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Impact of government pricing policies on cereal grain producers in Haiti

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by

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INTRODUCTION

In all countries in the world, government plays a certain role in the economy. In developing countries particularly, government interventions may take several dimensions ranging from macro to microeconomic levels. Under competition, an economy can achieve an optimum allocation of resources by the sole interaction of supply and demand. This is essentially the meaning of the idea of "invisible hand" first used by Adam Smith to refer to the market forces which influence the allocation of resources. Economic agents are normally assumed to be rational i.e., consumers maximize utility and producers maximize profits. In an economy where the two sides (supply and demand) of the markets are left to themselves, prices are signals that influence economic decisions. Under these conditions, it is easy to understand that government interventions in the economy disturb its normal mechanism. They generate price and quantity distortions which may result from a set of government policies.

Developing countries tend to have a broad range of price-distorting policies. Any price distortion imposes a burden on certain groups of economic agents in the economy. For instance, someone must pay for the implementation of a subsidization policy by the government. If a per unit tax is imposed on a particular commodity, the government tax

revenue is paid by either producers or consumers of that commodity or both, depending on the elasticity of supply and demand. For any policy, there are losers and gainers. The overall evaluation of a policy must, therefore, refer to its net social costs.

In Haiti, as in any other developing countries, the government intervenes in the economy in several ways. This study focuses on the government interventions related to the agricultural sector of Haiti. It addresses the issue of how some government policies may affect selected producer groups. These policies globally are pricing policies and the group of economic agents under focus are the cereal grain (corn, sorghum and rice) producers. The policies are captured through the price change they generate. More specifically, this study looks at the impact of price changes (under government policies) on the producers of cereal grains (corn, sorghum and rice) in Haiti.

Corn, sorghum and rice are three staple foods entering in the Haitian daily diet. Although the focus in this study is not on the consumer side, it is important to understand that the high demand for these cereals motivates farmers to devote an important portion of the land base of the country to the production of these three crops from which many farmers derive a substantial part of their income. Under these conditions, any change in the price of these cereals

will have an impact on grower income. In a situation like Haiti where producers of a certain crop are also consumers of that crop, income refers, in a strict sense, to the money income that comes from the sale of the surplus of production over consumption or marketed surplus. This study looks at the income effect of price changes on cereal grain producers that may also be consumers of the grains they produce.

This study is divided into five chapters. Chapter One focuses on the Haitian agriculture history and problems. It also contains a discussion of the government agricultural policies during the last two decades. Chapter Two includes a description of the methodology and the survey that are used for the study. Chapter Three provides insights on the general characteristics of the farms in Haiti. Chapter Four focuses on the analysis of policy impacts. Chapter Five summarizes the policy implications and concludes.

CHAPTER ONE. THE HAITIAN AGRICULTURE: HISTORY, PROBLEMS AND GOVERNMENT POLICIES

History

In 1492, a Spanish expedition led by Christopher Columbus arrived on the Quisqueya island (today Haiti and the Dominican Republic), a country inhabited by Indians. The newcomers found themselves in a territory where gold was abundant and did not hesitate to fight against these Indians in order to take possession of the whole country. Once their power was set up, they reduced into slavery the first inhabitants of Quisqueya and exploited carelessly the gold that was one of the major resources in this country. Following this discovery that brought about a massive accumulation of gold in Spain, the Spanish kingdom in Europe developed into an important economic power. Such a situation stimulated the jealousy of other countries like France and England that managed by filibustering actions against Spanish ships to steal a part of the wealth of the Quisqueya island. After a long period of great rivalry among the European colonial countries, Spain decided in 1697 by the Ryswick Treaty to give a part (1/3) of the Hispaniola island (so called during the Spanish occupation) to France.

When the French obtained from Spain the western fraction of the island, gold was no longer available in the country. The only way to take advantage of Saint-Domingue (so called

during the French occupation) was through agriculture. High quality land was a plentiful resource at that time but labor was not. Labor was imported from African tribes by the French colonists for the development of agricultural activities. Under a double exploitation of land and man, large plantations of sugar cane were set up on the colony of Saint-Domingue. According to the mercantile principle established at that time, the colony supplied raw materials to the French mainland and received from it all the manufactured goods needed. In this way the colony could not have any free trade with other nations.

The large plantations economy that was practiced by the French in Saint-Domingue was based upon a slavery system which was antithetical to human rights. Therefore, the basis of the colonial system was not firm enough to last forever. Towards the end of the eighteenth century, the black slaves of Saint-Domingue protested against the colonial regime. Some escaped from the plantations and went to live a more independent life in the mountains. Little by little, the blacks and the mulattos unified themselves to fight against the French colonists for freedom and possession of complete human rights. In 1804, after a relatively long period of war, Saint-Domingue emerged as an independent nation.

After the independence, the first government of Haiti (so called after the independence) believed that the large plantations economy should be maintained. However, labor scarcity due to the death of an important part of the population during the liberation war and land damages which occurred at that time limited the effectiveness of the large plantation system. Moreover, previous slaves manifested a great aversion to the large plantations that they associated with the slavery period. In 1809, Alexandre Petion, one of the two leaders who shared the direction of the country at that time, undertook in the Southern part of Haiti the first land reform in Latin America. Some years later, Henri Christophe, the other leader, did the same in the Northern part. Through their land redistribution policy, they changed the basis of the economic structure of the country from the state large plantations system to the individual unit plantation system. The lack of labor to maintain the large plantations turned out to be the major reason for this land reform.

From the nineteenth to the twentieth century, the population of Haiti expanded at a rapid and increasing rate. The rural customs and the inheritance law (which recognized inheritance rights to all children) generated a minifundia system over time. Land plots became so small that many rural families live today in a condition of extreme poverty.

Furthermore, the country's agriculture today is mainly based upon small holder's enterprises. The small farmer's income is deteriorating more and more.

At the government level, there has been little explicit attempt to improve the situation of Haitian agriculture today. Rather, some government policies make it clear that the incentive to ensure a betterment to the farmers' conditions does not exist in Haiti. The urban population and the political structure of the country often take advantage of the farmer's work, without in turn, caring about the problems of the agricultural sector and seeking to solve them. Rural poverty in Haiti is a phenomenon that gives evidence of the agricultural problems in this country. These problems are essentially social, physical, technological, financial, commercial and political.

Problems

Social Problems

In a country where the level of technological development is reasonably high, population increase, up to a certain limit, is not an obstacle to development. In Haiti, however, the demographic pressure is an important social factor responsible for the deterioration of the natural environment. In 1983, the net increase in population was estimated to be 1.9% per year with 1.8% and 2.4% in rural

and urban areas, respectively. The ratio of population/land is very high. From an economic perspective, the population pressure has pushed the rural income to the subsistence level and has led to diminishing marginal returns to the land factor and decreasing marginal productivity of labor in the major farming areas. Overpopulation has led people to farm on the sharp-sloped mountains of the country and to cut down the forest trees. As an immediate consequence, important amounts of the fertile topsoil are being lost by erosion. According to the World Bank, from around 300,000 hectares under cultivation, 10-15,000 hectares are being lost to soil erosion annually and almost 1.1 million hectares have been denuded of soil, becoming essentially wilderness with little or no vegetation. Small farms in the mountains have become unproductive as the soil got more and more rocky.

Population pressure is also one of the key explanatory variables for the Haitian migration within the country and abroad, and the pattern of farm size that exists in Haiti. The agricultural sector in this country is dominated by the existence of a large number of small farms. This results from the customary law on division of property upon death. The customary law, which is more common in the countryside, allows a greater land subdivision than does the written law. Of more than 600,000 farms in the country, it was estimated

that in 1985 more than 90% of the farms had less than 3 hectares (World Bank). Such a situation, by lowering farmers' income and generating poverty in the rural area restricts agricultural reinvestment and growth in the agricultural sector.

The small farm units are generally a set of small plots located in different places. The management of various distant plots sometimes obliges the male peasant to choose a woman in every place where he cannot practically go very often. This practice adds to the population pressure and the problems of small farm size. Many farmers do not have any legal title on the land they are cultivating. The precariousness of their land tenure discourages them from carrying out land improvements. Usually by the means of raised livestock, farmers transfer fertility from plots where ownership is less secure to plots close to home for which ownership is always more secure. Animals are grazed on the former and their residues are returned on the latter.

Regarding education, in general, farmers are completely illiterate. Their agricultural practices are inherited from a long tradition. The technological package that has been transmitted from generation to generation is certainly adapted to the natural environment for which it has been developed but it does not follow the pace of the population

increase. Due to their lack of education, farmers tend to mistrust new agricultural production techniques. Obviously, technology transfer from developed nations cannot make miracles in a developing country like Haiti, given the peculiarities of this country, but access to education by the farmers can facilitate technology transmission to the country.

Physical Problems

From a physical point of view, the country is a very special one. It is very mountainous. About 30% of its total area is above 500 m high and 18% is above 800 m. Fifty percent of the total land area has slopes greater than forty degrees (40°). The slope of the land contributes to problems of erosion.

The country's topography creates soil differentiation which, in turn, influences the partial distribution of crops in the mountains. With respect to the topography, two kinds of soils are generally distinguished in the rural community of Haiti: the "cold" soils and the "hot" soils. The former are poor and rocky and start at about 700 m of altitude; the latter starting at less than 700 m are productive and are used for food crops. The topography also explains the overall division of the country into regions with high rainfall and regions with low rainfall. For example, the Northwest part is the driest one while the South is very

humid. There exist two rainy seasons (the spring and the fall) and two dry seasons (the summer and the winter). In more than two-thirds of the country, the winter drought lasts at least five consecutive months, from November to March. There are ten important rivers in the country and the largest one, the Artibonite, has a flow of only 99 m^3/second. All the rivers are subject to important seasonal variations. The topography of Haiti has a negative impact on the agricultural marketing system by making it difficult to develop enough road infrastructure, given the country's economy.

Technological Problems

Technologically, Haitian agriculture is very poor. The special topography of the country, the low income level of farmers, the high costs of agricultural equipment and the small farm size are obstacles to the adoption of mechanical technology. It must be recognized, however, that machines are not always the solution to agricultural development, especially in countries where a great quantity of the labor force is employed in agricultural and the industrial sector is not able to absorb the total surplus of the rural labor force that the introduction of agricultural mechanization would make available. The World Bank estimates that the total area farmed by mechanical means is roughly (and optimistically) about 7,500 hectares while the total area

under cultivation in the country is about 900,000 hectares. In general, small holders use the following simple agricultural tools: the hoe, the machete, the pruning knife, the pitchfork. Given the low income level of farmers, the high price of the mechanical equipment, the land scarcity and the abundance of labor, the development of a labor-using (or land-saving) type of technology can be a good alternative for improving farmer's living conditions in Haiti.

Haitian agriculture also faces a problem of inadequate availability of some production inputs such as water, seeds, fertilizers, and pesticides. Seeds are most often held from the previous harvest, and there is little use of chemical fertilizer.

Financial Problems

The Haitian farmers are placed in a vicious circle. Their low income does not allow them to make improvements in their farming operation; at the same time, they cannot increase their income as long as their farming system remains what it is. Sufficient agricultural credit can change this situation, however. The World Bank reports that only 5-10% of the rural population of Haiti have access to formal agricultural credit because of difficult logistics and high costs of extending credit to large numbers of small and scattered farmers. The indebtedness of farmers to

moneylenders creates an exploitive "client" relationship in the rural areas. More explicitly, to finance the operation of a new agricultural season or to live between two harvests, farmers often borrow cash from moneylenders because they usually sell their product right after harvest and run out of money shortly later. Small holders are sometimes forced to mortgage part of their land or discount the price of the future harvest. The interest rate on subsistence loans goes from 10 to 20% per month. This generates a "monetary dependence" of farmers with respect to the moneylenders.

Commercial Problems

The commercialization of the agricultural products is hampered by the lack of road infrastructure. Many farms do not have access to the agricultural market, due to their remoteness and the absence of transportation roads. The opportunity costs faced by farmers living in remote areas of the country are very high when they want to reach the final consumers themselves. In places of difficult access, horses and donkeys are used to bring the agricultural products to the markets.

The marketing of the agricultural products is essentially conducted by a great number of women (called Madame Sarah) who travel from place to place around the country to buy or resell agricultural and/or manufactured

goods. These "Madame Sarahs" play an important role in the distribution of the agricultural production; however, they often extract all the benefits from the farmers' work. They usually buy at the lowest prices possible and resell at very high prices. On one hand, they improve efficiency in terms of product distribution; on the other hand, they are responsible for inefficiency in both production and consumption and they extract an important portion of the producer and consumer surplus for their own gains. They operate at all levels and at different market types: the urban, the regional, the semi-rural and the rural markets. Nowadays, their activity has been expanded to other countries like Dominican Republic, Miami, Curacao where they buy manufactured goods. The development of a good road system would decrease the farmers' reliance on this informal network of "Madame Sarahs" and allow farmers to retain a greater share of producer surplus.

Government Agricultural Policies in Haiti

During the last two decades, the Haitian government has intervened in many ways within the economy, especially in the agricultural sector. These various interventions have generated serious distortions in this sector and created barriers to growth. The government agricultural policies have had a strong impact on agricultural prices. In general, retail prices for many agricultural commodities

have been well above the world prices. Consumers were heavily taxed, and grain prices raised considerably. In 1975, the retail price of rice in Haiti was about double the U.S. price. In 1980, U.S. rice plus shipment still cost half the Haitian rice. In 1981, the price of corn was more than triple the cost of the grain in the U.S. At the same time, shipped corn cost 57.5 to 143.8 percent less than domestically-produced corn. For wheat flour, the Haitian price was 2 and 1/2 times the f.o.b. costs of wheat grain in the U.S. (Muskin, 1983). The price of sorghum shifted dramatically upward after 1973. Since 1978, red beans price followed a rising trend (Borsdorf, Foster and Hague, 1985). For sugar, according to Berg (1984) the domestic retail price for the refined product is much higher than the international price ($.34/lb vs. $.24/lb respectively). Unlike many developing countries where there is a tendency to subsidize food items, in Haiti a high tax was imposed on food commodities.

In studying the government agricultural policies in Haiti, it is possible to distinguish three different periods: a) before June 1986; b) from June 1986 to March 1987; and c) after March 1987. These periods are separated because some policy reforms took place in 1986 and 1987 and they must be taken into consideration. However, parts of

the basic policy structure that prevailed before June 1986 did not change.

Before June 1986

This period was characterized by a high degree of price control by the government. Some of the policy instruments that were used to control the prices of the agricultural commodities were: import tariffs, export taxes, quota (licensing), taxes on processed foods, administered prices and price control by state monopolies.

Cereal grain, export crops and processed commodities (sugar, flour) policies With respect to cereal grains, the government goal was to achieve self-sufficiency for staple foods like rice, sorghum and corn and to reduce the imports of wheat. Wheat is not produced in Haiti but it is imported from the U.S. and transformed by the "Minoterie d'Haiti" mill into flour that is supplied in the Haitian market. Import tariffs were imposed on rice, sorghum and corn. Flour price was raised with the purpose of raising government revenue and of shifting a part of the total flour demand into locally produced cereals (rice, sorghum and corn) under the assumption that these products could be substituted for flour. On the supply side, the import tariffs were to raise the domestic price of grains and, consequently, to give incentives to producers. In 1980, the imports of rice and corn were respectively 160 and 1,191

metric tons (cited by Berg, 1984). There were no sorghum imports. Market forces determined the price of sorghum which was still high because of the substitution, on the demand side, of sorghum for rice and corn whose prices rose because of the import tariffs.

Export taxes were high for export crops like coffee, cocoa, sisal and essential oils. Berg states that "since 1980, coffee production for export has been relatively less rewarding for farmers than production and sale of corn or beans. In the 1960s the effective tax on small coffee growers varied from 37% to 48% averaging 43%. In 1980-82, it was slightly one-third of potential producer income" (Berg).

In addition to the import tariffs on cereals and the export taxes on traditional tradable crops, the government used restrictive licensing (quotas) practices to control the price of sugar, flour and rice. Restrictive import licensing practices did not apply for sorghum and corn because they were less relevant for these commodities, given that the Haitian people prefer their own variety of corn to the U.S. yellow corn and that sorghum's market is limited to human consumption in rural areas. From 1983 until June 1986, the number of products subjected to quotas was 112 among which were coffee, corn, rice, sugar, wheat, flour, natural fruits, soybean oils and other edible oils (U.S.

Government Memorandum, June 1986). This was the result of an improvement from outright prohibitions on many consumer goods to a licensing system (quota).

Government policies have also distorted sugar prices, and made sugar production less profitable for producers in Haiti, compared to that in other countries. Sugar cane prices at the producer level were determined by fiat and government institution but sugar prices were administered at the consumer level. Sugar cane growers received a low price for their raw material ($13/metric ton). In other words, the share of the production costs of raw sugar that went to the farmers was low (29 percent). According to the World Bank (1985) an accepted international standard for an efficient sugar production enterprise is 70 percent share for cane and 30 percent for processing. Besides the low cane prices, the government also taxed the raw sugar (U.S. $0.08/lb).

Governmental parastatals and their role Beside import restrictions, state monopolies are other instruments used by the Haitian government to control domestic prices. There existed four major state institutions dealing with food: La Minoterie d'Haiti (wheat), La Regie du Tabac (sugar), La Societe d'Exploitation d'Oleagineaux or SODEXOL (becoming "Entreprise Nationale des Oleagineux" (ENAOL) later on) (soybean oil) and Le Magasin de l'Etat (rice).

For cotton, the promotion of its production was under the responsibility of the "Institut de Developpement Agricole et Industriel" (IDAI) which benefited from a legal monopoly on seed cotton; moreover, this institution gave credit to cotton growers, set cotton prices and was the unique seller of yarn and fiber to the industrial sector.

La Minoterie d'Haiti had the monopoly on wheat imports. Wheat was, by far, the most important food grain commodity. It was milled at the state mill, transformed into wheat flour and sold in the market.

Since 1961, La Regie du Tabac was the unique wholesaler of sugar in Haiti. It was also the unique legal buyer of sugar from the domestic mills. It had the monopoly for exporting sugar and could prevent imports of sugar by the private sector without any legal authority for so doing. Since 1976, Haiti has become a net importer of sugar. The government's sugar control was reinforced by the fact that, in 1984, it owned half of the total crushing capacity with two mills: Usine Sucriere du Nord (USN) and Usine Sucriere Nationale de Darbonne. The latter does not exist anymore today.

SODEXOL had the monopoly on soy oil imports. For a long time, semi-refined oil needs were met by imports through seven private refiners. With the creation of SODEXOL in 1979, private investors' role in the seed oil market was

squeezed. It was reduced to only oil refinery activity with the imports of oil seeds and the semi-refinery operation left to SODEXOL. This latter institution was granted a monopoly right of import of oil seeds and crude or semi-refined edible oils.

Le Magasin de l'Etat had the monopoly on rice imports. However, the government could allow some private imports. There was not much rice imported because Haiti approached self-sufficiency in rice production. According to Kite and Pryor, the imports of rice in 1980 were estimated at only 160 metric tons.

The major role of the state monopolies was to influence retail food prices directly, and to provide revenues to the government.

Consequences of the government agricultural policies

Import tariffs on cereal grains (rice, corn, wheat) raised the grains prices despite the fact that these tariffs were administered with frequent exemptions. High prices for cereals and high tax rates on export commodities led to resources reallocation. Farmers responded to the change in relative prices by diverting part of their land from coffee and cocoa production to cereals production. The substitution of cereal plants for coffee plants on the Haitian high-sloped mountains intensified the soil erosion process in the country. Such policies created price

distortion in the economy and generated negative consequences in terms of production and growth, government revenue, foreign exchange earnings, welfare distribution and caused loss of non-renewable resources. Moreover, according to the World Bank (1985), these policies acted against the country's comparative advantage which is in coffee production.

Producers of cereal grains (corn, rice, sorghum) benefited from the higher prices but producers of export crops lost in the very short run. Overall, producers lost more from the reduction of the export crops than they gained from the high price for cereals, especially rice (Norton, 1985). With respect to consumers, the high prices for cereal grains represented a tax burden and affected the nutritional status of the poor. Regarding wheat, since Haiti is not a wheat producer, import tariff or quota on this commodity could not have any impact at the producers level. However, the high price for wheat flour hurt consumers.

Effects of government price control and parastatals

In all the cases, except for rice whose high price was much more determined in a context of import tariffs or licenses, the high consumer prices for processed foods such as flour, sugar and edible oil were related to the presence of the

parastatals. In general, domestic retail prices for processed foods were above the world prices.

The relatively high ex-factory price of wheat flour resulted from the transfer that La Minoterie d'Haiti had to make to the Treasury, as well as the cost inefficiencies in the milling process of wheat. Because of import restrictions on wheat flour, the milling plant could easily charge high prices to the consumer.

La Régie du Tabac imposed a substantial tax burden on consumers. At the consumer level, the sugar price was influenced by the tax, and the monopoly power of La Régie for sugar imports and exports. At the producer level, the officially fixed low price for cane ($13 a ton) did not give incentives to growers to supply their cane to the national sugar industry which mostly counted on farmers for raw material. Cane growers diverted their product to other alternative markets (low-grade alcohol and "rapadou") or reallocated lands suitable for cane production to more profitable crops. Except in the North, acreage devoted to cane production has been stagnant or declining (Berg, 1984). Combined, these policies explained why Haiti lost its export competitiveness in sugar and also why Haitian consumers could not benefit from low world prices for sugar.

By replacing the seven private refiners in the importing of oil seeds and crude or semi-refined edible oils, La

Société d'Exploitation d'Oléagineux (SODEXOL) captured all the rents from its predecessors. However, Berg found that Haitian consumers were much worse off with the entry of SODEXOL than with the private refiners alone. In 1983 for instance, while the world prices for refined oil fell, SODEXOL prices increased. This institution had the power to reduce processor margins by playing on the supply of semi-refined oil. Since the market price for edible oil, for a given demand, was determined by the quantity of oils and fats available, the increased price for semi-refined oils did not necessarily hurt consumers but rather reallocated "rents" from refiners to SODEXOL.

IDAI often paid to Haitian cotton producers a price lower than the import parity price because of its monopoly power. At the same time it sold cotton fiber to textile mills or spinners, lint to mattress makers and cottonseed to SODEXOL - all at prices that were below cost. Such policies taxed cotton producers and subsidized the industrial sector. In addition, they increase income inequality and reduce smallholders' incentives to participate in the IDAI program. According to Berg, the number of participants in the IDAI cotton program decreased from an average of 8,000 in the mid 1970s to 4,000 in 1984.

Government policies before 1986, in general:

- raised consumers' prices of staple foods (cereals), and processed foods (flour, sugar, edible oils),

- lowered prices to the producers of industrial commodities (sugar, cotton),

- transferred income 1) from producers and/or consumers to the government and parastatals (flour, sugar, cotton) or 2) from the private sector to the parastatals (edible oil) or 3) from the consumers to the producers (rice, sorghum, corn).

Other impacts of government policies The government policies also favored smuggling, inflation, extrabudgetary revenues and rent earnings. Due to the government policies, domestic prices for many agricultural commodities exceeded border prices. This gave incentives for smuggling. For example, the sale of sugar in the Cap-Haitian area in 1982 was very low because the market was supplied by smuggled sugar (Berg, 1984). High tariffs on cereals (rice) and government set prices of sugar encouraged people to move these products from neighboring countries through contraband channels. This has created tension between producers and smugglers and hampered growth in the agricultural sector.

Inflation emerged from inefficient production systems, inadequate investments in technology and government policies. The inflation level led to an overvaluation of

the country's currency which has had an official parity with the U.S. dollar since 1919 (i.e., one Haitian dollar for one U.S. dollar). The overvaluation of the Haitian currency reduced the country's agricultural exports, and the producers' income. For instance, coffee growers were negatively affected by the overvaluation of the exchange rate. It also favored the production of non-tradable traditional crops. The government ended up with a net gain despite a reduction in the export tax revenues because of the increased profits of the parastatal processing plants. It is likely that through distortions in resource allocation, the overvaluation of the Haitian currency has affected the country's long-term growth by reducing export crops production. Moreover, the overvalued exchange rate reduced the relative price of foreign grains. As the government imposed tariffs and restrictive licensing measures on grains, the equilibrium local price of grains remained higher than the border price, except for corn which had a price almost at the same level as the international price.

Taxes on flour, sugar and on the profits earned from reexporting sugar bought at low prices in the world market generated extra-budgetary revenues for the government.

The government fiscal policies also generated rent earnings from forgone taxes, from public licensing,

subleasing of cheap public lands by individuals, from cheap irrigation water, from exemptions from different taxes, from high wages at the parastatal food processing plants. Not all of these rents were retained in the public sector.

From June 1986 to March 1987

This period brought some policy reforms that is worth to emphasize. However, as said before, there was no systematic change in the whole policy structure that prevailed before 1986.

On June 18, 1986, the "Conseil National de Gouvernement" (CNG) abolished quotas on a number of important products. This was motivated by the desire of lowering the consumer prices for several products. Up to June 1986, there were 112 products subjected to quotas among which there were many processed foodstuffs. This situation considerably hurt consumers who had to pay prices above the world prices for several goods. In June 1986, the number of products subjected to quotas was reduced to 37 and an import license granted by the Department of Commerce and Industry was required. Among the 37 products on which the quotas were maintained were coffee, flour (of corn, wheat, rice, cassava), natural fruits, soybean oils and other edible oils, corn, rice and sugar. Quotas were maintained on the 37 products for various reasons: 1) to protect the PL 480 Title III for soybean oil, 2) to protect the weaker producer

groups which were unable to compete in the world market, and 3) to protect the parastatals (La Minoterie d'Haiti, Usine Sucriere de Darbonne and Usine Sucriere du Nord (USN)).

The abolition of quotas on many products was expected to bring more efficiency and competitiveness in the industrial sector and less distortion in the structure of domestic prices with respect to world market prices.

After March 1987

On March 1, 1987, the Conseil National de Gouvernment (CNG) eliminated all quotas on 30 products. The seven products still subjected to quotas are rice, sugar, corn, millet (sorghum), pork, beans and chicken parts. The removed quotas were replaced by a tariff of approximately 20-40%. For the seven products, the quotas were controlled through a licensing system and licensed individuals could import these products under the condition of paying a tariff. For grains, the tariff rate was 50 percent of the CIF value and a 11 percent sales tax had to be paid. The following table summarizes the situation for three grains (rice, corn and wheat) at different periods.

Summary

Many factors hamper the development of the Haitian agriculture. They are either structural or policy-related factors. The structural factors come from different sources

Table 1.1. Duties and taxes imposed on grain imports[a,b]

	Type of Duty or Tax	Period Applicable
Rice:		
Import duty	fixed-value (@ $170/mt)	to 1986
Tariff	50% CIF value	1987
Sales tax:	1) 11% on (CIF+import duty)	to 1986
	2) 11% on (CIF+tariff)	1987
Corn:		
Import duty	fixed-value (@ $70/mt)	to 1986
Tariff	50% on (CIF+import duty)	1987
Sales tax:	1) 11% CIF	to 1986
	2) 11% (CIF+tariff)	1987
Wheat:		
Special account[c]	fixed-value (@ $20.46/mt)	to 1986
Port ad tax[c]	fixed-value (@ $1.10/mt)	to 1986
Excise duty[c]	fixed-value (@ $0.88/mt)	1986
General ad tax[c]	11% Minoterie flour price	to 1986
Sales tax[c]	11% (CIF+tariff)	1987
Tariff[d]	40% CIF value	1987

[a]Notes: Some of the duties and taxes imposed may have been in existence prior to 1984 as well. However, for the purpose of the study only the duties and taxes imposed on the imported cereal grains from 1984 are of interest.

[b]Source: Personal communication with USAID/Haiti staff by H. Jensen, July 1987.

[c]Applied to wheat flour.

[d]Applied to whole wheat.

such as:

1) land scarcity and population growth, which reduce farm size, generate erosion, migration and poverty.
2) topography, which influences the rainfall distribution, hampers roads development for agricultural marketing purposes.
3) technology, which is very poor and imposes severe constraints on farm productivity.
4) credit system, which is underdeveloped in its formal dimension, generating rents to unformal moneylenders through the high interest rate charged to farmers.

During the last two decades, government policy measures related to agriculture created inefficiency and growth obstables. In some cases (sugar cane, cotton, coffee) producers were not given incentives to produce. Low farm prices for sugar cane and cotton and high export tax on export crops discouraged the production of these commodities. However, import tariffs on cereal grains encourage their production. Farmers responded to changes in relative prices by substituting non-tradable commodities like cereals for export crops like coffee. This diverted the country from its comparative advantage which is in coffee production. In addition, many government parastatals operating in the agricultural sector were sources of price inefficiencies. Due to the presence of these parastatals

and/or import restrictions, consumers prices for commodities like wheat flour, rice, corn, sugar and edible oils were high. Retail prices for these commodities were higher than the international prices. While many other developing countries subsidize food consumers, in Haiti there were often a transfer of income from producers and/or consumers to the government. Smuggling, inflation and rents were also outcomes of the government agricultural policies.

Successive policy reforms occurring in 1986 and in 1987 reduced considerably the number of products subjected to quotas fron 112 to only 7. More specifically, in June 1986, the number of products subjected to quotas was reduced to 37 for which an import license granted by the Department of Commerce and Industry was required. In March 1987, only seven products, rice, sugar, corn, millet (sorghum), pork, beans and chicken parts were subjected to quotas which were controlled through a licensing system. At the same time, the removed quotas were replaced by a tariff of approximately 20-40 percent. Among the seven products, the tariff rate on grain was 50 percent and a 11 percent sales tax were also imposed.

The current proposal is that the government of Haiti lowers the tariff rate on imported agricultural commodities.

CHAPTER TWO. RESEARCH METHODOLOGY - DATA AND SURVEY DESIGN

Research Methodology

General issue

This is a study that evaluates the impact of selected government policies on cereal grain producers in Haiti. This study focuses on only three cereal commodities, corn, sorghum and rice, which are among the most important staple foods in Haiti in terms of production and consumption and the number of people involved in both acts. The importance of these crops will be proven in Chapter 3. Under such conditions, government policies with respect to these crops are a major issue for the whole country and may have a considerable impact nationwide.

In Haiti, for agricultural households, there is no clear cut distinction between the production and consumption act. In other words, cereal producers also consume a part or the totality of their production depending on their production level and their consumption needs. If producers own consumption of cereals is lower than the actual quantity produced, the production surplus is supplied in the market where it is bought by other people. The sale of the marketed surplus generates money income to producers. If, however, farmers own consumption of cereals exceeds

production, the additional quantity needed to meet food requirements is bought in the market. Therefore, a cereal grain producer in Haiti can either be a net seller (if production exceeds consumption) or a net buyer (if consumption exceeds production).

General welfare and resource allocation analysis requires that both aggregate supply and aggregate demand be considered at one time. This study, however, focuses on the production side of the market in order to better understand factors which affect production and the impact of policy on producers. This is a partial analysis in the sense that it is only located at the producer level. However, it is an important issue by itself that can be used to supplement aggregate level analysis.

Overall, this chapter presents the methodological approach that will be used to analyze the impact of government pricing policies on the Haitian cereal grain producers (corn, sorghum and rice). It also gives a description of the survey design and considers two sources of error, sampling and non-sampling errors that are likely to occur in the data.

Policy issue

In this study, the selected government policies are referred to as pricing policies as shown in the next section. Starting from an equilibrium domestic or

international price, government policies like taxation, subsidization, import tariffs or export taxes result all in a change in the equilibrium market price faced by the economic agents. Therefore, policies are considered as effecting price change. From the producer point of view, an internal tax on any of the three cereal grains (corn, sorghum or rice) is identical to a decrease in the domestic price, an internal subsidy is identical to a price increase, an import tariff is identical to a price increase and an export tax is identical to a price decline. Since cereal grains in Haiti are not tradable, i.e., not exported, the only policy that is covered in this study through price changes is import tariff. Regarding import tariffs on cereal grains which are very high, the current proposal is to lower the tariff rates.

Theoretical framework of policy analysis

Fig. 3 illustrates the effect of an import tariff on producer and consumer prices for a small country. Initially, under the assumption of free trade, the price that prevails in the importing country is the same as the world price P_W. At this price, domestic production is OQ_A, import is Q_AQ_B (=AB) and domestic consumption is OQ_B.

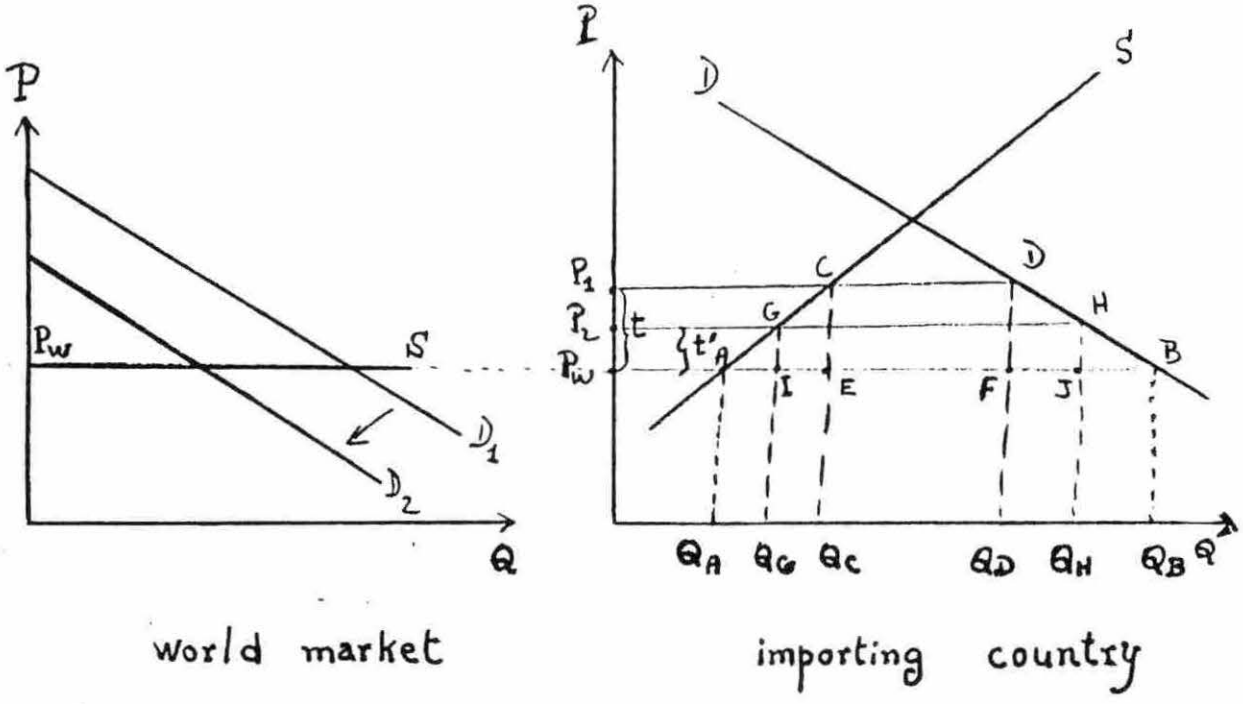

Fig. 3. Effect of an import tariff on producer and consumer prices (small importing country)

Suppose that the government of this small importing country imposes an import tariff of $t per unit of the commodity imported. This import tariff cannot change the world price P_W given that the country is a small one and cannot influence the world market (which is the case for Haiti for cereals like corn, sorghum and rice). However, the world demand for the commodity decreases from its initial level D_1 to D_2. In the importing country, the price increases by the amount of the import tariff t. The domestic price faced by both producer and consumer becomes P_1 greater than the world price. Domestic production

increases from OQ_A to OQ_C and domestic consumption decreases from OQ_B to OQ_D as a result of the increase in price caused by the import tariff. There is a transfer of income from the consumers to the producers and the government. The loss for the consumers is represented by the area P_1DBP_W. The gain for the producers is the area P_1CAP_W. The government revenue is the area CDEF. The triangles ACE and BDF represent the net social losses.

If the government reduces the import tariff from t to t' (t' < t) the price faced by both domestic producer and consumer will be P_2 which is lower than P_1 (that was generated by the import tariff t). Domestic production will decrease from OQ_C to OQ_G. Domestic consumption will increase from OQ_D to OQ_H. Government revenue will be the area GHJI. The deadweight loss for the society will be the two triangles AGI and JHB.

Procedure and measure

The analysis of the price change effects on cereal grain producers does not examine the change in the producer surplus. The absence of a complete demand schedule that would generate with the aggregate supply function (sum of the marketable surpluses) and an equilibrium market price prevents using the producer surplus approach. Instead, the effects of the government policies are looked at in terms of

income effects of price changes on the cereal grain producers as net sellers or net buyers.

In order to analyze these policy impacts, a conceptual model that captures the joint production/consumption act is developed. This model took into account the two different possible cases where a cereal grain producer can either be a net seller or a net buyer. As can be seen further in the mathematical demonstration in the next section, the model provides the means of measuring the income effect of price change on the cereal grain producers. It is based on the assumptions that production and consumption can respond to price changes and that all other prices and other incomes are held constant. The following general results are derived from the model (these results are demonstrated in the next section):

1) If a producer is a net seller of a cereal grain (corn, sorghum or rice) a decline (increase) in the price will decrease (increase) his income if the ratio of his sales over his total production (of corn or sorghum or rice) is greater than the ratio $\frac{e_d - e_s}{1+e_d}$.

2) If a producer is a net buyer of a cereal grain (corn, sorghum or rice) a decline (increase) in the price will increase (decrease) his income if the ratio of his purchase over his total consumption is greater than the

ratio $\frac{e_s - e_d}{1 + e_s}$ where e_s and e_d are respectively the supply and demand elasticities.

Conceptual model and mathematical demonstration

These results can be shown as follows.

(1) $Q_p = g\ (P,\ P_x)$

(2) $Q_c = f\ (P,\ P_o,\ I)$

(3) $MS = Q_p - Q_c$

(4) $I = P * MS + I_o - C$

where Q_p = quantity produced (output)

Q_c = quantity consumed (consumption)

MS = marketed surplus

P = price of the commodity (corn or sorghum or rice)

P_x = other prices

I = total money income including sale of marketed surplus

I_o = income from sources other than corn, sorghum or rice

C = production costs.

Assuming that all other prices are constant and Q_p and Q_c are variable, and totally differentiating equations (1), (2), (3) and (4); we have:

(5) $dQ_p = g_1 dP$

where g_1 is the partial derivative of Q_p with respect to P

(6) $dQ_c = f_1 dP + f_3 dI$

where f_1 and f_3 are the partial derivatives of Q_c with respect to P and I respectively.

(7) $dMS = dQ_p - dQ_c$

(8) $dI = PdMS + MSdP$

(9) Substituting for (5) in (7):

$$dMS = g_1 dP - dQ_c$$

(10) Substituting for (9) in (8):

$$dI = P(g_1 dP - dQ_c) + MSdP$$

Substituting for (10) in (6):

$$dQ_c = f_1 dP + f_3[(Pg_1 dP - PdQ_c) + MSdP]$$

$$dQ_c = f_1 dP + f_3 Pg_1 dP - f_3 PdQ_c + f_3 MSdP$$

$$dQ_c + f_3 PdQ_c = f_1 dP + f_3 Pg_1 dP + f_3 MSdP$$

$$(1+f_3 P)dQ_c = (f_1 + f_3 Pg_1 + f_3 MS)dP$$

(11) $$dQ_c = \left(\frac{f_1 + f_3 Pg_1 + f_3 MS}{1+f_3 P}\right) dP$$

Substituting for (11) in (6)

$$\left(\frac{f_1 + f_3 MS + f_3 Pg_1}{1+f_3 P}\right)dP = f_1 dP + f_3 dI$$

$$f_3 dI = \left(\frac{f_1 + f_3 MS + f_3 g_1 P}{1+f_3 P}\right)dP - f_1 dP$$

Putting upon common denominator in the right hand side:

$$f_3 dI = \frac{f_1 dP + f_3 MSdP + f_3 g_1 PdP - f_1 dP - f_1 f_3 PdP}{1+f_3 P}$$

Factoring out f_3 and cancelling out $f_1 dP$

$$f_3 dI = \frac{f_3(MSdP+g_1PdP-f_1PdP}{1+f_3P}$$

Cancelling out f_3 in both sides

$$dI = \frac{MSdP+g_1PdP-f_1PdP}{1+f_3P}$$

$$(12) \quad dI = \left[\frac{MS+(g_1-f_1)P}{1+f_3P}\right]dP$$

The denominator $1+f_3P$ is always positive, the effect of price change on income depends on the numerator $MS+(g_1-f_1)P$.

$$\frac{dI}{dP} < 0 \quad \text{if} \quad MS + (g_1-f_1)P < 0$$

Replacing g_1 and f_1 by $\frac{dQ_p}{dP}$ and $\frac{dQ_c}{dP}$ respectively.

$$MS + P\left(\frac{dQ_p}{dP} - \frac{dQ_c}{dP}\right) < 0$$

$$MS + \left[\frac{P}{Q_p}\frac{dQ_p}{dP} * Q_p\right] - \left[\frac{P}{Q_c}\frac{dQ_c}{dP} * Q_c\right] < 0$$

Replacing MS by equation (6) and writing the next terms in elasticity forms

$$(13) \quad (Q_p-Q_c) + Q_pE_s - Q_cE_d < 0$$

Define purchase (corn or sorghum or rice) = $B = Q_c - Q_p$

therefore, $Q_p = Q_c - B$

Equation (13) becomes:

$$(- B + E_s(Q_c - B) - Q_c E_d) < 0$$

$$-B(1+E_s) < -Q_c(E_s - E_d)$$

Multiplying by -1:

$$(14) \quad B(1+E_s) > Q_c(E_s - E_d)$$

Since $(1+E_s)$ is a positive number, equation (15) can be written:

$$\frac{B}{Q_c} > \frac{E_s - E_d}{1+E_s}$$

$$\text{i.e., } \frac{dI}{dP} < 0 \text{ if: } \frac{\text{Purchase (corn or rice or sorghum)}}{\text{Consumption (corn, rice or sorghum)}} > \frac{e_s - e_d}{1+e_s}$$

(case of net buyer)

Similarly, it can be demonstrated that:

$$\frac{dI}{dP} > 0 \text{ if: } \frac{\text{purchase (corn or rice or sorghum)}}{\text{consumption (corn, rice or sorghum}} > \frac{e_s - e_d}{1+e_s}$$

case of net buyer)

where e_s = supply elasticity

e_d = demand elasticity

Also $\frac{dI}{dP} > 0$ if: $MS + (g_1 - f_1)P > 0$.

Define MS (marketed surplus) = Sales = $S = Q_p - Q_c$

therefore, $Q_c = Q_p - S$

$$\text{As above: } (Q_p-Q_c) + \frac{P}{Q_p}\frac{dQ_p}{dP} * Q_p - \frac{P}{Q_c}\frac{dQ_c}{dP} * Q_c > 0$$

$$(Q_p-Q_c) + Q_pE_s - Q_cE_d > 0$$

Substituting for (Q_p-Q_c) and Q_c

$$S + Q_pE_s - (Q_p-S)E_d > 0$$

$$S + Q_pE_s - Q_pE_d + SE_d > 0$$

$$S(1+E_d) + Q_p(E_s-E_d) > 0$$

$$S(1+E_d) > - Q_p(E_s-E_d)$$

For corn, sorghum and rice, demand is inelastic; therefore, $(1+E_d)$ is positive. S and Q_p are positive. We can have:

$$\frac{S}{Q_p} > \frac{E_d-E_s}{1+E_d}$$

$$\text{i.e., } \frac{dI}{dP} > 0 \text{ if: } \frac{\text{Sales (corn or rice or sorghum)}}{\text{Production (corn, rice, sorghum)}} > \frac{e_d-e_s}{1+e_d}$$

(case of net seller)

Similarly, it can be demonstrated that:

$$\frac{dI}{dP} < 0 \text{ if } \frac{\text{Sales (corn or rice or sorghum)}}{\text{Production (corn, rice, sorghum}} > \frac{e_d-e_s}{1+e_d}$$

case of net seller)

Application of the model

Based on these results, the first step in measuring the impact of price change on cereal grain producers income is to calculate the ratios sales/production and purchase over consumption. Production is defined as the sum of total

sales and total stock for one harvest period under the assumption that all the stock accumulated after harvest is used for consumption between two harvests. The two ratios are calculated for each farm size category and region and for each cereal grain as an average share of 1) sales over production and 2) purchase over consumption. The second step is to calculate the ratios $\frac{e_d - e_s}{1+e_d}$ and $\frac{e_s - e_d}{1+e_s}$. The supply and demand elasticities (e_s and e_d) for cereal grains in Haiti are not known nor can they be calculated using currently available data. Different levels of supply and demand elasticities have been assumed and the analysis was carried out on this basis for both net sellers and net buyers.

The third step is to compare the ratios in the first step with the ratios in the second step to draw the policy impact on the income of the joint producer/consumer of corn, sorghum and rice in Haiti. For each category of farm size as well as for each region, the percentage number of farmers to whom the average shares in step one apply is represented by cereal crop (corn, sorghum and rice).

Data and Survey Design

The data that support this study come primarily from a Household Expenditures and Consumption Survey (HECS) conducted by "l'Institut Haitien de Statistiques et

d'Informatique" (IHSI) in Haiti during 1986-1987. The primary objectives of the survey were to provide the statistics for calculating the national accounts and developing the weights for the cost of living index. In addition, the survey was to provide data for tabulations and various analyses at the regional and national levels of the country.

For the purpose of the survey, the country was divided into five geographical regions (see map on the following page): north, transversal, south, west (without Port-au-Prince) and the metropolitan area of Port-au-Prince. Each region was divided into two parts, urban and rural except for the metropolitan area of Port-au-Prince. This division, therefore, created nine major strata that were subdivided into substrata on the basis of socioeconomic homogeneity to the extent possible. In particular, the urban substrata were derived from socioeconomic considerations based on income level (low, middle, high) or field observations while the rural substrata were based on socioeconomic considerations in relation to ecological conditions (flat area or mountain). The population weights came from the Haitian 1982 Census of Population.

In order to reduce the costs of data collection and increase the quality and operational control, a two-stage process was used for the survey design (Dauphin and Megill).

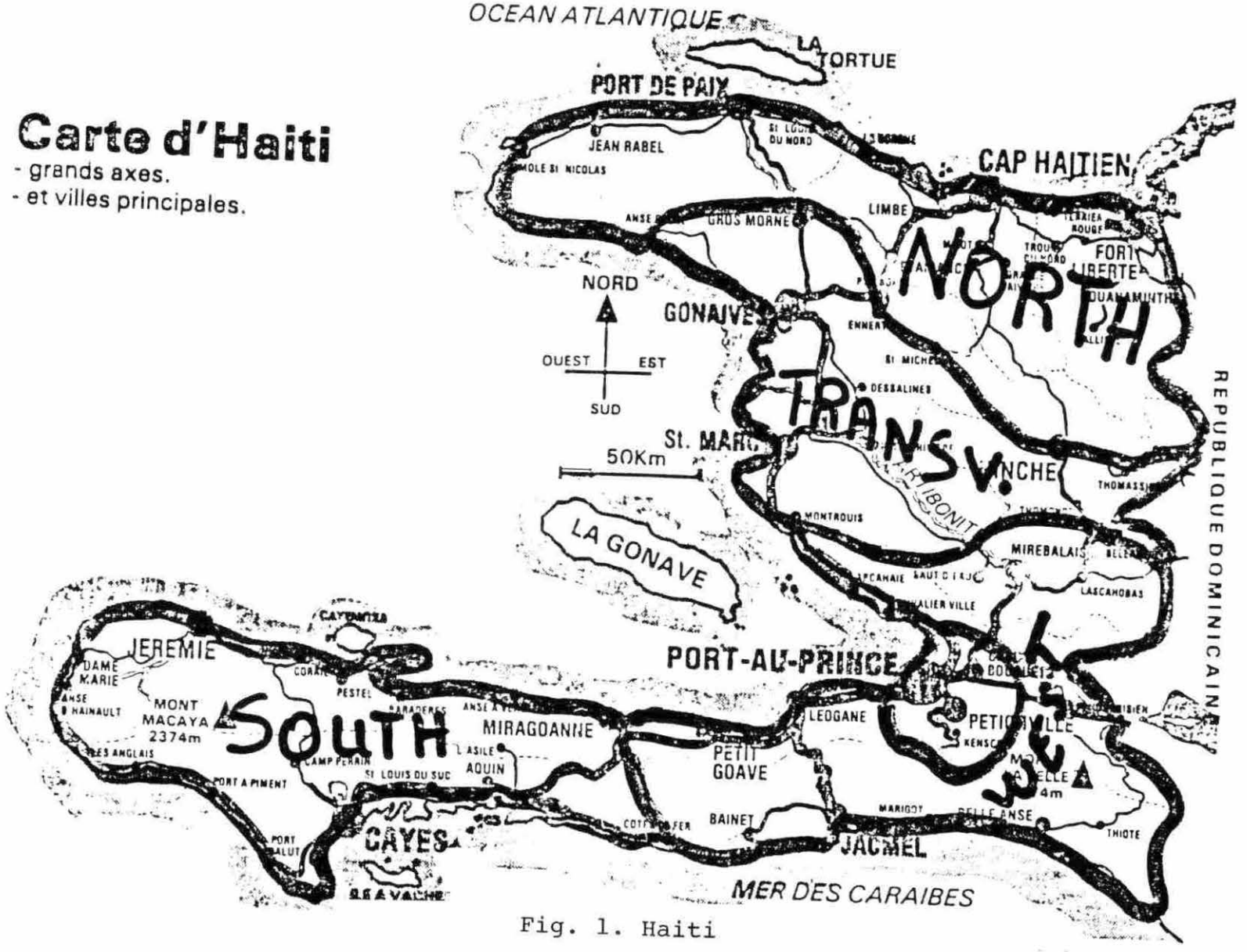
Carte d'Haiti
- grands axes.
- et villes principales.
OCEAN ATLANTIQUE
LA TORTUE
PORT DE PAIX
JEAN RABEL
MOLE ST NICOLAS
ST LOUIS DU NORD
CAP HAITIEN
LIMBE
GROS MORNE
NORD
GONAIVES
OUEST
EST
SUD
NORTH
TRANSV.
50Km
DESSALINES
MONTROUIS
ARTIBONITE
LA GONAVE
MIREBALAIS
LASCAHOBAS
PORT-AU-PRINCE
LEOGANE
PETIONVILLE
JEREMIE
DAME MARIE
MONT MACAYA 2374m
SOUTH
MIRAGOANNE
PETIT GOAVE
CAMP PERRIN
ST LOUIS DU SUD
PORT A PIMENT
BAINET
CAYES
JACMEL
MER DES CARAIBES
REPUBLIQUE DOMINICAINE

Fig. 1. Haiti

The first stage identified the primary units of the survey, or the "sections d'enumeration" (SDEs) defined from the 1982 Census. The survey design at this first level generated the list of 4,730 SDEs which cover the total area of Haiti. The systematic selection of the SDEs was made as follows:

Within the rural strata for each region, the SDEs were identified as belonging to either the substratum "flat area" or the substratum "mountain." In the metropolitan area of Port-au-Prince, each SDE was related to one of the socioeconomic substrata: low, average or high. In the other urban strata, the SDEs of the cities were also divided into economic substrata whenever possible. Moreover, in each substratum, the SDEs were geographically ranked in order to have an implicit stratification. After the first stage, the sample contained a total of 312 SDEs distributed among urban areas (excluding Port-au-Prince), rural areas and the metropolitan area of Port-au-Prince. The SDEs in the sample were divided into 13 national subsamples of 24 SDEs in each subsample (period). Ideally, one subsample was to be surveyed in a month (four week period). The survey design was made such that each subsample is representative of the country. That is to say that it is possible to draw conclusions at the national level with a limited number of periods of data. The current study utilized the first three periods of data. Because of the subsampling design, the

fact that the study does not use the complete survey data does not limit the validity of the conclusions.

The second stage of the survey design was based on an inventory of all the housing units which was made for each of the SDEs selected at the first level. The number of households is considered as a size measure for each SDE in the survey. The 312 SDEs in the sample contain in average from 200 to 250 households. From the total households, 10 were selected from each SDE plus 5 substitution households. Thus, the total sample size was 3120 housing units or households (with 10 households chosen in each of the 312 SDEs).

A housing unit was defined as a house, an apartment, a group of rooms or a single room that was occupied or would be occupied by one or more persons who live and eat together separately from the other persons in the house. Thus, the unit of analysis for which the data were collected was the household. There was a one-to-one correspondence between the housing unit and the household. A household was defined as the set of all the persons who occupy the dwelling unit. They could be a single, two or more families or a single person or any group of people who live together or share a house. The members of the households were only persons who have their customary residence in the house.

In order to have a self-weighted sample at the national level, the overall sample was distributed among the strata in proportion to size of the strata. This distribution is efficient for the national estimates. If an equal distribution was chosen, some regions would not obtain a sufficient number of observations that would make possible reliable estimates for these regions. The difference of variability in the socioeconomic characteristics among the households was also taken into account. Since this variability was higher in the urban strata than in the rural ones, a greater sample size was allocated to the urban strata. Moreover, the cost of enumeration was lower in the urban strata than in the rural ones. Although different sampling weights were distributed to each stratum, a self-weighted sample was maintained within the strata.

With respect to the weighting within a household, the information for the different items was collected for specific reference periods, based on recall reference period. That is, the data on expenditures were collected for one week, one month, one trimester or the whole year, depending on the typical frequency of the expenditures for the item. The agricultural production data, excluding the inputs data, have a period of reference of 12 months which refer to the year preceding the beginning of the survey. The inputs section of the survey and the animal production

one, however, make reference to the 6 months preceding the beginning of the survey.

Sources of Error

In any survey, there exist various sources of error. They can be classified into two different categories: sampling errors and non-sampling errors. Both can seriously affect the results of a survey. The Expenditures/ Consumption survey that has been used for this study was potentially subjected to both kinds of error.

Sampling errors

Sampling errors can occur in four different ways:

a) If the housing units were not well specified during the mapping process, the interviewer may have to choose himself the household to survey or to question multiple households if there were, for instance, a group of households living in the same house.

b) If nonvalid housing units (i.e., those that are not parts of the population of interest) were included in the sample, this would cause overcoverage error for the population of interest. By taking them out during the estimation, this would cause a loss in the sample size that can negatively affect the reliability of the estimates.

c) If a housing unit appeared more than once on the mapping list, this would be a source of bias.

d) If the occupant status of the housing unit changed at the time of the survey, for instance, if a household lived in a housing unit that was not occupied at the time of the mapping process or conversely, this would lead to another source of bias.

Non-sampling errors

The major source of non-sampling errors can come from non-response cases. However, Scott states that "studies have repeatedly shown the presence of alarmingly high levels of response error even on the simplest of survey questions" (as cited by Timmer, Falcon and Pearson). Erroneous response, observation or measurement mistakes, errors in recording or coding the information and others are also possible.

Different sources of non-response bias exist

1) There may be no person in the house. This would occur if the interviewer chose a visit hour such that he does not find anyone in the house.

2) Some households may refuse to answer the questions due to the failure to promote the survey in the media, to explain its objective, to involve the local authority in it, to stress good interview techniques during the training session for the interviewers. The attitude of the interviewer may also have something to do with the non-response.

3) The designated respondent may have a problem of non-capability, non-ability and non-availability. In this case, failure to stress a rational process of using another person to respond to the questions at the training session may lead to non-response error.

4) If the mapping and inventory process are not very good, a house or household may not be found. The interviewer may also not survey a household in a house because this household is different from the one that he expected to find.

5) There may be a loss of questionnaire because of a lack of control of the flow of the questionnaire from one hand to another, i.e., from the central office to the supervisors, from the supervisors to the interviewers, from the interviewers to the editors and from the editors to the codificators.

It is important to note that the survey in Haiti was conducted in a period of political unrest. It was not easy to obtain the cooperation of the households for the mapping process. In this process, a number was assigned to each household in the sample. This identification number was written on the door of the household's house to make it easier for the interviewers to find the households in the sample. Some households had erased their number.

In addition, the survey was very long. Each household had to be visited four times within one week and they had to answer many and varied questions. Without highly motivated respondants, it was likely that fatigue and disinterest would increase at the end of each session, and increased the likely non-sampling errors.

Overall, there were 14 sections in the survey. They were the following:

Section 1: Characteristics and expenditures related to housing

Section 2: General characteristics of household's members

Section 3: Economic characteristics

Section 4: Food products and beverages inventory

Section 5: Food consumption and other daily expenditures

Section 6: Consumption outside the house

Section 7: Expenditures for services and non-food goods

Section 8: Payment of goods and services bought at credit

Section 9: Revenue

Section 10: Health

Section 11: Agricultural production

Section 12: Agricultural input costs

Section 13: Livestock production

Section 14: Specific products

This study was based primarily on data from Sections 11 through 13, and Section 5.

CHAPTER THREE

GENERAL CHARACTERISTICS OF THE FARMS IN HAITI

An economic study on the agricultural sector in any country may be conducted at two different levels: the macro and the micro level. For the first alternative, the analysis integrates the agricultural sector into the set of macroeconomic issues and treats it as a sector unit in the economic development strategy. Two examples of this would be to consider a) the share of agriculture in the gross domestic product (GDP), and b) the impact of the agricultural sector on national employment. Analyzing the agricultural sector at the micro level, however, orients the focus to the production unit (which is the farm) and on microeconomic variables related to the latter such as productivity and technical efficiencies, profitability, etc. Whether the analysis is made at the micro or macro level, the production unit plays a central role. In fact, the overall performance of the agricultural sector is a measure of the performance levels of its different production units. If a country has only a limited number of large landowners that dominates the agricultural production and achieves high productivity while the bulk of the farmers are working on small plots and using traditional and less productive methods and techniques of production that do not guarantee a good return on farming work, it is difficult under these

conditions to talk about good performance of the agricultural sector. This is the case in Haiti. Given the importance of the agricultural unit, for the purpose of an analysis of the impact of selected government grains policies, it is important, therefore, to understand the situation of the Haitian farms more broadly.

The analysis of the Haitian farm made in this chapter does not consider each individual production unit but rather focuses on groups formed on the basis of the farm size and regional distribution criteria. As referred to the survey, farm size is taken as the total area under cultivation regardless of ownership. Since the survey data are drawn from a population-based sample, the analysis made throughout this chapter takes the households as primary focus. More explicitly, within farm size group and region or any other variables related to the description of the farm unit, what is taken into account is the percentage number of agricultural households that are represented. There was no sample weighting factor applied to the data in these calculations. Almost all of the observations come from the "rural" stratum. All conclusions are drawn on the basis of the households representation, in percentage terms, for a specific variable.

In creating groups the use of farm size is justified on the grounds that land is a major asset in developing

countries (therefore, in Haiti); it is also a major source of wealth. The use of the region variable is justified by the fact that regional differences are likely to exist in terms of analyzing policy impacts. Farm size categories and regional divisions will allow us to focus on distributional policy consequences.

It is important to underline that the focus in this study is on farm households. A farmer is defined in this study as somebody who reported having some land under cultivation. The analysis in this section, which is entirely descriptive and based on the most current data available, gives insight into the general characteristics of the Haitian farms by looking at the farmers in relation to their farming system. In so doing, we will consider the farm size, the farm structure, the cultivated crops, the farm inputs and the livestock. One socioeconomic characteristic, family size, is also taken into consideration as an indicator of labor available to the household farm operation.

Description of the Haitian Farmer

Farm size

The variable farm size in this study, except in Table 3.1, is constructed using the areas that the reported agricultural households had under cultivation (see

Appendice, question 108). Table 3.1 includes the zero values of farm size. In all the other tables, these zero values were eliminated. This screening process was necessary because any other information related to farming operation missed when the value of the farm size (i.e., the area under cultivation) was zero. This reduces the number of farm households from 290 to 246. That is 44 agricultural households reported having no land under cultivation. All the analyses in this study are carried out on the 246 farm households that had an area under cultivation.

Table 3.1 gives evidence that the majority of the farmers in Haiti are smallholders. About 62 percent of the farmers have less than one carreau.[1] Only 2 percent of the households farm five carreaux or more. The percentage number of farmers sharply decreases as the farm size increases. In general it tends to be almost three times less from one farm size category to another. For instance, from the "less than one carreau" class to the "between one and two carreaux" one, the percentage of farmers represented goes from 62.8 percent to 22.8 percent. In the next class (2-3 carreaux) it is only 8.6 percent. The same falling pattern goes on up to the category 4-5 carreaux.

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[1]One carreau = 1.29 hectare.

Farm structure

Farm structure refers to the number of plots (or parcels) that may represent a farm unit. In Haiti, the farm unit is generally a set of plots located in different areas close or distant to each other. Several reasons may explain why a farmer has a plot in a certain area. They have to do with land scarcity, protection against risk. More explicitly, because of land scarcity associated with population increase, a farmer has no choice but to take the plot that is in supply at the time he wants to buy land, no matter where this plot is located. Moreover, because of time and regional variations in the rainfall distribution pattern throughout the country due to topographical variations, a farmer who originally farms in a dry area may buy plots in an irrigated area or in an area with better rainfall conditions to insure himself against drought.

As said before, Table 3.2 is based on all the rural households that have reported having land under cultivation at the time the data were collected. Leaving out the 44 agricultural households which were not currently farming, this redistributes the household percents throughout the farm size categories (comparing to Table 3.1). The number of agricultural households not currently farming are in the first farm size range in Table 3.1 since their farm size value is zero.

Table 3.2 shows that farmers with small farm size have fewer parcels on average and the number of parcels increase only up to a certain farm size (< 4 cx). Farmers with a farm size at least equal to 4 cx tend to have fewer parcels also. The number of parcels can roughly be considered as a function of farm size that first increases and then decreases as farm size increases. Farmers with very small landholdings (< 2 cx) and larger landholders (> 4 cx) have less parcels while farmers with farm size between 2 cx and 4 cx have a larger number of parcels. An interpretation of this fact might be that large landowners have the best irrigated land and are the richest farmers, therefore, they do not have to protect themselves too much against risk by buying parcels. Small landholders (farm size less than 2 carreaux) have a limited number of parcels probably because their farm is small or because they cannot afford to buy more. Middle class landowners (farm size between 2 cx and 4 cx) have more parcels because they can afford to buy land. Because of land scarcity, they have to purchase a plot where it is available. This might be the reason why they tend to have more parcels.

The groupings of farm sizes may surprise some people, especially when holdings with areas between 2 and 4 cx are considered as middle size and 4 or 5 carreaux at least are classed in the upper category of farm size. There is no

special rule of classification of farm size in the case of Haiti. This classification must be seen in relative terms. A farmer with an area less than two carreaux has very different opportunities as another one with two or three carreaux, the more so if the latter has plots in better environments. That is to say that all else equal, the farmer with the larger holding will harvest more and receive a higher income. Therefore, a common element of a farm size category can be their income level (low, middle or high) which may justify the grouping of all the farms in this farm size category. However, factors like differences in land productivity and access to inputs within a certain farm size category can create differences between farms within that category.

Cultivated Crops

Due to its topographical features, the country is divided into micro-regions with different ecological characteristics. The general orientation of Haiti's various mountain chains also explains the regional and local differences. The side of the mountains exposed to the wind receives more rainfall than the others. In terms of the general rainfall distribution, dry and rainy seasons alternate across the year in an erratic fashion sometimes. Rainfall distribution and topography together account for the existence of various micro-ecological units with

different agricultural vocation. Thus, farmers farming several parcels may have crops specific to different micro-climates.

In terms of climate, Haiti is a tropical country. The temperature remains an average 25°C all year long at sea level and is stable for a given area. It decreases at the rate of 1° per about 150 meters (Jean-Robert Estime, 1972).

Under these conditions, different crops are grown in Haiti. Among the most important are cereals (corn, sorghum, rice), tubers (cassava, sweet potato, yam and others), legumes and vegetables (different varieties of beans, eggplant, onion, etc.), industrial crops (coffee, cocoa, sugar cane, fruit (banana, mango, avocado, orange, pawpaw, grapefruit, lemon, melon, cucumber, etc.).

Table 3.3 shows the distribution of the crops which were cultivated once the last year by farm size category. Farms with size below 3 carreaux have a greater variety (larger number of types of crops) than those with an area above 3 cx. The Haitian agricultural system is characterized by multicropping practices, i.e., it is possible to find all kinds of crops in a given parcel. Except for a limited number of farmers (especially those who have a large farm and those who can afford to buy agricultural inputs) monoculture is not a common practice in this country.

Identification of the most important crops

For the purpose of our analysis, it is important to know the most important crops of the Haitian farming system. Different approaches could be adopted to measure the importance of a certain agricultural commodity. Looking at the number of households involved in the production of that commodity is one way to do so. A second alternative would be to consider the total quantity harvested (i.e., production) of this commodity. A third alternative could be based on the total area planted in that commodity. This latter approach requires that total area planted in combination and association[1] (crop rotation) for the crop in question be determined.

. Due in part to the fact the HECS was designed as a consumption survey, not all methods of measuring production are available. The most direct measure in the HECS is based on the number of households producing a commodity or crop. By looking at the percentage number of farmers planting a particular crop the importance of the crop is defined with respect to the farmers themselves, not with respect to quantity. This measure can be considered as a

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[1]Association refers to a situation where different crops are planted on a given area but they are separate from each other, e.g., corn and sorghum association. Combination refers to a situation where different varieties of the same crop are planted together, i.e., are mixed, e.g., combination of different varieties of beans.

"participation rate." The HECS can give an accurate measure of the percentage number of farmers involved in the production of a crop.

We use the budget/consumption survey to find out the most important crops in the Haitian farming system from a ranking based on the number of households involved in the production of these crops nationwide. We also try to support our finding by computing data available from ADSII reports about areas planted in monocropping, association and combination in the South department of Haiti for each of the major crops. ADSII is an agricultural development support project that was collecting data in the south of Haiti.

Tables 3.4 and 3.5 are lists of ranking crops according to the number of households cultivating them and the total area devoted to them respectively. While Table 3.4 is constructed using the HECS data, Table 3.5 is based on computation of the data on areas planted for the considered crops available in ADSII reports.

It can be seen from these tables that in spite of a difference in the rank of the crops from one table to the other the top ten crops that are indeed the most important in Haiti do not change in both ranking lists. This proves two things. First of all, either approach is worthwhile to determine the major crops in the Haitian agricultural system. Second, the area covered by the two surveys (one is

nationwide and the other is only for the South department of Haiti) does not appear to have a significant influence on the overall result. It is, therefore, certain that across the country corn, beans, yam, plantain, sorghum, sweet potato, cassava, coffee, rice and sugar cane are the ten most important crops cultivated in Haiti.

In terms of the number of households involved in the production of each crop by different categories of farm size (see Table 3.8) it is clear that each of the major crops is essentially cultivated by the small farmers. The agricultural sector in Haiti is dominated by a large number of small farms that grow both subsistence and export crops.

Distribution of the farmers by region

Table 3.6a reveals that the majority of the farming households are in the South. Then comes the Transversal region with about one fourth of the total farmers of the country. The Transversal region benefits to a large extent from irrigation facilities because the most important river of the country (the Artibonite) is located in this part of the country. In third positions come, respectively, the West and North departments. Except for the South that accounts for 30 percent of the total number of Haitian farmers, all three departments, Transversal, West and North account for between 20 and 25 percent of this total. The metropolitan area of Port-au-Prince, which geographically is

located in the West, has been separated into a separate region because of its urban nature that contrasts with most other parts of the country. This area is not an agricultural one even though one percent of the total number of farmers has been reported to belong to it.

Distribution of the farmers by farm size within region

The distribution pattern of the number of farmers in each region according to farm size reflects the general farming conditions in Haiti (reference Table 3.6b). In each region there are more farmers concentrated on small farms less than 1 carreau. Comparing farmers concentration on very small plots (less than 1 carreau), a higher portion (three-fourths) of the total number of farmers in the Transversal region represent very small holders while in the South only about half of the farmers are in the farm size range between zero and one carreau. In the North and the South about 60 percent of farmers have an area less than 1 carreau.

In each of the four agricultural regions (North, transversal, West, South) about 80-92% of the total number of farmers have less than 2 carreaux. In the Transversal valley alone 92.86% of all farmers farm less than 2 carreaux. While this region might not have any big farms (greater than 5 carreaux) there exists a very limited number of farmers in the North, the West and the South areas with

farm size greater than 5 carreaux with more in the North and less in the West. One possible explanation for not having any large farms in the Artibonite Valley may be that no large landholder has been interviewed during the first three months of data supporting this study (end November/beginning December 1986-February 1987).

Distribution of the farmers (in percentage terms) by major crops cultivated and region

Cropping patterns also differ by region, as shown in Table 3.7. For all the major crops except rice and sorghum the South has the highest percentage of growers. One-third of corn producers, more than one-half of the yam producers and about two-thirds of the coffee producers are in the South. In this region, beans, plantain, sweet potato, cassava and sugar cane account for between 30 and 45 percent of the total number of growers in the country. Rice producers are mainly in the Transversal region which is the major area for rice. After the South, this region accounts for the larger number of plantain, sweet potato, cassava growers. The largest percentage of sorghum growers is in the West. This area has, after the South, the second largest number of beans producers. With more than one-fourth of the coffee growers, the North presents the second largest figure for coffee. For yam, the North and the Transversal regions are equally represented in terms of

percentage of growers and are classed second in this regard. The West department has the lowest number of yam producers. For sugar cane the North and the South have an equal share of growers and are in the first position together.

Distribution of the farmers (in percentage terms) by major crops cultivated and farm size

Table 3.8 shows the distribution of farm households by crop and farm size. For all ten major crops the majority of the producers are small farmers cultivating less than 1 carreau of land. For example, 54.35 percent of the corn producers, 49.09 percent of the sorghum producers and 47.37 percent of the rice producers are very small farmers with less than 1 carreau. Up to 4 carreaux exclusively, for any of the ten major crops (corn, beans, yam, plantain, sorghum, sweet potato, coffee, rice, cassava and sugar cane) the percentage number of farmers decreases as farm size increases. Once again, this is an evidence that agriculture in Haiti tends to be a small farm activity. Except for sweet potato, sugar cane and cassava, for all the other major crops, the percentage number of farmers cultivating at least 5 carreaux is greater than the percentage number of farmers cultivating between 4 and 5 carreaux.

Distribution of the crops within the regions according to the percentage number of farmers

The ten crops which have been discussed so far have been chosen on the basis of their importance for the country. This does not mean, however, that they are the only crops produced in Haiti. Table 3.3 shows the range of crops that enter in the Haitian farming system. That is to say that if a given region is taken into account, it is possible to make a census of the crops pattern of that region in first place and to determine for each crop within this specific region the number of farmers (in percentage terms) represented. Based on Table 3.9 which includes the percentage number of farmers involved in the production of the ten major crops in the country, a ranking sequence of these crops can be developed for each agricultural region. For each region, it has the following distribution by order of importance (the criterion being the percentage number of households):

1) In the North: beans, corn, yam, plantain, coffee, sugar cane, cassava, rice, sweet potato, sorghum.

2) In the Transversal region: beans, corn, rice, plantain, sweet potato, yam, cassava, sorghum, sugar cane, coffee

3) In the West department: corn, sorghum, beans, sweet potato, cassava, yam, plantain, sugar cane, rice, coffee.

4) In the South: corn, beans, yam, coffee, plantain, sorghum, sweet potato, cassava, rice, sugar cane.

The rankings show that among the major crops, rice varies significantly in importance among the regions. Beans and corn are consistently among the first three most cultivated crops.

Inputs Purchased

Under the concept of input are considered different elements such as seeds/plants, fertilizers/pesticides, agricultural equipment (tractors and some kinds of tools or machines using animal energy), labor, water (irrigation), land. From a marketing point of view, transportation and packaging are also taken into account. To capture the use of inputs the focus is made on the purchase (seeds/plants, fertilizers, labor, water, transportation/packaging or rent (agricultural equipment and land)) of that input in the survey (see Appendice, Section XIII). If a farmer does not purchase or rent an input this does not necessarily mean that he is not using it. Such is the case for all the inputs. Seeds/plants may not have been purchased in the market for a long time period. However, continuous uses of non certified seeds from previous harvests lowers production because the genetical material of the seeds/plants may decline over time. For agricultural equipment, generally small farmers own their own simple tools or share them among

family members. The rental market for agricultural equipment like tractors mostly is relevant for large farms. For land, most farmers have ownership right on their farm. For water, in some areas of the country farmers do not pay for irrigation. For labor, the use of family members to achieve the farm work is common. The kind of fertilizers that is referred to in the survey is the chemical one, however different natural fertilizers or practices may be used to enhance the soil fertility (plant residues, animal wastes, ashes, fallow). For transportation/packaging the use of donkey, horses/mules and the carriage of the products to the market on baskets by women are other alternatives available to small farmers besides the public transportation .and the costs associated to it.

Table 3.10 shows information about purchased or rented inputs over the last six months period. First of all, a majority of farmers purchase labor services. Despite the fact that a relatively high proportion of farmers hire paid labor, there is still a substantial percentage of farmers (34%) who are exclusively using family labor services. Agriculture in Haiti is essentially a family activity type. That is to say that on the small farms, which are in majority in the country, non-paid family members are mostly used first before hired labor in the agricultural activity. Farm employment may come about because farmers may a) want

to have their land plowed on time before the rainy season, or b) want to harvest as quickly as possible especially if the harvesting made in the traditional way is tedious (for instance, rice is harvested with a small knife cluster by cluster).

It is important to note that workers participating in harvest can also be paid in kind, proportionately to the amount that they harvest. This may not be reflected in the data. There is no standard for the determination of this portion of the harvest that a farmer can receive. The payment is up to the employer. Payment in kind is more common for rice harvest. Besides family labor and paid labor, a farmer may use the services of other peasants free of charge. That peculiar case supposes that he is a member of a peasant group or can exert some leadership in his county. Peasant groups are formed on a basis of reciprocity. In a group, farmers cooperate in order to achieve a task (mainly soil preparation) on members' holdings.

Second, seeds/plants are purchased by 52.85 percent of the farmers. About half of the farmers in Haiti do not use improved seeds/plants in farm production. This occurs not because these inputs are not supplied but mainly because they are expensive. The pay-off of improved seeds in the poor structural conditions of agriculture in Haiti does not

justify their use for many farmers. For instance, a farmer in a very dry area where the rainfall is very erratic does not have much incentive to buy improved seeds. Therefore, there are two different causes explaining why most farmers do not buy improved seeds: their budget limitation vs. the high price of these inputs and their risk aversion, given the numerous problems of agriculture in Haiti, especially the lack of water. Farmers mostly use low quality seeds that come from their previous harvests or parts of old plants, depending on the crop. Coffee plantations, for instance, are still reproducing today from plants that came from the French colonists almost 200 years ago. In these conditions, it is easy to understand why the agricultural productivity in Haiti is very low.

Third, transportation and packaging material are the concern of about one-third of the farmers. The reason why they are considered as inputs is because for most Haitian farmers, agricultural activity is market-oriented and this marketing aspect implies some transportation and packaging costs. There is no reason to believe that the other two-thirds of the farmers do not bring their products to the market. As said before, they may not use the modern transportation (public vehicles) but they use their horse or donkey to carry their crops to the market. Also, small farmers who do not own any horse or donkey or cannot afford

to pay the costs of public transportation often reach the market on foot even if it is located at about 20 kilometers from their home.

Fourth, less than one-fourth of the farmers pay rent for the land they are farming. This gives evidence to the fact that the majority of the Haitian farmers are landowners, or there may be other land arrangements not identified in the data which do not involve explicit payment. Ownership rights on land go back as far as 1809 when the government of Haiti at that time undertook the first land reform in Latin America that is today basically responsible for the small size of the farms. Land ownership is not the only factor accounting for the high percentage (76%) of farmers not subjected to rent payment for the land they are farming. Other explanatory factors are: a) undivided land owned jointly by related families, b) the "métayage" system or "deux moitiés" which is a cropsharing system according to which a peasant uses another person's land free of rent charge in return for giving half of the harvest to the landowner. Under this system, the peasant is totally responsible for all the production inputs costs. There is a great deal of inefficiency associated with this arrangement. The landuser usually does not have any incentive to invest enough money in inputs purchase (improved seeds, fertilizers, pesticides, etc.) since he knows that he can

capture only half of the benefits of these inputs. Moreover, both parties do not have any incentive to make land improvements even if they would both gain by so doing. Finally, c) the use of public property: some farmers may have illegally set up on public land and pay no rent. These different types of land tenure have as consequence that most Haitian farmers do not have any ownership title on the land they farm and are very vulnerable to eviction.

Fifth, no more than twenty-two percent of the farmers purchase fertilizers and pesticides. These inputs are expensive and not affordable in general to the peasant. Fertilizers and pesticides are imported from the United States by a few wholesalers in the capital city of Port-au-Prince. From there, they are bought by retailers in other cities and in the countryside. At all the different levels the seller charges a price such as he can have a substantial profit. When these inputs finally reach the farm gate level their price is inflated by the profit margins of all the middlemen and the transportation costs. Farmers' low income, high fertilizers/pesticides prices, lack of water, lack of incentives are major factors explaining that only a small proportion of farmers purchase the two inputs.

Sixth, with respect to agricultural equipment a low percentage of farmers rent agricultural tools or machines

(tractors). The equipment generally used by farmers in Haiti (hoe, pitchfork, pruning knife, machete) has a very low productivity.

Seventh, water is purchased by a very limited number of households. Depending on the region where they are farming, some farmers do not have to pay for irrigation water (e.g., the Transversal region). Others rely on rainfalls for their agricultural activity, however, the country does not have a regular and well distributed rainfall pattern. Very often, farmers in very dry areas lose their harvest because of lack of rain or irregularities in the rainfall. This situation causes famine in some parts of the country and rural migration to the cities where job opportunities for unskilled peasants are rather scarce.

Inputs ranked by farm size according to the percentage number of buyers for each of them

Table 3.11 considers the importance of each input type for each farm size category on the basis of the number of households purchasing or renting that input depending on the case.

Labor is, in general, the most commonly purchased input in the farm size categories. However, as the farm size increases, there is a tendency to have more farmers purchasing labor. This might occur because the family labor becomes insufficient to achieve all the farm tasks as the

farm area increases. In other words, in general for two different farm size categories, there is more hired labor in the larger farm size range. This is probably a consequence of the fact that labor family services cannot fulfill all the required farming work due to greater farm size and lower quantity of family members.

Seeds/plants are generally the second most purchased input, after labor, in the different farm size categories, although there is a substantial number of farmers that are using seeds/plants from previous harvests. Almost 50 percent of the farmers in the farm size category less than 4 carreaux and 66 percent of these above 4 carreaux purchase their seeds/plants. Therefore, more farmers in each farm size range below 4 carreaux use seeds/plants from previous harvests than in the farm size range above 4 carreaux.

With respect to transportation and packaging, more large farmers tend to use these marketing means for their products. This is, obviously, due to the fact that larger farm produce more not only because of their size but also probably because more big farmers tend to purchase or rent production inputs that increase productivity (as we have seen for seeds and shall see for other inputs). High productivity of large farms and market-oriented behavior of the Haitian farmers may explain why the percentage of farmers using packaging and modern transportation for their

products (percentage with respect to the total number of farmers in each farm size category) increases as we go from the lower to the higher farm size category.

In any of the farm size categories above 4 carreaux (4 cx is the lower limit of the first category) the ratio of farmers paying for land rent to the total number of farmers in the categories is higher in percentage terms than the ratio for the categories below 4 carreaux. If we look at this fact in a dynamic point of view, the question that we may ask is whether or not farmers increase their farm size by renting new land. This might be the case; however, our analysis is only static given that the available data do not allow to make insight into dynamic matter.

Overall, in farm size categories above 2 cx, the percentage of farmers within these categories purchasing fertilizers/pesticides tend to be higher than the percentage within categories below 2 cx. The high price for fertilizers/pesticides limits their purchase by small farmers. It is likely that these inputs are bought only by small landholders that have good quality land and irrigation facility.

In terms of the rent of agricultural equipment (tractor), it turns out that the greater the farm size, the higher the proportion of farmers who rent agricultural equipment. As mentioned before, this does not mean that the

other farmers do not use agricultural equipment at all. Only the tools that they are using are simple ones that may have been bought a long time ago or used on a share basis. Except for tractors and other mechanical equipment, there is no rental market for these simple tools.

With respect to water, in general, in any farm size category the number of farmers purchasing water is low. This gives evidence to the idea that the access to water is one of the major constraints of agriculture in Haiti. It should also be mentioned that, as the farm size gets larger, the proportion of farmers buying water increases. As said before, farmers who do not purchase water must rely on unpredictable rainfalls or are not charged for irrigation water (e.g., Transversal valley). In such conditions, many small farmers who cannot afford to pay for irrigation facilities must expect their planting efforts have little or not return in drought years.

In summary, labor and seed/plants are consistently purchased by most farmers in the different farm size categories. Farmers in large farm size categories tend to give much more importance to transportation and packaging; probably because they produce more and have a larger quantity of products to bring into the market. In larger farm sizes, fertilizers and pesticides tend to be purchased by most farmers. Although the information about water

purchase lacks for farm sizes above 4 carreaux, it is clear that farmers who have to pay for irrigation water tend to purchase it if they have larger areas to cultivate. It is probably so because large farms can afford to buy water, given their higher income. Agricultural equipment (tractors and other machines) is rented much more by large farms. Farmers tend to pay rent for the land they are farming, especially if they have a larger farm size.

As a whole, technology tends to differ among small farms and large farms.

Livestock

Livestock by category of farm size

Table 3.12 looks at the total number of different livestock types (cow, pig, sheep, goat, chicken, turkey) available by category of farm size. The use of maximum is preferred to average because the latter is not very meaningful in the situation where many households that answered the questions reported zero for some animal types.

The table shows that not all the households involved in farming activity during the survey period provided information about their livestock. For instance, only 78 percent of all the farmers in the very small category of farm size (greater than zero and less than one carreau) gave information about their number of cows, pigs, sheep, goats,

chickens and turkeys. For donkeys/horses/mules the reported quantities seem to be out of range. Therefore, we do not take them into account. Although, in reality, donkeys/ horses/and mules play a major role in the Haitian marketing system, this is not reflected in the data. We do know that these animals are commonly used by the Haitian farmers to reach their market. In many cases, the production area does not have the necessary road infrastructure to make it possible for the Haitian peasant to use the modern transportation system (public car). Donkeys/horses/and mules are as important as land and other inputs in the agricultural production process because farming is not just a production activity but it also has an exchange dimension that makes it possible for farmers to collect money income from the agricultural production. It is generally believed that Haitian farmers are very market-oriented and that agriculture in this country is not purely a subsistence activity. Moreover, the fact that Haiti is a mountainous and a poor country makes it difficult to provide roads to farmers in the remote areas. In these conditions, the important role played by donkeys/horses may easily be understood.

What results do come about from the livestock data? First of all, according to the data, the major livestock types associated with agricultural production on the Haitian

farm are, in order of importance, rabbit, chicken, goat, cow, sheep, pig and turkey, as shown by Table 3.13.

The ranking in this table is likely to reflect the true livestock situation in Haiti despite some abnormalities that may exist in the data. The issue of distribution of the total number of each livestock type among farmers in each category of farm size is the most important one to look at. In general, cow, pig, sheep, goat, chicken and rabbit are found in the low and middle farm size categories. As previously defined, the low farm size category includes all farms with less than 2 carreaux and the middle one groups all farms with a size between 2 and 4 cx.

Distribution of selected livestock types by farm size rank (small, middle and large farm size class)

It can be seen in Table 3.14 that, as a whole, the farms with an area less than 2 carreaux have the highest concentration of all the livestock types considered, i.e., cow, pig, sheep, goat, chicken, rabbit and turkey. For farm size between 2-4 cx (equal to 2 and less than 4), the concentration of these livestock categories decreases and it decreases further for the total number of farms with a size at least equal to 4 cx. Other facts that appear from Table 3.14 are that, first of all, the small farms (less than 2 cx) account for the total quantity of rabbits. Should we infer, however, that rabbit production exclusively takes

place in farms with an area less than 2 cx? Not necessarily. However, it is likely that this activity is concentrated on small farms.

An important question that may be raised by analyzing this table is the following: What might explain the fact that small farms (considered here as farms with a size less than 2 cx) tend, as a whole, to have a higher concentration of livestock types such as cow, pig, sheep, goat and chicken? It might be that the low profitability of farmers with small farm size induces them to diversity their activity and raise more animals in order to protect themselves against risk. In Haiti, farmers are not always the owner of the animals they raise. There exists a system called "gardiennage" according to which a farmer takes care and feeds another person's animal in return for keeping for himself a baby animal at the first birth (usually the animal put in gardiennage is a female). Horses and cows are kept on the field and moved from plot to plot in different regions over time. Pigs, rabbits and sheep are kept in the back yard. Poultry are marked and left in nature as well as goats.

One point that should be made is that until the massive elimination of the Haitian pigs in the early 1980s due to the expansion of the African swine fever, pigs were one of the most important livestock types raised by small farmers.

This was considered as a kind of investment that allowed these farmers to find the necessary funds to finance important expenditures such as funerals, tuition payment for their children, weddings, etc. Today, the indigenous pig population are being replaced by Iowan pigs. The replacement process is still underway with the new pigs only moving to the small farmers in the last year or two. Also, it is possible the new stock are not quite appropriate for small farmers because of the high feed costs they require to perform as well as in their environment of origin. Moreover, their adaptation to the tropical climate of Haiti is challenging.

The results obtained from Table 3.14 are obviously influenced by the aggregation of the initial farm size categories into more extended ranges. However, there is nothing wrong by so doing since the numbers in a relative frequency table can always be interpreted in a cumulative way.

Socioeconomic Characteristics

Family size

Table 3.15 considers the average family size by farm size range. Although there is not a regular declining trend pattern in the number of family members with respect to farm size, it is clear that, on average, farmers with small farm

size (less than 2 cx) tend to have more children than those with middle class of farm size (between 2-4 cx) and those that have at least 4 cx.

The fact that a high percentage of the rural households in Haiti has very small farms and tends at the same time to have a larger number of people depending on these farms gives insight into the Haitian rural poverty. Given the low productivity that characterizes farming in the country, smallholders income is insufficient to support large families. Job opportunities for farmers outside their farm unit are scarce and the budget of a small farmer, in general, does not allow him to fully satisfy the primary needs of his family.

Table 3.1. Distribution of agricultural households by farm size[a]

Farm Size (in carreaux)	Percentage households	Cumulative percentage
Less than 1	62.8	62.8
1-2	22.8	85.5
2-3	8.6	94.1
3-4	2.8	96.9
4-5	1.0	97.9
5 or more	2.1	100.0
Total farms (n = 290)	100.0	

[a]Source: Household Expenditures and Consumption Survey (HECS), 1986-87 (Periods 1-3 months).

Table 3.2. Agricultural households currently farming and average number of parcels[a]

Farm size (in carreaux)	Percent	Cumulative Percent	Average Number Parcels
Less than 1	56.1	56.1	2.08
1-2	26.8	82.9	3.14
2-3	10.2	93.1	4.88
3-4	3.3	96.3	5.00
4-5	1.2	97.6	2.33
5 or more	2.4	100.0	3.67
Total farms (n = 246)	100.0		

[a]Source: HECS, 1986-87 (Periods 1-3).

Table 3.3. Crops by category farm size[a]

Farm Size Category	Crops
Less than 1 cx:	Corn, sorghum, rice, yam, "malanga" tuber, sweet cassava, bitter cassava, sweet potato, "mazumbel" tuber, peanuts, other tubers, arthocarpus incisa, avocado, plantain, pumpkin, beans, eggplant, cucumber, "calalou", orange, grapefruit, melon, banana, mango, coconut, coffee, cocoa, tobacco, sugar cane.
1 - < 2 cx:	Corn, sorghum, rice, yam, "malanga" tuber, sweet cassava, bitter cassava, "mazumbel" tuber, peanut, other tubers, arthocarpus incisa, avocado, plantain, pumpkin, cucurbita "giraumont", beans, breadfruit, other legumes, orange, melon, banana, lemon, mango, coconut, coffee, tobacco, sugar cane.
2 - < 3 cx:	Corn, sorghum, rice, yam, "malanga" tuber, sweet cassava, bitter cassava, sweet potato, "mazumbel" tuber, onion, peanut, arthocarpus incisa, avocado, plantain, pumpkin, beans, orange, banana, other fruits, coffee, sugar cane.
3 - < 4 cx:	Corn, sorghum, yam, sweet cassava, bitter cassava, sweet potato, peanut, other tubers, arthocarpus incisa, avocado, plantain, beans, orange, coffee.
4 - < 5 cx:	Corn, sorghum, rice, yam, sweet cassava, arthocarpus incisa, banana, peas, banana, coffee, sugar cane.

[a]Source: HECS, 1986-87 (Periods 1-3).

Table 3.4. Ranking of the crops by total frequency (total number of households cultivating them)[a]

Crops	Frequency
Corn[b]	138
Beans[b]	120
Yams	81
Plantains	62
Sorghum	55
Sweet potato	46
Cassava (bitter and sweet)	44
Coffee	41
Rice	38
Sugar cane	19
Arthocarpus incisa	17
"Malanga" tuber	16
Peanut	12
Avocado	10
Orange	8
Mango	7
Other tubers	7
Coconut	6
Breadfruit	6
"Mazumbel" tuber	5
Banana	4
Cucurbita "giraumont"	4
Grapefruit	3
Pumpkin	3
Melon	2
Onion	2
Lemon	2
"Calalou"	2
Bean cocoa	2
Raw tobacco	2
"Corossol"	1
Other fruits	1
Eggplant	1
Cucumber	1

[a]Source: HECS, 1986-87 (Periods 1-3).

[b]For these crops, the total is likely to be for two harvest seasons since green, dry and processed forms have been added up to obtain the total frequency.

Table 3.5. South department: ranking of the crops by total area cultivated (hectares) in monoculture, association, and combination (1986)[a]

Crops	Area Cultivated (hectares)
Beans	256,160
Sorghum	218,740
Corn	169,830
Cassava/Bitter and Sweet	114,280
Plantain	94,020
Sweet potato	93,780
Coffee	61,420
Yam	54,450
Sugar cane	43,150
Rice	42,970
"Malanga" tuber	34,620
Banana	17,840
Peanut	14,920
"Cucurbita" giraumont	10,420
"Mazumbel" tuber	9,850
Other	3,420
Tomato	3,360
Cabbage	3,000
Vetiver	2,010
Potato	1,800
Tobacco	1,500
Sisal	1,300
Cotton	520
Pineapple	300

[a]Source: ADSII Survey (Report #24 and 31), December 1986 and May 1987 respectively.

Table 3.6a. Distribution of the number of agricultural households (or farms) by region (percentage)[a]

Region	Percent Agricultural Households
North	21.38
Transversal	24.14
West	23.45
South	30.00
Port-au-Prince	1.03
TOTAL	100.00

[a]Source: HECS 1986-87 (Periods 1-3).

Table 3.6b. Distribution of the number of farmers by farm size category within region (percentage)[a]

Farm Size Category	North	Transversal	West	South	Port-au-Prince
Less than 1 cx	62.90	75.71	60.29	52.87	100.00
1 - < 2 cx	22.58	17.15	23.54	27.59	0
2 - < 3 cx	6.46	7.14	5.88	13.79	0
3 - < 4 cx	1.61	0	5.88	5.45	0
4 - < 5 cx	1.61	0	2.94	0	0
5 cx at least	4.84	0	1.47	2.30	0
TOTAL	100.00	100.00	100.00	100.00	100.00

[a]Source: HECS 1986-87 (Periods 1-3).

Table 3.7. Number of agricultural households for the major crops by region (in percentage terms)[a]

Crops	North	Transversal	West	South	Port-au-Prince	Total
Corn	15.65	17.69	32.65	33.33	0.68	100.00
Beans	21.55	23.28	24.14	31.03	0	100.00
Yam	19.12	19.12	7.35	54.41	0	100.00
Plantain	20.00	29.23	7.69	43.08	0	100.00
Sorghum	0	11.86	49.16	38.98	0	100.00
Sweet potato	10.00	30.00	18.00	42.00	0	100.00
Cassava (bitter & sweet)	13.34	24.44	17.78	44.44	0	100.00
Coffee	27.91	4.65	0	67.44	0	100.00
Rice	13.95	53.49	2.33	30.23	0	100.00
Sugar cane	35.00	25.00	5.00	35.00	0	100.00

[a]Source: HECS 1986-87 (Periods 1-3).

Table 3.8. Percentage of households cultivating the ten most important crops by category of farm size[a]

Farm Size Category	Corn	Beans	Yam	Plantain	Sorghum	Sweet Potato	Coffee	Rice	Cassava bitter & sweet	Sugar cane
Less than 1cx	54.35	49.17	37.70	48.39	49.09	41.30	41.46	47.37	45.45	42.11
1 cx	27.54	28.33	34.43	30.65	25.45	36.95	29.27	31.58	36.37	31.58
2 cx	8.70	10.83	13.11	14.51	10.91	8.70	17.07	13.16	6.82	10.53
3 cx	5.06	5.00	8.20	1.61	9.09	8.70	4.88	0	6.82	0
4 cx	1.45	2.50	1.64	1.61	1.82	4.35	2.44	0	2.27	10.53
5 cx or more	2.90	4.17	4.92	3.23	3.64	0	4.88	7.89	2.27	5.26
TOTAL	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00

[a]Source: HECS 1986-87 (Periods 1-3).

Table 3.9. Percentage number of farmers for each crop within a region (percentage of the total number of crops - the 10 major ones and others)[a]

Crops	North	Transversal	West	South	Port-au-Prince
Corn	14.84(2)[b]	14.45(2)	27.67(1)	14.50(1)	33.33(1)
Beans	16.13(1)	15.00(1)	15.56(3)	13.31(2)	0
Yam	8.39(3)	7.22(6)	2.78(8)	10.95(3)	0
Plantain	8.39(3)	10.56(4)	2.78(8)	8.28(5)	0
Sorghum	0	3.89(9)	16.11(2)	6.80(6)	0
Sweet potato	3.23(8)	8.33(5)	5.00(5)	6.21(7)	0
Cassava (bitter & sweet)	3.87(7)	6.11(7)	4.45(6)	5.91(8)	0
Coffee	7.75(4)	1.67(12)	0	8.59(4)	0
Rice	3.87(7)	12.78(3)	0.56(11)	3.85(9)	0
Sugar cane	4.52(6)	2.78(9)	0.56(11)	2.07(11)	0

[a]Source: HECS, 1986-87 (Periods 1-3).

[b]The numbers in parentheses represent the rank of the crop among all other crops cultivated in the area in terms of the percentage of farmers cultivating these crops in this area.

Table 3.10. Percentage of farmers purchasing their agricultural inputs[a]

Input	Number households farming	Number households purchasing each input	Percentage households purchasing each input
Labor	246	162	65.85
Seeds/plants	246	130	52.85
Transportation/ packaging	246	85	34.55
Land (rent)	246	59	23.98
Fertilizers/ pesticides	246	55	22.36
Agricultural equipment	246	36	14.63
Water (irrigation)	246 (237)[b]	15	6.33

[a]Source: HECS, 1986-87 (Periods 1-3).

[b]Because of missing information for 9 households over the total, the percentage for water is calculated with the ratio 15/237.

Table 3.11. Inputs ranked by farm size according to the percentage number of buyers (of these inputs)[a]

a. Farm size >0 - <1 cx		b. Farm size 1 - <2 cx	
Inputs ranking	Percent of Households	Inputs ranking	Percent of Households
Labor	63.04[b]	Labor	62.12
Seeds/ plants	53.62	Seeds/ plants	50.00
Land rent	26.09	Trans./pkg.	42.42
Trans./pkg.	23.91	Fert./pest.	19.70
Fert./pest.	20.29	Land rent	16.67
Ag. equip.	10.14	Ag. equip.	15.15
Water	5.07	Water	6.06

[a]Source: HECS, 1986-87 (Periods 1-3).

[b]Each percentage is calculated as follows:

$$\frac{\text{number of buyers for the input}}{\text{total number of farmers in the farm size range}} * 100.$$

Table 3.11. Continued

c. Farm size 2 - <3 cx

Inputs ranking	Percent of Households
Labor	84.00
Seeds/plants	52.00
Trans./pkg.	48.00
Fert./pest.	32.00
Land rent	32.00
Ag. equip.	24.00
Water	8.00

d. Farm size 3 - <4 cx

Inputs ranking	Percent of Households
Labor	87.50
Trans./pkg.	75.00
Seeds/plants	50.00
Fert./pest.	37.50
Ag. equip.	37.50
Water	25.00
Land rent	12.50

e. Farm size 4 - <5 cx

Inputs ranking	Percent of Households
Trans./pkg.	100.00
Seeds/plants	66.67
Fert./pest.	66.67
Labor	66.67
Ag. equip.	33.33
Land rent	33.33
Water	n.a.

f. Farm size 5 or more

Inputs ranking	Percent of Households
Labor	66.67
Seeds/plants	66.67
Trans./pkg.	50.00
Ag. equip.	33.33
Land rent	33.33
Fert./pest.	16.67
Water	n.a.

Table 3.12. Livestock by category of farm size[a]

Category farm size	Number of farming households	Number of households reporting		Maximum number of		
				Cow	Pig	Sheep
Less than 1 cx	138	(78%)	108	80	8	24
1 cx - 2 cx	66	(86%)	57	52	15	18
2 cx - 3 cx	25	(92%)	23	40	19	3
3 cx - 4 cx	8	(100%)	8	4	0	0
4 cx - 5 cx	3	(100%)	3	9	0	0
5 cx or more	6	(66%)	4	3	0	0
TOTAL	246	(82%)	203	188	42	45

[a]Source: HECS, 1986-87 (Periods 1-3).

[b]From the 1300 there are 500 donkeys and 800 young horses.

[c]The 500 are only for horses.

livestock					
Goat	Chicken	Turkey	Donkey horses mules	Rabbit	Number of households reporting[b,c]
176	436	15	1,300[b]	1,100	46 (33%)
141	368	6	0	0	27 (41%)
57	135	0	0	0	13 (52%)
18	117	6	0	0	5 (62%)
7	6	2	500[c]	0	2 (66%)
14	18	0	0	0	1 (16%)
413	1,080	29	1,800	1,100	94 (38%)

Table 3.13. Livestock ranking by order of importance[a]

Livestock type	Total # of head	Percentage
Rabbit	1,100	37.97
Chicken	1,080	37.28
Goat	413	14.26
Cow	188	6.49
Sheep	45	1.55
Pig	42	1.45
Turkey	29	1.00
TOTAL	2,897	100.00

[a]Source: HECS, 1986-87 (Periods 1-3).

Table 3.14. Distribution of selected livestock types by farm size rank (small, middle and large farm size class)[a]

Farm size	Cow		Pig		Sheep	
	Number	Percent	No.	%	No.	%
Small (less than 2 cx)	132	70.21	23	54.76	42	43.33
Middle (between 2-4 cx)	44	23.40	19	45.24	3	6.67
Large (4 cx or more)	12	6.30	0	0	0	0
TOTAL	188	100.00	42	100.00	45	100.00

[a]Source: HECS, 1986-87 (Periods 1-3).

Goat		Chicken		Rabbit		Turkey	
#	%	#	%	#	%	#	%
317	76.76	804	14.14	1,100	100.00	21	72.41
75	18.16	252	23.33	0	0	6	20.68
21	5.08	24	2.33	0	0	2	6.10
413	100.00	1,080	100.00	1,100	100.00	21	100.00

Table 3.15. Average number of family members by different category of farm size[a]

Category farm size	Number households cultivating	Minimum number members	Maximum number members	Mean
> 0 but < 1 cx	138	1	13	5.28
1 cx - < 2 cx	66	1	15	5.76
2 cx - < 3 cx	25	1	10	4.32
3 cx - < 4 cx	8	2	8	5.13
4 cx - < 5 cx	3	4	9	2.65
5 cx at least	6	2	11	3.08

[a]Source: HECS, 1986-87 (Periods 1-3).

CHAPTER FOUR. ANALYSIS OF POLICY IMPACTS

This chapter looks at the different parameters that are necessary to carry out the analysis and evaluates the impact of pricing policies. In determining the effect of price change on cereal producers' income, as shown earlier, it is important to know whether the agricultural household is a net seller or a net buyer. For each, the respective parameters of sales/production ratio and the purchase/total consumption ratio are of importance.

Definitions of the Parameters

Given the survey design, several parameters need to be specifically defined for the analysis.

Sale is considered as the difference between total production and total consumption. A negative sale means that consumption exceeds production. It also says that all production is consumed and that a certain amount is bought in the market to satisfy the total consumption needs. Producers are considered as net sellers if their sale is positive and net buyers if their sale is negative (i.e., their purchase is positive). Total production is considered as the sum of total sales and total stocks. In calculating the total production, both total sales and total stocks need to be converted into the same unit of measurement. This is done by converting local units into standard units, such as

pounds (called quantity equivalent in the survey, see Appendice). To calculate the share of sales in total production (in quantity terms) it is necessary that the two components of the total production, i.e., sales and stocks, are expressed in the same standard units. For the majority of the farmers the conversion rates from local to standard quantity measures are the same in the data for both sales and stocks but, in some cases, there are discrepancies between the two. When that happens, some decision rules are applied. We chose to evaluate both sales and stocks by the smallest of the two conversion rates when there are different for stocks and sales by the same household.

The calculation of total consumption requires information from the food expenditures and consumption part of the survey, as well as the agricultural part. Given the bad storage conditions in Haiti, producers' stocks are usually limited and used for consumption purposes. Therefore, crops in inventory can be seen as the portion of the harvest that is consumed. However, additional consumption may take place from purchases. The measure for total consumption would be calculated by adjusting the amount saved from total production (and not sold in the market) by a factor reflecting the percent of total consumption from harvest sources. This factor would come

from the reported weekly consumption of food data. This relationship can be written as follows:

$$\left(\frac{H}{TC}\right)Q_C = Q_I$$

where H = value total consumption from harvest (one week)

TC = value total consumption from all sources (one week) (purchase, gift, inventory and harvest)

Q_C = total quantity consumed (over harvest period)

Q_I = total quantity stocked from harvest (over harvest period)

The ratio $\left(\frac{H}{TC}\right)$ can be calculated from the expenditure data and Q_I is given in the agricultural data in quantity terms. Therefore, the unknown Q_C can be calculated for any of the three cereal grains (corn, sorghum and rice). This calculation of total quantity consumed offers several advantages to using inventory data alone:

1. It allows us to extrapolate from the observed expenditures data to the agricultural part of the data.
2. It does not rely on obtaining retail or farm gate prices.
3. It controls for time. More explicitly, the quantity consumed is calculated for the same time period as the inventory (and sales and production).

Once total Q_C consumption is known in quantity, it is possible to determine for each cereal grain which farmers

are net sellers and which ones are net buyers by looking at the difference between total quantity produced and total quantity consumed. Net sellers are farmers for which this difference is positive and net buyers are those for which it is negative. A negative sale corresponds to a purchase.

Knowing total production (Q_P) and total consumption (Q_C) it is also possible to calculate the two ratios sales/production and purchase/consumption for the situations of net buyer and net seller.

The elasticities of supply and demand for each of the three grains are not currently available from the HECS data. Instead, values for the elasticities were assumed based on those in the CARD (Center of Agriculture and Research Development) study (Banskota, Jensen, and Johnson). Based on the CARD study, the assumed base elasticity values are as follows:

	e_s	e_d
Corn	0.04	-0.40
Sorghum	0.03	-0.30
Rice	0.05	-0.50

Net Sellers and Net Buyers

As seen in Chapter 2, the net seller position of a farm for a given commodity is defined as one where the farm production exceeds the farm consumption of that commodity and the surplus is marketed in return of money income.

The net buyer position of a farm for a given commodity is, inversely, one where the farm production is not sufficient to meet the farm consumption of that commodity and the additional quantity needed is bought in the market.

Measuring impact of price changes

The price change effect on net sellers and buyers of corn, sorghum and rice refer to the income effect only in this study. Measuring the magnitude of the income change resulting from the commodities price change is not the purpose of this study, rather the focus is on knowing the direction in which cereal grain producers income changes as price changes under government pricing policies (in this case, effecting a change in output price). The production/consumption model developed in Chapter 2 for cereal grain producers shows that under government pricing policies:

1. An increase in the price of a cereal grain (corn or sorghum or rice) will increase the income of the net seller producers (of corn, sorghum or rice) in which case the ratio sales/production for the cereal grain commodity (which can be interpreted as the propensity to sell) must be greater than the ratio $\frac{e_d - e_s}{1+e_d}$ where e_s and e_d are respectively the supply and demand elasticities of the commodity whose price changes. Inversely, a

decrease in the price of the commodity will decrease the income of the net-seller producers if the same condition is satisfied.

2. An increase in the price of a cereal grain (corn or sorghum or rice) will decrease the income of the net buyer-producers (of corn or sorghum or rice), in which case the ratio purchase/consumption for the cereal grain commodity must be greater than the ratio $\frac{e_s - e_d}{1+e_s}$ where e_s and e_d are respectively the supply and demand elasticities of the commodity whose price changes. Inversely, a decrease in the price of the commodity will increase the income of the net buyer producers if the same condition is satisfied.

Analysis of price changes

The analysis of price changes under government pricing policies for both net sellers and net buyers of cereal grains (corn, sorghum and rice) is carried out first by evaluating the sensitivity of the impact measures to the elasticity assumptions. Starting from the initial estimates of the elasticities, different cases are considered for each crop (Tables 4.1a, 4.1b, 4.1c). The cases evaluated are as follows:

1. The initial supply elasticity increases by 10 percent and the initial demand elasticity stays the same.

2. The initial supply elasticity stays the same while the initial demand elasticity increases by 10 percent.
3. The initial supply elasticity decreases by 10 percent and the initial demand elasticity stays the same.
4. The initial supply elasticity stays the same while the initial demand elasticity decreases by 10 percent.
5. Both the initial supply and demand elasticities increase by 10 percent.
6. Both the initial supply and demand elasticities decrease by 10 percent.

Tables 4.1a, 4.1b, and 4.1c can be seen as evaluating the sensitivity of the measures. The tables show that the ratio $\frac{e_d - e_s}{1+e_d}$ is much more sensitive to change in the demand elasticity than to change in the supply elasticity. A 10 percent increase or decrease in the supply elasticity does not practically change the ratio. However, a 10 percent increase or decrease in the demand elasticity has a substantial impact on this ratio.

Because of some data processing problems related to the expenditures data set, the ratio $(\frac{H}{TC})$ cannot be computed at this point. Another approach that uses only the agricultural data is followed. The sales/production ratio is calculated directly from these data using the sales (quantity) figure and considering production as the sum of

stock and sales. This should not have any impact on the conclusion drawn for the net sellers. However, this approach can not be used to calculate the purchase/consumption ratio for the net buyers, given that neither total consumption nor consumption from harvest and purchase (for corn, sorghum and rice) that should be derived from the expenditure data are currently available. In such a situation, the conclusion about the net buyers cannot be based on the true values for the purchase/consumption ratio. However, the level of the ratio $\frac{e_s - e_d}{1+e_s}$ can still be used to evaluate alternative values for the purchase/consumption share and the income gain or loss for a net buyer as the price of the commodity (corn, sorghum or rice) he buys changes.

Farm Size and Average Propensity to Sell

The propensity to sell refers to the ratio sales/production and is calculated on an average basis for different farm size categories and by cereal grain and the results are shown in Tables 4.2a, b and c. These tables show that sales share generally ranges between 64 and 82 percent throughout the various farm size categories and all the three crops. Its high level gives evidence that cereal grain producers in Haiti are market-oriented.

For each of the three crops the average propensity to sell generally tends to increase with farm size. Although all farmers sell a relatively important amount of their production, the share of sales over production is generally lower on the average for small farms than for large farms cultivating corn, sorghum and rice. The propensity to sell cereal grains, therefore, tends to be an increasing function of farm size.

Several interesting conclusions can be drawn from Tables 4.2 a, b, and c:

1. Small corn producers (farm size less than 1 carreau) represent more than half (52.38 percent) of the total corn producers and have a propensity to sell of 64 percent. Small sorghum growers have a lower propensity to sell (57 percent) and represent less than half (41.38 percent) of the total sorghum producers. Small rice producers have a propensity to sell of 64 percent and represent also less than half (42.31 percent) of the total rice growers. Therefore, although all small cereal grain small producers have a fairly high propensity to sell, small rice producers and small corn producers tend to sell more than small sorghum producers. Moreover, the percentage of small corn growers is higher than the percentage of small rice growers.

The percentage of small rice growers is higher than the percentage of small sorghum growers. In addition, sorghum is much more consumed by its producers than corn and rice by their producers in the very small farm size range (less than one carreau). More corn and rice from harvest is sold in the market by small farmers than sorghum.

2. In the farm size category between 1 and 2 carreaux[1] the pattern is the same with respect to the percentage number of farmers cultivating the three crops. However, while the propensity to sell rice stays the highest, the propensity to sell sorghum is higher than the propensity to sell corn (average propensity for the group).
3. In the farm size range between 2 and 3 carreaux, the pattern of the average propensity to sell is the same as in 2 but the percentage number of the sorghum growers in this farm size category is higher than for the corn growers, with the percentage of rice growers the highest one.
4. Above 3 carreaux, the pattern of propensity to sell varies for the three crops in a non uniform fashion.

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[1] 1 is included but 2 is not. The same remark is worth for the other farm size categories.

Overall, the average propensity to sell of cereal grain producers is higher for rice than for sorghum and tends to be higher for sorghum than for corn in farm size categories less than 3 carreaux (except that the very small sorghum growers in the farm size less than 1 carreau sell less than the small corn growers). In the farm size categories above 3 carreaux there is no uniform pattern in the propensity to sell for the three crops. In percentage terms, the number of growers in the farm size categories less than 2 carreaux is greater for corn than for sorghum and rice. In absolute terms also, there are more small corn producers than sorghum producers and more sorghum producers than rice producers.

Region and Average Propensity to Sell

As seen in Tables 4.3a, b and c, for any region and any of the three crops, the average propensity to sell is at least 50 percent except that the North does not seem to grow sorghum. This may be due to seasonal factors. Therefore, cereal grain producers throughout the country tend to be market-oriented. However, there exist some regional differences for each of the three crops and across them in terms of the average propensity to sell as well as in terms of the percentage number of producers. The following conclusions can be drawn from Tables 4.3 a, b, and c.

1. Although all the producers in general are market-oriented (on the basis of their propensity to sell),

corn producers in the North and South are slightly more market-oriented than corn producers in the Transversal valley who are themselves more market-oriented than those in the West. Moreover, corn producers concentration expressed as a proportion of the total corn growers is higher in the South (42.86 percent) than in the West (22.61 percent) higher in the West than in the Transversal region (17.86 percent) and higher in this latter region than in the North (16.67 percent).

2. Sorghum producers in the South have a higher average propensity to sell than sorghum producers in the West who have themselves a higher average propensity to sell than sorghum producers in the Transversal valley. No sorghum producer seems to exist in the North. The concentration of the sorghum producers follows the same pattern as in 1 with 51.72 percent of the sorghum producers in the South, 31.03 percent in the West and 17.24 percent in the Transversal valley.

3. Rice producers in the West, the North and the South sell a high percentage of their production (average propensity to sell equals .93, .89 and .83 respectively). However, average propensity to sell rice in the Transversal valley is only .65; which

means that an important portion of the rice produced in this area is consumed. Therefore, rice producers in the West are more market-oriented than those in the North who are themselves more market-oriented than those in the South. Moreover, the latter are more market-oriented than the rice producers in the Transversal valley. Rice is by far the most important crop in the latter region and people tend to consume much rice in this area. Looking at the regional distribution of rice growers across the country, there are more rice producers in the Transversal valley (61.54 percent) than in the South (23.08 percent), more in the South than in the North (11.54 percent) and more in the North than in the West (3.85 percent).

Looking at across all the three crops by region:

4. The North has a higher average propensity to sell rice (0.89) than to sell corn (0.81). No sorghum seems to exist in the South (or probably not much). In other words, corn is much more consumed by corn producers than rice is consumed by rice producers in this area. Rice is much more produced for the market in this area than corn.
5. The Transversal region has a higher average propensity to sell rice (0.69) than corn (0.60) and

a higher propensity to sell corn than sorghum (0.50). Therefore, cereal producers in this area tend to consume more from their sorghum harvested than from their corn harvested and more from their corn harvested than from their rice harvested. Rice is much more produced for the market in this area than corn and sorghum.

6. The West has a higher average propensity to sell rice (0.93) than sorghum (0.65) and a higher propensity to sell sorghum than corn (0.58). Consequently, in percentage terms consumption of corn from harvest exceeds consumption of sorghum from harvest which itself exceeds consumption of rice from harvest. Again, rice is much more produced for the market in this area than corn and sorghum.

7. The South has a higher average propensity to sell rice (0.83) than sorghum (0.80) and a higher propensity to sell sorghum than corn (0.71). Therefore, in percentage terms, the portion of the total quantity harvested of corn consumed in this area is greater than the portion for sorghum which is greater than the portion for rice. Rice, is, like for the other regions, mainly produced for the market.

Overall, there are more corn and sorghum producers net sellers in the South and more rice producers net sellers in the Transversal valley. Corn is much more produced for the market in the North by a few corn producer net sellers and a larger share of the corn production is consumed in the West by net sellers. Sorghum is produced much more for the market in the South and a larger share of the sorghum production is consumed by the net sellers in the Transversal valley. Rice is produced much more for the market by a few rice growers net sellers in the West and a larger share of the rice produced by rice net sellers is consumed in the Transversal valley. Sorghum is produced much more for the market in the South by the majority of the net sellers producers and much more consumed by the few net sellers producers in the Transversal valley. The North does not seem to produce sorghum.

The net seller producers consistently consume an important portion of their production of corn, sorghum and rice (between 30 and 50 percent) in the Transversal valley while the net seller producers in the North consistently sells an important part of their corn and rice production (between 80 and 90 percent).

It is possible to consider the distribution of the producers of corn, sorghum and rice into net sellers and net buyers by farm size and region in absolute and percentage

terms. Total producers of corn, sorghum and rice refer to the absolute values on which the percentages in Tables 3.7 and 3.8 have been calculated for the three crops (Table 3.7 refers to the regional classification while Table 3.8 refers to farm size classification). Net sellers by farm size and region have been calculated for the three crops in earlier tables (see Tables 4.2 a, b, c and 4.3 a, b, c). Net buyers by farm size and region are considered as residuals. Producers are considered either as net sellers or as net buyers. There is no way to know if a producer consumes all his production of cereal grains and does not purchase grains in the market (i.e., is neither net seller nor net buyer). Such a producer (if he exists) is considered as a net buyer (i.e., is put in the residual) because, with enough time, it is likely that he becomes a net buyer.

Distribution of net sellers and net buyers by farm size for the three crops (corn, sorghum, rice)

Tables 6 a, b, c looks at the distribution of the cereal grain (corn, sorghum and rice) producers by category of farm size. All the three crops, the majority of the net sellers and the net buyers are in farms less than 2 carreaux.

For corn, 82.14 percent (i.e., 52.38 + 29.76) of the neet sellers and 81.48 percent (i.e., 57.41 + 24.07) of the net buyers have less than 2 carreaux, 15.58 percent of the net sellers and 11.11 percent of the net buyers have farm

size between 2 and 4 carreaux, 2.38 percent of the net sellers and 7.41 percent of the net buyers have at least 4 carreaux.

For sorghum, 68.97 percent of the net sellers and 80.77 percent of the net buyers have less than 2 carreaux, 24.13 percent of the net sellers and 15.38 percent of the net buyers have farm size between 2 and 4 carreaux, 6.90 percent of the net sellers and 3.85 percent of the net buyers have at least 4 carreaux.

For rice, 69.23 percent of the net sellers and 78.95 percent of the net buyers have less than 2 carreaux, 19.23 percent of the net sellers and 0 percent of the net buyers have between 2 and 4 carreaux, 11.54 percent of the net sellers and 0 percent of the net buyers have at least 4 carreaux.

It can also be seen from these tables that 60.87 percent and 39.13 percent of all the corn producers are net sellers and net buyers respectively. For sorghum, 52.73 percent and 47.27 percent are respectively net sellers and net buyers. For rice, the figures are respectively 68.42 and 31.58 percent.

Moreover, it can be seen that the majority of the producers for the three crops are in small farms with an area less than 2 carreaux. For instance, 81.89 percent of all the corn producers, 74.54 percent of all the sorghum

producers and 78.95 percent of all the rice producers are in this farm size category. Between 2 and 4 carreaux, there are 13.76 percent of the corn producers, 20 percent of the sorghum producers and 13.16 percent of the rice producers. However, only 4.35 percent of the corn producers, 5.46 percent of the sorghum producers and 7.89 percent of the rice producers have at least 4 carreaux.

Distribution of net sellers and net buyers by region for the three crops

The distribution of net sellers and net buyers by region is shown in Table 4.7 a, b, c.

For corn, 16.67 percent of the net sellers and 14.52 percent of the net buyers are in the North, 17.86 percent of the net sellers and 17.74 percent of the net buyers are in the Transversal Valley, 22.62 percent of the net sellers and 46.77 percent of the net buyers are in the West, 42.85 percent of the net sellers and 20.97 percent of the net buyers are in the South.

For sorghum, no producers are reported from the North, 17.24 percent of the net sellers and 6.67 percent of the net buyers are in the Transversal Valley, 31.03 percent of the net sellers and 66.67 percent of the net buyers are in the West, 51.73 percent of the net sellers and 26.66 percent of the net buyers are in the South.

For rice, 11.54 percent of the net sellers and 17.64 percent of the net buyers are in the North, 61.54 percent of the net sellers and 41.18 percent of the net buyers are in the Transversal Valley, 3.85 percent of the net sellers and 0 percent of the net buyers are in the West, 23.07 percent of the net sellers and 41.18 percent of the net buyers are in the South.

These tables also reveal that 57.53 percent and 42.47 percent of all corn producers are respectively net sellers and net buyers; for sorghum the figures are respectively 49.15 percent and 50.85 percent for net sellers and net buyers; for rice 60.47 percent and 39.53 percent of all the producers are respectively net sellers and net buyers.

It has to be noted that the total number of producers for each of the three crops is not the same for farm size and regional distribution (see Tables 4.6 a, b, c and 4.7 a, b, c). The larger number of producers reported for region is due to the way the variable farm size is constructed in the study. As said earlier, farm size is based on only positive value of the areas under cultivation during the year preceding the beginning of the survey. However, no such restriction was imposed on the variable region.

Distribution of net sellers and net buyers of corn, sorghum and rice (as percentage of total producers) by farm size

Tables 4.8 a, b, c show that for corn, there are more net sellers than net buyers in the small (less than 2 cx) and middle (between 2 and 4 cx) farm size ranges. However, for the large farm size category (4 cx or more) the number of net buyers exceeds the number of net sellers. For sorghum, in the small farm size (less than 2 cx), there are more people buying (net) than selling (net). However, as farm size gets larger, the number of net sellers exceeds the number of net buyers within the farm size categories (2-4 cx and 4 cx or more). For rice, within any of the farm size ranges, the number of net sellers exceeds the number of net buyers. In addition, above 2 carreaux, all the producers are completely net sellers of rice.

Distribution of net sellers and net buyers of corn, sorghum and rice (as percentage of total producers) by region

As shown in Tables 4.9 a, b, c, for corn, except in the West where a larger number of producers are net buyers, in all the other regions of the country (North, Transversal, South) there are more producers net sellers than net buyers. For sorghum the same is true, however, no sorghum producers seem to exist in the North. For rice, except in the South where the number of net buyers exceeds the number of net sellers, in the other regions (North, Transversal, West) the

number of net sellers are either equal or greater than the number of net buyers. There are no producers net buyers of rice in the West.

Overall, for any of the three crops, there are more producers net sellers and net buyers in the farm size category less than 2 carreaux than in the middle (between 2 and 4 carreaux) and the large (4 carreaux or more) farm size categories. This reflects the fact that the Haitian agriculture is concentrated on small farms. In terms of ranking regional distribution of the cereal grain producers net sellers and net buyers, we have the following in decreasing rank order (based on Table 4.7 a, b, c).

1. Corn net sellers: South/West/Transversal/North
   Corn net buyers: West/South/Transversal/North
2. Sorghum net sellers: South/West/Transversal
   Sorghum net buyers: West/South/Transversal
3. Rice net sellers: Transversal/South/North/West
   Rice net buyers: Transversal/South/North/West

In addition, within farm size categories and regions, in general, the number of net sellers exceeds the number of net buyers. This reflects the fact that Haitian farmers are market-oriented.

Overall impact analysis of price changes

There are two non-mutually exclusive alternatives possible for measuring the impact of price change on cereal

grain producers under government policies. The first one is based on the sales/production ratio, the purchase/consumption ratio and the two measures of impact $(e_d-e_s)/1+e_d$ and $(e_s-e_d)/1+e_s$. The second alternative uses the percentage number of producers (net sellers and net buyers) that are likely to be affected by these policies.

Alternative 1 We know that there is a positive relationship between price and income for net sellers of corn, sorghum and rice if the sales/production ratio exceeds the ratio $\frac{e_d-e_s}{1+e_d}$. We also know that there is a negative relationship between price and income for net buyers of corn, sorghum and rice if the purchase/consumption ratio exceeds the ratio $(e_s-e_d)/1+e_s$. For given inelastic (i.e., $e_s < 1$ and $e_d > -1$) supply and demand for the three commodities (which is the case in Haiti), the implications for evaluation of the impact of price changes are the following:

1) All corn, sorghum and rice producers will experience income gain (loss) if they are net sellers (in which case sales/production > 0) of those commodities if government policies raise (decrease) their prices. The ratio $\frac{e_d-e_s}{1+e_d}$ is a negative number. Since the sales/production ratio is always greater than this latter ratio, the income effect of price changes under government policies on producers net sellers of corn, sorghum and rice does not depend on the

elasticities of demand and supply (as long as demand is inelastic). In other words, a net seller of corn, sorghum and rice will always have income gain or loss if government policies raise or decrease their prices for inelastic demand. This will be the case no matter his farm size and the region he belongs to. Therefore, government policies, under the assumption of inelastic demand, do not have distributional impact with respect to farm size and region as long as the direction of the income effect of the price change generated by these policies is concerned.

2) All corn, sorghum and rice producers will experience income loss (gain) if they are net buyers (in which case purchase/consumption > 0) of those commodities and government policies raise (decrease) their prices. The ratio $\frac{e_s - e_d}{1+e_s}$ is a positive number since the purchase/consumption and the elasticities-related ratio are both positive, the income effect of price changes under government policies also depends on the magnitude of these two ratios and the supply and demand elasticities. In other words, if the value of the purchase/consumption ratio is greater than the elasticities-related ratio, a net buyer of corn, sorghum and rice will experience an income loss or gain as government policies raise or decrease their prices. Conversely, if the value of the purchase/consumption ratio is less than the elasticities-related ratio, a net buyer of corn, sorghum and

rice will experience an income gain or loss as government policies raise or decrease their price. Depending on the magnitude of the two ratios for the different farm size categories or the different regions, government policies can have different distributional impacts with respect to farm size and region. As said earlier, the expenditures data that would allow us to calculate the purchase/consumption are not currently available for use because of data processing problem. However, it is still possible, although not in real sense, to analyze the effect on net buyers of price changes under government policies. For instance, for a supply elasticity of 0.04 and a demand elasticity of -0.40 for corn (see Table 4.1a) the value of $\frac{e_s - e_d}{1+e_s}$ is 0.42. If a farm size category or region producing corn was in a net buyer position for this commodity and presented an average purchase/consumption ratio <u>greater</u> than 0.42, it would experience an income loss (or gain) as the price of this commodity increases (or decreases) under government policies. Inversely, if a farm size category or region producing corn, sorghum or rice was in a net buyer position for corn and presented an average purchase/consumption ratio <u>less</u> than 0.42, it would experience an income gain (or loss) as the price of this commodity increases or decreases under government policies. (This last case is a mathematical deduction that may never be observed in practice. We have

seen that the standard result where average sales/production $> \frac{e_d - e_s}{1+e_d}$ is obtained for the net sellers from the agricultural, probably the standard case with calculated average purchase/ consumption > 0.42 would be also obtained for the net buyers from the expenditures data.

Alternative 2 Besides the income effect approach, the analysis of price changes under government policies with respect to cereal grains (corn, sorghum and rice) can also focus on the number of producers (net sellers and net buyers) that are likely to be affected by these prices. Knowing net sellers and net buyers distribution by farm size and region can tell us the distributional impact of these policies with respect to the number of people (in percentage terms) represented in the different farm size categories and regions. The number of people affected by a price policy is an important issue per se. Rural families are relatively large in size and family ties are strong. Therefore, any government policy that affects a cereal grain producer is likely to impact on all the members of his family (multiplicative effect).

Tables 4.7 a, b, and c show that cereal grain production (corn, sorghum and rice) is concentrated on small farms. Moreover, they show that, in terms of the percentage number of farmers, farms with size less than 2 carreaux and which are net sellers of corn, sorghum and rice will be more

affected by government policies than middle and large farm sizes. Similarly, government policies that raise (decrease) the price of cereal grains (corn, sorghum and rice) will have more impact in terms of the percentage number of people affected on small farms net buyers than on middle and large farms net buyers.

In terms of regional impacts based upon the percentage number of producers affected we have the following:

1) Government policies that change corn price will affect net sellers producers and more are in the South than in the North, the Transversal Valley and the West. Corn price policies will also affect net buyers producers and more are in the West than in the North, the Transversal Valley and the South.

2) Government policies that change sorghum price will affect more net sellers producers in the South than in the three other regions (the North does not seem to produce sorghum). Sorghum price policies will also affect more net buyers producers in the West than in the other regions. The West has the highest percentage of sorghum growers (see Table 3.7).

3) Government policies that change rice price will affect more net sellers producers in the Transversal Valley and the South than in the two other regions. At the same

time, these two regions count more net buyers of rice. The Transversal Valley has the highest percentage of rice growers and then comes the South (see Table 3.7).

Table 4.1a. Measures of impact for various assumptions about e_s e_d for corn

		1	2	3	4	5	6
	e_s=0.04 e_d=-0.40	e_s=0.044 e_d=-0.40	e_s=0.04 e_d=-0.44	e_s=0.036 e_d=-0.40	e_s=0.04 e_d=-0.36	e_s=0.044 e_d=-0.44	e_s=0.036 e_d=-0.36
$\frac{e_d - e_s}{1+e_d}$	-0.73	-0.74	-0.86	-0.73	-0.63	-0.86	-0.62
$\frac{e_s - e_d}{1+e_s}$	0.42	0.43	0.46	0.42	0.38	0.46	0.38

Assumptions

e_s = elasticity supply for corn.

e_d = elasticity demand for corn.

1: increases by 10% and e_d stays the same.

2: e_s stays the same and e_d increases by 10%.

3: e_s decreases by 10% and e_d stays the same.

4: e_s stays the same and e_d decreases by 10%.

5: both e_s and e_d decrease by 10%.

Table 4.1b. Measures of impact for various assumptions about e_s and e_d for sorghum

		1	2	3	4	5	6
	e_s=0.03 e_d=-0.30	e_s=0.033 e_d=-0.30	e_s=0.03 e_d=-0.33	e_s=0.027 e_d=-0.30	e_s=0.03 e_d=-0.27	e_s=0.033 e_d=-0.33	e_s=0.027 e_d=-0.27
$\frac{e_d - e_s}{1+e_d}$	-0.47	-0.48	-0.54	-0.47	-0.41	-0.54	-0.41
$\frac{e_s - e_d}{1+e_s}$	0.32	0.32	0.35	0.32	0.29	0.35	0.29

e_s and e_d = elasticity supply and demand for sorghum.

1, 2, 3, 4, 5, and 6 have the same meaning as in 4.3a.

Table 4.1c. Measures of impact for various assumptions about e_s and e_d for rice

		1	2	3	4	5	6
	e_s=0.05 e_d=-0.50	e_s=0.055 e_d=-0.50	e_s=0.05 e_d=-0.55	e_s=0.045 e_d=-0.50	e_s=0.05 e_d=-0.45	e_s=0.055 e_d=-0.55	e_s=0.045 e_d=-0.45
$\frac{e_d - e_s}{1+e_d}$	-1.10	-1.11	-1.33	-1.09	-0.91	-1.34	-0.90
$\frac{e_s - e_d}{1+e_s}$	0.52	0.53	0.57	0.52	0.48	0.57	0.47

e_s and e_d = elasticity supply and demand for rice.

1, 2, 3, 4, 5, and 6 have the same meaning as in 4.3a.

Table 4.2a. Average sales/production ratio and percentage number of farmers by farm size for corn[a]

Farm Size	Sales/Production (Average)	Farmers (%)	Number of Farmers
<1 carreau	0.64	52.38	44
1-2	0.68	29.76	25
2-3	0.79	9.53	8
3-4	0.82	5.95	5
4-5	0.72	2.38	2
5 or more	0.00	0.00	0
TOTAL		100.00	84

[a]Source: HECS 1986-1987 (periods 1-3).

Table 4.2b. Average sales/production ratio and percentage number of farmers by farm size for sorghum[a]

Farm Size	Sales/Production (Average)	Farmers (%)	Number of Farmers
<1 carreau	0.57	41.38	12
1-2	0.81	27.59	8
2-3	0.81	17.23	5
3-4	0.84	6.90	2
4-5	0.33	3.45	1
5 or more	0.91	3.45	1
TOTAL		100.00	29

[a]Source: HECS 1986-1987 (periods 1-3).

Table 4.2c. Average sales/production ratio and percentage number of farmers by farm size for rice[a]

Farm Size	Sales/Production (Average)	Farmers (%)	Number of Farmers
<1 carreau	0.64	42.31	11
1-2	0.82	26.92	7
2-3	0.85	19.23	5
3-4	0.00	0.00	0
4-5	0.00	0.00	0
5 or more	0.86	11.54	3
TOTAL		100.00	26

[a]Source: HECS 1986-87 (periods 1-3).

Table 4.3a. Average sales/production ratio and percentage number of farmers by region for corn[a]

Region	Sales/Production (Average)	Farmers (%)	Number of Farmers
North	0.81	16.67	14
Transversal	0.60	17.86	15
West (without P.a.P.)	0.58	22.61	19
South	0.71	42.86	36
TOTAL		100.00	84

[a]Source: HECS 1986-87 (periods 1-3).

Table 4.3b. Average sales/production ratio and percentage number of farmers by region for sorghum[a]

Region	Sales/Production (Average)	Farmers (%)	Number of Farmers
North	0.00	0.00	0
Transversal	0.50	17.24	5
West (without P.a.P.)	0.65	31.04	9
South	0.80	51.72	15
TOTAL		100.00	29

[a]Source: HECS 1986-87 (periods 1-3).

Table 4.3c. Average sales/production ratio and percentage number of farmers by region for rice[a]

Region	Sales/Production (Average)	Farmers (%)	Number of Farmers
North	0.89	11.54	3
Transversal	0.69	61.54	16
West (without P.a.P.)	0.93	3.85	1
South	0.83	23.08	6
TOTAL		100.00	26

[a]Source: HECS 1986-87 (periods 1-3).

Table 4.4a. Comparison of average sales/production ratio and the ratio $\frac{e_d - e_s}{1+e_d}$ by farm size for corn[a]

Farm size	Sales/Production (Average)	Comparison sign	$\frac{e_d - e_s}{1+e_d}$*	Farmers (%)	Number of Farmers
0-1 c.	0.64	>	-0.73	52.38	44
1-2	0.68	>	-0.73	29.76	25
2-3	0.79	>	-0.73	9.53	8
3-4	0.82	>	-0.73	5.95	5
4-5	0.72	>	-0.73	2.38	2
5 or more	0.00	irre-	-0.73	0.00	0
TOTAL		levant		100.00	84

[a]Source: HECS 1986-87 (periods 1-3).

Table 4.4b. Comparison of average sales/production ratio and the ratio $\frac{e_d - e_s}{1+e_d}$ by farm size for sorghum[a]

Farm size	Sales/Production (Average)	Comparison sign	$\frac{e_d - e_s}{1+e_d}$*	Farmers (%)	Number of Farmers
0-1 c.	0.57	>	-0.47	41.38	12
1-2	0.81	>	-0.47	27.59	8
2-3	0.81	>	-0.47	17.24	5
3-4	0.84	>	-0.47	6.90	2
4-5	0.33	>	-0.47	3.45	1
5 or more	0.91	>	-0.47	3.45	1
TOTAL				100.00	29

[a]Source: HECS 1986-87 (periods 1-3).

Table 4.4c. Comparison of average sales/production ratio and the ratio $\frac{e_d - e_s}{1+e_d}$ by farm size for rice[a]

Farm Size	Sales/Production (Average)	Comparison sign	$\frac{e_d - e_s}{1+e_d}$*	Farmers (%)	Number of Farmers
0-1 c.	0.64	>	-1.10	42.31	11
1-2	0.82	>	-1.10	26.92	7
2-3	0.85	>	-1.10	19.23	5
3-4	0.00	irrelevant	-1.10	0.00	0
4-5	0.00	irrelevant	-1.10	0.00	0
5 or more	0.86	>	-1.10	11.54	3
TOTAL				100.00	26

[a]Source: HECS 1986-87 (periods 1-3).

Table 4.5a. Comparison of average sales/production ratio and the ratio $\frac{e_d - e_s}{1+e_d}$ by region for corn[a]

Region	Sales/Production (Average)	Comparison sign	$\frac{e_d - e_s}{1+e_d}$[b]	Farmers (%)	Number of Farmers
North	0.81	>	-0.73	16.67	14
Transversal	0.60	>	-0.73	17.86	15
West (without P.a.P.)	0.58	>	-0.73	22.62	19
South	0.71	>	-0.73	42.86	36
TOTAL				100.00	84

[a]Source: HECS 1986-87 (periods 1-3).

[b]Assumptions: e_s = elasticity supply for corn = 0.15.
e_d = elasticity demand for corn = -0.40.

Table 4.5b. Comparison of average sales/production ratio and the ratio $\frac{e_d - e_s}{1+e_d}$ by region for sorghum[a]

Region	Sales/Production (Average)	Comparison sign	$\frac{e_d - e_s}{1+e_d}$[b]	Farmers (%)	Number of Farmers
North	0.00	irrelevant	-0.47	0.00	0
Transversal	0.50	>	-0.47	17.24	5
West (without P.a.P.)	0.65	>	-0.47	31.03	9
South	0.80	>	-0.47	51.72	15
TOTAL				100.00	29

[a]Source: HECS 1986-87 (periods 1-3).

[b]Assumptions: e_s = elasticity supply sorghum = 0.05.
e_d = elasticity demand sorghum = -0.20.

Table 4.5c. Comparison of average sales/production ratio and the ratio $\frac{e_d - e_s}{1+e_d}$ by region for rice[a]

Region	Sales/Production (Average)	Comparison sign	$\frac{e_d - e_s}{1+e_d}$ [b]	Farmers (%)	Number of Farmers
North	0.89	>	-1.40	11.54	3
Transversal	0.69	>	-1.40	61.54	16
West (without P.a.P.)	0.93	>	-1.40	3.85	1
South	0.83	>	-1.40	23.08	6
TOTAL				100.00	26

[a]Source: HECS 1986-87 (periods 1-3).

[b]Assumptions: e_s = elasticity supply rice = 0.20.
e_d = elasticity demand rice = -0.50.

Table 4.6a. Distribution of net sellers and net buyers by farm size (number and percentage) for corn[a]

Farm size	Net Sellers Number	Net Sellers Percent	Net Buyers Number	Net Buyers Percent	Corn Producers[b] Number	Corn Producers[b] Percent
Less than 1 cx	44	52.38	31	57.41	75	54.35
1-2 cx	25	29.76	13	24.07	38	27.54
2-3 cx	8	9.53	4	7.41	12	8.70
3-4 cx	5	5.95	2	3.70	7	5.06
4-5 cx	2	2.38	0	0	2	1.45
5 or more	0	0.00	4	7.41	4	2.90
Total	84	100.00	54	100.00	138	100.00
Percent of total	(60.86)[c]		(39.13)[c]			(100.00)[c]

[a]Source: HECS 1986-87 (Period 1-3).

[b]This information is exactly the same as in Table 3.8.

[c]The number in parentheses are percentages of total corn producers for net sellers and net buyers.

Table 4.6b. Distribution of net sellers and net buyers by farm size (number and percentage) for sorghum[a]

Farm size	Net Sellers Number	Net Sellers Percent	Net Buyers Number	Net Buyers Percent	Sorghum Producers[b] Number	Sorghum Producers[b] Percent
Less than 1 cx	12	41.38	15	57.69	27	49.09
1-2 cx	8	27.59	6	23.08	14	25.45
2-3 cx	5	17.23	1	3.85	6	10.91
3-4 cx	2	6.90	3	11.53	5	9.09
4-5 cx	1	3.45	0	0	1	1.82
5 or more	1	3.45	1	3.85	2	3.64
Total	29	100.00	26	100.00	55	100.00
Percent of total	(52.73)[c]		(47.27)[c]		(100.00)[c]	

[a]Source: HECS 1986-87 (Period 1-3).

[b]This information is exactly the same as in Table 3.8.

[c]The number in parentheses are percentages of total sorghum producers for net sellers and net buyers.

Table 4.6c. Distribution of net sellers and net buyers by farm size (number and percentage) for rice[a]

Farm size	Net Sellers Number	Net Sellers Percent	Net Sellers Number	Net Sellers Percent	Rice Producers[b] Number	Rice Producers[b] Percent
Less than 1 cx	11	42.31	7	58.33	18	47.37
1-2 cx	7	26.92	5	41.67	12	31.58
2-3 cx	5	19.23	0	0	5	13.16
3-4 cx	0	0.00	0	0	0	0
4-5 cx	0	0.00	0	0	0	0
5 or more	3	11.54	0	0	3	7.89
Total	26	100.00	12	100.00	38	100.00
Percent of total	(68.42)[c]		(31.58)[c]		(100.00)[c]	

[a]Source: HECS 1986-87 (Period 1-3).

[b]This information is exactly the same as in Table 3.8.

[c]The number in parentheses are percentages of total rice producers for net sellers and net buyers.

Table 4.7a. Distribution of net sellers and net buyers by region (number and percentage) for corn[a]

Region	Net Sellers Number	Net Sellers Percent	Net Buyers Number	Net Buyers Percent	Corn Producers[b] Number	Corn Producers[b] Percent
North	14	16.67	9	14.52	23	15.75
Transversal	15	17.86	11	17.74	26	17.81
West (without P-a-P)	19	22.62	29	46.77	48	32.88
South	36	42.85	13	20.97	49	33.56
Total	84	100.00	62	100.00	146	100.00
Percent of total	(57.53)[c]		(42.47)[c]		(100.00)[c]	

[a]Source: HECS 1986-87 (Period 1-3).

[b]There is one household who reported being a corn producer in the metropolitan area of Port-au-Prince (see Table 3.7). This household is not taken into consideration in this table. Total number of corn producers is 146 instead of 147 as in Table 3.7.

[c]The number in parentheses are percentages for total corn producers for net sellers and net buyers.

Table 4.7b. Distribution of net sellers and net buyers by region (number and percentage) for sorghum[a]

Region	Net Sellers Number	Net Sellers Percent	Net Buyers Number	Net Buyers Percent	Sorghum Producers[b] Number	Sorghum Producers[b] Percent
North	0	0	0	0	0	0
Transversal	5	17.24	2	6.67	7	11.86
West (without P-a-P)	9	31.03	20	66.67	29	49.16
South	15	51.73	8	26.66	23	38.98
Total	29	100.00	30	100.00	59	100.00
Percent of total	(49.15)[c]		(50.85)[c]			(100.00)[c]

[a]Source: HECS 1986-87 (Period 1-3).

[b]This information is exactly the same as in Table 3.7.

[c]The number in parentheses are percentages for total sorghum producers for net sellers and net buyers.

Table 4.7c. Distribution of net sellers and net buyers by region (number and percentage) for rice[a]

Region	Net Sellers Number	Net Sellers Percent	Net Buyers Number	Net Buyers Percent	Rice Producers[b] Number	Rice Producers[b] Percent
North	3	11.54	3	17.64	6	13.95
Transversal	16	61.54	7	41.18	23	53.49
West (without P-a-P)	1	3.85	0	0	1	2.33
South	6	23.07	7	41.18	13	30.23
Total	26	100.00	17	100.00	43	100.00
Percent of total	(60.47)[c]		(39.53)[c]			

[a]Source: HECS 1986-87 (Period 1-3).

[b]This information is exactly the same as in Table 3.7.

[c]The number in parentheses are percentages of total rice producers for net sellers and net buyers.

Table 4.8a. Distribution of net sellers and net buyers (as percentage of total producers) within farm size for corn[a]

Farm size	Net Sellers (%)	Net Buyers (%)	Total (%)
Less than 2 cx	61.06	38.94	100.00
2-4 cx	68.42	31.58	100.00
4 cx or more	33.33	66.67	100.00

[a]Source: HECS 1986-87 (Period 1-3).

Table 4.8b. Distribution of net sellers and net buyers (as percentage of total producers) within farm size for sorghum[a]

Farm size	Net Sellers (%)	Net Buyers (%)	Total (%)
Less than 2 cx	45.45	51.22	100.00
2-4 cx	63.64	36.36	100.00
4 cx or more	66.67	33.33	100.00

[a]Source: HECS 1986-87 (Period 1-3).

Table 4.8c. Distribution of net sellers and net buyers (as percentage of total producers) within farm size for rice[a]

Farm size	Net Sellers (%)	Net Buyers (%)	Total (%)
Less than 2 cx	0.60	0.40	100.00
2-4 cx	100.00	0.00	100.00
4 cx or more	100.00	0.00	100.00

[a]Source: HECS 1986-87 (Period 1-3).

Table 4.9a. Distribution of net sellers and net buyers (as percentage of total producers) by region for corn[a]

Region	Net Sellers (%)	Net Buyers (%)	Total (%)
North	60.87	39.13	100.00
Transversal	57.69	42.31	100.00
West (without P-a-P)	39.58	60.42	100.00
South	73.47	26.53	100.00

[a]Source: HECS 1986-87 (Period 1-3.

Table 4.9b. Distribution of net sellers and net buyers (as percentage of total producers) by region for sorghum[a]

Region	Net Sellers (%)	Net Buyers (%)	Total (%)
North	0	0	0
Transversal	71.43	28.57	100.00
West (without P-a-P)	31.03	68.97	100.00
South	65.22	34.78	100.00

[a]Source: HECS 1986-87 (Period 1-3).

Table 4.9c. Distribution of net sellers and net buyers (as percentage of total producers) by region for rice[a]

Region	Net Sellers (%)	Net Buyers (%)	Total (%)
North	0.50	0.5	100.00
Transversal	69.57	30.43	100.00
West (without P-a-P)	100.00	0	100.00
South	46.15	53.85	100.00

[a]Source: HECS 1986-87 (Period 1-3).

CHAPTER 5. SUMMARY AND CONCLUSIONS

From the colonization period to now, the Haitian agriculture generally followed a declining trend. From large plantations, the farms have been reduced into small and mostly unproductive land units where large numbers of peasants are struggling for their living. The era of minifundia started with the agrarian reform initiated by the governments of Petion and Christophe during the first quarter of the nineteenth century, i.e., shortly after the independence of the country in 1804. The deterioration of the Haitian natural environment is a phenomenon that is caused by social factors like demographic pressure and physical factors like topography and land scarcity. The low performance level of the agricultural sector is related to technology, finance and marketing problems. A major factor that also restricts the development of this sector is the government agricultural policies during the last two decades. The majority of the population is working in the agricultural sector, and food has a large share in the households expenditures, however, the government agricultural policies during the last two decades did not seem to take these facts into consideration. In some cases, these policies were not in favor of either small producers or consumers or both. For instance, a high tariff rate on export crops (coffee, cocoa) discouraged producers, import

tariffs on cereal grains (corn, rice) raised consumers prices. Moreover, government parastatals placed between producers and consumers created inefficiency and drove up retail prices of some products (sugar, wheat flour, edible oils) or reduced the price paid to producers (cotton, sugar cane). The existence of these parastatals led to a transfer of income from producers and/or consumers to the government. Such situations worsened poverty, income inequality and hampered the country's economic growth under some pressures made by international organizations like the World Bank and the International Monetary Fund, some policy reforms (elimination of many quotas) have been successively made in 1986 and 1987. However, the tariff rates for some products (grains) are still very high today.

Agricultural output in Haiti is low because the productivity of the small farms on which the agricultural sector is based is very low, due to numerous structural constraints. These constraints determine farmers' behavior. The multicropping system, as well as the association of livestock with crop production on small farms and the dispersion of the parcels must be seen as risk attitudes. Haitian farmers are risk averse with respect to the uncertainty related to lack of irrigation water, weather conditions and other natural adversities. Economic theory tells us that risk-averse farmers in situations of

uncertainty produce less than they would produce under certainty.

In spite of their limited farm production, Haitian farmers tend to be very market-oriented. Changes in farm prices under government policies can be expected to have some impact on Haitian producers.

Corn, sorghum and rice which are among the most important staple foods in Haiti are subjected today to high import tariffs. These tariffs raise the Haitian producers price for these three commodities; however, due to these import tariffs consumers are paying a price well above the international prices for these three products and the pricing structure has encouraged increased smuggling. The actual proposal is that the government lower the tariff rate on cereal grains.

In Haiti producers of cereal grains consume from their production. They can be either net sellers or net buyers of grains. They are net sellers if their production exceeds their consumption and net buyers if their consumption exceeds their production. Any price change under government policies may affect them either as net sellers or as net buyers.

Under these conditions, agricultural pricing policies are a major concern for farmers because these policies directly influence the price they receive from selling their

production surplus in the market or the price they pay from buying agricultural commodities in the market. The situation in which most Haitian farmers are today makes them more aware about policies that bring a change in crop prices. Farmers are essentially smallholders whose farm unit is a collection of small plots located in different areas. A farmer's agricultural activity is generally oriented towards satisfying his family food consumption need and deriving money income for the consumption of all other goods. In this situation, farmers tend to produce on their small farm different kinds of crops ranging from pure subsistence to export crops. Corn, beans, yams, plaintain, sorghum, sweet potato, cassava, coffee, rice and sugar cane are the ten major crops that enter in the cropping pattern of the Haitian farms. As seen in the HECS data on agricultural households, agricultural production is carried out on small farms with limited use of inputs like certified seeds and plants, fertilizers and pesticides. Associated with crop production are different types of livestock which reinforce the diversity of farm production, especially on small farms.

The effect of price changes under government policies on net sellers and net buyers of cereal grain (corn, sorghum, rice) producers is determined in this study based on a producer/consumer model. This model shows the direction in

which income (money income) changes as price change for both net sellers and net buyers.

In a country like Haiti where producers of cereal grains (corn, sorghum and rice) are also consumers of those commodities, their money income is based upon their marketed surplus. Cereal grain producers are either net sellers or net buyers of grains. Any change in the price they receive either by a tariff reduction or by any other government policies (tariff increase, internal tax, internal subsidy) must have an impact on their money income. The income effect of a change in the price of corn, sorghum and rice for producers who are net sellers of these commodities is expected to go in the same direction as the price change, given that producers' own consumption demand for the three commodities is inelastic. That is to say that an increase (decrease) in the price of corn, sorghum and rice under government policies will increase (decrease) producers net sellers income. However, for producers who are net buyers, the income effect of price change depends upon the value of supply and own consumption demand elasticities and the value of the share of cereal grains purchase in total consumption of cereal grains (i.e., purchase/consumption ratio).

In terms of distributional impact of government policies will have the same effect on net sellers of cereal grains no matter their farm size and their geographic location.

However, these policies will affect a larger number of small farms. Moreover, policies that change the price of corn will affect a larger number of producers net sellers in the South and the West than in the North and the Transversal Valley; so will policies that change the price of sorghum. Policies that change the price of rice will affect a larger number of net seller producers in the Transversal Valley and the South than the rest of the country. For net buyers, depending on the magnitude of the share of purchase in total consumption and the supply and own consumption demand elasticities, there may exist impact differences by farm size and region. Moreover, a larger number of small farms net buyers is likely to be affected by the price change effect of these policies. Policies that change the price of corn will affect a larger number of producers net buyers in the West than in the rest of the country; so will policies that change the price of sorghum. Policies that change the price of rice will affect a larger number of producers net buyers in the Transversal Valley and the South than the rest of the country.

Moreover, because of market-oriented behavior of the Haitian farmers, no matter their farm size and region, policies related to corn, sorghum and rice will affect a larger number of producers net sellers than producers net buyers. This is because a net seller position is, in

general, a more common case than a net buyer position within farm size and region.

Limitations to the Analysis

The analysis in this study is subjected to various limitations:

1) The data that are used are not quite suitable for this kind of analysis because they were collected in the context of a Household Expenditures and Consumption Survey (HECS). They do not always allow a direct measure of some variables and force us to make extensive use of the number of households (which is among the most reliable data in the survey) as a way of measuring these variables.

2) This study is based on data collected during three months (end November/beginning December 1986 until February 1987). The net seller and the net buyer positions are defined in reference to information collected for the 1986 harvests of corn, sorghum and rice. Corn and rice were harvested in the summer while sorghum was harvested earlier in the winter. There are two harvests for rice (summer, winter), one harvest for corn (summer) and one harvest for sorghum (winter). The net seller and net buyer concepts are dynamic ones, i.e., there may be a position change from net seller to net buyer and vice versa over time. The data do not capture seasonality which would allow us to take the position moves into consideration in our definition of net

sellers and net buyers. Seasonality could be captured only if we had data collected for more than one agricultural season. The second interview could be done just before the next harvest of corn, sorghum and rice to see whether or not some producers who were net sellers right after the first harvest did not end up being net buyers right before the next harvest.

3) This study does not say anything about the change in producers' utility. The income value which enters in the own consumption demand equation of the model ($Q_C = F(P, P_O, I$ where Q_C is demand, P is output price, P_O is other prices, I is income) is not a full income. It is only the money income derived from the sale of the marketed surplus of cereal grains, plus other incomes, less production costs (i.e., equation (4) of the model in Chapter 2: $I = P*MS + I_O - CP$). If the "full income" was used, the marketed surplus MS would be replaced by total production Q_P, i.e., it would include the value of grain consumed by the producer. In this case, the change in price would be related to a change in utility. Utility must be seen as an overall utility derived from consuming a part of the production and selling the other part.

4) This study focuses only on the income (money income) effect of price changes and does not look at the

substitution effect, i.e., the possible trade-off between selling and consuming as price changes.

5) This study uses a purely qualitative approach of measuring price change impacts on cereal grain producers. It does not look at the magnitude of the income (money income) effect of price changes. It does not either measure the surplus of the producer-consumer of cereal grains (corn, sorghum and rice) in Haiti.

6) This study does not estimate the supply and own consumption demand elasticities, but depends on assumed values from studies done earlier in Haiti or in other similar countries. More specific information about these important parameters is needed.

7) Finally, because of data processing problems related to the expenditures data set which could not be made available to us, this study is not able to estimate the total own consumption of the producers of corn, sorghum and rice.

APPENDIX

SECTION XI - PRODUCTION AGRICOLE	
105.Au cours des 12 derniers mois aviez-vous, vous et ou un autre membre de votre ménage une exploitation agricole à sa disposition pour travailler? ENQUETEUR: Vérifier la réponse avec la Question 88	20000 1[ ]Oui 2[ ]Non-Fin de la visite
106.Quelle est la superficie totale de cette exploitation?.....	SUPERFICIE 20001 _____Carreaux
107.Combien de parcelles aviez-vous dans votre exploitation agricole?	20002 _____ Nombre
108.De votre exploitation quelle est la superficie totale que vous utilisez pour vos cultures?.....	SUPERFICIE 20003 _____Carreaux

SECTION XI - PRODUCTION AGRICOLE			
113.Combien aviez-vous reçu pour la vente de la dernière récolte?	114.De la dernière récolte quelle quantité fut stockée?		
		UNITE DE MESURE	
VALEUR TOTALE EN GOURDES	QUANTITE	LOCALE	EQUIVALENTE
20009 _____.00	20010 _____	_____	20011 _____
20017 _____.00	20018 _____	_____	20019 _____
20025 _____.00	20026 _____	_____	20027 _____
20033 _____.00	20034 _____	_____	20035 _____
20041 _____.00	20042 _____	_____	20043 _____
20049 _____.00	20050 _____	_____	20051 _____
20057 _____.00	20058 _____	_____	20059 _____
20065 _____.00	20066 _____	_____	20067 _____
20073 _____.00	20074 _____	_____	20075 _____
20081 _____.00	20082 _____	_____	20083 _____
20089 _____.00	20090 _____	_____	20091 _____

SECTION XII - COUT DES INTRANTS AGRICOLES

AU COURS DES 6 DERNIERS MOIS:		COMBIEN? (montant en gourde)
115.A-t-on acheté dans votre ménage des semences ou des plants?	1[ ] Oui----> 2[ ] Non	20092 _____.00
116.A-t-on acheté dans votre ménage des fertilisants et des pesticides?	1[ ] Oui----> 2[ ] Non	20093 _____.00
117.A-t-on dépensé dans votre ménage pour la location de tracteurs, de machines à tractions animales, ou pour l'utilisation d'autres outils agricoles?	1[ ] Oui----> 2[ ] Non	20094 _____.00
118.A-t-on payé dans votre ménage pour le transport des produits au marché (dos d'âne, camion, tap tap) et effectué d'autres dépenses (achats des sacs, paniers, boites, sceau, sac en paille, macoute, cabrouette)?	1[ ] Oui----> 2[ ] Non	20095 _____.00
119.A-t-on dépensé dans votre ménage pour la main-d'oeuvre (défrichement et labour, semis et plantation, entretien et sarclage, travaux après récolte)?	1[ ] Oui----> 2[ ] Non	20096 _____.00
120.A-t-on dépensé dans votre ménage pour l'irrigation de la plantation?	1[ ] Oui----> 2[ ] Non	20097 _____.00
121.A-t-on payé dans votre ménage pour l'affermage de la terre?	1[ ] Oui----> 2[ ] Non	20098 _____.00

ECTION XIII - PRODUCTION ANIMALE

122. Combien de es animaux a-ez-vous mainte-ant (ou les au-res membres du énage) sur vo-re exploita-ion? NQUETEUR: 'il n'y en a as écrire éro (0)		AU COURS DES 6 DERNIERS MOIS... 123. Aviez-vous acheté (ainsi que tout autre membre de votre ménage) les animaux suivants:				124. Aviez-vous vendu (vous ainsi que tout autre membre de votre ménage) les les animaux suivants:			
			COMBIEN?				COMBIEN?		
			QUANT	PRIX	VALEUR		QUANT	PRIX	VALEUR
ACHE	20099	[]Oui []Non	20100	20101	20102	[]Oui []Non	20103	20104	20105
EAU	20109	[]Oui []Non	20110	20111	20112	[]Oui []Non	20113	20114	20115
TAUREAU	20119	[]Oui []Non	20120	20121	20122	[]Oui []Non	20123	20124	20125
GENISSE	20129	[]Oui []Non	20130	20131	20132	[]Oui []Non	20133	20134	20135
PORC ET TRUIE	20139	[]Oui []Non	20140	20141	20142	[]Oui []Non	20143	20144	20145
OUTON & REBIS	20149	[]Oui []Non	20150	20151	20152	[]Oui []Non	20153	20154	20155
CABRIT & CHEVRE	20159	[]Oui []Non	20160	20161	20162	[]Oui []Non	20163	20164	20165
COQ ET POULE	20169	[]Oui []Non	20170	20171	20172	[]Oui []Non	20173	20174	20175
DINDE	20179	[]Oui []Non	20180	20181	20182	[]Oui []Non	20183	20184	20185

SECTION XIII - PRODUCTION ANIMALE

AU COURS DES 6 DERNIERS MOIS...

125. Aviez-vous abattu (ainsi que tout autre membre de votre ménage) les animaux suivants:	126. Aviez-vous vendu (ainsi que tout autre membre de votre ménage) tout ou partie de cet animal abattu (ces animaux abattus)?	127. A combien estimez-vous la valeur de cette vente?
		Gourdes
20106 1 [ ] Oui 2 [ ] Non	20107 1 [ ] Oui 2 [ ] Non	20108 _____.__
20116 1 [ ] Oui 2 [ ] Non	20117 1 [ ] Oui 2 [ ] Non	20118 _____.__
20126 1 [ ] Oui 2 [ ] Non	20127 1 [ ] Oui 2 [ ] Non	20128 _____.__
20136 1 [ ] Oui 2 [ ] Non	20137 1 [ ] Oui 2 [ ] Non	20138 _____.__
20146 1 [ ] Oui 2 [ ] Non	20147 1 [ ] Oui 2 [ ] Non	20148 _____.__
20156 1 [ ] Oui 2 [ ] Non	20157 1 [ ] Oui 2 [ ] Non	20158 _____.__
20166 1 [ ] Oui 2 [ ] Non	20167 1 [ ] Oui 2 [ ] Non	20168 _____.__
20176 1 [ ] Oui 2 [ ] Non	20177 1 [ ] Oui 2 [ ] Non	20178 _____.__
20186 1 [ ] Oui 2 [ ] Non	20187 1 [ ] Oui 2 [ ] Non	20188 _____.__

English Traduction of the previous questions

Section XI - Agricultural Production

(for the last 12 months)

Question 105 During the last 12 months, did you or another member of your household have a farm available to work in?

Question 106 What is the total area of this farm?

Question 107 How many plots did you have in your farm?

Question 108 From your farm, what is the total area used for crops?

Question 109 What crops did you harvest for the last 12 months?

Question 110 How many harvests did you get from this crop?

Question 111 In which month did you have the last harvest?

Question 112 What was the quantity sold from the last harvest?

Question 113 How much did you receive for the sale of the last harvest?

Question 114 What was the quantity stored from the last harvest?

Section XII: Cost of Agricultural Inputs

(for the last 6 months)

Question 115 Were seeds or plants bought in your household?

Question 116 Were fertilizers or pesticides bought in your household?

Question 117 Were there expenses for renting tractors, animal-power machines or for using other agricultural tools in our household?

Question 118 Was there a payment in your household for transporting products into the market (by donkey or public transportation); and were there other expenses (bag purchases, baskets and other)?

Question 119 Were there expenses for labor (land clearing and tillage, seeding and plantation, maintenance and weeding, after harvest work) in your household?

Question 120 Were there expenses for irrigation in your household?

Question 121 Was there payment for land rent?

Section XIII. Livestock production

(for the last 6 months)

Question 122 How many of these animals do you (or the other members of your household) have now on your farm? (These animals are in aggregate the

following: cow, pig, goat, chicken, turkey, duck, guinea fowl, rabbit, horse/mule/donkey).

Question 123 Did you (as well as any other member of your household) buy these animals?

Question 124 Did you (as well as any other member of your household) sell these animals?

Question 125 Did you (as well as any other member of your household) slaughter these animals?

Question 126 Did you (as well as any other member of your household) totally or partly sell these slaughtered animals?

Question 127 What is your estimation for the sale value?

Variables (or other) used in the study and their relationship with the questions

Variable (or other)	Question
Farm size	108
Parcels (farm structure)	107
Crops	109
Sales (from harvest)	112
Stock	114
Production	112+114
Inputs purchased or rented	115-121
Number of animals	122

N.B. Region and household members are two variables from Section 1 of the survey: Characteristics and Expenditures related to housing.

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