appropriate technologies may increase internal rate of returns such that agricultural loans from the new financial institution created in diamond producing areas can be justified.

In the next chapters we are going to understand these issues and show that instead of neglecting traditional agriculture producing food crops, industrial and export crops, the revised model would like to promote not only export crops but also at the same time stimulate irrigated food and industrial crop productions. Indeed promoting only export crop such as coffee has only been beneficial for licensed exporters who have access to foreign exchange. With the gradual dollarization of the Zairian economy, growers will also taste how sweet is the US dollar.

CHAPTER 4. MICROECONOMIC REFORM INVESTMENT IN PRIVATE DIAMOND PRODUCTION

This chapter analyzes possible assumptions of the microeconomic model of investment in diamond mining. By computing the benefit cost ratio of a project we will see whether villagers and other private firms make a rational investment decision. To see this, we will also compute the internal rate of return. Finally we will see what can limit the investment process in diamond mining.

Assumptions of the Model

In Zaire, efficient allocation of resources in the diamond industry is met when the private sector is involved in the investment process. The legalization of informal activities in 1982, has caused a decline in diamond smuggling, and has increased incentives to investment in diamond activities. Agricultural labor force has shifted from subsistence agriculture to diamond mining, and affected the already neglected agricultural output, namely food crop production has decreased in the diamond mining areas in the Kasai provinces (Kasai Occidental, and Kasai Oriental). Recent discoveries of new mines in the provinces of Haut Zaire and Bandundu, have pulled in many people regardless of sex and age.

As seen in Chapter 2, private diamond production has increased tremendously from 432,000 carats in 1982 to about 6 million in 1983, and to about 14 million carats in 1984. This trend keeps continuing up to now. Incentives to invest in the diamond industry have increased even more after the 1991 measures allowing the sale of precious stones within Zaire in foreign currency. Some diamond miners have wisely spent their revenues from diamonds in cars, trucks, refrigerators, boats, constructions. Most of the wealthiest ones had bought planes and cargoes that shuttle between the Republic of South Africa , European countries and Mbuji Mayi, the regional Capital of the Kasai Oriental province. They used to carry manufactured goods and foodstuffs.

For diamonds investors, efficient resources allocation, pricing , taxation, national and international diamond market structures, demand and prices constitute the major concerns.

Results of our analysis show that profit maximization is realized when internal rate of return of marginal investment equals to the domestic market interest rates. This would be true if the Tshikapa and Mbuji Mayi commercial banks were giving loans to diamond miners. Traditionally, commercial banks do not give short and medium term loans for the purchase of diamond mining equipment to the private sector. In addition, in diamond mining areas, there is not any financial institution that could provide investors with long term loans. With the absence of capital market, it becomes hard to say that profit firms and individuals involved in diamond activities maximize their profits when internal rate of returns of marginal investments equal the market interest rate. However, individuals and firms make their investment decisions based upon the price of equipment, the market wage rate, the prevailing selling price, the expected diamond production, and personal savings or retained profits. Under those conditions, we can formulate that private investment model as follows:

$$I = f(P^K, W, P_D, E(Q), r_1, S$$

where I is investment, P_D is the average expected selling prices per carat, P^K is the price of equipment, $E(Q)$ is the expected quantity of diamond to be produced, S is personal savings or retained firms' profits, and r_1 is the opportunity cost of lending personal savings.

The selling price of diamonds is expressed as a function of quality stones, and the prevailing international prices.

$$P_D = f(4C, P_I)$$

where P_D is the average selling price per carat, 4C stands for the quality of the stone, and P_I is the prevailing international price per carat known by diamond buying offices located in Tshikapa.

Expressing quality

The basic elements of quality have been publicized by De Beers under
the name *the Four Cs* (Bruton, 1978, p. 190). Three of them refer to
quality. They are clarity, color, and cut. Of these, the first two have
most affect on price, except when the cut is very bad.

The word clarity was chosen not just because it began with c but
because it is a much better word than purity for the jeweler to use. By
saying a diamond is pure or perfect implies that others are impure or
imperfect, whereas a stone of different clarity or color is really one
created in a slightly different way by Nature. The inclusions that lower
the clarity of a diamond are commonly called carbon spots. Most are small
fissures caused during the natural growth of the stone, or small pieces of
the original minerals with which the diamond grew.

Color seems the most difficult of the quality factors to judge, since
it requires entirely subjective decisions. In this sense, color means the
exact tint of white would normally be called white. Even white is not
right, because the finest color is transparent and colorless. The finest
color used to be described as *of first water*, which means as pure as clear,
limpid stream water. Stones tinged with yellow were called by-water or bye.
In practice, clarity is more difficult. Price concerned here are related
to rough and uncut stones.

Price of diamonds

The fourth of the four Cs is *carat weight*. This obviously affects
prices. Most people know that the price of diamonds goes up as the weight
goes up and also as the quality goes up. What is not realized is that the
price per carat increases. In practice this favors those who want a large
show of diamonds rather than a single stone in a ring or other jewelry. For
example, four diamonds each weighing a quarter of a carat each have a
larger superficial area than one diamond weighing 1 carat. If they were of
exactly the same quality as the 1-carat stone, they would still be much
lower priced because the price per carat of quarter-carat stones is much

lower than the price per carat of 1-carat stones. It also explains why diamonds are good supporting stones for rings with colored main stones. The price of the colored stone will probably be much the same per carat within wide limits of weight, so a large one will not be too expensive. A number of small diamonds around it will give a good show of diamonds at a relatively low price. Large diamonds have great intrinsic beauty if effectively cut, but they are being found much less frequently. There is no doubt that smaller gem diamonds are coming from most of the world's diamond sources and that designers and manufacturers of jewelry will have to use smaller stones increasingly in their jewelry as the years go by.

Controlled prices of diamonds

The Central Selling Organization (CSO) is a group of marketing companies through which all the principal diamond producers sell diamonds on a cooperative basis. The company is located in the Republic of South Africa. The CSO has set up buying offices in a number of diamond-producing African countries that do not supply directly through CSO channels. Some offices were set up to help combat illicit digging, smuggling, and general lawlessness on the diamond fields. The CSO controls 80 percent of the world's diamond production.

Similar problems occurred in Zaire. The government invited the CSO to establish a buying office in Tshikapa, in the diamond producing areas some 400 mile (600 km) from the capital, Kinshasa. Nowadays, other offices have opened their offices in Tshikapa, Kahemba, and Kinshasa. The carat cartel comprises the Republic of South Africa, Botswana, Namibia, Angola, Australia, and Russia.

All diamonds the CSO handles are first sent by mines to the Diamond Producers Association (DPA) offices in Johannesburg or to the Diamond Corporation offices in London. They are divided into two groups—gem and industrial, each of which is sold through different organizations. If demand falls badly, the (DPA) can allocate sales quotas to each of its producing members and also instruct the Diamond Corporation to limit its purchases from producers who have agreements with the DPA.

A recent article published by *The Economist* on September 17th, 1994 published some statistics about the diamond cartel (see Figure 8). The reader may see himself that Zaire is not in this cartel. The *Economist* reported that the South African company produces just under half the world's annual output of gem-quality diamonds (measured by value); Russian mines produce just over one-quarter. Diamonds are bought for reason of vanity, not necessity, so, cooperating to get the highest possible price, rather than fighting over market share, makes sense. Russia seems determined to play an endless game of chicken, suggesting that the Central Selling Organization (CSO)—a subsidiary of De Beers which controls the wholesale market—needs Russia a lot more than Russia needs the CSO.

Relations between the two have never been particularly easy. De Beers is worried by the continuing *leakage* of diamonds outside the agreement. In 1993, Russia sold diamonds worth $1.14 billion through the CSO, and, directly to the market, another $680m of *technical* diamonds-stones which are too small or not good enough to make gems, although in practice many stones the Russians classify as technical are whoppers. Estimates of how many more gems leaked onto the world market range up to $500m. De Beers is obliged to buy as many of the leaked diamonds as possible in order to maintain its control of the flow of gems onto the market. If producers get away with selling their best stones directly, there is a risk that the CSO will turn into a dustbin for otherwise unsellable goods.

For their part, the Russians suspect that their diamonds are undervalued by the CSO. Many of De Beers's overheads are fixed: Russia has to pay for an elaborate sales and marketing system and finance a large stockpile of diamonds regardless of market conditions. It makes a profit by shoving the largest possible number of diamonds through this system. If one of the world's largest producers of high-quality diamonds decided to leave, it might be hard to hold the cartel together, much less make a profit. Also, the CSO agreements cover only rough diamonds. Producing countries can do whatever they like with diamonds that have already been cut and

Production

1992 total $6.42bn

	0	0.5	1.0	1.5

Botswana

Russia

Angola

South Africa

Australia

Sales

Central Selling Organisation

1993 total $4.37bn

Other 24%

Russia 26%

De Beers 50%
(South Africa, Botswana, Namibia)

Price

Medium quality 1 carat stone $'000

September figures

1980 82 84 86 88 90 92 94
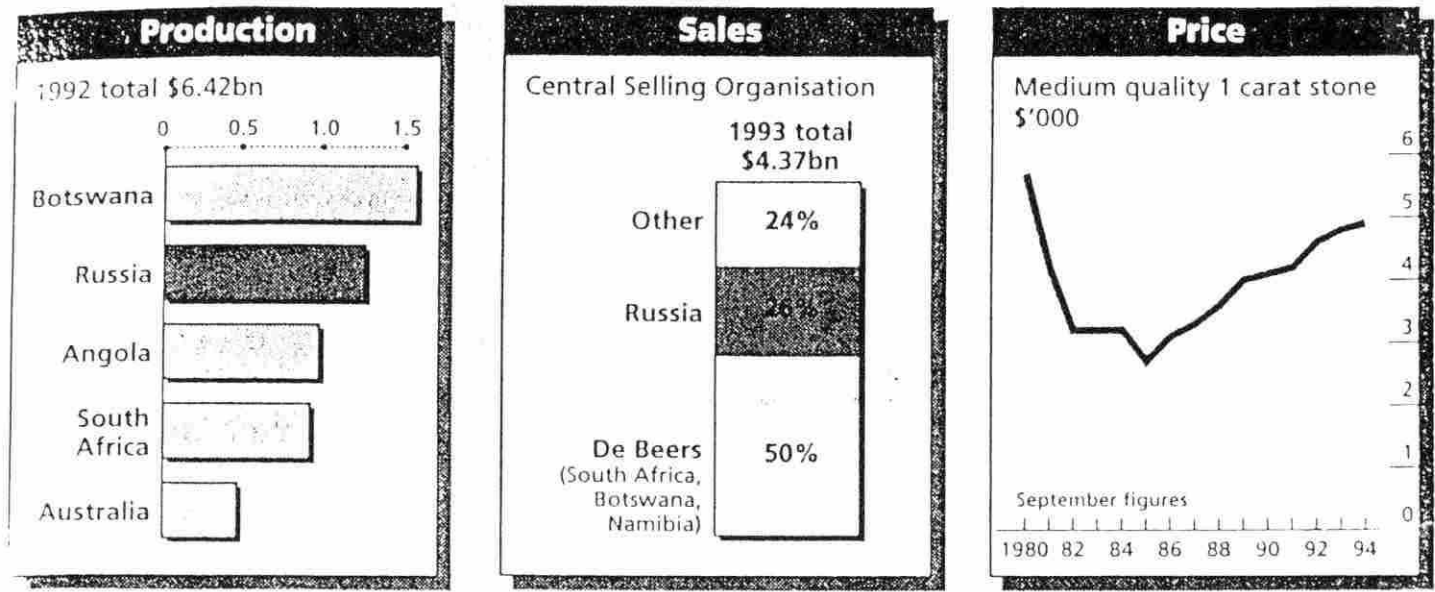
Sources: Ashton mining; CSO; Rapaport Diamond Report

Figure 8.   The Carat Cartel

(Russia and De Beers. Russian diamonds: Disputes are forever.

1994. *New York Times - The Economist, 332*(7881), p. 73)

polished. What is to stop Russia breaking free from the cartel and building up its own cutting industry? On the surface it makes admirable sense to build up a high-value industry such as diamond cutting. The Russian government has already promised to plunge in. Before it does, it would be wise to ask two questions: why do no big diamond-producing countries have a significant cutting industry (South Africa tried to develop one, but gave up)? And, why do Antwerp, Tel Aviv, Bombay and New York—the four big cutting centers produce not a single diamond? The answer to both these questions lies in the fact that diamond cutting is a fashion business, dominated by small, family-owned firms with a keen instinct for what the markets wants. It is also a business which operates on fine margins: if an Israeli cutter loses half a percentage point more of a stone than he had planned to while cutting it, he makes no profit. Russia's few existing cutting factories are sprawling, unproductive operations which employ thousands and are light years away from any kind of market. If Russia insists on developing its cutting industry, it will probably end up subtracting value from its diamonds and lose a fortune.

The above text was extracted from *The Economist* September 17th 1994), was not signed but gives us some insights about what the revised model is suggesting in the next chapter. On September 17th 1994, *The Economist* published a figure giving the production sale and for the carat cartel, and the price of a medium quality carat stone.

Expected production

According to geologists, producers can found from 0.9 to 5 carats per cubic meter in the Zairian mining areas in Tshikapa and Mbuji Mayi (MPR 20 ans, 1985, p. 203). In addition larger stones can also be extracted. To illustrate the richness of the fields in Mbuji Mayi area, Bruton (1978, p. 193), reported that a curious mining official washed some of the gravel from the trammels used to cover paths in the city. Bruton found that they had a content of 20 to 25 carats of large diamonds per cubic meter. Because of the number of large diamonds rejected, it was decided to install

a crusher to reduce all the large rejected material and to repass it through the recovery plant. Any large diamonds are therefore crushed.

We would like to introduce the concept of the production function, but according to the fact that fixed proportions of inputs do not produce exactly a standard per unit of output in diamonds activities, i.e., 1 man hour plus 1 machine hour may produce different quantities of carat stones depending on the richness of the site, the depth of the mine, and the labor productivity. Because of its density, large diamonds are expected to be found at the deepest level. Therefore, in this study we will not look to maximize a standard production function subject to inputs costs because of the variability of output per unit of fixed proportions of input combination. However, we can make this approach if we use the concept of expected quantity to be produced.

Alternative diamond investment projects

We may think about six alternative investment projects, and we define probable states of nature for each project and distribute some probability to each state of nature.

a_1 : This project consists of buying diamonds from producers located in villages distant from Tshikapa where are situated diamond buying offices.

a_2 : This project consists of alluvial diamond exploitation without any equipment. Without any equipment courageous young men dive in rivers in order to prick gravel from the bottom of rivers. After straining on the riverbanks, they may pick up some diamonds. If the river is not deep enough, miners can just bound and pick gravel that will be strained on the riverbanks. If they dive, they cannot remain under water very long, and pick up small quantity of gravel.

a_3 : In this project, miners exploit alluvial diamonds with equipment (SCUBA diving system). With a diving system, men can stay about 30 minutes to one hour under water, picking gravel, filling baskets that are pulled out by other workers in the barge or row boat. Then they will pan gravel and by chance pick some diamonds. A air compressor is necessary to fill air tanks borne by divers under water.

a_4 : This project uses floating dredging equipment such as 5 in., 6 in., and 8 in. Keene Engineering triple sluice dredging pumps. You may use diesel or electric engines.

Among different diamond dredging equipment made in the US, we have found that small equipment supplied by Keene Engineering Inc. in California are the most efficient for alluvial diamond exploitation in streams and rivers in Zaire.

The 4 in. and 5 in. triple sluice dredges are designed and engineered for ultra fine gold and gem recovery, with a variety of engines and pumps to meet any requirement for portability, altitude or deep dredging needs. The new Triple Sluice Hedder Box and Expansion Chamber has been enlarged to accommodate greater capacity for more selective classification in all three sluice. All minus 1/8 in size side gates are provided for more precise metering of flow, that is necessary for proper recovery of super fine values. The larger and coarse materials is processed through the enlarged center sluice. The center sluice also classifies and screens the larger material through two different types of riffles for separation of all course values. All new 4 in. and 5 in. triple sluice dredges feature the new 4 Module Marlex flotation frame assemblies with *pin lock fasteners* for greater stability and ease of assembly. All 4 in. and 5 in. triple sluice models are equipped with 15 feet of suction hose and are powered with the extremely efficient power jet suction system. Model 5511PH (5 inch) for example is powered by an 11-hp Honda engine with a P-350 pump. Featuring oversized impeller for up to 30% more suction power and heavy-duty 263 compressor for additional air supply for two divers to 50 feet. This is ideal for deep dredging and high-altitude use. The assembled weight is 378 lbs. and the shipping weight is 439 lbs. The most important 4 in. and 5 in. sluice specifications are: the dredge capacity of up to 8 yards, consuming half a gallon of fuel per hour.

For more economy, portability and efficiency you can use the selection of new compact 6 and 8 inch heavy duty dredges. The sluice box sets below the surface of the water, reducing out of water lift increasing suction power efficiency and is equipped with a winching level system for

fine sluice box adjustments. The range of maximum dredge capacity is 14 to 20, and 22 to 30 yards per hour respectively for the 6 and 8 inch model.

The new 8 and 10 inch hydromatic jig diamond and gold dredge are available with either gasoline or diesel fueled engines. Equipped with an effective and efficient *5 stage recovery system* designed to recover gold and gemstones. The new economical model 8080 dredge, for example, is the only one of its kind employing several unique patented recovery techniques. It can be shipped in a 20 foot container and field assembled anywhere in the world. This dredge has proven itself in the diamond fields of Africa. While we were working on this research, Keene engineering sale manager told us that one of this type of equipment was sold to Zaire.

The fifth and sixth alternatives are described as follows:

a_5 : Miners may also dig inland with rudimentary tools. In the Tshikapa area, they may find diamonds at the depth of 6 to 10 meters. The bedrock is located at about 15 to 20 meters.

a_6 : Finally, in project six we consider the case of inland mining using dredging equipment.

States of nature and probabilities

We define different states of nature that may happen. The state of nature represents the decision maker's estimate of events that could occur in the natural or economic process. The states of nature to be considered are those that can affect the production or pricing process. Definition of states of nature requires judgment about such variables as rainfall; prices; government actions regarding diamonds; the collapse of mines; crocodiles can also attack miners in rivers; mechanical disruption of equipment; and the richness of the sites. We will call:

θ_1 : mining in areas where one may get 0.9 carats per cubic meter;

θ_2 : mining in areas where one may get 1 carat per cubic meter;

θ_3 : mining in areas where one may get 2 carats per cubic meter;

θ_4 : mining in areas where one may get 3 carats per cubic meter;

θ_5 : mining in areas where one may get 4 carats per cubic meter;

θ_6 : mining in areas where one may get 5 carats per cubic meter.

Then we attach subjective probabilities to each state of nature denoted $P(\theta_j)$ where j is the jth state of nature. As denoted, these probabilities represent the decision maker's degree of belief in the occurrence of a particular outcome and can be formulated in a variety of ways. They do have the axiomatic properties ascribed to probability and must sum to one when added over all states. The $P(\theta_j)$ are called prior probabilities because they represent the initial degree of belief about the richness of the mines. These prior probabilities and expected production (Table 10) might eventually be modified by new information. The expected quantity is equal to state of nature times probability times quantity of gravel extracted.

$$E(Q_D) = \theta_j * P(\theta_j) * m^3$$

Table 10.   Prior probabilities and expected production

States of nature	Probability	Expected production per cubic meter of gravel # of carats
	$P(\theta_j)$	
0.9	0.40	0.90*0.4 = 0.036
1.	0.20	0.20*1 = 0.200
2	0.15	0.15*2 = 0.300
3	0.12	0.12*3 = 0.360
4	0.08	0.08*4 = 0.320
5	0.05	0.05*5 = 0.25
	1	1.466 carat per cubic meter of gravel.

So, we can now say that expected output is a function of input factors (K: capital, L:labor, and m: gas, oil, spare parts, maintenance and repairs costs). But because we already know the quantity the firm is assumed to produce, there is no more need to go through the process of maximizing the production function subject to input costs.

Short run total cost

The total economic cost will be equal to explicit costs + implicit costs. Explicit costs are highly visible costs that the owners of firms incur when acquiring resources services from other households or when acquiring intermediate goods from other firms. These costs include: wages and salaries paid for the use of other people's labor (W), rental payment for the use of other people's money (i), payments of raw materials and intermediate goods to other firms (Pm), rental price of land (r_{land}), and payment of taxes (t).

Because of the variability of quantity of carat-stones extracted, which are not highly correlated with man hours and machines hours, but depend also on the richness of the site, and the productivity of the labor, and because we have avoided the standard formulation of the Cobb Douglas production function, we cannot say that wage rate is equal to the marginal product of labor. Wage should be determined based upon expected quantity that can cover average variable and total cost. Being very high business because of uncertainty in output determination, in the Tshikapa areas, minings are organized mostly on a family basis in order to avoid the payment of salaries to workers in the case where the firm did not find any diamond. Family members can bear easily the loss than other workers would not do.

With respect to capital the cost of equipment used vary depending on the type of exploitation, from simple tools to dredging equipment such as Keene engineering dredges. Up to the Tshikapa diamond mining areas in Zaire, total costs of these equipment are approximately US 10,000, $.30,000, and $ 60,000, respectively for a 5 in., 6 in., and 8 in. model.

Expected revenues and profits

Knowing the expected quantity of production, given the average price per carat in buying offices, the firm or individual producers can form their expectation on revenues and profits.

Expected total Revenue = Price * expected quantity.

$$TR = TR = P_D * E(Q_D)$$

Prices of diamonds are determined by the *Bureau d' expertise*, an office that examine each stone and determines the quality and value of stones. In the city of Thsikapa, price per carat-stone averages US $1,000, while villagers can sell in their villages at US $300 to 500 per carat. So, expected profit will be the difference between expected total revenue and total cost.

Net Profit = TR - TC

Benefit Cost Criterion of Investment Decision

For a private investor, common sense requires that benefits must exceed cost for projects to be implemented. The rate at which benefits exceed costs, as expressed by the ratio has an important influence on the choice of projects.

For marketable commodities, the benefit of a project to an investor is equal to revenue or to market value. The benefit of a project is the stream of resources which is released from the alternative and which becomes available to produce other outputs.

The money costs of the project reflect the value of the resources which are used. Project cost is the value of goods and services used to establish, maintain, and operate a project. Associated cost is the value of goods and services needed, beyond project cost, to make the output of the project available.

Direct benefit is the value of the immediate products or service resulting from the measures for which project and associated costs were incurred. Indirect benefit is all other benefit attributable to the project that can be expressed in monetary terms. Intangible benefit is all the benefit that cannot be expressed in monetary terms.

In evaluating the benefits and costs of a project, two situations must be compared: the development of the economy with the project and the development that would occur without it. The change in the path of the economic system because of the project involves certain costs and certain benefits, and it must be the objective of benefit-cost analysis to identify these changes. The *with and without* principle requires that the economic analysis contrast these two hypothetical situations.

In order to compare projects, the data on benefits and costs must be organized into some specific form which can serve as a criterion:

(1) compare the difference between benefits and costs,

(2) compare the rates of return on investment,

(3) compare the ratio of benefits to costs.

Suppose that a diamond miner has an investment in dredging equipment of $10,000 (a 5 in. Triple sluice dredge); suppose that its sales are $1,800,000,000 a year and that the operating profit on these sales is $984,000; its total annual cost is $816,000, and suppose that the opportunity cost of lending his savings is 3 percent. Let us assume that capital market does not exist such as there is no market interest rates. Investment was funded by personal savings. The ratio benefit cost will be

$$\frac{B}{C} = \frac{984,000}{816,000} = 1.2058$$

A calculation of crude rate of return of this investment will give a rate of 98.4 per year

$$\frac{B}{I} = \frac{984,000}{10,000} = 98.4$$

Marginal Efficiency of Investment

In 1988, we saw a diamond miner diving in the Tshikapa River without any diving system, picking up some gravel, coming up at the surface. After he panned them he found some stone carats of gem diamond per week. Let's assume that he only found one carat per week, that he may work during 13 weeks in the dry season and gets 13 carats of gem diamonds. We also know that one can get from 0.9 to 5 carats per metric cube in the Kasai mining areas.

At unit selling price of $1,000, total expected revenue will be $13,000 US. If he takes $10,000, his revenues of 10 weeks to purchase a *Triple Sluice dredge* at Keene Engineering in California, he can then produce 115 carats per week. The 114 additional carats per week for 13 weeks (1482 carats) is a measure of the *Gross Marginal Productivity* of the Triple Sluice Dredge. Whether the dredge (capital) is productive depends on balancing the gain in output against the cost of purchasing the equipment. The Net Marginal Productivity will be computed as follows:

$$1482 - (10 \text{ carats} = \text{the purchasing cost of the equipment,}$$

$$(130 \text{ carats} = \text{the cost of other inputs (Variables costs),}$$

$$(60 \text{ carats} = \text{the tax values,}$$

$$(200 \text{ carats} = \text{the export cost up to the USA).}$$

$$(80 \text{ carats} = \text{other charges)}$$

$1482 - 480$ carats $= 1000$ carats would be sold in the USA at $3,000 a carat. Thus, $3 million is the Net Marginal Productivity.

When capital's dredge marginal productivity is positive, investment (the act of adding to the amount of capital) allows the miner to produce a larger output even after 'netting' out the cost of the capital. The annual percentage rate of return is a measure of the Net Productivity of Investment in Capital that allows us to compare the productivity of various projects.

$$I_0 = \frac{R}{1+g}$$

where I_0 is the initial cost and R is the resulting addition to output
(capital's gross marginal value product) the next year; g denoting the rate
of return is a percentage. When I_0 (capital equipment) yields services
over more than one year,

$$I_0 = \frac{R_1}{(1+g)} + \frac{R_2}{(1+g)^2} + \frac{R_3}{(1+g)^3} +,\ldots,+ \frac{R_n}{(1+g)^n}$$

Given the initial cost of the equipment and the contribution to output in
each year, we can solve this expression for g. The marginal rate of return
on the investment g is the net increase in revenue resulting from the
investment expressed as a percentage of each extra dollar invested.
Internal Rate of Return is also called Marginal efficiency of investment.

$$0 = -I_0 + R_t + \frac{R_{t+1}}{(1+m)} + \frac{R_{t+2}}{(1+m)^2} +,\ldots,+ \frac{R_{t+n}}{(1+m)^n}$$

m is the IRR (internal rate of return) such as PV (present value of future
revenues) equals to zero.

The marginal efficiency of an investment project, g, is defined as
the rate of interest that will discount the PV of the project to zero. If
with any C and R stream, we solve for g, we have the interest rate that
would discount the project's net returns back to zero. Investment projects
can be ranked by g as well as by discounted present value (DPV). It would
seem that a project with a *high* returns stream would have a *high* PV and
this requires a *high* g to discount the net returns stream to zero. Thus, g,
can be plotted against i (see Figure 9).

As the size of the total investment program is increased, we go to
projects with lower and lower R streams, so that as i rises, g falls. Thus
g function representing investment demand, can be confronted by a supply-
of-funds schedule to determine the equilibrium level of investment.
The supply-of-funds schedule r shows that up to a certain point the
interest cost of financing investment is roughly constant. But as the size
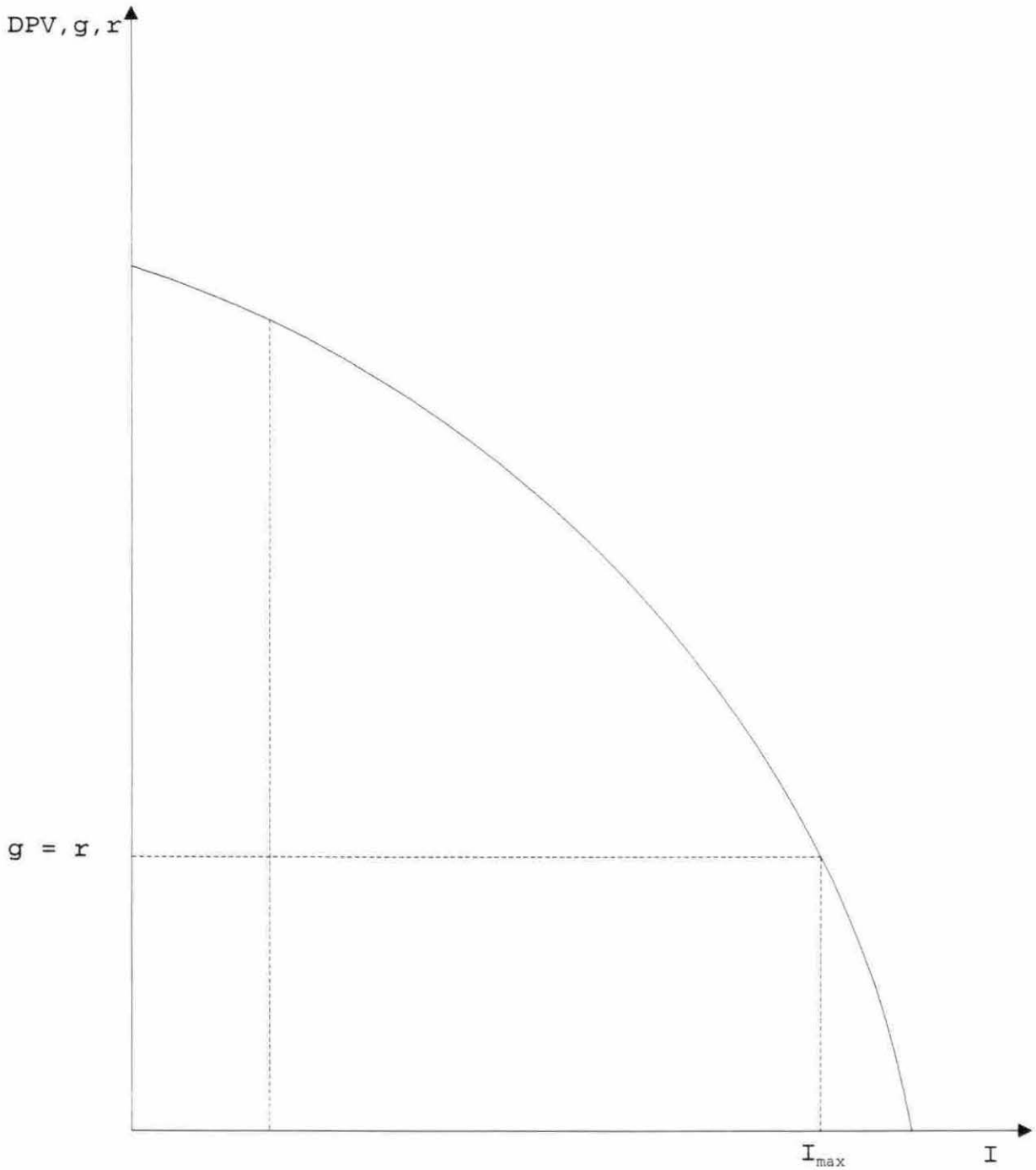
Figure 9.   Discounted present value, interest rate, marginal efficiency of investment and investment level

of the investment program goes beyond that point the cost of borrowing, or the opportunity cost of using retained earnings, begins to rise.

Present Value and Marginal Efficiency of Investment

The marginal efficiency makes no reference to the market rate of interest, which measures the opportunity cost of investment. The present value ranking depends on the market rate of interest, the rate at which earnings can be reinvested, while the marginal efficiency of investment is not related to the market rate. Therefore, the marginal efficiency rankings may be different from present value rankings. Suppose two projects I and II.

Project I: MEI : $0 = -1 + 0 + \dfrac{0}{1+g} + \dfrac{4}{(1+g)^2}$

$$1 = \frac{4}{(1+g)^2}$$

$$4 = (1+g)^2$$

$$g = 1$$

Project II: MEI : $0 = -1 + 0 + \dfrac{2}{1+g} + \dfrac{1}{(1+g)^2}$

$$1 = \frac{2}{1+g} + \frac{1}{(1+g)^2}$$

$$1(1+g)^2 = \frac{2(1+g)^2}{(1+g)} + \frac{1(1+g)^2}{(1+g)^2}$$

$$1+g)^2 = 2 + 2g + 1$$

$$g^2 = 2 + 2g + 1 - 2g - 1$$

$$g^2 = 2$$

$$g = 1.414$$

The marginal efficiency of investment criterion indicates that project II is unequivocally better that project I, since $g_2 > g_1$. However,

under the present value criterion there is no unequivocally correct answer because the PV ranking depends on the market interest rate.

With i = 0

$$\text{Project I:} \quad PV = -1 + 0 + \frac{0}{1} + \frac{4}{1} = 3$$

$$\text{Project II:} \quad PV = -1 + 0 + \frac{2}{1} + \frac{1}{1} = 2$$

With low interest rate Project I is preferable.

With i = 1

$$\text{Project I:} \quad PV = -1 + 0 + \frac{0}{2} + \frac{4}{(1+1)^2} = 0$$

$$= PV = -1 + 0 + \frac{0}{2} + \frac{4}{4} = 0$$

$$\text{Project II:} \quad PV = -1 + 0 + \frac{2}{2} + \frac{1}{(1+1)^2} = 0.25$$

With high interest rate Project II is preferable.

With the marginal efficiency criterion we may have the case where at interest rate below a specific market interest rate, i^*, project I will have the higher PV, but above i^*, project II wins (see Figure 10). Thus, a firm can obtain a true ranking of investment projects in terms of their opportunity cost by computing DPV for each project at the relevant rate of interest. Instead of g, we will use r in the denominator of the formula we used to compute the marginal efficiency of investment or internal rate of return.

Assuming that life machine of a 5 in. triple sluice dredging equipment supplied by Keene Engineering is three years, that net returns are those specified in column 2, and that the opportunity cost of lending its savings is 50 percent, the internal rate of the investment project is computed (see Table 11).
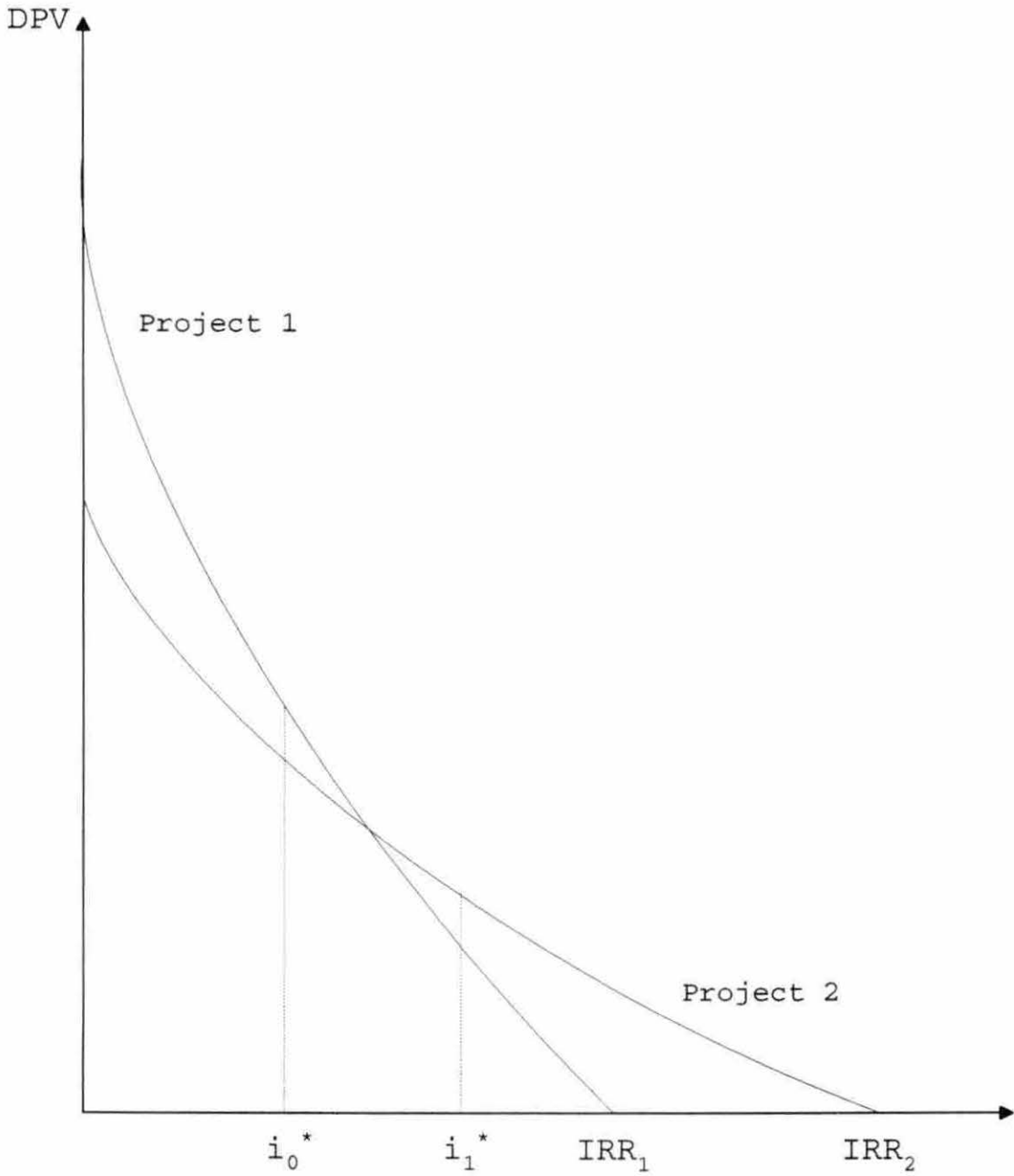
Figure 10.   Internal rate of return (or marginal efficiency of investment)

Table 11.   Internal rate of the investment project

Year	r = 0.5	Net Return	DPV
0	$\dfrac{1}{(1+0.5)^0}$	$-10,000$	$\dfrac{1}{(1+0.5)^0} * (-10,000) = -10,000$
1	$\dfrac{1}{(1+0.5)^1}$	$984,000$	$\dfrac{1}{(1+0.5)^1} * (984,000) = 656,000$
2	$\dfrac{1}{(1+0.5)^2}$	$884,000$	$\dfrac{1}{(1+0.5)^2} * (884,000) = 392,000$
3	$\dfrac{1}{(1+0.5)^3}$	$784,000$	$\dfrac{1}{(1+0.5)^3} * (784,000) = 232,296$
			$1,171,184$

With a discounted present value of US $1,171,184 internal rate of return (IRR) for this project will be determined as follows:

$$0 = \frac{DPV}{1+g} - I$$

$$0 = -10,000 + \frac{1,271,184}{1+g}$$

$$10,000 = \frac{1,271,184}{1+g}$$

$$(1+g)10,000 = 1,271,184$$

$$10,000 + 10,000g = 1,271,184$$

$$10,000g = 1,271,184 - 10,000$$

$$g = \frac{1,271,184 - 10,000}{10,000} = 126.12 \text{ per cent}$$

Assuming that i, the nominal market interest rate is 50%, while inflation
is 100%, this project would still be profitable because the internal rate
of return is greater than the market interest rate.

In The Tshikapa area, nominal interest rate is not an investment
determinant of potential investors because capital market does not exist.
In addition, the Central Bank of Zaire has removed it as a choice indicator
guiding investment decision because of its high level due to inflation.

A firm can raise money for the purchase of new capital in five ways:
by using internal funds, by selling bonds (debt), by issuing stock
(equity), and by borrowing funds to the commercial banking system or to
investment banks. In practice commercial banks give short term loans to
finance circulating capital, while development banks give medium and long
term loans to finance the building of plants, the purchase of equipment
animals, or some physical assets such as plantations. The fifth financing
source consists of selling part of physical assets. In a world of perfect
competition and no tax biases, the imputed cost assigned to each of these
means of raising money would be the same, allowing for risk differential.

As a fact, however, because firms assign extra cost to funds borrowed
outside due to the fixed liability associated with bond sale or the
dilution of control that comes from stock issue, firms are likely to impute
a lower rate to funds raised inside the firm by retained earnings plus
depreciation allowances than to the other three sources of funds apart the
sale of physical assets. Thus, the interest rate, or opportunity cost used
to compute the user cost of capital may be a weighted average of the
interest which apply to these four different sources, where the weights are
the fractions of total funds from these alternative sources:

$$U = r_1 \frac{internal\_funds}{total\_investment} + r_D \frac{bond\_issue}{total\_investment} + r_E \frac{equity\_issue}{total\_investment}$$

$$+ r \frac{bank\_loans}{total\_investment}$$

where r_1 is the opportunity costs of lending the firm's retained
earnings;

r_D is an established bond rate;

r_E is average earnings-price ratio on corporate equity;

r   is the real market interest rate.

In the Tshikapa areas, individual miners do not have any idea about nominal or real interest rate. The concept of internal rate of return is also unknown. They work in diamond digging because they need to get diamonds that can be sold at any time at high price. They invest their physical energy with some small capital because they expected high returns in comparison with few money spent in digging operations. They are motivated by very expected returns. Assuming that a grant of $10,000 is given to someone in the Tshikapa area, he or she would likely invest in diamond activities, instead of investing in agriculture. The reasons are that not only expected returns in diamonds seem to them to be greater than in agriculture, but also because agricultural products require too much time before harvesting. In addition, the quality of soil and temporary drought do not allow high yield for food crops such as maize, or cassava.

However, as we said before, variability of output in diamond activities make it so risky if miners do not get any diamonds. So, if workers were hired, any firm or individual would be facing serious problems because workers must be paid. The bearing of loss is dramatic in that case. For this reason diamond activities are often organized on a family basis. Members of a family can bear easily the risk of loss.

Funding Diamond Activities

As stated before, official capital market is not organized in the Tshikapa areas. Households hardly make bank deposits because they do not trust any financial institution for political instability. Thus potential investors cannot apply for bank credits or issue bond and equity. So, interest rate cannot be used to confront marginal efficiency criterion. For interest rate to be used in the calculation, it must first be assumed that the firm faces a competitive capital market, so that the interest rate at which it can borrow appears fixed. When this market does not function,

it is impossible to form a function that describes the relationship between investment and the interest rate. Our understanding at this level is that kind of relationship appears between investment and the capital price, personal savings, and other factors such as the selling price of diamonds. Investment is only funded by internal funds or personal savings

If internal personal resources or internal funds are less than any investment project cost, potential investors will keep raising money. They may keep the same rate of saving or increase it by reducing current consumption.

In industrialized societies increase in interest rates may cause increase in further expected future consumption reducing current consumption. However, in the Tshikapa areas where market interest rates are absent, and if someone wants to purchase a floating dredge, the motivation to save is the expected high returns in diamond mining. In the case where personal savings or familial savings, or the total savings of a clan, do not match the cost of equipment, potential investors may also sell some physical assets in order to increase savings. Sometimes kinship may work and other wealthier relatives may give the potential investor some money to help him buy equipment or start a business. Cooperative or so-called temporary associations hardly work especially where investors are unskilled people.

If personal funds are equal to the cost of equipment, potential investors will make investment decision: first, the decision will lead to the purchase of equipment, and second it will lead to the study of the area assumed containing diamonds to be mined. Thus, if price of equipment increases, expenditures on capital decrease; if price of equipment falls, expenditures on capital increase.

Therefore, without any least square estimate, we learn from our observations in the milieu that a correlation between expenditure on capital and the price of capital exist in the mind of any investor as well with wages, and the opportunity cost of lending savings.

$$I = \left(\frac{W}{R^K}\right) P^K$$

where I is investment, W is wage, R^K is the user cost of capital, and P^K is the cost of new equipment.

<div align="center">Limitations on Investment in Diamond Activities</div>

Marginal efficiency of investment

We have seen that individuals or private firms will keep investing until marginal efficiency of investment equals the opportunity cost of lending private savings in the absence of market interest rates.

Geographic limitations

Geographic limitations refer to the size of diamond beds under exploitation and estimated mineral reserves in Zaire. Investment will expand until complete exploitation of the Kimberlite rock under conditions of existing demand for diamonds and the financial capability of firms and physical energy of individuals to work in diamond activities. Let us remind that the field size of the area where diamonds are extracted in the two Kasai provinces is estimated at about 340,000 kilometers square. However, nowadays new diamonds beds have been discovered in the Bandundu province in the Kahemba areas, and in the province of Haut Zaire, in the Kisangani and Isiro areas. In addition, the big portion of the Kimberlite rock is located down underground at deepest levels.

Financial and technical constraints

In the future, firms may be facing some technical and financial constraints as well if they want to extract diamonds at deepest levels. More sophisticated and costly equipment will be required. That is the reason why the revised model for investment is suggesting that investments in applied research and development must be undertaken and import of heavy manufactured industries must be one of the priorities of macroeconomic policies.

Marketing prices of diamonds

By increasing its already impressive diamond production, Zaire may
inflate supply. This would lead to decrease international prices despite
the fact that prices of stones are mainly determined based on their
quality. However, with macroeconomic policy that support import of export
manufacturing industries using rough diamonds as inputs, international
prices of diamonds may be stabilized though increasing production of rough
diamonds.

Findings

Expectations on output and on revenues in foreign currency are the
most important incentives to increasing diamond production. Holding foreign
currency such as the US dollar has become a dream for most Zairian because
of the protection of purchasing power the dollar guarantees. Appreciation
of the zaire due to the massive presence of the US dollars possibly may
occur if some mechanism is set up and that can give incentives to bank
deposits.

CHAPTER 5. FINANCIAL DEVELOPMENT IN RURAL DIAMOND PRODUCING AREAS

This chapter analyzes the structure of capital market in Zaire, different savings mobilization policies under stabilization programs, the structure of savings, and the role of a new financial institution. A particular attention will be given to loans to irrigated agriculture.

Structure of Capital Market in Zaire

The main objective of the financial system in Zaire has been the mobilization of savings via fiscal and monetary regulation, direct savings, or as a result of inflation, forced savings. The effects of financial development on real economic growth depend on whether external (market) finance or internal finance is predominant and, in either case, whether the financial system is allowed to influence the volume and composition of investment.

Does free weak capital market development inhibit very rapid economic development or is there any correlation between planned rapid capital market development and rapid real growth? However, a planned rapid capital market would be associated with high costs and maybe high benefits as well.

In Zaire, the formal financial sector consists of the Banque du Zaire (BZ), the central bank; ten commercial banks of which two are state owned (the *Banque Zairoise du Commerce Extérieur* (BZCE) and the *Nouvelle banque de Kinshasa* (NBK); the *Société Financière Développement* (SOFIDE) and the *Banque de Crédit Agricole* (BCA), both development banks; the *Société Nationale d'Assurance* (SONAS), the national insurance company; the Institut *National de Sécurité Sociale* (INSS), the national institute for social security; the *Caisse d'Epargne du Zaire* (CADEZA), a saving bank; and a network of cooperative savings and loans institutions, the *Coopératives d'Epargne et de Crédit* (COOPEC's).

The ten commercial banks have a network of 116 branches across the country, 23 of them situated in Kinshasa, the capital of the Zaire. Only four of these banks are actually represented throughout the country, i.e.,

the Banque Zairoise de Commerce Exterieure (BZCE), the *Union Zairoise des Banques* (UZB), and the *Nouvelle Banque de Kinshasa* (NBK).

As we said before, the clientele of the commercial banks is recruited essentially from the modern sector of the economy, concentrated in the urban areas. In 1985, 71 percent of deposits originated from enterprises, the balance from private persons. The agricultural sector provided only 4.2 percent of deposits while the commercial, industrial, and service sectors (including transport) accounted for 68 percent of deposits. We remember that in 1987, investment represented 13 percent of GDP, and that only 10 percent was financed by the domestic savings.

Let us recall also that SOFIDE, which was established in 1970, is really the only institution providing any medium and long term credit for agricultural development. However, many of its investments over the past decades have been for the rehabilitation and modernization of industrial capacity and for agricultural and transport projects. Until the liberalization of Zaire's foreign exchange market in 1983, SOFIDE, was the only local non governmental source of term lending in foreign exchange to the productive sectors. The minimum loan SOFIDE handles is the equivalent of $20,000. The World Bank has been a strong supporter of SOFIDE.

The BCA, which was established in 1982, was given a very broad mandate to further economic development by supporting the creation, extension, and modernization of enterprises set up in Zaire in the agriculture, fishery, and livestock sectors, as well as in those sectors serving agriculture. BCA's lending has been limited by its low level of capitalization. At the time of incorporation, BCA's potential total capitalization was the equivalent of almost $22 million; however, at the end of 1986 its equity was only a little more than $1 million. Moreover, until the late 1980s it had only one office, situated in Kinshasa, making it very difficult to attract deposits from the agricultural community. The loans made by BCA since its inception have been located in all regions of the country, but nearly half of the loans have been for the Bas-Zaire, Bandundu, and Kinshasa provinces. At the end of 1985, 75 per cent of deposits came from the tax feeding *the Fonds des Convention de Développement* and from the *Fonds Agricole*, a tax on agricultural exports,

both of which have since been abolished. In 1986 USAID agreed to loan
$450,000 from it counterpart funds for funding of medium term credit. In
1987, the German credit agency KfW agreed to a $1.4 million in credit line.
In 1988, the Belgian government agreed to provide 250 million zaires to the
BCA from its counterpart funds.

In 1987-88 the BCA set up offices in Lubumbashi, in the Shaba
province, and in Kikwit, in the Bandundu province, and was participating in
the establishment of a local bank in the Kivu province (*Caisse Populaire de
Crédit Agricole*).

In 1991 BCA became virtually bankrupt and was placed under the direct
supervision of the Bank of Zaire. Its overhead costs on loans remain quite
high, and it usually charges negative rates of interest if inflation is
taken into account, thus eroding its own capital. BCA is now a mixed
capital company and is looking for foreign participation in its capital.

The CADEZA, a saving bank that was created in 1950. With its 72
regional offices established throughout the country CADEZA is in principle
well placed to launch a major effort to mobilize domestic savings in the
interior since it accepts accounts with more modest initial deposits than
do most other banks. It has, however, accumulated major losses over the
past years and is continuing to operate only because of support from the
Bank of Zaire. For practical purposes, CADEZA is bankrupt.

In a survey done in 1986 by the Ministry of Rural Development, a
total of 800 cooperatives were listed. Among these, about 400 are savings
and loans cooperatives, 200 are agricultural production and marketing
cooperatives, about 100 are livestock cooperatives, and the remainder are
medical and rural housing cooperatives (Shapiro, 1992).

The largest cooperatives are the savings and loans cooperatives. They
can be divided up into three networks according to their religious origins:

1. The Caisse Populaire de Crédit Luymas (CPCL/CBZO) in Kinshasa and
   Bas-Zaire. They were funded by Luyeye Massamba, a Protestant pastor
   trained in the US. They are inspired by American Cooperative Savings
   and Loans Associations but they are not recognized as an authentic
   cooperative by the Association of Savings and Loans Cooperatives in
   Africa. Thus, Luymas is not part of UCCEC, the *Union Centrale de*

Coopératives d'Epargne et de Crédit, as they do not accept all conditions pertaining to cooperatives. In 1989 there were 36 caisses Luymas with 210,617 members and 1.118 billion zaires in deposits, equivalent to

2. The network of COOPECs in Kinshasa, Bas-Zaire, Bandundu, and Kivu which is inspired by Protestant missions.
3. The network of COOPECs in Equateur and Shaba which are of the Catholic denomination.

There are 120 COOPECs in total with six hundred thousand members, grouped in five COOPECs and represented by UCCEC. In 1989 they had 1.5 billion zaires in deposits.

Agricultural production and marketing cooperatives in Zaire have a reputation of being unstable institutions as they go from prosperity to decline, eventual disappearance and rebirth. Most cooperatives are active in the supply of inputs and in the sale of agricultural products. The government does not offer them financial assistance in the form of subsidized credit or grants.

Most of the Non Governmental Organizations NGOs are religious organizations, either foreign inspired or local ones. In many cases, they provide basic economic and social services to the population and have effectively taken over many of the functions which are normally expected from the state. However, they do not command the resources needed to adequately fulfill their role which usually cover a wide range of activities. Many NGOs lack the technical capability and skills required to adequately solve the problems they confront. Some NGOs have a purely social objective, some have an economic objective, some are mixed and aim for integrated rural development comprising health, education, agricultural production, community development, etc. Some NGOs are really fake and exist only as a vehicle to attract and absorb funds. Some NGOs such as GENAGRO are the receiving end of large agro-industrial companies (UNIBRA AND ESTAGRICO) and carry out activities which are not directly profitable but which enhance the organization and benefit rural people working indirectly for the company.

Does the financial structure of Zaire seek economic development by controlled inflation, or is there any financial planning that stimulate growth, or does the financial structure makes use of financial techniques to stimulate growth?

Savings Mobilization Policies in Zaire

The government of Zaire has mainly been using inflationary finance measures during almost three decades since independence in 1960. Under stabilization programs, the IMF and the World Bank policies for savings mobilization consisted of reducing government spending (cut in imports, in public employees wage, and cut in public investments), and domestic credit contraction. With the treasury bill starting in 1981, financial techniques of savings mobilization have appeared.

Inflationary finance measures

Under stabilization programs, the government of Zaire had been expanding the money supply in order to expand the amount of investment which can be undertaken. However, expanding the money supply has affected price levels. Hyperinflation has affected the productivity of investment to the extent that prices become unrelated to scarcity values, less rational investment decisions are made due to the increased uncertainty created by inflation, and changes in the structure of financing have resulted, leading to less productive investment being undertaken.

Inflationary financing through expansion of the money supply leads to increased savings through the accumulation of money balances. However, the expansion of the money supply and/or inflation may not have neutral effects on the rate of savings through other financial channels, that is, accumulation of financial assets as a percentage of the gross national product. But savings rate through accumulation of money balances were completely offset by inflation causing decreases in savings rates for other financial assets. Following reasons may explain savings rates in Zaire:

(i)   For many channels of savings, the rate of savings is in part
        dependent upon the difference between the expected yield and the rate
        of inflation expected over the period during which the financial
        instrument is maturing.

(ii)   For other channels of finance that are affected by the current rate
        of inflation, for example government self-finance has been inversely
        varying with the rate of inflation. Inflationary measures were relied
        upon in the place of taxes to finance not only desired investment,
        but mostly increased government fictitious expenditures. Indeed
        falling tax collections has forced the government to turn to
        inflationary finance measure.

Financial techniques to stimulate savings, investment and growth

Under stabilization programs the government of Zaire had been
expanding domestic credit to finance desired investment and expenditures
through increased money supply. After 1981, the treasury bill has been a
dynamic domestic savings mobilization mechanism. It led to positive
interest rates, but at prohibitive nominal interest due to hyperinflation.
However, because a large portion of currency and bank credits have been
directed to the purchase of coffee and diamonds, huge amount of cash was
held by diamond sellers, and coffee plantations without returning into
official banking system. This is due not only to a lack of savings
institutions and bank agencies through rural areas, but also it due to the
fact that households do not trust savings institutions and commercial banks
especially in diamond producing areas.

The degree of financial intermediation may be roughly measured by
relating money and near-money (quasi-money) to gross domestic product. This
measure, despite its many weaknesses for international comparisons, can be
accepted as a broad index of the degree of financial development and the
quality of the financial markets in these countries where the liabilities
of the monetary sector (central bank and deposit institutions) account for
the bulk of financial assets. The ratio of money and near-money to the
gross domestic product measures the extent to which nonfinancial sectors

hold part of their wealth in the form of financial assets. Money and deposits are the principal financial assets (Samez, 1972, p. 197).

In the mid-1960s this financial ratio ranged from around 8 percent to close to 24 percent in tropical Africa. The equivalent ratio (total financial assets to gross domestic product) in highly developed countries in Western Europe and North America is in excess of 100 percent. One should expect a positive correlation between levels of economic and financial development as well as between the rates of growth in real income and in financial assets, and several empirical studies have confirmed these relationships for both industrialized and developing countries. One would expect a smaller amount of currency in the countries with some variety of financial intermediaries and markets than in countries where banks are few and far apart and where even relatively large transactions are executed in currency. Not, too, that time and savings deposits are large relative to demand deposits in those countries which are ranked highest according to the ratio of money and near-money to gross domestic product, while time and savings deposits are negligible in the countries ranked lowest.

Another ratio that could help us understand importance of financial development is the currency deposit ratio. Let us remember that the money supply consists of currency (CU) and checking deposits (D) that individuals and firms hold at banks. The currency deposit ratio _ measures how much currency people want to hold as ratio of their deposits.
Currency is related to bank deposits , and c is the currency deposit ratio. Rarely do households save money in savings institutions in rural areas, despite the number of COOPECs and commercial banks described above.

Crawford Young and Thomas Turner (1985, p.322), reported that a singular anti-inflation action was undertaken at the end of 1979, when the regime suddenly announced *demonetization* measures. The banknotes for 5 and 10 zaires the largest denominations then in circulation, were nullified and had to be exchanged for new currency with up to a fixed maximum of 3,000 zaires. Many merchants as well as ordinary citizens held much of theirs savings in cash, either because of the distance from banks or lack of confidence in financial institutions; many of those who lacked access to

the centers of power or who were distant from banks lost all their cash savings.

As we know, starting 1991, more than 5 million carats of GEM diamonds are sold annually in Zaire in US dollars at an average price of $1,000 per carat in Tshikapa, Mbuji Mayi Kahemba, and now in Kisangani areas. Total revenue equals US $5 billion. Because households do not trust financial institutions, and because of riots undertaken by soldiers during these four years, we can assume that much of the US $5 billion have been held every year in the Tshikapa, Mbuji Mayi and Kahemba areas where diamonds are produced and marketed.

Savings Structure in Zaire

Referring to some statistical sources, observation of savings and investment in Zaire reveal forms in which savings are placed either for direct investment or with intermediaries:

(I) Savings used by an economic unit to finance its own investment. This form of savings never directly enters the financial markets.

(ii) Savings directly placed by one economic unit with another. This type of transaction is made in a financial market but does not require intermediary.

(iii) savings placed by an economic unit with a financial intermediary which in turn may place the funds with an investing unit. Both of these transactions are made in financial markets and financial intermediary is relied upon.

We can summarize categories of placement of savings in Zaire as follows:

1. Self-financed investment
    a. Government sector recurrent budget surplus
    b. Corporate retained earnings and depreciation allowances
    c. Household reinvestment of savings

2. Direct obligations
    a. Government securities
    b. Corporate securities, and stocks
    c. Directly placed personal mortgages and loans

3.   Obligations of financial intermediaries

    a.   Currency

    b.   Demand deposits: banks

    c.   Interest-earning deposits: banks and other savings institutions.

    d.   Paper of nonbank intermediaries (mainly short-term)

    e.   Insurance

    f.   Mutual funds

    g.   Compulsory deposits

Let us remember that financial savings need not finance investment. They can be used to finance consumer purchases. Corporate self-finance can be used to finance an increase in the value of inventories that does not represent the accumulation of additional stocks but rather the increasing cost of inventories with inflation.

In 1994, while working on this research, we know that commercial banks and savings institutions are not trusted, SOFIDE does no longer receive external financial supports from the World Bank, BCA became bankrupt in 1991, and CADEZA with most COOPECs as well. There is an urgent need to reorganize the Zairian financial market, and to give new hope to households and make them trust financial institutions whether or not the corrupt ruling elite is still in power protected by hunter soldiers ready to burglarize everyone especially in rural areas. The creation of new private financial development enterprises owned by Zairians and Americans together become increasingly a necessary condition for taking off economic rehabilitation of Zaire. Why American business should join Zairians in the organization of this institution; Why should this institution get established in Tshikapa, Mbuji Mayi, Kahemba, and Kisangani? How should it be organized? Finally what mission should be given to it?

New Private Financial Institution

Status of the Zaire-US Diamond Bank

We would like "ZAIRE-USA DIAMOND BANK" as denomination given to the financial development institution, because it will deal mainly with

diamonds. Most diamonds produced privately in Zaire will be marketed in the US, in order to get more US dollars needed to finance growth. The choice of the US is inspired by the fact that advanced technologies needed for the Zairian economic growth are provided by the US. Thus, the Zairian diamond industry should be linked to American banks, and to American Associations and corporations dealing with diamonds.

In order to get the attention of the US government, for its political support to the *ZAIRE-US DIAMOND BANK*, a corporation should be created. However, in its inception, the institution may be created as a non governmental organization, in the case where the US government does not want to get involved immediately. Any skepticism in the chief of the US government would be a political mistake.

Role of Zaire-US Diamond Bank

As a financial institution, ZUDB will be an intermediary that will be channeling the savings of individuals, businesses and government into loans and investments. At the beginning, ZUDB, created by the researcher with its personal savings, and maybe with the support of some partners, will be given the following objectives:

- alluvial exploitation of diamonds with a 5" triple sluice Keene Engineering dredge in the Tshikapa area;
- marketing of diamonds in Tshikapa and in the US;
- purchase of diamonds from other individual miners and their marketing in Zaire and in the US;
- investment in the building of the financial institution;
- sophisticated military organization for the protection of ZUDB, with the support of all diamond miners, and traditional chiefs; and with the help of American lobbies involved in diamonds businesses;
- collection in kind (diamonds) of rights for damaging and polluting the environment that diamond miners have to pay to the government;
- collection of savings of diamond miners willing to get in touch with American firms; intermediary role in imports of American goods, and export of diamonds;

- organization of an office for tourism and trips throughout the US; delivery of travelers' checks and passports; an arrangement with the Zairian State Department of Foreign Affairs will allow ZUDB to provide passengers with passports;
- credit allocation to people organized in a "LIKELEMBA"; in order to stimulate these kind of mutuality;
- credit allocation to willing to work in diamond activities, regardless of age, sex, religion and tribes;
- credit allocation to individuals willing to invest in other activities;
- credit allocation to pupils, students, teachers, college and university professors, willing to learn, invest in any applied researches;
- credit allocation to individual willing to organize a school or any training programs involving the learning of appropriated technologies;
- credit allocation to individuals willing to invest in churches, social activities and community agencies;
- credit allocation to individuals willing to get married, for graduation ceremonies, for baptism;
- social support in cash or in kind (coffin) given to individuals who had lost a family member;
- credit organization to individuals willing to organize musical activities (for dance or religious music);
- credit allocation to individuals willing to organize sportive activities
- participation in investment projects in small hydroelectric power plants, in drilling drinking water wells in the villages of all traditional chiefs, and latter in other large villages;
- participation in the building of main rural roads, linking villages of traditional chiefs; These roads must be paved; - credit allocation to individuals willing to organize telecommunication systems, and other communications systems between villages;

- provision of public television in villages for the promotion and rehabilitation of spiritual and moral education;
- credit allocation to individuals willing to keep tracks of important event in the history of families and clans (photo albums, video films);
- participation in social investments such as hospital and health care centers.
- social support to people who suffer from AIDS and to all handicapped persons as well;

Loan and interest rates

Because of abundant foreign exchange earned within Zaire from the sale of diamonds in foreign currencies, and captured by ZUDB, we expect to fund investment projects and other activities at interest determined by the supply and demand schedule, that is the real market interest rate. We expected it to be situated at low levels.

Savings and interest rates

Credit authorization will be directed to individuals with ZUDB, and who have savings, checking accounts, and those who have medium and long term bank deposits. Required initial amount, a necessary condition to qualify for loans, would vary with different categories of memberships, from $10 for low income groups, to $1,000 for middle class income group, up to $10,000 for private firms. Interest rates will also vary within groups. But for firms, savings interest rate and interest on medium and long term deposits will tend to close to real market interest rates.

Computerized bank cards

All clients of ZUDB, will have computerized bank cards and will use them in food groceries and other stores built by ZUDB. They may also

benefit from discount rates on their bills. Other customers will not and will be required to buy goods in foreign exchange in our stores.

Reimbursement of capital and interest

With computerized bank cards, transactions will be made without carrying cash. Limited amounts of cash will be allowed to be drawn at teller machines. Such a funds will always be available for reimbursement of credit and interest payments. As we found in 1971, most Congolese debtors (now Zairians) rarely reimbursed credit allocated to them by the financial institution known called "the Societe de credit aux classes moyennes et a l'industrie", which used to give loans to middle classes.

Findings

Because capital market in diamond producing areas does not exist, the process of mobilizing private savings may consist of the creation of the *Zaire-US bank* in Tshikapa. This private bank will not only collect savings but also lend funds to investors in the diamond industry, in irrigated agriculture and in other economic and cultural activities.

Investing in Small Scale Irrigation System in Zaire

Most African governments have seen irrigation as a means towards food self-sufficiency, or as a source of foreign exchange earnings from export crops. Tenants on major schemes are, therefore, usually required to concentrate on commercial production of the crops given priority by the government and to sell them to the state. High food crop yields are needed to pay for costly irrigation investments. By contrast, traditional irrigation is more often used only to provide subsistence food. It is normally less costly, and often integrated with rainfed and livestock farming as a means of reducing climatic risks.

The cost of modern irrigation works for full water control ranged from US $4,000 to over US $8,000/ha, excluding roads and social

infrastructure (Underhill, 1990). Over half the African countries have some of their territory in drought-risk zones where small-scale irrigation based mainly on small dams and groundwater—and probably, of necessity, grant-funded—could do much to reduce rural hardship and the need for costly disaster relief.

There are at present many constraints to these developments. Social, institutional and economic factors appear more important than technical limitations. To improve the future performance of irrigation in Africa governments would have to make difficult policy and institutional changes. Planners must recognize that, to become established, modern irrigation requires long periods of social change and adaptation, in a consistently favorable policy and budgetary environment. Financial returns from irrigation need to be raised to improve the commitment of irrigators, and to encourage the emergence of private sector agricultural services. Inefficient government irrigation agencies need to shed excess staff, and abandon unprofitable activities and wasteful methods. Manpower development is needed at all levels, especially for managers. This will only be possible with substantial foreign exchange and foreign technical assistance programs.

Justification for Irrigation in Zaire

In Zaire, the population is rising at an estimated 3.2 per annum. Total food production is rising at about 2.3%. During the last decade, in some areas of the Bas Zaire province, South of the Bandundu province, Kasai provinces and Shaba province, food production had been affected by a series of periodic droughts. Unlike other African countries such as Zambia and Zimbabwe which faced these alarming trends, and turned to irrigation as a possible means of feeding their growing population, the government of Zaire did not think about planning irrigation actions. It would also be possible for it to promote agriculture where there is a water surplus. Some people may consider promoting agricultural activities in the Zaire Basin.

Zaire can be divided into four major biogeographical regions:
1) the Central Basin (equatorial zone);

2) the transitional woodlands to the north and south of the Central Basin (tropical humid zone);

3) the tropical humid mountain region of eastern Zaire; and

4) the forested savanna region along the southern border with Angola and Zambia.

The central basin

The Central Basin is a depression of about 750 to 1 million km^2 with an altitude above sea level ranging from 340 to 750 meters. It includes Zaire's closed canopy rainforest, of which a third is periodically flooded. The region is sparsely populated by indigenous farming and hunting and gathering cultures, and support a very limited commercial timber industry. The forest receives between two to three thousand mm of rainfall per year and is supported by soils generally classified as Oxisols. Owing to the highly leached and residual mineral nature of the soil, the forest biomas is the reservoir for most of the biologically essential nutrients.

The Zaire basin which occupies 16 percent of the surface of Sub-Saharan Africa has 55 percent of the mean annual discharge. The forested area not subject to flooding is generally suitable for perennial tree crop production. This is an area for coffee beans, rubber, palm oil trees, cocoa, banana plantain, and tea. This region possesses a largely untapped reserve of exotic and commercial grade lumber. Annual crop production, especially for food crops, is less suited to the region due to loss of mineral elements upon forest clearing resulting in a loss of organic matter and nutrient leaching.

The humid tropical zone

North and south of the rainforest are transitional woodland forests characterized by an open canopy covering at least 40 percent of the land surface. These regions have less rainfall (1,200-2,000 mm)_ than the Central Basin, but in a bimodal distribution that permits two cropping seasons per year. In this humid tropical zone, rain is fairly well

distributed, seldom with more than four dry months. The growing period for annual crops usually exceeds 280 days/year. Irrigation is seldom economically justified except for dry season supplementals of some perennial crops.

These regions support a large proportion of the country's human population owing to the availability of forested, relatively fertile soils for cropping. Within these regions are the agricultural production areas that provide food (maize, cassava, rice, groundnuts, and cattle meat) for Kinshasa and the mining regions in Kasai and southern Shaba.

The agricultural production technology is based primarily on shifting cultivation that involves forest clearing and burning followed by cropping for two to three year before abandonment due to decreasing soil fertility. Complete regeneration of forest cover requires 15 to 20 years, although fallow periods of seven to eight years are reportedly minimal to reestablish soil fertility.

Uncontrolled burning of the interforest savanna prevents the accumulation of organic matter in those soils and limits their agricultural value. In areas of high population density, cropping and wood harvesting pressures have caused considerable loss of original forest, and in some case have reduced fallow periods between cropping cycles to as little as three years. Reduced fallow result in lower yields (per land area) and encourage farmers to increase crop production area to maintain total crop production.

The tropical mountain region

The tropical mountain region lies eastern of the central rainforest along the eastern border with Uganda, Burundi, Rwanda and across Lake Tanganyika. This high altitude region supports a dense humid upland forest and is the most densely populated rural area on the country's most fertile soils (volcanic origin). Rainfall is plentiful (2,000 mm/yr) and falls in a bimodal distribution patter. This area is suited to cultivation of a wide variety of crops. It is the center of production for arabica coffee and cinchona (quinine) and also produces a large proportion of the country's

bananas, beans, potatoes, and groundnuts. This high human population densities have put considerable pressure on the land resources for both agricultural crops and fuelwood. Overcutting of the forest, short fallow, and steep hillside farming have caused severe degradation of both soil and forest resources.

The tropical forested savanna

The tropical forested savanna region south of the forested transition zone extends along the southern border with Angola and Zambia. This region receives 800 to 1,500 mm of rain per year in a monomodal rainfall distribution pattern, permitting only one planting season. Within-season rainfall patterns as well as seasonal totals may be erratic, with as much as a tenth of the seasonal total falling in one day. The growing period for annual crops ranges from 240 days down to 120 days. Below about 200 days of the year there is likely to be increasing risks of crop failure due to drought. Supplementary irrigation may give worthwhile benefits even in average rainy seasons, by compensating for within-season dry spells. Irrigation is essential for dry-season annual cropping and for many perennial crops.

This zone consists of open woodlands of drought tolerant trees that can withstand the four to seven month dry seasons. The higher plateaus have isolated gallery forests dispersed throughout a grassy savanna. Areas of swamp land are found in the Upemba depression south of Lake Moero.

This region is sparsely populated except around the urban areas which support the extensive mining interest with labor and services. The region is a net importer of food from the transition forest to the north and from Zambia to the south. Maize is the primary agricultural crop and is produced on both relatively large modern sector farms and smaller traditional shifting cultivation farms. Increasing population pressures in the traditional sector (similar to the other food crop producing areas of the country) and the generally poor acid sandy soils of this region in particular, have resulted in similar practices of shorter fallow periods between cropping campaigns and the utilization of ever increasing areas for

cultivation. The gallery forests are being cut to supply the demand for fuelwood and more fertile agricultural soils. Less fertile soils in the transitional woodland forests and in the gallery savanna regions, irregular rainfall distribution over the year, temporary droughts mixed with a longer dry season of about six month as you move south, are natural binding constraints to increase agricultural productivity in traditional agriculture. As said above, in that case, water irrigation seems to be a necessary condition to increase soil fertility.

Existing irrigation and potentialities

Irrigation is considered in the widest sense not only as any human action which can influence the natural flow of water to or from the farmer's crop, but also as those forms of agriculture which take advantage of naturally rising or falling water levels for production.

Apart the Zaire Basin, most of Zaire is geologically ancient and highly weathered, and is often based on crystalline rocks. Soils tend to be leached and deficient in major mineral nutrients, as well as lacking organic matter due to high temperatures. Often they have only limited potential for arable agriculture. There are, however, patches of more fertile alluvium along the present and past courses of major rivers, as well as inherently fertile vertisols deposited in old lake beds. Both riversides alluvium and vertisols have attracted small scale irrigated agriculture. Irrigators have also been drawn to soils formed under swampy conditions where paddy (rice) is cultivated. In most cases, however, potentially irrigable soils are in scattered patches rather than large blocks, and often at some distance from a potential water source.

Irrigation types

Unlike other African countries where large, medium and advanced small scale irrigation schemes are practiced, Zaire is still at a stage where small scale irrigation is based upon water harvesting or spreading collected from streams or from wells. Buckets are often used to collect

water. The use of shallow groundwater for small scale irrigation arises
spontaneously as part of the process of intensification of traditional
agriculture in response to rising population pressure particularly in
Kinshasa, the capital and in other urban areas. For small scale vegetable
production, in particular, it is a response to market access or
opportunities (urban areas markets). In Kinshasa, some vegetable growers
use dirty water from polluted streams across the town.

Table 12 gives for three Sub-saharan Africa countries, estimates of
irrigated areas, in 1982, in relation to irrigation potential.

Table 12.   Area developed 1982 ('000 ha)

Country	Irrigation potential	Modern	Small-scale or traditional	Total developed as % of potential	
	('000 ha)				
Zaire	4,000	4	20	24	1
Zambia	3,500	10	6	16 <	1
Zimbabwe	280	127	3	130	46

Sources: Study team estimates of areas developed; irrigation potentials
from FAO Land and Water Division, 1985 (provisional estimates) (Underhill,
1990, p. 90).

Major unused reserves remain in Zaire, Zambia, Tanzania, Mozambique,
Sudan, Nigeria and Chad, each with over one million hectares. However in
practice it is necessary to exclude from this potential the wetter areas
where irrigation is unlikely to be necessary, (e.g. the Central Zaire
Basin). As said before, irrigation is justified in other parts of Zaire and
within-seasons. In the Shaba province, in the Fungurume areas, we have
observed since 1967 that small scale irrigated tomatoes fields yield large
quantities of tomatoes during the dry season. Beans and vegetables are
grown during the dry season along riverbanks. Small fields are watered with
water river and have high productivity per unit of land.

Opportunities and constraints for the future

Improved base data on soils, topography, climate, hydrology and crop water requirements are likely to be needed if large scale, medium schemes, and advanced small scale irrigation systems are to be successfully introduced in Zaire.

Other technical needs include:
- simple designs of hand and electric pumps and other items of small-scale equipment, suitable for local manufacture and capable of being repaired and maintained by the farmer or village mechanics; For the use of electric pumps, small hydroelectric plants across streams and rivers are feasible, and cost very cheap. Some of these small hydroelectric stations exist in the Bandundu province in the Idiofa zone.
- further progress with the challenging problem of lowering the cost of solar-powered pumps, so as to make small-scale irrigation independent of outside fuel supplies;
- low-cost irrigation systems or methods which can give acceptable returns when used only for supplementary watering of traditional crops.

More groundwater surveys could:
- accelerate the spread of small-scale subsistence irrigation to semi-arid areas where it can provide a lifeline for populations at risk;
- facilitate the expansion of small-scale vegetable production and other high return activities;
- facilitate the introduction of conjunctive use of surface and groundwater on irrigation schemes;
- if groundwater recharge is limited, warn of over-exploitation of aquifers.

In areas where water irrigation is justified, groundwater aquifers are located at about 40 m in southern Shaba province; whereas in the Tshikapa area waterbeds are situated at more than 100 meters depth. Where water is too deep for irrigation to be viable, aquifers may be exploited for livestock watering and domestic use.

More systematic attempts could be made to adapt some of the low-cost
small-scale systems of Asia and North Africa to local conditions and
materials, to arrive at irrigation methods which are more readily accepted
by individuals or communities as components of rural development projects.

Economic considerations

In African countries practicing medium and large scale irrigation,
the economic viability of further government investment in modern
irrigation schemes is constrained by the high current costs of
construction, operation and maintenance, and the low import parity prices
of most of the crops for which there is an adequate market.

A FAO study (Table 13) shows that for an irrigation scheme
constructed over eight years and reaching full production in year 12, a
scenario fairly representative of past results - it is necessary to
generate a net annual benefit at full development of about US $150 on each
US $1,000 invested in irrigation works to give a return of 12%. If a return
of only 7% is regarded as acceptable the net annual benefit must still be
around US $100. Taking rice as a representative crop and assuming that,
under relatively efficient production, government and on-farm operating
costs absorb only 30% of the gross value of output, it is possible to
calculate the incremental annual production needed to justify some typical
costs of irrigation works. These figures are shown below. Two import parity
prices are given for rice. The figure of US $180/t represents a project
located near to a major port and supplying its urban population as an
alternative to food imports. US $300/t is taken to represent the price
which would be incurred by the state to supply food to people living in the
distant interior of the Sahel.

Table 13.　　Incremental paddy output to justify typical investment costs of irrigation (assuming 68% milling efficiency and operating costs equal 30% of gross output value) (FAO, 1986, p. 42)

	Desired Rate of Return			
	12%			7%
Rice price (US $/t)	180	300	180	300
New Irrigation		t paddy/ha/yr		
- partial control				
(US $4,000/ha)	7.1	4.3	4.7	2.8
- full control				
(US $8,000/ha)	14.2	8.5	9.4	5.7
Rehabilitation*				
- Major repair				
(US $1,500/ha)	2.7	1.6	1.8	1.1
- Minor repair				
(US $ 750/ha)	1.3	0.8	0.9	0.5
Traditional Systems				
- Rising flood				
(US $1,500/ha)	2.7	1.6	1.8	1.1
-Swamp				
(US $ 500/ha)	0.9	0.5	0.6	0.3

*This case assumes works over three years and full benefits in year six.

　　The figures show clearly the combination of high yields and cropping intensities which would be necessary to justify new investments in fully-controlled irrigation. Even the most successful of the six projects could reach only the lower of the two rates of return at the higher of the two rice prices. This implies that while new, fully-controlled irrigation costing US $8,000/ha might perhaps be justified in, say Chad, it is unlikely to be economically viable in the lower Senegal Valley nor in many other parts of Sub-Saharan Africa. Bearing in mind that with incomplete water control only one crop is likely to be possible per year, the figures

for new partially controlled irrigation are almost as unfavorable despite the lower capital cost. On the other hand the figures suggest that there is a much better economic case for more limited capital investments in rehabilitation, and in developing traditional forms of rice cultivation on the rising flood or in swamps.

In Zaire, with the use of groundwater irrigation systems these figures will be even more different from what FAO found in the Sahel case. With a dry season lasting from 4 to 7 months, opportunities to grow tomatoes, beans, vegetables, soya, and rice during that season. We may use Deep Rock drilling equipment for drilling water wells at very cheap costs (less than US $2 per 400 gallons of water) per hour. With the low cost of groundwater internal rate of returns may be high and justify investment in irrigation systems.

A typical example of a modern irrigation system was built by the Chinese agricultural mission in Lubumbashi in the 1980s. About two irrigated hectares of vegetables were grown in the area along Lake Lubumbashi and the International Karavia Hotel. Water was pumped from the lake to the field. Impressive quantities of vegetables were harvested at any season. Because of lack of managerial skill this remarkable field has been completely destroyed.

Social factors

Much could be done in theory to make participation in major irrigation projects more attractive to farmers. Perhaps the most important change would be to minimize the dependence of the proposed farming system on external factors or agencies, particularly imported machinery and materials, as well as on state support and marketing services which the irrigation distrust. This is one of the reason that call for import substitution heavy manufacturing industries that can assemble or fabric dredging and drilling equipment.

Being a free market economy, the new financial institution may stimulate small scale irrigation systems by providing financial support to farmers. In the Shaba province, some farmers interviewed were willing to

use DeepRock Hydra drill taken by the researcher in order to drill water
wells in their farms. With 2.268 thousand km^2 of land area of which 4
million are appropriate for irrigation, Zaire only irrigated 24,000 ha in
1992 (Table 14, 15 and 16).

Table 14.   Surface area, population (1982) and estimated length of rainfed
            growing period for the countries covered by the study

Country	Land area thousand (km^2)	Population 1982 (million)	Range of length Growing period (days)
Zaire	2,268	30.3	210-365
Zambia	740	6.1	120-210
Zimbambwe	386	7.9	150-210

Source: FAO Production Yearbook (FAO, 1986, p. 108)

Table 15.   Irrigation potential, estimated irrigated areas and irrigated
            in relation to population

Country	Irrigation '000 ha	Potential percent of land area	Estimated 65 74 82			Irrigated area as percent total cropped (1982)	No. people per ha irrigated (1982)
Zaire	4,000	1.8	2.5	4.2	24	0.4	721
Zambia	3,500	4.7	2.0	17.5	16	0.3	381
Zimbabwe	280	0.7	36.0	65.4	130	4.6	61

Sources: Irrigation potential (Underhill, 1990, p. 20)

Table 16.   Inventory of existing irrigated agriculture in Sub-Saharan
             Africa (FAO, 1986, p. 108)

Country	Population 1982 (millions)	Irrigated area (ha)			Other information
		1965	1974	1982	
Zaire	30.7	2,530	4,200	24,000	Small-scale. Inland swamp and flood irrigation for rice.
Zambia	6.0	2,000	17,500	16,000	One large sugar estate: irrigation by flood and sprinkler. Other small-scale irrigation.
Zimbabwe	7.5	36,000	65,800	130,000	3,000 ha of very large and large private commercial estates producing cotton, sugarcane and citrus. Method of irrigation is both sprinkler plus flooding.

Findings

Because Zaire does not have any medium or large scale irrigation
systems, except a large number of small irrigation systems, a results of
the Chinese agricultural mission in irrigation showed that introducing
irrigation in traditional agriculture in areas where the dry season lasts
about 6 months, may be much more profitable. However, it should be funded
by savings on sales of diamonds in foreign currency. The reason is that
irrigation systems require imported inputs such as fertilizers, pesticides,
and agricultural equipment.

CHAPTER 6.   DISCUSSION, CONCLUSION, AND RECOMMENDATIONS

Discussion

Institutionalized corruption

Zaire highlights the difficulties and complicated nature of external attempts to implement a development policy package in the midst of domestic and international constraints.   In Zaire, the World Bank faces what might be described as a hostile domestic environment. We can add to the list of policy distortions, what we call *political distortion*. The lack of a democratic regime has been of great impact on socioeconomic deterioration in Zaire. Because of political interests, western governments have supported a dictatorship regime which could not promote economic growth and human development.

Zaire is characterized by a centralized institutional structure juxtaposed with traditional pre-colonial notions of authority, based on important clan and kinship ties and rooted in informal economic networks, or in the *economy of affection*. The nature of the regime enables the ruling elite to maintain power and consolidate its economic base. So, it sees development assistance as yet another means to accumulate personal wealth.

A highly personalized , authoritarian form of rule, in which Mobutu has been able to frustrate internal opposition and manipulate external Western allies by taking advantage of their competing interests.   The power of the Zairian state is centralized in the Office of the President. All decisions relating to domestic or foreign policy are made by Mobutu himself. Individuals in public office are totally dependent on him for selection and maintenance in power. By frequently rotating government posts, Mobutu manages to maintain uncertainty and vulnerability. It this uncertainty, coupled with the relative scarcity of economic resources (i.e., foreign exchange) which results in *grabbing* and corruption. Mobutu engages his officials to pursue such corruptive practices as a means of control, thereby assuring their continuing support. He plays the role of

big chief, rather reminiscent of the pre-colonial order, bestowing favors on his subjects based on personal discretion.

What is considered to be simply bureaucratic disorganization and economic mismanagement by external actors is to Zaire's ruling elite a rational policy of *organized disorganization* designated to maintain the status quo. The ruling elite has engaged in systematic illegal extraction of the state's resources. Gould (1982), Leslie (1987), Mokoli (1992), Nguza (1982), Nzongola-Ntalaja (1986), Shapiro and Tollens (1992), and Young and Turner (1985) have reported the same observation.

Why restructure the Zairian economy?

After 34 years of independence, the economic picture in Zaire is bleak. Paradoxically, in terms of natural resources, it is one of the richest countries in Sub-Saharan Africa. The economic and debt crisis has been prolonged in spite of IMF Stabilization Programs, Paris Club rescheduling, formal rescheduling by Western banks in the London Club, and frequent major devaluation of the nation's currency the zaire.

Expansionary monetary and fiscal policies have contributed to the depreciation of the Zairian currency. A weakened currency does no longer attract foreign investors to operate in Zaire except for the purchase of diamonds, gold, and coffee. Strategic economic sectors do not receive enough resources for their development.

Over the period 1970-90, SOFIDE, with the support of the World Bank mainly distributed loans in foreign exchange to existing foreign enterprises engaged in import substitution industries and in traditional exports. The World Bank support was mainly directed to the state-owned copper mining company. No more than 1,000 km of paved roads were constructed during the period. The existing railway systems suffer from a lack of maintenance and the availability of wagons and locomotives. The construction of new railways is far away in the mind of decision makers.

Though increases in maize production, overall food crop production does receive too much attention from the government of Zaire. Not only less than 7 percent of the government budget is allocated to the agricultural

sector, but also the diversion of funds for feeder roads maintenance by government employees and officials contributed to the decline of agricultural output. In addition, because Zaire does have any plant producing fertilizers, pesticides, improvement in productivity per unit of land is not achieved.

For the revised model scarce available resource should first be allocated to the diamond private mining which quickly generates foreign exchange within the country. Then, increased profits may be allocated to other sectors of the economy.

Private sector and economic growth

Since the 1983 liberalization measures, signs of economic growth came from the private sector. However, foreign owners do not fully repatriate profits (exports earnings) into the Bank of Zaire. With the 1991 measures allowing the sale of diamonds in foreign currencies, Zairian private diamond producers can sell on average from 1 to 4 million carats of diamonds, which represent billion of US dollars.

The public sector is inefficient in Zaire because of mismanagement, corruption and diversion of public resources. The privatization of parastatals is a good idea if new owners are dynamic and nationalists. On contrary, we have seen that in Zaire instead of privatizing state-owned firms, the government had decided their suppression. This constitutes a smart practice of stealing public resources. The national office for housing, the *Fond de convention de development* (FDC), in 1971 the *Societe de credit aux classes moyennes et a l'industrie*, the *Fond de promotion de la petite et moyenne industrie* (FPMI), the *Caisse nationale d'epargne et de credit immobilier* (CNECI), all these financial institutions had been suppressed, without requiring debtors to reimburse what they owed them.

Since 1991, a new style of suppression of state-owned companies has appeared. It consists of the destruction during riots of targeted firms. It is hard to believe that economic growth may come from the public sector.

Micro reforms

From the the point of view of the International Monetary Fund (IMF) and the World Bank, microeconomic reforms aim to promote agriculture for smallholders, encourage increase in producer prices, introduce new cultivation techniques, use of high yield varieties, and allocate credit to the private sector. This would lead to efficiency in production. In the context of Zaire, credit to smallholders was organized with the financial support of the International Development Agency (IDA) and the FIDA. However, this finanacil support was provided for small size farms of the area of just half an hectare.

Structural transformation

The World Bank's current strategy for economic development seeks to incorporate the twin objectives of growth and poverty alleviation. The following are three approaches to development assistance:
1. The project approach
2. An approach based on *gap theory*
3. An approach directly related to income distribution/social welfare theory.

The project approach

The project approach is based upon the finding of the correlation between underdevelopment and the lack of infrastructure, productive facilities, and technical expertise in developing countries. The purpose of multilateral aid is to finance sound economic projects to correct these imbalances. This, in turn, will attract foreign private investment to lay the foundation for growth.

According to the Gap theory between the amount of economic resources required by developing countries and those locally available, growth can occur only if this shortfall is eliminated: a lack of skills; and inadequate level of savings that limits the domestic investment needed for

significant growth; an a foreign exchange gap, the difference between foreign exchange earnings and the foreign exchange requirements for continued growth. Progress toward self-sustaining development is constrained by one of these resources gaps at various stages of the growth process. External sources of finance encourage growth by compensating for these shortfalls, thereby facilitating more efficient use of other resources such as labor. Developing countries development is inhibited by inadequacies in the structure of production (structural disequilibrium) which prevent adaptation to changing patterns of internal and external demand.

Income distribution and social welfare theory

Economists seem to fall into two camps. There are those who stress redistribution even at the cost of a decline in growth in the short-term, advocating government intervention to facilitate transfers of income and productive assets (particularly land) and a growth strategy based on labor-intensive production. Others try to reconcile redistribution with growth via a strategy of investment reallocation, thereby raising the income of the poor through their contribution to the productive process. Increased incomes would enhance development by stimulating aggregate demand, expanding employment, and changing the composition of production to more efficiently produced goods. Development assistance would alter the plight of the poor by concentrating on investment programs to increase their income and make them more productive, and by providing technical assistance to the traditional sector. The basic needs approach to aid underlines the provision of public services such as education, health, and nutrition to the economically disadvantaged groups.

In addition to these concerns, the structural adjustment approach is seen as a means of stimulating development. Some important structural constraints have hampered the development process. For example, consumption patterns as well as the technologies adopted in productive sectors such as industry, agriculture, and energy are highly import-intensive, while the Developing countries' foreign exchange earning capacity is limited. High

import bills in the face of poor export earnings create persistent balance of payments difficulties. Growth can only occur via structural transformation, in which domestic constraints are addressed and attempts are made to mitigate the effects of external factors.

The agenda advances an agricultural-based export-led development strategy, founded on Africa's comparative advantage in the production of primary products for the world market and characterized by efficiency in resource use and economic management as well as "restrained" public sector. This will lay the foundations for long-term economic transformation and industrialization. Policy reform in the productive sectors and economic planning are of central importance in the Agenda. Reforms in the key sector of agriculture aim at improving both export and food production and include a comprehensive rural program focusing on smallholder production, liberalization of pricing and marketing strategies to provide production incentives, and finally, renewed efforts in agricultural research extension.

Industrialization is seen as a vital part of any long-term development effort. However, over the short term it must play a secondary supportive role vis-à-vis agriculture. The industrial sector as well, must emphasize efficiency via measures such as phasing out direct government controls, improving the performance of state-owned enterprises, and using tax incentives to promote industrial investment and stimulate exports. Structural changes in other productive sectors such as mining, energy, and transport stress rehabilitation of existing facilities, production efficiency, and better economic planning. Finally, the development of human resources (education and training), population control, and an urban strategy that highlights the provision of basic needs, are seen as essential to any long-term development strategy.

We have seen that in the case of Zaire, the World Bank had tried but without great success these strategies because over the period, the World Bank policy consisted of lending to inegalitarian, corrupt governments who have little concern for welfare, but who can maintain a stable but not democratic political environment. Because of noncompliance by the government of Zaire, the IMF and the World Bank have been playing the game

of giving on one hand while threatening the government on the other hand. Knowing the game, the ruling elite used to agree on any arrangement, but as soon as assistance falls in the Bank of Zaire, it takes the direction of private pockets. The Bank will react late and suspend next tranches. After a while the government of Zaire will show a nice face in order to make the Bank feel sorry. The Bank will come again hoping that serious engagements will not be broken. Late in 1991, the IMF and the World Bank understood that with that kind of regime stabilization and structural adjustment programs cannot reach targeted objectives. As a result the financial support has been suspended. The attitude adopted by these institutions is *wait and see*.

Failure of macroeconomic policies

Over the period under examination, macroeconomic policies were inadequate because they were characterized by:
- expansionary monetary and fiscal policies (accelerated money supply growth, increased government budget deficit),
- frequent massive devaluation with adverse effects on the agricultural sector (scarce available resources shifted from agriculture to diamond and gold mining, from export crops [palm oil, cotton] to coffee plantation, to food production [maize, rice]),
- increased nominal rate of protection due to the overvaluation of the national currency (in terms of zaires imports of raw materials and intermediate goods needed by imports substitution industries and of goods consumed in urban areas cost cheap), and due to taxes on agricultural products,

However, liberalization measures did neither increase export crop production of palm oil, or cotton nor augmented food crop production. With negative interest rates, credit had been allocated to investment projects of low productivity, while the treasury bill system introduced by the Bank of Zaire made positive interest rate but at prohibitive nominal interest.

Failure to pay interests on foreign loans had led to increasing foreign debt burden amounted in 1994 over US 10 billion. Finally,

macroeconomic policies were inadequate because they did not give incentives to domestic savings and did not increase investment levels.

Revised macroeconomic model

Figures 11 through 14 describe the failure of the macroeconomic policies during 1973-1990. A Human Development Report published by UNDP in 1990, gave the following situation about Zaire. The Zairian population has increased from 16.4 million in 1960 to 34.0 million in 1988. Estimate of the population in year 2000 is 49 million inhabitants. Annual population growth rate has increased from 2.7 in 1960 to 3.2 in 1988. We have seen that GDP growth rate has decreased annually by -1.5, while both savings and investment have respectively decreased by 27% and 51% from 1980 to 1989. In a graph showing investment, savings and output per worker, the investment schedule per worker would shift back to the left, output and savings per worker curves will shift down to the right. One would conclude that macroeconomic policies over the period 1975-90 were not efficient.

We have seen that current account and government budget deficits have been increasing over time, that private savings and investment have been decreasing as well. At a given world interest rate schedules for savings would show a tendency to shift upward back to the left while investment schedule would be shifting down to the left. One would conclude that there was no improvement in the process of reducing Zairian twin deficits.

We have seen that inflation rate has been increasing without bound over the period under examination, that current account deficits have worsen during the period under examination. On a IMF graph plotting the *balance of payments* (or just current accounts) on the Y-axis, and the rates of inflation for different years, the curve balance of payment and domestic credit expansion schedule have always intersected in the second quadrant with negative current account. The balance of payment schedule has been shifting back to the left, while the domestic credit expansion line has been shifting down to the right. One would conclude that macroeconomic policies during the period were ineffective.
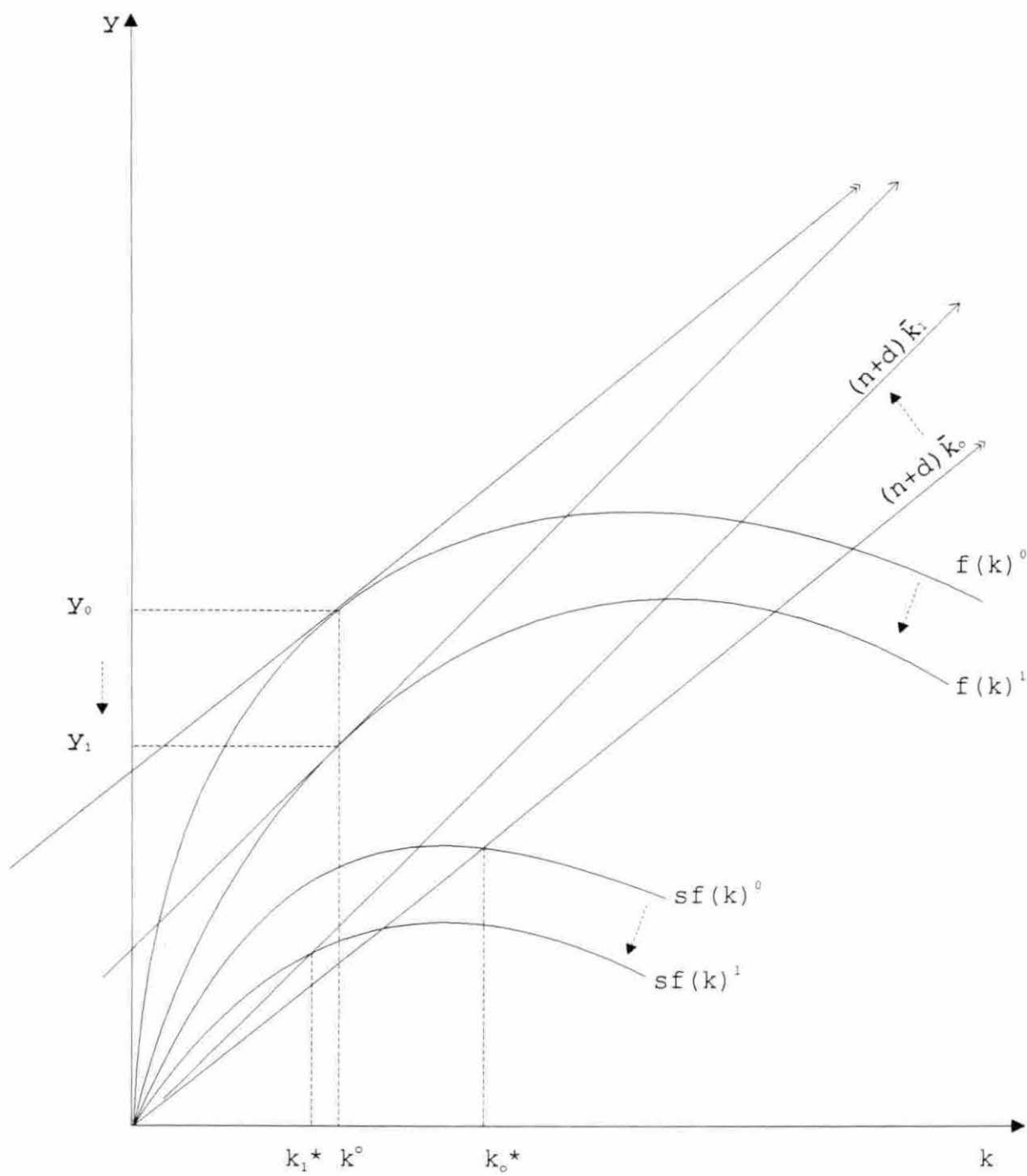
Figure 11. Output, investment, and savings per worker
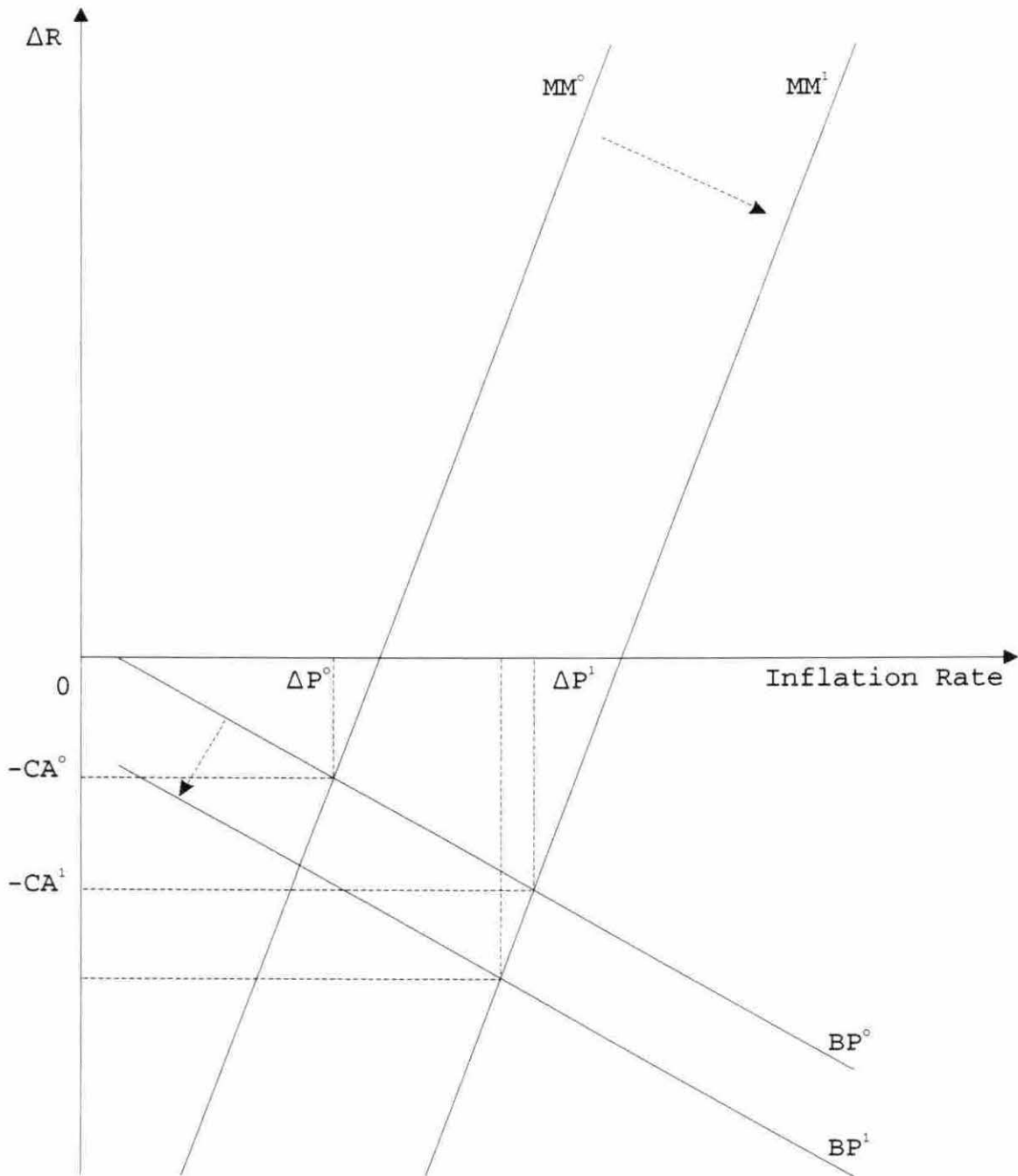
Figure 12. Current account and inflation rate
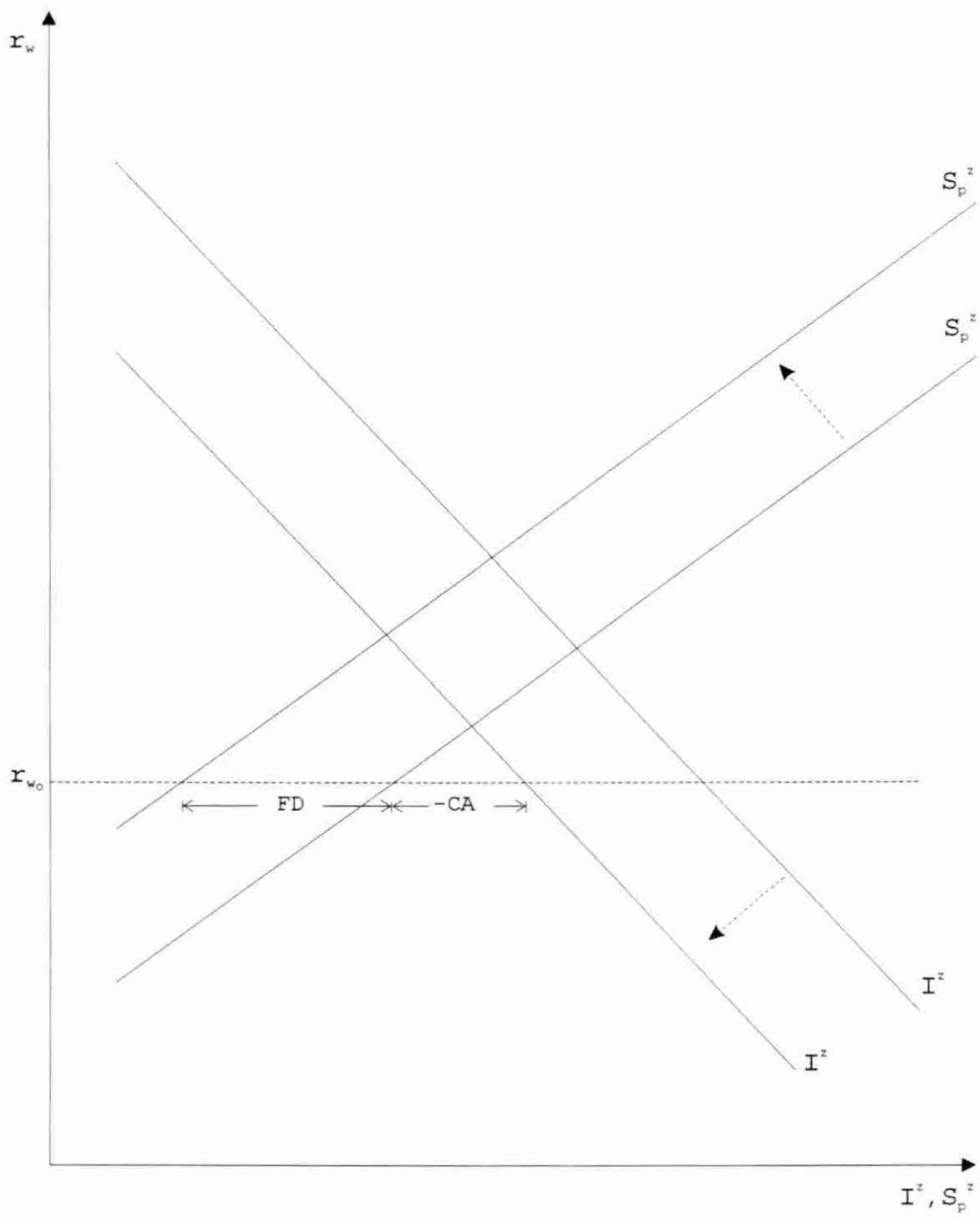
Figure 13.   Twin deficits
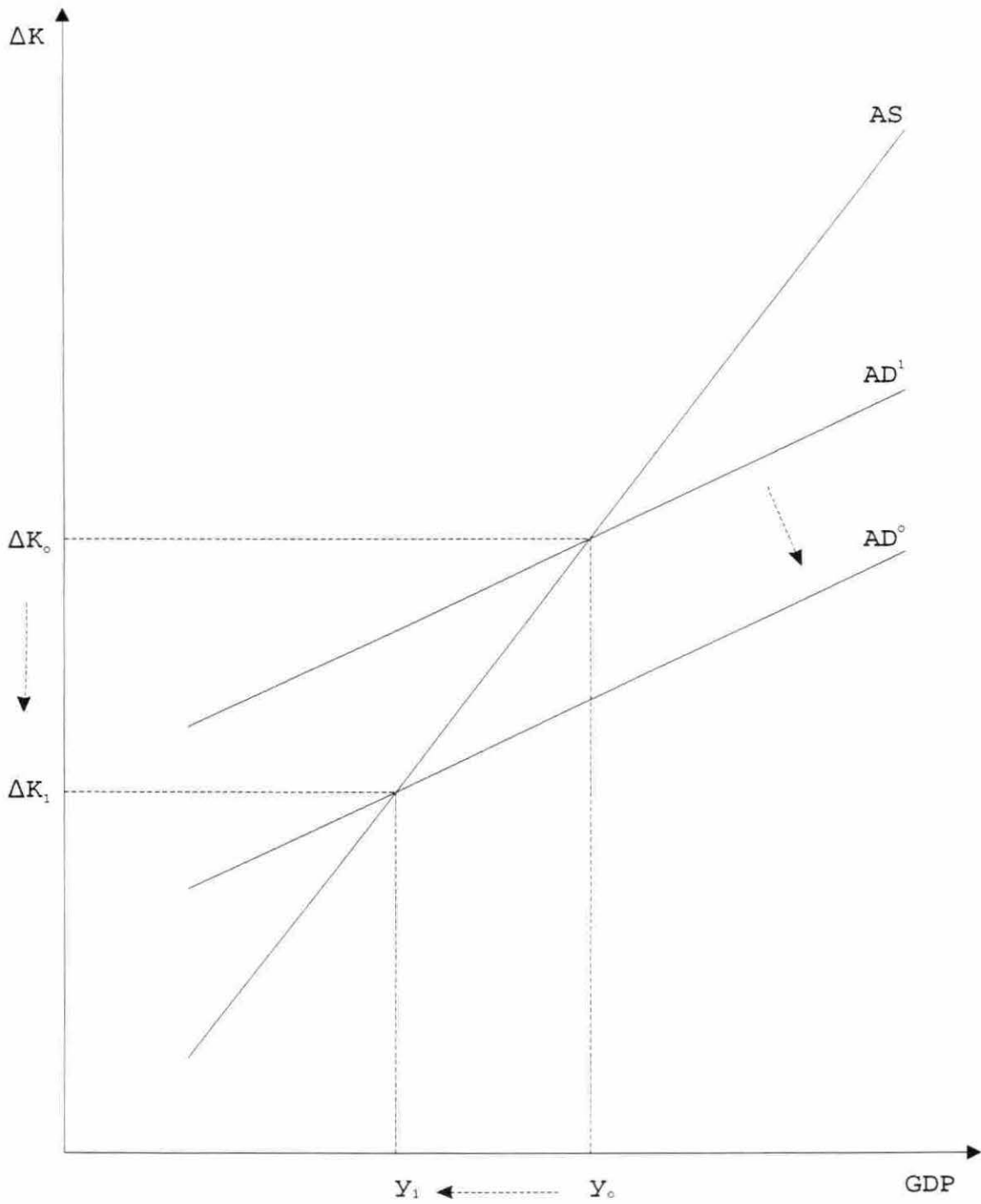
Figure 14.   Investment and real gross domestic product (GDP)

We have seen that GDP has been decreasing by -1.5 per year over the period 1973-89, that investment ha been decreasing as well. On a World Bank graph plotting investment against GDP, the Zairian situation will be located below initial equilibrium. One would conclude that macroeconomic policies were not appropriate for the Zairian case.

We conclude that savings mobilization did not operate well under these macroeconomic policies, that new mobilization techniques should be set up even if the political situation remains unchanged. New instrument variables will give positive results because (1) by allowing the sale of diamonds within Zaire in foreign currencies, the Zairian government wanted to escape from assets arrested outside and which are saved in Western countries. However, at the same time, the measure gives the chance to peasants to earn directly foreign exchange from the sale of diamonds and gold; (2) The new private financial institution will be supported by the government because it will increase the sale of passports in diamond producing areas. People living in the Kasai, the Bandundu and the Haut Zaire Provinces, will cheer any policy allowing them to travel abroad because right now for misunderstanding, an unpopular government tried in 1993 to forbid planes to fly from Mbuji Mayi airport to Europe and South Africa, without landing first in Kinshasa. Constructing small hydroelectric plants in diamond producing rural areas, drilling drinking water wells, allocating credit to different types of activities, and organizing intermediation between the new bank and diamond miners will be supported by most Zairian people living in diamond producing areas. Gradual dollarization of the Zairian economy, and the building within Zaire of small diamond cutting plants by Americans and Zairian will increase the availability of foreign exchange.

The revised macroeconomic model suggests the best macro and microeconomic reforms. They should (i) promote tourism in diamond producing areas, increase the sale of passports and encourage diamond miners to travel abroad, (ii) create a private financial institution in diamond producing areas, (iii) organize the market of rights for polluting and damaging the environment, (iv) appreciate the exchange rate of the national currency by suppressing parallel exchange market organized in

diamond producing areas, (v) reestablish market interest rates needed to promote investment demands and to encourage bank deposits, (vi) stimulate domestic savings, (vii) provision by the new private financial institution of some public goods such as rural electricity, paving rural roads, and improves waters services in rural areas, (viii) organize loans to irrigated agriculture with funds from sale of diamonds. Being a surplus land country, credit should be allocated for the cultivation of 5 hectares of field per household in Zaire.

Diamond activities as a leading industry

In order to improve efficiency in private diamond production and in irrigated agriculture, the revised model would like to link investment to market interest rate such as investment in diamond mining will expand until marginal efficiency of investment equals to the market interest rate. The complete liberalization of imported capital goods, the promotion of diamond cutting, and manufacturing will lead to efficiency in production. In addition, the financial institution should allocated credit to advanced geological studies, to research on new extracting techniques, and to the fabrication or assembling of imported equipment such as diamond dredges. This means activating backward linkages. Forward linkages would include the cutting of diamonds within Zaire, and the organization of the jewelry industry and other manufactured industries using rough diamonds.

<div align="center">

Conclusion

</div>

Overall, investment demand in Zaire have not been matched by domestic savings. Investment decreased by 3 percent from 1973 to 1989, while domestic savings only increased by 0.12 percent per year.

The period 1967-74, was characterized by massive foreign investments amounted to more than 4 billion US dollars. Foreign investors were attracted by the zaire currency worth two US dollars for one zaire. The Zaire currency was aligned on the US dollar. However, these investments have been directed to reinforce the traditional export sector and to

promote light import substitution industries, without any backward or forward linkages, and relying on foreign inputs.

Investment projects with long gestation period absorbed a large portion of foreigner loans, such as the construction of the hydroelectric dam at Inga, and the construction of 1,800 km power transmission line Inga-Shaba, and the construction of the steel mill at Maluku, which was to treat imported scraps from Italy.

Due to external (terms of trade deterioration, elimination of export/import route through Angola due to the civilian war, oil price shock increasing imports costs, nonrepatriation of most export earnings by foreign investors and Zairian exporters) and internal shocks (weaknesses in savings mobilization, government of Zaire inappropriate macroeconomic policies offsetting the IMF and World Bank stabilizing and structural adjusting measures, mismanagement of public enterprises, inappropriate reallocation of export earnings between private diamond producers and licensed exporters), the zaire exchange rate depreciated by 44 percent from 1973 to 1989. Although the presence of the liberal 1969 investment code, foreign investors were no longer attracted by a weak Zairian currency whose the exchange rate was 9 million zaires for US $1 at the end of 1993.

Inappropriate savings mobilization techniques contributed to the deterioration of the Zairian currency, namely the inflatory finance measures (expansion of money supply in order to expand the amount of investment which can be undertaken, massive devaluation imposed by the IMF and the World Bank, contraction of private and domestic public credit imposed by the IMF and the World Bank without any crowding in effects, increasing nominal interest rates on bank loans), low level of interest rate paid on savings, checking accounts and on medium and long term deposits. In addition, because private diamond exploitation was prohibited activities from 1960 to 1982, diamond miners and sellers used to keep their savings home. Diamond smuggling was indirectly encouraged, and incentives to bank deposits were absent. Exports earnings from sale of diamonds by official and unofficial buying offices were mostly saved in western banks. After the 1982 diamond and gold digging liberalization measures, diamond production which was decreasing during the period before liberalization (-

6.5 percent), has increased thereafter. With increasing depreciation of the national currency, diamond prices have been rising, making diamond the most attractive product in diamonds producing areas, increasing the purchase of diamonds by foreigners and buying offices, and unofficial Zairian diamond dealers, draining large proportions of money supplied by the Bank of Zaire, in the rural diamond producing areas (Tshikapa, Mbuji Mayi, Kahemba, and Kisangani). With financial institutions becoming bankrupt, increasing institutionalized corruption and depreciation of the national currency, households have been pushed to not trust any savings and financial institution, keeping home their savings. As a consequence, the level of investment not only was very low compared with other African countries, but also has been decreasing over time. In addition, only about 10 percent of investment was financed by domestic savings.

Recommendations

The worsening of the socioeconomic and political situation and insecurity between 1990 and 1994 led the researcher to inspire Zairian authorities by already applying some measures of the revised stabilizing and structural adjusting macroeconomic policy model:

1. The 1991 measure allowing the sale of diamond and other precious stones in foreign currencies has given strong incentives to diamond miners. This measure allows an equitable distribution of foreign exchange between diamond producers and licensed exporters.

2. Following policy instrument variables will act on other variables and push the economy to targeted levels of real GDP and investment needed by the Zarian economy to take off its development and sustain long run economic growth. These measures will give strong incentives to domestic savings mobilization. The creation of a private multinational diamond bank aims to collect domestic savings, allocate credits, and promote imports of the US goods by diamond miners and dealers. The promotion of tourism allowing diamond miners and other Zairians to visit the US aims to give a strong learning effect by seeing what the strong American people has done in its country. As the research

believes now in the power of the US capitalism system, unskilled rich
Zairian people who deal with diamonds will learn more in the US and
will become dynamic partners with the US business society. The
organization of rights to pollute and damage the environment instead
of single taxes on diamond digging, and their payment in kind will
allow the Zaire-USA Diamond Bank to increase government revenues in
foreign exchange. This institution will also participate in the
provision of public goods such as paving rural roads, building micro
hydroelectric power plants in villages, and drilling water wells and
constructing improved drinking water services in rural areas.

With the provision of new imported technologies by the new financial
institution, diamond miners and farmers will increased their productivity.
By providing irrigation systems to farmers in rural areas where the dry
season last too long, internal rate of returns in irrigated agriculture
will compete with those in diamond activities. With increase foreign
exchange within Zaire and intermediation role of the new bank, the zaire
exchange rate will appreciate, the parallel exchange market will disappear,
interest rates on bank loans will decrease, stimulating investment demand.

Finally, computerized stores and range of credits to social, cultural
and spiritual activities will give strong incentives to bank deposits,
increasing private domestic savings, and finally increasing the level of
productive investments.

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APPENDIX: SUPPLEMENTARY DATA

GDP = Gross domestic product.

STATISTICAL YEARBOOK 1987

	GDP and Net Material Product (in million US $)	GDP (in billion US $)	GDP DEFLATORS (1980 = 100) IFS/1986 p. 36
1967		1.44	3.6
1968		1.44	5.2
1969		1.76	5.9
1970	1,904	1.88	5.7
1971		2.10	6.0
1972		2.31	6.6
1973	3,003.6	2.95	7.8
1974	3,674	3.60	9.2
1975	3,785	3.84	10.4
1976	3,580	3.61	16.3
1977	4,520	4.62	22.4
1978	6,556	6.56	32.7
1979	6,423	6.42	66.2
1980	6,145	6.15	100.0
1981	5,424	5.38	134.5
1982	5,410	5.44	181.5
1983	4,588		340.5
1984	2,760		558.1
1985	2,953		
1986	3,412		
1987	2,909		
1988	3,329		
1989	3,385		

Production of major food crops

(thousands of tons)

Year	Maize	Paddy (rice)	Cassava	Sweet Potato	Beans Peas	Ground- nuts	Plantain banana
1963	252	60				130	
1964	237	55				122	
1965	232	49				137	
1966	270	91				149	
1967	297	100				163	
1968	326	117				181	
1969	350	130				200	
1970	428	179				267	
1971	436	184				278	
1972	452	196				282	
1973	459	199				299	
1974	477	201				303	
1975	495	207				308	
1976	504	212				315	
1977	510	218				319	
1978	500	225				306	
1979	536	223	12,566	324	138	318	1,496
1980	562	240	13,087	333	151	337	1,563
1981	639	245	13,172	343	155	348	1,608
1982	687	251	14,185	353	159	349	1,654
1983	668	258	14,601	363	164	367	1,703
1984	704	286	15,038	373	169	376	1,749
1985	726	297	15,493	381	174	386	1,795
1986	756	307	15,900	375	175	392	1,797
1987	786	319	16,400	372	166	410	1,798
1988	816	329	17,000	368	178	420	1,799
1989	846	341	17,400	373	179	425	1,800

Source: Shapiro and Tollens, 1992 p. 10

The conversion rate from paddy to rice is approximately 60 per cent.

Groundnuts are unshelled.

Production of export and industrial crops, 1959-89
(thousands of tons)

Year	Sugar	Coffee	Cocoa	Tea	Tobac-co	Seed cotton	Rubber	Palm oil	Quinine
1959		62	4.5	4.2			40	245	
1962		26	7.0	4.0			40	190	
1963		49				43		185	
1964		44				40		171	
1965		27	4.6	4.2		19	24	120	
1966		37				20		124	
1967		37				24		149	
1968		63	5.1	5.7		45	41	242	
1969		68				60		245	
1970		59				49		170	
1971		65	6.1	7.5		58	42	178	
1972		68				51		166	
1973		57				68		153	
1974		69	4.8	6.9		47	31	146	
1975		51				27		145	
1976		89				24		129	
1977		56				33		105	
1978		77				15		99	
1979	48	60	5.7	6.0	7.2	19	17	99	3.5
1980	48	74	5.9	6.1	7.4	19	18	93	3.6
1981	47	71	4.5	4.8	7.7	21	18	106	3.7
1982	52	68	4.3	4.5	7.8	23	17	94	3.8
1983	52	63	4.3	4.7	8.1	27	16	85	3.9
1984	61	93	4.4	4.9	8.2	21	15	93	4.0
1985	56	92	4.3	4.7	8.2	20	15	89	4.0
1986	61	95	6.3	4.7	3.2	19	13	86	7.2
1987	68	97	5.4	3.4	2.9	17	12	84	7.0
1988	70	99	6.2	3.1	2.8	10	12	91	6.5
1989	74	107	7.1	3.1	2.9	12	12	90	6.4

Diamond production

(thousands carats)

Year	Total	Industrial	GEM
1971	12,744	12,004	660
1972	13,390	12.181	1,209
1973	12,939	12,004	935
1974	13,597	12,991	606
1975	12,801	12,415	386
1976	11,821	11,323	498
1977	11,214	10,681	(1,031)
			533
1978	11,243	10,603	640
1979	8,734	8,440	294
1980	10,235	8,001	2,234
1981	6,758	5,754	1,004
1982	6,079	5,656	423
1983	11,982	8,663	3,319
1984	18,459	13,349	8,239
1985	20,159	16,127	4,032
1986	23,304	18,643	4,661
1987	20,210	15,540	4,670

Source: Statistics of the African economy p. 50.9

Government Consumption of goods and services

(thousands of zaires)

Year	Current Returns	Current Expenses	Investment Expenses	Balance	
1966		(63)			(-10.1)
1967		(88)			(-5.7)
1968		(140)			(-18.2)
1979		(197)			(.9)
1970	315.3	264.6	62.4	-13.0	(-20.3)
1971	288.8	279.4	68.8	-60.0	(-76.2)
1072	298.8	284.1	72.2	-84.0	(-81.5)
1973	376.7	345.1	104.5	-138.0	(-142.0)
1974	588.6	545.5	199.8	-212.5	(-324.4)
1975	477.2	510.4	121.4	-228.2	(-214.6)
1976		(555.0)			(-421.0)
1977		(772.0)			(-450.4)
1978		(893.0)			(-595.5)
1979		(1,857.0)			(-533.9)
1980		(3,391.0)			(-237.5)
1981		(4,190.0)			(-1,332.2)

Bureucratic Corruption and underdevelopment in the Third World. The case of Zaire, p. 106, and Tshibaka (p. 44)

GDP and total revenue

	Total Revenue as percent of GDP	GDP	Total Revenue
1971	28.23	1,867.4	527.167
1972	26.47	1,876	496.577
1973	26.11	3,003.6	784.239
1974	29.69	3,674	1,090.810
1975	22.67	3,784.8	858.01
1976	17.15	3,580	613.97
1977	17.39	4,520	786.028
1978	13.48	6,556	883.748
1979	17.83	6,423	1,145.22
1980	22.10	6,145	1,358.045
1981	19.95	5,424	1,082.088
1982	19.86	5,410	1,074.426
1983	19.38	4,588	889.15
1984		2,760	
1985		2,953	
1986		3,412	
1987		2,909	
1988		3,329	
1989		385	

YearBook 1980-89

CONSOLIDATED   CENTRAL GOVERNMENT

Million of zaires : Year ending December 31

Year	Total Revenue & grants	Total Revenue	Tax Revenue	Nontax Revenue	Grants
1971	328.8	296.2	285.9	13.8	32.6
1972	344.3	306.3	297.1	11.4	38.0
1973	439.6	385.3	379.1	14.5	54.3
1974	588.1	534.1	515.6	18.5	54.0
1975	490.5	435.1	422.1	13.0	55.4
1976	572.8	490.5	479.1	11.5	82.2
1977	829.6	688.1	676.0	12.1	141.5
1978	910.1	739.0	723.3	15.7	171.1
1979	2,456.0	1,980.3	1,909.1	71.2	475.7
1980	4,650.0	3,798.1	3,345.0	453.1	851.9
1981	5,905.1	4,744.3	4,149.7	594.6	1,160.8
1982	7,183.1	6,179.2	5,584.6	594.6	1,003.9
1983	13,883.6	11,461.4	10,124.1	1,337.3	2,422.2

Source   YearBook   1988 (p.161)

CONSOLIDATED   CENTRAL GOVERNMENT

Year	Total Expenditures & lending rep.	Total Expendit.	Current Expendit.	Capital Expendit.
1971	405.4	396.9	312.9	84.0
1972	426.3	424.7	320.0	104.7
1973	580.6	578.2	386.6	191.6
1974	912.4	856.2	518.1	338.1
1975	706.6	707.8	552.8	155.0
1976	1,199.8	1,206.1	953.1	253.0
1977	1,279.2	1,278.3	1,002.8	275.5
1978	1,505.5	1,506.2	1,238.6	267.6
1979	3,004.6	3,000.8	2,516.8	484.0
1980	4,981.6	4,979.9	4,004.2	975.7
1981	8,062.9	8.062.9	5,783.4	2,279.5
1982	10,688.0	10,666.6	8,263.3	2,403.3
1983	15,564.6	15,564.6	12,419.4	3,145.2

Source IFS (p.161)

CONSOLIDATED CENTRAL GOVERNMENT

Year	Lending minus repay'ts	Overall Deficit Surplus	Financing Abroad	Domestic Financing	D.Financing From Mon.Auth. & Dep.Mon.Banks
1971	8.5	-76.6	44.8	31.8	31.9
1972	1.6	-82.0	54.2	27.8	29.2
1973	2.4	-151.0	109.1	31.9	30.4
1974	56.2	-324.3	118.5	205.8	206.9
1975	-1.2	-216.1	103.8	112.3	115.9
1976	-6.3	-627.0	105.9	521.1	521.8
1977	.9	-449.6	157.2	292.4	295.9
1978	-.7	-595.4	69.8	525.6	528.2
1979	3.8	-548.6	63.7	484.9	484.9
1980	1.7	-331.6	126.1	205.5	238.3
1981		-2,157.8	722.3	1,435.5	1,458.3
1982	21.4	-3,504.9	276.3	3,228.6	3,267.6
1983		-1,681.0	-867.2	2,548.2	2,589.5

SourceA: IFS (p.161)

Imports

Year	Total Import Bill (current US $ million)			Food Import Bill		
	IFS/85	Tshibaka		Cereal	Other	Total c.i.f
1966		1,020.0		17.2	19.5	36.7
1967		331.8		10.6	18.3	28.9
1968		292.0		14.9	16.1	31.0
1969		370.0		12.2	17.1	29.3
1970	535.6	524.0		17.6	22.7	40.3
1971	619.0	666.0		20.0	22.1	42.1
1972	625.4	522.0		20.3	35.3	55.6
1973	754.4	691.8		35.5	38.4	73.9
1974	1,051.0	954.0		60.0	49.0	109.0
1975	904.8	946.2		40.8	37.8	78.6
1976	673.5	784.5		95.9	77.7	173.6
1977	609.3	807.5		67.0	30.4	97.4
1978	589.0	759.6		83.0	52.3	135.3
1979	597.5	885.4		59.2	53.1	112.3
			E.O.AFR p.349			
1980	835.5	1,015.2	1,472	84.9	82.1	167.0
1981	668.2	832.2	1,421	156.9	84.1	241.0
1982	479.6		1,297			
			YB/92 p.1020			
1983	470.0		1,213			
1984	675.8		1,176			
1985	791.0		1,247			
1986	875.0		1,283			
1987	756.0		1,391			
1988	771.0		1,705			
1989	849.0		1,771			

Source: YearBook 1992, p.864

Exports

Year	Value of Export Crops (current US $ million)	Total value of all Exports
1966	62.0	424.2
1967	73.9	308.8
1968	80.2	570.2
1969	81.5	680.2
1970	96.0	781.2
1971	34.8	687.0
1972	106.3	737.6
1973	126.7	1,012.8
1974	179.8	1,381.0
1975	100.4	864.8
1976	323.5	867.9
1977	293.2	1,019.1
1978	270.7	772.8
1979	190.9	1,169.6
1980	238.2	2,476.2
1981	182.6	1,889.3

Source: YearBook 1980-89

X_a = Agricultural exports

Evolution of eight export crops (in thousands of tons)

Products	1930	1945	1954	1971	1972	1973	1974
Palm oil	37.0	78.0	184.0	202.11	147.93	139.55	124.86
export				111.88	86.97	69.68	62.43
Palm coconut	66.0	43.0	72.0	48.51	37.83	33.44	34.56
export				44.78	37.25	32.86	33.98
Coffee robusta	7.0	20.0	46.0	65.00	67.51	56.81	69.34
export				62.03	61.52	56.25	68.65
Coffee arabica		1.0	10.0				
export				9.58	12.53	10.66	9.07
Tea				7.50	8.00	7.65	6.90
export				6.53	6.38	6.65	5.58
Cotton	9.9	37.0	63.2	18.14	16.11	19.89	16.47
export				6.03	4.29	6.63	1.62
Rubber				42.11	40.45	44.72	30.91
export				39.88	37.71	30.18	26.62
Timber				288.30	263.22	323.29	293.97
export				12.56	30.80	50.04	29.89

Source:

X_{na} = Nonagricultural exports

(X_D = Diamonds exports)

DIAMOND PRODUCTION AND EXPORTS (thousands metric carats)
YearBook 1982 p. 605 + YearBook 1987 p.446

	Yearbook 1982		Yearbook 1987			
Year	Industrial	GEM	Industrial	GEM	Tshikapa	Exports
1970	12,438	1,649				
1974	12,991	606				
1975	12,415	386				
1976	11,323	498				
1977	10,681	533				
1978	10,603	640	10,603	640		
1979	8,440	294	8,440	294		
1980	9,890	345	8,001	2,234		
1981	8,550	450	5,754	1,004		
1982	8,550	450	5,656	423		
1983	8,266	3,172	8,627	3,355		
1984			13,290	5,169		
1985			16,127	4,032		
1986			18,643	4,661		
1987			15,540	4,670		

The data relate to mine and alluvial production of uncut diamonds and cover GEM and Industrial stones.

M^S = Money Supply

(million zaires)

Year	Money Supply	Reserve Money
1966	77.7	
1967	111.0	
1968	136.2	
1969	154.4	
1970	188.3	144
1971	190.5	
1972	235.8	157
1973	294.7	185
1974	394.6	225
1975	462.8	316
1976	680.2	576
1977	1,058.9	743
1978	1,651.4	1,160
1979	1,651.9	949
1980	2,884.9	2,030
1981	4,395.6	3,241
1982	7,347.2	6,207
1983	14,366	10,507
1984	17,869	15,660
1985	22,485	19,999
1986	35,889	32,110
1987	68,487	64,491
1988	150,110	139,866

Source:

International Reserve excluding gold (in million US $)

Special drawing rights (SRD) + Reserve position in IMF +

Foreign Exchange

	Zaire	SDR	Position in IMF	Foreign Exchange
1979	207	0	0	207
1980	204	0	0	204
1981	152	1	27	124
1982	39	0	0	39
1983	102	22	0	80
1984	137	0	0	137
1985	190	0	0	190
1986	269	0	0	269
1987	181	0	0	181
1988	187	0	0	187

Source:

MONETARY AUTHORITIES

(Billions of SDRs : End of Period)

Year	Total Foreign Assets	Total Foreign Liabil.	Total Foreign Assets	Deposit banks Total Foreign Liabil.	Banking System Total Foreign Assets	Banking System Total Foreign Liabil.
1971	.130		.033	.005	.163	.005
1972	.161	.029	.035	.011	.196	.040
1973	.185	.029	.042	.012	.227	.041
1974	.111	.045	.059	.014	.171	.059
1975	.049	.098	.090	.128	.139	.226
1976	.090	.197	.098	.042	.188	.239
1977	.119	.267	.123	.047	.242	.314
1978	.142	.284	.125	.032	.266	.316
1979	.227	.308	.100	.036	.327	.344
1980	.280	.397	.135	.034	.415	.432
1981	.248	.460	.126	.034	.374	.494
1982	.256	.587	.100	.046	.357	.633

Source: YearBook 1980-90

e   = exchange rate

EXTERNAL TRADE CONVERSION FACTORS

US $ per Zaire

Year	IMPORTS	EXPORTS
1967	2	2
1968	2	2
1969	2	2
1970	2	2
1971	2	2
1972	2	2
1973	2	2
1974	2	2
1975	2	2
1976	1.23277	1.24421
1977	1.16577	1.15876
1978	1.20564	1.22179
1979	0.57008	0.56523
1980	0.36150	0.35993
1981	0.22778	0.23351
1982	0.17444	0.17429
1983	0.07299	0.08146
1984	0.02728	0.02764

Source: Du Congo au Zaire, p.203, YearBook 1980-1990

Source:

Inflation

(1975 = 100)

Tshibaka p.44

1966		13.3
1967		18.7
1968		35.1
1969		38.2
1970		45.4
1971	8.7 %	47.6
1972	6.6 %	55.4
1973	9.3 %	64.6

wa Bilenga p. 129

1974	30.4 %	77.8
1975	59.3 %	100.0
1976	63.3 %	188.2
1977	58.0 %	307.0
1978	80.0 %	486.3
1979		961.2
1980		1,420.4
1981		1,977.5
1982		2,727.4
1983		4,688.5
1984		7,437.4
1985		9,209.3
1986		13,511.1
1987		25,724.4
1988		42,689.5
1989		67,662.9

From 1975 to 1983, inflation averaged 60 percent annually

wa Bilenga Tshishimbi, p 9

T_{GS} = Taxes on goods and services.

	Taxes on goods & services as percent of Total revenue	Total Revenue	Taxes on goods &
1971	11.82	527.16	62.31
1972	12.67	496.58	62.916
1973	10.74	784.24	84.227
1974	9.01	980.59	88.35
1975	12.55	858.01	107.68
1976	13.43	613,97	82.456
1977	14.71	786.03	115.625
1978	17.55	883.75	155,09
1979	12.86	1,145.22	147.275
1980	12.40	1,358.05	168.39
1981	15.63	1,082.09	169.13
1982	22.94	1,074.43	246.47
1983	24.43	889.15	217.219

Source: YearBook 1980-89

All major crops were taxed during 1971-82 except rice and palm oil. Rates of taxation were, in decreasing order, highest for cotton, coffee, groundnuts, and maize. Overall, export crops were discriminated against more than food crops.

Taxes on international transactions (imports and
exports taxes).

	Taxes on international trade and transactions as percent of Total Revenue	Total Revenue	Taxes on Intern. Trade & Transactions
1971	57.39	527.16	302.537
1972	57.85	496.58	287.271
1973	64.99	784.24	509.677
1974	61.17	980.59	599.826
1975	48.08	858.01	412.53
1976	45.15	613.97	277.207
1977	36.97	786.03	290.595
1978	27.90	883.75	246.566
1979	42.86	1,145.22	490.84
1980	38.43	1,358.05	521.898
1981	30.77	1,082.09	332.959
1982	25.70	1,074.43	276.128
1983	28.83	889.15	256.34

Source: YearBook 1980-89

The average annual share of taxes on imports and exports was about
52.6 percent of the total government budgetary revenue during the 1970-
78 period against 63.9 percent in 1970. In 1978 the average share of
taxes dropped to about 28.5 percent. The drop was due to a growing
weakness in tax administration (tax collection) and an increase in tax
evasion.

The ratio of import taxes to import value declined from 25 percent to 20
percent and that of export taxes to export value from 34 percent to 14
percent during 1970-77.

The fall in the share of export taxes was more pronounced, largely
because of GECAMINES' financial problems and the tax rebate the company

received. The ration of export taxes to export value dropped from 32 percent in 1974 to 14 percent in 1997.

Table 35. Taxes on Income and property.

	Taxes on Income & Profits as % of Total Revenue	Total Revenue	Taxes on Income & Property
1971	22.92	527.16	120.825
1972	22.17	496.58	110.09
1973	18.56	784.24	145.55
1974	21.12	980.59	207.10
1975	26.02	858.01	223.25
1976	32.21	613.97	197.759
1977	37.48	786.03	294.60
1978	40.83	883.75	360.835
1979	30.72	1,145.22	351,81
1980	30.37	1,358.05	412.439
1981	35.67	1,082.09	385.98
1982	33.39	1,074.43	358.75
1983	30.56	889.15	271.72

Source: YearBook 1980-89

Social security

	Social Security Contribution as percent of Total Revenue	Total Tevenue	Social Security (INSS)
1971	2.19	527.16	115.448
1972	2.19	496.58	108.75
1973	2.02	786.24	158.416
1974	1.87	980.59	183.37
1975	2.67	858.01	229.088
1976	2.79	613.97	171.29
1977	2.56	786.03	201.22
1978	2.77	883.75	244.798
1979	1.48	1,145.22	169.49
1980	1.98	1,358.05	268.89
1981	1.70	1,082.09	183.955
1982	1.68	1,074.43	180.50
1983	1.10	889.15	97.806

Source: YearBook 1980-89

Private consumption, GDP and taxes on goods and services

Year	C_p	GDP	T_{GS}	Y^D

(marginal propensity to consume)

(miilion US $)

Year	C_p	GDP	T_{GS}
1973	1,351.62	3,003.6	84.23
1974	1,543.08	3,674	88.35
1975	1,665.31	3,784	107.68
1976	1,646.8	3,580	82.47
1978	1,943.6	4,520	115.63
1979	4,589.2	6,556	155.09
1980	3,853	6,423	147.28
1981	3,748.45	6,145	168.39
1982	3,471.36	5,424	169.13
1983	2,975.5	5,410	246.40
1984	2,844.56	4,588	217.22
1985	966	2,760	
1986	1,417.44	2,953	
1987	1,637.76	3,412	
1988	2,239.93	2,909	
1989	1,331.6	3,329	
1990	265.65	385	

All Taxes and GDP

	Taxes	GDP
1973	739.45	3,003.6
1974	895.27	3,674
1975	743.46	3,784
1976	557.42	3,580
1977	700.82	4,520
1978	762.49	6,556
1979	989.925	6,423
1980	1,102.73	6,445
1981	888.07	5,424
1982	745.28	5,410
1983		4,588
1984		2,760
1985		2,953
1986		3,412
1987		2,909
1988		3,329

INVESTMENT - GDP

	Investment	GDP
1973	901.08	3,003.6
1974	1,124.24	3,674
1975	1,207.09	3,784
1976	927.22	3,580
1977	1,740.20	4,520
1978	1,206.30	6,556
1979	1,258.91	6,423
1980	1,604.81	6,445
1981	1,361.42	5,424
1982	1,303.81	5,410
1983	890.07	4,588
1984	800.40	2,760
1985	856.37	2,953
1986	1,057.72	3,412
1987	756.34	2,909
1988	765.67	3,329
1989	65.45	

Source: YearBook 1980-90

GDP, consumption (private and government), imports, exports, taxes

Year	GDP in current prices million zaires	C_P	C_G	I	X	Z	T
1966	304	195	63	42	74	69	
1967	479	269	88	95	201	173	
1968	722	306	140	140	292	157	
1969	879	423	197	217	364	321	

National Account Statistics 1990 p.2107

Year	GDP	C_P	C_G	I	X	Z	T
1970	938	413	266	245	415	401	
1971	1,049	512	285	345	374	467	
1972	1,157	650	265	386	378	522	
1973	1,475	805	312	442	562	646	
1974	1,799	941	428	551	817	937	
1975	1,919	1,220	452	613	520	885	
1976	2,860	2,089	555	742	927	1,453	
1977	3,956	2,849	772	1,524	1,117	2,305	
1978	5,481	3,812	893	1,007	1,216	1,448	
1979	11,105	6,686	1,857	2,179	2,742	2,359	
1980	17,183	10,426	2,756	4,277	6,102	6,379	
1981	23,781	15,275	4,190	5,967	8,349	10,000	
1982	31,110	17,094	5,948	7,493	10,013	9,437	
1983	59,134	36,794	8,676	11,492	23,387	21,214	
1984	99,723	34,363	14,999	29,322	76,783	55,883	
1985	147,263	70,360	17,134	43,364	106,269	89,911	
1986	203,416	97,841	38,567	63,585	124,847	121,268	
1987	326,946	251,916	73,147	83,764	206,485	288,365	
1988	622,822	249,986	231,979	140,857	504,615		
1989	2,146,811	1,480,976	309,686	356,149	498,106		

Source: YearBook 1980-90

Current account, imports, and exchange rates

	Current Account	Imports - million US $ YB/92 p.864 c.i.f	Exports - million US $ YB/92 p.875 f.o.b.	Exchange Rates US $/zaires
1973	-244.9	782	1,013	2.00000
1974	-372.3	1,051	1,381	2.00000
1975	-592.7	927	865	2.00000
1976	-832.8	674	930	1.24421
1977	-1,451.2	609	981	1.15876
1978	294.3	592	951	1.22179
1979	146.0	597	1,324	0.56523
1980	-153.6	842	1,639	0.35993
1981	-424.0	672	662	0.23357
1982	-433.0	480	569	0.17429
1983	-309.7	498	1,134	0.08146
1984	-325.0	675	1,003	0.02764
1985	-290.0	791	954	0.02010
1986	-400.0	875	1,097	0.01672
1987	-655.0	756	970	0.00885
1988	-762.0	771	1,108	0.00529
1989	-640.0	849	1,249	0.00261

Source: YeaarBook 1980-90

223

Imports , official and uniofficial exchange rates

Year	Imports US $ (current million)	Imports US $ million c.i.f YB/92 p.864	official Exchange rate (Z / US $)	parallel market rate	GDP
1966	1,020.0		0.165	0.647	
1967	331.8		0.333	0.587	
1968	292.0		0.500	0.650	
1969	370.0		0.500	0.626	
1970	524.0	835,0	0.500	0.724	1,742.6
1971	666.0	917.2	0.500	0.775	1,867.4
1972	522.0	939.8	0.500	0.780	1,876.0
1973	691.8	782.0	0.500	0.837	3,003.6
1974	954.0	1,051.0	0.500	0.967	3,674.0
1975	946.2	927.0	0.500	1.040	3,784.8
1976	784.5	674.0	0.807	2.423	3,580.0
1977	807.5	609.0	0.857	3.267	4,520.0
1978	759.6	592.0	0.836	5.146	6,556.0
1979	885.4	597.0	1.729		6,424.0
1980	1,015.2	842.0	2.800		6,145.0
1981	832.2	672.0	5.465		5,424.0
1982		480.0	5.750		5,410.0
1983		498.0	30.120		4,588.0
1984		675.0	40.450		2,760.0
1985		791.0	55.793		2,953.0
1986		875.0	71.100		3,412.0
1987		756.0	131.500		2,909.0
1988		771.0	274.000		3,329.0
1989		849.0	454.620		385.0

Imports, GDP and external conversion factors

Year	Imports c.i.f.	GDP	Eternal conversion factor
1973	782	3,003.6	2
1974	1,051	3,674	2
1975	927	3,784	2
1976	674	3,580	1.23277
1977	609	4,520	1.16577
1978	592	6,556	1.20564
1079	597	6,423	0.57008
1980	842	6,145	0.36150
1981	672	5,424	0.22778
1982	480	5,410	0.17444
1983	498	4,588	0.07299
1984	675	2,760	0,02728
1985	791	2,953	0.02003
1986	875	3,412	0.01676
1987	765	2,909	0.00889
1988	771	3,329	0.0054
1989	849	385	0.00262

Source: YearBook 1980-90

Current account, imports, exportsand exchange rates

Year	CA (US $ million) Tshibaka p.43	Current Account	Imports Tshibaka million US $ p.41	Exports current million US $ p.42	Official Exchange Rate	Parallel Exchange Rate
1966	3.8	3.8	1,020.0	424.2	0.165	0.647
1967	14.4	14.4	331.8	308.8	0.333	0.587
1968	50.3	50.3	292.0	570.2	0.500	0.650
1969	47.0	47.0	370.0	680.2	0.500	0.626
1970	-63.7	-63.7	524.0	781.2	0.500	0.724
1971	-124.7	-102.0	666.0	687.0	0.500	0.775
1972	-365.5	-329.0	522.0	737.6	0.500	0.780
1973	-279.3	-244.9	691.8	1,012.8	0.500	0.837
1974	-471.1	-372.3	954.0	1,381.0	0.500	0.967
1975	-592.7	-592.7	946.2	864.8	0.500	1.040
1976	-830.2	-832.8	784.5	867.9	0.807	2.423
1977	-1,451.3	-1,451.2	807.5	1,019.1	0.857	3.267
1978	-82.8	294.3	759.6	772.8	0.836	5.146
1979	-14.9	146.0	885.4	1,169.6	1.729	
1980	-1.5	-153.6	1,015.2	2,476.2	2.800	
1981		-424.0	832.2	1,889.3	5.465	

1982		-433.0			5.750	
1983		-309.7			30.120	
1984		-325.0			40.450	
1985		-290.0			55.793	
1986		-400.0			71.100	
1987		-655.0			131.500	
1988		-762.0			274.000	

Diamond production in Kasai Occidental and Kasai Oriental

(thousands carats)

Year	Total production	Kasai Oriental (state-owned company: MIBA)	Kasai Kasai Occidental quantity bought by Official buying offices in Tshikapa and Mbuji Mayi
1967	13,154	13,154	-
1968	11,904	11,353	551
1969	14,116	11,616	2,500
1970	14,063	12,408	1,033
1971	12,742	12,002	743
1972	13,390	12,181	1,209
1973	12,939	12,004	935
1974	13,597	12,991	606
1975	12,801	12,415	386
1976	11,821	11,516	305
1977	11,215	10,795	420
1978	11,245	10,599	646
1979	8,734	8,063	671
1980	10,335	8,001	2,334
1981	6,758	5,754	1,004
1982	6,079	5,656	423
1983	11,982	5,807	6,175
1984	18,459	6,896	11,563
1985	19,975	6,977	12,998
1986	23,205	8,664	14,541

Source: Vingt ans du MPR, p. 346.