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ABSTRACT

THE FINANCIAL SYSTEM SUPPORTING RICE MARKETING IN ECUADOR

By

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This study examines the financial system supporting rice marketing in Ecuador. The main findings are based on field research conducted during 1988 and direct observation of rice market participants behavior during credit and price policy changes. While the research focused on the physical rice flow system, the emphasis was directed to the financial mechanism inherent in rice marketing activities.

The rice marketing system has been stagnant and the rice milling industry has become obsolete. The only noticeable change in the system is an increasing concentration of market power in the hands of a few national wholesalers. This concentration has its roots in the accessibility this group has to bank loanable funds. Meanwhile, access to credit has been limited for small rice market participants. The scarce subsidized interest rate loans provided by the BNF, CFN, and private banks has been rationed away from certain rice market participants such as traders and small borrowers in general. Increasing transactions costs has been a common measure to discourage small borrowers from demanding subsidized loans.

Inflation induced liquidity problems have been found in long-term investments. Although debt financing is attractive when interest rates are below the inflation rate, firms undertaking long-term investments confront severe liquidity problems during the first payment periods. The study recommends a number of ways to help firms to mitigate this problem.

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LIST OF ACRONYMS

ALGRACESA Compañía Almacenadora de Granos, Sociedad Anónima - the Grain Storage Company, a semi-private firm.

ALMACOPIO Compañía de Almacenamiento y Acopio - the Assembly and Storage Enterprise. The majority of its capital belongs to BCE and BNF.

ALMAGRO Almagro - a grain elevator private company.

ANIA Asociación Nacional de Industriales Arroceros - the National Association of Rice Millers.

BCE Banco Central del Ecuador - the Central Bank of Ecuador.

BNF Banco Nacional de Fomento - the National Development Bank.

BPA Bolsa de Productos Agropecuarios - the Agricultural Products Exchange Board Corporation.

CFN Corporación Financiera Nacional - the National Finance Corporation, a state owned enterprise.

COFIEC Corporación Financiera Ecuatoriana - the Ecuadorian Finance Corporation, a private finance company.

EMSEMILLAS Empresa Nacional de Semillas - the National Seed Enterprise. A firm under MAG's administration.

ENAC	Empresa Nacional de Almacenamiento y Comercialización - the National Grain Marketing and Storage Enterprise. A firm under MAG's administration.
ENPROVIT	Enpresa de Productos Vitales - the Basic Food Distribution Enterprise. A firm under MAG's administration.
FENACOMI	Federación Nacional de Comerciantes Minoristas - the National Federation of Small Traders and Retailers.
FERTISA	Fábrica de Fertilizantes, Sociedad Anónima - the Fertilizer Mixer Company. The majority of its capital belongs to BNF.
IDB	Inter-American Development Bank
IDEA	Instituto de Estrategias Agropecuarias - the Institute of Agricultural Strategies.
IBRD	International Bank for Reconstruction and Development (the World Bank).
MAG	Ministerio de Agricultura y Ganadería - Ministry of Agriculture and Livestock.
PNA	Programa Nacional del Arroz y Control de Piladoras - National Rice Program, a technical division of MAG.
PROARROZ	Productores de Arroz - the Rice Producers Association.

CHAPTER ONE

INTRODUCTION

A. An overview of the economic and political dimensions of rice marketing in Ecuador

Food demand in Ecuador has been influenced by rapid population expansion and growing urbanization. From 1962 to 1988, the population in Ecuador more than doubled, growing at an average annual rate of approximately 3 percent. Now, 54 percent of Ecuador's population lives in urban areas (See Table 1.1). Quito, the capital of Ecuador, and Guayaquil, the major port city on the Pacific coast, are the urban centers where population increases have been the greatest.

Another important demographic change has occurred in the Sierra and the Costal regions. In 1962 the Sierra population accounted for 51 percent of the total population and the Costa 48 percent. In 1988 the Sierra accounted for only 46 percent while the Costal region accounted for 50 percent.

These changes in population and the location of people in Ecuador have caused changes in the food marketing system in general and the rice marketing system in particular. Larger amounts of rice are now channeled to ever larger concentrations of people, requiring better marketing facilities, including transportation and storage, and requiring at the same time larger amounts of financial resources to fund

rice marketing efforts.

Table 1.1 Ecuador's Population in Census Years 1962-1982 and Projection for 1988 (Thousands of People).

POPULATION DISTRIBUTION	POPULATION CENSUS YEARS 1962	%	1974	%	1982	%	PROJECTION 1988	%
	---------- Urban and Rural Population ----------							
URBAN	1612	36	2699	41	3968	49	5529	54
Quito	355	8	600	9	866	11	1186	12
Guayaquil	511	11	823	13	1199	15	1635	16
Other Towns	746	17	1276	20	1903	24	2708	27
RURAL	2864	64	3823	59	4092	51	4674	46
TOTAL	4476	100	6522	100	8061	100	10204	100
	---------- By Regions ----------							
SIERRA	2271	51	3147	48	3802	47	4695	46
COSTA	2127	48	3179	49	3947	49	5056	50
ORIENTE	78	1	196	3	312	4	453	4

Source: Whitaker and Alzamora, 1988c

Another change affecting rice marketing in Ecuador has been an increasing per capita consumption of rice. Navarrete (1979) reports that annual consumption of rice was 9 kg per capita in 1970 and 23 kg in 1978. The National Rice Program (PNA), a technical division of the Ministry of Agriculture (MAG), estimates that annual consumption for 1988 was approximately 6 million quintals (cwt) of rice, equivalent to about 273,000 metric tons (MT). A recent study by Stewart and Cuesta (1988, p 5) estimates an annual per capita rice consumption of 27.5 kg for the same year.

The process of urbanization and the increase in per

capita consumption help to explain why urban industrialists and organized unions have been lobbying for lower food prices. Meanwhile, vested interests on the production side, representing a strong political force, have been lobbying for higher support prices and lower input costs. Politicians are sensitized to these political forces and conflicting interests. A recurrent mechanism utilized by policy makers to face this conflict has been to offer subsidized credit to finance production and to set subsidies for the importation of agricultural inputs, while setting and attempting to enforce official consumer prices.

B. Product and financial flows in the rice marketing system

1. The rice subsector in Ecuador

The rice subsector is conceived in this study to be a sequence of vertically coordinated stages from the supply of financial resources to acquire farm inputs to the final consumption of the product. The flow of rice from one stage to the next usually implies: 1) a physical exchange of rice for a financial instrument, such as cash, check, or a promissory note, associated with 2) a transfer of property rights over the product; and 3) a change in the value of the product.

The marketing process for rice requires operating capital to facilitate the flow of rice from one stage to the next.

Moreover, additional capital is needed to finance rice processing operations such as cleaning and drying, storage, milling, and physical transportation to final consumers. Channeling rice through the marketing system can not take place without the use of financial resources. Each stage of rice processing, including such functions as processing, transportation, and storage, cannot be undertaken without the use of financial resources such as cash or cash substitutes.

An efficient and smooth flow of rice requires physical facilities and equipment to fulfill these marketing functions. Among these are trucks to assemble and distribute the grain, drying and processing equipment to make the rice suitable for human consumption, and silos and warehouses to store the product during off-harvest periods, since production is seasonal. All these physical facilities need to be operating adequately for the marketing system to maintain stability between supply and demand forces.

2. The role of credit in Ecuador's rice marketing system

The capital needed to finance rice marketing assets are supplied as either equity or debt capital. In this study, the focus of the analysis is on debt capital funds which can be made available either through non-official financial intermediaries or through official financial institutions.

Officially allocated credit often has been rationed away

from some important marketing activities, such as distribution of the product, storage, and investments in facilities. This allocation has reflected a bias against financing marketing activities and has been based on political factors and misconceptions about the role of assemblers, millers, wholesalers and retailers.

In the past legal and institutional restrictions have limited access to administratively allocated credit. Some of these restrictions have been imposed by allocating credit disproportionately to priority sectors and target beneficiaries. Other restrictions have taken the form of subsidies in the interest rate and easy loan terms. Non-official financial resources have been also constrained by overestimating the risk and underestimating the profitability of agricultural marketing activities. These constraints in the financial system have been more binding in the rice trade and storage segments of the marketing system. It was especially so during 1988 when official credit was rationed away from rice trade and storage.

Bottlenecks in the flow of rice through the marketing stages are somehow created by financial constraints. These bottlenecks occur because marketing participants lack incentives for undertaking marketing investments. The incentives they lack are attractive rates of return on investments.

3. Premises about the financial system supporting rice marketing investments

Policy makers have often expressed their strong anti-intermediary biases. During political campaigns, government officials and policy makers have blamed middlemen and traders for increases in food prices. The frequently stated solution to reduce consumer prices of food items, such as rice, has been the elimination of the "long chain of intermediaries". This bias against this group of participants has influenced the official allocation of financial resources.

Financial policy makers have expressed, in a number of inter-institutional meetings, their perception and fear that commercial credit to finance short-term marketing activities, such as distribution and storage, contributes to price increase. They reason that these activities are not productive, i.e. do not add real value to the economy. Yet the financial policy adopted increases the money supply and inflation.

Inflation is a pervasive, detrimental financial phenomenon constraining in many ways the use of financial resources to invest in market facilitating assets. It limits investments in durable assets because loan repayments generate cash deficits. The cash flow deficits created by inflation cause liquidity problems for the firm, especially during early periods of an investment's life. Inflation and its attendant

liquidity problem have influenced private lenders to reduce the loan term making it even more difficult for private entrepreneurs to undertake capital investments.

Finally, credit policy makers have asserted that there is evidence that the installed capacity to dry, mill, and store rice is sufficient for domestic production. This assertion, irregardless of its truthfulness, has resulted in a limited allocation of financial resources to these marketing activities.

4. Hypotheses of the study

The main hypothesis that this research tests is that there are artificially imposed capital market constraints that limit access to credit that would otherwise be available to finance rice marketing activities. These suboptimal constraints supposedly affect both rice millers and traders. They also affect consumers since rice is made available to them at higher prices than would be possible if the financial system could function without these artificial constraints.

These artificial constraints we examine are both institutional and economic in nature. Some take the form of credit subsidies and preferential treatment for rice production, creating problems in both the supply and demand sides of the financial system. Other restrictions are the high costs of processing loans. By increasing transaction costs lending

institutions ration credit away from small borrowers.

C. Study purpose and objectives

The main purpose of this study is to identify those constraints that limit the timely and competitive access to credit for rice marketing activities and to recommend financial mechanisms and credit policies that will contribute to the development of a more efficient, progressive and equitable rice marketing system.

The specific objectives of the study are:

(1) To provide a concise diagnosis of the functional organization of the rice subsector and the credit system facilitating the functioning of the rice marketing system.

(2) To identify the major constraints limiting access to operating capital needed to finance the trading and storage of rice.

(3) To investigate the profitability of long-term investments in rice mills, storage facilities and equipment.

(4) To assess the impacts of inflation on enterprise liquidity and the economic feasibility of long-term

investments when capital assets are debt financed and interest rates incorporate part or all the inflation rate premium.

(5) To recommend changes in credit policies and related administrative loan delivery procedures to facilitate the economic flow of rice through the marketing process.

D. Research procedure

a. Field reconnaissance

A rapid field reconnaissance was conducted during January of 1988 to identify the main stages in the rice marketing system, the flows of rice through the main market channels, and the key participants in the system.

b. A field survey of the financial mechanisms facilitating rice marketing

The first task was to collect relevant information about the problem stated and to get acquainted with related efforts being conducted in the country and elsewhere. This activity included the collection of relevant secondary data from public and private organizations, especially from the PNA, the Marketing Division of MAG, and the National Development Bank (BNF), as well as from the Rice Producers Association

(PROARROZ), and the National Association of Rice Entrepreneurs (ANIA).

While collecting the secondary data, informal interviews were conducted with key market participants. The interviews were based on a set of questions about the rice marketing system and its associated financial mechanisms. The group of selected participants included rice producers, millers, wholesalers, and credit officials from BNF, National Finance Corporation (CFN), Ecuadorian Finance Corporation (COFIEC), Corporación Bolsa de Productos Agropecuarios (BPA), Banco del Pacífico, and Central Bank.

c. In depth survey of rice milling enterprises

A pre-selection of 70 first and second class mills was made, based mainly on their size, location, and years in business, using the PNA files of registered mills. Technical personnel from the PNA helped in this pre-selection.

Most of the preselected mills were visited but not all millers were interviewed, either because the plants were shut down or owners/managers were not at the plants. After this task was completed, selection of a better sample was possible. The criteria used to select a representative sample of 22 mills was:

i) size, organized under two basic categories: sheller and huller mills, which corresponds closely to the

PNA classification;

ii) plant facilities for receiving, drying, storing, and milling rice;

iii) operating level; and,

iv) financial structure and operations.

By working closely with the selected millers, it was possible to collect and organize most of the data required to construct prototype annual operating budgets and cash flow statements. These were then used to study the profitability of long term investments in equipment and storage facilities. They were also used to study the impact of inflation on the liquidity of rice enterprises when investments are debt financed.

d. Limitations of the field survey

The research effort at the wholesalers level faced serious difficulties because of the political environment surrounding rice trade and storage at the time of the field work. After the 1988 winter harvest period (May and June), milled rice prices began to rise due to the presence of higher prices at the northern (Colombia) and southern (Peru) borders. Unofficial export trade increased, reducing the domestic supply of rice and increasing milled rice prices. The upward price movement continued until the 1988 summer harvest (October). During this time the milled rice price rose

rapidly from about 6,000 sucres in October to more than 10,000 sucres by the end of November. In an attempt to control both unofficial trade and rising prices, the government began to seize stocks of rice from wholesalers in the main cities. Under these circumstances most rice wholesalers were unwilling to provide information for this study.

e. Descriptive and diagnostic analysis of the financial flows facilitating marketing activities

After collecting and organizing the secondary and primary information gathered during the field research period, an effort was made to describe and analyze the financial system supporting rice marketing activities. The observations and preliminary findings of this research work completed prior to December of 1988 were presented and discussed in a seminar held in Guayaquil on December 15, 1988. The participants in this seminar were rice producers, millers, and traders, representatives of ENAC and the PNA, and Drs. Riley, Robison and Tschirley from Michigan State University. The preparation for this seminar and the discussions of the preliminary results of the research with the seminar participants resulted in a number of innovative and thoughtful recommendations to deal with the problem of credit for rice marketing activities. Some of these are included at the end of this report.

f. Profitability and liquidity analysis of rice milling enterprises

The final stage of the research analyzed the profitability of rice storage as well as the profitability of long term investments in rice marketing facilities. These investments were mainly for drying and milling equipment and storage facilities. This analysis included a study of the impact of inflation on the liquidity position of rice milling enterprises when durable assets are loan financed and the interest rate incorporates an inflation rate premium.

E. Organization of the study

The conceptual approach and methods for analyzing the financial system associated with the rice marketing process will be described in Chapter Two. Chapter Three contains an overall description and diagnosis of the rice marketing system. It focuses on those stages where financial funds are critically needed to improve the physical flow of grain. Chapter Four presents a description and diagnosis of the existing credit system associated with the rice marketing process. It emphasizes the financial arrangements and operational mechanisms needed to support the rice marketing activities. Chapter Five investigates the use of credit to finance operating capital to physically assemble, store and

distribute the grain. Chapter Six evaluates the profitability of long-term investments in marketing facilities when they are financed by bank loans. Chapter Seven analyzes the impacts of inflation on the liquidity position of rice milling enterprises when capital assets are financed by long-term loans carrying interest rates which incorporate all or a large proportion of the inflation rate. The final chapter presents the main conclusions of the research. It also includes important recommendations to reduce or eliminate the constraints that limit access to the financial resources on a competitive basis that are required to finance investments which would improve the performance of the rice marketing system.

CHAPTER TWO

METHODS FOR ANALYZING FINANCIAL MECHANISMS SUPPORTING THE RICE MARKETING SYSTEM

Introduction

This Chapter is organized into three main parts. Each part is divided into sections. The first section of part A defines the conceptual subsector analysis framework and its application to the financial system supporting rice marketing activities. The second section defines the main functions of a rice marketing system. The third section describes the vertical coordination mechanisms used in the financial system facilitating rice market activities. The fourth section identifies the main participants in the financial and rice marketing systems. Part B presents the research methods, emphasizing the analytical tools used in this study. The first section of part B presents the procedure used to build prototype rice mills. The second section shows the method utilized to evaluate the profitability of rice storage, concentrating the analysis of this function at the wholesale level. The third section presents the method utilized to assess the overall profitability of mill operations, both as they are currently structured and with additional investments in drying and milling equipment and storage facilities. Part C will discusses some issues related to financial market

performance measures and methods to evaluate the overall functioning of the system.

A. The subsector analysis approach

1. The concept of subsector analysis applied to the study of the financial mechanisms supporting rice marketing activities

a. The conceptual subsector analysis framework

The concept of "subsector" appeared originally in Shaffer (1973), who defines it as "the vertical set of activities in the production and distribution of a closely related set of commodities". The development of this concept follows the works of Mighell and Jones (1963) and Shaffer (1968 and 1973), French (1974), Marion (1986), and Riley (1989). The approach gained recognition and wide application through the numerous publications produced by the North Central Regional Research Project 117 (NC 117).

The usefulness of the subsector analysis stems from its pragmatism and applicability. It can be used effectively for comparative static analysis by facilitating the understanding of the impacts of policy changes on the main functions and participants of the subsector. It can be used to prepare diagnostic and analytic studies of commodity systems,

providing a sound basis for designing normative policy changes. Moreover, since the concept includes the substantive characteristic of interdependence and interactions among the components of the subsector, the approach can lead to an increased understanding of the forces of change and evolution in an economic system.

The tools used in subsector analysis are much the same as those used in other economic and agri-business studies. These tools are applied considering the economic system as an integrated set of components adapting itself to changing conditions. Some of the financial analysis tools that can be used in the subsector approach are the net present value model. This tool was developed to evaluate the profitability of long-term investments. The cash flow technique can also be used in the subsector approach to identify cash flow deficits and liquidity problems. Finally, financial ratios that compare the performance of a specific firm with standards estimated for similar enterprises is another financial tool that can be used in the subsector approach.

The subsector is looked upon simultaneously as a structure consisting of stages and as a movement or flow. From the structure point of view, the key elements of a subsector are the stages where important economic activities take place. From the flow perspective, the main elements of a subsector are i) the functions, ii) the coordination mechanisms, and iii) the participants.

i) Functions: These refer basically to the marketing utilities known as form, space, time, and possession. Bressler and King (1978, p 165) define form utility as the value added to the primary product by transformation of its characteristics. This value, in a competitive economic environment, should equal the costs of that transformation, including a normal profit. These costs are associated with the size and scope of the plants used for transforming the products. Important considerations are advanced with respect to the size and characteristics of fixed assets (See for example Williamson, 1986). With respect to the space utility, Tomek and Robinson (1972, p 144) argue that, in a competitive situation, the difference in the price of a homogeneous product between two markets should equal the cost of transferring the product because arbitrage is the force that would equilibrate the price difference to the transfer cost. The implicit market integration of this idea has been tested empirically by a number of authors (see for example Ravallion, 1986, and Delgado, 1986). In a competitive scenario, the price difference between two points in time should equal the costs of storage, both, operating and financial, including depreciation and a normal profit (Tomek and Robinson, 1972; Bouis, 1983; Goetz and Weber, 1986). Finally, the possession utility concerns property rights and transaction costs included in the exchange. All these functions are productive economic activities which add value to the products.

ii) Coordinating mechanisms: Basically two forms of coordination are critical: vertical integration and external organization. In the case of vertical integration, the coordination is internal within a single business enterprise and the exchanges are decided by a unique body of decision makers (Williamson, 1985). The external organization takes various forms, such as spot markets, future markets, and forward contracting (Marion, 1986).

iii) Participants: These are the economic agents deciding upon functions and coordination mechanisms. They are represented by individuals as well as by organizations and public institutions.

All these components are immersed within a set of broader economic, social, cultural and political forces regulating their activities. An effective way to organize the analysis of these components is to look at the subsector under three interacting dimensions: environment, behavior, and performance.

i) Environment: Includes the factor and product markets; the set of rules, property rights, prices, contracts and taxes; and the social, cultural and political forces guiding the functioning of the subsector. Institutions and transaction costs are the key elements within the environment. Institutions are the rules governing exchange and the set of norms that people follow when trading. Transaction

costs are the expenses, monetary and non-monetary incurred in performing the exchange.

ii) Behavior: Williamson (1985) considers three kinds of behavior: 1) opportunistic behavior defined as "self-interest seeking with guile"; 2) open and simple self-interest seeking behavior; and, 3) obedience, which means following established norms in a mechanistic manner. Opportunistic behavior sets in motion social forces leading towards what Platt (1973) calls "social traps". These take the form of individuals pursuing their own self interest but damaging the group, or groups of individuals in the process. These individuals may still benefit in the short run but may impair and damage the source of the benefits in the medium and long-term.

iii) Performance: Is the set of results and impacts of the actions of the participants. These results are important and more so when they feed back into the behavior of the participants and stimulate the undertaking of changes which can improve the functioning of the system. According to Schmid (1984), performance is a way to look at the distribution of costs and benefits; that is, a way to investigate "who gets what".

b. The applied subsector analysis framework

Applied to the objectives of this research, the subsector analysis framework can be defined as a comprehensive and integrative approach to the study of the rice marketing system. The system is treated essentially as a sequence of vertically coordinated stages between which two basic types of flows occur: a physical flow of product and a flow of financial instruments. Key participants are responsible for coordinating these flows at each and every stage of the system. These participants have their peculiar ways of acting in the system, according to their perceptions and the challenges that changing conditions impose on them. The functional organization of the system and the behavior of the participants are influenced by a set of rules, policies, and institutions set forth to regulate the evolution of the system. Some of these policies are more closely related to a particular commodity system, while others are broader in scope. An example of the first is the credit and financial policies. An example of the second is the set of sectoral and macro-economic policies. The functioning of the rice subsector, as described here, generates performance results, which, in turn, have impacts and a strong influence on the evolution of the system.

The subsector framework can be illustrated as in Figure 2.1, which shows the rice subsector as a sequence of stages

through which two basic flows take place: the physical flow of grains and the flow of financial instruments. This market process is influenced by the credit and financial policies and institutions, as well as by the sectoral policies and institutions. The entire subsector is incorporated within a more general economic, social, and cultural environment.

The focus of this study encompasses the transactions taking place from the farm gate forward, through the processing stage, and up to the wholesaling stage. The study emphasizes the credit and financial policies and institutions. The sectoral policies and institutions will be investigated only tangentially, to the extent they are related to the financial mechanisms facilitating rice transactions. As applied in this research, the subsector analysis framework has many similarities with the "agribusiness commodity system analysis" approach developed at Harvard University and applied in other Universities and overseas field research (see for example Goldberg, 1974).

From the structure point of view, these are some of the main issues that need to be considered. The exchange of rice for financial instruments is prevalent in the rice subsector. The flow of rice and financial means through the marketing system should be smooth and balanced, reflecting a stable equilibrium through time between supply and demand. This smooth and balanced flow of rice needs to be free of technical constraints as well as financial restrictions.

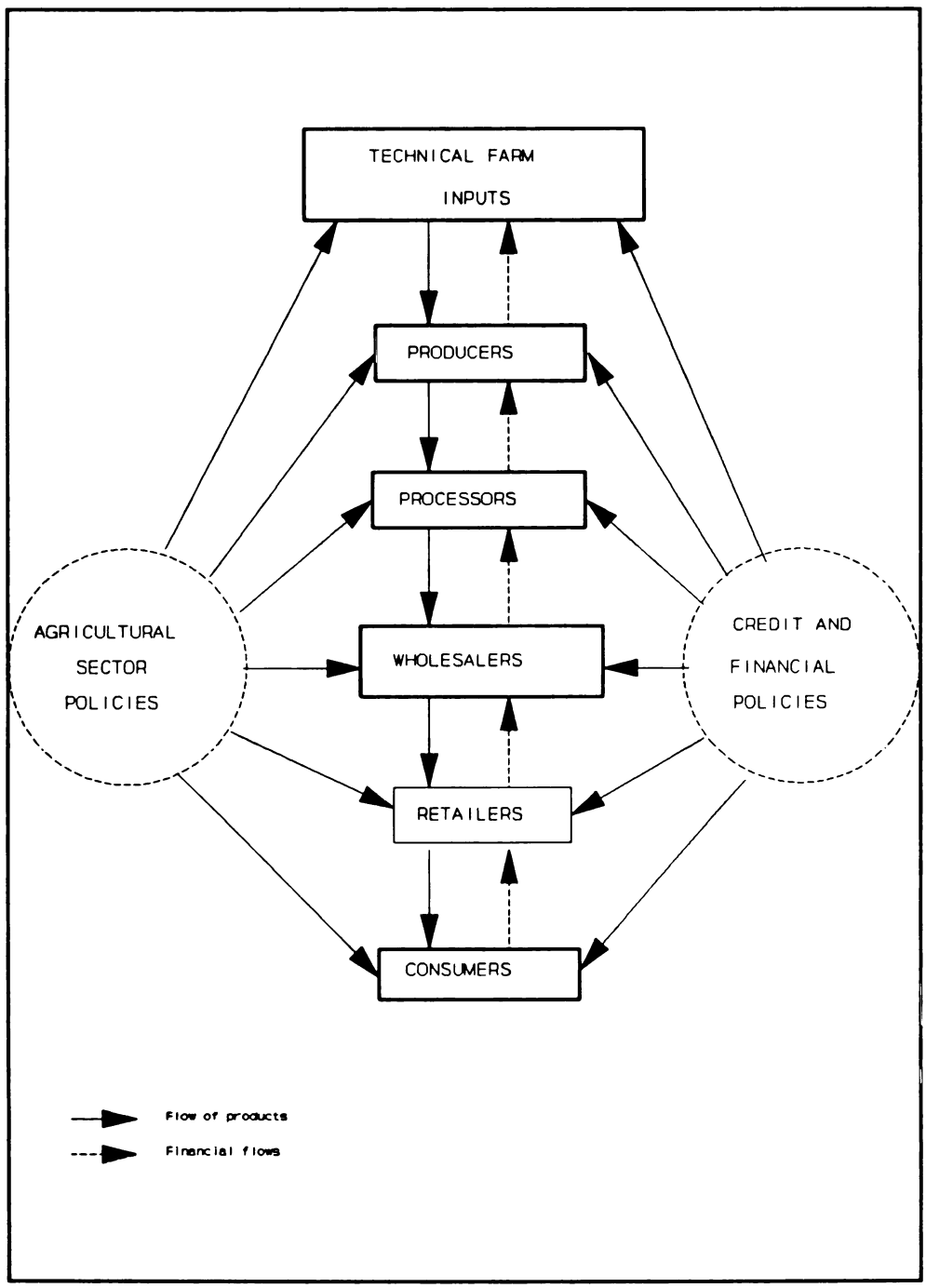

Figure 2.1 Schematic view of the rice subsector framework of analysis.

The receiving and drying capacities for paddy rice at the processor level should be sufficient to process all the rice produced. Rice has to be dried after harvest. If it is to be immediately milled, the moisture content has to be lowered to about 13 percent. If it is to be stored, the moisture content has to be reduced to levels recommended for the time the grain will be stored. Unhulled rice left without drying for more than 24 hours after harvest begins to heat up. This in turn causes burn spots and discolorations of the grains and yields a lower amount of milled rice.

The flow of paddy into the processing stage could be constrained both by technical factors and financial restrictions. These constraints could be ameliorated with a sufficient injection of financial resources, and changes in the credit delivery system. This innovation would allow timely and less costly access to credit for all investors and entrepreneurs.

2. Functions of the rice subsector and their relation with financial mechanisms

All four economic functions (time, space, form, and possession) are implemented in the rice subsector. Moreover, all require a flow of financial resources to undertake them. First, there is the issue of ownership or possession. Even though rice can be located at some specific place (farm, mill,

or warehouse), it is important to investigate who owns that grain. It is common to find farmers whose rice has been sold or committed to some buyer before harvest or millers who buy, dry and store rice in behalf of a wholesaler.

Second, rice is delivered to consumers spread throughout the country, from the Costa area where it is produced to towns in the Oriente. To be effectively performed, this physical distribution requires large amounts of financial funds. The important aspect to investigate is whether the price differences over spaces equal the transfer costs. This price difference will be tested in this study, using the major consumer centers of Quito, Guayaquil and Ambato as market test cases. The simple correlation of historical prices among markets will be explored first, and then the correlation among the first differences of monthly prices in those markets will be examined.

Third, the production of rice is seasonal while its consumption is relatively constant within a year. To match the supply of rice with its demand, the usual mechanism used in Ecuador is to store the grain during cropping periods, acquiring rice at harvest and depleting it gradually until the next harvest. Ensuring a stable supply of rice is critical in Ecuador given the economic and political importance of rice in the diet of the Ecuadorian population. It requires an efficient financial system and an environment free of uncertainty for this storage function to be performed effectively,

so that the demand can be satisfied by a stable supply of rice. The price difference between two points in time should be enough to cover the storage costs.

Finally, rice needs to be transformed from paddy to milled rice. This function is critical because it requires financial funds to facilitate the millers purchase of paddy, and to finance the facilities required: receiving, drying, milling, and storing, to mention the most important ones. This study emphasizes this financial function and looks at the profitability and liquidity of long-term investments in the rice milling industry.

3. Vertical coordination mechanisms in the financial system supporting the rice subsector

Vertical coordination is defined by Mighell and Jones (Marion, 1986) as "the general term that includes all ways of harmonizing the vertical stages of production and marketing". Hojjati and Staatz (1987) define coordination as "all ways of equilibrating supply and demand in adjacent stages of commodity systems taking into account how the interest of various actors get counted".

Vertical coordination is not a static concept but rather a dynamic mechanism that achieves the objectives identified by the marketing system. However, the simple flow of goods and financial resources between stages does not define dynamic

vertical coordination. Supply and demand at every stage may clear at a certain price and every time the exchange takes place. But the critical question is whether or not consumers are satisfied. What if the market clears at given prices but producers accumulate unnecessary stocks?, or consumers would like goods of better quality?. Dynamic coordination should mean adjusting the supply and demand to changing preferences. It should also change incentives when needed to encourage modernization of the production and marketing systems. It should also exploit profitable opportunities for development and look for alternative ways to satisfy in a more effective way the individuals' demands for employment, food and health.

A diagnosis of the functional operations of the financial mechanisms supporting the rice subsector, with emphasis on those stages from the farm gate through wholesaling, can be achieved by analyzing at the manner in which the flows are vertically coordinated.

a. Vertical integration

Vertical integration means that two or more stages of the marketing system are under the same administrative unit. Rice production and milling, being two different stages in the marketing process, administered by two different decision units can be integrated into one single administrative unit. This may take place when a rice grower decides to integrate

his/her farm business with a rice processing plant. The flow of rice and money between separated stages is basically determined by the market, i.e. decisions are made by responding to market signals and bilateral negotiations, which include transaction costs. When the stages are integrated under a unique decision unit, the flow of products and financial funds are independent of market forces and negotiations, which reduces or even eliminates transaction costs. A rice farmer who is also a miller, moves paddy rice from farm to mill as an internal decision and without the inconveniences of setting a price or inspecting the quality of the grain.

Vertical integration offers the advantage of securing a certain level of product to the mill, at least by an amount equal to own production quantity, which may allow the firm to expand operations by purchasing more rice with the proceeds from the sale of its own milled rice.

Using this method of organizing the flow of rice between production and processing, the physical transfer of grain may not be limited by financial constraints but by unbalanced processing facilities. Although the flow of rice from farm to mill may not require a flow of funds, it may be difficult to proceed if the plant does not have the facilities to receive the grain, or to dry it at the rate required, or to mill it at the pace set forth by the market. Thus, efficient vertical integration requires that neither technical nor financial constraints block the flow of rice.

In the rice subsector of Ecuador there are a number of cases of vertical integration. These occur mainly between production and processing and between wholesaling and retailing. Most of the medium and large rice mills in Ecuador are vertically integrated with rice production; the large majority of urban rice wholesalers have a retail outlet.

b. Forward contracting

Under this form of vertical coordination, the exchange of rice for money is not simultaneous. This mechanism has to consider the time, form and space utilities included in the exchange, plus the risk cost and normal returns to this activity, and the consequent increase in the value of rice. Money is exchanged with an agreement to deliver rice after a certain period of time, and to a certain place. This mechanism is often used to coordinate exchange between millers and producers ("fomento"), and between wholesalers and millers ("anticipos").

If the financial flow is not sufficient to facilitate the rice flow, it becomes crowded in some point of the marketing system causing the returns to be reduced and the incentives to invest to be hampered. The entire system is damaged and the rice gets to consumer at higher prices.

c. Spot markets

This form of vertical coordination consists of a simultaneous exchange of rice for a liquid financial instrument. For example, a check or money in exchange for rice. An efficient spot market equilibrates demand and supply and provides enough financial resources to be exchanged for the rice. If the flow of financial means is not enough to support the physical exchange for rice, the rate of return for some participants will be lower than expected, and future flows of rice will not balance supply and demand, making the system more costly.

d. Informal trading arrangements

This form of vertical coordination consists of exchanges arranged by telephone in which the product is described and payment conditions set. Several necessary conditions are required for this mechanism to perform efficiently: i) information which must be reliable, timely, and as complete as possible to facilitate the formation of rational expectations; ii) grades and standards must be widely acceptable if it is to reduce transaction costs and uncertainty; iii) a flexible and timely financial system. Deficiencies in these conditions increase uncertainty and adverse selection and moral hazard may occur, which in turn increases transaction

costs and prices. It may also cause market failures if only a few participants, such as few wholesalers, have access to this type of market and the information gathered becomes asymmetrical.

4. Participants in Ecuador's financial system and rice subsector

The key participants providing financial resources for rice marketing activities are the National Development Bank (BNF), the National Finance Corporation (CFN), private banks, rice millers and wholesalers, as well as local moneylenders, participants in the informal financial system Ecuador's rice subsector. The main participants in the rice subsector are producers, millers, wholesalers, retailers, and consumers. Some aspects of their behavior will be addressed in a subsequent chapter. However, some relationships between rice market participants and the financial system are described in this section.

Millers who have easier access to credit and whose access is timely, gain advantages over those who have to overcome financial and institutional barriers such as high transaction costs and the fulfillment of a long list of requirements. This segmentation of borrowers at the milling stage could result in lower farm prices for paddy, since the number of effective buyers is lower than would be otherwise, driving up

the price of milled rice. Millers using informal sources of funds to complete their financial needs, such as wholesalers advances, will have higher financial costs. These costs will be passed on to farmers or forward to consumers.

The rate at which paddy has to be milled depends not only on the market demand for milled rice, which is more or less constant throughout the year, but also on the returns to the storage of paddy. The storage of paddy at millers facilities represents financial capital tied up in rice inventories. But this financial capital has an opportunity cost. It also requires that returns pay for depreciation of facilities, treatment of the rice, losses, etc. The expected difference between the price at purchase time and the price at release time should cover all of these costs (including cleaning and drying) plus a comparable return to any other use of the capital, under similar conditions of risk. If there are constraints to the financing of this critical activity, then rice will be milled and shipped to wholesalers, who will have to store milled rice. This possibility will generate a need for financial resources at the wholesaling stage to purchase the grain and to store it, plus it will crowd the available storage facilities at this stage while leaving idle those of the millers (not a cost-effective way of using existing facilities of millers). The transfer of the storage function from millers to wholesalers does not eliminate the need for financial resources to finance the flow of rice and its

storage costs. It only implies a reassignment of facilities. In summary, the flow of rice from the processors to the wholesalers should respond to economic factors such as price expectations, supply, demand, and returns, but should not be unnecessarily accelerated by financial pressures and limitations.

The rice wholesaling stage shows a wide spectrum of participating groups, differentiated by their scale of operations and geographic concentration.

The first level of wholesalers consists of a relatively small number of participants operating at a national level (i.e., distributing milled rice to all consumption centers of Ecuador and even outside its borders, to Colombia and Peru), who are identified in this study as "national wholesalers"; the second level is represented by a larger number of participants operating mainly within provincial borders, identified as "provincial wholesalers"; the third level consists of an even larger number of participants operating basically within the major urban centers, identified as "urban wholesalers". The question to investigate is whether or not the flow of rice through all these strata of wholesalers is carried out under competitive conditions. A market that fails to allow entry of participants and restricts participants to a small group of wholesalers, permits profits higher than those comparable to other activities. This situation necessarily means higher prices to consumers and lower prices for producers. Unequal

access to financial resources contributes to the existence of concentrated markets. On the contrary, a reduction in the limitations to access to financial funds will allow new participants to enter and compete at the wholesaling stage, especially at the national wholesaling level.

B. Methods used to assess the profitability of financing marketing activities and to study the liquidity problems of long-term investments

1. Design of prototype rice mills

A field reconnaissance was conducted during January, April and May of 1988. These field visits allowed the author of this thesis to observe rice production and processing, and to interview a number of producers, middlemen and particularly millers. These contacts were helpful in selecting a sample of 17 first class and 32 second class millers, located within Guayas and Los Rios provinces. The main criterion for the selection of millers was the location of the mills within the production area. In this task, direct participation of PNA's field technicians was invaluable. Other factors were considered as well with the objective of selecting a representative sample of all first and second class mills, such as: i) size: measured basically by the rate of rice milled per hour, i.e., cwt per hour; and ii) additional facilities: including

receiving facilities and capacity, drying capacity and method, storage facilities and type, and office space and utilities supply. Other selection criteria that were explored were the way millers financed their investments and operating capital, the coordinating mechanisms used by millers, the rate of capacity utilization, and the operating experience of mills. These factors proved not to be important in the selection of mills because the majority of mills presented similar patterns of investment financing, vertical coordination, operating experience, and capacity utilization.

The pre-selected mills were visited during April and May and a smaller sample of mills was selected from among them: one large mill, with a milling capacity of 120 cwt per hour (one of the 15 mills with a milling capacity of more then 50 cwt per hour); three medium size mills, with milling capacities ranging between 20 and 25 cwt per hour; and five small mills, with milling capacity between ten and 15 cwt per hour. Frequent visits were made to the selected mills to obtain more detailed information about their operations and the financing mechanisms they used, and to design prototype mills for the small, medium, and large sizes. For all three mills, two basic situations were established. i) The Winter and Summer harvest are 57.5 and 42.5 percent of the annual harvest, respectively. These are the averages for the period 1969-88. ii) The same annual profile of purchases was assumed. The average annual profile of harvest is as follows:

Table 2.1 Average percentage of rice harvested, for the Winter and Summer cycles, estimated for the period 1985-88.

	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
					%				
Winter (100%)	8	32	45	15					
Summer (100%)					6	24	34	21	15

Source: PNA's Statistics

2. The profitability of rice storage

Using a series of monthly wholesale prices (sucres per cwt) in Quito for the period 1971-88, a seasonal price index were calculated (Goetz and Weber, 1986) as well as the trend, cycle, and random component of the series. Based on these seasonal indexes, and knowing from field research the peak Winter and Summer harvest months, the evaluation of profitability of storage assumed two purchasing months, June and October, and two storage periods, June-September and October-April.

Profits from storage were calculated for every month of the two storage periods. The profits were estimated on the price difference between the release and the purchase months (September-June and April-October, for the Summer and Winter cycles, respectively). The storage costs, including the opportunity cost of capital and operating cost (treatment,

depreciation charges, and losses)were discounted from this difference. The net difference was divided by the purchase price to find the percent margin (Mears, 1982). That is:

$$m = \frac{(P_{r(j)} - P_{a(i)}) - S_j}{P_{a(i)}}$$

where:

m = percentage profit (loss) to storage

$P_{r(j)}$ = release price, in month j

$P_{a(i)}$ = acquisition price, in months i (May-June and October-November)

S_j = Storage cost accumulated up to month j

Since it was not possible to estimate operating costs, S_j represents only the opportunity cost of capital, measured by the market interest rate prevalent in each year, during the period 1981-88. Sensitivity analysis was performed to see how the percentage profit changed by varying the opportunity cost, assuming that the opportunity cost is represented by the inflation rate, and the inflation rate plus and minus 10 percent (Tschirley, 1988).

3. The profitability of prototype mills

The basic financial model used to assess the long-run profitability of mills is the net present value, defined by:

$$NPV = \frac{\sum_{t=1}^{n} R_t}{(1+r)^t} - I_o$$

where:

R_t = real and risk adjusted net cash income in period t

I_o = initial investment

r = real and risk-adjusted discount rate

t = each of the years of the project, t = 1, ., n

n = the useful life of the project.

Two important considerations are worth discussing regarding the use of this simple model: i) the assumptions about the discount rate to be used, and the degree of certainty of the cash flows; and, ii) the "with and without" approach needed to evaluate additional investments to the existing mills.

i) About the discount rate: It is generally defined as the opportunity cost of an investment project. If the investment were entirely financed by a bank loan, the discount rate should be the commercial loan rate; if the investment were financed by a mix of loan and own resources, then the discount rate could be a weighted average cost of capital. The discount rate must reflect the basic principles of

present value models as described by Robison and Brake (1984). One of these principles is consistency: a net cash flow series in nominal (real) terms must be discounted by a nominal (real) rate. When the commercial interest rate used as the discount rate is below inflation, the resulting real discount rate is negative; using a negative real discount rate in the NPV model would increase (not discount) the real net cash income series. One way to cope with this problem is to use the certainty equivalent cash flow, as discussed in Brealey and Myers (1981, Ch 9). Following the consistency principle, a certain cash flow must be discounted at a real, risk-free discount rate r_f, while an uncertain one, at a real, risk-adjusted discount rate r. Brealey and Myers demonstrate that

$$REQ_t = a_t R_t$$

where:

REQ_t = certainty equivalent net cash flow in period t

R_t = net cash flow in period t

and

$$a_t = \frac{(1 + r_f)^t}{(1 + r)^t}$$

Using this equivalence, the NPV model can be written as:

$$NPV = \frac{\sum_{t=1}^{n} REQ_t}{(1 + r_f)^t} - I_o$$

where r_f, the real, risk-free rate can be easily known.

Here also a sensitivity analysis will be conducted, changing basically the discount rate to reflect a number of scenarios: a discount rate that incorporates fully the inflation rate; one that is simply the commercial loan rate; and one that is the commercial rate plus 5 and 10 percent.

ii) About the "with and without" approach: This idea is presented here simply to differentiate this approach from the wrong one summarized in the words "before and after". The "with and without" approach is closely related with the incremental budget technique, that will be used in this study to prepare the financial statements for the prototype mills.

4. Long-term capital investment problem

The hypothesis regarding this topic is that capital investments in periods of high inflation causes cash flow deficits for the firm. As the inflation increases the nominal rate of interest increases as well. This reduces the net cash

flow of the firm under ceteris paribus condition. The debt service can become large enough as to make the net cash flow negative, which in turn causes liquidity problems to the firm. An explanation of this phenomenon is found in Robison and Brake (1980). Their argument follows. Assume that net cash receipts R grows annually at i, for an infinite period of time. The present value V, discounted at a nominal interest rate r_n, will be given by:

$$V = \frac{R(1+i)}{r_n - i}$$

which can be rewritten in the form

$$r_nV - iV = R(1+i)$$

In the above expression, the right hand side term is the net cash inflow and the left hand side is the difference between interest expenses and capital gains. Assume that V is entirely debt financed and that the lenders require payment of interest r_nV. The net cash inflow R(1+i) must equal the interest payment r_nV in a competitive capital market. With i>0, (r_nV-iV) equals R(1+i). Therefore the net cash inflow is less than r_nV by iV, the magnitude of the cash deficit. In later periods, of course, the cash flow deficit decreases.

The methods used to investigate this topic are again the NPV model and the cash flow statement. The use of a nominal discount rate is required to make apparent the impact of

inflation in the behavior of the net cash flow of the firm. This study will be complemented by presenting financial credit arrangements to manage this problem, such as the use of models developed to moderate repayments of loans.

C. Performance criteria used to evaluate the functioning of the financial system supporting the rice subsector

The assessment of the financial system' performance that supports the evolution of the rice subsector requires an agreement on specific criteria and the establishment of impact measures.

This study is concerned with the efficiency of the organization of the credit system to facilitate rice marketing activities. The study poses the questions of whether the economic situation and the financial policies allow the undertaking of basic marketing functions by the private sector?. How are the benefits and costs of the system distributed among participants, or "who gets what"?. Do the economic and financial policies stimulate long-term investments that would modernize the rice milling enterprises?. Is the financial system adequate to allow modifications in its credit delivery mechanisms that would adjust repayments to the projects' return schemes?. These basic questions are associated with such criteria as cost-effectiveness in performing marketing functions, equity in the distribution of benefits,

flexibility of the system to adopt new technologies, and progressiveness in terms of modernizing the rice processing.

The performance assessment of the financial mechanisms facilitating the rice marketing system is based on a relevant list of objectives that the rice subsector must fulfill. The supply of rice has to satisfy domestic consumption, that is, the market has to match supply and demand through the form, space, and time functions, in a cost-effective manner. To achieve this ultimate objective, the financial mechanisms that support the rice marketing system must be fluid and free of economic and institutional restrictions. The flow of financial resources to support the rice subsector, must be sufficient to cover the value of the product at every point in its market process, including the value added due to its changed form, space, and time utilities. This performance criteria applied in this study means that the returns from using financial resources to facilitate form, space, and time transactions in the rice subsector must be enough to cover costs and provide incentives for further investments in rice marketing activities. Any constraint in this financial flow, either in amounts, timing, or accessibility, would increase the costs of financing and make rice transactions more costly, ultimately resulting in higher consumer prices.

The financial system should facilitate improved efficiency and increased technology adoption. Efficiency, as measured by the highest level of output per unit of input, can be

achieved by facilitating the acquisition of better technical equipment and facilities, as well as by facilitating higher levels of plant capacity utilization. Progressiveness, measured by the rate of technology adoption, can be reinforced by allowing the financial system to operate with less restrictions in terms of allocations, and access.

If financial resources required to support the rice marketing system are artificially restricted, there may be groups of participants who may be hurt by the constraints. But also there may be groups who may benefit. By reducing or eliminating artificial barriers to financial resources there may be a more even distribution of benefits. As a result, larger groups of participants, including small farmers, medium size millers, small wholesalers, and especially consumers, will benefit from the improved financial system while larger rice markets and informal capital market participants might see their returns diminished.

Technological change usually is coupled with higher capital-labor ratios. In the rice subsector and especially the rice milling industry, this seems to be the case. The objective of the financial system to contribute to the modernization and increased cost-effectiveness of the rice milling industry seems in conflict with a broader and fundamental objective of the economy, that of increasing the employment rate and people's income. This conflict represents a classical trade-off between efficiency and equity and often

is a matter of political decisions and an issue that must be assessed within a broader sectoral and macro-economic perspective. A diagnosis of the unintended effects of subsidized credit is utilized as another criteria to assess the performance of the financial mechanism supporting the rice subsector.

Summary

The subsector analysis approach is the basic conceptual framework utilized in this study. The study looks at the financial system facilitating the functioning of the rice subsector as an integral and interdependent set of stages, functions, and coordinating mechanisms. The basic analytical tools utilized in this study are the same as those developed within economic and business disciplines. Briefly, these tools are the net present value methods. This method allows us to evaluate the profitability of marketing activities and capital investments in the rice subsector. The cash flow technique used with nominal net present value models allows us to investigate liquidity problems caused by inflation when long-term investments are undertaken.

CHAPTER THREE

THE FUNCTIONAL ORGANIZATION OF THE RICE SUBSECTOR

Introduction

This chapter contains a diagnostic analysis of the rice marketing system, including the identification of the physical flows of paddy and milled rice, and the financial flows that finance them. Although the emphasis is on the physical movement of rice, the stages, functions, and transactions where financing is needed are identified. Particular consideration is given to the rice milling and wholesaling activities and consequently to participants, millers and wholesalers, who perform them and their backward and forward financial linkages.

A. The functional organization of rice production

1. Geographical distribution of rice production

Rice is produced almost entirely in Guayas and Los Rios provinces of the Costa region; only a small proportion of rice is produced in other tropical zones of Ecuador. On average, these two provinces have produced approximately 90 percent of the domestic supply of rice during the last five years (1984-1988); Guayas province, on average, has supplied 43 percent

of the annual volume produced domestically, and Los Rios, 45 percent. However, there exists inter-seasonal variation in production between these two provinces. While the production of rice in Guayas province has remained fairly equal during the Winter and Summer cycles, in Los Rios province Summer production usually drops to about 50 percent of Winter production. The average amount of land utilized in Guayas is 121,000 hectares during the Winter, and 120,000 hectares during the Summer. Averages for Los Rios are 136,000 hectares during Winter and only 58,000 hectares during Summer. The main reason for the dramatic change observed in Los Rios is the reliance of rice production on rainfall cropping and the lack of irrigation and water management and control facilities. This situation seems to be closely associated with restrictions on loans for land improvement works, especially for small farmers not associated to some type of organization.

2. Credit needs of rice producers

Small farmers with less than five hectares, the majority of whom are organized into production cooperatives, constitute the largest group of rice producers. There are few large rice farmers, some of whom farm more than 1,000 hectares.

During the 1988 Winter production cycle, about 89 percent of individual farmers used approximately 31 percent of the rice land in farms of up to 20 hectares. Only 2 percent of

farmers used 32 percent of rice land in farms greater than 100 hectares. During the 1988 Summer cycle, 68 percent of farmers used about 16 percent of the rice land in farms of up to 20 hectares. Only 5 percent of farmers used 41 percent of land in farms greater than 100 hectares (Table 3.1).

Table 3.1 Land utilization in rice production by size of farms and number of independent farmers during the 1988 production year.

SIZE OF RICE FARMS (HAS)	WINTER 1988 (HAS)	%	No. OF FARMERS	%	SUMMER 1988 (HAS)	%	No. OF FARMERS	%
Less than 5	9136	17	3654	77	1141	4	456	41
From 5 to 20	7212	14	577	12	3732	12	299	27
From 20 to 50	8623	16	246	5	7207	24	206	19
From 50 to 100	10813	20	144	3	5953	19	79	7
More than 100	17193	32	110	2	12583	41	60	5
TOTALS	52977	100	4731	100	30616	100	1100	100

Source: National Rice Program: Annual Statistics.

Adding the usage of rice land during Winter and Summer cycles of 1988, the figures show a very skewed distribution of land. About 85 percent of farmers used 25 percent of rice land in farms of up to 20 has, while only 3 percent of farmers used 36 percent of land in farms greater than 100 has. The distribution found for 1988 appears to be representative of other years as well, as the Annual Statistics of the National Rice Program suggest.

During the Summer, the small farmers shifted land from rice to either maize or soybean production because these crops perform better than rice in the dry season. This shift reduced the land area utilized by small farmers in rice production by about 70 percent below their Winter season use of land. Although large producers also shifted from rice to maize or soybeans for the Summer cycle, their reduction of land area used in rice production amounted to only a 27 percent reduction below the Winter season. These shifts suggest that small farmers have less access to irrigation facilities compared to large farmers.

Cooperative organization of mostly small farmers possessing less than 5 hectares is extensive in rice production. Small farmers organize into cooperatives to gain better access to credit and to obtain lower prices for farm inputs sold by parastatals (BNF, FERTISA, a fertilizer supplier, and EMSEMILLAS, a seed distributor). The president and manager of each cooperative are responsible for bank loans but all the land owned by the cooperative members is collateralized and will not be free until all loans have been repaid. The advantage of the cooperative organization is that it lowers transaction costs for obtaining credit and it gives the opportunity to gain discounts on their purchases of farm inputs. According to PNA's estimations, the membership of the cooperatives typically ranges between 20 and 40 farmers. PNA's technicians argue that members of these cooperatives

individually do not own more than 20 hectares. Table 3.2 shows the distribution of land among cooperatives during the 1988 production year.

Table 3.2 Land utilization in rice production by size of farms and number of cooperatives during 1988 production year.

SIZE OF COOP. FARMS (HAS)	WINTER 1988 (HAS)	No. OF COOPS	SUMMER 1988 (HAS)	No. OF COOPS	TOTAL 1988 (HAS)
Less than 50	2200	88	2978	119	5178
From 50 to 100	4402	59	5162	69	9564
From 100 to 150	5361	43	3636	29	8997
From 150 to 200	4224	24	4119	24	8343
More than 200	17798	66	7560	25	25358
TOTALS	33985	280	23455	266	57440

Source: National Rice Program: Annual Statistics.

B. The functional organization of the rice marketing system

1. Rice flows, and rice marketing participants

a. Paddy rice marketing system

There are three major marketing channels for paddy rice: i) the National Grain Marketing and Storage Enterprise (ENAC), ii) grain elevators, both private, such as ALMAGRO, and semi-private, such as ALGRACESA (Grain Storage Company), and iii) private mills. The flows of grain, indicated as

percentages in Figure 3.1, have been estimated as an average over a number of years. For ENAC the number of years considered is 10, about 5 for grain elevators, and 5 for mills[1]. The flow from producers to millers is handled by a group of rural assemblers or middlemen. They usually have receiving outlets in the towns located in the production areas. They transport paddy rice in their own or contracted trucks from the farms to their facilities. The scale of operations of this group of participants is relatively large but they trade with many small farmers who sell small amounts of rice even at peak harvest time.

All paddy rice eventually arrives at private mills, except for a negligible percentage that ENAC mills, and about 1 percent that is milled at ALGRACESA's facilities. Also the on-farm consumed rice, which is less than 1 percent of the national production, flows to private mills.

The flow of paddy to ENAC has been about 12 percent of domestic production, while the flow of paddy to grain elevators has been about 8 percent, on average. The bulk of grain, about 80 percent of domestic production, flows to private mills. However, private mills process about 98 percent of all the paddy rice produced, buying rice from farmers and under contracts with ENAC and some private grain elevators.

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[1] Figure 3.1 is similar to the one prepared by Grupo de Consultores Asociados and presented in its report "Estudio del Sistema de Mercadeo de Granos en la Region Costera del Ecuador", Vol III, Mercadeo de Arroz, published by the Institute of Agricultural Strategies, IDEA, July 1987.

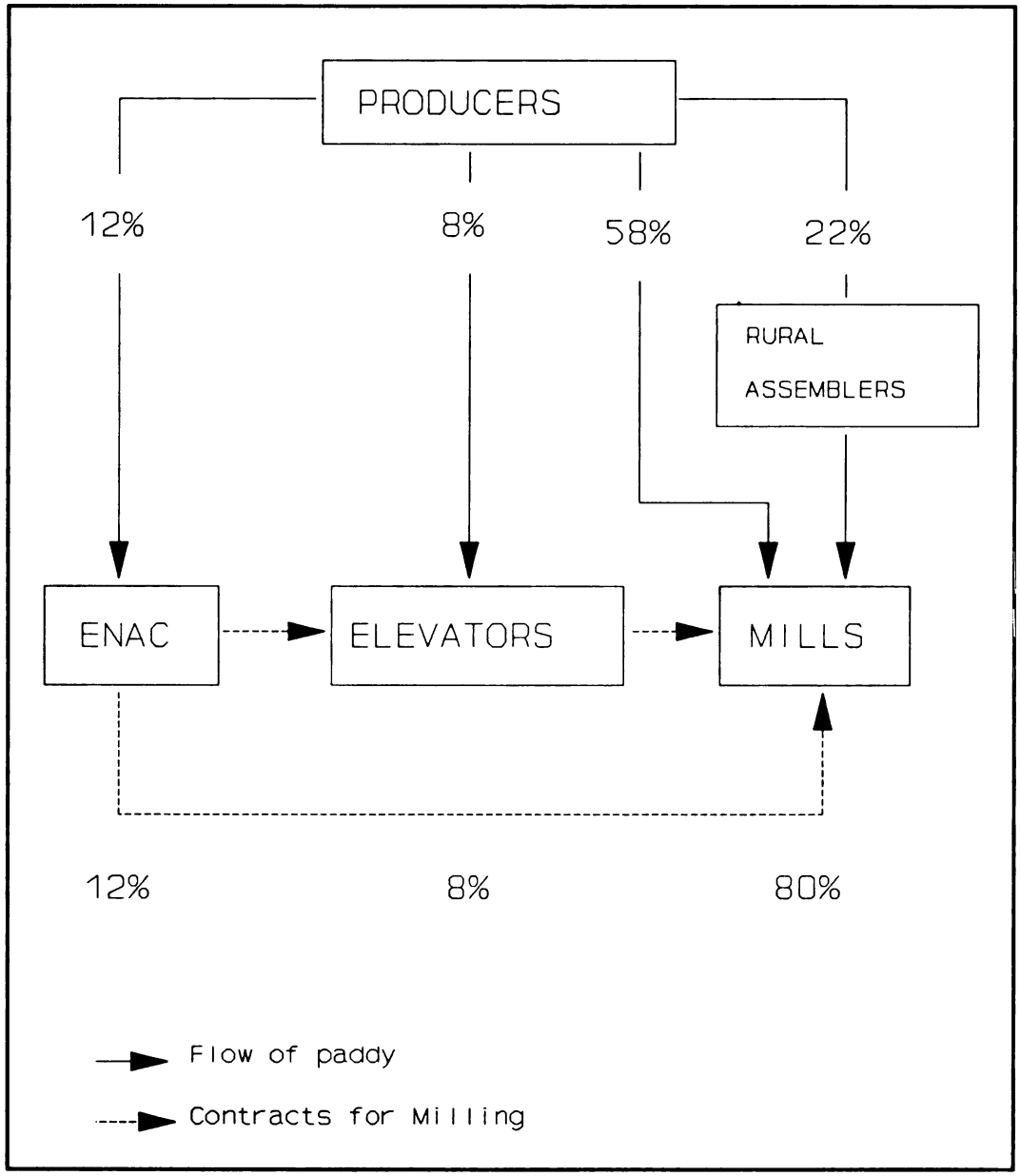

Figure 3.1 Market channels and flows of paddy rice.

Source: Grupo de Consultores Asociados, "Mercadeo de Arroz", Vol III, IDEA, July 1987.

b. Milled rice marketing system

The milled rice marketing system is more complex than that for paddy rice. This is because there are more stages and participants. Figure 3.2 shows these channels, flows, and participants. The percentages of rice flowing between stages and participants represents estimations based on field observations and comparisons with former studies[2]. The rice flows from ENAC have three main destinations: national wholesalers, retailers, and consumers.

The flow originated at the grain elevator level ends up at the national wholesalers level. ENAC is supposed to sell to retailers under some rationing scheme based on quotas determined on the basis of their operating capital. Other important buyers of ENAC stocks are larger wholesalers and government employees, through inter-institutional arrangements.

The main flow of rice (65 percent of marketed milled rice) goes from millers to national wholesalers, either directly or through brokers who perform their intermediation role by receiving money advances (usually 50 percent) from national wholesalers, paying this amount to millers, and getting credit (usually the other 50 percent) from millers until the time that they deliver the product to wholesalers.

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[2] Basically the study by Grupo de Consultores Asociados, 1987.

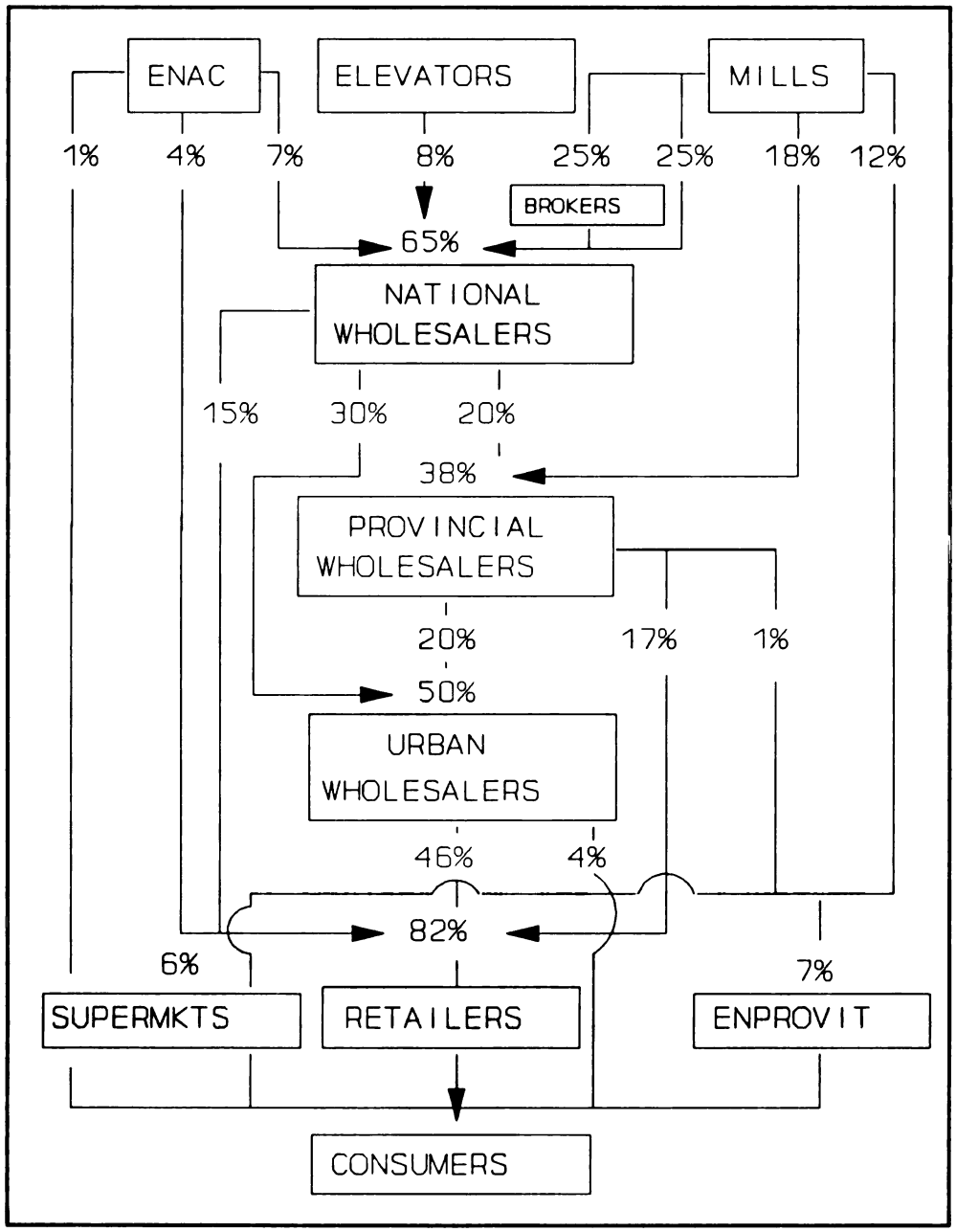

Figure 3.2 **Market channels and flows of milled rice.**

National wholesalers are relatively few in number and are concentrated mainly in Guayaquil, Quito, and Ambato. They distribute rice at the national level and are involved in border trade with Colombian and Peruvian wholesalers. They form a relatively closed group but are far from being a cartel. Nor do they act in collusion. The main barrier to becoming a national wholesaler is the capital required. Each one handles very large amounts of capital, which are difficult to raise. They can remain in business because of their close personal ties to commercial bank officials. This relationship helps them obtain the funds needed to sustain their high volume of operations. Another important characteristic of this group is their substantial financial and physical capacity to store grain when price expectations are favorable.

The provincial wholesalers are more numerous than the national wholesalers and their operations are usually carried out largely within the boundaries of a province. The distinction between provincial and national wholesalers, as well as between provincial and urban wholesalers is often blurred. The main difference between provincial and national wholesalers is the volume of operations. The difference between provincial and urban wholesalers is that the latter handle a broader group of products, i.e., they wholesale a number of basic commodities and groceries as well as rice.

The urban wholesalers handle about 50 percent of the

marketed milled rice although they form a large and broadly dispersed group. Despite this importance, they store very little rice, keeping in storage only a working stock.

Retailers deliver about 82 percent of the milled rice to consumers. There are a large number of participants and most of them are organized under the National Federation of Marketing Retailers (FENACOMI), which claims to have more than 600 thousand members. ENPROVIT, the retailing parastatal, has a rice market share of only 7 percent. Originally this parastatal was created to serve as the food distribution mechanism to target populations. Now it is mainly a food retailing network for urban based medium income families. About 6 percent of the marketed rice is delivered by super-markets, mainly to medium and high income families of Quito, Guayaquil, Ambato and Cuenca, the major cities of Ecuador.

2. Vertical coordination in the rice subsector and identification of its financial needs.

Rice milling is often vertically integrated with farm production. The reasons for this integration include: i) The need to take advantage of subsidized production credit from the BNF or a commercial bank. These lending institutions have access to the rediscount facility managed by the Central Bank of Ecuador (BCE) through the Financial Funds Mechanism. ii) The need to secure available drying facilities for the grain

produced when the harvest exceeds existing facilities. iii) The need to conserve and raise operating capital by milling its own production and selling milled rice. iv) The mitigate the risk associated with investment in specialized assets.

Vertical coordination between farm production and milling also takes the form of forward contracts, called "fomento". Through this mechanism a miller advances money and/or farm inputs to a farmer with the agreement that he/she will deliver their paddy to the miller. The "fomento" is mostly used to finance harvesting expenses. But if the production is expected to be poor because planted area is less than expected or because bad weather is expected to reduce yields, then the "fomento" can be used to finance other production activities as well. Millers "foment" to assure the provision of rice at harvest time, especially when competition for paddy rice is strong among millers and ENAC. Some millers openly charge interest to farmers. Others recover their capital plus interest by down-grading the quality of the offered paddy rice and asking the farmers to add some extra pounds over the 200 lbs a sack of paddy rice usually weighs. This practice, however, has been the basis of the widely held view that millers who "foment" are exploiting farmers. The fact is that this mechanism has existed for a long period of time and its maintenance requires a close relationship, often a kinship, between millers and farmers.

Some farmers have tried to substitute for "fomento"

financing by a formal credit arrangements with the BNF. But eventually most have returned to the traditional "fomento" form of financing, convinced that this is faster, more timely, and even less costly than BNF loans especially when transaction costs are counted as part of the cost of obtaining a loan. Millers and producers usually agree on prices at harvest time based on what the market is offering (although farmers are free to search for better prices). But rarely do they not honor their commitment to deliver their paddy rice to the "fomenting" miller.

A similar vertical coordination mechanism operates between national wholesalers and millers under the name of "anticipos". Wholesalers agree to advance capital to millers to finance their purchases of paddy during harvest time with the agreement that millers will deliver milled rice upon the wholesalers' demand. In general, wholesalers benefit from this forward contract in at least two ways. First, they fix the price at harvest time (rarely offering premiums if delivery takes place after one month). Second, they benefit from "free storage" since millers have to assume the costs of this activity. The advantage of this agreement for millers is twofold. One, they partially finance their operating capital needs during times of financial stress. They also can turn the funds over more than 2 times before they deliver milled rice. Two, they are sure of their market since part of the "anticipo" agreement is to deliver not only the

financed grain but some additional amounts. For this part of the delivery, millers can use current market prices to compensate for those fixed at harvest time.

Here also a long term relationship is required and transient wholesalers do not have access to this kind of agreement. This characteristic establishes clearly two distinct markets for millers: a contract market and a spot market. Transient wholesalers can only access spot markets while those with a longstanding relationship with millers can access the contract market. The rigidity of prices set at harvest time emerge as the outcome of some sort of insurance arrangement between wholesalers and millers by which risk averse millers are induced not only to increase their level of seasonal operations but also to choose larger initial investments in fixed assets.

In addition to the "fomento" and "anticipo" mechanisms, which are examples of contract markets, another mechanism of vertical coordination consisting of the spot market. The spot market is the simultaneous exchange of goods for money (or any other acceptable financial means). This mechanism becomes important because of ENAC's intervention. To fulfill the objective of price stabilization, the government, through the Economic Council, sets a minimum purchase price for paddy and maximum sale price for milled rice. ENAC has been the principal implementing agency of this policy. Its implementation, however, has usually required the allocation of large

amounts of financial resources, to both sustain the minimum price and to build buffer stocks to be released when prices are above the maximum price. ENPROVIT has contributed to the defense of the maximum price consumers pay by retailing rice, especially in urban centers. Two characteristics of this pricing mechanism have been relevant. First, the minimum prices have usually been fixed at high levels (an ex-post evaluation indicates that they have usually been above market prices during the period 1972-88). Meanwhile maximum retail prices have been fixed at low levels. In fact, the opportunities for private sector intervention could have been eliminated had these prices been rigorously enforced. Second, both prices have been kept effective during a whole season (often, they have been set for a whole year). Due to these characteristics of the pricing system, ENAC has had to intervene in the rice market and to assume much of the storage function. These activities have required large amounts of financial resources from the government's budget to cover ENAC's operating losses and to subsidize the sale of milled rice. These activities have distorted the functioning of the rice marketing system, especially when ENAC has stored a large proportion of available rice in the Winter months (see Chapter Five). In addition to these distortions, ENAC adds a great deal of uncertainty to the rice market. The lack of transparency about ENAC's plans concerning the monitoring and managing of the stocks of rice. They raise questions such as

when the rice stocks will be released and at what price?. The lack of concrete signals generates uncertainty among market participants that translate into higher operational costs and eventually higher costs to consumers.

The trading by description of the product through telephone communications is a coordination mechanism that is becoming more important. An informal grades and standards system has been generated through the use of this mechanism. Among rice traders there is a clear understanding of what white ("flor"), broken ("quebrado"), and yellow ("crema") rice means, as well as what should be understood when they refer to long and medium grain. To these standards, the moisture content is often added by naming the well dried rice as old ("viejo"), and the less dried rice, as new ("nuevo").

C. The structure of the rice milling industry

1. Functional organization of the rice milling industry

Supreme Decree No 1593, dated October 22, 1971, established the National Rice Program and transferred the rights and obligations of the former Superintendency of Mills. The Program's constitutive law, in its article 6, classifies rice mills into three categories: 1) first class mills: those having a milling capacity of more than 20 cwt per hour (cwt/h); 2) second class: those having a milling capacity of

more than 8 cwt/h and up to 20 cwt/h; and, 3) third class: those with a milling capacity of up to 8 cwt/h[3].

Direct observation permitted the identification of most first class mills as "sheller mills". These consist of a mechanical cleaner and dryer, disc sheller, compartment-type separator and vertical cone polisher. There are also 15 mills with a milling capacity of more than 50 cwt/hour that can be classified as modern mills. These include truck scales, receiving hoppers, mechanized cleaners and dryers, rubber roll huskers, electronic separators, polishers with glazers, a full system of conveyors and elevators, and a packaging system. Second class mills have more traditional equipment, such as a simple huller, manual receiving and weighing systems, a mixture of mechanical and solar drying systems, and a single machine that combines the huller and polisher into one unit.

Machinery and equipment suppliers agree that "sheller mills" can yield about 65 percent of milled rice, 3 percent of broken, 9 percent of bran, and 23 percent of hulls. "Huller mills" can yield about 63 percent of milled rice, 5 percent of broken, 8 percent of bran, and 24 percent of hulls, on average. The milling recovery rates vary according to size of grain. Yields are higher for short kernels than for long ones, and for dried grains than for more humid grains.

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[3] In practice, the PNA has increased the upper limit for third category mills up to 10 cwt/h.

Third class mills are neglected in this study because they have processed, on average, only 2 percent of all rice produced during 1982-87. These mills are family type enterprises with a capacity to mill the amount of rice families need for their own consumption.

In October 1988 the PNA reported the existence of 1,235 mills in total. There were 226 (18%) of first class mills, 844 (69%) of second class, and 165 (13%) of third class. Among the first class mills there were 3 large mills, each with a milling capacity over 100 cwt/h, totaling a milling capacity of 600 cwt/h and a drying capacity of 1,420 cwt/h. There were also 13 mills with capacities ranging between 50 and 100 cwt/h, totaling 765 cwt/h milling capacity and 1,613 cwt/h drying capacity. First class mills have a total milling capacity of 278 MT per hour (MT/h), equivalent to approximately 36 percent of the total milling capacity. The first class mills have milled 59 percent of the total rice produced during the 1982-87 period. Second class mills have a total milling capacity of 458 mt/h, equivalent to about 59 percent of the total milling capacity. They have milled about 40 percent of the rice produced during the 1982-87 period (Table 3.3).

Table 3.3 Drying, storage, and milling capacities of mills in metric tons and as percentages of national totals, in 1988.

MILL CLASS	NUMBER	DRYING	MILLING	STORAGE	AVERAGE (*)
			M.T.		
FIRST	226	458	278	134844	113067
SECOND	844	361	458	59835	76572
THIRD	165	10	35	1489	3311
TOTAL	1235	830	771	196168	192950
			% OF TOTAL		
FIRST	18	55	36	69	59
SECOND	68	44	59	31	40
THIRD	13	1	5	1	2
TOTAL	100	100	100	100	100

(*) It is the annual average of rice milled during each of the years 1982-87.
Source: National Rice Program: Annual Statistics.

First category mills have larger drying capacities[4] than milling capacities and 69 percent of the total storage capacity. Second class mills have more milling capacity than drying capacity and only 31 percent of the storage capacity. A larger drying than milling capacity is needed, however,

[4] Drying capacity is based on the time paddy rice, with an average of 22 percent moisture content, can be dried down to 13 percent moisture. Using solar heat, the rice needs usually two full days to lose 9 percent of moisture (field research). The drying rate estimated and reported by the PNA for this system demands a careful use.

since grain has to be dried approximately at the same rate as harvesting, while milling can be paced to market (consumption) needs. First class mills have better facilities to serve rice processing needs during harvest time than second class mills. About 30 percent of the first class mills total drying capacity corresponds to a solar system, based on the use of concrete slabs, called "tendales". The solar drying system exceeds 50 percent of the drying capacity among second class mills. Discounting these proportions of solar drying facilities, because they are unreliable and because they often are used to dry maize, soybeans and coffee, the total mechanized drying capacity is approximately 500 MT/h. Considering that 1) about 53 percent of the Winter production is harvested during the peak month of June; 2) the peak harvest for June reached 198,600 MT in 1985; 3) the harvesters operate only 26 days per month during harvest time; and, 4) the harvesters work at most 12 hours per day, the hourly rate of harvest results in approximately 636 MT/h, 27 percent over the estimated mechanical drying capacity of mills.

Only the largest first class mills (about 15) have modern metal silos for storing paddy. Their total storage capacity is 48,000 MT, of which 22,300 MT belong to the three largest mills. The rest of the first and second class mills have simpler warehouses, made of brick and wood, without protection against birds and rodents, and facilities to aerate the grain to control its relative humidity.

In connection with these findings and considering that 1) the largest Winter harvest reached 374,600 MT in 1985; 2) the harvest profile is 3 percent in April, 21 percent in May, 53 percent in June, and 23 percent in July[5]; 3) the monthly consumption is 25,000 MT of paddy rice equivalent to milled rice, the need for storage space would be equal to the figures shown in Table 3.4:

Table 3.4 Flows and consumption of Winter harvested paddy rice and the need for storage facilities, based on 1985 Winter harvest data.

	APRIL	MAY	JUNE	JULY
		000 MT		
(a) Harvest	11.2	78.6	198.6	86.2
(b) Consumption	25.0	25.0	25.0	25.0
(a-b) Difference	-13.8	53.6	173.6	61.2
Cumulative	-13.8	39.8	213.4	274.6

Source: National Rice Program: Annual Statistics.

By the end of July, the needed storage capacity amounts to 274,600 MT. The existing storage capacity of mills totals 192,900 MT. About 75 percent of this capacity could be considered adequate, according to technical personnel of the PNA, resulting in a deficit of about 130,000 MT. This deficit is supplied by ENAC's storage capacity for both paddy and

[5] "Plan de Comercialización y Financiamiento de Productos Agrícolas para el Año 1989 con Enfasis en el Arroz y Maiz Duro", Comisión Especial, Abril 5, 1989.

milled rice (86,600 MT), and the facilities of private and semi-public grain elevators (82,500 MT)[6].

The location of rice mills within the rice production area is relatively dense. The harvested area during 1988 Winter was about 90,000 hectares, and during 1988 Summer, 55,000 hectares. Taking the Winter rice area, the location of mills shows an average ratio of one mill for every 70 hectares, or one mill for every 350 MT of paddy, considering a yield of 5 MT/ha. Assuming 60 ten hour working days during the Winter harvest period, this average means that each mill would have to dry rice at a rate of less than 2 cwt/h.

There are several reasons for the establishment of a large number of small mills in the rice producing area of Ecuador. The first reason is the poor transport facilities, especially before the petroleum boom of the mid-seventies. This situation favored the location of mills close to farms. A second reason is the exclusive allocation of administered funds to finance production and processing of agricultural products as a vertically integrated operation. This condition limits the access to credit by non-farmers entrepreneurs willing to invest in rice mill equipment and machinery. A third reason is the scarcity of funds at BNF and CFN to finance long-term investments. And finally, another reason

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[6] These additional facilities must share their space with other crops, such as maize and soybeans. The storage facilities of animal feed manufacturers are excluded, as well as those of rice wholesalers.

is the relatively high profitability of these small mills, given their low volume of investments in drying and milling equipment.

Overall, the rice milling industry is characterized by the predominance of small scale, relatively obsolete machinery. About 75 percent of mills were built more than 15 years ago, and about 85 percent more than 10 years ago. Only a few of the more modern mills (no more than 50) have been built during the last 5 years. The recent trend has been to build larger mills adding modern equipment not used before such as truck scales, large hoppers, and continuous drying machinery.

There is evidence of sub-utilization of installed milling capacity. Some possible reasons for sub-utilization might be the limited access to funds to finance working capital, the accumulated depreciation of most mills that has already covered the book value of machinery, and the small average cost reduction due to increases in the operating levels. The usual operating volume of most mills corresponds to the flat part of the average cost curve, reducing the incentives to aggressively increase operations.

Most of the milling machinery needs replacement and modernization. Restrictions on such an endeavor currently are the inflation and liquidity problems, which cause delays in replacing some major parts of the old plants, and the constraints on the accessibility to financial resources to finance long-term investments.

2. Identification of functions and credit needs

a. Credit needs for rice processing

There are two important functions where credit may improve the functioning of the rice marketing system at this stage: i) purchase of paddy rice to be dried, stored and milled; ii) investments in equipment, machinery and storage facilities either to add to the existing ones, or to replace them partially or totally.

i. Purchase and storage of rice

The study of the rice milling industry has shown the use of informal mechanisms to finance part of the purchases of paddy rice. One is the "fomento" mechanism and the other is the "anticipo". Vertically integrated millers usually take advantage of the BNF's production credit to partially finance their "fomento" activities. This practice reduces the availability of loanable funds which can otherwise be addressed to a larger group of rice producers. Although this procedure does not necessarily show a lack of financial resources, it does indicate the need to revise the credit delivery system of the BNF if a larger number of small farmers are to be the direct beneficiaries of this facility. This indication does not lead necessarily to the conclusion that

millers financial intermediation needs to be eliminated, but that this credit mechanism should be made more transparent (see recommendations in Chapter Eight).

The general consensus among millers is that the "adelanto" mechanism is a recourse of last resort, utilized basically because of their limited access to formal credit, either from the BNF or from commercial banks. The study of prototype mills does not lead to an unambiguous conclusion concerning the costs and benefits of this financial mechanism for millers. There are some indications that it is expensive for millers, more so in periods of high inflation and when delivery of milled rice is somehow delayed. But on the other hand, it permits millers to increase their operations, and therefore, their profits. Obviously, it has an advantage as a multiplier. Additional amounts of credit to finance these activities, especially storage, and more accessibility to it, would reduce or even eliminate the need for millers to rely on "adelanto" financing.

ii. Investments in equipment, machinery, and storage facilities

The lack of adequate drying equipment and storage facilities, and the obsolescence of the majority of milling machinery is apparent. One important and urgent investment is the shift from a solar drying system to a mechanized

drying system. The advantages of modern drying equipment in terms of cost, the ease of installation and operation, the relatively low cost of additional civil works, and the ease of controlling temperature, relative humidity, and cleanness are evident. The conversion rates from paddy to milled rice are higher when paddy has been dried by mechanical means than when paddy has been dried with solar heat. The losses are less and the milling process yields less broken kernels. The probability of increases in the price of diesel and electrical energy, however, are additional considerations that may serve as a deterrent to investments in mechanical drying equipment.

The need for additional mechanical drying capacity will increase as production expands. The possibility of exporting rice requires to improve the rice processing technology to obtain better quality of rice (see Whitaker and Alzamora, 1988b, p 24).

There is a large deficit of silo storage space in the mills and of adequate warehouse space. The majority of existing warehouses are simple constructions of brick and wood, and metal roofing. They are built at the ground level, without adequate protection from water, rodents, and small reptiles. The roof also lacks adequate protection, and birds and insects can easily get into the warehouse. Warehouses do not have facilities to aerate and to control the relative humidity of grains.

b. Credit needs for rice wholesaling

The first stage of wholesaling is performed by a small group of participants with access to large amounts of capital made available by commercial banks. Entry into this group of market participants is limited by the capital needed to compete effectively by advancing money to millers to secure a large volume of milled rice. Provincial and urban wholesalers would like to gradually form part of the national wholesalers group and to be able to buy larger amounts of rice directly from millers. Less concentration of credit at the national wholesaling stage could have the effect of gradually eliminating one or two steps within the wholesaling channel to the benefit of both consumers and producers. Surely a larger allocation of trade credit to millers would avoid the recourse to the "anticipo" financing, and millers might have more freedom to search for better markets. This change would reduce the power national wholesalers seem to have over an important part of the rice flow. Yet, credit is still necessary to finance the wholesaling function. The assurance of a market for milled rice that the "adelanto" (contract market) seems to provide could be replaced by new market institutions, such as forward contract markets and more intense use of the Agricultural Commodities Exchange (Bolsa de Productos Agropecuarios) where warehouse receipts are traded.

Credit also is needed to finance grain handling equipment, transportation facilities, and warehouse remodeling works. The process of loading and unloading sacks of rice to and from trucks, as well as the process of filling and evacuating a warehouse is completed using manual labor. Grain handling at warehouses can be improved by adding small equipment to sack rice into bags of less than 100 lbs weight. Credit is needed to finance trucks which will be used by urban wholesalers to directly access mills and to deliver the product to retail outlets. Wholesalers have expressed their need to have adequate warehouses, although urban wholesalers recognize that these warehouses will be multipurpose, that is, to store rice, sugar, and other commodities and groceries.

Summary

Rice production is an activity involving many small farmers and a few large, mechanized agricultural enterprises. The majority of independent small farmers do not have access to formal credit and they have to use funds supplied by millers through the "fomento" mechanism. Small farmers appear to gain access to formal credit when they join cooperatives while at the same time benefiting from lower costs for their farm inputs and equipment.

The milling industry is facing serious problems. Millers seem to lack enough formal financing for their operating

capital and have to rely on the "anticipo" mechanism, a forward contract agreed upon with national wholesalers. It is apparent that the majority of mills are old and urgently need remodelling. They also need to significantly improve their storage facilities. Yet, it appears that there are not enough incentives for millers to undertake major investments. So most of them are surviving with fixed assets that have been completely depreciated.

Better access to credit at the national wholesaling level might help reduce the relative concentration of economic power among national wholesalers. Credit access might also make possible more direct linkages between millers and urban wholesalers, thus reducing distribution costs.

Many wholesalers have expressed the need for financing the purchase of grain handling equipment as well as transportation facilities and warehouses remodeling.

CHAPTER FOUR

THE CREDIT SYSTEM FACILITATING RICE MARKETING ACTIVITIES

Introduction

The functional organization diagnosis of the rice subsector has identified the activities where financial resources are needed. This chapter will investigate how credit is allocated and who has access to it. In this chapter, some financial constraints hindering a more efficient rice marketing system operation will be identified. One such constraint is subsidized credit. These issues will be studied in detail in this chapter.

A. Functional organization of the financial system

1. The BNF as the official credit administrator

The BNF has supplied credit to finance the main rice subsector activities. Credit has been provided to finance production inputs such as seeds and chemicals, farm equipment and machinery, irrigation equipment and land leveling. Credit has also been provided to finance paddy rice trading, with the goal of helping producers delay the sale of paddy rice post harvest dates. Finally, credit has been provided to finance long-term investments in drying and milling equipment.

The BNF also extends credit for financing a broader category of milling equipment under its agro-industrial credit program. This makes it nearly impossible to quantify the amount of the official credit for long-term capital investment. The same data problem occurs with the credit extended to finance fixed farm assets, included in the farm machinery and land improvements credit categories.

Table 4.1 BNF's loans to finance the production and marketing of paddy rice during the period 1970-88, reported in nominal and real sucres, with May 1978-April 1979 = 100.

YEAR	PRODUCTION CREDIT	TRADE CREDIT	PRICE INDEX	PRODUCTION CREDIT	TRADE CREDIT
	--S/000 nominal--			---S/000 real---	
1970	68821	40155	38.5	178756	104299
1971	57874	7225	40.6	142547	17796
1972	53875	7488	43.7	123284	17135
1973	225501	8874	49.0	460206	18110
1974	613422	23534	60.1	1020669	39158
1975	743764	45411	68.7	1082626	66100
1976	850300	17957	75.7	1123250	23721
1977	572337	138437	85.5	669400	161915
1978	547345	29217	96.7	566024	30214
1979	745519	22417	105.9	703984	21168
1980	863265	28379	118.3	729725	23989
1981	915851	31251	135.9	673915	22996
1982	948743	27463	158.1	600090	17371
1983	1969286	137847	234.6	839423	58758
1984	3133442	556710	307.8	1018012	180867
1985	5916193	608755	394.0	1501572	154506
1986	6622702	969828	484.7	1366351	200088
1987	6454682	1064797	627.7	1028307	169635
1988	9645780	2652340	983.6	980655	269655

Source: Credit: BNF: Annual Reports
Price Index: Banco Central del Ecuador: Memorias

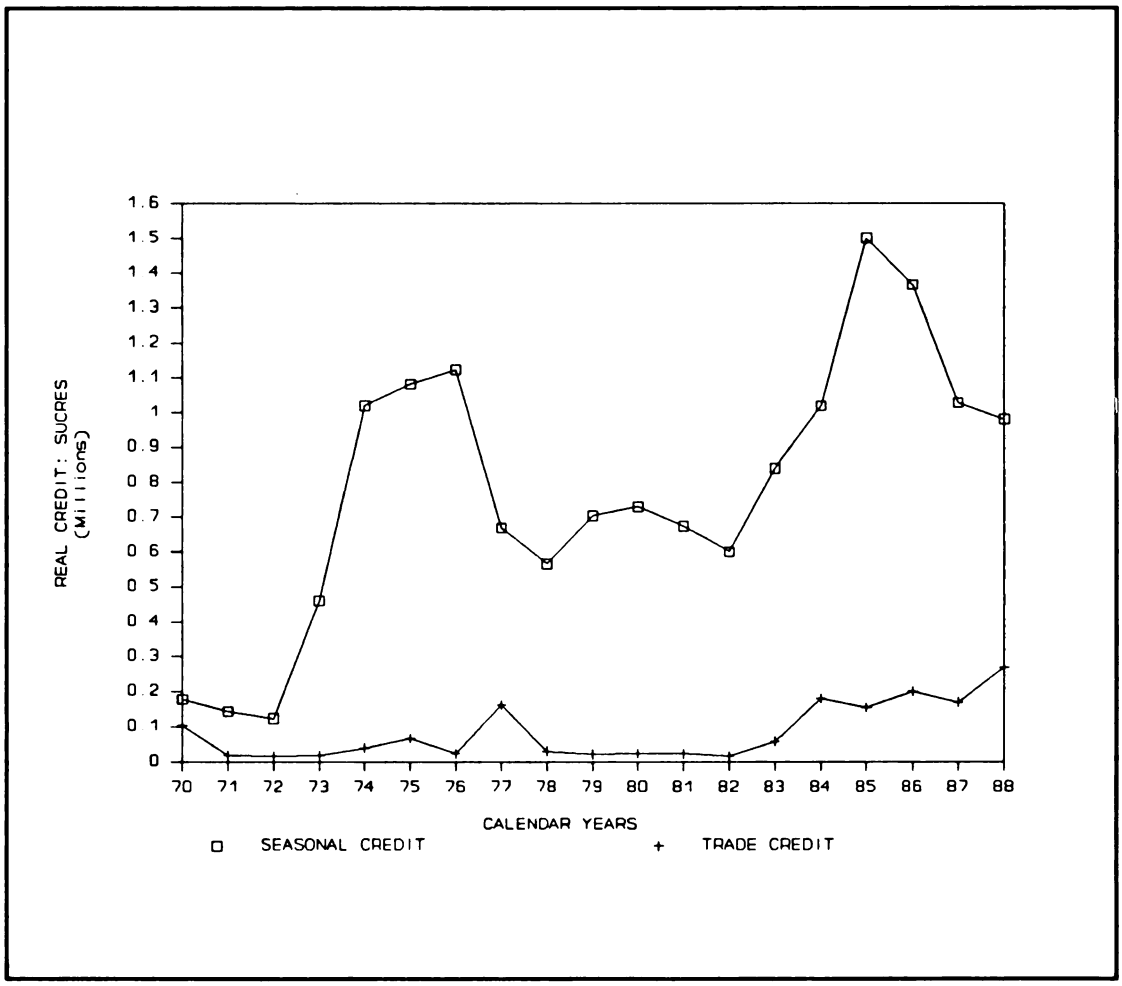

Figure 4.1 BNF's production and trade credit, in real terms (May 1978-April 1979 = 100), for the period 1970-88.

Source: National Rice Program: Annual Statistics.

The amount of production credit has decreased during the last 4 years. Meanwhile the amount of credit to finance rice trading has increased, both in nominal and constant sucres. The amount of credit to finance rice trading includes the credit for ENAC that the Central Bank allocates and passes through the BNF. Most of this credit has been used by ENAC to liquidate overdue loans, leaving a small proportion of new operating funds in each year.

Three subperiods are important to notice in Figure 4,1. The first subperiod includes the 1974-76 years, characterized for an accelerated growth of credit financed mainly with oil export revenues. The second subperiod includes the 1983-85 years, characterized also by another increase of credit accompanied by high support prices (Stewart and Cuesta, 1988). The third subperiod is the 1986-88, characterized by a dramatic reduction of real credit as a consequence of high inflation rates, especially during 1988.

Two observations are worth noticing in relation to the BNF's trade credit. First is the relatively low amounts of funds allocated for this purpose. Second is the recent trend to increase this allocation. This trend is apparent during 1984-88, despite the increasing inflation rate during this period. The beneficiaries of these trade loans in the rice subsector have been mainly farmers and, in a lesser degree, large millers. The average term for production loans is 6 months. The funds are disbursed by parts, as major

investments are undertaken, that is, after the farmer has financed his/her expenditures. This procedure causes cash flow deficits at harvest time, and farmers have to search for informal financing to cover their expenses. Immediately after harvest, farmers have the obligation to repay the loans because the collateral (the grain) has been disposed of, even though they may still have some time before the end of the term. During the last 4 to 5 years, rice farmers have been negotiating the swap of loans from the production to the trade category. This gives them another 3 months of time after harvest to repay their debts. This practice explains why trade loans have been increasing.

BNF's participation in financing long-term investments in rice milling equipment and machinery peaked during 1974-78 period. These years correspond to the petroleum boom period. It was also a period of aggressive borrowing from the Inter-American Development Bank (IDB) and World Bank (IBRD), through their global agricultural credit programs. However, since 1985 the BNF has not approved loans to finance drying and milling equipment, and storage facilities for millers. The corresponding IDB and IBRD credit programs regulations allow long-term investment financing in milling equipment and storage facilities only at farm level. The experience of these programs indicates a negligible demand for funds by farmers for long-term investments related to rice processing. One of the reasons to limit financing of long-term

investments in the rice processing business is the belief that there is enough drying, milling and storage capacity in the country to process rice. This conjecture neglects the importance of the adequacy of the existing processing facilities, which are not acceptable. From the credit demand side, some reasons that explain the lack of effective demand for long-term investment funds are the following. First, the low profitability of these investments in the farm, given the low premiums for a drier and cleaner grain. Second, the lack of managerial capacity of most farmers and the lack of confidence impeding farmers to hire external management for either their farm or their rice processing enterprise. And third, the lack of technology dissemination throughout rice growers.

The interest rate charged by BNF for both production and trade loans has been kept below the inflation rate during the 1970-88 period. During 1988 this rate was fixed by the Monetary Board at 23 percent, while the inflation rate was never below 45 percent. In April 1989, (El Comercio, April 21, 1989) the Monetary Board agreed to raise the interest rate to 32 percent. But the inflation rate had increased to over 90 percent, making even more negative the real interest rate. The negative effects of "subsidized" interest rates have been extensively studied and will not be analyzed in this study (See for example Adams, 1984; Von Pischke and Adams, 1980).

Finally, we need to consider BNF's relationship to ENAC. Since 1974 ENAC has been getting large amounts of credit from

the Central Bank through the BNF. The loans allowed ENAC to intervene in the trading of grains, including rice. These actions, however, reduced considerably the amount of funds that could otherwise be allocated to private traders. The price system imposed on ENAC by the government has not allowed it to profit from its intervention. On the contrary, it has been consistently loosing significant amounts of funds and increasing its overdue accounts at BNF. By December 1988, the overdue portfolio of ENAC exceeded 18 billion sucres. This may represent the costs of ENAC's intervention or the cost of the subsidy to consumers. But the government has not been willing to accept it as a subsidy payment and the deficit (losses) has been attributed to poor and perhaps corrupt administrators.

The Annual Statistics of the PNA show that, on average, the BNF's share of rice production financing has been 58 percent for Winter crop, and 50 percent for Summer, during the period 1986-88 (Table 4.2).

Table 4.2 Percentage participation of financial institutions in the seasonal rice production credit as an average of the years 1986-88, in nominal terms.

Cycle	BNF	Commercial Banks	"Fomento" Funds	Own	Total
	%	%	%	%	%
Winter	58	9	8	25	100
Summer	50	12	12	26	100

Source: National Rice Program: Annual Statistics.

During the 1981-88 period, the BNF's production credit has financed approximately 70 percent of the total area cultivated. The BNF's Statistics do not show the composition of its beneficiaries. However, it has been discovered that BNF has provided more financing for large farmers than for small and medium ones (Table 4.3).

Table 4.3 Sources of credit for the 1988 rice Winter crop.

Farm Size (has)	BNF %	Commercial Banks %	Other Sources %
0 - 50	45	30	25
50 - 100	52	28	20
100 - plus	70	12	18

† Represents "fomento" and farmers' own resources.

Source: "Hoy" newspaper, December 10, 1988.

2. Private banks participation in the rice subsector

The extent of private banks participation in rice production is limited to the legal obligations imposed on them. The Monetary Board regulations require that private banks have at least 20 percent of agricultural sector loans in their portfolios. The agricultural loans can be rediscounted at the Central Bank, under the Financial Funds Mechanism. Commercial banks fulfill this requirement with a few large loans and demanding large amounts of security as collateral. They seek investments considered highly profitable with low risk. Additional reasons for limiting loans to few and large borrowers is to reduce transaction costs and to reduce their need for trained technicians to closely control and supervise investments (Ramos, 1984).

The interest rate spread on the use of the Central Bank's Financial Funds Mechanism is considered by private banks

officials insufficient to stimulate an extensive participation of commercial banks in agricultural loans, especially because the rate does not allow them to cover default risk.

With regard to commercial banks financing of rice production and processing, the few loans granted by them are devoted to large rice farmers. The loans devoted to investments in equipment and machinery for rice processing are negotiated for less than 2 years. These short-term loans, however, can be rolled over up to 3 times. At each time the interest rate is determined and the value of the collateral is revalued.

The major participation of private commercial banks in the rice subsector is found at the wholesaling level. Here private banks provide the operating capital needed to facilitate trading and private storage of rice. The interest rate charged for these loans is the market rate, which has been below the inflation rate but higher than the "subsidized" rates charged by the BNF and the Central Bank's Financial Funds Mechanism. During 1988 this rate fluctuated from an average of 45 percent in January, to a high 48 percent by mid year, and reached an average of 52 percent by the end of 1988. Meanwhile the inflation rate reached 85.7 percent by December 1988 and averaged about 56.7 percent (El Comercio, Martes Económico No. 10, February, 1989). The main beneficiaries of these funds have been largely national wholesalers, and to a lesser extent, provincial and urban wholesalers.

3. Trading and financial institutions for rice marketing

a. The issuance and use of warehouse receipts

Warehouse receipts are legal trading instruments issued by public and private grain warehouses operating under the National Storage System (Sistema Nacional de Almacenamiento), of which the main participant is ENAC. These receipts were used primarily to collateralize commercial loans but also to facilitate grain exchange. Before the creation of the Agricultural Products Exchange Board (BPA) in January 3 of 1986, the main issuers and users of these instruments were ALGRACESA and ALMAGRO, a division of Banco del Pacífico.

The creation of the BPA in 1986 was a government initiative. The intervention of government in its origin and functioning gave rise to bitter opposition from interested sectors, mainly from producers associations and from the bureaucracy of ENAC, leading the BPA almost to its extinction. The creation of the BPA was not accompanied by an effective educational process to teach potential users about the Exchange Board objectives and operations. The primary participants in the grain marketing system expected that this institution would solve their problems of transportation and trading of their products. The role of the BPA as a facilitating institution for price discovery and market transparency was not widely understood. Nor were the uses of the so called

certificates of deposit well understood. Their purpose was to facilitate trading, reduce transaction costs, and serve as collateral for bank loans.

During the first year of operations the main product traded in the Bolsa was rice. This product alone included about 56 percent of the Bolsa's annual trading operations and represented about 16 percent of the 1986 rice production. From January to November of 1987 rice trading in the BPA reduced to only 11 percent of the 1987 rice production (Análisis Semanal No. 47, December 9, 1987).

After a period of relatively intensive use of the warehouse receipts (1986 and 1987), their use was still not completely understood and accepted by the majority of farmers and traders. Small rice farmers accepted the warehouse receipts, especially during 1986, because ENAC was obligated to issue them to avoid using new loans from the government. In addition to this, the market was saturated by the bumper crop of 1985 and market prices were below official prices. Large rice farmers accepted with less resistance the use of these warehouse receipts, perceiving the advantages of negotiating with these instruments and of using them to collateralize their commercial loans.

b. Critical issues concerning the use of warehouse receipts

It is important to briefly discuss some aspects of the role of ENAC, BNF and the BPA to understand the reasons why warehouse receipts were not accepted.

i) Role of ENAC: Policy makers saw in the warehouse receipts an expedient means to avoid funding ENAC with new money. All of ENAC's 1986, 1987 and most of 1988 purchases were made by issuing indiscriminately warehouse receipts. These receipts were supposed to be redeemed at the BNF. But a number of problems surrounded this mechanism. Farmers, especially small ones, were not prepared to receive an unknown document instead of cash for their product. This situation created resistance and apprehension. Then ENAC's paper work required to issue a receipt became painful and time consuming, increasing insecurity and transaction costs to the already cumbersome exchange. Also, there was lack of freedom to negotiate these receipts at banks or even at the Bolsa, since they were earmarked for redemption only by the BNF. Finally, these receipts contained a discount for storage costs, giving them the appearance of depreciable papers that had to be rapidly passed on to another participant. This perception was exacerbated by the rigidity of official prices, which were not allowed to be adjusted for storage costs.

ii) Role of BNF: BNF officials saw this mechanism as an expedient way to recover their loans, and consequently supported its intensive use. The redemption process took this form. The certificates of deposits were received by the BNF and then sent to the BPA to be sold. Only after these warehouse receipts were transferred to a buyer (almost entirely the same ENAC) and cancelled, would the BNF proceed to liquidate them. The BNF would discount the value of the loan, the interests accumulated up to this date (not the date the farmer handed in the receipt) and the storage costs, and would return the balance to the farmer (the discounted storage costs were later credited to ENAC's accounts). It is easy to see why farmers considered this mechanism cumbersome and exploitative.

iii) Role of the BPA: In addition to the cumbersome procedures described before, inside trading of some brokers of the BPA increased the doubts that market participants had about the system. Rice trading promoted by some brokers were never registered in the BPA and the exchange took place without any contact between either the seller or the buyer with the BPA.

4. Non-institutional sources of credit

Too often informal financial arrangements have been used in the rice subsector such as the "fomento" and the "adelanto". The "fomento" mechanism consists of millers financing farmers harvesting expenses. The "adelanto" consists of wholesalers advancing money to millers as part of an agreement for future delivery of milled rice. The study of these two informal credit mechanism emphasizes their economic rationale and financial relevance.

From an economic theory perspective, these financial arrangements can be associated with the markets for paddy and milled rice. These markets include the spot market and the contract market. Rice producers can choose to wait until harvest to sell their production or to contract paddy rice delivery for a future date, agreeing upon prices and lead time. Rice millers can also sell milled rice in the spot market, at the ongoing price, or they can contract with wholesalers for future delivery of milled rice, agreeing also upon prices and lead time.

The analysis that follows refers more specifically to the "adelanto" or contracts between millers and wholesalers.

In the spot market, prices fluctuate relative to the strength of the demand and supply forces. In the contract market, both prices and lead time are subject to negotiation and can vary in some inverse relationship. A miller can agree

to fix the price at the time of the contract agreement, but he/she can negotiate the extent of the lead time to create the opportunity to turnover the "adelanto" several times and thus compensate any foregone benefit caused by freezing the price. The longer the lead time, the larger is the number of times the "adelanto" can turnover. Or else, a miller can negotiate higher prices (premiums) for shorter lead times if wholesalers are turning over their capital faster to accommodate supply to a growing demand. The contract guarantees the wholesaler will have a preferred place in the queue when demand is high. The contract, on the other hand, guarantees the miller that the wholesaler will continue to purchase milled rice at the fixed price even though the wholesaler could find lower prices on the spot market, when demand is low. If the wholesaler switches to the spot market because of better prices, and lets the miller extend the lead time beyond the end of harvest date allowing him/her to incur on unexpectedly higher storage cost, then the wholesaler may not be able to return to the contract market as a loyal customer and may loose his/her preferred position in the queue when demand is high.

Millers use the wholesaler's "adelanto" especially during the Winter harvest period, that is, during May and June, extending the lead time up to 2 months, to turnover this capital several times. Beyond this term (usually 2 months, ending early July), when the opportunities to turnover the "adelanto" are reduced considerably. Millers want to deliver

the contracted milled rice to avoid incurring storage costs. If they want to store some rice beyond harvest period because of expectations of higher prices, they would like to own the grain to benefit from the returns to storage.

Millers are assumed to be risk averse. They would prefer to invest small amounts of their own capital and larger amounts of the lenders funds in the business of buying paddy, storing it, milling it, and then selling it as milled rice. If millers were to perform their businesses with their own capital only, the volume of operations would be lower than otherwise because of risk considerations. If millers were able to finance their businesses entirely with debt, the volume of operations would be larger because any profits they get would represent an infinite rate of return. The advantage of the "adelanto" is to induce millers to behave as if they were risk neutral, stimulating them to buy, mill and sell larger amounts of rice.

This behavior can explain some aspect of the rice marketing system. First, the efforts of millers to gain a contract with ENAC to serve as its assembly center, buying paddy with ENAC's resources and delivering milled rice after an extended lead time. Millers can make good profits even after paying official prices for paddy rice when market prices are lower, since the funds they use are external to their finances and they can extend the lead time for several months, delivering milled rice to ENAC only when storage cost becomes

larger than benefits. Second, a rice subsector economy of risk averse millers would allocate smaller capital amounts to finance trading than a rice subsector economy of risk neutral participants. The supply curve for the risk averse subsector would lie to the left of the a supply curve for the risk neutral subsector. Therefore, for a given demand, prices in the risk averse subsector will be higher than in the risk neutral subsector. Millers are induced to behave as if they were risk neutral when they have the opportunity to reduce investment of their own capital and increase the use of lenders' funds. Millers can know with certainty both the cost of the borrowed capital and the purchase and the sale price of the products they handle, estimating with great certainty the profits they can make.

B. Official allocation of funds to the rice subsector

Official credit has been targeted to three main destinations, to support rice production, to finance trading of rice, and to finance long-term investments in equipment and machinery.

i) Credit allocated to increase rice production: Credit and production are assumed to have a positive relationship. However, since credit is fungible, it may be diverted to finance activities offering a higher rate of return, or to

substitute funds otherwise used to finance the purchase of consumption goods. This possibility has attracted powerful borrowers who have obtained large amounts of credit, leaving lenders short of loanable funds to satisfy the demand of small borrowers.

ii) Credit aimed at financing marketing activities: Biases against intermediation and private storage have limited allocation of official funds to finance trade and, more rigorously, storage of rice. Perceptions of a linkage between short-term credit and inflationary pressures have been expressed by credit policy officials, neglecting to consider that trade, processing and storage (space, form, and time utilities) are economic activities that add value to the product.

iii) Credit aimed at financing long-term investments in the rice marketing subsector: Currently, funds to finance investments in drying and milling equipment and storage facilities are scarce. These investments can be officially financed only when they are placed in the farms and borrowers are farmers. This limitation derives from the assumption that storage and processing facilities are sufficient to handle the flow of grain. Although the assumption seems to be realistic, it needs to be revised considering the current status of the industry and some performance dimensions such as efficiency,

cost-effectiveness, progress and modernization of the plants, and also taking into account adjunct services such as transportation, which have improved during the last two decades.

Another cause for limiting the allocation of funds to finance these long-term investments stems from the impact of inflation on the interest rate and the term of the loans. Under a financial policy which sets controls over the interest rates, fixing them below the inflation rate, lenders ration the loanable funds away from long-term investments, in general, and, particularly, away from investments in activities which the political environment makes more uncertain and riskier.

Profitability of the investments and the impact of inflation on the liquidity of these investments, could be another cause for limiting the allocation of financial resources to these long-term investments.

C. Impacts of subsidized credit

1. Transaction costs and credit rationing

It is critical to include in this analysis the concept and implications of transaction costs in the credit delivery systems of the financial intermediation. From the lender's viewpoint these costs include the inspection expenses and credit supervision, court and legal expenses incurred to

recover overdue loans, and the cost equivalent to the default risk, if it is not yet included in the financial (interest) cost. From the borrower's perspective, transaction costs include all the expenses incurred in getting the loan, that is, the trip(s) to the bank, the opportunity cost of the time spent in the negotiation, the expenses to fulfill all the requisites demanded by the lender, and some additional expenses such as food and lodging.

A real negative interest rate (represented by the vertical axis in a two-dimensional graph) calls for a demand for loans (represented by the horizontal axis) asymptotically approaching the horizontal axis and located outside the supply curve. When this situation exists banks have to ration their loanable funds among borrowers. If in addition to this, the interest rate is administratively fixed and regulated, rationing must be accomplished using mechanisms that can affect transactions cost. These mechanisms are negotiations over the time span of the repayment schedules, the amount of the loan, the proportion of borrower's equity required as counterpart, the value of the collateral, and the list of requisites to be fulfilled. All these factors affect the magnitude of transaction costs. For example, the author's field survey revealed that informal sources of credit offered much lower transactions costs to small borrowers and over small amounts of loans than formal lending institutions, especially when confidence and trust have been cultivated

between the borrower and the lender.

2. Effects of subsidized interest rates

Subsidized credit generates a chain of important effects that influence the functioning of the entire sector and economic system. To organize the discussion of these effects, they will be looked at from the supply of and demand for financial resources.

i) From the supply side: Low interest rates limit savings and resource mobilization. An extensive body of literature concerning this issue has been published, led especially by the applied research conducted over a number of years and less developed countries by faculty and researchers of the Ohio State University (See for example Von Pischke, Adams and Donald, 1983; Adams, Graham and Von Pischke, 1984).

Low interest rates affect negatively the amount and purchasing power of the lender's capital. The deterioration of capital occurs when the inflation rate is superior to the interest rate; lenders capital loses purchasing power, even when the default rate is zero; the capital may fade away if write-offs have to be made over and above the reductions of purchasing power.

Given these two detrimental effects, the lender's financial activities, particularly when the lender is an

official bank like the BNF, are sustained by two sources of funds. First, government budget allocations, which increase fiscal outlays and, most likely, the fiscal deficit. The increase of fiscal deficits bring about an increase of inflation. If this increase of inflation is not fully absorbed by the interest rates, the magnitude of the distortion increases, causing larger and larger erosions of the lender's capital. Second, loans from external donors, which increase the costs of the debt services, demanding larger allocations of fiscal funds to honor them, which in turn increase the fiscal deficit, setting in motion inflationary pressures.

ii) From the demand side: Real negative interest rates cause, theoretically, an infinite demand. Subsidized interest rates do not improve the profitability of investments. Loaned funds have to be converted into productive inputs and their prices are likely to increase when cheap loans are made available in larger amounts than under real positive interest rates. The cost of production does not necessarily decrease by financing investments with low interest rates. However, capital gains are likely to be obtained by fixing low interest rates, which are capitalized in fixed assets (See for example Lee and Rask, 1976; Robison and Brake, 1980). The value of these assets increase to reflect capital gains, making their owners richer: the larger the amount of subsidized credit they

can get, the richer they are. Thus subsidized credit distorts the distribution of income, exacerbating the existing inequity.

Summary

This chapter has identified the main suppliers of financial resources and has also identified the main credit mechanisms. Structural and institutional restrictions have been identified both in the formal and informal capital markets. Particularly those that support the rice marketing system. Few incentives exist for private banks to finance rice marketing activities. Primarily because controlled interest rates and risk perceptions give them earning below market rates of return. Biases against middlemen and misconceptions about the benefits of short term credit for trading and storage are the major causes for an insufficient allocation of formal credit to finance these activities.

The lack of credit to finance long term investments in rice drying and milling equipment, and storage facilities is due the uncritical assumptions about overall capacity for rice processing, the detrimental effects of inflation on interest rates and term of loans, and the negative impacts on profitability and liquidity of these types of endeavors.

CHAPTER FIVE

THE USE OF CAPITAL TO FINANCE RICE MARKETING AND STORAGE

Introduction

This Chapter's main objective is to assess the profitability of financing rice trading and storage with formal credit. The chapter will focus on millers and wholesalers, including the role of ENAC, especially in storing rice. It will be shown that, despite low margins between the official minimum and maximum prices, private sector storage exists when price enforcement is not rigorous. The first two subsections of section A will discuss the profitability of financing rice trade at milling and wholesaling stages, respectively. The first subsection of section B will discuss the profitability of storing rice, identifying the key participants in this function of marketing, and the quantity and seasonality of stocks. The second subsection will develop a brief analysis of the seasonality of prices. This will help identify the pattern of rice purchases, storage and stocks release. The Chapter's third section discusses the profitability of storing both paddy and milled rice. Finally, the Chapter ends with a discussion of the role of ENAC in the storage function.

A. Working capital needs for marketing and storing rice

1. Financing millers working capital

The author's field survey revealed that about 20 percent of millers' financial resources used to trade paddy rice during the Winter harvest of 1988 was financed by wholesalers, through the "adelanto" mechanism. The hypothesis tested in this subsection is that the substitution of formal sources of credit for "adelanto" financing would improve the financial and economic outcomes of mill operations. To test this hypothesis, the preparation of annual operating budgets and financial statements for the three prototype mills constructed in this study were prepared (See Appendix A).

Several assumptions were used to analyze the profitability of rice trading at the mill level. First, the sources of finance for the prototype rice mills are assumed to be the BNF and commercial banks (40 percent), the wholesalers' "adelantos" (20 percent), and the millers' own resources (40 percent). Second, the commercial loans used to finance rice trading from banks assumed to be obtained at 90 days terms. Third, the "adelantos" are supposed to be paid back one third every month after the May and June disbursements, and one half every month after the October disbursement. Finally, the commercial loans are assumed to be negotiated at an annual interest rate of 44 percent (the average rate during 1988).

The financial cost for the wholesalers' "adelantos" was estimated as the difference between the money received by millers and the value of the rice delivered to wholesalers.

Table 5.1 Financial costs of wholesalers' "adelantos" for prototype rice mills during 1988 operations for a three months loan.

Size of mills	% Cost of "Adelantos"	Cost per cwt of "Adelantos"
Large	11.32 %	S/ 43.82
Medium	12.99 %	S/ 55.65
Small	13.33 %	S/ 44.87

Source: Annual operating budgets for prototype mills (Appendix).

The commercial bank interest for a 3-month loan was equivalent to 11 percent during 1988. It is apparent that the financial costs of using the "adelantos" are higher than those carried on by bank loans and that they are more expensive for small mills than for medium and large ones. Dividing the interest expenses by the number of cwt of milled rice processed by each mill, the unit (cwt) financial cost is larger for the medium size mill, and smaller for the large mill. It is apparent also that a substitution of bank loans for the "adelantos" improves the financial outcome for rice mills. Using the annual operating budgets prepared for each prototype mill (Appendix), a number of changes in the percentage participation of the "adelantos", changes in the pattern of

paddy rice purchases, and changes in the pattern of repayment of these "adelantos" were explored. Considering a positive (greater than zero) participation of the "adelantos", it was observed that the relationship between the "adelantos" and the profits was inverse. With respect to the pattern of monthly (or weekly) purchases and repayments, it was difficult to establish a definitive conclusion. The actual results of the ways millers purchase paddy rice and deliver milled rice (repayments of the "adelantos") would depend on a number of factors, most of which are subject to miller's management capacity to perceive the trend of paddy and milled rice prices, the timing of paddy rice purchases, the timing of the repayments (deliveries of milled rice) to wholesalers, the pace at which rice is milled, and to select the appropriate turnover ratio.

2. Financing wholesalers' working capital

Interviews with national wholesalers revealed their excellent accessibility to financial resources from private banks, both through normal commercial loans and contracted overdrafts. This situation has been the result of a number o factors: the amount of fixed assets national wholesalers have, the high daily average balance of their deposit accounts, the high turnover ratio of this balance, and their economic solvency, demonstrated during a relatively long

period of time.

Provincial and urban wholesalers have less access to large commercial loans, because of their lower average balances in their bank accounts and lower value of the collateral they can offer when banks require additional guarantees for their loans.

B. Profitability of financing rice storage

1. Market participants in rice storage

The main participants in the storage of rice are the rice millers, the wholesalers, and the parastatals, including ENAC, ALMACOPIO, and ENPROVIT. Millers store both their own paddy rice and that actually owned by national wholesalers. National, provincial and urban wholesalers store milled rice in their own warehouses: national wholesalers store rice during periods ranging between 2 and 4 months; provincial wholesalers, during periods not longer than 2 months; and urban wholesalers, during very short periods, no more than two weeks. ENAC stores both paddy and milled rice.

It has been difficult to get reliable information about the stocks of rice held by millers and wholesalers. The PNA records the rice inventories held by all participants in the rice market, especially millers, inspecting directly the mills and sampling the private warehouses in the Sierra and the

Costa, twice a month. PNA personnel also collect information from ENAC and private grain elevators, twice a month. However, the most reliable data are that provided by ENAC. The rest of the data are believed to be biased downwards because millers have to pay a tax of 80 cents for each cwt milled, and because wholesalers are afraid of being accused of "speculators" if they are found holding large inventories of rice.

Table 5.2 Stocks of rice at the end of June and October, and the Winter and Summer production for the 1982-88 period (Metric Tons).

	WINTER			SUMMER		
YEARS	PRIVATE SECTOR STOCKS	ENAC STOCKS	PRODUC-TION	PRIVATE SECTOR STOCKS	ENAC STOCKS	PRODUC-TION
1982	43702	32006	140570	39850	38923	69609
1983	7541	4285	53978	6633	3752	95121
1984	22756	0	138807	24180	0	100683
1985	51409	7596	114557	50575	13178	91987
1986	75307	33159	208264	43575	69784	106971
1987	38697	96633	148772	24755	96209	104338
1988	37577	25313	150010	26317	10265	96666

Source: National Rice Program: Annual Statistics.

For the Winter cycle, the stocks are reported at the end of June, when stocks are building and grow to their highest level. For the Summer cycle, the rice stocks are reported at the end of October, the peak harvest month of this cycle, when stocks are built to supply rice during the Winter months of

January to mid-April. The data on production corresponds to the whole Winter and Summer harvests. Observing the Winter harvest of 1988, we can see that production reached 150,010 MT of milled rice; the stocks reported to have been built by the end of June reached only 62,890 MT. This suggests that 87,120 MT were consumed during the harvest months (May and June), which could not have happened. Comparing in this way the figures on production and stocks, it is clear that reports on stocks are biased downwards.

During periods of relative oversupply, as the 1986-87, ENAC's stocks were higher than those of the private sector, while during periods of normal and relative short supplies, the private sector's stocks were higher than those of ENAC. The reason for this behavior is that prices are lower during periods of abundance than during periods of scarcity and, therefore, the monthly price differences are insufficient to cover storage costs.

Analyzing the data on rice stocks on a monthly basis, it is found that millers stored paddy rice during the Winter months of January-April in relatively small amounts. The explanation concerns the adequacy of the millers' storage facilities (warehouses) to keep rice in good condition during these months of high humidity and related infestations of insects and fungus. Paddy rice during these months was mostly stored in the silos of large millers, grain elevators, and ENAC. Relatively more rice than the market needs to satisfy

current consumption is milled during the months of November and December and it is transferred to the Sierra warehouses, where storage is assumed to be less costly than in the Costa.

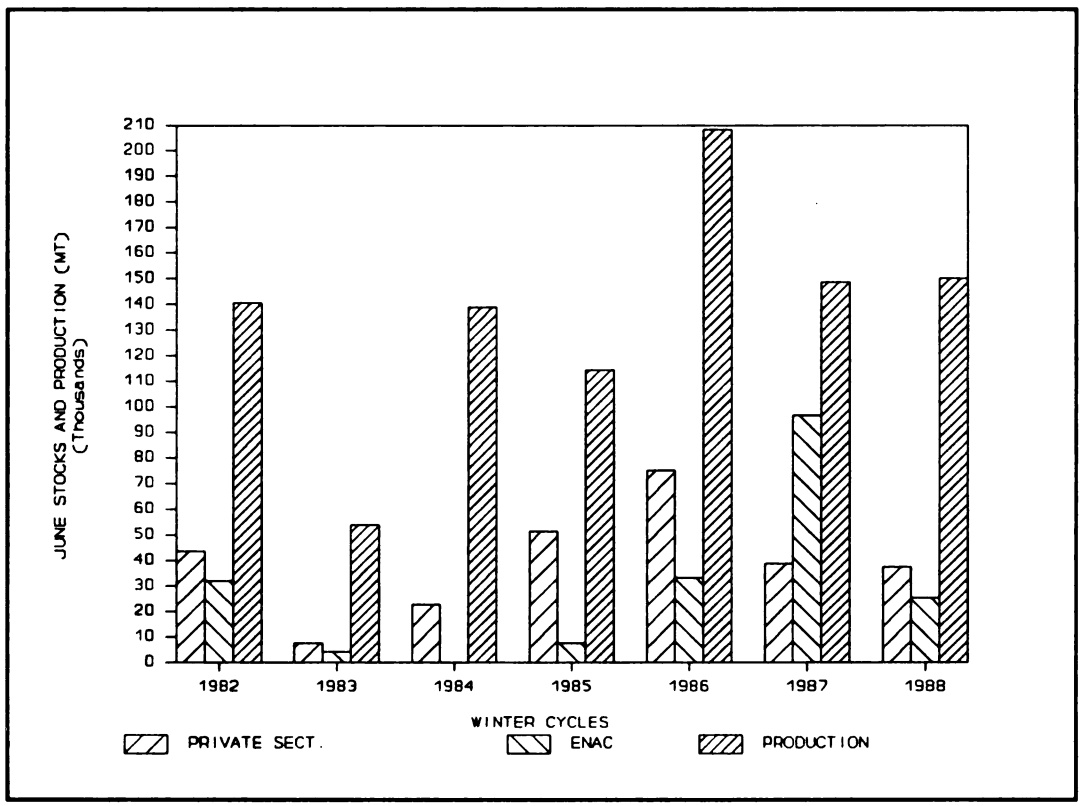

Figure 5.1 End of June rice stocks and Winter production, in MT, all converted to milled rice for the period 1982-88.

Source: Table 5.2

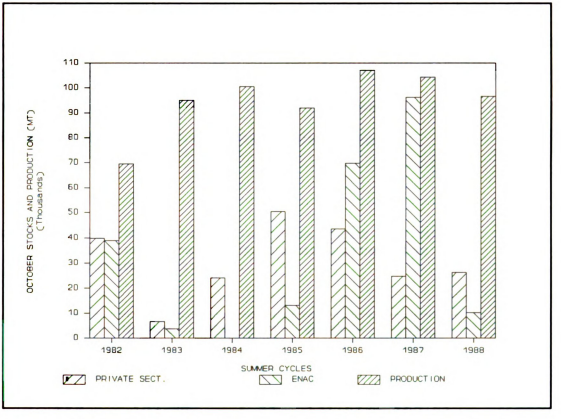

Figure 5.2 End of October rice stocks and Summer production, in MT for the period 1982-88.

Source: Table 5.2

2. Seasonal movement of rice prices

Using a monthly series of wholesale prices in Quito for milled rice (sucres per cwt), for the period 1971-88, the seasonal index was calculated (Goetz and Weber, 1986). The lowest index value of 95.7 corresponds to June, and the highest index of 104.4 corresponds to April.

Table 5.3 Seasonal wholesale price index per cwt of milled rice in Quito estimated for the period 1971-1988.

MONTHS	GRAND SEASONAL INDEX	STANDARD ERROR OF THE MEAN	GSI+/- ONE STD ERR	GSI+/- TWO STD ERR
JAN	100.59	1.23	99.36	98.13
FEB	103.79	1.88	101.91	100.03
MAR	102.51	1.86	100.65	98.79
APR	104.44	2.41	102.03	99.62
MAY	101.07	1.52	99.56	98.04
JUN	95.71	1.71	97.42	99.13
JUL	97.42	1.09	98.51	99.60
AUG	98.73	5.60	104.34	109.94
SEP	99.09	2.01	101.10	103.11
OCT	97.67	1.69	99.36	101.05
NOV	99.02	1.17	100.19	101.36
DEC	99.96	1.02	100.98	102.01

Source: Marketing Division of MAG.

The price range does not seem wide enough to conclude that there is a strong seasonal pattern in rice prices. The standard errors of the mean seasonal indexes are relatively small, except for April, September and especially August.

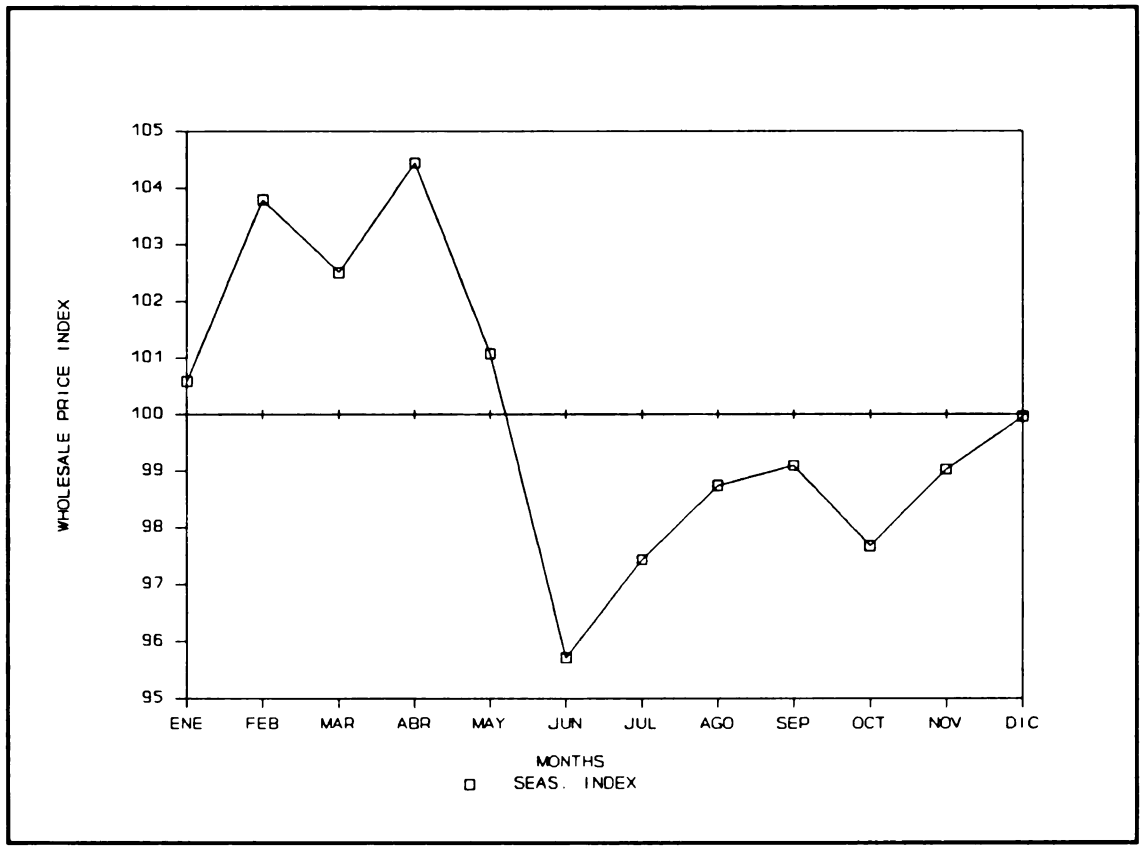

Figure 5.3 Seasonal wholesale price index for cwt of milled rice in Quito for the period 1971-88.

Source: Table 5.3

The mean standard errors variation can be explained by the Winter harvest. It starts around April, depending on whether the rainfall period is advanced, in which case harvest starts in early April, or it is delayed, in which case harvest starts at the end of April. These changes necessarily affect the seasonality of rice prices. A similar phenomenon can explain the large production fluctuation during August, a month that often marks the beginning of the Summer harvest.

The strength of the seasonality indexes was measured by adding and subtracting 1 and 2 standard errors to the grand seasonality indexes. It was found that the June index as still below the annual average when 2 standard errors were added and that the April index fell below the average when 2 standard errors were deducted. October's index, the second trough of the series, rose above the average when 2 standard errors were added. The seasonality index for this month does not seem to be remarkably strong. Using the 1985-88 series of wholesale prices, the seasonality pattern did not change. The April index continued to be the highest and those of June and October continued to be the lowest. However, the value of the indexes did change and April's index became 107.6; June's index changed to 96.2; and October's index changed to 94.3. All these indexes maintained their position in reference to the annual average when 2 standards errors were added (subtracted), and all showed smaller mean standard errors. Again, August's index showed an even larger mean standard

error, equal to 10.4, indicating the high variability of production (and prices) during this month, which depends largely on weather conditions and the emerging practice of cropping rice 3 times in 14 months. One of the harvest periods of this three-crops sequence takes place every other year in August.

To understand better the variability of wholesale prices, percentage changes in real prices were analyzed, taking the differences between the prices in June and October, and between the prices in April and October of every year, during the period 1971-88.

Apart from seasonal variations, real wholesale prices show severe fluctuations, due largely to changes in the level of production caused by natural disasters, and by factors related to international trade, credit and pricing policies. The sharp declines in rice production (and in other products as well) during 1977-78 and 1982-83 periods were caused by a severe drought and a disastrous flood, respectively. These falls in production were not supplemented by timely imports of rice. In fact, imported rice arrived at the end of 1978 and beginning of 1979, when domestic production had already recovered thanks to a reversal of the drought, increasing domestic supply (imported stocks plus production) well above domestic demand and driving down rice prices until 1980. Imports to offset the poor Summer harvest of 1982 arrived at the same time as the 1983 Winter harvest was being collected,

again overcrowding domestic supply and depressing rice prices. The low prices received by farmers during 1983 led them to plant crops such as maize and soybeans instead of rice, causing low production in 1984, which drove prices up. These phenomenon and the untimely counteracting measures generated a dramatic fluctuations in prices during these periods.

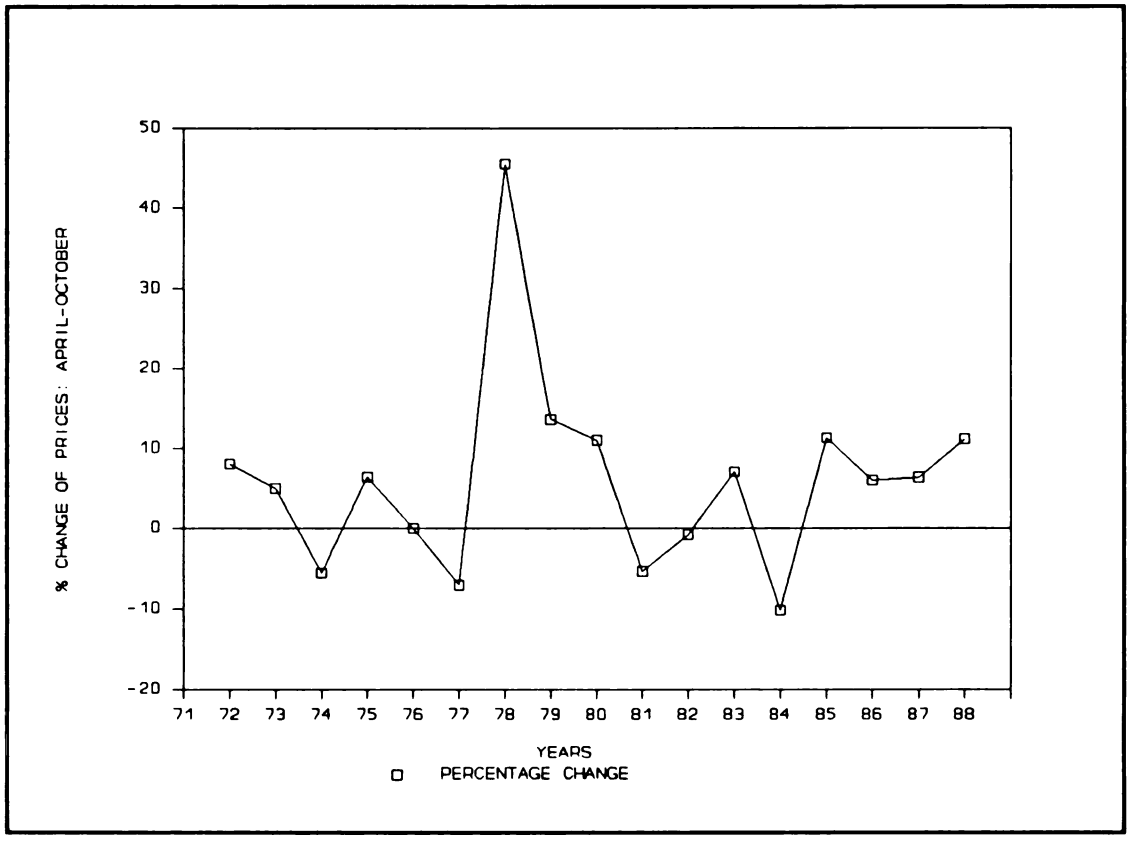

Figure 5.4 Percentage changes in real wholesale prices between April and October in Quito for the period 1971-88.

Source: Marketing Division of MAG.

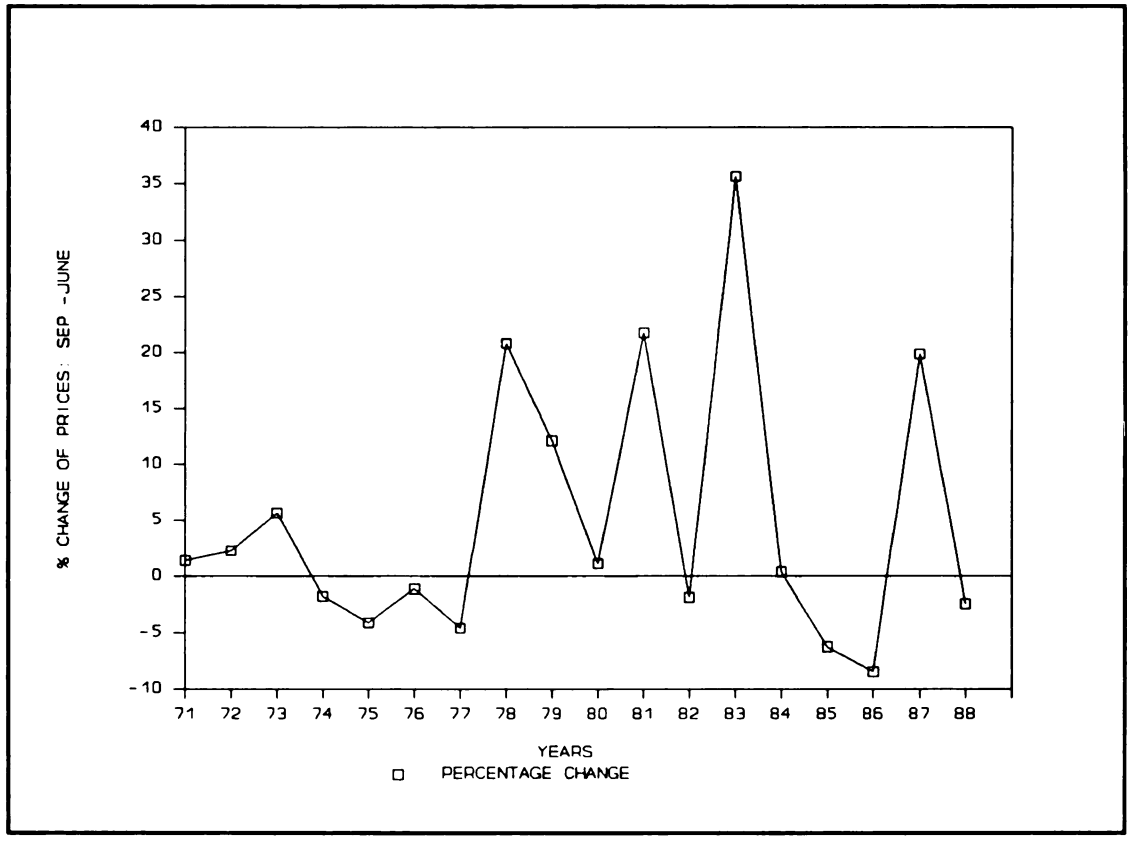

Figure 5.5 Percentage changes in real wholesale prices between September and June in Quito for the period 1971-88.

Source: Marketing Division of MAG.

During 1984-85 rice was being unofficially imported from Peru at prices well below those prevailing in Ecuador (El Comercio, August 25, 1985), driving domestic prices down. During the last quarter of 1988 (and early 1989) rice was being unofficially exported to Colombia, where rice prices were about 50 percent above Ecuadorian prices (El Comercio, October 17, 1988). This unofficial trade moved domestic rice prices up.

Another factor affecting rice price fluctuations was the administratively allocated credit. From 386 million sucres of loans to finance rice production in 1973, the government decided to increase to 1,033 million sucres for rice production in 1974, increasing this amount to 1,284 million sucres in 1975 (BNF's Annual Reports). These increases of loans for rice production brought about above normal harvests, causing prices to move downward from 1974 to 1976.

During 1985 and 1986, the government adopted a policy of incentives to expand rice production, fixing support prices well above world prices (Stewart and Cuesta, 1988). This policy was effective in increasing rice production. Rice production during 1985 became the largest obtained in Ecuador. Large stocks were accumulated during 1985 and 1986; finally ENAC had to export rice assuming substantial losses because the export price was below the purchase price.

The pattern of the June-September rice price changes shows a tendency towards greater instability, that is, towards

larger fluctuations. This is more evident for the period after 1978. One of the reasons for this increasing instability is the ever larger influence of the border prices (Colombia and Perú). Another reasons for the greater instability observed during the June-September period are the low participation of ENAC in setting reference prices and the higher expectations about price behavior during the Winter months.

3. Profitability of financing rice storage

This analysis uses the wholesale prices in Quito for the 1981-88 period. Using the author's research data, a similar analysis is presented for the millers' storage function during 1988.

To use the method of estimation of storage margins presented in Chapter Two, the following assumptions were formulated: i) the cost of storage S_j was assumed to be equal to the opportunity costs of capital, measured as the market interest rate. A sensitivity exploration was conducted using the savings interest rate. It is recognized that interest is not the only storage cost; however, data about operations costs and depreciation charges were difficult to obtain; ii) it is assumed that wholesalers would buy in June and October, when rice prices are seasonally low, and will store during the following months, until the next harvest. Tables 5,4 and 5,5

show these estimations, using the market interest rates to compute storage costs (monthly interest rate, times purchase prices per cwt of milled rice, times the number of months rice is stored), and annualizing the monthly returns to storage. An average annualized return for each month of storage was calculated, as well as the mean standard error, the mean minus one standard error (to include about 83 percent of the observations, within this lower limit and the right end of the normal curve, assuming a normal distribution of the rates of return).

Table 5.4 Annual rates of return for rice purchased in June and stored during part or the entire July-October period using market interest rates to estimate storage costs.

BUY IN	OCT PRICE	SAV. i (1)	MKT i (2)	STO COST (3)	ANNUAL RATES OF RETURN STORING RICE UNTIL NOV	DEC	ENE	FEB	MAR	APR
OCT 81	667	0.01	0.01	8	-0.08	-0.11	-0.13	-0.03	-0.02	-0.03
OCT 82	717	0.01	0.01	9	0.90	1.33	2.03	0.34	0.24	0.17
OCT 83	1950	0.01	0.02	31	-0.61	-0.61	-0.59	-0.48	-0.31	-0.23
OCT 84	2000	0.02	0.02	38	-0.47	0.19	0.40	0.24	0.42	0.40
OCT 85	2268	0.02	0.02	46	0.96	0.84	0.54	0.24	0.25	0.17
OCT 86	2225	0.02	0.02	53	-0.47	-0.49	0.10	0.32	0.27	0.18
OCT 87	2785	0.02	0.03	73	-0.08	-0.00	0.45	0.67	0.56	0.81
OCT 88	5705	0.02	0.03	172						
AVRG. ANNUAL RET.					0.02	0.16	0.35	0.16	0.18	0.21
STANDARD ERROR					0.25	0.26	0.27	0.12	0.10	0.12
MEAN - SE					-0.23	-0.10	0.08	0.04	0.08	0.09
PROBABILITY OF LOSS					0.63	0.50	0.29	0.29	0.29	0.29

(1) Savings interest rate
(2) Market interest rate
(3) Monthly storage costs

Sources: Prices: Marketing Division of MAG.
Interest: Central Bank: Annual Reports.

Table 5.5 Annual rates of return for rice purchased in October and stored during part or the entire November-April period using market interest rates to estimate storage costs.

BUY IN	JUNE PRICE	SAV. i (1)	MKT i (2)	STO COST (3)	ANNUAL RATES OF RETURN STORING RICE UNTIL JUL	AUG	SEP	OCT
JUN 81	535	0.01	0.01	7	0.97	0.97	0.80	0.59
JUN 82	676	0.01	0.01	8	0.33	0.05	-0.01	0.03
JUN 83	1311	0.01	0.02	21	1.63	1.30	1.98	1.27
JUN 84	1701	0.02	0.02	33	0.12	0.12	0.55	0.73
JUN 85	2404	0.02	0.02	48	0.21	-0.13	0.22	0.37
JUN 86	2288	0.02	0.02	54	-0.75	-0.43	-0.40	-0.37
JUN 87	2200	0.02	0.03	57	2.14	1.16	0.68	0.48
JUN 88	4240	0.02	0.03	128	0.29	0.43	0.29	0.68
AVRG. ANNUAL RET.					0.46	0.31	0.43	0.41
STANDARD ERROR					0.33	0.23	0.25	0.17
MEAN - SE					0.14	0.09	0.18	0.24
PROBABILITY OF LOSS					0.13	0.25	0.25	0.25

(1) Savings interest rate
(2) Market interest rate
(3) Monthly storage costs
Sources: Prices: Marketing Division of MAG.
Interest: Central Bank: Annual Reports.

The average return to storage for the Winter period fluctuates dramatically moving from a low of 2 percent for the first month of storage, to a high 35 percent for the third month, and diminishing for the next months. This suggests that wholesalers would be better off purchasing rice in October and storing it until January, instead of selling it either before or after the third month. This situation can be explained by the fixity of official prices, which does not allow for storage cost recuperation after a certain period of time. Once the market price reaches the ceiling official price, wholesalers are not stimulated to hold stocks of rice. Yet, if they do hold inventories after this point, their returns diminish or even vanish. The returns to storage obtained during the Summer months are in general higher than those of the Winter period. It may be because ENAC's stocks liquidation is moderate or even nil during this cycle, and official prices are not rigorously enforced, allowing market prices to vary in a way that permit recuperation of storage costs and an attractive profit. Despite this characteristic of the annual returns, and assuming that operations costs plus depreciation charges constitute a low amount, the storage at the wholesale level seems to be have been profitable. This statement may not hold in reference to periods of high inflation, such as the Winter and Summer cycles of 1988 and Winter of 1989, when the inflation rate exceeded 55 percent and reached 90 percent at the end of 1988, while the market

interest rate was held below 52 percent. One mean standard error was reduced from the average rates of return. These rates were still positive, except for those for the first two months of storage during the Winter period.

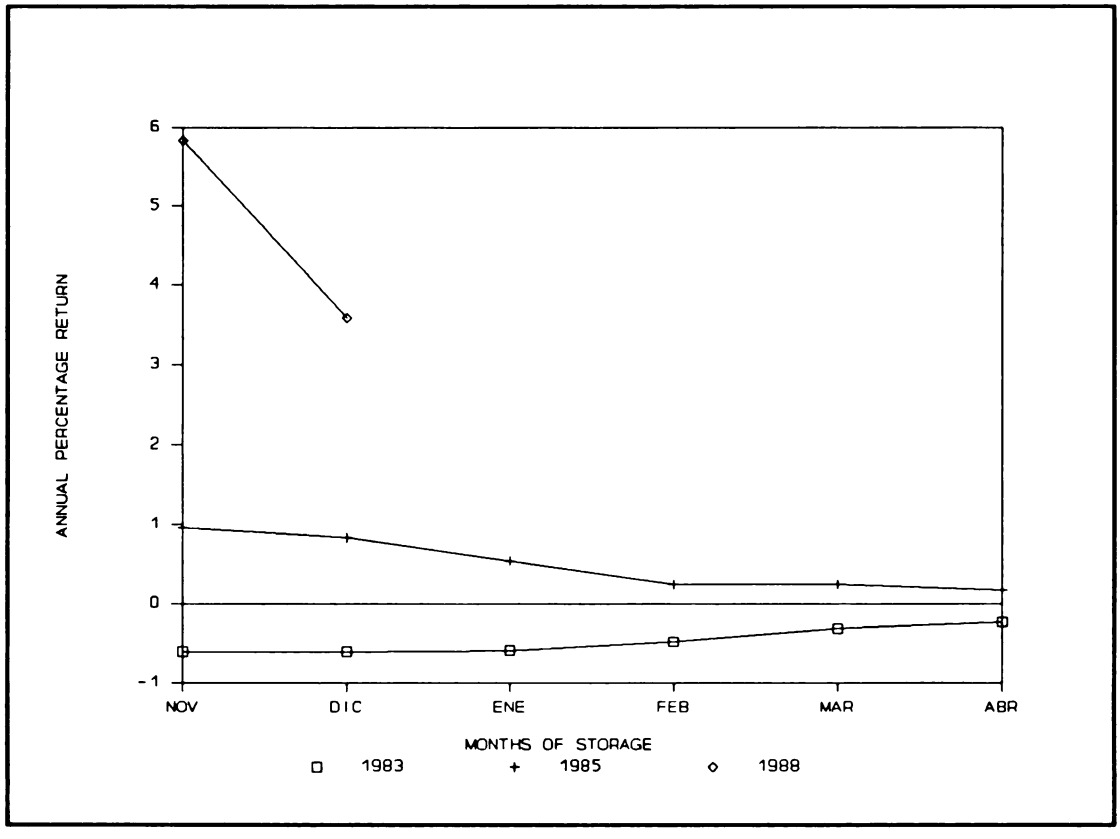

Figure 5.6 Annualized rates of return to storage during one or more months of the Winter 1983, 1985 and 1988 periods.

Source: Table 5.4
Note: Complete data for 1988 were not available.

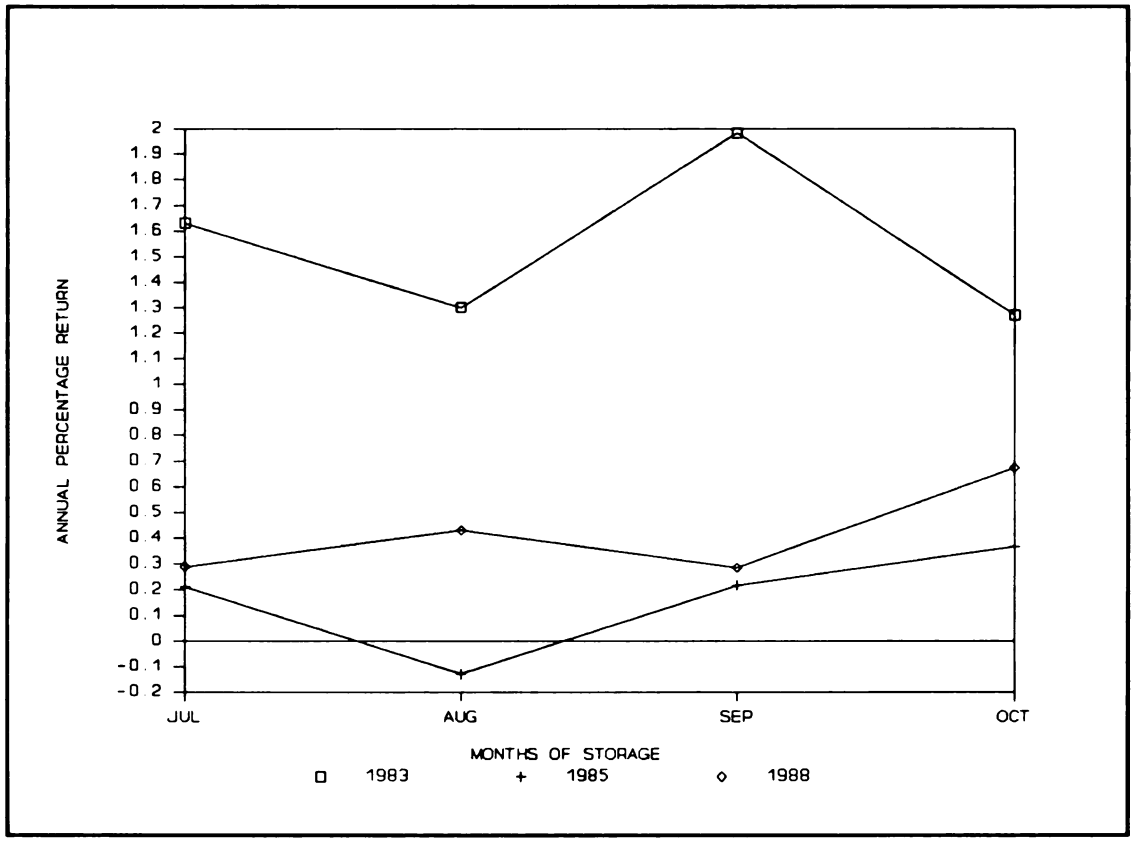

Figure 5.7 Annualized rates of return to storage during one or more months of the Summer 1983, 1985 and 1988 periods.

Source: Table 5.5

Observing the behavior of the rates of return to storage during years of shortages in supply and years of overproduction, it is apparent that returns were consistently higher during periods of shortages than during periods of oversupply. During 1985, the monthly differences of wholesale prices were not enough to stimulate private storage of rice, and this function had to be largely fulfilled by ENAC. The opposite situation occurred during the periods of supply shortages (1983 and 1988, for example).

C. ENAC's participation in the storage of rice

1. Allocation of financial resources

The foundation of ENAC's participation in the rice marketing subsector has been its commitment to sustain government support prices and reduce price instability. ENAC has attempted to sustain minimum producer prices by purchasing rice through the assembly centers it has opened during the Winter harvest periods. ENAC has made efforts to reduce price variability by keeping buffer stocks of paddy and milled rice, and by importing and exporting rice when ENAC officials considered that domestic supplies were not adequate to match domestic demand. Although official prices have been above domestic market prices during 14 out of 17 years of the period 1972-88, ENAC has not purchased significant amounts of rice,

basically because of the long procedures to receive the grain, to issue the payment (either a check or a warehouse receipt that had to be cleared through the BNF), and because of the rigorous grading of the grain. In other words, because of the higher transaction costs that selling to ENAC demands.

Table 5.6 Average official and market prices for 200 lbs sacks of paddy rice, ENAC purchases (milled rice equivalent), and BNF's credit to ENAC to finance rice trade and storage, for the period 1972-88.

YEARS	OFFICIAL PRICES S/ SACK	MARKET PRICES S/ SACK	% OFI/MKT PRICES	ENAC PURCHS %	BNF CREDIT ENAC S/ 000
1972	152	105	145		
1973	187	140	134		
1974	272	175	155	3.5	459673
1975	345	225	153	9.5	1145953
1976	345	235	147	1.9	261721
1977	335	245	137	7.1	41500
1978	335	280	120	5.6	369000
1979	390	325	120	2.8	416847
1980	435	355	123	15.3	900000
1981	571	470	121	9.6	1150000
1982	571	490	117	11.5	900000
1983	870	900	97	0.0	1450000
1984	1460	1375	106	0.0	0
1985	2175	2000	109	5.1	4021250
1986	2175	2200	99	22.1	8780000
1987	2395	2400	100	32.4	0
1988	6000	6200	97		0

Source: Economic Council's Decrees
Marketing Division of MAG
BNF's Annual Reports

Comparing the percentage ratio between the official and market prices with both the percentage purchases of ENAC and the trade credit granted by the BNF to ENAC, it is not

possible to find a definite pattern. This lack of consistency in ENAC's participation might have been caused by the use of quantities and not of prices as triggers for its intervention. The decisions to purchase rice, to import and to export have been taken based on information about quantities and not on price signals, which are supposed to be more accurate to indicate shortages and oversupplies (Cornelius Hugo, D. Tschirley, and H. Ramos, 1989).

The amounts of BNF's credit for ENAC have been, on average, 25 times higher than those that BNF allocates to private sector to finance rice trade and storage. However, millers and wholesalers have been able to move larger amounts of rice by revolving the funds at higher velocity than ENAC. ENAC buys rice and basically stores it, foregoing the benefits of turning the capital over a number of times.

2. Profitability of financing official stocks of rice

ENAC intervention in the rice marketing system has been characterized by at least two critical factors: i) official prices have been established at higher levels than market prices, which has obligated ENAC to request considerable amounts of funds to attempt to sustain them; ii) official prices have not included either regional or time utilities. Official prices have been fixed for all the regions in the country and often for an entire year.

These factors have caused ENAC to suffer considerable losses every year it has intervened, making it impossible for ENAC to pay its credits to BNF. Since 1980, ENAC has had to request either that the government pays the debt to BNF or that Central Bank renews the debt for a longer term (more than 180 days). By 1986 the overdue loans of ENAC were about 5 billion sucres, plus interest charges of more than 1 billion (BNF' Annual Report). In 1987 the government requested the Central Bank to acquire government bonds, totaling 5 billion sucres, and to use the proceeds to cancel ENAC's debt with BNF, which, in turn, has not been able to complete the payment to Central Bank (Supreme Decree No.2971 of June 8, 1987). This operation was the last of 5 negotiated in previous years, totaling more than 9 billion sucres. This amount could be equivalent to the losses accumulated by ENAC during the 1980-88 period, of which a significant part is the value of the "subsidies", accounted for the low margins between buying and selling prices, which have not covered operational and storage costs.

This situation not only increased the fiscal deficit but also deteriorated the BNF's capital, since the credit allocated by the Monetary Board to ENAC has been automatically debited by the Central Bank from the BNF accounts at due date, without considering whether ENAC has paid or not to BNF. The secondary effects of these events are suffered by BNF borrowers, who are left with less loanable funds.

Summary

The use of formal financial resources to finance trading of rice has usually been profitable for millers and wholesalers. The use of the wholesalers "adelanto" by millers has been a recourse of last resort. If millers had access to formal commercial credit, they would have not used these funds.

The storage of rice by wholesalers has usually yielded positive rates of return. These returns have been inversely related to the level of rice supply, being relatively high in periods of shortages and relatively low in periods of oversupply.

The allocation of official loans to finance rice trade through ENAC has been substantially higher than the allocation of trade loans to private millers and wholesalers. However, because official prices do not include premiums to cover inter-regional transfer and storage costs, ENAC has been loosing money, having requested government support to cancel its debt with BNF. The amount of the subsidies have contributed to a deterioration of BNF's operating capital, hampering other borrowers as well.

CHAPTER SIX

PROFITABILITY OF LONG-TERM INVESTMENTS IN PRIVATE STORAGE FACILITIES AND DRYING AND MILLING MACHINERY

Introduction

This chapter assesses the profitability of financing long-term investments in storage facilities drying and milling machinery, and equipment. This chapter identifies investment opportunities in these items, and their costs and benefits. It measures the profitability of piecemeal financing of machinery and equipment replacements and compares it to financing the construction of completely new plants. The last section of this chapter presents a cost-effectiveness and economies of size analysis of investments in new plants.

A. Identification of long term investments opportunities

1. Piecemeal machinery replacement and additions of equipment

The records of permits submitted to the PNA either to modify the existing plants or to construct new ones show that more and more millers are substituting a mechanical drying system for the solar drying method. Most of the equipment replacements undertaken during the last 3 to 5 years have

consisted of small size drying equipment. A few more modern drying systems (the batch or continuous flow systems) have been assembled in no more than six mills during the last two years.

The installation of new drying equipment in the majority of mills have taken place gradually. The installation often begins by first buying a portable dryer (motor and burner) and building the needed drying tunnels. These drying tunnels consist of two floor closed rooms, divided by a metal screen. The upper level is the space to pile the rice. The lower level is an empty space whereby the hot air is blown inside the room. The mechanical for the solar drying substitution process rarely has been a one time decision. It is usually completed during at least two harvest cycles. The reason for both the piecemeal substitution and the selection of a relatively small size equipment derives from the lack of long-term loanable funds in the BNF and private banks to finance this type of investments. Millers, however, have invested their own resources in small size, simple drying equipment, in a piecemeal manner, both to increase operations and to slowly substitute more modern systems for the traditional processes.

Replacement of major parts of milling equipment have had a lower priority. Millers are constantly replacing the parts of their mills that wear out the most, such as sieves, sifters, screens, and more frequently, rubber rolls.

The supply of these parts has not been limited, but their prices have generally increased because of changes in the import taxes and the exchange rate.

There is still a need for major improvements in storage facilities. Technicians of the PNA estimate that of the 195,000 MT storage space no more than 30,000 MT is silo capacity. The conditions of the remaining warehouse space often provide inadequate protection from ground humidity, rodents, birds and insects. Millers recognize these inadequacies and are willing to undertake investments in remodelling and improving their warehouses. Some of them have expressed a desire to acquire silos and small machinery to move rice within the plants, such as payloaders and carts. For them, the major limitation of these investments seems to be the lack of long-term funds, both at the BNF and at commercial banks.

2. Investments in new rice milling plants

Only a few new rice milling plants have been built during the last three years (no more than 7 mills, according to PNA information). All of these plants have been classified as first category mills because their milling capacity exceeds 40 cwt/h. All of them are vertically integrated with large rice farms. Entrepreneurs have financed the construction of these plants with their own resources and commercial bank loans. These loans have been negotiated in such a way that

they can be rolled over every six months after payment of interest and usually 20 to 25 percent of the outstanding principal amount. This practice of rolling over short term loans has allowed lending institutions to adjust the interest rate to approximately the prevailing inflation rate.

The size trend in the new plants constructed has been towards larger and more modern facilities, including automated receiving equipment (grading, weighing and unloading), batch or continuous drying equipment, and automated sacking equipment. There are some concerns among technicians of the PNA and the BNF about the size, location and number of the new plants. In fact, the PNA's Engineering Department is requesting millers who plan to install a new plant with a milling capacity of 50 cwt/h or more, to include in the construction an automated receiving facility. Such a condition is currently being discussed with BNF credit officials to coordinate some regulating procedures aimed to make the rice milling industry more adequate to process the current and potentially larger rice production.

B. Profitability of financing long-term investments in rice processing and storage

1. Current capacity utilization of prototype rice mills

For a number of reasons, rice mills are not busy all year around. One reason is the time needed to repair and maintain the equipment and machinery. Another reason is the pattern of rice processing which parallels the harvest. Although milling can be undertaken at a pace different from that of drying, millers usually mill rice at almost the same pace as they dry it. This allows then to turnover the operating capital the greatest number of times possible. Once the peak harvest period ends, millers either reduce the rate of milling or shutdown the milling phase. They resume milling when they have accumulated a volume of rice that can justify turning on the mill. However, drying is a permanent activity, as long as millers purchase paddy rice.

To estimate the maximum capacity of rice milling, the hourly rate (cwt/h) has been multiplied by 8 hours of work per day. Annually, this means that 2,304 hours per year (8 hours of work per day, times 24 days a month, times 12 months) are available. These hours per year could, of course, be used in 96, 24 hours working days requiring three shifts. Based on these data, Table 6.1 shows the actual capacity utilization of mills.

Table 6.1 Maximum capacity and actual capacity utilization of mills measured in hours of work and cwt units of milled rice per year for the year 1988.

MILL SIZE	MILLING CAPACITY cwt/h	MAXIMUM CAPACITY hrs/yr	MAXIMUM CAPACITY cwt/yr	ACTUAL CAPACITY UTILIZATION hrs/yr	ACTUAL CAPACITY UTILIZATION cwt/h	% UTILIZATION
LARGE	120	2304	276480	1676	201104	73
MEDIUM	25	2304	57600	1627	40664	71
SMALL	12	2304	27648	2141	25691	93

Source: Field Survey: Annual Operating Budgets for prototype rice mills.

Small, second class mills operate at about 90 percent of their maximum capacity, while the large and medium size mills operate at about 70 percent. Using maximum capacities estimated by the equipment suppliers as a reference, the actual capacity utilization is even lower since the number of hours per year is assumed to be at least 50 percent over the figures used in Table 6.1.

One other reason for a reduced capacity utilization is the lack of financial resources. Most millers interviewed complained that funds were scarce during harvest periods. They all agreed that the practice of turning over the relatively small working capital as many times as possible helps them to increase their operating volume to levels where milling could yield positive returns. But they recognize that this practice puts a great deal of stress on their milling equipment and labor. Moreover, it requires that they

sacrifice the potential benefits of storing rice until its market price increases.

Table 6.2 compares the average total cost for these mills at their current operating level, at their break-even point, and at their maximum capacity, as estimated previously.

Table 6.2 Average total cost per cwt of milled rice estimated at current capacity utilization, at break-even level, and at maximum capacity for large, medium and small prototype mills.

MILL SIZE	BRK-EVEN cwt UNITS	AVG.COST AT ACTUAL UTILIZAT.	AVG.COST AT BRK-EVEN	AVG.COST AT MAX.CAP
LARGE	150980	1400	1698	1177
MEDIUM	59614	1478	1188	1210
SMALL	39516	1491	1165	1428

Source: Author's Field Survey

These estimations show that unit cost per cwt of milled rice is lower for the larger mill than for the medium and small mill, both at their current level of operations and at their maximum capacity. The unit costs estimated at the break-even level differ from the expected pattern because the break-even point for the large mill is found at a lower level than its current and maximum capacities, while for the other two mills, it is found at levels above their current and maximum capacities.

These findings give an indication that there may be

economies of scale in the rice milling industry in Ecuador. In fact Figure 6.1 illustrates the existence of economies of scale. The curves in Figure 6.1 are short run average cost curves. The range of mill sizes is too limited to attempt to estimate a long run average cost curve. It is apparent that the short run average cost curves for the small and medium mills turn up after certain volume (cwt units), while the curve for the large mill continues descending after a volume of about 350,000 cwt of milled rice; it turns up only after about 600,000 cwt units per year. Because these results are based on a mathematical model, it is not safe to assume that in actuality these curves show the mills cost behavior. The average costs may turn up faster and perhaps at lower operating volumes. Cost elasticities measure the ratio between marginal and average costs. These have been used to investigate economies of scale. Wailes and Holder (1987), however, suggest the inverse of the cost elasticity is a better measure of economies of scale, yet not a strict and definitive measure. To estimate both the cost elasticity and its inverse, the long-run average cost curve is needed. But it has not been possible to estimate this curve given the few point estimates that three mill sizes can offer.

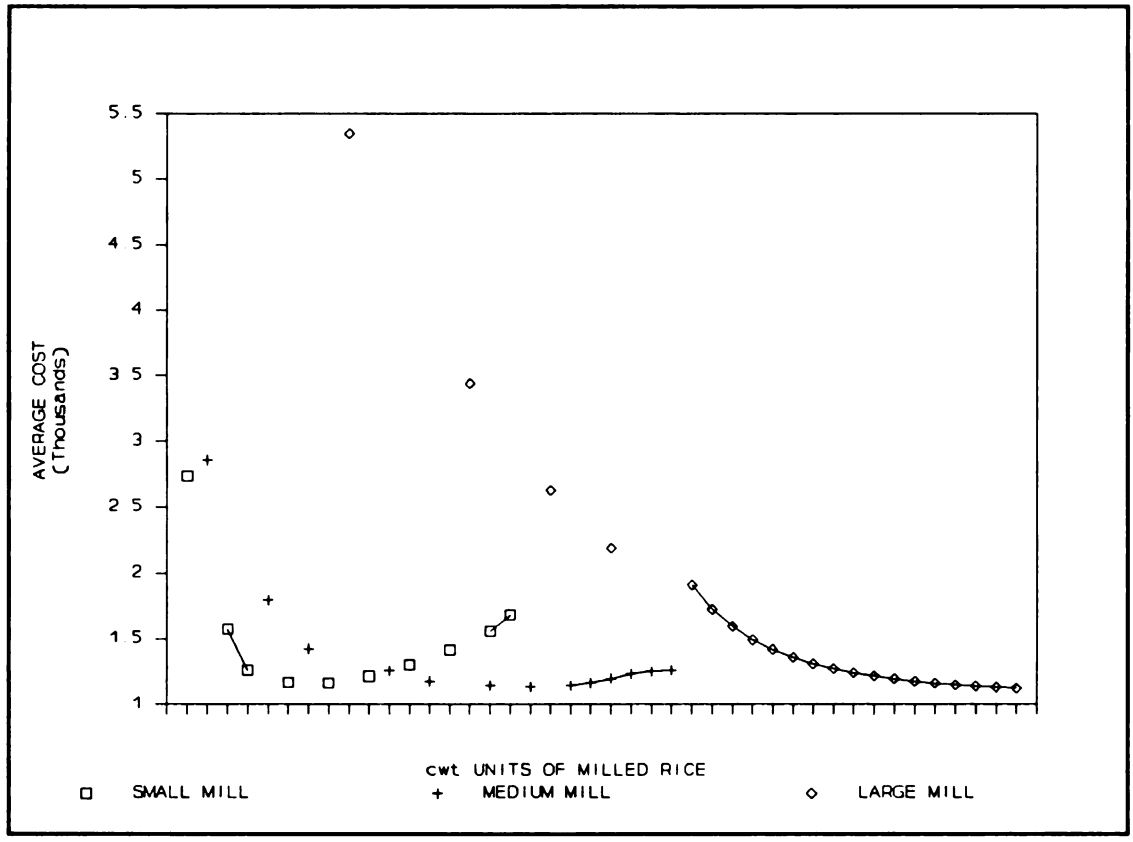

Figure 6.1 Average cost curves for large, medium, and small prototype rice mills in Ecuador.

Source: Field Survey[7]

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[7] The average cost curves were calculated using a double log quadratic function.

Large mill:

$$L(AC) = 15.9262 - 2.7983\ L(CWT) + 0.2195\ [L(CWT)]^2$$
$$(0.2251) \qquad (0.0224)$$
$$R^2 = 0.9888$$

Medium mill:

$$L(AC) = 15.9940 - 4.1842\ L(CWT) + 0.4885\ [L(CWT)]^2$$
$$(1.2193) \qquad (0.1522)$$
$$R^2 = 0.5629$$

Small mill:

$$L(AC) = 17.7295 - 5.9883\ L(CWT) + 0.8397\ [L(CWT)]^2$$
$$(1.9877) \qquad (0.2794)$$
$$R^2 = 0.3352$$

AC=average cost; CAP= cwt/h; CWT=cwt units of operation.
NOTE: The X-axis scale goes from 10 thousands cwt units to 350 thousands.

2. Profitability of financing piecemeal replacements and additions of equipment and machinery

Annual operating budgets have been prepared for the three types of rice mills. One type of budget represents mills without additional investments, i.e. as they are currently operating. Another type of mill includes replacements and additional investments. The difference between the "with" and the "without" budgets results in the incremental annual operating budget, which captures the additional costs and benefits of the new investments.

For the large mill, these new investments consist of replacements of major components of the drying system, valued at 32 million sucres, and the replacements of major components of the milling machinery, valued at 71 million sucres (author's field survey), for a total of 103 million sucres. The net present value of the incremental investment, at 15 years (the estimated useful life of the new equipment), and at a real discount rate of 2 percent, is 411 million sucres. It has been considered that 60 percent of the value of these investments is financed by a private bank loan, negotiated at 3 years term and 52 percent interest rate (as it actually happened in one case). The first 3 years' net receipts were negative, although the net cash flows were positive because of the depreciation charges (see the Appendix).

To get a positive NPV, the mill would have had to increase its operation by at least 50 percent. The average total costs per cwt would have been reduced from 1,400 to 1,298 sucres. Looking at the incremental situation, the unit cost of the additional cwt units of milled rice is only 1,048. The NPV without these new investments is 232 million sucres, for an initial capital outlay of 310.5 millions, while the incremental NPV is 411 for an initial investment of 103 millions. The contribution of the additional investments is substantial, but it depends on the increase in the operating level: the units must mill approximately 300.000 cwt units (13,636 MT) of milled rice per year, 100,000 over the current output.

The additional investments planned for the medium size mill are an additional mechanical drying system, valued at 5.13 million sucres, and warehouse improvements, estimated to cost 2.5 million sucres, totaling 7.63 million sucres. These investments would be 60 percent financed by the BNF assuming that the miller is also a rice producer and can get access to BNF's funds, for 7 years at an interest rate of 32 percent. The NPV of the incremental investment is 22.8 million sucres, assuming 15 years as the useful life of the equipment and a real discount rate of 2 percent. To increase NPV, an increase in the operating level of at least 20 percent is required. However, an increase of 30 percent is expected, that is, an annual volume of approximately 52,860 cwt units of milled rice

(2,400 MT), which is still less than the original estimated maximum annual capacity. The total average cost with these new equipment and improvements is 1,275 sucres per cwt of milled rice or about 15 percent less than the original average cost. The NPV for the initial investment of 75.6 millions estimated to last 15 years is a negative 0.5 million sucres. The discount rate used is the same as for the earlier cases. It is apparent that the incremental investments would increase the value of the firm, increasing even more the NPV of the entire project.

The additional investments planned for the small mill are a new drying system, valued at 6.48 million sucres, and a major improvement of the warehouse. The cost of these investments is estimated at 4.5 million sucres. The total new investment would be 10.98 million sucres. The NPV of these incremental investments is 8.8 million sucres, assuming also that 60 percent is financed by BNF to be repaid over 7 years term at an interest rate of 32 percent. In this case it is projected to increase capacity utilization by at least 30 percent. If this goal is achieved, the total average cost per cwt would decrease to 1,437 sucres from its original level of 1,491 sucres. Despite these outcomes, the NPV including the incremental investments will still be a negative 2.8 million sucres. To substantially improve the outcome of this mill, its operating level would have to double, making the mill work at almost full capacity.

The net receipts of the medium and small mills are negative, although the net cash incomes are positive because they include depreciation charges (Appendix A). This finding suggests that medium and especially small mills are surviving by neglecting to make depreciation allocations.

The incremental investments may help medium and small mills to improve their financial position and profitability. But there are at least 3 problems with such undertakings. One is the impossibility for mills intending to make these long-term investments to borrow from BNF. If they obtain 60 percent financing with private bank loans, at 52 percent interest and 3 years term, both the NPV and the net cash income for the first 3 years are negative. Two, if these investments are made, mills will still need additional working capital to increase their output to be able to pay off this capital outlay. Given an expected increase in the demand for funds, it is reasonable to expect that many mills will be left without adequate financing. Finally, cost-effectiveness and economies of scale are critical issues to consider. Large mills show a relatively large unused capacity that could be utilized before their average cost curves begin to turn up, and millers recognize that the more volume they process the lower is the unit cost. Consequently, large millers will be stimulated to buy ever larger amounts of paddy rice, compelling medium and especially small mills to eventually exit the industry. Large millers have easier access to credit,

both to finance investments and working capital. This gives them an additional advantage over the other millers.

Who benefits from this potential trend toward fewer, larger and more modern rice mills? Assuming competition among large mills, rice producers are expected to benefit from this trend, since the need for larger supplies of paddy rice will stimulate aggressive procurement tactics by millers. Consumers are also expected to benefit from lower prices and better quality rice. Lower prices will be possible due to lower per unit processing cost (cost-effectiveness), and better quality because larger, more modern machinery has a higher conversion rate with lower percentage of broken kernels. The owners and workers of medium size mills and the majority of owners and workers of the small mills will be adversely affected by this change toward larger mills. Exit costs are expected to be large because of the low liquidity (high specificity) of the assets, and the lack of a well developed market for used machinery.

3. Profitability of financing the construction of new plants

To assess the profitability of building new mills, the same prototype operating budgets prepared to evaluate piecemeal investments are used. Some of the basic assumptions are changed in this case. Now the interest rate is assumed to be 52 percent, which was the commercial loan rate during the

first months of 1988 and consistent with the date at which mills assets were valued. The term of the loan is assumed to be 3 years, the average term for commercial loans aimed at financing investments (not consumption). The real discount rate is assumed to be 2 percent. It is also assumed that the useful life of the investment is 15 years.

Building a complete new mill with the same characteristics as the large prototype mill, including the additional investments, and assuming 50 percent increase in the operating level and 60 percent debt financed, appears to be a profitable investment since the NPV is a positive 450 million sucres. Assuming 100 percent debt financing, the NPV is 135 million sucres; while with 0 percent debt, the NPV is 945 million sucres. The NPV remains positive under a number of assumptions about levels of debt, terms of the loan, and discount rate, up to about 7 percent. The NPV becomes negative at real discount rates above 8 percent.

The same evaluation was conducted with the medium and small mills. Under a reasonable range of discount rates, interest rates, terms of debt, the NPV is positive. However, as the proportion of debt financing increases, the NPV decreases but remain positive. But net cash income is negative while loan payments are being made. This is the situation when debt financing is over 85 percent of the investment for both the medium and small size mill. The net cash incomes do not become negative even with 100 percent debt

financing, when the interest rate of the loan reduces to 32 percent and the term of the loans increases to 7 years (see the Appendix).

Throughout all this discussion the need to increase the level of operations has been a prevalent condition for the investments to be profitable. This increase would have to derive from these sources: one, an expansion of domestic production; two, a reduction of operations by some mills, likely the small ones; three, a combination of the previous 2. An expansion of production is already taking place and is expected to accelerate in the near future (Whitaker and Alzamora, 1988a). Yet, this is a long-term process while the investments analyzed in this chapter are short-term decisions, demanding an immediate increase in supplies of paddy rice. In the short-run, increasing the operations of the large mills will have to be achieved by reducing the amount of paddy rice handled by the small mills. This suggests many more small, inefficient, and obsolete mills will exit the industry, leaving room for the installation of more modern, larger, and progressive mills. The credit related consequence of this trend is the need for a larger volume of loanable funds, and, more importantly, the need for an increase in the maximum amount of loans granted to a single firm.

4. Comparison of two financing strategies

This comparison refers especially to credit considerations. It is apparent that new plants require far more funds than partial investments to add or replace equipment to an existing mill. Given the current restrictive financial and monetary situation in Ecuador, it is now difficult to obtain large loans. This situation is exacerbated in the case of investments in the rice milling industry. Therefore, from a financial perspective, it is more likely that more partial investments will be undertaken than the construction of new plants.

This preference towards partial investments in rice mill enterprises is reinforced by the inflationary situation of the country. Inflation is currently causing two negative impacts: i) delays in the decision to replace fixed assets. Millers are stimulated to maintain their plants for the longest time possible before considering whether to replace some parts or to build a complete new plant (Nelson, 1976, 930); ii) liquidity problems when firms do not have enough cash to cover loan installments. This problem is exacerbated when firms roll over short-term credit at ever higher interest rates. A piecemeal investment can reduce the illiquidity effect caused by inflation since a positive large cash income from the whole plant can offset the negative cash flow due to the incremental investment. Investing in the construction of a

complete new plant will not have the advantage of some older assets covering the cash deficits of the new ones.

Another important aspect relates to the goodwill of existing plants. By maintaining the old plants and replacing gradually the obsolete equipment and machinery, and improving some other facilities, millers are able to maintain their clientele and attract other clients.

Summary

The analysis presented in this chapter has identified a number of potentially profitable investments in the rice milling industry. This analysis shows that piecemeal replacement of drying and milling equipment, as well as investment in storage facilities, are generally profitable investments, under the current economic and financial environment.

The construction of new mills are also an attractive investment from the financial point of view. However, this decision now faces serious financing limitations, including limitations of official and private sources of funds.

Ecuador's current inflation adversely affects investments in fixed assets in two ways. First, it compels entrepreneurs to delay the replacement of depreciated assets. And second, it causes cash flow deficits when they are undertaken with a significant proportion of debt. The next chapter will examine this latter effect.

CHAPTER SEVEN

THE IMPACT OF INFLATION ON THE LIQUIDITY OF LONG TERM INVESTMENTS

Introduction

It has been argued (Robison and Brake, 1980) that inflation generates cash flow problems for long-term investments in depreciable and non-depreciable assets, when they are debt financed. This argument has been proposed as an hypothesis in this study. The liquidity problem will be defined and, if it exists, identified and illustrated using data from the rice milling enterprise of Ecuador. Assuming the hypothesis is true in the rice milling firms, an attempt will be made to demonstrate that the presence of cash flow deficits prevents long-term investments.

A. Definition of the problem

1. Theoretical background

Robison and Brake (1980) state that:

> "Using present value techniques, we show that even accurately anticipated inflation creates liquidity or cash flow problems for farm firms as capital gains increase in relation to cash returns;

moreover, the higher the rate of inflation, the more severe the liquidity or cash flow problem of the firm."

The definition of the liquidity problem follows this reasoning. Let **V** be equal the value of an asset. The net cash income that this asset is able to generate is **R** which grows annually at rate **i**. Moreover, let **r** be the real, inflation-free discount rate. Assuming an infinite time horizon and a constant net cash income, the value of the asset will be equal to:

$$V = \frac{R}{r}$$

Now, assume that the net cash income grows annually at a rate i (the inflation rate), affecting also the discount rate. The present value of the asset will be:

$$V = \frac{R\,(1+i)}{(1+r)(1+i)} + \ldots + \frac{R\,(1+i)^n}{(1+r)^n\,(1+i)^n} + \frac{V_s\,(1+i)^n}{(1+r)^n\,(1+i)^n}$$

where V_s is the salvage value of the asset.

It is easy to see that the terms $(1+i)^t$ can be cancelled out. Assuming the series is infinite and that $V = V_s$, the value of the asset is again

$$V = \frac{R}{r}$$

But, by solving uncritically the model in this way, an important issue is missed. Consider net cash flow in the first period. It equals R(1+i). Replacing R for its equivalent value rV, the net cash flow is also equal to

$$(r + ri)\ V$$

With 100 percent financing, the interest costs equal

$$(r + i + ri)\ V$$

The difference between the receipts of the first year, which is (r+ri)V, and the interest cost is

$$\text{difference} = (r + ri)\ V - (r + i + ri)\ V$$

from where,

$$\text{difference} = -\ iV$$

It should be apparent that the first year's cash flow is not sufficient to pay the interest cost of the asset. It must

also be clear that this difference is the capital gains inflation adds to the asset's value.

2. The theoretical model in the context of rice mills investments

Two basic assumptions are made in this study that allow us to discuss the liquidity problem defined in the previous section. First, the useful life of the investments is estimated to be 15 years. And second, the salvage value of the assets is assumed to be zero, to simplify the calculations. This assumption becomes more realistic when it is recognized that there is not a well functioning market for used rice milling machinery in Ecuador.

Another assumption concerns the relationship between the nominal interest rate, the real rate of interest, and the inflation rate. The real interest rate has been defined as equal to the nominal rate of interest minus the expected inflation. The assumption in this study is that the inflation rate is constant, and thus the expected inflation is known. With this assumption, the denominator of the present value model can be substituted in this way:

$$(1 + r_n) = (1 + r)\ (1 + i)$$

where r_n is the nominal discount rate equals to the product of

one plus the real rate times one plus the inflation rate. Then the net present value model can be written as

$$V = \frac{R\,(1+i)}{(1+r_n)} + \frac{R\,(1+i)^2}{(1+r_n)^2} + \ldots + \frac{R(1+i)^t}{(1+r_n)^t}$$

If V were 100 debt financed, the constant annual installment of the loan, at t years term and r_n nominal (inflation adjusted) interest rate would be:

$$A = \frac{r_n V}{\left[1 - \frac{1}{(1+r_n)^t}\right]}$$

The last two equations will be applied to analyze the liquidity situation of the prototype mills constructed in this study, assuming they are projects to be undertaking. Several values for the relevant parameters will be used as a sensitivity approach to test the hypothesis proposed.

B. Application of the conceptual model to the rice milling industry of Ecuador

As a first approximation, it is assumed that the estimated investments for the 3 type of mills are undertaken under this set of conditions: 100 percent loan financed (shown also

60 percent debt financed), at a lending interest rate of 52 percent (commercial loan rate), and at 5 years term (t of loan). The project is assumed to have a useful life of 15 years. The rate of inflation g is assumed to be 85 percent, equal to the one observed by the end of 1988. Since the assets are 100 percent debt financed, the discount rate i is the lending rate, that is, 52 percent. When the debt financed is less than 100 percent, the discount rate is the weighted average between the commercial lending rate and the opportunity costs of capital, estimated at 60 percent.

Table 7.1 Net cash flows from estimates associated with investments in rice mills, and of annual loan installments assuming current commercial loans conditions.

	100 % FINANCING			60 % FINANCING	
MILLS	V	R	A	R	A
LARGE	413.50	137.67	245.25	137.67	147.15
MEDIUM	83.20	42.90	49.35	42.90	29.61
SMALL	58.50	28.27	34.70	28.24	20.82

V Asset's value, equal to the loan amount
R Net cash income
A Loan installment
Source: Operating budgets for prototype mills.

It is apparent that the estimated net cash income (R) is far from being enough to cover the installment of the loan (A), under the assumption of 100 debt financing. Using the

calculated figures for the large mill, the behavior of R and A for the assumed life of the investments is presented in Figure 7.1:

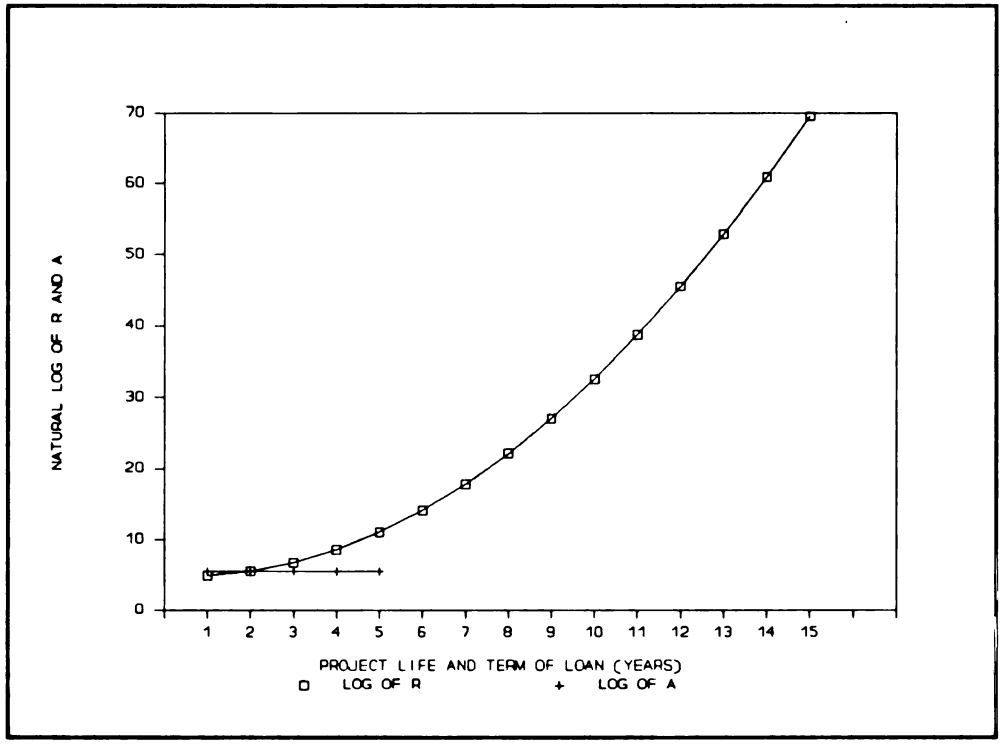

Figure 7.1 Schedules of loan repayments(A) and net cash returns (R), for investments in large rice mills in Ecuador, assuming 100 percent debt financing.

Note: The values of R and A are in natural logs.
Source: Table 7.1

Reducing the proportion of debt financing to 60 percent and keeping the other assumptions unchanged, the net cash return for the large mill is not sufficient to pay the loan installment, while the returns for the medium and small mills are enough to pay the amortization of the loan. If profits before debt service outlays were considered to make these comparisons instead of net cash returns, which include depreciation charges, the deficit problem would be dramatic; all mills show profits before loan payment that are insufficient to cover the amortization of their loans, even when debt financing is as low as 25 percent; with 100 percent debt financing, mills will have negative net profits for at least four years, perceiving positive net gains only after the period of amortization.

The model was tested also assuming that entrepreneurs can access credit from the BNF, at 32 percent interest and an exceptionally 12 year term. Both 100 percent and 60 percent financing were assumed.

Table 7.2 Net cash flows estimates associated with investments in rice mills and of annual loans installments under the assumption of subsidized BNF loan.

		100 % FINANCING		60 % FINANCING	
MILLS	V	R	A	R	A
LARGE	413.50	137.66	137.22	137.66	82.33
MEDIUM	83.20	42.90	27.61	42.91	16.57
SMALL	58.50	28.23	19.41	28.22	11.65

V Asset's value, equal to the loan amount
R Net cash income
A Loan installment
Source: Annual operating budgets for prototype mills.

It is apparent that mills are better off when softer conditions are negotiated for their loans; net cash returns from investments are sufficient to pay the loan installments, even assuming 100 percent debt financing.

This analysis indicates that inflation generates cash deficit problems in long term investments in rice mills in Ecuador, when loans are negotiated at relatively short terms and prevalent commercial interest rates, assuming that credits finance over 75 percent of investments. The liquidity problem encountered does not necessarily prevent investments to be profitable in the long run. In fact, even under the extreme conditions of financing (100 percent), interest (52 percent), and term (5 years), all mills appear to be profitable within 15 years of operations. However, if mills are not able to externally finance their cash deficits, even when they are

temporary, then their profitability is seriously hampered, and even fades away if problem is persistent.

The sensitivity analysis performed in this section suggests that softer conditions of loans to finance durable assets are able to modify the outcome of the analysis and to moderate the impacts of inflation. Extending the term of the loans and reducing the interest rate can eliminate the liquidity problem while maintaining the profitability of the investment project.

C. Credit conditions to reduce or eliminate the liquidity problem of long-term investments partially financed with loans.

An evident solution to reduce or even eliminate the liquidity problem is to schedule the loan installments to be congruent with the pattern of net returns. Such schedules of amortization fall into the moderated payment loans category. A number of methods to moderate the loan repayment schedule are discussed, such as: 1) the skip payment loan, which consists of including a grace period in the contracted term; during this period the payments of principal are skipped, and often the payments of interest; 2) the buy down loan, by which lower installments are established for the first years of the term, estimated using lower interest rates, while higher payments are demanded during later years, offsetting the

initial "subsidies"; 3) the constant principal payment loan, allowing the negotiation of an especial schedule of payments for the interests; 4) the compensated balance loans, by which the borrower agrees to maintain a certain amount of resources (balance) immobile in his/her account, earning or not a determined interest rate. Under this set of methods to moderate the payments, the graduated payment model becomes important. The lender agrees to receive payments that grow as the term of the loan reduces, in parallel with the pattern of net returns.

The graduated payment model is a modified version of the general amortization one that allows payments to gradually increase from an initial one, at a rate similar to the growth rate affecting net returns, or any other rate agreed upon by lender and borrower. The graduated payment model can have at least 2 presentations:

i) A constantly increasing schedule of payments, developed with the following rationale: Defining the first loan payment as A_1, the following payments will be given by:

$$A_t = A_1 (1+g)^t$$

where g is the growth rate (not necessarily equal to the inflation rate i), and t = 1,2, ...n-1, being n the term of the loan. The sum of these payments will be equal to the loan amount, L, plus interest, I, that is:

$$L + I = \sum_{t=1}^{n} A_t = (A_t / g) [(1+g)^n - 1]$$

The problem is to find A_1 such that the present value of the payments will be equal to the amount of loan L. This equation is:

$$L = \frac{A_1}{r_n} \left[1 - \frac{(1+g)^n}{(1+r_n)^n}\right]$$

where r_n in this case also stands for the nominal interest rate. It a simple task to solve this equation for the value of A_1 once the loan amount is known as well as g, r_n and n, the term of the loan.

ii) An increasing schedule of payments during part of the loan's term, and then a constant schedule of payments: The present value of such an schedule, which must be equal to the amount of the loan, will be:

$$L = \frac{A_1}{r_n} \left[1 - \frac{(1+g)^k}{(1+r_n)^k}\right] + \frac{A_1 (1+g)^k}{r_n(1+r_n)^k} \left[\frac{(1+r_n)^n - (1+r_n)^k}{(1+r_n)^{n+k}}\right]$$

where k is the number of years that payments increase.

The first term is the present value of the increasing stream of payments, up to year k, and the second term is the constant stream of payments that starts in year k+1 and ends in year n, the loan's term. It is again an easy task to solve this equation for A_1 once the other parameters are know.

Working with this model, it is not difficult to modify some terms to include other variations, such as a decreasing schedule of payments after an initial period of increasing payments, in such manner as to make the stream of payments to appear a bell shape; or to split annual payments into semester installments (or quarter, or monthly payments).

All these models show a precise equality between the loan amount and the present value of the payments stream; therefore, neither option means any lost for the lender. Consequently, from a financial point of view, lenders should not reject accommodating their loans to these models, which may better represent the pattern of the project's net returns. In fact, the undertaking of these alternative payment schedules may reduce the default rate that banks, especially the BNF, are confronting in their long-term portfolio. The cash deficits that borrowers face when making long-term investments with debt financing have been the cause of bankruptcy of firms in many cases.

One of the objections banks may argue against is the fact that the interest rate remains fixed for a certain period of time while inflation is rising. Currently, lenders are

granting loans for a maximum term of 6 months (most often, the loan term is only 3 months), which allows them to revise the interest rate every 6 months. These short-term loans can be rolled over by paying a portion of the principal plus interest (Author's field survey). This mechanism, however, does not alleviate the liquidity problem, especially when interest rates are high, as previously demonstrated (that net returns are insufficient to cover interest payments). It only allows borrowers to tacitly count on relatively long-term financing, but not to solve their cash deficits. In the next chapter some suggestions to cope with this problem will be discussed.

Summary

The hypothesis that inflation causes cash deficits in the financial position of firms undertaking long-term investments with debt financing was proposed for empirical investigation. The theoretical foundation of the liquidity problem was discussed before empirically testing the hypothesis. Using the constructed annual operating budgets for prototype mills, the effects of inflation in the cash flow of these enterprises were analyzed. The inflationary effects were factored into the net cash returns, making them grow annually at a rate g, and into the discount rate, making it approximately equal to the real opportunity cost of capital (the real commercial lending rate, when financing was assumed to be 100 percent

debt) plus this growth rate g. For simplicity, this rate was defined as the nominal discount rate i (= r + i + ri).

Under the assumption of 100 percent debt financing, the investments in rice mills showed liquidity problems. The net cash returns proved to be insufficient to cover the payments of the loans, contracted at current conditions: 52 percent interest and 5 years term. These liquidity problems were eliminated when the loan conditions were modified to lower the interest rate to 32 percent, to extend the term to 12 years, and to finance less than 100 percent of the investments.

Finally, some alternative schedules of payments were presented as mechanisms developed to alleviate the liquidity problem, These alternative models would attempt to adjust the payments stream to the pattern of net cash returns of the enterprises. Financially, these models precisely equilibrate the amount of the loan with the net present value of the payments stream; therefore, lenders should not be concerned about the profitability of these loan negotiations.

CHAPTER EIGHT

CONCLUSIONS AND RECOMMENDATIONS

Introduction

The central purpose of this study was to diagnose how rice marketing activities in Ecuador are financed. Attention was focused on the activities that occur as rice moves from farmers through wholesalers. The nature of the constraints that limit access to financial funds by a broader group of participants was identified. The five operational objectives were:

1) To provide a concise diagnosis of the functional organization of the rice subsector and the credit system facilitating the functioning of the marketing system.

2) To identify the major constraints limiting access to operating capital needed to finance the trading and the storage of rice.

3) To investigate the profitability of long-term investments in rice mills, storage facilities and equipment.

4) To asses the impacts of inflation on enterprise liquidity and the economic feasibility of long-term investments when capital assets are debt financed and interest rates incorporate part or all the inflation rate.

5) To recommend changes in the credit policies and related administrative procedures to deliver loans so as to

facilitate the economic flow of rice through the marketing system.

Three basic hypothesis were proposed for research. The first hypothesis was that there are artificial constraints that adversely affect the availability of credit to finance rice trading, storage and investments in drying and milling equipment and storage facilities. The second hypothesis was that official financial resources are being allocated away from investments in equipment, machinery and storage facilities associated with rice processing. Moreover, that private financial institutions are reluctant to grant loans for long-term investments. Finally, the third hypothesis was that inflation generates cash deficits when investments are financed with debt. Only when capital is sold are capital gains caused by inflation converted to cash, solving any liquidity problem associated with its purchase.

A. Summary of the principal findings of the research

Approximately 50 percent of the rice production credit is provided by BNF. The participation of private banks is relatively small. They fulfill legal requirements about composition of their portfolio by lending to large farmers, since transaction costs are lower than lending to small farmers and the default risk is perceived to be lower.

Private banks do not have enough trained field personnel

to supervise the utilization of credit and to follow up on a large number of farm level investment projects. Broader access to subsidized production credit through private banks would require a larger cadre of field technicians and higher administrative costs. The alternative to hiring their own field experts would be to contract outside technical personnel which would not only be expensive but would take the supervision of loans out of the direct control of the banks. So private banks meet their legal requirement to allocate part of their loanable funds to the agricultural sector by lending to a few, large borrowers.

Financing land improvements is possible under officially managed lines of credit. However, there are restrictions for small farmers to access these financial resources. Rationing subsidized interest rate loans is achieved by raising the level of transaction costs. Even though the BNF credit regulation permits loans to farmers without legal ownership of land, in practice, BNF and private banks participating in the Financial Funds Mechanism do require land ownership titles. This title as well as other documents requested by the banks as requisites for loans are costly to obtain. Producers cooperative organizations have proved to be helpful in ameliorating these restrictions as they affect small farmers.

The study has indicated that part of the production credit needed, especially by small farmers, are channeled

through millers under the "fomento" mechanism. Although most of the miller loans finance only harvesting expenses, some also finance the acquisition of agro-chemical inputs.

At the wholesaling level, access to credit seems relatively concentrated in the hands of a small group of large, national wholesalers. This group of participants handles about 65 percent of the total milled rice marketed in Ecuador. The author's field survey reveals that this group of national wholesalers numbers less than 20 entrepreneurs, while the group of provincial wholesalers is estimated to be about 3 times larger, and the group of urban wholesalers is considerably larger. The modernization of the banking system through the automation of deposit account management obligated many participants to leave the wholesaling business. Previously, the purchase of rice using check payment instead of cash gave wholesalers at least 2 weeks of costless credit, the time required for their checks to clear. Meanwhile the wholesalers could liquidate their stocks and return to millers for another stock of rice. At present, almost all banks have computerized national accounting systems so that the clearing of checks is almost instantaneous. The use of checks has now become equivalent to the use of cash.

The capacity of existing rice mills seems to be more than adequate to process the rice currently produced domestically. Yet, milling efficiency appears to be relatively low. There are about 1,200 mills, out of which only 15 have a milling

capacity of over 50 cwt/h, and only 3 have capacity larger than 100 cwt/h. Meanwhile, in the United States the smallest mill has a capacity of 167 cwt/h. As an overall average, Ecuadorian mills are operating at about 70 percent of their estimated capacity, partly because of the limited availability of working capital. This limited availability has been heavily influenced by misconceptions concerning the legitimacy of private storage, and by a pervasive anti-intermediary bias on the part of policy makers and bankers. Since commercial credit to finance rice trade and storage has been limited and concentrated, only a few, large millers have been able to access private banks for loans in the amounts needed. The rest of millers have had to rely on the wholesalers' "adelanto" financing, which has proven to be more expensive than commercial loan financing.

The research conducted does not provide a definitive answer to the question of whether or not there is enough cost-effective drying, milling, and storage capacity in the country. A more definitive answer needs further examination and specificity. If the question refers to mechanized drying capacity, the answer is more likely to be no. There is not enough mechanized drying capacity. If the question is the adequate cost-effective milling capacity, the answer is also likely to be no. There are many small, technically inefficient mills with low milling conversion rates that produce a high proportion of broken kernels, and that work at low

capacity utilization rates. Furthermore, the majority of the mills are more than 10 years old, and many have been running for 20 years without major replacements or any remodelling investments. Finally, if the question refers to silo storage capacity, the answer is a definitive no. Only a few mills have metal bins or silos technically adequate to conserve grain quality. Most of the mills' storage facilities are simple warehouses, poorly protected from humidity and insect invasions.

There are many potentially profitable investments in rice mills. However, there are not lines of credit at the BNF and the CFN to finance these investments. Commercial loans, on the other hand, are restricted and allocated under strong, and yet not strictly economic, rationing criteria.

Millers and wholesalers have had to compete with ENAC in paddy and milled rice trading as well as in the storage of rice. ENAC's intervention has usually been at a low level, except during periods of oversupply. ENAC's participation has usually resulted in financial losses because the spread between the purchase and the selling prices has not been enough to cover operation and storage costs. These losses represent the amount of the subsidy that the government has been offering to consumers. However, these losses have never been recognized as subsidies and they have never been included, ex-ante, within the government budget. When the losses have occurred, they have been attributed to poor

administration.

This study has found a close relationship between the high variability of prices and the delays when ENAC is making decisions on importing or exporting rice as a way to stabilize domestic rice prices. ENAC's responses to shortages of rice have taken long periods of time and imports have been received and distributed after domestic production has recovered. The release of these imports have usually coincided with domestic harvest, depressing prices further. ENAC's exports have been decided after domestic prices have plummeted.

B. Concluding remarks about financing operating capital

1. Working capital financing

Access to subsidized loans, in general, has not been easy for small producers and small millers, especially to finance a portion of their working capital needs. The amount of loans received by small farmers from BNF has not usually included the resources to finance activities such as rice harvesting, transportation and storage. The loans from BNF are supposed to cover, at least, 80 percent of the cost of production, and are supposed to be granted for a 2-year term. However, the majority of rice production loans have been negotiated at 180 days, maximum. Moreover, the 80 percent participation has been based on BNF's estimated costs of production which have

been consistently lower than those estimated by the PNA. The reason for this limitation is of a legal nature and is related to the disposition of the rice placed as collateral for the loans and once the rice is harvested and sold, the physical collateral of the loan disappears. Another reason for this limitation concerns the loan delivery system utilized by BNF. This system consists of partial disbursements of the total loan, made after pre-established cropping investments have been verified. The last disbursement would then be delivered after the last set of activities have been undertaken, which includes harvesting and transportation. But when farmers have already harvested and sold their production, what would be the need for the last disbursement?. This procedure reinforces the lack of financial resources that small farmers have to accomplish basic activities such as harvesting, post-harvest conditioning of the grain, transport and storage of rice.

If the access to BNF's credit for small rice producers has been restrictive, it has been more so for small rice processors. Most millers who are vertically integrated with production, have negotiated production loans and used a large part of the funds to finance their working capital needs. Those millers who are not vertically integrated have had more difficulty in getting loans from the BNF.

Commercial private bank loans have been less constrained than subsidized (BNF's) loans. Millers and wholesalers have had to develop personal relationships with commercial banks

in order to have access to working capital loans. Since the rates of interest have been higher than BNF's rates, borrowers have been required to increase their returns by increasing their turnover ratios. Wholesalers seem to have had easier access to these funds than millers because of their proximity to the banks and the high daily average balance in their bank accounts.

2 - Operating capital to finance rice storage

The access to subsidized credit to finance private sector storage of rice has been very limited: perceptions and biases against "speculation" have contributed to reinforce this limitation. Another reason for the limited availability of storage loans has been the competition from ENAC for these funds. Commercial bank loans have been used extensively by a few large millers and especially by wholesalers.

The restriction found by millers to access sufficient amounts of formal financial resources to substitute for wholesalers' advances in the financing of rice storage, have reduced millers' returns, and have diminished incentives to undertake investments which could make the flow of rice smoother and less costly.

3. Financing long-term investments in rice marketing activities

Subsidized lines of credit to finance long-term investments, such as dryers, shellers and huskers, storage facilities, and minor equipment outside farms have been denied by credit authorities during the last three years. The main reason has been the uncritical perceptions expressed by credit policy makers that existing rice processing capacity is already sufficient to provide adequate drying, storing, and milling services in the country. This perception has dominated the allocation of funds provided by the World Bank and IDB. However, the contention of this study is that, although the current processing capacity may be sufficient to handle all the rice being produced domestically, the status and technology of the rice processing facilities needs to be upgraded. It needs upgrading not only to serve more cost-effectively the existing and projected domestic demand, but also to take advantage of the possibilities of exporting rice to neighboring countries, and to be able to supply these markets with a dependable flow of high quality rice.

Despite the evidence that long-term investments in rice milling and storage activities are profitable, inflation creates two basic problems. First, it delays the replacement of machinery and equipment, and second, it creates liquidity problems for investments in major equipment replacements and

large investments in remodeling rice mills. These inflation effects discourage long-term investments in the rice subsector.

C. Related demand and supply considerations about subsidized credit

Subsidized interest rates generate market distortions by channeling funds toward investments that would not be undertaken if loans were not provided at subsidized interest rates. Investment in small size rice mills would not be attractive if financed with market interest rate loans. Small rice mills have proliferated because of subsidized loans provided especially during the petroleum boom (mid 1970s).

Subsidized interest rates usually benefit larger borrowers (farmers, millers and wholesalers) and discriminates against small borrowers, since transaction costs and default risks to the lender are usually higher for small borrowers than for larger ones. Financial intermediaries, especially the BNF, recognize that their financial returns are lower than the true opportunity cost of capital and, often, lower than the inflation rate. One way they can reduce costs is to reduce fixed costs such as inspections and legal documentation. Since these transactions costs depend directly on the number of loans, lenders try to reduce the number of loans and increase the size of each loan.

Subsidized interest rates, that is, low or even negative real interest rates, prevent people from holding money balances. They recognize they will inevitably lose purchasing power at the rate of inflation. So money balances are transferred as quickly as possible from hand to hand, causing an increase in the velocity of money. Assuming that money supply (M) and the real output of the economy (Q) are held unchanged, the price level (P) necessarily increases, thus raising the inflation rate.

Low interest rates narrow the incentives to save and mobilize financial resources, reducing the amount of loanable funds at financial intermediaries, causing a capital deterioration of all lending institutions, especially of the state supported ones. To satisfy an ever increasing demand, these state financial institutions have to rely on ever larger government transfers and loans from external donors, which ultimately press upward on inflation.

D. Recommendations

The recommendations that follow contain prescriptions that could significanlty correct the inadequate credit supplies available to many borrowers with legitimate loan requests. The first recommendation is to increase the amount of loanable funds investments in the financial system of Ecuador and to stimulate a more significant participation of

private banks in financing rice trade, storage and long-term investments in the rice subsector. The second recommendation is to extend the use of an existing system of informal credit aimed basically at reducing transaction costs for loans to small rural borrowers. The third recommendation is to use credit to guide investments in drying and milling equipment and storage facilities, in such a way that the industry is helped to become more cost-effective, progressive and competitive. The fourth recommendation relates to the role of ENAC in the rice marketing system and proposes a concise objective and a mechanism for this intervention. Although this recommendation is not immediately associated with the financial aspects of rice marketing, it does have a direct effect in the financial mechanism supporting rice marketing, since a reduction of the credit allocated to ENAC's market intervention will increase the funds available for the private sector. Finally, the fifth recommendation considers moderated payment schedules for loans by both private banks and the BNF.

1. Private banks participation in financing marketing, storage, and long-term investments in the rice subsector

The credit policy needs to stimulate private banks participation in the financing of rice marketing activities. The obligation private banks have to complete their portfolio with 20 percent agricultural sector loans is one measure but

it provides no economic incentives to avoid concentrating their loans. Instead of this regulation there should be some minimum percentage of the total number of loans to be agricultural loans, to diminish the concentration of loans into a few large borrowers.

Banks are requested to maintain up to 31 percent of their current demand and term deposits into cash and deposits in the Central Bank, as "legal reserves". These funds do not yield any financial return. It has been estimated that every 2 percent increase in these reserves reduces the amount of loanable funds from the financial system by about 10 billion sucres (Boletines Mensuales, Banco Central). It may be possible to permit private banks to complete the 31 percent of legal reserves with evidences or certificates of loans granted to specific items within the agricultural sector, up to a certain proportion (this could be 2 percent of the legal reserves, equivalent to about 10 billion sucres). These additional loans to the agricultural sector would not serve to fulfill the 20 percent of loans that have to go to this sector because of other regulations. The items that these additional funds could finance would be long-term investments in drying and milling equipment as well as in storage facilities.

The mechanism to implement this recommendation may consists of "certificates of agricultural credit" (a financial instrument that would have to be approved by the monetary

authorities) that private banks can deposit at the Central Bank as part of their legal reserves. These financial instruments can be of two classes: 1) class "A" designed for short-term loans to finance rice trade and storage; 2) class "B" designed for long-term loans to finance long-term investments such as equipment and construction of storage facilities.

The incentive for private banks to use these financial instruments stems from the opportunity private banks have to earn profits from funds that otherwise would yield no return. The advantage for credit policy officials stems from the opportunity to direct unutilized funds toward specific investments.

2. Innovations in the credit delivery system

The significant participation of millers as another source of funds to finance rice production has been apparent. This informal financial mechanism lacks transparency, despite its extensive use especially by small rice producers. It is recommended that this informal system be integrated into the formal credit mechanism. This mechanism can be interpreted as an indirect granting of loans and its design would be as follows. Millers would contract with the BNF a "trade line of credit", collateralizing this operation with a mortgage on their mills. At harvest time, millers can purchase paddy rice

from farmers issuing checks against this trade line of credit at BNF, to be cashed by or deposited at the BNF (in the Ecuadorian legislation, the name of a check with the condition that it be cashed by a specific bank is "cheque cruzado"). The BNF would then have the opportunity to require farmers to cancel their production loans or to repay part of it. Millers would settle with the BNF on the amount utilized from their trade lines of credit. On the suggestion of the author this mechanism has already been implemented in two branches of the BNF, located within the rice producing area, during the Winter harvest of 1989. This experience showed that the mechanism could work smoothly and serve a large number of millers and small farmers, as well as the BNF. One problem, however, was the accumulation of outstanding debt into a single account over the limit permitted by BNF's regulation. This problem could be avoided by requesting millers to repay their loans as they sell milled rice. In this way, the outstanding balances would never be above the established limit.

With some modifications, this mechanism can be extended to private banks as well. Millers could contract with private banks to open trade lines of credit, collateralizing these operations with a mortgage on their mills. Millers would use the funds provided under this mechanism to purchase paddy rice from farmers. The assumptions upon which this mechanism is expected to work are two. First, millers need paddy rice to operate at a profitable level of capacity utilization.

Second, there are many small farmers who have difficulties obtaining loans directly from financial lending institutions. Yet, they have developed stable financial arrangements with millers. Millers would gain a fixed commission for their intermediation of credit. The miller-farmer contract would include a clause stipulating that the farmer could pay back the loan either in cash or in kind, depending on the price offered by the miller compared to the market price. The advantage to the private bank is a considerable reduction in transaction costs.

3. Guiding the construction of cost-effective mills, their number, and locations

Credit policy makers, especially those in charge of monitoring the FOPINAR (Small Industry and Artisanry Promotion Funds) program, can use the credit delivery system to influence investments toward cost-effective size of mills. A range of cost-effective prototype rice mills needs to be designed as references for new projects. These model mills could be used to assess the technical and economic feasibility of loan proposals. If the financial institutions do not have the technical staff to assess the projected cost-effectiveness of the proposed new plants, they can contract the technical, financial and economic evaluation of these projects with the National Rice Program, which has an Engineering Department

able to undertake such assessments, or with private consulting firms.

4. Defining the role of ENAC in the rice marketing system

ENAC was created basically to regulate the markets of basic food products. Neither ENAC's law nor its regulations have defined concretely what should be understood by "regulating" the markets. This objective has usually been interpreted as "controlling" the markets, translating this command into serious efforts to enforce minimum support prices for farmers and ceiling prices for consumers. These prices have consistently been set too high for producers and too low for consumers, creating problems for private sector intermediaries. One of the Central Bank's actions has been the allocation of large amounts of official credit to ENAC to finance the always expected but rarely accomplished goal of buying more than 30 percent of grain production. In fact, ENAC has rarely accomplished such a goal, mainly because of insufficient funds (despite government allocations) and due to the Central Bank and BNF's cumbersome procedures and delays to effectively allocate the funds into ENAC's accounts. The intervention of ENAC has thus absorbed large amounts of highly subsidized credit, which otherwise could have been used by private sector participants.

The recommendation is to redefine the role of ENAC in

grain marketing, specifically in rice marketing, converting ENAC from a controller to a regulator institution. Market regulation would require a less aggressive intervention and, therefore, less financial resources. ENAC's objective should be to regulate the grains market. A goal towards this objective could be to stabilize prices, cutting the excessive increases and the drastic falls by managing a buffer stock, an agile foreign trading capability, or a combination of both. ENAC's decision to intervene in the market could respond to price signals instead of estimating shortages or oversupplies of grains. The recommended stabilization policy that ENAC should pursue include the implementation of a price band scheme (Pinckney, 1988; Ahmed and Bernard, 1989; Hugo, Tschirley and Ramos, 1989; Quezada, 1989) along with an efficient management of foreign trade.

From the point of view of government cost, this policy has proven to be less expensive than a more aggressive strategy of price controls and food self-sufficiency. The cost saving can be converted into additional funds to be loaned to the private sector. From the private sector viewpoint, this policy has the advantage of reducing instability and uncertainty, stimulating private sector participation.

5. Negotiation of moderated payments schedule in loans aimed to finance long-term investments

Lending institutions should consider negotiating credit conditions which would mitigate liquidity problems of long-term investments under conditions of high inflation. A number of moderated payment loans can be considered as options to reduce liquidity problems of debt financing. The graduated payment loan is suggested, including some modifications which would allow payments to adjust better to the pattern of net cash income of the investments.

E. Some suggestions for future research

This research has shown some evidence that Ecuadorian milling enterprises are evolving toward larger and more modern plants, and that they are able to gain economies of scale. Before new larger-scale plants are constructed, it would be useful to design a profile of an efficient rice milling industry, indicating a range of economically efficient sizes, an adequate number of enterprises to serve the subsector, and their more convenient locations, in the context of Ecuadorian conditions.

A related area of future research is the capital-for-labor substitution in the rice milling industry and the impact on the rural employment situation. The trend within the rice

milling industry is expected to increase the capital/labor ratio, at least in the technical side of mill operations. It is also expected to press some small rice milling enterprises to exit the industry. These changes will have an impact on rural employment that needs to be evaluated. This change is a long-term process during which labor employment could be adjusted and reallocated to other rural and urban activities, including new crops for export markets, agro-industry development, small industry enterprises to serve the needs of a more mechanized rice subsector and a more industrialized food system.

APPENDIX

APPENDIX

FIXED ASSETS OF A LARGE RICE MILL VALUED AT 1988 PRICES

ITEMS	Sucres
Receiving equipment	6,500,000
Payloader and 4 trucks	80,000,000
Drying equipment	32,000,000
Milling equipment	142,000,000
Drying tunnels	6,400,000
Concrete platform	4,600,000
Warehouse	14,000,000
Plant buildings	25,000,000
	310,500,000

Source: Author's Field Surveys.

ANNUAL OPERATING BUDGET FOR A LARGE RICE MILL
DURING 1988

	CONCEPT	ANNUAL TOTAL	COST/ cwt
1	BASIC DATA		
a	Hours of operation	1471	
b	Sacks purchased	185000	
c	Sacks dried	185000	
d	Sacks milled	185000	
e	QQ milled rice	201114	
2	Fixed Costs:		
a	Receiving equip. deprec.	650000	3.23
b	Payloader and trucks	8000000	39.78
c	Drying equip. deprec.	2133333	10.61
d	Milling equip. deprec	9466667	47.07
e	Drying tunnel depre.	320000	1.59
f	Concrete platf. deprec.	230000	1.14
g	Warehouse deprec.	700000	3.48
h	Plant bldg. deprec.	1250000	6.22
i	Insurance, license & fees	45619030	226.83
j	Administration	21600000	107.40
k	Long term loan PMT	63431741	315.40
l	Interest on Investm.	27324000	135.86
	FIXED COSTS	180724771	898.62
3	Variable Costs:		
a	Utilities	3203958	15.93
b	Fuel, oil and grease	10119500	50.32
c	Repair & mainten.	20691118	102.88
d	Labor	6321894	31.43
e	Other expenses	20997032	104.40
f	PMT WC bank loan	117965361	58.13
g	PMT whlsalers adv.	97183583	54.78
h	Storage costs	15587083	77.50
i	Interest on Wkg. Cap.	12235404	60.84
j	COST OF PADDY RICE	834232063	4148.06
	Total Var. Costs	1138536994	556.22
	Total Costs	1319261765	1454.84

ANNUAL OPERATING BUDGET FOR A LARGE RICE MILL
DURING 1988

	CONCEPT	ANNUAL TOTAL	COST/ cwt
4	GROSS RECEIPTS		
	Banks WC loans	106275100	528.43
	Wholesalers' advan	86166988	428.45
	Milled rice sold	994923792	799.01
	Broken rice	37349400	185.71
	Powder of rice	48020657	238.77
	Total Receipts	1272735937	1223.50
5	NET RECEIPTS	-46525828	-231.34
6	NET CASH INCOME	15783576	78.48

Source: Author's Field Surveys.

FIXED ASSETS OF A MEDIUM RICE MILL
VALUED AT 1988 PRICES

ITEMS	Sucres
Receiving equipment	800,000
Drying equipment	12,000,000
Milling equipment	40,000,000
Drying tunnels	8,000,000
Warehouse	2,800,000
Plant buildings	12,000,000
	75,600,000

Source: Author's Field Surveys.

ANNUAL OPERATING BUDGET FOR A MEDIUM RICE MILL
DURING 1988

	CONCEPT	ANNUAL TOTAL	COST/ cwt
1	BASIC DATA		
a	Hours of operation	1520	
b	Sacks purchased	38000	
c	Sacks dried	38000	
d	Sacks milled	38000	
e	QQ milled rice	40664	
2	Fixed Costs:		
a	Receiving equip. depre.	80000	1.97
b	Drying equip. deprec.	800000	19.67
c	Milling equip. deprec.	2666667	65.58
d	Warehouse depreciat.	140000	3.44
e	Drying tunnels deprec	400000	9.84
f	Plant bldg. depreciat.	600000	14.75
g	License & fees	27000	0.66
h	Administration	9600000	236.08
i	Long term loan PMT	15444250	379.80
j	Interest on Inves.	6652800	163.60
	FIXED COSTS	36410717	895.40
3	Variable Costs:		
a	Fuel and utilities	2544393	62.57
b	Oil and grease	870960	21.42
c	Repair parts & maint.	2916500	71.72
d	Labor	3335810	82.03
e	Other expenses	3632130	89.32
f	PMT WC banks loans	24230723	59.05
g	PMT whlsalers adv	19962033	55.65
h	Storage Costs	3201671	78.73
i	Interest on W.C.	2513218	61.80
j	COST OF PADDY RICE	171355775	4213.90
	VARIABLE COSTS	234563213	582.30
	TOTAL COSTS	270973930	1477.69

ANNUAL OPERATING BUDGET FOR A MEDIUM RICE MILL
DURING 1988

	CONCEPT	ANNUAL TOTAL	COST/ cwt
4	GROSS RECEIPTS		
	Banks W.C. loans	21829480	536.82
	Wholesalers' adv.	17699165	435.25
	Milled rice	202264937	760.10
	Broken rice	7702630	189.42
	Powder of rice	9903381	243.54
	TOTAL RECEIPTS	259399594	1193.06
5	NET RECEIPTS	-11574336	-284.63
6	NET CASH INCOME	2278349	56.03

Source: Author's Field Surveys.

FIXED ASSETS OF A SMALL RICE MILL
VALUED AT 1988 PRICES

ITEMS	Sucres
Receiving equipment	500,000
Drying equipment	8,600,000
Milling equipment	22,000,000
Drying tunnels	4,500,000
Concrete slab	3,600,000
Warehouse	1,600,000
Plant buildings	6,600,000
	75,600,000

Source: Author's Field Surveys.

ANNUAL OPERATING BUDGET FOR A SMALL RICE MILL
DURING 1988

	CONCEPT	ANNUAL TOTAL	COST/ cwt
1	BASIC DATA	2.00	
a	Hours of operation	2017	
b	Sacks purchased	24200	
c	Sacks dried	24200	
d	Sacks milled	24200	
e	QQ milled rice	25691	
2	Fixed Costs:		
a	Receiving equip. deprec.	50000	1.95
b	Drying equip. deprec.	573333	22.32
c	Milling equip. deprec	1466667	57.09
d	Drying tunnel depre.	225000	8.76
e	Concrete slab deprec.	180000	7.01
f	Warehouse deprec.	80000	3.11
g	Plant bldg. deprec.	330000	12.84
h	License & fees	19000	0.74
i	Administration	6000000	233.54
j	Long term loan PMT	9683300	376.91
k	Interest on Investm.	4171200	162.36
	FIXED COSTS	22778500	886.62
3	Variable Costs:		
a	Fuel & utilities	2066352	80.43
b	Oil and grease	217800	8.48
c	Repair & mainten.	1639550	63.82
d	Labor	3267000	127.16
e	Other expenses	2767438	107.72
f	PMT WC bank loan	12344916	47.62
g	PMT whlsalers adv.	10170131	44.87
h	Storage costs	1904705	74.14
i	Interest on Wkg. Cap.	1280418	49.84
j	COST OF PADDY RICE	87301258	3398.09
	Total Var. Costs	122959568	604.08
	Total Costs	145738068	1490.70

ANNUAL OPERATING BUDGET FOR A SMALL RICE MILL
DURING 1988

	CONCEPT	ANNUAL TOTAL	COST/ cwt
4	GROSS RECEIPTS		
	Banks WC loans	11121546	432.89
	Wholesalers' advan	9017259	350.99
	Milled rice sold	103980954	649.24
	Broken rice	4885705	190.17
	Powder of rice	6281621	244.50
	Milling services	2481878	96.60
	Total Receipts	137768963	1180.51
5	NET RECEIPTS	-7969105	-310.19
6	NET CASH INCOME	387513	15.08

Source: Author's Field Surveys.

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