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This USDA/AID work pulls a broad range of Vietnam economic and demographic data into an economic intelligence system. The analyses of these data lend valuable insights into inner workings of the Vietnamese economy to aid decision makers. Data inadequacies are apparent, but the USDA/AID team worked to develop as much economic information as possible into a logical system rather than dwelling on data shortcomings.

Several analytical techniques are used to quantify economic relationships. Regression analysis, ranging from simple linear relationships to polynomial distributed lags, formed the basis of most of the analysis. Supply and utilization tables were constructed for major commodities, supplemented by seasonal analyses, index number construction, and a detailed economic profile.

Much of the analysis is then drawn into an illustrative multi-equation framework of the Vietnamese economy. This framework provides important guides to policymakers through simulated alternative assumption levels. It also demonstrates important interrelationshipw within the agricultural sector, as well as between agriculture and the national accounts.

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AGRICULTURE IN VIETNAM'S ECONOMY

A System for Economic Analysis

by

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ABSTRACT

This USDA/AID work pulls a broad range of Vietnam economic and dem graphic data into an economic intelligence system. The analyses of the data lend valuable insights into inner workings of the Vietnamese econo to aid decisionmakers. Data inadequacies are apparent, but the USDA/AI team worked to develop as much economic information as possible into a logical system rather than dwelling on data shortcomings.

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Much of the analysis is then drawn into an illustrative multi-equation framework of the Vietnamese economy. This framework provides important guides to policymakers through simulated alternative assumption levels. It also demonstrates important interrelationships within the agricultural sector, as well as between agriculture and the nationa accounts. Important conclusions are:

---Formal analytic techniques can give reasonable results even with data inadequacies and social upheaval. These techniques demonstrate that relative food prices are directly related to differences in income and demand elasticities.

-Assuming stable relative food prices:

(1) More than a third increase in food production will be required over the next 5 years to feed the growing population and offset food imports.

(2) Additional food production increases may be absorbed by increased domestic demand resulting from increased GNP and associated higher income levels.

Key words: Vietnam, agriculture, economic analysis, sector analysis, models, projections, technical assistance, less developed countries, lower income countries, regression analysis.

FOREWORD

This analysis, based on work by U.S. Department of Agriculture's "Vietnam Demand Analysis Team," is part of a broad effort to study Vietnam's agriculture and its interrelationships with the general economy. The first phase of the broad effort was concerned with appraising the 5-Year Rural Economic Development Plan produced by Vietnam's Ministry of Agriculture and recommending ways to strengthen the planning process. The second phase involved the analysis of price-quantity relationships for all major agricultural commodities and the relationship of the agricultural sector to other parts of the economy. The third phase was a study to determine optimal use of basic agricultural resources and marketing facilities and distribution patterns associated with optimal resource use. The fourth phase related to the marketing process and changes needed to accommodate the movement of projected supplies.

These studies are a cooperative effort between the Agency for International Development (AID) Mission to Vietnam, the Ministry of Land Reform, Agriculture, Fishery and Animal Husbandry Development of the Government of South Vietnam, and the Economic Research Service (ERS) of the U.S. Department of Agriculture. The ERS research program was intended to (1) bring together and analyze available economic information as a basis for the work of the new Directorate of Agricultural Economics as well as AID personnel, (2) develop and test appropriate research techniques and procedures for continuing the informational base needed for planning, and (3) provide experience and training for the staff of the newly-created Directorate of Agricultural Economics.

The work of the Vietnam Demand Analysis Team concentrated mainly on the second phase of the broad area of study. This included (1) assembly of published information and basic data about South Vietnam's agricultural sector and national accounts, (2) analysis and summarization of this information in ways to facilitate systematic economic analysis, (3) development of analytical tools and procedures useful in appraising the demand for farm products and the related output response of farmers to economic and institutional incentives, and (4) illustration of how such techniques are used to prepare projections and appraisals which permit the economic analyst to gain insights into the workings of the economy, and to demonstrate some possible alternative economic prospects.

The Demand Analysis Team compiled, from existing published data, many of the factors affecting supply and demand (price) relationships in Vietnam. These included a cross-section survey of consumer expenditures, supply and utilization tables for major agricultural products, national income accounts data, related agricultural price series, and production and yield data. In addition, an analysis of foreign market prospects was included to aid the discussion of possible export potential.

Results of this analysis of the national accounts and major agricultural sectors were then used to develop an economic framework to facilitate analysis of the economic situation and near-term prospects for South Vietnam. A special purpose computer program was used to manipulate the economic framework, and to generate projections of selected economic variables. In addition, summary measures of economic interdependence were examined, including (1) elasticities of demand and supply, (2) income (or expenditure) elasticities, and (3) dynamic impact multipliers. These summary measures provide important information about the economic relationships, but, of course, do not replace the full framework as a basis for projections analysis.

Results of the economic framework's projection analysis are not intended as precise forecasts but, rather, as illustrations of the type of analysis that might aid economic decisionmaking. This approach includes the systematic review and analysis of existing data sources to provide a starting point in the development of Vietnam's agricultural economic intelligence system as well as future analysis. The Team fully recognizes data inadequacies and the disruptive effects of social upheaval in Vietnam. However, current policy decisions must be based on the economic information that is available.

The illustrative projections are also discussed in FDD Field Report 26, "Vietnamese Situation and Near-Term Prospects," published by the Economic Research Service, U.S. Department of Agriculture, cooperating with the U.S. Agency for International Development. The "situation report" summarizes the work of the Demand Analysis Team and discusses the major implications of the larger demand study.

Members of the Demand Analysis Team preparing this report were: Rex F. Daly (supervisor), Robert G. Hoffman, Nancy Hancock, Frederick Nelson, and Hyman Weingarten. Daly and Hoffman had the broadest involvement in most commodity analyses and development of the general economy framework. Hancock carried out most of the research on the general economic profile of the economy. Nelson was primarily responsible for the research on rubber, and provided continuing technical assistance in compiling the final report. Weingarten worked with AID; Military Assistance Command, Vietnam (MACV); and USDA to facilitate computer application in carrying out the analytical work. Anthony Rojko and Boyd Chugg of the Foreign Demand and Competition Division, ERS, were primarily responsible for the analyses on foreign market prospects. Terry Barr of the Economic and Statistical Analysis Division, ERS, assisted in summarizing and interpreting the consumer expenditure survey data.

Many others contributed to the overall effort. We want to recognize the contributions of Dr. Ernest J. Nesius and his staff at AID/Saigon and the staff of the Agricultural Economics and Statistics Service, Vietnam Ministry of Agriculture, as well as the staffs of the National Institute of Statistics and Bank of Vietnam. We acknowledge the assistance of the staffs of the AID and MACV computer centers in Saigon as well as cooperative support from many on the staff of ERS' Economic and Statistical Analysis Division and the Foreign Demand and Competition Division.

William A. Faught
Project Coordinator

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AGRICULTURE IN THE NATIONAL ECONOMY OF SOUTH VIETNAM

INTRODUCTION

Social and economic upheavals associated with the war have dominated Vietnam's economy in much of the past decade. General shortages, black markets, huge imports, excessive demand pressures, and general inflation characterized the war years. Inflationary pressures eased some in 1970 and 1971. However, increased hostilities in 1972 complicated the economic reform program initiated in 1970 and 1971 to reduce the economy's dependence on U.S. aid. Renewed war in the North brought more refugees, a need for more government-supplied food, and larger imports of rice. Increased hostilities and the generally high cost of imported goods, as the piaster was allowed to seek its own level (devalued) under the reform program, sharply reduced the demand for nonfood imports. Uncertainties of the war and the planned dampening effects of reform measures led to cuts in industrial production in 1972, a sharp drop in general economic activity, and a buildup in stocks of nonfood imports. At the same time, prices continued to rise, especially the price of rice, other foods, and domestic products in general. And financing the expanded war activity could further accelerate inflationary pressures.

Situation and Near-Term Prospects

The demand-supply balance for food and most domestic goods is tight and promises to continue so in coming years. Domestic production of major food commodities, including fish, apparently increased around 12 percent from 1964 to 1970, but population grew about 21 percent. As a result, per capita food output declined some 7 percent over the 6-year period. Food imports, however, increased sharply and, in 1970, made up possibly 12 to 15 percent of the total domestic food consumption. In the same comparison for 1964, imports were about 3 percent of total food use. Imports of grain in 1970 approximated 25 percent of total domestic use. Around 60 percent of fats and oils used were imported and 75 percent of the sugar and most of the dairy products were imported in 1970. Including the large volume of imports, total domestic use of food in 1970 was approximately a fourth above 1964. Population growth accounted for around 20 percent of the increase and slightly larger per capita use for the balance.

As Vietnam's population grows and hopefully becomes more prosperous, markets for food will increase. Even the demand for basic staple foods, which are not particularly responsive to price and income changes, will grow with increases in the number of mouths to be fed and gains in consumer buying power. Moreover, demand for poultry, pork, other red meats, sugar, and many fruit and vegetable items--foods high on the consumer preference list--will increase even more rapidly than the demand for staple foods. A growing demand for livestock also will expand markets for feed grains (including paddy and rice for feed) which are already in tight supply.

In order to illustrate the relative size of the production deficit, let us assume population growth of about 16 percent (3 percent annually) from 1972 to 1977 and a similar growth in real purchasing power. These forces would increase the domestic market for food some 25 to 30 percent, assuming no major change in relative prices for foods. With food imports in 1972 equal to about 15 percent of total domestic use, an output increase of around 35 percent would be required to match the growth in population without an increase in per capita food use assuming imports are eliminated. The combined impact of a growing population and a rise in per capita use may require a domestic food production increase of nearly 50 percent to match demand expansion in the next 5 years and eliminate imports. The food trade balance, however, would not preclude the possibility of a continued sizable volume of food imports with export expansion above the severely reduced level in recent years. Obviously, under these assumed conditions, net exports of foodstuffs in any volume will be difficult to manage in the next several years.

The ability of Vietnam to meet the expanding demand for foods and other farm products will depend on its capacity to increase farm output or continue to finance imports of food. Vietnam has a substantial agricultural resource base for a nation of nearly 20 million people. Vietnam once exported large quantities of rice and other foods to nearby markets and shipped large quantities of rubber to Europe. Food output has recovered rather sharply from depressed levels in 1967 and 1968, according to estimates for recent years. But further large gains in output will be needed, as indicated above, just for the nation to become self-sufficient.

Any general expansion in net food exports must depend primarily on the ability of agriculture to produce a surplus above domestic needs. This will be a big task that will require a concentration of investment and a productive effort in agriculture, as well as programs to curb expansion in domestic demand. Expanded investment programs will be needed to reclaim paddy land, increase hectares planted to high-yielding varieties, introduce improved breeding stock, rebuild and expand water control systems, rebuild the rubber industry, and develop fishery and forestry resources. Such expansion in farm investment and output also will require demobilization and a shift of population back to rural areas. Moreover, it will require the development of domestic commercial markets and facilities to market, process, and ship greatly expanded output of food and other farm products. Much of the output development work for fisheries, the rubber industry, other forest products, and crop and livestock production will require scarce foreign exchange. In general, these resources must come from earnings of foreign exchange or from continued large foreign aid commitments.

The economic pressure for greatly expanded exports is obvious. And, export demand prospects are promising in nearby markets for most of the surplus foods and feed grains that can be produced in Vietnam. Markets for food in Japan, Taiwan, Hong Kong, and Malaysia have expanded rapidly in the past 10 to 15 years. Such markets provided convenient and natural outlets for food and other farm products from Vietnam.

The tight demand-supply balance in Vietnam, present and prospective, does not bode well for greatly expanded exports in the next several years, however.

This does not preclude the possibility and desirability of developing export potentials, especially for high-value speciality items such as selected seafoods, tropical fruit items, some vegetables, spices and perhaps a number of forestry products. Moreover, if a cutback in foreign aid occurs and expanded exports are mandatory, some expansion is possible with relatively optimistic production prospects and a tight rein on increases in domestic markets for food and other farm products. Such limits on domestic demand expansion may require tough aggressive tax and savings policies designed to restrict growth in household income and in the domestic demand for food. A restrictive program also may require curbs on population growth in order to facilitate a much needed expansion in export capability and earnings.

USDA/AID Study Initiated

In 1971, the U.S. Agency for International Development Mission to Vietnam (AID) and the Economic Research Service of the U.S. Department of Agriculture initiated an overall study of Vietnam's agriculture. This report of the "Demand Analysis Team" is Part II of this broad study. The team's charge was to appraise relevant facets of current and prospective demand and prices for major farm products. More specifically the team's mission involved:

1. Assembly of published information and basic data on South Vietnam's agricultural sector;

2. Arrangement of basic published data into meaningful arrays for economic analyses;

3. Development of analytical tools and materials useful in appraising the demand for farm products and the related output response of farmers to economic and institutional incentives; and

4. Preparation of projections and appraisals which provide insights into the workings and prospects for Vietnam's agriculture.

In addition to the above interpretative and analytical objectives, the team was to assist in the development of a Directorate of Agricultural Economics in the Ministry of Agriculture. This assistance involved primarily staff training and the development of a research and service program in agricultural economics.

Since a major part of the team's mission was concerned with the assembly and testing of available data, we drew almost exclusively on published materials, primarily the Agricultural Statistics Yearbook, Agricultural Economics and Statistics Service; The Vietnam Statistical Yearbook, National Institute of Statistics; reports of the Bank of Vietnam; and other published reports of Government Ministries and industry groups.

One main thrust of the team's mission was assembling the information and analytical tools for economic decisionmaking. The task was to move toward a

continuing program and capability in providing economic intelligence for agriculture--a compass to guide decisionmaking in the agricultural industry. The team's effort is a step, but only a step toward that goal.

Economic Intelligence for Decisionmaking

Economic intelligence for agriculture is concerned with the whole range of economic and institutional forces influencing decisionmaking in farming and related industries. Such intelligence involves a description and interpretation of what is or has been happening, and an appraisal of what is expected to happen. It is concerned, too, with program analysis, policy development, and appraisals of the long-run prospects for agriculture. This is a big task in any economy, and one of tremendous difficulty in Vietnam. Our modest efforts, hopefully, will provide some guidelines as well as tools that will help in moving toward an economic intelligence program for Vietnam's agriculture.

Every management decision, Government program, or individual investment decision involves some kind of judgment about the future. These decisions do not wait for new data and analyses; they face you day by day in both a free and highly regimented society. Actually the informed decision maker knows that economic, social, and political events can never be foreseen with certainty. As with any discipline, the economist and statistician cannot assure complete foresight. But the analyst can contribute materially to an interpretation of what is happening in the economy and, with modern analytical tools appraise the probable impacts of alternative courses of action. Thus, in addition to the "what and why" of what is happening in the economy, the informed decision maker wants to know probable alternatives that face him and possible impacts of the alternatives he chooses. Such appraisals are an integral part of rational actions to influence one's future.

The debate today between the "model builders" and those who have little use for formal analytical techniques is overdrawn and largely misses the essential point for effective analysis. No analytical technique can give precise direction to the decision maker. Any appraisal involving the future is a judgment, but it can be an informed judgment. Formal models and analytical techniques are tools as are informal techniques, but neither can substitute for the analyst. The formal analytical techniques are more likely to force the analyst into a systematic and more complete consideration of a problem. They greatly extend the insights, quality of work, and productivity of the analyst. They permit the mechanization of operations that can be done efficiently by machine and allow the economist time to function as an analyst. They also enable an efficient exploration of impacts of alternative courses of action in a manner otherwise impossible. Formal analytical models, although greatly abstracted compared to relevant detail, are essential tools of economic analysis.

Three Alternatives Assumed

When research for this report was conducted in Vietnam in early 1972, prospects for the next several years obviously centered on the war and the time

and conditions surrounding its termination. Accordingly, three alternative sets of conditions were outlined as a basis for projections for the next 5 years. Alternative I is a generally optimistic peace alternative. It assumes a cutback in aid of about VN$2 billion per year, a VN$5 billion annual reduction in imports, and a VN$3 billion cut in Government expenditures from 1972 levels. With peace conditions and demobilization, investment outlays are projected to increase around 8 percent per year, including a like increase in the number of fishing boats. An increase of 50,000 hectares per year planted to improved varieties as well as an increase in reclaimed paddy land of 50,000 hectares per year are assumed. Export volume is assumed to increase 10 percent per year and livestock production is projected to expand 3 percent per year.

The second set of assumptions (Alternative II) is super optimistic with respect to aid levels, investment, and available resources in a no-war situation. It assumes that aid levels and Government expenditures hold around 1972 levels with imports declining about VN$2 billion per year from 1972. As demobilization progresses under peacetime conditions, resources would be available for capital expansion at a rate double that assumed for Alternative I. There would also be a 20 percent annual gain in the volume of exports. This most optimistic set of conditions also assumes a more rapid population shift back to rural areas, reclamation of 100,000 hectares of paddy land per year, accelerated seed and breeding programs, a step up in technology, and a 5 percent annual increase in livestock production.

The pessimistic assumption (Alternative III) assumes war conditions until 1974, an annual increase of VN$3 billion in aid levels, an increase of about VN$6 billion in imports, and a VN$5 billion increase in Government expenditures largely to finance a continuation of hostilities. Capital outlays and exports are assumed around the reduced 1972 rates. Technology, plantings to high-yielding varieties, and land reclamation hold unchanged and the annual gain in livestock production slows to 2 percent.

Policy Issues and Implications

1. Vietnam economic development prospects revolve around the war. An early return to peacetime conditions and demobilization could free many resources for rebuilding Vietnam's economy. Government can do much to create conditions of general security and business confidence through fiscal and monetary programs to control inflation, develop incentives to save and expand priority investment, and establish a trade policy that facilitates the conduct of business and assures reasonable returns prospects.

2. A period of wartime demands with inadequate domestic production, large aid inputs, and general inflationary pressures have imposed large management burdens on the Government in trying to orchestrate greater economic stability and equity. Many favorable conditions will spring from a settlement of the war and return to secure peacetime conditions. Local businessmen and Government administrators probably are aware of many highly promising private and public investment possibilities without outside advice.

However, even with a return to a stable peace, the country will likely require substantial outside resources to rebuild and expand their agriculture and generally expand the country's output potential.

3. Appraisals for the next 5 years point to a generally tight supply situation for major food crops and rubber relative to probable growth in demands. This general situation has important implications for programs relating to (1) expansion of domestic production, (2) limiting domestic demand, and (3) development of much needed exports to reduce dependence on foreign aid.

4. The need for production expansion programs appears clear cut if the country is to approach self sufficiency. Vietnam has a large agricultural resource base. Development of these resources should receive high priority in allocating scarce resources. Specific actions to expand production might include movement of the population back to rural areas, reclamation of land for crops and pasture, programs to increase use of high-yielding varieties and improved breeding stock, investment in rebuilding and improving water control systems, and capital outlays to rebuild and expand rubber production, fisheries, and forest resources.

5. The generally tight supply-demand balance indicated for major foods also suggests the need for a policy and specific programs to limit domestic demand expansion and encourage increased savings and investment. Such objectives may require taxes and other fiscal measures designed to limit the flow of income to consumers; they may require some combination of prices and/or special taxes to limit domestic use and thus make supplies available for export; and/or they may require a system of support prices or subsidies to growers designed to stimulate expanded output and facilitate exports. To undertake these objectives will require an aggressive carrying out of programs which may be sufficiently restraining to be unpopular.

6. Export potentials must be explored and developed. Nearby markets are growing rapidly and will likely provide outlets, particularly for available foods, feeds, and probably rubber. Vietnam's export prospects appear promising for a number of high-value foods, including seafoods, selected tropical fruit and vegetable items, spices, forestry products, and possibly some animal products if feed resources can be developed. However, the current and prospective supply-demand balance for foods and rubber appears tight even under fairly optimistic assumptions for increased production. This situation springs mainly from the fact that a substantial share of total food use comes from imports. Accordingly, it may be several years before the economy can become self-sufficient. And it may be even longer before substantial net export of foods will be available.

GENERAL APPROACH AND METHOD OF ANALYSIS

There are many ways to approach an appraisal of the agricultural sector, or better the agricultural industry. Techniques of analysis depend to a considerable extent on data available and the kind of questions to be answered. The objectives of this analysis were to appraise the current economic situation as well as prospects for next year, the next several years, and the longer run.

The analyses attempt to identify forces influencing demand and probable supplies and the approximate measurements of the effect of these forces on commodity output, prices, and farm income.

There were a number of data gaps, especially in statistics available for livestock, rice stocks, prices, etc., and more than the usual questions about accuracy of the data. Moreover, war conditions brought tremendous dislocations in the economy, in its institutions, and indeed in its entire cultural, economic, and social behavior. Such conditions are difficult to appraise with any kind of analytical tools. Yet, public administrators and businessmen responsible for day-to-day decisionmaking face these same conditions and the generally inadequate data. Their decisions cannot wait until better data and economic analyses are available. The challenge to the economist and economic statistician, consequently, is to see what data and tools can be developed to help improve public and private decisionmaking.

Multiple regression analysis, based on recent history, provided the main basis for empirical measurement of the forces influencing demand and changes in farm output. In most instances data were available for 10 to 12 years.

The approach is essentially predictive and hopefully to some extent probabilistic--an appraisal of what "probably will be" if certain specified conditions prevail--rather than normative or prescriptive. The analysis does not suggest the potential or optimum output--what could be or what should be--under optimum inputs with given prices and production costs.

Commodity Analyses

Demand, supply, and price influences on output and utilization of a product cannot be considered independently of each other. The dynamic framework traces out a path for output, utilization, and prices. The utilization balance must reflect the output response of producers, domestic and foreign demand pressures, and related price adjustments. This is a big order which usually can be only approximated.

We begin the analyses with a supply-utilization balance for the commodity in as much detail as is available. Utilization estimates based on a constant percentage of output may be interesting, but they add nothing to an analysis of year-to-year changes. Actual utilization components as a percent of total supply vary considerably from year to year. Therefore it becomes important to identify those factors which may influence the changes in utilization.

Supply consists of beginning stocks (S_t), output (0), plus imports (M). Utilization may consist only of exports (EX), carryover stocks (S_{t+1}), and the resulting disappearance (D). It is often possible to make reasonable estimates of use for seed and possibly industrial uses (DO). But, use of major grains and some other commodities for feed (DF) are often difficult to separate from total use. The balance is represented as follows:

$$S_t + 0 + M = DF + DO + EX + S_{t+1}$$

The Supply Response

In supply response analysis we are primarily interested in output (0). However, imports (M) may be an important source of supply and thus should be considered separately. Imports usually depend primarily on the domestic supply-demand balance and associated domestic and world prices as well as institutional controls such as tariffs and/or subsidy programs. Beginning stocks (S_t) are given.

Analysis of farmers' output response in this report does not involve simply a study of the relationship between available inputs and potential output--a production function analysis. Production functions underly the theoretical ideas about farmers' output response, but this type of analysis also requires a consideration of forces that motivate farmers to organize and use different amounts of resources to produce alternative outputs at different points in time.

Crop output is viewed as the product of the area planted and associated yield. Both of these factors can change from year to year due to several influences which are discussed below. Generally it was assumed that Vietnamese producers adjust their output plans over time in response to changes in economic incentives, as represented by the available data series, in addition to the obvious effects of social disorder.

Conventional economic theory suggests a number of factors or forces that might be considered in an appraisal of producers' output response. These include, among others: the commodity's price or price support, input costs (prices), resource restraints, technological forces, government policies, weather, risk aversion, and others. In supply appraisals developed for this study, we attempted to allow for the influence of the above factors as well as the influence of general security conditions.

Supply analysis in South Vietnam is complicated because of war activities over most of the historical period studied. Despite inherent statistical problems in trying to approximate war impacts on production, we felt it necessary to account in some way for periods of intense war activity rather than ignore the problem entirely (see Rice Sector statement for discussion of security shifter).

Use of traditional economic factors in the supply analyses provides a rough test of the hypothesis that Vietnamese producers do, in fact, adjust supply in response to changes in economic incentives. Vietnamese producers respond much as expected on the basis of economic theory. However, the degree of responsiveness, to price for example, was fairly low, which may be partly due to the impacts of risk and uncertainty of war which are otherwise not adequately accounted for in the analysis. Other forces contributing to a relative small price elasticity of supply include such factors as limited alternative use for irrigated land; imperfect knowledge about price prospects and technology; inadequate marketing, transportation, and storage facilities; and customs and habits of a large rural subsistence economy. These factors may influence the speed of adjustment in the production process and therefore affect both the short-run and the long-run price elasticity of supply.

Supply models developed for the agricultural sector range in complexity from the single equation analyses used to predict the fish catch and hog slaughter to the multiequation systems developed for rice and rubber, where separate equations were developed to explain plantings and yield per hectare. Separate rice supply analyses also were developed for two regions. The rubber model includes two equations to predict area--one for new plantings and one for removal of old rubber trees. The following is a discussion of the groups of variables used to help explain output, yield, and plantings. Discussion of the particular functions are included in the technical discussion for each commodity.

Commodity Prices and Input Costs.--Current and/or lagged values of commodity prices and input costs or commodity input price ratios are included in all of the supply response functions with the exception of the yield equations for rice. Lagged prices are prices reported for previous years. For example, "price lagged one period" is last year's price and "price lagged two periods" is the price 2 years ago. If current and lagged prices are used to estimate supply (or area or yield) in 1970, the "current price" is the 1970 price and the lagged prices are those for 1969 and 1968.

Current price is included in a supply function only if it is thought that current supply is affected significantly by current price. This depends on the physical aspects of production, the way in which producers form expectations about price, and the extent to which they can adjust supply when price expectations change. Current prices usually have little effect on current supplies of most farm products, except as they influence stock changes, net imports, or have impacts on commodities with very short production cycles. Even if current price can affect current supply, producers may give it little weight in forming their opinions about the price they expect to receive at the time of sale.

Usually in agricultural supply analysis, prices lagged one or more periods are included because there may be considerable lag between the time when plans are made and the time production is ready for market. More than one lagged price may be included if it is assumed that the price producers expect to receive is based on some average of a number of past prices or price changes.

Whenever price lags extending back more than a year are included in the supply function, a change in price will affect supply in more than 1 year. For example, if price is lagged 1 year and 2 years, there will be an initial effect on supply when the first lagged price increases and an additional effect when both lagged prices are at their new levels. This is consistent with the notion that adjustments in supply usually take place over a period of more than 1 year.

Lagged Supply.--In addition to prices, the previous year's output (or hectares) is often included in the supply function when estimating the current year supply. A lagged output variable was used in the rice and fish analyses in this study. This is equivalent to assuming that changes in supply are affected by expected prices and the past level of output or the general size of the physical plant for rice, livestock, or fish, for example.

Resource Constraints.--In addition to including supply (or hectares) lagged 1 year in the analysis, the level of some durable or relatively "fixed" resource may be included as an explanatory variable. This was done in the fish analysis, for example, by including the number of fishing boats as a resource constraint. The supply function is a short-run function in this case which would require an additional equation to explain changes in the number of boats over time in order to analyze long-run price effects. In the rice analysis rural population was included in both the plantings and yield equations to reflect the effect of labor shortages which have become a major problem in some areas. These constraints are sometimes called "supply shifters" in quantitative analyses because changing their level "shifts" the entire supply response and changes the predicted supply for a given price.

Technology, Weather, and Security.--Other factors which shift the supply curve are changes in technology which increase the productivity of resources used in production. For example, the number of hectares planted with improved rice varieties was included as a supply shifter in the rice yield equation to allow for a change in the average productivity of land due to use of better quality seed. It is not easy to find or construct a measure which adequately reflects changes in technology. A series of numbers usually increasing by one each year is often used to approximate "technological change" or a trend in supply not explained by the other variables.

Weather or general growing conditions are difficult to measure adequately in an analysis. The combinations of moisture, sunlight, temperature, etc., which determine "good" or "poor" growing conditions are involved, difficult to understand, and probably impossible to measure accurately. Natural disasters and indicators of "good" or "poor" growing conditions plus considerable judgment is needed to construct an index reflecting weather conditions. No attempt is made to predict the weather.

War and general security conditions, of course, can have a tremendous effect on the historical profile of most economic forces. Such conditions greatly complicate any economic analyses, econometric or informal. In the case of rice and rubber, for example, special variables, assumed to account for negative shifts in the supply function, were used to reflect judgments about the effect of intense and continued military activities.

Demand Analyses

Appraisals of demand begin with the same basic commodity supply-use table described above. The demand analyses attempted to identify and measure, for the commodity under consideration, the major forces influencing use for food, feed, industrial products, seed, and perhaps waste. Such analyses are concerned too with forces influencing exports of the commodity and those determining how much might be carried into the next marketing year. The analyses are not concerned with "need," but with consumer demand and ability to buy under varying economic conditions.

We do not attempt a neat discussion of conventional demand theory nor do we try to develop the true demand curves of economic theory. Rather, our objective was to approximate the relative importance of price changes; consumer buying power; population growth; and prices of competitive products on the demand for a product. We are concerned too with the influence of exports and consumer preferences on domestic use of food and other farm products. The analyses attempt some measures of the short-run impacts (up to a year, or a crop cycle) of changes in major demand forces on consumption. But, for outlook, program evaluation, projections, and many planning uses, neither prices nor quantities can be assumed as given in a longer-run context. Longer-run supplies will depend largely on growth in output and the volume of imports--the response of supply to economic and institutional incentives.

Demand expansion for major foods depends mainly on population growth, changes in consumer buying power, and relative prices for the commodity and for closely competing commodities. These are the major determinants of demand, but there are other forces. Age composition and geographic shifts in the population; distribution of income; taste changes associated with rural-urban population shifts; and cultural or religious influences on diet and health considerations all influence demand for farm products. These factors may be quite important, though difficult to measure.

Importance of Demand Forces.--Population growth is the major force shifting demand. A 10 percent increase in the number of persons to be fed adds 10 percent to domestic use, if price, income, and other forces do not change. Thus, population has a weight (elasticity) of 1. Some demand appraisals base estimates of need solely on population growth; limited supplies are frequently rationed on such estimates also. However, the demand analyses in this study express use on a per capita basis; this is to eliminate one variable (population) from the analyses.

Changes in the consumer's ability to buy, changes in prices of the product and in competitive products, and trends in taste are major forces modifying the diet or the mix of products used by consumers. A simple demand relationship of the type often used in time series analyses may help to illustrate price and income elasticity of demand:

$$Q = a - bP_q + dP_c + iI$$

In this relationship (Q) refers to per capita use of the commodity, (P_q) to the price of the commodity, (P_c) to prices of competing products, and (I) to consumer income (buying ability). In this conventional function the sign on the (b) coefficient is negative and determines the weight given to price of (Q) (price elasticity of demand) in determining its use. The coefficient (i) should be positive--consumption increases as incomes rise; it gives relative weight to the impact of income on consumption. The coefficient (d) measures the relative importance given prices of competitive products and

logically should be positive--higher prices for competing products tend to increase consumption of product (Q). 1/

Analyses for rice show a price elasticity of demand for all Vietnam of -0.2 to -0.3. However, in rural areas, where feed use may be quite responsive to price, the elasticity may run as high as -0.5 to -0.7. Income elasticity of demand was indicated in the range of 0.25 to 0.35. The inventory of livestock numbers the previous fall was also related to total domestic use as a proxy for feed demand. The associated elasticity was 0.2 to 0.3--a 10 percent increase in livestock numbers operated to increase per capita use of rice by 2 to 3 percent. Similar elasticity estimates for fish, hogs, and rubber are shown in Table 1.

Table 1.--Price and income elasticities of demand for selected commodities

Quantity of:	Change in per capita use with 1 percent change in: 1/		
	Direct price deflated (P_q)	Per capita income deflated (I)	Price or supply of competing products (P_c)
	Percent		
Rice (QDV/N2) 2/	-0.2 to -0.3	0.25 to 0.35	0.2 to 0.3 (IOA) 0.2 to 0.6 (PA/PP)
Rice (QDR)	-0.5 to -0.7	-0.1 to -0.15	0.2 to 0.3 (IOA)
Fish (QDF/NU2) 3/	-0.3 to -0.4	0.5 to 0.6	0.10 to 0.20 (PPKW/CPI)
Hogs (QPKC)	-0.6 to -0.8	0.5 to 0.6	0.1 to 0.2 (PRW/CPI)
Rubber (CRUB) ...	-.35	1.5	Trend + 10 percent

1/ Elasticities based on analyses of time series data evaluated at the mean.
2/ Per capita food and nonfood uses of rice.
3/ Per capita use of fish.

1/ In a linear relationship of this type, these elasticities vary over the range of the data, i.e., the elasticity will vary according to the point at which the function is evaluated. The price elasticity of demand is:

$$EQ \cdot P_q = \frac{dQ}{dP_q} \cdot \frac{P_q}{Q} = b \frac{P_q}{Q}$$

For the cross elasticities of other goods, it is:

$$EQ \cdot I = i \frac{I}{Q}; \; EQ \cdot P_c = d \frac{P_c}{Q}$$

Demand for feed is probably much more responsive to price and changes in relative prices than is demand for food. Although there were no direct estimates of feed use, analyses for rice demonstrated that total domestic use of rice was significantly related to livestock numbers and to the ratio of livestock product prices to paddy prices.

No attempt was made to empirically approximate export demand (EX), in part because there were virtually no data available except for rubber. A fairly reasonable demand function was approximated for carryover stocks of rice (S_t).

Income Elasticities from Cross-Section.--Income elasticities from cross-section household expenditure data were generally consistent with results from time series analyses for rice, fish, and pork. To illustrate relative consumer preference for major foods, per capita expenditure for each food group was related to total expenditure per person--a proxy for income where household saving is small over most of the income range. The resulting coefficients might most accurately be referred to as expenditure elasticities, but, for South Vietnam's economy, the coefficients can practically be considered income elasticities and may be interpreted as such. These coefficients illustrate the relative preference consumers place on major foods as incomes (and therefore per capita expenditures) rise. Such elasticities based on cross-section data for major food groups are summarized in Table 2. (See Appendix G for an appraisal of the household expenditure survey.)

Commodity Demand-Supply-Price Framework

Demand, supply, and price forces, as discussed earlier, cannot be effectively appraised independently of each other. With today's statistical techniques and rapid computers, more realistic economic frameworks can be solved and tested for their reasonableness. Accordingly, commodity analyses in this study combine appraisals of the supply response with demand analyses. This combination results in a simple dynamic analytical framework which traces the path of output, utilization, and prices for the past and provides a tool for projections under alternative sets of assumptions.

Most annual agricultural crops fit quite logically the simple recursive supply-demand analytical framework. Once the crop is planted and the resources are committed, there can be little adjustment of output to changes in economic forces. Accordingly, plantings and, to a considerable extent, yields reflect price and cost expectations before planting. Such expectations probably are based largely on recent levels and trends in product prices (P), costs for major inputs (C), government price support levels or other incentives (G), and perhaps trends in technology (T). Thus, output in the current year depends largely on economic conditions in recent periods. The analytical system combines such supply response functions with a demand relationship for the commodity. The simple recursive system might be illustrated as follows:

$$Q_t = f\ (P_{qt-1},\ C_{t-1},\ G_t,\ T_t)$$

$$P_{qt} = f\ (Q_t,\ I_t,\ P_o)$$

Table 2.--Per capita expenditure elasticities for high and low household expenditure groups 1/

Item	All Vietnam			Saigon		
	Under 300,000 2/	Over 200,000 3/	All groups 4/	Under 300,000 2/	Over 200,000 3/	All groups 4/
All food	.825	.655	.741	.862	.811	.830
Lower elasticity staple foods						
Cereals & products	.320	.186	.223	.321	.243	.260
Fish	.456	.328	.375	.539	.453	.472
Fresh vegetables	.470	.295	.380	.255	.420	.347
Edible oils	.354	.215	.255	.168	.306	.212
Moderate elasticity foods						
Pork	.970	.815	.895	1.186	.902	1.003
Milk and eggs	.791	.570	.682	.452	.656	.588
Coffee	.636	.434	.558	1.651	.792	1.036
High elasticity, preferred foods						
Beef	1.677	.704	1.122	2.990	.869	1.615
Other meats	2.427	.906	1.622	2.278	1.543	1.719
Poultry	2.792	1.640	2.282	2.971	1.845	2.489
Fresh fruit	1.450	.877	1.738	.974	2.646	2.129
Sugar products	1.422	1.654	1.550	1.547	2.291	2.121
Eating out	1.854	.732	1.239	1.395	.507	.839
Soft drinks	3.290	2.345	2.802	2.455	2.626	3.183
Alcoholic beverages	1.879	2.466	2.089	4.454	4.039	4.201
Clothing	2.138	1.630	1.840	2.309	1.804	2.106
Utilities	3.957	2.997	3.738	.896	2.650	2.766
Household equipment	.818	1.453	1.150	.816	1.308	1.042
Miscellaneous services	1.694	1.420	1.503	1.515	1.031	1.230

1/ The NIS survey of household expenditures (annual expenditures in piasters) in 1969-70.
2/ Includes 3 lowest expenditure groups.
3/ Includes 3 highest expenditure groups.
4/ Includes all 5 expenditure groups.

Elasticities computed on the basis of a double log relationship ($\log E_f = a + b \log E$). The elasticities (b values) show the percent change in cost of living items with a 1 percent change in per capita total expenditure, a reasonable proxy for income in this study.

In this illustration, the output (supply) (Q_t) depends on past prices for the product (P_{qt-1}), expected costs for major inputs (C_{t-1}), the government policy variable (G_t), and technology (T_t). The demand function uses output (Q) from the supply response along with income (I) specified in the general economic framework, and competing prices or supplies (P_o) determined in other commodity analyses. The recursive commodity analytical system can be tested to see how well it explains changes in past years, and then how it can be used as a mechanism for making projections into the near-term future. Supply is estimated for a year (t) based on economic conditions (or given assumptions). This is combined with the demand function for the year (t). The result provides the basis for estimating year t + 1. This process is repeated to determine estimates for year t + 2, t + 3, and so on.

General Economic Framework

The analytical approach for the general economic framework also begins with basic national accounting identities much like the commodity supply-utilization balance. Most analyses for South Vietnam's economy were based on the following expenditure or product identity in the accounts:

$$GNP' \cdot PY = CF' \cdot PF + CN' \cdot PNF + I' \cdot PI + G' \cdot PG + EX' \cdot PEX - M' \cdot PM$$

This identity simply says that the sum of the following is equal to the gross national product (GNP) of the economy in terms of current piasters:

1. Consumer expenditures for food (CF) plus,
2. Consumer expenditures for nonfood goods and services (NF) plus,
3. Investment outlays (I) plus,
4. Government spending for goods and services (G) plus,
5. Exports of goods and services (EX) less,
6. Imports of goods and services (M).

Current piaster values for each of the above categories were split into a real component (GNP') and a price component (PY).

The usual method in constructing a macro analytical framework is to develop a behavioral relationship for each of the 12 variables on the right side of the identity. This would have been too ambitious for the time and resources available for the agricultural sector analysis. Instead, relationships were attempted for consumer goods, investment outlays, and imports in an analytical framework for the general economy which highlights farm-nonfarm interrelationships. In most of our appraisals we simply assume, rather than estimate, investment outlays, government expenditures, exports, and, for some appraisals, imports. Price equations were attempted for food and nonfood consumer goods, and household income was approximated from the income side of the accounts. However, it was not possible to adequately investigate the forces influencing the general price level and the individual price level for each major component of GNP. Nor was it possible to explore possible

behavioral equations for savings, Government revenue and the distribution of income to households. Moreover, data were completely inadequate for appraisals of employment levels and productivity.

The Agricultural Sector Model

The agricultural sector analytical framework consists of the above described commodity analyses for rice, fish, livestock (pork), and rubber. These analyses were integrated with a simple framework for the general economy as shown in Figure 1. Production of rice and other foods directly influence the size and growth of the gross national product. And, the national accounts directly influence rice demand via household income and the general level of prices and costs as described by the consumer price indexes. There are similar interrelationships between the general economic framework and fish, hogs (livestock), and rubber. Specific linkages among commodities are generally indicated through prices for competitive relationships.

MAJOR COMPONENTS OF AGRICULTURAL SECTOR AND NATIONAL ACCOUNTS

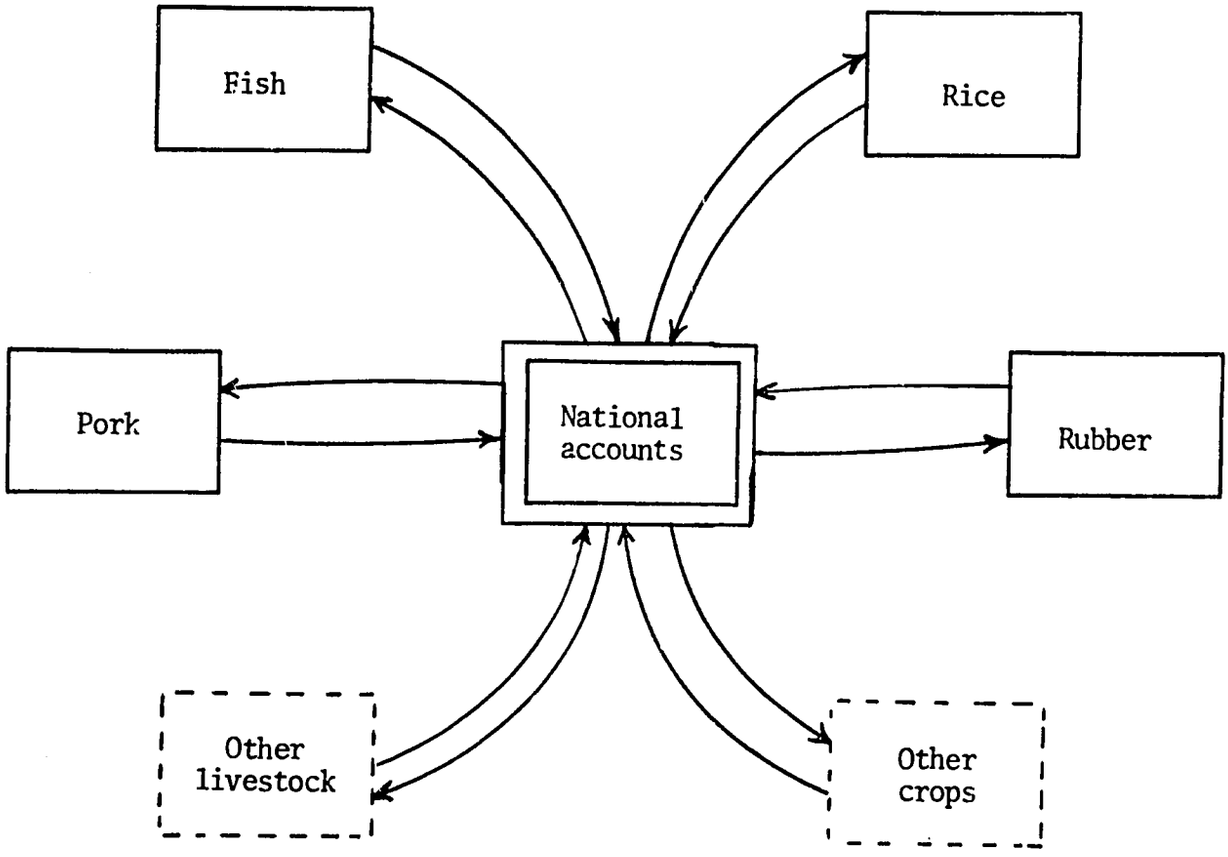

Figure 1

VIETNAM'S GENERAL ECONOMY

Agriculture, including both farming and related industries, is by far the dominant industry in Vietnam's economy. The net product of farming, i.e. value of final products originating on farms, accounts for more than two-thirds of the economy's output. The sector accounts for an even larger share of total employment.

The strategic dominance of the farming economy and the industries which market farm products and provide farm inputs dictates analytical approaches which integrate the agricultural sector and the general economy. They are integral parts, one of the other, and therefore general economic policies and programs have important impacts on the development and prosperity of agriculture. Similarly, changes in agriculture have direct and important impacts on year-to-year changes and growth of Vietnam's economy.

The development of a complete model of the economy would have been a big undertaking in itself and an impossible task for the USDA/AID team in terms of its mission and time frame. However, we expect that this modest effort will help to emphasize and illustrate major basic interrelationships between agriculture and the general economy.

National Accounting Data Framework

The analysis for the general economy is built around the national accounts data for the economy. These data were accepted as reported through 1968. A number of questions arose in the course of the investigation about the conceptual framework, basis for estimates, and some of the relationships, and there are inadequacies in the data and some serious data gaps. Nevertheless, the overall data framework was perhaps more logical than we were led to expect.

The gross national product in current piasters was shown as the sum of values for each product and price component as follows:

+CF'·PF = Real consumer expenditures for food times food expenditure price component

+CN'·PNF = Real consumer expenditures for nonfoods times nonfood expenditure price component

+I' ·PI = Real business investment outlays, including fixed investment and inventories times investment price component

+G' ·PG = Real government expenditures for goods and services times government expenditure price component

+EX'·PEX = Real export value plus factor payments abroad times export price component

-M' ·PM = Real import value times import price component

GNP'·PY = Real value of gross national product times implicit price deflator; this is GNP in current value.

Another concept useful in measuring domestic economic activity is gross domestic expenditure (GDE). Gross domestic expenditure summarizes the domestic activity exclusive of any trade balance effects. If subsidized imports exert an unusually high effect on GNP, then changes in GNP can be "distorted" as imports change. Defining GNP again as:

$$GNP = CF + CN + I + G + EX - M$$

then substituting:

$$GNP - EX + M = CF + CN + I + G$$

and if:

$$GDE = GNP - EX + M$$

then:

$$GDE = CF + CN + I + G$$

This concept then minimizes the accounting impact of large changes in the net trade balance. These impacts on the domestic economic activity can result from policy actions to encourage imports and/or exports. However, this approach does not reveal any contributions of imports or exports on the economy (Figure 2).

In an effort to refine a general measure of consumer buying power, the relatively inadequate income accounts were organized into government revenue (R), gross business saving (S), government transfer payments (GT), and the flow of income to households (HI). This resulting measure was used in the commodity demand (price) analyses as an approximate measure of consumer disposable income.

$$HI = GNP - R - S + GT$$

The complications of rampant inflation during much of the decade made it advisable to devote most attention to the real (price deflated) component of the national product accounts. We examined factors influencing the volume of food consumed and found that the principal factors affecting food consumption expenditures were production of rice, livestock products, and fish, as well as imports of food. The volume of nonfood use by consumers (nonfood consumption expenditure) was examined relative to imports and the overall level of economic activity. Investment outlays were closely related to imports (thus aid levels) and overall economic activity. Although expenditures by government were related to aid levels, both government expenditures and exports were assumed as predetermined in the analyses for the general economy.

A general illustration along lines described above for the real product accounts is approximated in the accompanying schematic diagram (Figure 3). It is one of many possible logical frameworks that might be used as a basis for the general economic framework. The major variables and interrelationships are illustrated about as developed in the analytical framework.

Another schematic (Figure 4) provides a simple illustration for the economy in terms of real output and the general price level. It illustrates some of the interrelationships used in estimating prices of consumer goods, the general price level, and current piaster gross national product.

GROSS NATIONAL PRODUCT ACCOUNTS--VIETNAM

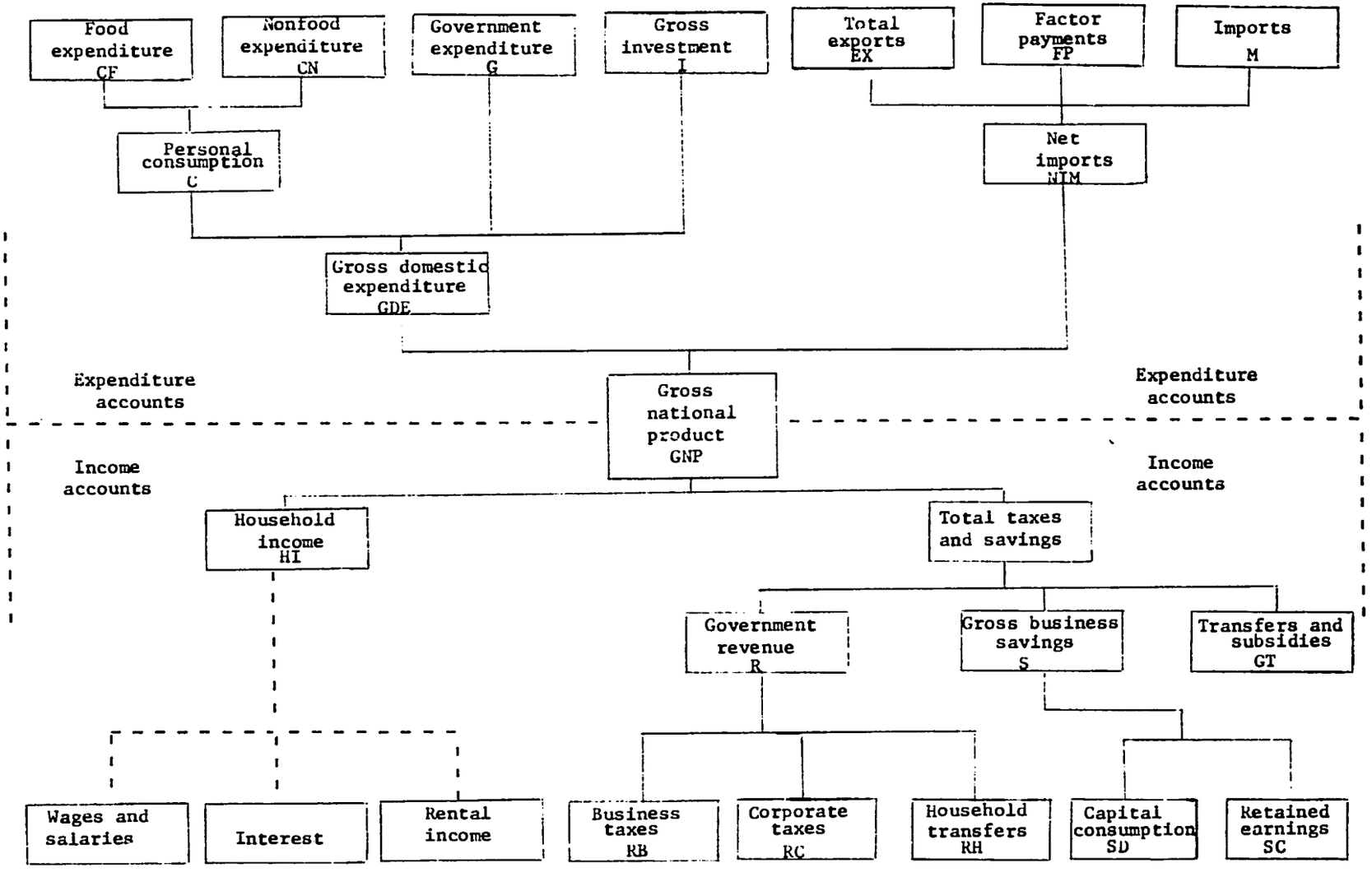

Figure 2

GROSS NATIONAL PRODUCT: REAL OUTPUT IN CONSTANT PRICES

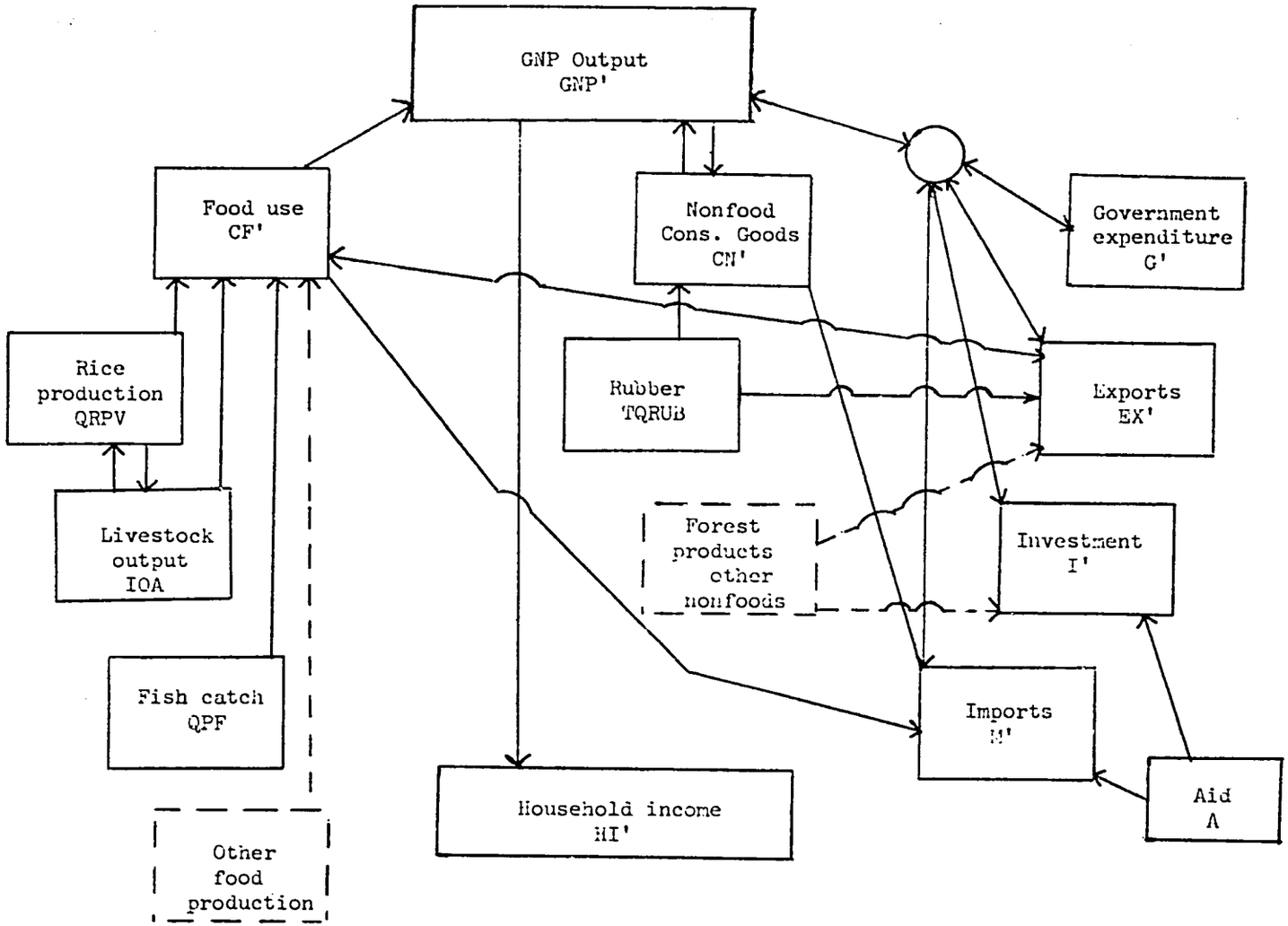

Figure 3

GROSS NATIONAL PRODUCT IN CURRENT PRICES

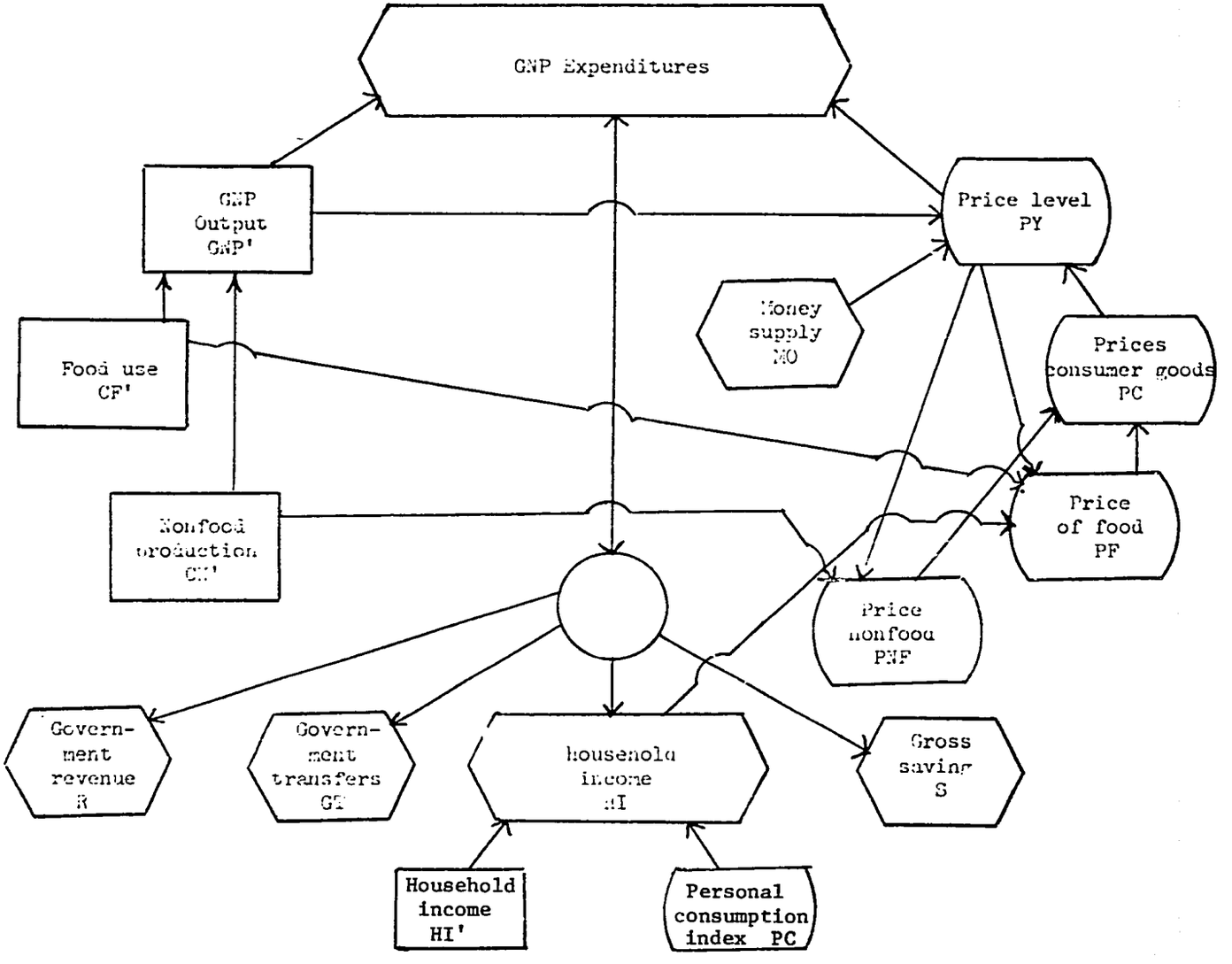

Figure 4

The gross national income flows to households, government revenue, and business saving are determined directly from the expenditure side of the accounts. It was not possible with data available to analyze employment and productivity, the distribution of income to households, or the complicated price making forces in the general economy.

An examination of the basic data, together with a summary of the most reasonable analyses reported in Appendix A, will permit the analyst to consider a number of alternative analytical frameworks. With first-hand knowledge of the economy and some experimentation, an experienced analyst may develop a number of perhaps more realistic and more effective general economic frameworks than the one used in preparing this report.

Consumer Outlays for Goods and Services

In recent years, consumer outlays for goods and services ranged above 80 percent of the gross national product. They were a relatively stable share of gross domestic expenditures (GDE), accounting for 70 to 75 percent of that total in recent years. Government expenditures have taken a big and growing share of the total, while investment outlays have been relatively small.

As a basis for analysis, consumer expenditures were divided into foods (CF) and nonfoods (CN). However, these subtotals are still highly aggregated as a basis for analysis. Changes in the quantity of food used (CF'--see Figure 5) were determined by changes in rice production (QRPV) using the current year's

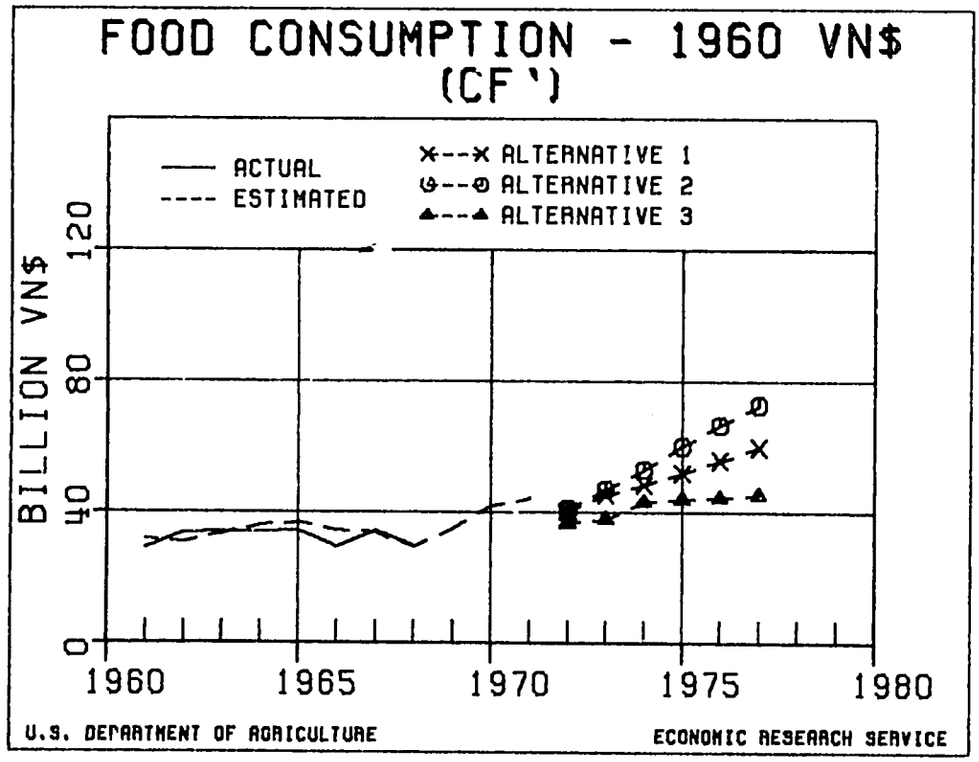

Figure 5

crop (i.e. the 1971-72 production used to determine 1971 food expenditures) rather than the previous year's production, since the national accounts apparently were put together in that way; the number of livestock (size of the livestock plant) reported the preceding fall (IOA); and net imports of rice (RNIMP). 2/

Rice production is an important determinant of the volume of food used under this specification. Generally a 10-percent increase in the rice crop was associated with at least an equal increase in total food use. Livestock numbers and rice imports were also significant contributors to the volume of food used, but these were much less important than rice.

The analysis would have been conceptually more complete if we had included the fish catch and production of other food in the analysis. But these additional variables would have introduced complications from intercorrelation among the explanatory variables. Rice production, livestock numbers, and rice imports in this analysis seem to adequately explain variations in the volume of food used.

$$CF'_t = 12.499 + .00775\ QRPV + .0558\ IOA + .00277\ RNIMP$$

(7.05) 3/ (2.62) (2.25)

[1.159] 4/ [.2185] [.0097]

R^2 = .934 5/

D.W. = 1.67 6/

$$PF_t = 104.9 - 5.50\ CF' + 1.053\ HI + .977\ PC_{t-1}$$

(3.35) (9.73) (7.12)

[-.767] [.682] [.632]

R^2 = .998

D.W. = 1.82

2/ Statistical analyses in these appraisals do not strive for statistical significance since most analyses are based on only 10 or 12 observations. Nevertheless, a number of measures of statistical significance were computed and reported.

3/ The number in parenthesis (t value) is a measure of the significance of the related coefficient. With a "t" value of 2.0 or more, the coefficient is considered statistically significant.

4/ The numbers in brackets are elasticities which indicate percent change in CF' with a 1 percent change in the variable. These are computed at the means, but for such linear relationships, elasticities could and perhaps should be computed at values for more recent years.

5/ This is the square of the coefficient of multiple correlation--the coefficient of determination.

6/ The Durbin-Watson statistic is a test of the distribution of residuals in a regression analysis. A value of about 2.0 on a scale of 0.0 to 4.0 suggests no systematic autocorrelation in the residuals. The Durbin-Watson statistic is generally considered to be inappropriate in a regression which uses the lagged dependent variable.

The food price equation is quite logical. The price and income flexibility coefficients are near the same size and both would be considered statistically significant by the usual measures. The coefficients suggest a relatively high price and income elasticity of demand for all food. 7/

Nonfood consumer expenditures--the real component adjusted for price change--was related to imports (M') and the level of total output of the economy (GNP'). The nonfood analysis would have been more accurately specified if nonfood imports could have been split out of total imports (M'):

$$CN' = 7.296 + \underset{\substack{(3.67)\\ [.718]}}{.3128\ GNP'} + \underset{\substack{(3.06)\\ [.1093]}}{.1729\ M'}$$

$$R^2 = .953$$
$$D.W. = 2.50$$

$$PNF = 78.31 - \underset{\substack{(1.20)\\ [-3.665]}}{1.335\ CN'} + \underset{\substack{(4.28)\\ [.6498]}}{.6686\ HI} + \underset{\substack{(1.324)\\ [.2089]}}{.2302\ PE_{t-1}}$$

$$R^2 = .994$$
$$D.W. = 3.34$$

The volume of nonfoods consumed is closely related to the economy's total volume of output as well as the volume of imports. In this formulation a 10-percent increase in total real output (GNP') is associated with an increase in nonfood consumption of around 7 or 8 percent. The coefficient is significant but small on the import variable (M'), which includes food as well as nonfood imports (Figure 6).

The price equation for nonfood (PNF) relates prices to the volume of nonfood use, household income (HI), and last year's price level (PE_{t-1}). The relationship of change in the volume of nonfood use (CN') to price change is negative, as expected. But the coefficient is not highly significant and may be somewhat large. Its reciprocal implies a price elasticity of demand for nonfoods that seems too low. The price level component (PE_{t-1}) in the demand (price) equation dominates the analysis, though it may prove to be a reasonable estimating equation.

7/ The elasticity coefficients in brackets in the price dependent demand function are referred to as price flexibility coefficients. In this case a 10-percent increase in overall use of food is usually associated with a decline of 7 or 8 percent in the price of food. This function implies a conventional price and income elasticity of demand of more than 1.0 for all food. Such elasticities may be quite logical for time series analyses based on total rather than per capita food use and undeflated income and price variables.

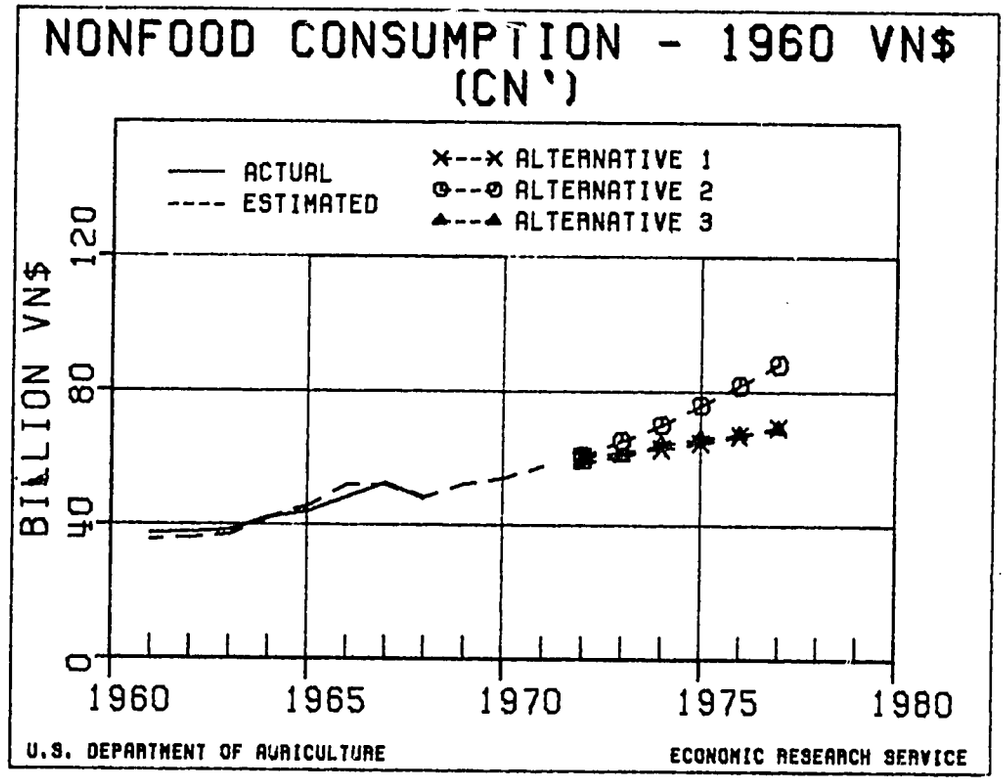

Figure 6

Volume of Imports

The volume of imports (M') during most of the 1960 decade was highly correlated with aid (A) levels. In fact, the relationships show that the two variables change about in direct proportion--a 10-percent increase in aid levels was associated with a 10 to 11 percent increase in imports. This is not surprising since most imports are directly or indirectly financed by aid.

Increases in the volume of domestic output, with improvement in domestic supplies, should also dampen imports. Accordingly, the following specification of the import relationship was considered one of the more logical and perhaps most practical among analyses tried:

$$M' = \underset{\substack{(.622)\\ [-.4266]}}{8.22} - \underset{}{.1175\ GNP'} + \underset{\substack{(8.41)\\ [1.1197]}}{2.476\ A}$$

$R^2 = .973$
D.W. = 2.26

Further Analysis of Investment Outlays

It should prove helpful to at least separate business fixed investment and residential construction. It may help also to break investment into its public and private components. Although investment levels are assumed predetermined for most appraisals for the next several years, the following relationship explains rather well the variations over the past decade.

$$I'_t = 6.49 + \underset{\substack{(1.32)\\ [1.139]}}{.1474\ GNP'} + \underset{\substack{(2.40)\\ [.3766]}}{.177\ M'}$$

$$R^2 = .861$$
$$D.W. = 1.43$$

This function suggests that a 10-percent increase in imports (M'), in the recent historic period, was associated with an increase of 3 to 4 percent in investment. Similarly, a 10-percent increase in the total output (GNP') was usually accompanied by a 10 to 12 percent increase in investment (I').

Gross National Product Estimating Equations

To summarize the framework and examine some basic relationships, the above structural relationships were substituted into the basic GNP accounting identity. This results in a "reduced form" estimating equation. The procedure might be illustrated by beginning with the basic accounting identity:

$$GNP' = CF' + CN' + I' + G' - M' + (EX' + FP')$$

The functions above for CF', CN', and M' are substituted for the variables in the identity balance. When the algebra is completed in this manner, the resulting "reduced form" estimating equation expresses the GNP' as a function of all exogenous variables--those which are given or determined outside the analysis. The following is the computed "reduced form" estimating equation for the gross national product:

$$GNP' = -26.0 + .013077\ QRPV + .17889\ IOA - 3.47403\ A$$
$$+2.1579\ G' + 2.1579\ (EX' + FP')$$

To use this equation, we must independently determine rice production, livestock numbers, aid levels, government expenditures, and exports. Later in the overall analytical framework, rice, fish, hogs, and rubber are integrated into the general economic framework to illustrate and approximate these interrelationships with the framework for the general economy.

The above reduced form equation also was estimated directly, by least square regression, with surprisingly logical statistical results, despite the large number of independent variables.

$$GNP'_t = -36.05 + \underset{\substack{(2.36)\\ [.734]}}{.01475\ QRPV} + \underset{\substack{(1.70)\\ [.264]}}{.203\ IOA} - \underset{\substack{(2.20)\\ [-.435]}}{3.498\ A} + \underset{\substack{(3.27)\\ [.5315]}}{2.053\ G'} + \underset{\substack{(1.97)\\ [.2815]}}{2.348\ (EX'+FP')}$$

$$R^2 = .989$$
$$D.W. = 1.85$$

The relationship of rice production, livestock numbers, government expenditures, and exports to changes in the gross national product are much as might be expected. Their signs and size appear quite reasonable. A billion-piaster increase in government expenditures tends to add about 2 to 2 1/2 billion to the gross national product. The multiplier for exports is about the same. Similarly, agricultural production has a large and direct impact on gross output of the economy.

Aid levels are more involved and this relationship perhaps oversimplifies the functions of aid on the economy. In this formulation, aid (A) directly influences and largely determines imports, especially in recent past years. Imports also are an important determinant of investment, consumption, government purchases, and the economy's ability to export. Thus, increased aid levels have a positive bolstering effect on the economy through their impact on imports and total domestic expenditures.

But, imports are a deduction from total spending in computing the gross national product. In past years, large imports have been necessary because of reduced or inadequate domestic production. Accordingly, it is not surprising that, in the past decade, an increase of 1 billion piasters in aid was usually associated with a reduction of around 3 1/2 billion in real domestic output of the economy. In future years a drawdown in aid levels will operate directly to slow total domestic spending. But if investment outlays and exports can be increased moderately through larger savings and a step up in government revenues, the increase in domestic production, even with reduced imports, would give a substantial fillip to the gross domestic product of the economy.

Income Flow to Consumers

Both national income and household income were used as measures of consumer demand in the commodity analyses. Household income is that remaining out of the gross national income flow after deducting government revenue (R) and gross business saving (S) and adding back government transfers. It is probably more logical to use household income rather than national income as a measure of consumer buying power. The government transfers back to households (GT) provide partial offsets to leakage into savings and revenues.

Since lack of time limited more complete analysis, particularly of tax structures and inducements to save, we adopted a crude analysis of revenues and business savings. These two functions consisted of simple ratios to the gross national product. In this manner household income was approximated in the following identity (Appendix A):

$$HI = GNP - R - S + GT$$

Similarly, national income is a residual after deducting from GNP the indirect business taxes (RB), capital consumption allowances (SD), and a small allowance for subsidies:

$$NI = GNP - RB - SD + subsidy$$

Prices and the General Price Level

Analyses of the general economy were not complete enough to attempt estimation of major price components of the gross national product. Price equations for consumer goods look reasonable. But price functions used in the overall analytical framework were, in general, greatly oversimplified. Although a number of analyses were tested, changes for most component price indexes were simply related directly to changes in the general price level rather than to basic changes in demand-supply conditions. One relationship for the general price level emphasizes the very close association between changes in the price level and changes in the money supply:

$$PE = 13.62 + \underset{\substack{(.836)\\ [.179]}}{.2636\ GDE'} + \underset{\substack{(4.20)\\ [.597]}}{2.845\ MO} + \underset{\substack{(.827)\\ [.1414]}}{.1672\ PE_{t-1}}$$

Estimates for the component deflators reflect largely the trend in the general price level. However, in analyses for rice, hogs, fish, and rubber, price estimates reflect changes in supply and demand conditions.

Accounting Identities and List of Variables

Accounting Identities

The analyses were built around three basic accounting identities: gross national product, gross domestic expenditures, and household income.

Gross National Product.--In current piasters, this shows the product of real constant piaster value, identified by the apostrophe, and indexes for price deflators where 1960 = 1.0.

$$GNP' \cdot PY = CF' \cdot PF + CN' \cdot PNF + I' \cdot PI + G' \cdot PG + (EX + FP)' \cdot PEX - M' \cdot PM$$

Gross Domestic Expenditures.--This is expressed as the value, volume, and price terms described above.

$$GDE' \cdot PE = CF' \cdot PF + CN' \cdot PNF + I' \cdot PI + G' \cdot PG$$

Household Income.--This is expressed in current undeflated piaster values.

$$HI = GNP - R - S + GT$$

List of Variables

The following list of variables includes a brief identification. A more complete description and the basic accounts are included in Appendix A.

C = Private consumption, billion piasters
CF = Food consumption, billion piasters
CN = Nonfood consumption, billion piasters
G = Government expenditures, billion piasters
I = Gross domestic investment, billion piasters
IF = Fixed investment, billion piasters
IS = Net change in inventories, billion piasters
GDE = Gross domestic expenditures, billion piasters
GDE = C + G + I
EX = Exports, billion piasters
M = Imports, billion piasters
FP = Factor income payments from abroad, billion piasters
GNP = Gross national product, billion piasters
NI = National income, billion piasters
NI = GNP - RB - SD + GS
R = Government revenue, billion piasters
RB = Business taxes, indirect, billion piasters
RC = Corporate taxes, billion piasters
RH = Household transfers + taxes, billion piasters
R = RB + RC + RH
S = Gross saving, billion piasters
SD = Capital consumption allowances, billion piasters
SC = Corporate saving, billion piasters
S = SD + SC
GT = Government transfer payments, billion piasters
GH = Government transfers to households, billion piasters
GI = Government interest payments, billion piasters
GS = Government subsidies, billion piasters
GT = GH + GI + GS
PIN = Personal income, billion piasters
PIN = NI - SC - RC + GT
HI = Household income, billion piasters
HI = PIN - RH = d
PY = Deflator index for gross national product, 1960 = 1.0
PC = Deflator for personal consumption, 1960 = 1.0
PF = Consumer price index for food, working class families, 1960 = 1.0
PNF = Deflator price index for nonfood, computed from PF and PC, 1960 = 1.0
PG = Deflator index for government expenditures, 1960 = 1.0
PI = Deflator for investment, 1960 = 1.0
PE = Deflator for gross domestic expenditures, 1960 = 1.0
PEX = Deflator for exports, 1960 = 1.0
PM = Deflator for imports, 1960 = 1.0
PN = Deflator for national income, 1960 = 1.0
IND = Index of industrial production, 1960 = 1.0
A = Foreign aid, billion piasters
MO = Money supply, end of year, billion piasters
QRPV = Rice production, 1000 M.T. milled rice
IOA = Index of livestock production, 1957-59 = 100
N_2 = Population as reported from provinces and cities, million

SOURCES: National Accounts, Bank of Vietnam, and Annual Reports of the National Institute of Statistics.

Framework Operation and Application

The equation system above, along with recursive supply-demand analyses for rice, fish, hogs, and rubber was worked into an overall system. This system, described in detail in the Framework chapter, page 100, was then used to test the impacts of alternative assumptions as a basis for projections of economic activity for the next several years. The equation system can be solved using a desk calculator, but the process is tedious and more assumptions are required, particularly for the major farm products.

It may be helpful to describe the operation of the system and its farm-nonfarm interrelationships by summarizing some major impact multipliers. The net change in real (volume) GNP associated with an increase of:

1 Billion $VN in Government expenditures (G')	=	2 to 2 1/2 billion $VN
1 Billion $VN in Exports (EX + FP)'	=	2 to 2 1/2 billion $VN
1 Billion $VN in Aid inputs (A)	=	-3 1/2 billion $VN
10-percent increase in rice production (QRVP)	=	7 billion* $VN
10-percent increase in livestock numbers (IOA)	=	2 1/2 billion* $VN

* These two variables would have to be considered to represent the approximate impact of total food crop and livestock production on GNP.

Since only very provisional estimates were available for the period 1969-71 and for 1972, the framework and data for the above major predetermined variables were used to simulate the 1969-71 period and make estimates for 1972 (Table 3). The estimates shown are those determined by the simulation framework for real deflated gross national product. Price deflators were estimated on the basis of reported prices for 1969-71 and estimates for 1972. Estimates of the flow of income to households is perhaps more tentative than those for the major GNP components. Government revenues and savings, which are closely related to changes in GNP, were held at the percentage of GNP reported in recent years.

Increased hostilities in 1972 complicated the economic reform program initiated in 1970 and 1971 designed to reduce the economy's dependence on U.S. aid. Renewed war in the North brought more refugees, food provisioning, and larger rice imports. Increased imports and the high cost of imported goods, as the piaster sought its own level (devalued) under the reform program, apparently operated to sharply reduce the demand for imported goods. Uncertainties of the war and the planned dampening effects of reform measures led to cuts in industrial production in 1972, a sharp drop in general economic activity, and a build up in stocks of nonfood imports. At the same time, prices continued to rise, especially the price of rice, other foods, and domestic products in general.

Table 3.--General economic growth and household income, 1968 and estimates 1969 to 1972

Item	Variable	1968	Estimated 1969	1970	1971	1972
		Billion piasters				
Private consumption expenditures	C	318.5	440.4	663.6	835.4	1,031
PCE in 1960 $VN	C'	77.7	87.2	95.9	102.0	100.7
PCE deflator, 1960=100	PC	410	505	692	819	1,024
Government consumption expenditure	G	86.5	130.6	153.9	204	340
GCE in 1960 $VN	G'	42.4	48.9	51.3	60.0	80
GCE deflator, 1960=100	PG	204	267	300	340	425
Gross investment	I	31.3	55.6	60.0	69.9	69.6
Investment in 1960 $VN	I'	14.3	22.4	16.8	14.6	12.0
Investment deflator, 1960=100	PI	219	248	357	479	580
Exports	EX	28.2	34.1	35.7	45.0	52
Exports in 1960 $VN	EX'	9.1	8.3	6.1	6.7	6.0
Export deflator, 1960=100	PEX	309	411	585	672	870
Imports	M	105.8	135.2	133.9	139.0	214
Imports in 1960 $VN	M'	46.6	63.8	55.3	54.5	70
Import deflator, 1960=100	PM	227	212	242	255	305
Net factor payments	FP	26.4	23.9	20.0	17.0	19.0
NFP in 1960 $VN	FP'	8.8	5.4	4.2	2.7	2.5
NFP deflator, 1960=100	PFP	300	443	476	630	760
Gross national product	GNP	385.3	549.4	799.3	1,032.3	1,298
GNP in 1960 $VN	GNP'	105.8	108.4	119.0	131.5	131.2
GNP deflator, 1960=100	PY	364	507	672	785	989
Gross domestic expenditure	GDE	436.4	626.6	877.5	1,109.3	1,441
GDE in 1960 $VN	GDE'	134.4	158.5	164.0	176.6	192.7
GDE deflator, 1960=100	PE	325	395	535	628	748
Household income	HI	309	441	641	831	1,043
HI in 1960 $VN	HI'	84.9	86.9	95.4	105.8	105.5
HI deflator, 1960=100	PY	364	507	672	785	989
Household income per capita	HI/N2	19,004	26,663	36,988	44,415	54,041
NI/N2 in 1960 $VN	HI'/N2	5,221	5,254	5,505	5,655	5,466
		Million				
Population	N2	16.26	16.54	17.33	18.71	19.3

Prospects for Near-Term Growth and Change

The overall simulation program was used to trace the path of major economic variables to 1977. The projections should help to explore possible development of the economy in the next 5 years, as well as give insights into economic strains on the economy and basic policy issues. Three alternative sets of assumptions provided a basis for the 5-year projections. These are shown in detail in the chapter on the overall Framework discussion, page 100.

Alternative I

Alternative I is generally optimistic and fairly realistic in that it assumed an early termination of the war. Projections suggest a very modest growth in gross domestic expenditures--less than population growth. But, with increased domestic production and fewer imports, the gross national product increases nearly 6 percent per year. This represents an annual growth in per capita real GNP of about 3 percent (Table 4).

Annual growth in real household income, however, runs only fractionally more than population. Thus, household income per capita holds about steady. The relative stability projected for household income from the growing gross national product reflects the assumption of an accelerating diversion of total income into government revenue and gross business saving. In recent years, insofar as we can estimate, the sum of government revenue and savings has totaled less than 20 percent of the GNP. Back in 1968 the ratio was probably around 16 percent. The assumptions of higher tax rates, a more efficient tax collection system, and programs to encourage increased savings operate to restrict the income flow to households and increase the ratio of revenue plus savings to gross national product to nearly 30 percent by 1977. Such an increase would require higher taxes as well as aggressive administration of special tax and savings programs.

Alternative II

Alternative II specifies a quick termination of hostilities. But it assumes too, a continuation of aid and government expenditures around the high 1972 levels. With an assumed sharper rise in investment outlays--about twice those for Alternative I--gross domestic expenditures (available resources) increase about 6 1/2 percent per year. Since imports decline moderately under this Alternative, the projected rise in the gross national product is accelerated accordingly, rising around 11 percent per year from 1972 to 1977. This is nearly double the annual gain projected for Alternative I.

But, assumed conditions for Alternative II may be too optimistic; they assume demobilization of the economy and, at the same time, assume that government expenditures and aid levels would hold at 1972 highs and provide resources for the larger public and private investment outlays assumed. Revenue and savings rates are stepped up as in Alternative I.

Table 4.--General economic growth and household income, alternative projections, 1972 to 1977

Item	Variable	Alternative	Projected					
			1972	1973	1974	1975	1976	1977
			- - - - - Billion piasters in 1972 prices - - - - -					
Private consumption expenditure	C	I	1,031	1,099	1,139	1,194	1,256	1,324
		II	1,037	1,149	1,262	1,395	1,522	1,649
		III	976	1,007	1,098	1,124	1,144	1,167
Food expenditures	CF	I	631	708	754	812	872	936
		II	637	734	829	940	1,042	1,137
		III	573	590	673	687	694	706
Gross national product	GNP	I	1,296	1,375	1,434	1,513	1,612	1,721
		II	1,296	1,454	1,622	1,820	2,018	2,225
		III	1,240	1,268	1,356	1,376	1,388	1,405
Gross domestic expenditure	GDE	I	1,444	1,459	1,459	1,481	1,511	1,549
		II	1,444	1,541	1,638	1,758	1,870	1,982
		III	1,399	1,466	1,571	1,631	1,683	1,743
Household income, total	HI	I	1,040	1,081	1,097	1,129	1,172	1,219
		II	1,045	1,146	1,244	1,359	1,469	1,576
		III 1/	997	1,022	1,094	1,111	1,121	1,135
Household income, per capita ..	HI/N2	I	53,886	54,322	53,512	53,507	54,009	54,420
		II	54,145	57,588	60,683	64,408	67,696	70,357
		III	51,658	51,357	53,366	52,654	51,659	50,670
Gross business saving and ..... Government revenue	GNP-HI	I	256	294	337	384	440	502
		II	251	308	378	461	549	649
		III	243	246	262	265	267	270
			- - - - - - - - - - - - Million - - - - - - - - - - - -					
Population	N2		19.3	19.9	20.5	21.1	21.7	22.4

1/ In this assumption the security shifter was cut back to a very low hostility by 1974; it would have been more logical to assume a gradual shift toward peacetime conditions over the period as the change from 1973 to 1974 appears too abrupt.

Effective implementation of these conditions would provide substantial resources for expanded investment, land reclamation, movement of people back to rural areas, and other programs to expand domestic output and exports.

Alternative III

Although gross domestic expenditures rise under Alternative III, much as they have in recent years, aid and imports provide most of the resources for increased spending. The gross national product--real output of the economy-increases about 2 1/2 percent per year. With the projected 3 percent growth in population, projected GNP per capita declines slightly. This implies a similar decline in real per capita buying power of households.

Results obtained under the three alternatives are graphically illustrated in Figures 7, 8, and 9.

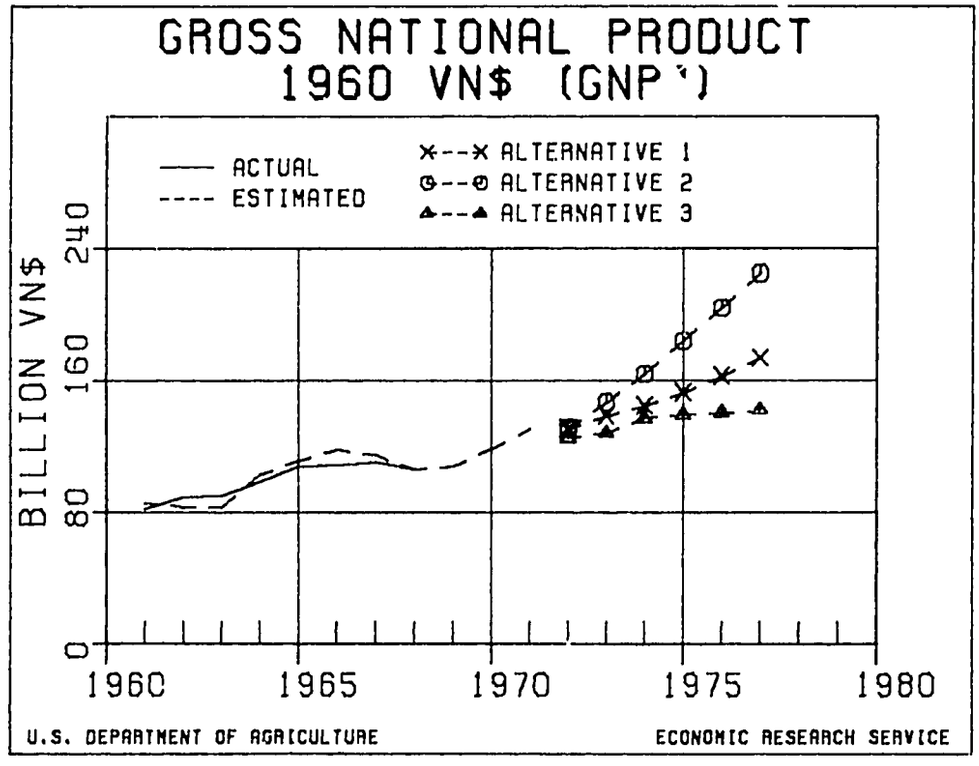

Figure 7

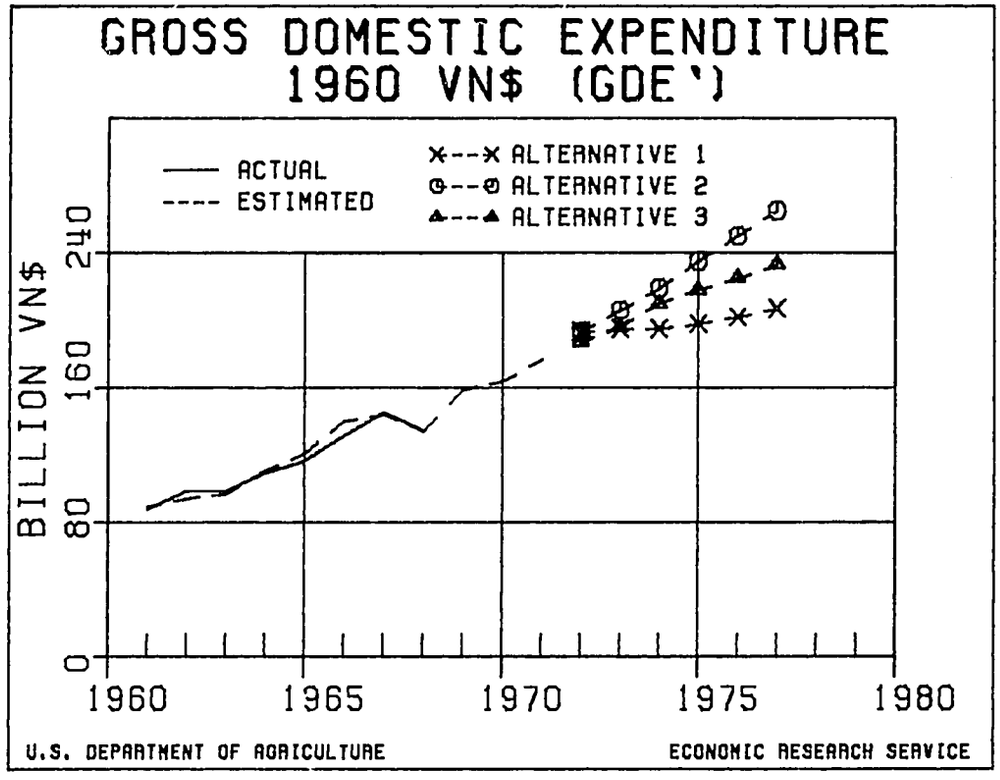

Figure 8

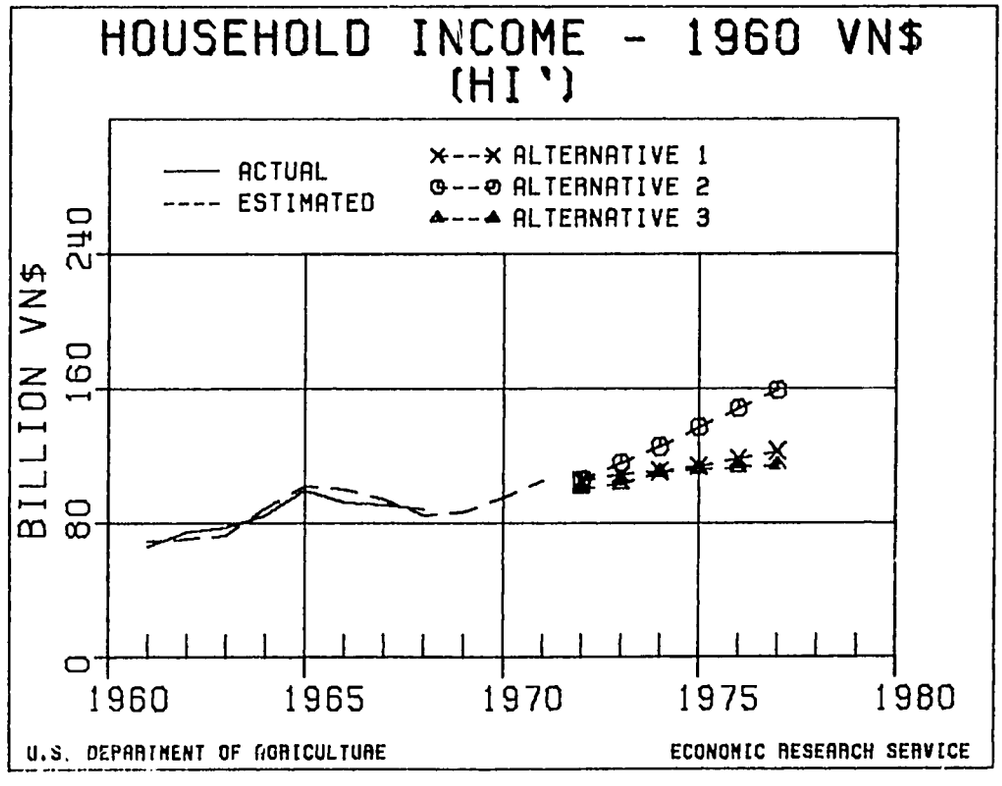

Figure 9

RICE SECTOR ANALYSIS

Rice accounts for about 35-40 percent of the total value of Vietnam's agricultural production, including livestock, fish, and forestry. Although paddy production increased by 15 percent in the last decade, population gained about a third, far outstripping the production gains. To maintain reasonable price levels, substantial imports were necessary. This shift in the rice production/population race transformed Vietnam from a rice exporter to a major rice importing country. However, other important demand factors such as income gains and increased requirements of paddy for feed also added to the demand pressures.

The rice supply-demand analysis reported here incorporated published Vietnamese data analyzed in a traditional supply/demand analytical framework. A conventional framework assumed positive supply relationships between rice prices and paddy hectares and, conversely, negative demand relationships between rice prices and rice consumption. These short-run relationships were shifted through time by such forces as technology, reclamation, population, and high-yielding varieties on the supply side and by growth in population, consumer buying power, and livestock numbers on the demand side.

The accompanying diagram (Figure 10) illustrates the basic relationships tested in Vietnam's rice sector and, specifically, how rice production enters as an important influence on the national income accounts. The relationships enter into policy planning, both for rice and the national economy.

Variable Identification

Supply Variables

HV = Hectares of paddy, Vietnam (1,000)
HD = Hectares of paddy, West Delta (1,000)
HO = Hectares of paddy, all other provinces (1,000)
YV = Paddy yield, Vietnam (Kg./hectare)
YD = Paddy yield, West Delta (Kg./hectare)
YO = Paddy yield, all other provinces (Kg./hectare)
PRPV = Paddy price at provincial rice mills, Vietnam ($VN/100 Kg.)
PRPD = Paddy price at provincial rice mills, West Delta, ($VN/100 Kg.)
PRPC = Paddy price at provincial rice mills, Central Lowlands, ($VN/100 Kg.)
CPIX = Consumer price index (excluding rent) for working class families, Saigon, 1963 = 100
T' = Technology proxy increasing 1.0 per year, plus additional 1.0 for each 100,000 hectare increase in IR varieties, 1961 = 100
DIR = Hectares of improved rice varieties, Vietnam (100,000 hectares)
DHL 5-8 = Dummy (0, 1) variable reflecting periods of war activities (1965-68 = 1.0)
NR2 = Rural population from series 2, NIS (million)
QF = Imports of chemical fertilizer, 3-year moving average centered, 1,000 M.T.

RICE (PADDY) SUPPLY, DEMAND, AND NATIONAL ACCOUNTS RELATIONSHIPS

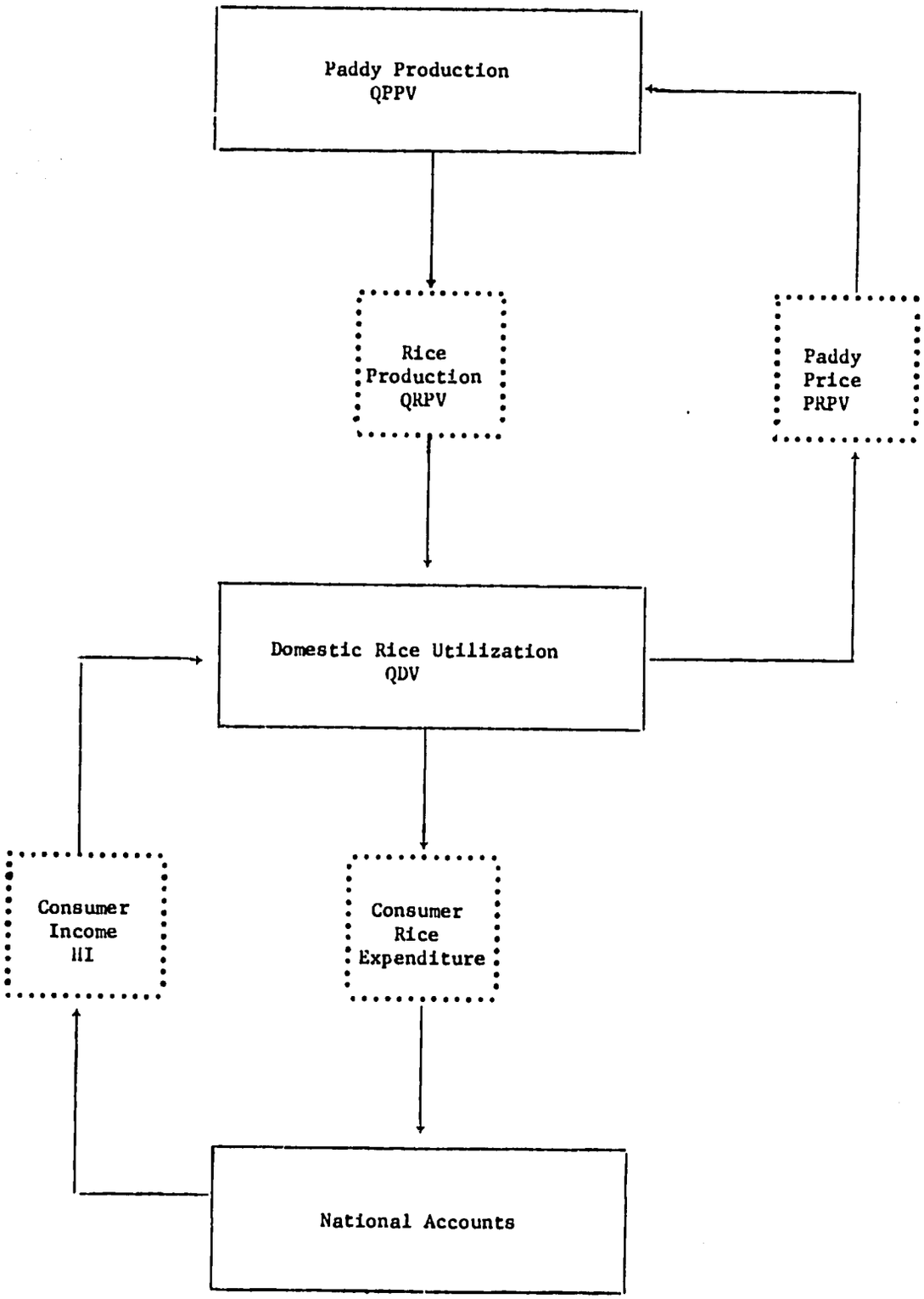

Figure 10

D63	=	Dummy (0, 1) shift for 1963; 1961-62 = 0.0; 1963 = 1.0; 1964-70 = 0.0
OUD	=	Other weather factors influencing yields, West Delta, 100 = normal conditions
OUO	=	Other weather factors influencing yields, all other provinces, 100 = normal conditions
QPPV	=	Quantity of paddy produced, Vietnam (1,000 M.T.)
QPPD	=	Quantity of paddy produced, West Delta (1,000 M.T.)
QPPO	=	Quantity of paddy produced, all other provinces, (1,000 M.T.)
QRVP	=	Quantity of rice produced, Vietnam (1,000 M.T.), (QPPV x 0.6)

Demand Variables

QRVP	=	Quantity of rice produced, Vietnam (1,000 M.T.)
QDEL	=	Quantity of rice delivered to Saigon (1,000 M.T.)
QDV	=	Rice disappearance to all uses, Vietnam (1,000 M.T.)
QDC	=	Rice disappearance to commercial uses (Saigon deliveries; change in Saigon stocks; and net imports) (1,000 M.T.)
QDR	=	Rice disappearance to rural uses (QDV-QDC), (1,000 M.T.)
RNIMP	=	Net rice imports, Vietnam (1,000 M.T.)
ESTK	=	Saigon rice stocks, December 31, (1,000 M.T.)
QRSV	=	Quantity of rice supplies (QRVP-1, plus RNIMP, plus the change in ESTK), (1,000 M.T.)
PRW	=	No. 1 wholesale rice price, Saigon, $VN/100 Kg.
PRR	=	No. 2 retail rice price, Saigon, $VN/100 Kg.
PPKW	=	Wholesale pork price, Saigon, $VN/100 Kg.
PFSHW	=	Wholesale price of fresh fish, Saigon, $VN/100 Kg.
HI	=	Household income, current prices, $VN 1,000
HI'	=	Household income deflated by implicit consumer expenditure deflator, $VN 1,000, 1960 = 100
CPI	=	Consumer price index including rent for working class families, Saigon, 1963 = 100
N2	=	Population from series 2, estimates from provinces and municipalities, million
NU2	=	Urban population from series 2, million
IOA	=	Index of animal products output, 1959-61 = 100
SD	=	Dummy variable for security level and unusual noneconomical events
NI	=	National income, current prices, $VN 1,000
NI'	=	National income deflated by implicit consumer expenditure deflator, $VN 1,000, 1960 = 100

Supply Analysis

The Western Delta region--that area south and west of Saigon--accounts for nearly 80 percent of South Vietnam's rice production. Excess Delta production historically exceeds local feed and food requirements, with substantial quantities moving through the marketing system to the urban and rice deficit areas. Accordingly, we felt the short-run supply analysis should divide the country

into at least two production areas--Delta and the rest of Vietnam. In this supply analysis, regional production designations include Delta and other Vietnam (see Figure 11).

Price Effects

Since rice requires several months to reach maturity following planting, current prices may have little impact on hectares planted and yield within the production year. Therefore, the prices the producer expects to receive provide an important economic factor influencing plantings. Such price expectations probably are influenced most by the price received for the crop most recently marketed, or the average price received the previous year. 8/

The supply response also considers expected costs as well as the price expectations. In this case, a consumer price index (CPIX) represented the level of changes in costs for such variable production input items as fertilizer, pesticides, production credit, and seed. Rice prices were expressed as a ratio to these input costs. This ratio was then lagged 1 year in estimating paddy hectares planted in each region.

Previous Plantings

The amount of land most recently used for paddy is probably the most important factor influencing plantings since paddy land probably is not easily shifted to alternative uses. Hectares planted the previous year represent relatively large inputs of capital and therefore largely explain plantings in the current year.

Technological Shifts

Introduction of new technology may also affect hectares planted. Higher-yielding rice varieties and increased production from these varieties should encourage expansion of the planted paddy area as producers seek to maximize total returns. Such shifts in the supply relationship have been quantified in a modified time trend proxy for technology. In this variable (T'), increments of 1.0 each year assume a continuous general increase in the level of technology. But, these annual increments were stepped up an additional 1.0 increment for each additional 100,000 hectares planted to improved rice varieties. However, after examining trends in yields, the actual hectares planted to new varieties (DIR) were used as a proxy for technology in the yield equations.

8/ Regional paddy prices employed in the analyses were linked to the Saigon wholesale rice price using the following relationships:

Delta	Other Vietnam
$PRPD = 1.4940 + 0.6197PRW$	$PRPC = 116.0283 + 0.7545\ PRW$
$R^2 = .99$	$R^2 = .96$

RICE (PADDY) SUPPLY RELATIONSHIPS

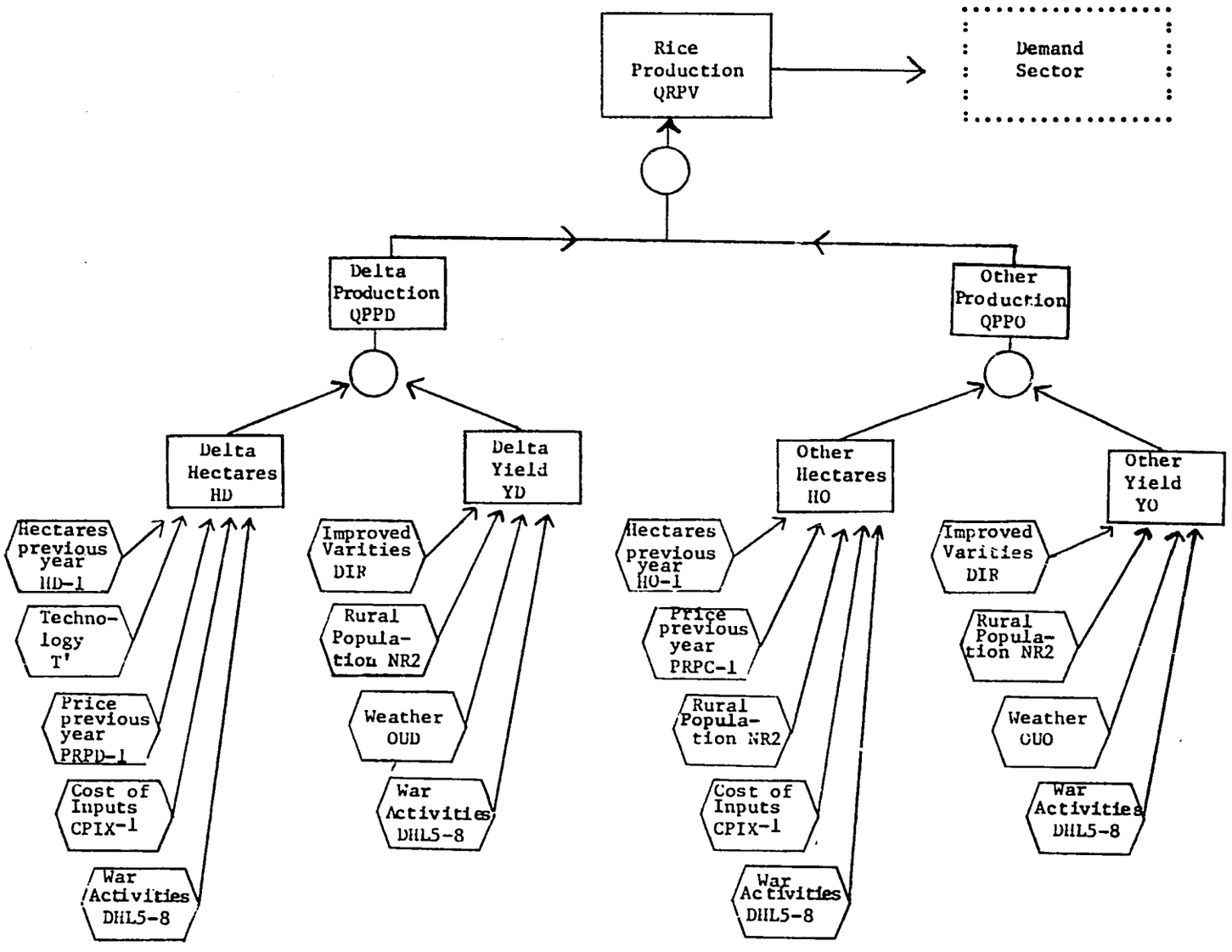

Figure 11

Population

Rural population apparently influences hectares planted in regions other than the Delta. Replacement of capital for labor (especially heavy tractors) in the Delta apparently reduced the dependence on the rural labor force in this region for planted hectares. The labor supply does appear to influence yields in all regions, however.

War Activity and Security Conditions

While the ebb and flow of fighting has long been a fact of life for Vietnam, most of the large-scale military operations affecting agriculture occurred in the 1965-68 period. No quantitative measure of this activity exists. The impacts of stepped-up war and poor security conditions used a fairly common statistical technique--the "dummy shift." A value of "0" reflects years of generally good security conditions, while "1" represents the period 1965-68 when large-scale military operations and poor security conditions were most disruptive to production. The dummy shift variable in both the hectare and yield estimating equations effectively shifts the entire supply response down in years of poor security. The coefficients on the security or dummy shift variable (DHL) reflect the measurement of these impacts. Decisions on values used in subsequent years necessarily require some subjective evaluation about the seriousness of war or security disruption compared with the 1965-68 period.

Weather

The effects of weather on yields present an especially difficult measurement problem. No readily available weather variable captures the effect of rainfall and temperature on yields. Although several variables were tested, none exhibited statistical significance. However, a proxy for the weather variable was constructed. After fitting basic yield equations, the unexplained residuals of these equations were assumed largely due to weather effects on yields. This "weather" proxy for the Delta (OUD) generally moved in much the same way as the "other Vietnam" variable (OUO) in the 1961-70 period. No attempt is made to project the weather for any projection period--these weather proxies are assumed to have a normal value of 100.

The Analytic Framework

A series of four structural equations for hectares and yield and one identity to compute total production represent the rice supply sector. Alternative specifications tested may be found in Appendix B.

The numbers in parentheses below the coefficients are "t" values--a measure of statistical significance. Values for "t" above 2.0 suggest the coefficient is significant for relatively large samples. D.W. refers to the Durbin-Watson statistic--a measure of randomness for the unexplained residuals for each equation

Delta Plantings--these are represented as follows:

$$HD = 691.82 + \underset{(4.4)}{0.395HD_{-1}} + 3.84T' + \underset{(2.4)}{0.40\frac{PRPD}{CPIX}-1} - \underset{(7.3)}{95.40\ DHL5\text{-}8}$$

$R^2 = .97$

Other Area Plantings--these are shown as follows:

$$HO = -267.8 + \underset{(2.5)}{0.927HO_{-1}} + \underset{(.3)}{17.13NR2} + \underset{(.7)}{0.310\frac{PRPC}{CPIX}-1} - \underset{(1.9)}{52.75\ DHL5\text{-}8}$$

$R^2 = .77$

Delta Yield--this is represented as:

$$YD = -1287.4 + \underset{(1.5)}{37.11DIR} + \underset{(1.1)}{136.0NR2} - \underset{(3.2)}{145.3DHL5\text{-}8} + \underset{(2.7)}{20.06OUD}$$

$R^2 = .91$ D.W. = 2.107

Other Area Yield--this is shown as:

$$YO = -719.1 + \underset{(12.4)}{49.39DIR} + \underset{(3.1)}{68.11NR2} - \underset{(2.3)}{20.45DHL5\text{-}8} + \underset{(14.6)}{17.70\ OUO}$$

$R^2 = .99$ D.W. = 2.876

Total Paddy Production--this is indicated by:

$$QPPV = (HD \times YD) + (HO \times YO)$$

Total Rice Production--this is represented by:

$$QRPV = QPPV \times 0.6$$

The annual rice crop in this analysis consists of rice produced largely in the calendar year, including a relatively small summer crop and the larger main crop harvested in the November-April period. Therefore, the crop produced and marketed in 1969-70 is defined as the 1969 crop. Because the largest portion of the crop is produced in the fall months, the domestic supply and use accounts are on a calendar year basis using rice production of the previous crop year (Figure 12).

Demand Analyses

Per capita rice disappearance in Vietnam has been maintained at about 200 kg. per year. This disappearance includes feed as well as food use (see Appendix B for supply/utilization tables as well as feed use estimates).

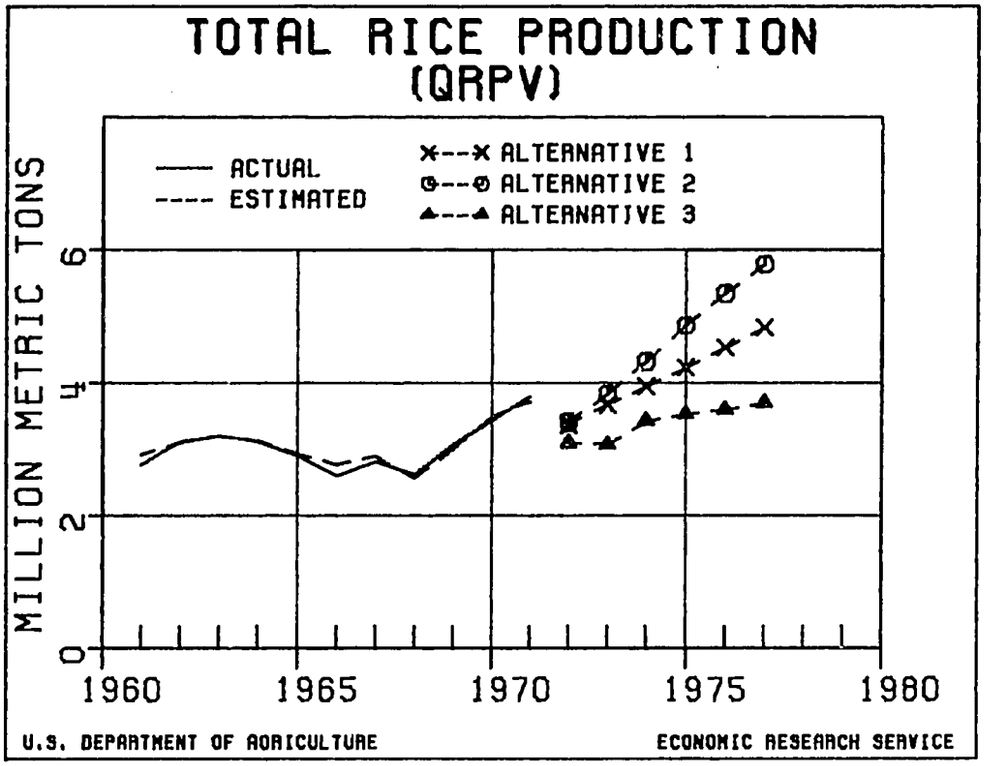

Figure 12

Total disappearance masks paddy use for livestock feed as well as possible differences in demand between rural and urban consumers. Numerous attempts were made to measure demand in different regions and rural-urban differences, but analyses based on highly aggregated data provided the most consistent results. 9/ The resulting demand structure is represented by the schematic diagram in Figure 13.

Total Demand

Total rice disappearance in the calendar year is equal to the previous year's rice crop ($QRPV_{-1}$) plus the net change in rice stocks ($\Delta ESTK$), plus net imports (RNIMP).

$$QDV = QRPV_{-1} + ESTK + RNIMP$$

9/ The problem of estimating "marketed surplus" of subsistence crops has been explored in "An Agricultural Outlook Service for Korea," R.F. Daly, report of AID contract work, May-June 1968; "Price Elasticity of the Marketed Surplus of a Subsistence Crop," Jere Behrman, American Journal of Farm Economics, Vol. 48, No. 4, Nov. 1966; and "Price and Market Relationships for Rice and Corn in the Philippines," M. Mangahos, A.E. Recto, and V.W. Ruttan, American Journal of Agricultural Economics, Vol. 48, No. 3, 1966.

RICE DEMAND RELATIONSHIPS

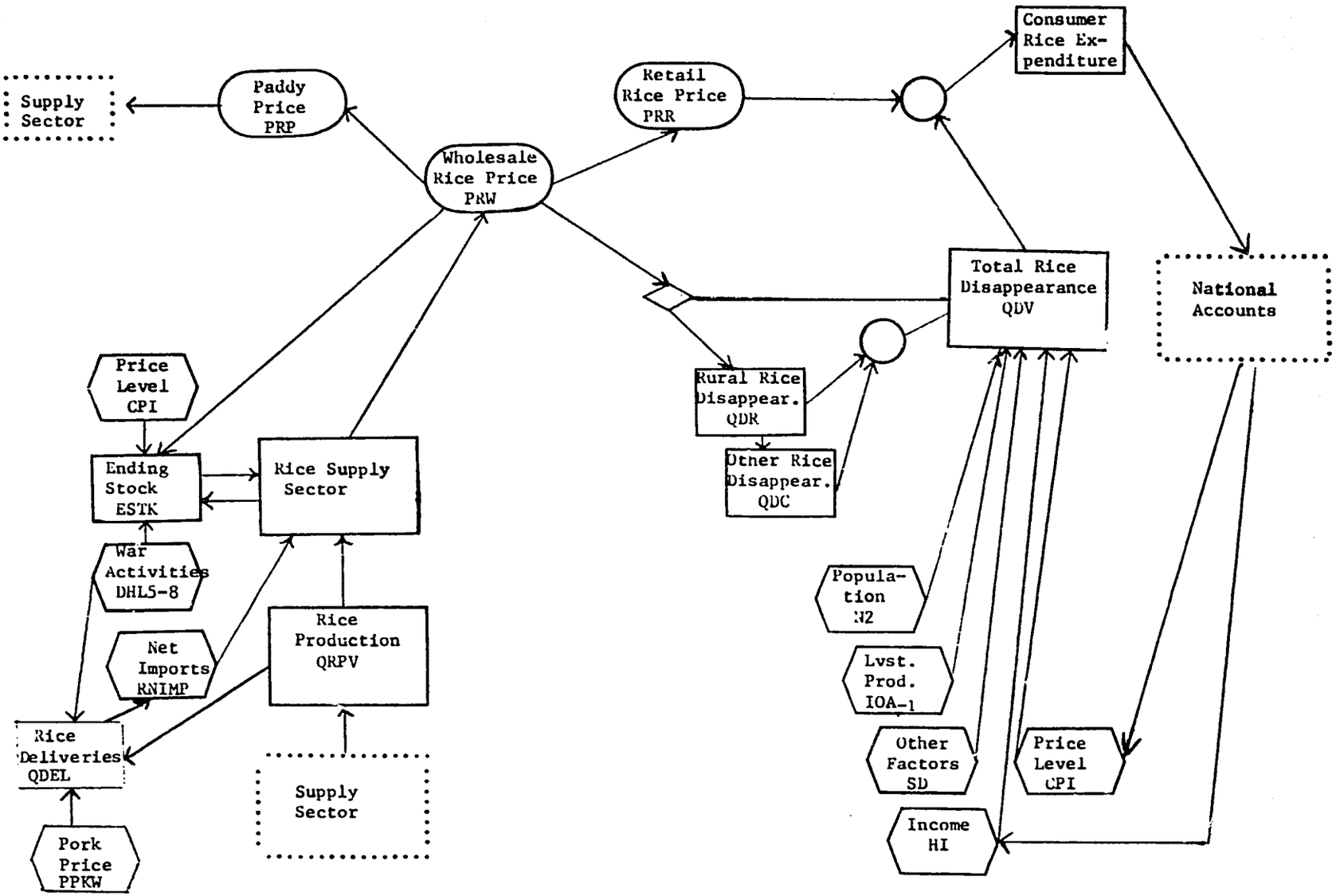

Figure 13

Stock Change

The net change in Saigon rice stocks defines the change in stocks (ΔESTK). Available rice supplies, including both production and net imports, directly influence stock levels. Price also may play a role bidding rice out of storage in periods of high prices while encouraging rice holdings in periods of low prices. In addition, an increasing hostility level may also encourage holdings. The estimated change in Saigon rice stocks is approximated by the following relationship:

$$\Delta ESTK = 78.15 + \underset{(2.7)}{0.23}\Delta(QRPV_{-1} + RNIMP) - \underset{(.6)}{0.217}\frac{PRW}{CPI} + \underset{(1.3)}{76.59}\ DHL5\text{-}8$$

$R^2 = .56$ D.W. = 1.704

Policy decisions most likely affect stock level changes as well as supply/demand forces. Although the estimating equation is reasonable and generally meets standard requirements for statistical and economic significance, projected stock levels probably should be assumed or predetermined outside the analysis.

Net Imports

Changes in rice deliveries directly influence net imports (imports less exports). As deliveries decrease, urban market supplies decrease to where imports are required to maintain per capita supplies and avoid large price increases. Therefore, the net imports estimating equation was specified as a function of the "commercial" supplies available, i.e. beginning stocks (ESTK-1) and per capita rice deliveries (QDEL). In this formulation, both increased deliveries and large beginning stocks were associated with decreased imports. As with the stock change equation, net imports could be considered as a policy decision completely outside the economic relationships. Nevertheless, the results strongly suggest that policy decisions have, in fact, been determined largely in response to economic considerations.

$$RNIMP/N2 = 66.301 - \underset{(7.2)}{1.918}\frac{QDEL}{N2} - \underset{(0.4)}{0.074}ESTK_{-1}$$

$R^2 = .90$ D.W. = 2.37

Deliveries

The rice deliveries relationship expresses deliveries as a function of rice production and the price of rice relative to pork. An increase in rice prices relative to pork tends to increase deliveries, while the size of the rice crop, of course, determines the total quantity available to be delivered.

Several factors may limit rice deliveries even when rice prices are relatively favorable and supplies are large. The most important factor here is the role the hostility level plays. Another less obvious economic factor is the competition for feed supplies represented by pork prices. An increase in pork prices, other things being equal, apparently tends to encourage increased hog feeding of paddy and therefore reduces the supply of paddy available for delivery to Saigon. This need not imply that farmers feed #1 quality rice to pigs. But, it appears that considerable paddy and much of the "brokens" are fed to livestock, and that price relationships affect the level of feeding activity and therefore rice deliveries.

$$QDEL = QRPV_{-1}(0.071 + \underset{(2.2)}{0.503}\frac{PRW}{PPKW} - \underset{(3.4)}{0.044}DHL5\text{-}8 + \underset{(3.9)}{0.084}D63)$$

$R^2 = .88$ D.W. = 2.239

Price

The #1 wholesale rice price (Saigon) was considered to be the most representative rice price for time series analysis. Demand analysis usually relates disappearance of the commodity to the real price of the commodity, the real income level of consumers, the number of consumers, and the prices of competing foods. Since rice contributes such a large share of Vietnam's purchased food, little competition from other foods could be identified in rice price relationships.

A more rigorous analysis for rice would attempt to measure the relationships for all the major sources of demand. For example:

a. Demand by urbanization group (rural/urban).
b. Demand for exports and imports.
c. Demand for stocks.
d. Demand for such nonfood uses as:

    1. Feed,
    2. Seed,
    3. Industrial use, and
    4. Waste and loss.

Several alternative models tested the commercial/noncommercial differences in demand as well as differences between surplus and deficit producing areas. Results obtained were mixed, generally because of the lack of adequate data. Seed requirements, as well as waste and industrial uses, were not specifically identified and were assumed as a constant proportion of total production.

The most important demand category, excluding food use, is the feed use of paddy. Virtually every rice relationship tested, involving the influence of livestock prices or numbers on rice demand, indicated significant interrelationships between the livestock sector and the demand for rice. The impact of livestock numbers on rice demand for feed was represented by the

index of livestock numbers measured as of the previous year, published by the Vietnam Agricultural Economics and Statistics Service (AESS). Using the price relationship below, annual estimates of rice and paddy fed were approximated from a base year estimate for 1970 (see Appendix B).

Since supplies of rice are generally fixed, except for imports during the calendar year, a price dependent demand equation was used to estimate the wholesale price of rice.

$$PRW/CPI = 1299.3 - 7.197QDV/N2 + 3.276IOA_{-1} + 62.268 \frac{HI'}{N2}$$

$$R^2 = .65 \qquad D.W. = 2.65$$

This relationship measures the effect of changes in per capita disappearance (QDV/N2) and income on the price of rice. Feed demand is represented by the index of livestock numbers (IOA_{-1}). The influence of income on prices is measured by per capita household income (HI'/N2).

Implied elasticities from the equivalent quantity dependent equation show a relatively inelastic demand for rice. For example, a 10 percent increase in price is associated with a 2 to 3 percent decline in the quantity of rice demanded. Therefore, fairly small changes in per capita disappearance are associated with fairly large price swings. Similarly, a 10-percent increase in per capita income is usually associated with a 2 1/2 to 3 1/2 percent increase in per capita demand. Such an inelastic demand also implies decreased total revenue with increased total production.

The feed demand elasticity associated with the lagged livestock inventory index also shows a 2 to 3 percent increase in per capita disappearance associated with a 10 percent increase in the livestock index. Increasing numbers of hogs and poultry apparently result in increased feeding of rice and other grains (Figure 14).

Seasonal Analysis

Rice price analyses should also consider the within-year price movements or seasonal effects. Seasonal price movements are affected by the same supply-demand forces as annual movements. However, measuring supplies within the year (stock changes, arrival of imports, and shifts in crop production within the year) is much more difficult. Therefore, any interpretation and measurement of within-year price movements should consider variations in supply-demand forces before associating seasonal movements with unspecified noneconomic forces.

The seasonal analysis for the Saigon wholesale rice and paddy price (Appendix B) indicates a highly-pronounced seasonal price variation in the early 1950's. In that period, prices peaked in the August-October period and reached their low point in February. The range in prices indicated a 15-20 percent swing in rice prices due solely to seasonal factors.

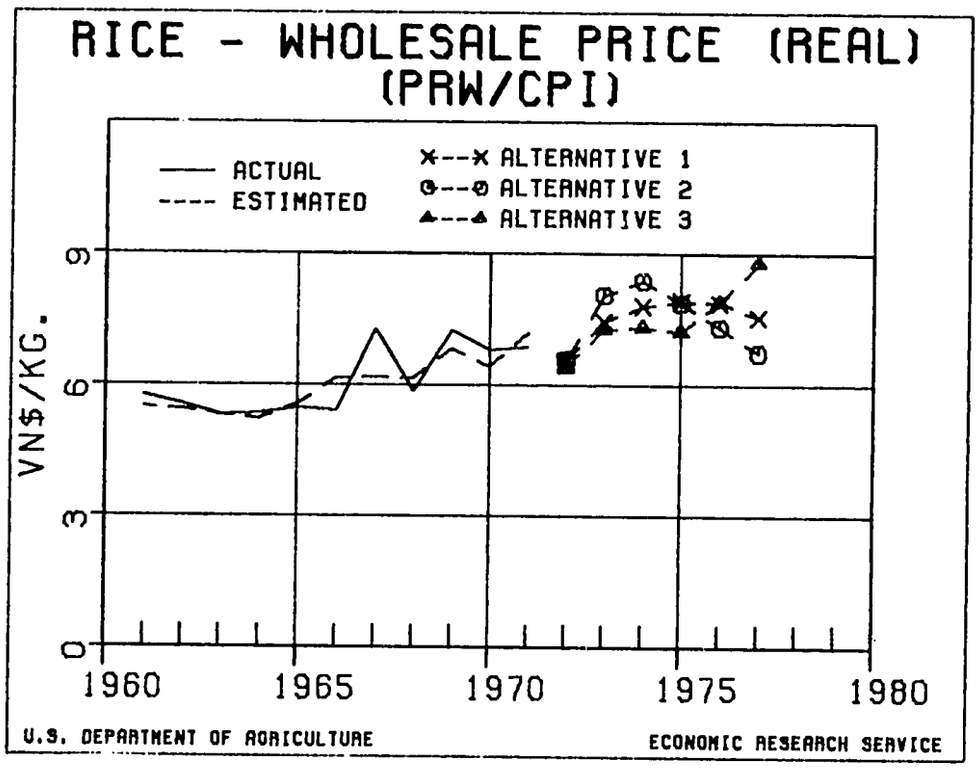

Figure 14

By the late 1960's large seasonal movements had virtually disappeared. The seasonal factors exhibited more of a bimodal movement within the year, with prices at slightly higher in March-April and October-November. The within year price variation has also become less pronounced. Much of this reduction in seasonal price variation can be linked to a similar reduction in the seasonal pattern for quarterly rice deliveries (Appendix B). In 1960, the seasonal variation for rice deliveries indicated about 60 percent variation in deliveries within the year. By 1969, this variation dropped to about 15 percent, indicating a much steadier flow of supplies during the year from the surplus areas.

Situation and Near-Term Prospects

Rice supplies early in 1972 appeared reasonably well in balance with prospective demand. But this was all changed by the step-up in hostilities accompanying the spring invasion in the North. In addition to losses from the crop about ready for harvest, thousands of refugees made provisioning necessary in many Provinces north of Saigon where the fighting was heavy. Uncertainty about the war affected rice deliveries from the Delta and the price rise began to accelerate around mid-year. Rice imports, originally scheduled at 125,000 to 150,000 M.T. totaled over 300,000 M.T. in 1972. Moreover, a strong market for rice probably resulted in minimal carryover stocks and the Saigon wholesale price rise about 50 percent above 1971.

Supply Situation

Paddy production in the 1971-72 crop year was the largest in more than a decade, totaling some 11 percent larger than the 5.7 million M.T. output in 1970. Production gains in recent years reflected increased hectares planted to paddy as well as sharply higher yields due largely to rapid expansion in hectares planted to high-yielding varieties.

Prospective plantings of paddy for the 1972-73 crop year were clouded by a number of uncertainties. Increases in rice prices relative to the consumer price and the associated tight demand-supply balance encouraged larger plantings of paddy. However, changes in the exchange rate increased fertilizer costs sharply, partially canceling the more favorable grower prices.

Combined effects of major forces on hectares planted to rice in 1972 suggest an overall decline of 10,000 to 15,000 hectares in the Delta and 25,000 to 30,000 hectares in the other regions. Under more pessimistic assumptions concerning the security situation, another 40,000 to 50,000 hectares could have been lost.

An expected small gain in planting to TN varieties in 1972-73 also will tend to limit yield increases. Similarly, a further decline in the rural labor force could limit gains in yields. The combined impact of poorer weather, increased hostilities, further reduction in the rural labor force, and a smaller gain in hectares of TN varieties could well reduce 1972-73 crop yield by as much as 8 to 10 percent. Obviously, such a forecast depends importantly on the level of hostilities and on the extent and course of growing conditions.

With prospective yields and hectares pointing to a decline, the 1972-73 rice crop could drop back around the 1971-72 crop, a decline of as much as 10 percent or so under the conditions specified above.

Import Requirement Higher

Past experience suggests that the larger 1971-72 paddy crop would have increased 1972 deliveries by perhaps 75,000 M.T. from 1971. In addition, the higher price of rice relative to pork should also have added to total deliveries. But increased hostilities, which tend to limit increases in deliveries, may limit the gain in deliveries to possibly 40,000 to 50,000 M.T. over 1971. Overall prospects for 1973 point to smaller deliveries in line with prospects for a smaller crop. Reduced hostilities could help bolster deliveries again next year though.

Renewed hostilities in 1972, associated problems of transportation and thousands of refugees generated larger import requirements--possibly more than twice as much as imports in 1971. Poorer paddy production prospects for 1972-73 point to substantially higher rice import requirements for 1973. To maintain per capita disappearance around 200 kg. could require 300,000 M.T. to perhaps more than 700,000 M.T. import requirements for 1973.

Illustrative Projections to 1977

Policy appraisal requires systematic evaluation of all the relevant factors affecting the supply, use, and price of rice. Previously discussed structural relationships for rice were incorporated into a more complete analytical framework to generate estimates of production, consumption, and prices consistent with general economic conditions and changes in commodities competing with rice.

Projections under fairly optimistic assumptions (Alternative I), both for limiting demand expansion and encouraging larger rice output, suggest a continued tight supply balance in coming years. In fact, the model simulations indicate that continued small net imports are more likely than an export surplus during the next 5 years.

Planning for an export surplus may require a rise in the relative price of rice (or some equivalent subsidy to growers and a corresponding curb on domestic demand); the ultra-optimistic supply conditions of Alternative II; or possibly other limitations on domestic demand restrictive enough to curb domestic markets to extract rice for export.

Major Assumptions for Rice.--Appraisals for rice simulated for the next 5 years are based on the overall analytical framework for rice and the general economy. Projected alternatives for coming years are based on the three sets of assumptions outlined earlier, with the following special assumptions for rice:

ALTERNATIVE I

1. Intense hostilities affecting primarily the northern region of Vietnam only in 1972, and little effect thereafter.

2. Slight decline in TN varieties in 1972, with an annual increase of 50,000 hectares thereafter.

3. Rural population increasing 100,000 per year.

4. Reclamation of land would bring in 50,000 additional hectares of paddy per year.

ALTERNATIVE II

1. Intense hostilities affecting primarily the northern region of Vietnam only in 1972, and little effect thereafter.

2. No change in TN varieties from 1971 to 1972, and an annual increase of 100,000 hectares thereafter to a total of 1 million hectares.

3. Rural population increasing 200,000 per year.

4. Reclamation adding 100,000 hectares of additional paddy annually.

ALTERNATIVE III

1. Intense hostilities in 1972 severely affecting the northern areas of Vietnam and, to a limited extent, the Delta. The entire country affected by increased hostilities in 1973, with no hostility effect thereafter.
2. No change in hectares of TN varieties from 1972 level.
3. No change in rural population from 1972.
4. No reclamation of abandoned land.

Output and Domestic Demand.--Paddy production simulated under Alternative I, the optimistic but moderate assumption, increases about 45 percent from 1972 to 1975. The gain is nearly 70 percent for Alternative II and about 20 percent under the pessimistic assumption. Prospects for the next several years indicate that these relatively large gains in production for the favorable assumptions must come largely from new plantings of paddy and less from yield increases. This contrasts with production gains in recent years which were due in large measure to increased yields.

Demand for rice depends mainly on population growth, consumer buying power, and growth in the livestock sector. Of course, domestic use also must reflect changes in relative prices and in supplies available. The supply, price, and use balance for each alternative is illustrated by projections in the accompanying table.

The projected values shown in Table 5 represent a fairly wide range of possibilities concerning rice production. Alternative III implies heavy import requirements, although rice prices advance sharply in spite of the specified imports. Prices remain at relatively stable levels under Alternative III until 1975 because of dampened demand pressures as well as large imports. However, as the predetermined imports shade off in 1976-77, prices rise rapidly because of small production gains.

The moderate export levels assumed under Alternative II in 1976-77 appear to be too low to prevent falling rice prices. Per capita disappearance reaches very high levels in 1976 and 1977. The Alternative II results indicate that, under very optimistic assumptions, Vietnam could export rice again in the next few years. At this point, additional model simulations were run to identify possible policy actions required to dampen domestic demand for food and feed to release rice for export.

Export Simulation Results

Alternatives I and II provided a supply base from which additional model simulations were tested by varying rice price and income levels. Permitting the model to run under the specified assumptions implies little, if any, export potential for rice in the foreseeable future. However, a variety of demand dampening measures could be applied to reduce the domestic demand for rice and permit exports to develop.

Table 5.--Projected rice production, use, and prices under three alternatives, 1973 to 1977

Year (Variable name)	Production QRPV-1	Net imports RNIMP 1/	Domestic disappearance Total QDV	Domestic disappearance Per capita QDV/N2	Wholesale rice price PRW/CPI 2/
	1,000 M.T.			Kg.	$VN/100 kg.
Alternative I					
1973	3,375	500	3,875	195	8,350
1974	3,678	250	3,928	191	8,700
1975	3,947	100	4,047	192	8,850
1976	4,237	---	4,237	195	8,800
1977	4,533	---	4,533	202	8,400
Alternative II					
1973	3,407	350	3,757	189	9,000
1974	3,832	80	3,912	191	9,400
1975	4,325	0	4,325	205	8,800
1976	4,862	-100	4,762	219	8,200
1977	5,344	-100	5,244	234	7,600
Alternative III					
1973	3,099	750	3,849	194	8,300
1974	3,069	950	4,019	196	8,350
1975	3,425	725	4,150	197	8,200
1976	3,534	550	4,084	188	9,000
1977	3,598	350	3,948	176	10,000

1/ Rice imports were assumed as predetermined in Alternatives I, II and III.
2/ Expressed in terms of 1972 prices per 100 kg. where the 1972 price is assumed as 7,315 $VN/100 kg.

These measures include stepping up the combined tax and savings rates to hold down household income gains. For example, the current model estimates for household income show annual gains of about 6 percent under Alternative I, and 9 percent under Alternative II (see Table 6). A very harsh policy measure

Table 6.--Household income

Year	Alternative I	Alternative II	Alternative III
	Billion 1972 $VN		
1972	1,040	1,045	997
1973	1,081	1,146	1,022
1974	1,097	1,244	1,094
1975	1,129	1,359	1,111
1976	1,172	1,469	1,121
1977	1,219	1,576	1,135

holding total consumer income at 1973 levels and pressing on with supply increases could increase export availability in two respects: (1) reduce demand for rice because of lower income and (2) reduce demand for feed for hogs because of lower pork demand related to lower income.

A second measure would include a rice price policy to maintain, lower, or increase rice prices. Policies to increase the real price of rice obviously would limit domestic demand and increase amounts of rice available for export. Several combinations of income and rice price assumptions, simulated in the model, indicate that, under rather severe demand restrictions, export potentials could be generated. Indicated export availabilities are shown in Table 7 (see following page).

The most stringent conditions, i.e. constant income levels and increasing rice prices, generate the highest level of exports. However, even these relatively severe restrictions on consumer demand result in only moderate exports under Alternative I.

The results of the rice export simulation indicate that relatively drastic demand dampening measures would be required along with an aggressive supply expansion to develop significant exports in the near future. The policy assumptions also do not specify how income is to be taxed, or how rice prices may be controlled. However, the implication is that exports could be generated by taking rather severe measures.

Multiplier Effects

Interrelationships of the rice economy and the national accounts may also be demonstrated through multiplier effects. Such short-run and long-run impacts of changes in the rice sector on other sectors can be approximated through impact multipliers. Table 8 summarizes the multiplier effects for several years, measured on the basis of a 10 percent increase in rice production on selected variables in the economy.

Table 8.--Effect on selected variables in the current year and succeeding years of a 10-percent increase in rice production

Item	1st year	2nd year	3rd year	4th year	5th year
	Percent				
GNP'	5.5	5.9	4.5	3.5	2.9
M'	-1.9	-2.1	-1.6	-1.2	-1.0
GDE'	4.2	4.5	3.4	2.7	2.2
CF'	10.0	10.7	8.2	6.4	5.2

Table 7.--Rice trade potentials projected to 1977

Year	Alternative I			Alternative II		
	Rice price 1/	Household income 2/	Net imports	Rice price 1/	Household income 2/	Net imports
	$VN/100 kg.	Bil. $VN	1,000 M.T.	$VN/100 kg.	Bil. $VN	1,000 M.T.
A. Rice prices held at 1972 levels; income generated from model						
1974	7,315	1,102	168	7,315	1,248	174
1975	7,315	1,130	89	7,315	1,354	61
1976	7,315	1,173	67	7,315	1,464	-15
1977	7,315	1,215	58	7,315	1,574	-69
B. Rice prices increase 5 percent per year; income generated from model						
1974	8,050	1,109	98	8,050	1,256	107
1975	8,450	1,145	-19	8,450	1,369	-44
1976	8,850	1,195	-89	8,850	1,487	-171
1977	9,300	1,246	-152	9,300	1,607	-284
C. Rice prices held at 1972 levels; income held at 1972 levels						
1974	7,315	1,040	135	7,315	1,040	68
1975	7,315	1,040	44	7,315	1,040	-101
1976	7,315	1,040	-119	7,315	1,040	-239
1977	7,315	1,040	-307	7,315	1,040	-361
D. Rice prices increase 5 percent per year; income held at 1972 levels						
1974	8,050	1,040	59	8,050	1,040	-105
1975	8,450	1,040	-76	8,450	1,040	-232
1976	8,850	1,040	-178	8,850	1,040	-443
1977	9,300	1,040	-278	9,300	1,040	-654
E. Rice prices decrease 5 percent per year; income held at 1972 levels						
1974	6,600	1,040	156	6,600	1,040	92
1975	6,250	1,040	91	6,250	1,040	-46
1976	5,950	1,040	80	5,950	1,040	-139
1977	5,650	1,040	94	5,650	1,040	-201

1/ Expressed in terms of 1972 prices assuming the 1972 wholesale rice price in Saigon at 7,315 $VN/100 kg.

2/ Household income in terms of 1972 price levels.

Summary and Implications

Supply-demand relationships can be approximated in the Vietnamese rice economy using time series data. While improvements can be made in the analysis presented here, the relationships presented conform reasonably well to accepted economic theory and logic relative to a market economy.

The supply sector results indicate that, in spite of declines in the rural population and the number of draft animals, rice production has been increased by stepped-up technology and substitution of capital for labor in major rice producing areas. The effects of the rural-urban migration of population probably has had its greatest impact on rice yields. Increased technology, especially the improved rice varieties, has a practical limit well below total hectares of paddy. Future production increases may well have to come from increased hectares and/or increased labor input.

Although paddy production reached 5.7 million M.T. in 1971-72, well above the previous high of 5.3 million M.T. in 1964, significant 1972 imports have been required to maintain adequate provisioning and limit price increases. A rapidly growing population has offset the production gains of recent years, and the rapid growth promises to continue. This and increased consumer buying power point to a relatively close demand-supply balance for rice in the next few years if inflationary price advances are to be avoided. The development of a feed grain economy (presumably complementary to rice production) may offer some lessening of feed demand for paddy. However, in the meantime, a growing livestock industry also operates to lessen prospects for any significant quantities of rice being available for export in the next several years. This will depend largely on the success of production programs for rice and grain crops as well as the effectiveness of limitations on domestic demand expansion, as indicated by the model simulations. Perhaps the most important implications of the demand analysis for rice are that population growth, income changes, and prices of competitive products affect consumer demand for rice. Moreover, the feed component of demand is also a significant factor influencing marketings, and overall use of rice must be considered in determining future developments in the rice economy.

FISH SECTOR ANALYSIS

The fish sector represents an important segment of the Vietnamese agricultural economy, with 1970 total fish catch value representing more than a fifth of the total value of agricultural production. Fish production has been hampered by war activity, but per capita production has increased about 10 percent per year in recent years. Because of this rapid supply increase, prices (adjusted for changes in the general price level) have trended downward. Although large imports of fish entered the country in 1968 and 1969, Vietnam has been largely self-sufficient in fish production.

Because fishing is such an important industry and a major source of food, the analysis for fish was developed incorporating interrelationships among fish, rice, the national economy, and competing foods. This structure is illustrated in the schematic diagram in Figure 15.

The analysis discussed here is based on published data from the National Institute of Statistics (NIS) on the fish catch and net imports. Most price (wholesale and retail) data also came from NIS, although estimated dock prices came from Bank of Vietnam data.

Variable Identification

PFSHW	=	Wholesale fish price, Saigon, $VN/100 kg.
PFR	=	Retail fish price (average of scaled and smooth fish), Saigon, $VN/100 kg.
PPKW	=	Wholesale pork price, Saigon, $VN/100 kg.
QPF	=	Total fish catch, 1,000 M.T.
FIMP	=	Total fish imports, 1,000 M.T.
FEXP	=	Total fish exports, 1,000 M.T.
FNIMP	=	FIMP - FEXP = Fish net imports
QDF	=	Domestic fish disappearance, 1,000 M.T. (QPF + FIMP - FEXP)
B	=	Fishing boats, Vietnam, 1,000
NI	=	National income, billion $VN
NI'	=	Real national income, billion 1960 $VN
CPI	=	Consumer price index, 1963 = 100
N2	=	Total population from series 2, million
NU2	=	Urban population from series 2, million
DHL5-8	=	Dummy 0/1 shift variable, 1965-68 = 1
T	=	Technology proxy, 1960 = 60, 1961 = 61, ...etc.

Supply Analysis

The supply/demand framework constructed for fish includes one function each for supply, demand (price), and net imports of fish. The supply function developed for the framework expresses the catch (QPF) as a function of relative prices for fish (PFSHW/CPIX) for last year's catch, the number of boats (B), and security conditions (DHL5-8).

FISH ANALYTICAL SCHEMATIC

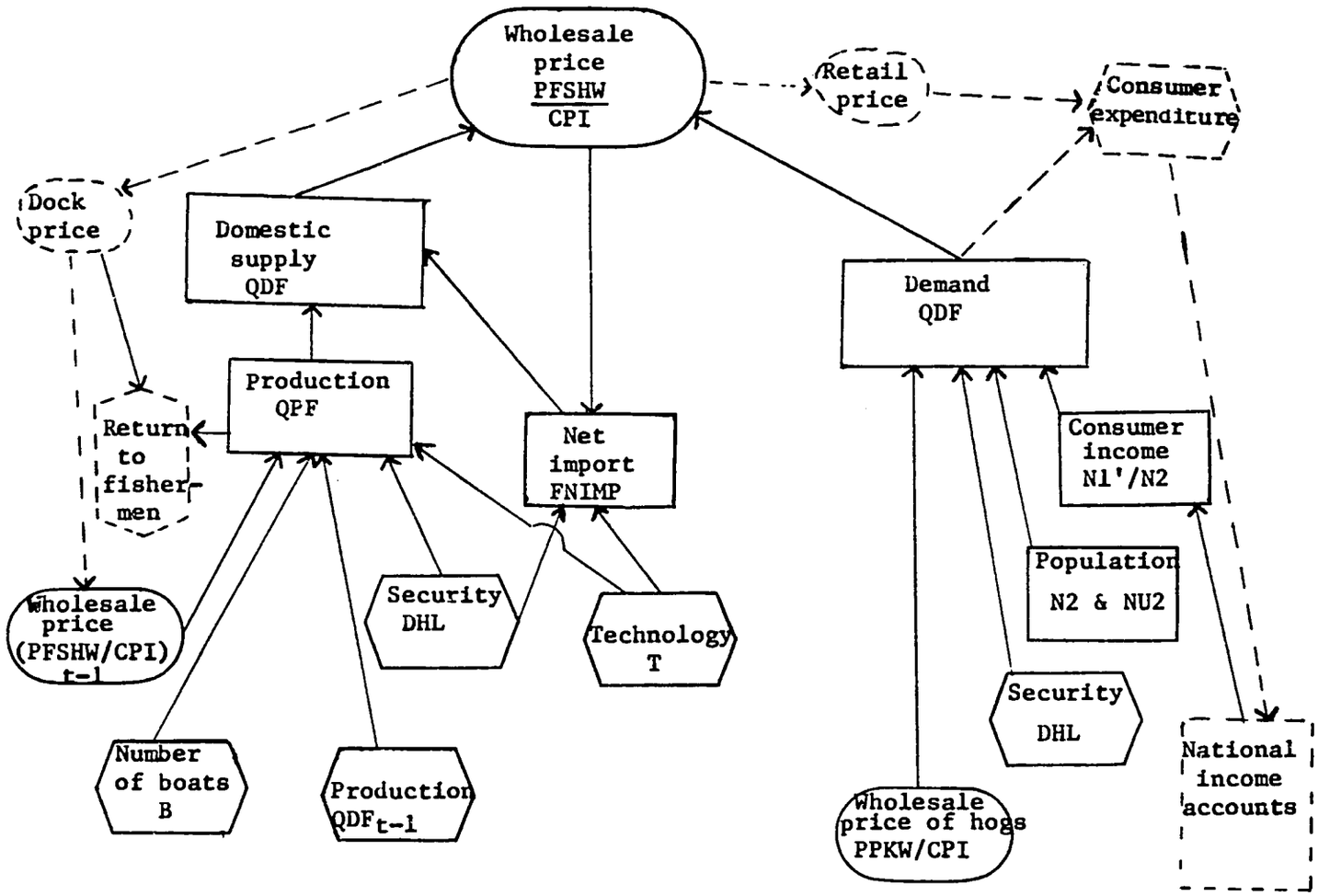

Figure 15

$$QPF = -62.61 + \underset{\substack{(2.2)\\ [.295]}}{1.79B} + \underset{\substack{(1.8)\\ [.267]}}{0.0263\ (PFSHW/CPIX)-1} + \underset{\substack{(6.6)\\ [.67]}}{0.728\ QPF-1} - \underset{\substack{(6.8)\\ [-.071]}}{60.57\ DHL5-8}$$

$R^2 = .987$

("t" values are shown in parenthesis with elasticities in brackets)

Boat numbers have jumped rapidly since 1965, reaching nearly 90,000 by 1970--up nearly 50 percent. The number of boats was included in this regression as a measure of the growing overall capacity of the fishing fleet. Other things equal, of course, more boats increase the amount of catch. The variable is highly significant in the relationship, but its coefficient (1.79) implies a relatively small catch per boat, i.e., each additional boat would add, on the average, less than 2 M.T. per boat per year to total production.

The relative price of fish has declined in recent years as production increased. The decline has had a dampening effect on fish output, as suggested by the analysis, because of the positive relationship to fish price expections. The implied elasticity of supply with respect to price indicates that output is relatively responsive--an increase of about 3 percent in fish catch is associated with a 10 percent increase in the lagged real price.

The previous year's catch also influences production for the current year. This variable is highly significant since it reflects the size of the fishing industry. Hostility levels were also found to be an important factor affecting fish production. The coefficient indicates about a 15 percent drop is associated with intensive military activities, assuming other factors are unchanged.

Demand (Price) Analysis

Wholesale prices were selected for the fish demand analysis because this series was more directly and conceptually related to series used in price analyses for rice and pork. As in the rice and pork analyses, supplies of fish in the current year were largely predetermined by past conditions because the factors affecting supply are fairly well fixed at the beginning of each year. In any event, producers probably cannot respond rapidly to short period price changes. Accordingly, it was logical to estimate the demand function using the price dependent equation.

The following demand (price) equation was then fit statistically for the 1961-70 period:

$$PFSHW/CPI = 1344.2 - \underset{\substack{(1.68)\\ [-.687]}}{32.06\ QPF/NU2} + \underset{\substack{(1.10)\\ [.786]}}{624.7\ NI'/N2} + \underset{\substack{(1.62)\\ [.035]}}{53.99\ FNIMP}$$

$$+ \underset{\substack{(3.15)\\ [.636]}}{0.826\ PPKW/CPI} - \underset{\substack{(1.16)\\ [-.097]}}{878.0\ DHL5-8}$$

$R^2 = .93$

D.W. = 3.10

This particular equation does perform reasonably well as a price predicting device, although the coefficients do not appear highly significant. The per capita fish catch was computed from the commercial catch and the urban rather than the total population, since the commercial catch is sold primarily in urban centers. The per capita series based on the urban population appeared more logical than the one based on total population. The price elasticity of demand in the equation appears to fall in a reasonably expected range of about -0.3 to -0.4.

Pork appears to be a major competitor with fish in the consumer diet. The price estimating equation indicates that changes in pork prices have a sizeable impact on fish prices--a 10 percent increase in the price of pork may push fish prices up 6 to 7 percent.

Real consumer income exerts a positive influence on fish price and appears to be very important. Rapid gains in fish production, which would normally greatly depress fish prices, apparently have been somewhat offset by increasing per capita incomes as well as increasing real pork prices.

Fish Imports

Vietnam fish exports averaged about 800 M.T. in the early 1960's. However, imports were required in the late 1960's, reaching a peak in 1968-69 of about 15,000 M.T. but then dropping to relatively low levels. As with rice imports, fish imports may well be associated more with policy than purely economic forces. The estimated relationship appears logical and in accordance with the expected parameters.

$$\text{FNIMP} = 75.17 + \underset{\substack{(2.9)\\ [19.55]}}{0.012\ \text{PFSHW/CPI}} + \underset{\substack{(0.9)\\ [.465]}}{2.745\ \text{DHL5-8}} - \underset{\substack{(1.8)\\ [-47.0]}}{1.943\ \text{T}}$$

$R^2 = .73$
D.W. = 1.73

Changes in fish prices move the net import relationship in an important manner, but the effect on imports may be somewhat overstated. It suggests that a 10 percent increase in price is associated with an increase of nearly 20 percent in net imports. In addition, the hostility level has been important in determining fish net imports.

Situation and Near-Term Prospects

Supply Situation

Fish catch in Vietnam in 1972 may total about 10 percent above the 1971 production of 588,000 M.T. Except for small dips in 1965 and 1968, production has increased each year since 1960. Production jumped dramatically in the 1969 to 1970 period, with the catch nearly 25 percent higher. Much of the

recent increases can be attributed to an aggressive expansion in the number of fishing boats, which were up more than 50 percent from 1963 to 1970.

Per capita fish disappearance, i.e. consumption, gained rapidly in the last decade. However, during the same period, wholesale fish prices (deflated by the consumer price index) also increased, reflecting some important shifts in consumer demand. These shifts can be associated with gains in consumer income as well as the increased demand for competing products represented by generally increasing pork prices. However, the nature of demand for fish has altered somewhat since 1968. The continuing rapid increases in fish production have more than offset demand shift pressures, with fish prices (deflated) actually declining in the 1968 to 1972 period.

Table 9.--Fish supply and utilization, wholesale fish prices, and related demand factors, 1969 to 1972

Item	Unit	1969	1970	1971	1972 1/
Fish catch	1,000 M.T.	463.8	577.4	587.5	655
Imports	1,000 M.T.	14.9	1.4	---	---
Exports	1,000 M.T.	---	---	1.2	---
Net imports	1,000 M.T.	14.9	1.4	-1.2	---
Domestic utilization	1,000 M.T.	478.7	578.9	586.3	655
Wholesale fish price					
Deflated	$VN/100 kg.	5,561	5,427	5,163	4,500
Current	$VN/100 kg.	24,000	32,042	36,000	38,500
Household income	Bil. $VN	441	641	831	1,043
Population	Million	16.5	17.3	18.7	19.3

1/ Estimated

Illustrative Projections to 1977

Projections of fish production and wholesale prices were generated from the complete model under three alternative sets of predetermined conditions (outlined on page 4). Additional assumptions related to fish are described below:

ALTERNATIVE I (moderately optimistic)

1. Fishing boats increase 8 percent per year.

2. Per capita annual income increases slightly.

3. No fish exports generated through 1977.

4. Hostilities continue through 1972 and conditions stabilize from 1973 to 1977.

ALTERNATIVE II (very optimistic)

1. Fishing boats increase 15 percent per year.

2. Per capita income levels increase about 6 percent per year.

3. Fish exports increase 200 M.T. per year.

4. Hostilities continue through 1972 and conditions stabilize from 1973 to 1977.

ALTERNATIVE III (pessimistic)

1. Fishing boats increase 3 percent per year.

2. Per capita income levels decline slightly over the period.

3. No fish exports generated.

4. Continued hostilities through 1973 with some move toward stability thereafter.

Table 10.--Alternative projections to 1977

Year	Alternative		
	I	II	III
	1,000 M.T.		
Fish production (QPF)			
1973	785	797	708
1974	878	922	768
1975	955	1,051	863
1976	1,023	1,183	927
1977	1,095	1,326	969
Fish wholesale price (PFSHW/CPI)	$VN/100 kg. 1/		
1973	51,200	54,300	42,800
1974	49,000	55,000	59,000
1975	47,000	54,000	55,000
1976	48,000	54,000	51,500
1977	48,500	53,500	53,500

1/ At 1972 prices, assuming 38,500 $VN/100 kg.

Fish production would likely advance rapidly under the assumptions posed by Alternatives I and II (Figure 16). Consumer demand (as indicated by the estimated prices) also appears to advance, especially under Alternative II (Figure 17). For purposes of projection, small amounts of fish were assumed to be exported under Alternative II beginning in 1973--0.2 M.T. in 1973, increasing to 1,000 M.T. by 1977.

Alternative III projections demonstrate, based on past experience, the disruptive effects of a period of increasing hostilities. The combined effect of reduced consumer income and lower prices for competing foods under Alternative II tends to dampen consumer demand for fish.

Summary and Implications

Rapid expansion of fish production was a relatively bright spot in the Vietnamese food production picture for the 1960's. Total catch nearly doubled and real prices increased only modestly. However, as with the other major food items, projected use increased in response to an expanding domestic demand for fish. Optimistic production gains, with investment increases assumed for fish, would help to stabilize prices. Even so, catch-demand-price projections for the next 5 years dampen prospects for volume exports of fish in the near future. Any sizeable export activity likely would require a larger catch or some restriction in demand, if rapidly increasing domestic prices for fish are to be avoided.

LIVESTOCK (PORK) SECTOR ANALYSIS

The analysis of the livestock sector largely concerned attempts to construct production estimates from available data and specify a supply/demand framework for pork. Lack of production data limits analysis of the livestock sector. Analyses must therefore rely heavily on reported inventory numbers and data on controlled slaughter (possibly a third of the total) to construct supply/demand relationships. Data on controlled hog slaughter provide probably the longest set of time series data available. Although this series represents only a share of total production, the data provide a base for fairly detailed commodity analysis.

Data on chicken production are even more fragmentary than those for hogs. With increases in poultry breeder stock, as well as broiler stock, there have been substantial increases in chicken meat production in recent years. These increases assume added importance in analyzing demand because chicken and pork are preferred foods in the Vietnamese diet, according to urban cross-section data on consumer expenditures.

Pork (controlled slaughter) production was selected as the supply indicator for the supply/demand analysis. Other factors considered in these relationships are indicated in Figure 18, a schematic of the hog supply/demand sector.

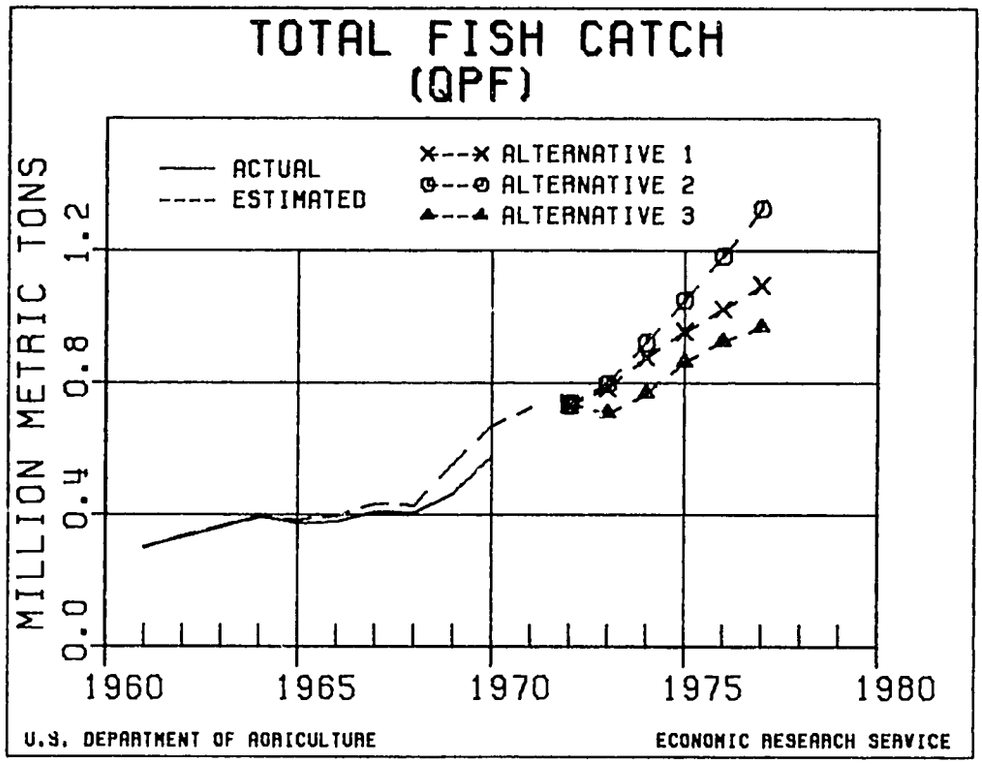

Figure 16

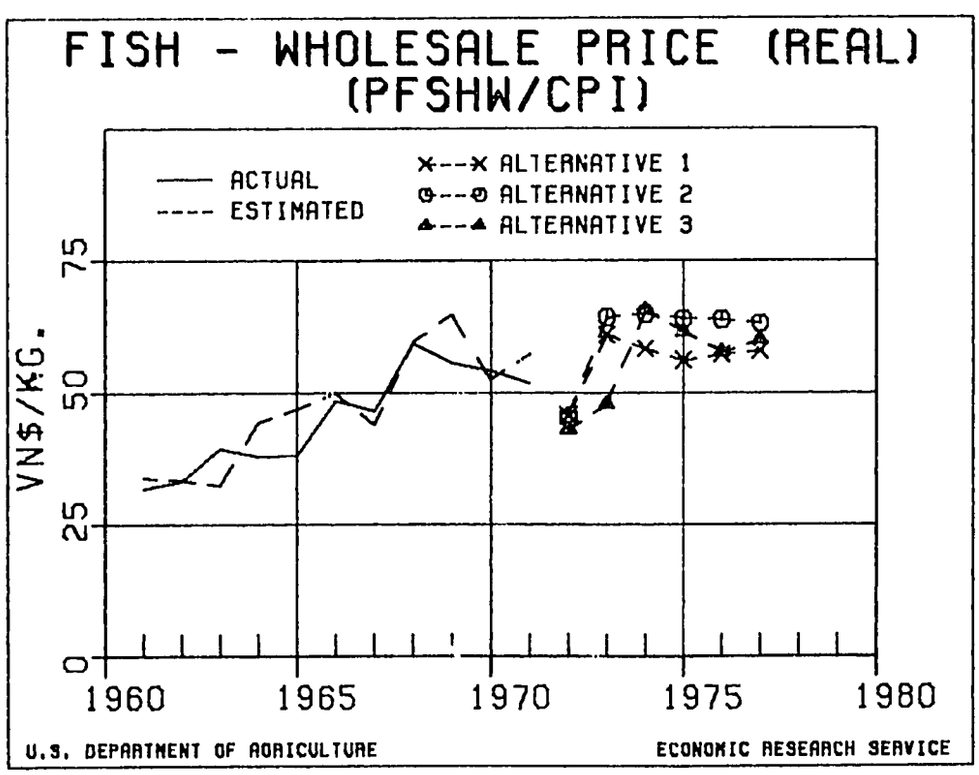

Figure 17

HOG SUPPLY-DEMAND RELATIONSHIPS

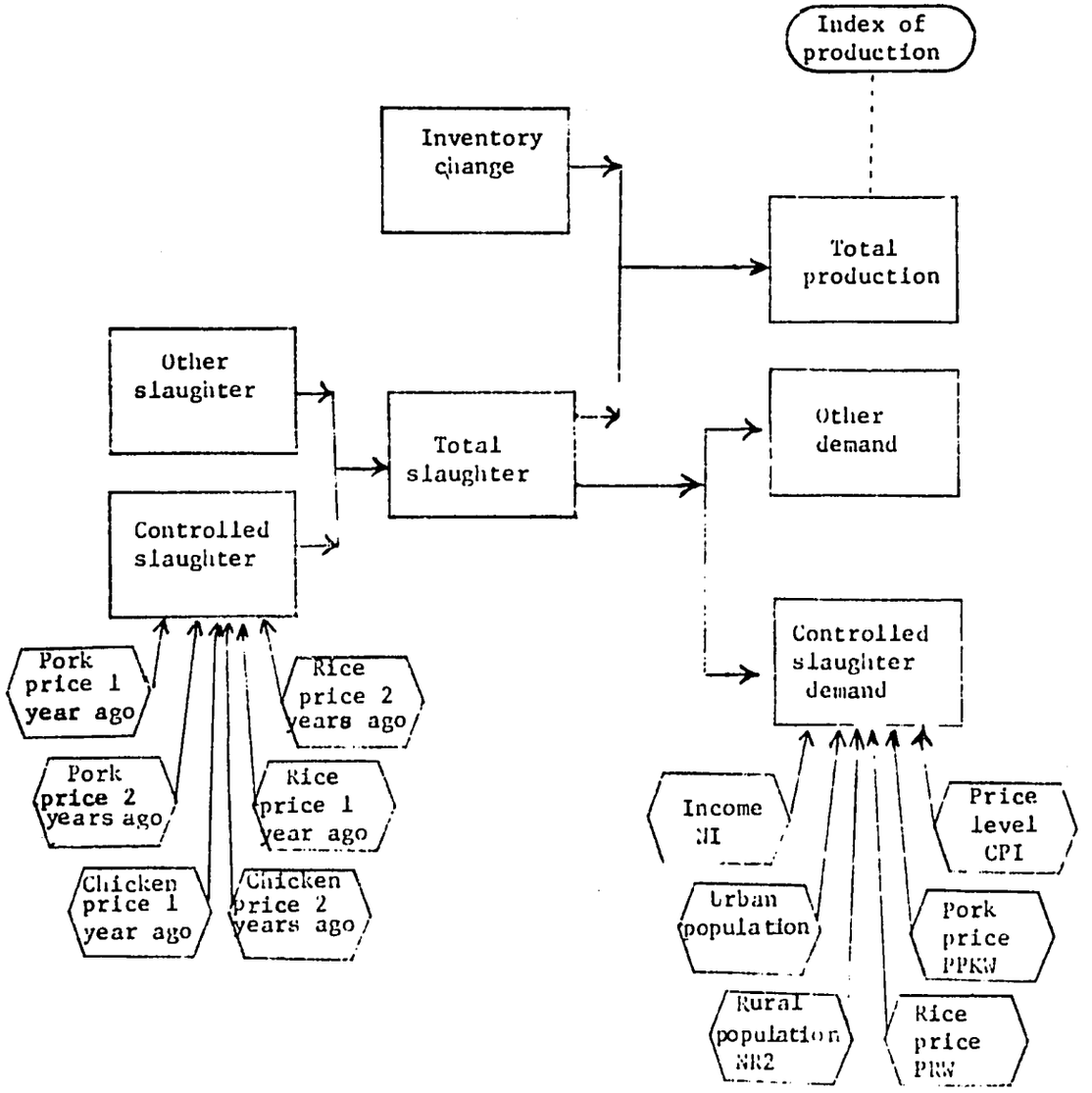

Figure 18

Variable Identification

PPKW	=	Wholesale pork price, Saigon, $VN/100 kg.
PRW	=	Wholesale rice price, #1, Saigon, $VN/100 kg.
PCKR	=	Retail chicken price, Saigon, $VN/100 kg.
QPKC	=	Controlled hog slaughter, Vietnam, million head
HI'	=	Real household income, billion 1960 $VN
CPI	=	Consumer price index, 1963 = 100
N2	=	Total population from series 2, million
NU2	=	Urban population from series 2, million
T	=	Time trend, 1960 = 60; 1961 = 61; ...etc.

Supply Analysis

Variations in controlled pork slaughter since 1956 suggest a recurring cycle of about 4 to 5 years. Controlled slaughter dropped sharply during the 1968 Tet offensive. But it appears the decline coincided with a trend toward the cyclic low point in hog production and, therefore, controlled slaughter simply dropped lower than might have been expected under more stable conditions.

Cycles in hog production can be related to the lag in producer response to cost of inputs (primarily feed) and to prices received for the product. Since it takes about a year from breeding time until hogs reach market weights under commercial operations, some 2 years pass before producers can show much response to changes in price levels in the current year.

The cobweb principle is often used in appraising producer response and lagged price effects on hog production. Quite simply, the cobweb model suggests that, because of lags in producer response to current price levels, producers tend either to undershoot or overshoot an optimum market equilibrium level. Thus, producers are caught in recurring cycles of expansion and contraction and, as a group, probably never really stabilize production. As long as entry into the production process is relatively easy, cycles may well continue.

A simple supply 10/ model was specified in which output responds to lagged producer price levels. The lagged price variable used was the ratio of pork price (PPKW) to the price of rice (PRW)--the previous year, and 2 years earlier. This is a conventional product/feed price ratio which is considered an index of prospective net returns.

10/ The number of hogs recorded under controlled slaughter was employed in this supply function, even though controlled slaughter probably accounts for only about one-third of total slaughter. Independent estimates of total hog production have been constructed taking into account improved breeding stock entry in recent years. These production estimates have been employed in index number construction but not in this analysis. Future testing of the pork sector may permit the inclusion of these estimates as well as additional supply estimates derived from retail price levels and associated elasticities.

Price ratios for chicken relative to rice were also included to reflect the influence of other livestock enterprises competing for the resources required for pork production. Since chicken has been an important competitor to pork in recent years, the lagged chicken/rice price ratio was also included in the basic supply relationship. A trend variable (T) was also included to grossly measure the apparent declining ratio of controlled slaughter to total pork slaughter in Vietnam.

The framework eventually tested assumed that net returns of sales over feed cost (PPKW/PRW) and the competition of other livestock enterprises for the factors of production (PCKW/PRW) largely describe changes in controlled slaughter.

$$QPKC = 0.963 + \underset{(1.3)}{0.072}\frac{PPKW}{PRW}-1 + \underset{(4.6)}{0.216}\frac{PPKW}{PRW}-2 + \underset{(0.5)}{0.011}\frac{PCKR}{PRW}-1 - \underset{(2.0)}{0.058}\frac{PCKR}{PRW}-2 - \underset{(1.1)}{0.15}T$$

$R^2 = .91$
D.W. = 2.202

("t" values are shown in parenthesis)

Alternative specifications of this basic supply function are shown in Appendix D.

The implied elasticities of supply with respect to the pork/rice price ratio are quite high and suggest pork production is relatively responsive to prospective returns. Moreover, the cross elasticity with respect to the chicken/rice ratio in the second year is also quite high, reflecting strong competition for feed supplies from the poultry industry. The following supply elasticities measure the response of controlled slaughter supplied relative to:

(PPKW/PRW) -1	0.4 to 0.6
(PPKW/PRW) -2	0.8 to 1.0
(PCKR/PRW) -2	-0.6 to -0.8

These elasticities, for example, indicate that a 10 percent increase in the previous year's ratio of the price of hogs to the price of rice tends to increase controlled hog slaughter in the current year by 4 to 6 percent.

Demand Analysis

The demand appraisal also considered controlled slaughter data. Although these data represent only about one-third of the total slaughter in recent years, the basic demand relationships explained reasonably well changes in wholesale pork prices. Several alternative demand formulations were tested. Of these, the relationship using the pork price (PPKW/CPI) in a dependent position as a function of rice price (PRW/CPI), controlled pork slaughter (QPKC), and total real household income (HI') was selected. Slaughter and income were expressed as totals rather than per capita terms because it appeared that the increase in population was probably about offsetting the

decline in the proportion of controlled slaughter relative to total slaughter.

$$PPKW/CPI = 1733.8 - \underset{(2.4)}{2442.4\ QPKC} + \underset{(1.4)}{2.6384\ PRW/CPI} + \underset{(2.3)}{32.534\ HI'}$$

$$R^2 = .63$$
$$D.W. = 1.836$$

Although the statistical fit (R^2) of some alternative relationships was somewhat higher, this particular relationship was used in the overall model because the elasticities, particularly the relationship to income, appeared to be more in line with expectations.

The demand relationship shows the expected negative relationship between controlled slaughter and prices. The price of rice, the major food item, shows a significant positive effect on pork prices. The effect of household income is positive, as expected, but income does not appear to have as much impact as indicated by the cross-section consumer expenditure data.

The implied elasticities of demand are somewhat higher than those for developed countries, indicating a ready and willing domestic market for much of Vietnam's domestic pork production. Although the income elasticity from the time series is somewhat lower than the cross-section data, the important income effects are still evident. Demand elasticities relative to selected variables summarized from the time series analysis are as follows:

PPKW/CPI	-0.5 to -0.7
PRW/CPI	0.1 to 0.2
HI'	0.5 to 0.6

Therefore, a 10 percent increase in the price of hogs, adjusted for price level change, is associated with a 5 to 7 percent decline in the consumption of controlled hog slaughter.

Situation and Near-Term Prospects

Estimates of controlled hog slaughter for 1972 indicated a slight decline from the 1971 total, or about 1 million head. Controlled slaughter for Vietnam averaged just over 1 million head for the 1960 to 1970 period, although total pork production has probably been increasing. Production estimates for pork, based largely on inventory numbers and increases in improved breeding stock, have apparently increased 8 to 10 percent annually in recent years. This appears reasonable in the perspective of relatively stable real wholesale prices for pork since 1968 and the changes in household income, i.e., consumer purchasing power.

Illustrative Projections to 1977

The supply relationship generally explains much of the change in controlled slaughter for the 1960 to 1970 period. Even the fairly large drop in slaughter in 1968 is estimated reasonably well by the price ratios and other variables. However, the demand (price) equation does not explain all of the annual changes in price. Much of the uptrend in the real price (adjusted for the price level) is explained, but several turning points are missed. However, the demand equation appears to do an adequate job of tracing major changes over time.

Projections of controlled hog slaughter and associated wholesale pork prices were computed under three sets of assumptions for the 1973-77 period. In addition to these assumptions which were outlined on page 4, other major assumptions for the pork sector included:

ALTERNATIVE I (fairly optimistic)

1. Chicken prices remain unchanged around 1972 levels.

2. Rice production increases with increased technology and land reclamation, although no rice surplus appears likely through 1975.

3. Per capita consumer incomes increase, but only slightly over the period.

ALTERNATIVE II (very optimistic)

1. Chicken prices remain unchanged from 1972 levels.

2. Rice production increases more than under Alternative I due to the step up in technology and land reclamation.

3. Per capita household income grows 6 percent per year.

ALTERNATIVE III (pessimistic)

1. Chicken prices remain unchanged from 1972 levels.

2. Rice production stagnates so that large rice imports are required through 1977.

3. Per capita consumer income trends downward slightly over the period.

Controlled Hog Slaughter.--Under all three alternatives, controlled hog slaughter shows little change from 1972 to 1973, and from 1973 to 1974. However, in the later years, the patterns for each alternative vary widely

depending on the interactions of pork, rice, and chicken prices (see Figure 19). For the 5-year period, 1972 to 1977, annual controlled slaughter averaged as follows:

Alternative I : 1.029 million head
Alternative II : 1.114 million head
Alternative III: 1.055 million head

Controlled slaughter under the three projected alternatives averages relatively close to the average of recent years. Apparently the larger slaughter generated under Alternative II is the result of higher pork prices associated with higher consumer incomes.

Wholesale Prices.--Under the three alternatives, wholesale pork prices (real) tend to stabilize in the 1973 to 1977 period, although prices under Alternative III remain at a relatively high level (see Figure 20). The effect of higher income through the 1973 to 1977 period tends to push up pork prices under Alternative II despite larger controlled slaughter.

Table 11.--Controlled hog slaughter and wholesale pork price projections, 1973 to 1977

Item	Unit	1973	1974	1975	1976	1977
Controlled slaughter:						
I	Mil. head	1.021	0.998	1.114	1.029	0.983
II	Mil. head	1.020	.981	1.142	1.179	1.249
III	Mil. head	1.011	.895	1.005	1.262	1.101
Wholesale price 1/ :						
I	$VN/100 kg.	45,000	44,500	43,000	44,500	45,500
II	$VN/100 kg.	47,500	49,500	49,000	49,500	49,500
III	$VN/100 kg.	38,500	48,000	45,500	42,500	45,500

1/ Expressed in terms of 1972 prices assuming the 1972 wholesale pork price in Saigon at 30,160 $VN/100 kg.

Summary and Implications

Testing the existence of a hog cycle as related to the cobweb theorem indicates the existence of a hog production cycle. Because of the 1- and 2-year lags of the pork/rice price ratio affecting pork slaughter, economic factors from an earlier period can influence production prospects for a nearby period. Or, supply is virtually fixed in the current period and, therefore, largely determined by price movements in earlier periods.

Little statistical evidence could be found concerning direct effects of security situations on pork slaughter. However, security situations may well have accentuated movements in the production cycle.

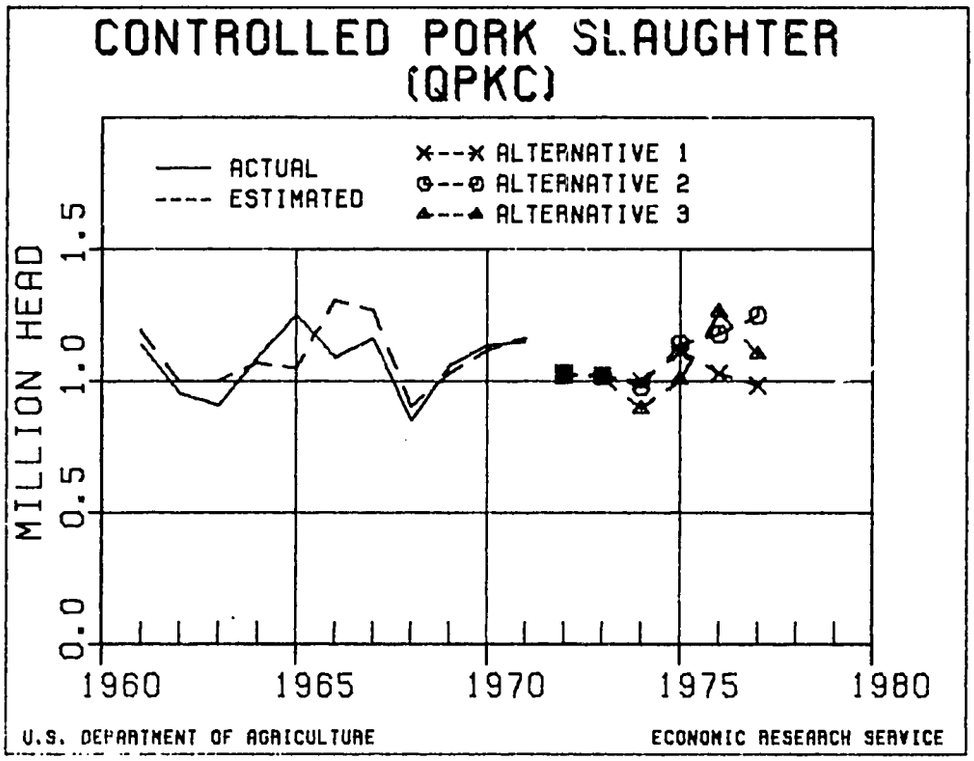

Figure 19

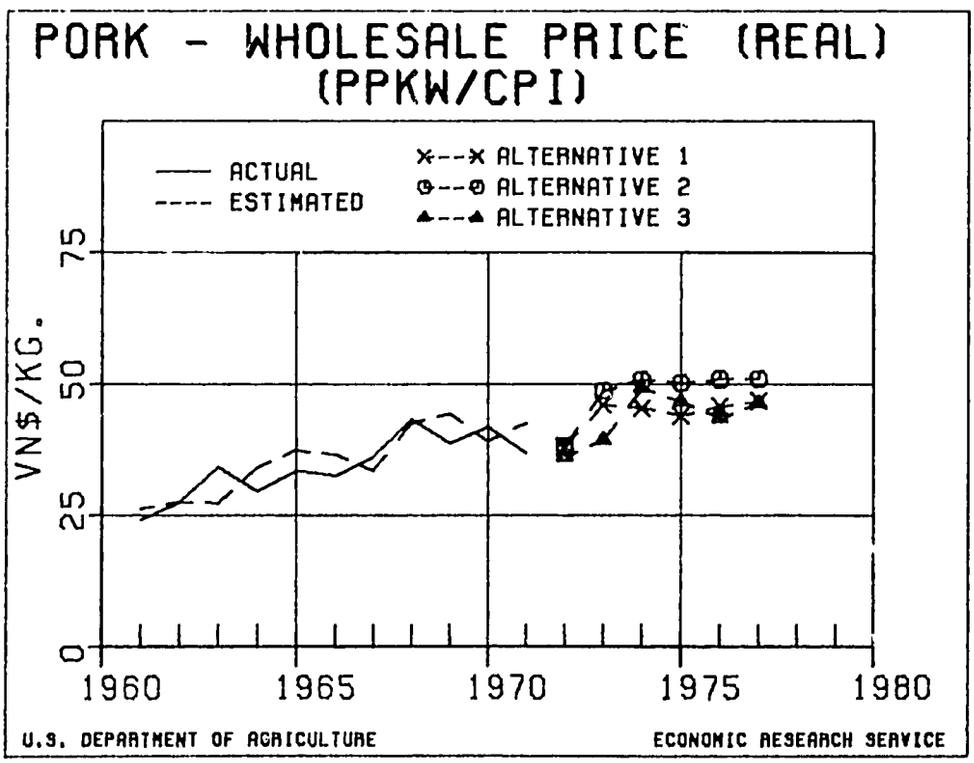

Figure 20

The estimated demand relationships indicate the theoretically expected sign on pork prices relative to demand (i.e., negative), and positive relationships with competing foods. Increases in consumer income also exert strong positive impacts on the demand for pork, a result consistent with the independent cross-section analysis.

Demand analyses for livestock and the urban cross-section data on consumer expenditures demonstrate a very strong consumer demand for chicken and pork, even stronger than for fish, although fish is more important in total in the diet. A growing economy with rising consumer income will result in a strongly expanding domestic market for poultry and pork, thus increasing pressures to expand hog production. This, in turn, increases the demand for feed. Since th economy may continue well below self-sufficiency in feed grains, it may be difficult for livestock production to meet expanding domestic markets. Export prospects appear dim, at least until feed production can be increased substantially.

As with other commodity analyses of Vietnam's agriculture, the supply/demand investigation of the controlled pork slaughter indicates the existence of market forces at work. Producers apparently do consider economic factors, and consumption of pork responds to price and income changes.

RUBBER SECTOR ANALYSIS

The purpose of this analysis is to: (1) summarize the historical record for rubber, (2) conduct a systematic statistical analysis of that historical record, (3) prepare illustrative projections of prospective future changes in the rubber sector under alternative sets of assumptions and (4) discuss the usefulness, limitations, special problems, and tentative conclusions of the study.

The historical summary provides insights into the extent and nature of rubber production and use during the last two decades. This is done by presenting tables and charts showing quantities and values for key economic variables. Many of these economic variables have been measured and published before; however, some new measures and data frameworks are presented in this report.

The statistical analysis presents a quantitative economic framework for the rubber sector. This model has been included in the overall computer program designed to estimate the level of various commodity outputs, uses, and prices, along with GNP and other macroeconomic variables.

The computer program allows the calculation of supply and demand for rubber using estimated functions for: (1) area planted in new rubber trees, (2) area from which trees have been removed, (3) yield per hectare and (4) domestic consumption. Alternatively, any or all of these functions may be disregarded and predetermined values used in the calculation, or simulation, of rubber sector developments.

Projections of rubber production and disposition are made to illustrate the use of the data and framework. Two quite different procedures are used to make short-term projections to 1978 and longer-term projections to 1990 and beyond. The GVN Rubber Development Program assumptions are used for the long-term projections, with two alternative planting programs assumed. Short-term projections are based on the most recent statistics available and some extreme assumptions about near-term changes in the rubber supply situation.

One assumption is that changes in the rubber supply can be explained, at least in part, by changes in expected profitability of long-term investment in rubber trees. Another assumption is that domestic consumption can be largely explained by the changes in national income, the price of rubber, and population.

A major problem in a quantitative analysis of rubber production is the question of appropriate variables to determine expected future profits. In this study, a special regression analysis program was used to test various combinations of current and past prices as indicators of future price expectations. This is not an unusual assumption in supply analysis, but there are many reasonable ways to include prices in such estimating equations.

Expectations and actual profits in the rubber sector have been dominated by war activities in varying degrees during the period studied. It may be argued, and perhaps rightfully, that there have been no "normal" periods in the recent past from which one can make judgments regarding rubber supply responsiveness in Vietnam. Furthermore, there appears to be a potential for substantial technological changes in production which may, if they come about, make the historical functions obsolete. Even so, the framework would still be a useful tool of analysis. Finally, it may be argued that, because of institutional conditions and relationships between plantation owners and the GVN, Vietnam will likely have rubber development by decree or not at all. The role of the government is of special importance because of its control of exchange rates, foreign trade, and the domestic rubber market.

Domestic demand for rubber is derived from the demand for various products made from rubber. Retail prices and quantities of these products were not available for analysis. Moreover, it is not known to what extent the domestic supply of these products is constrained by plant capacities or by imports, import restrictions, or other factors which will influence the reliability of the demand analysis.

Attempts have been made to deal with these problems; however, it is very rarely possible to include all the relevant variables. Nevertheless, the research reported in this report provides a foundation for systematic analyses and projections of trends in the rubber sector using modern econometric techniques.

Figure 21 provides a schematic view of the factors affecting the rubber sector, and some of their interrelationships. The large block at the top lists some of the important predetermined, or "exogenous," variables in the formal analytical model described in the next section. The arrows show the direction of influence of one variable on variables in other boxes.

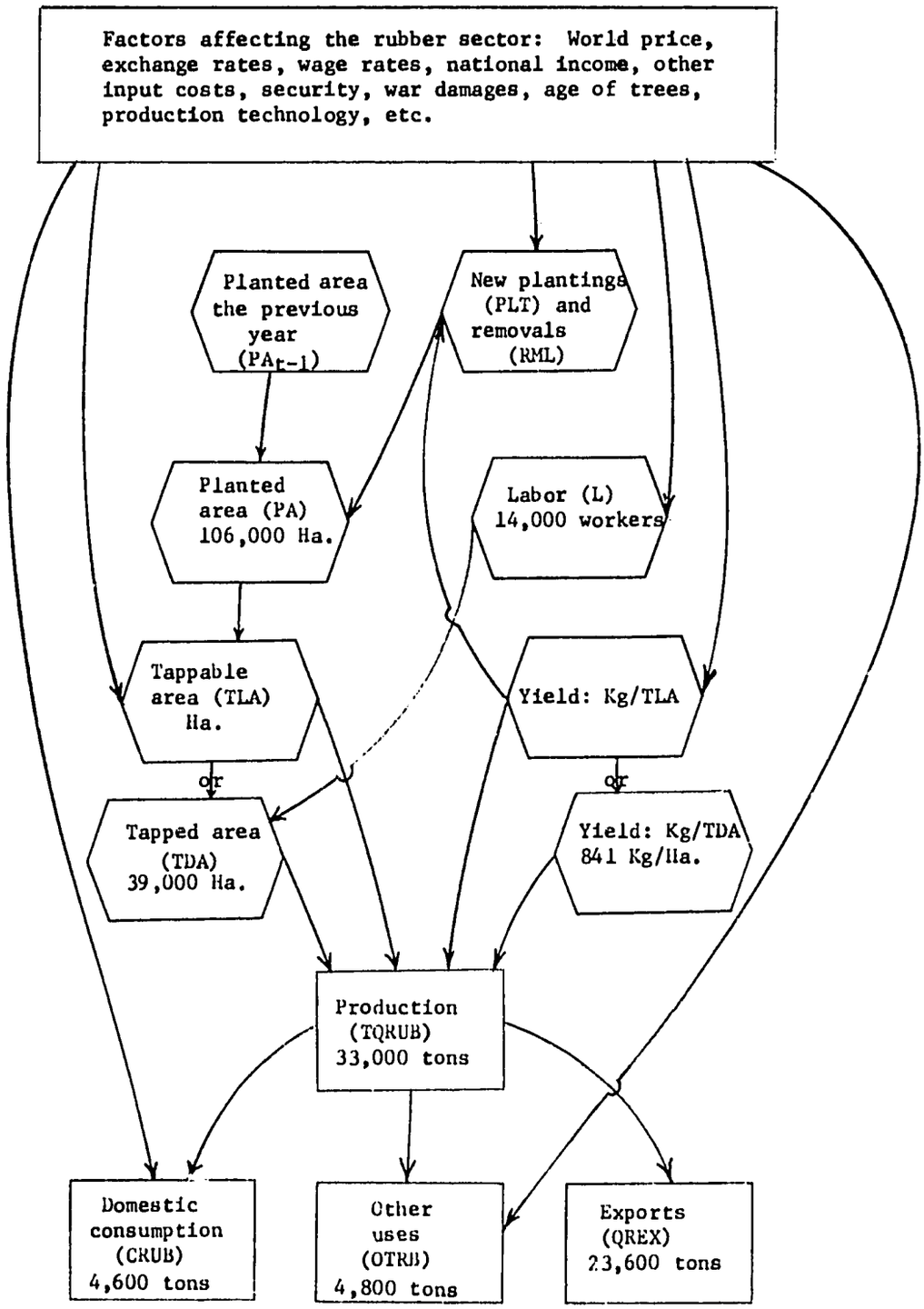
Factors affecting the rubber sector: World price, exchange rates, wage rates, national income, other input costs, security, war damages, age of trees, production technology, etc.
Planted area the previous year (PA_{t-1})
New plantings (PLT) and removals (RML)
Planted area (PA) 106,000 Ha.
Labor (L) 14,000 workers
Tappable area (TLA) Ha.
Yield: Kg/TLA
or
or
Tapped area (TDA) 39,000 Ha.
Yield: Kg/TDA 841 Kg/Ha.
Production (TQRUB) 33,000 tons
Domestic consumption (CRUB) 4,600 tons
Other uses (OTRB) 4,800 tons
Exports (QREX) 23,600 tons

Figure 21

One major variable determining production is the number of hectares on which trees capable of producing rubber are growing (tappable area--TLA). This area is largely determined by the total area planted in rubber trees (PA), the age of trees, and the extent of damage to planted trees as well as such factors as disease and weather. Planted area is affected by previous area (PA_{t-1}), current plantings (PLT), and the physical removal of rubber trees (RML). Plantings and removals are assumed to be determined, in part, by changes in long-run expectations about prices, exchange rates, input costs, yields, production technology, security conditions, etc.

With a given number to tappable hectares, changes in production (TQRUB) may result from changes in yield per tappable hectare. This concept of yield is, by definition, affected by the percentage of tappable area that is actually tapped (harvested or exploited area--TDA) and the maximum potential yield of existing trees. Maximum yields depend on the age and kind of tree, both of which can change over a long period.

The percentage of the total area tapped and the yield per tapped hectare probably depend largely on the profitability of combining labor, available land, and other inputs in the harvest of rubber from the existing trees. Profitability is, in turn, determined by market prices for rubber, wage rates, other costs, and production technology.

Exports of rubber depend on the excess of production over domestic utilization. Domestic utilization depends on the market price for rubber, population, per capita income, and perhaps some institutional controls over the market.

In summary, short-run rubber production is basically determined by existing planted area, potential yield, and factors which make yield less than the maximum potential. Removals and yield are influenced by rubber technology, world rubber prices, and national economic factors such as input prices, wage rates, and exchange rates. Domestic production is divided between exports and domestic use depending on world prices and the strength of world demand compared with consumer demand and the domestic market for rubber. In the long run, production and exports will be influenced by changes in planted area in response to technological changes and expectations of profitability. Increases in tappable area will reflect plantings some 7 years earlier and current tree removals.

Basic Equations and Variable Identification

(1) QREX = TQRUB - CRUB - OTRB

OTRB = "other uses of rubber"

(2) CRUB = f(T60, PRBD, RNIP) · N_2

(3) TQRUB = KR · QRUB

(4) QRUB = TLA · YRUB

(5) YRUB = f($PRBF_{t-i}$, WRUB, T51, DY)

(6) TLA = TLA_{t-1} + PLT_{t-7} - RML - OATA

(7) PLT = f($PRBP_{t-i}$, NY, DP)

(8) RML = f($PRBP_{t-i}$, T51)

OATA = "other adjustments to tappable area"

Further explanation of these equations, keyed to the numbers in parenthesis, follows:

(1) Quantity of rubber export = total production - consumption - other uses.

(2) Consumption = per capita consumption function times population.

(3) Total quantity of rubber produced = (KR) times production by large plantations.

(4) Rubber production by large plantations = tappable area times yield.

(5) Yield per tappable hectare function.

(6) Tappable area = previous tappable area + new seven year old tree area - removals - other adjustments.

(7) New plantings function.

(8) Removals function.

Further identification of the independent variables used in the equations follows:

T60	=	A series of numbers (time) = 1, 2, 3 .. (1960 = 1).
PRBD	=	Wholesale price of rubber in Saigon deflated by the consumer price index.
RNIP	=	Real national income per capita.
N_2	=	Population based on reports of provinces and municipalities.
KR	=	Ratio of total production to production by large plantations.
$PRBF_{t-i}$	=	Current and lagged values of the f.o.b. Saigon export price of rubber.
WRUB	=	Rubber cutters' daily cash wage rate.
T51	=	A series of numbers (time) = 1, 2, 3 .. (1951 = 1).
DY	=	Dummy variable for the yield function.
$PRBP_{t-i}$	=	Current and lagged values of the ratio of the f.o.b. export price to the wage rate multiplied by expected yield.
NY	=	Expected yield equal the trend value of actual yield.
DP	=	Dummy variable for plantings function.

Table 12 summarizes the rubber supply and demand functions. The theory behind the estimated equations for these functions, together with a discussion of the interpretation, usefulness, and problems associated with use of the estimated relationships follows. Figures 22 to 25 show the actual historical values of the functions as well as the values predicted using the estimating equations.

Table 12.--Rubber supply and demand functions 1/

Plantings for large plantations (PLT), 1951-64

$$PLT_t = -.8475 + \underset{(1.2)}{1.25}\ PRBP_t + \underset{(1.1)}{.28}\ PRBP_{t-1} - \underset{(.3)}{.07}\ PRBP_{t-2} + \underset{(1.0)}{.21}\ PRBP_{t-3} + \underset{(2.9)}{1.11}\ PRBP_{t-4} + \underset{(4.1)}{6.72}\ NY_t + \underset{(9.3)}{1676}\ DP_t$$

$R^2 = 94$ dw = 2.31 NY = expected, or normal, yield per tappable hectare.

DP = 0,1,2, dummy variable.

Removals for large plantations (RML), 1951-69

$$RML = 4253 - \underset{(3.6)}{4.7}\ PRBP_t - \underset{(1.7)}{.5}\ PRBP_{t-1} + \underset{(4.0)}{1.4}\ PRBP_{t-2} + \underset{(4.1)}{1}\ PRBP_{t-3} - \underset{(3.3)}{1.6}\ PRBP_{t-4} - \underset{(1.7)}{117}(T51)$$

$R^2 = 61$ dw = 2.46 T 51 = 1,2,3, ... 1951 = 1.

Yield for large plantations (YRUB) 1951-69

$$YRUB = 244 + \underset{(4.3)}{7}\ PRBF_t + \underset{(5.7)}{6}\ PRBF_{t-1} + \underset{(6.3)}{5}\ PRBF_{t-2} + \underset{(5.3)}{4}\ PRBF_{t-3} + \underset{(3.6)}{2}\ PRBF_{t-4} + \underset{(1.4)}{1}\ PRBF_{t-5} - \underset{(.1)}{1}\ PRBF_{t-6} + \underset{(.1)}{.2}\ WRUB + \underset{(8.4)}{34}(T51)$$

$$- \underset{(12.1)}{249}\ DY.$$

$R^2 = 99$ dw = 2.61 WRUB = rubber cutters wage rate. DY = 0,1,2,3,4,5 dummy variable

T 51 = 1,2,3 .... 1951 = 1.

Per capita domestic consumption (PCRB), 1960-70

$$Ln\ PCRB = - 14.4438 + \underset{(2.1)}{1.4832}\ Ln\ RNIP - \underset{(1.1)}{.3187}\ Ln\ PRBD + \underset{(3.3)}{.1218}\ (T60)$$

$R^2 = 93$ dw = 1.40 RNIP = real national income per capita

T 60 = 1,2,3 .... 1960 = 1. Ln indicates natural logarithms.

1/ Rubber price variables are: PRBP = (PRBF/WRUB) X NY and PRBD = PRBW/CPI-X (see list of variables). Numbers in parenthesis are $_t$ statistics.

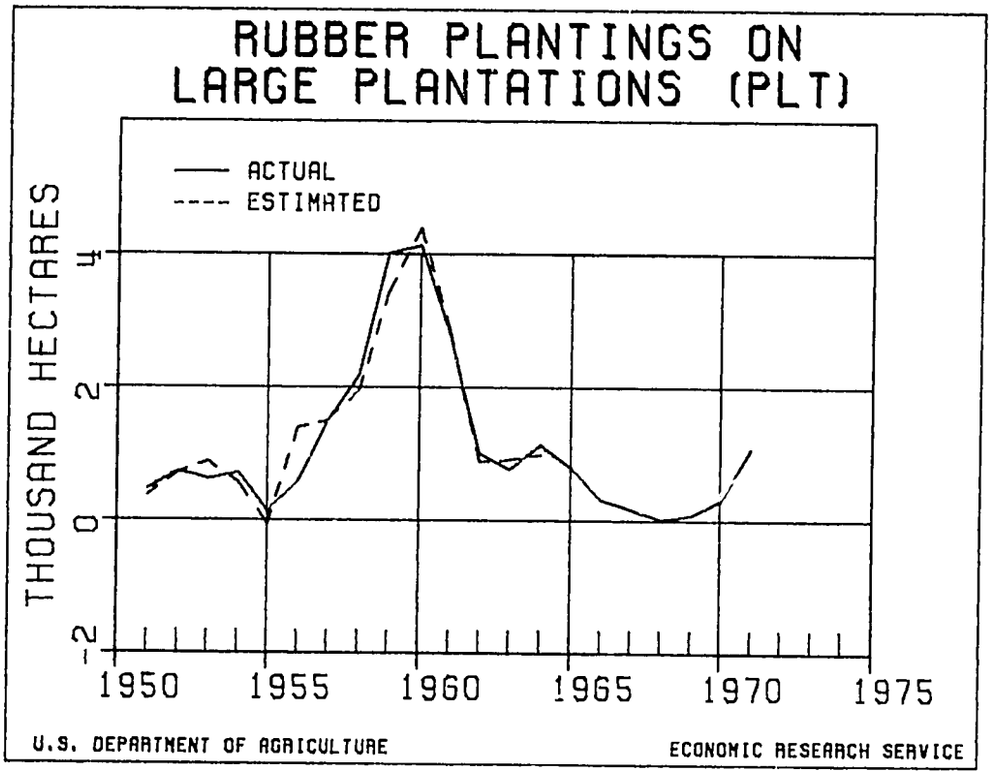

Figure 22

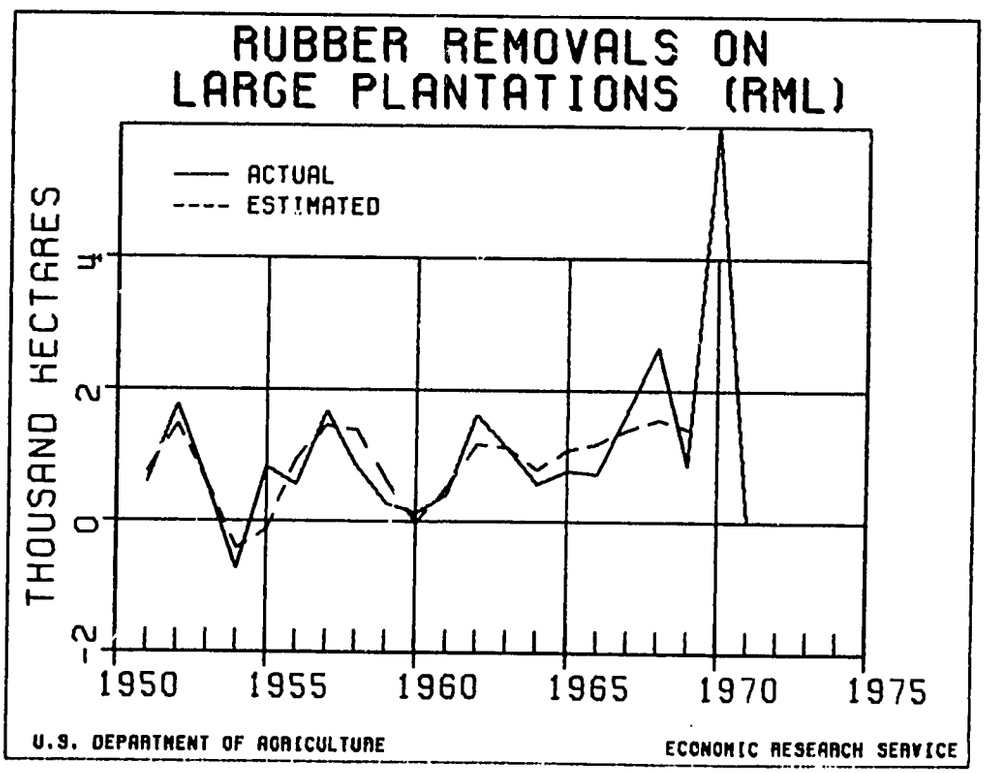

Figure 23

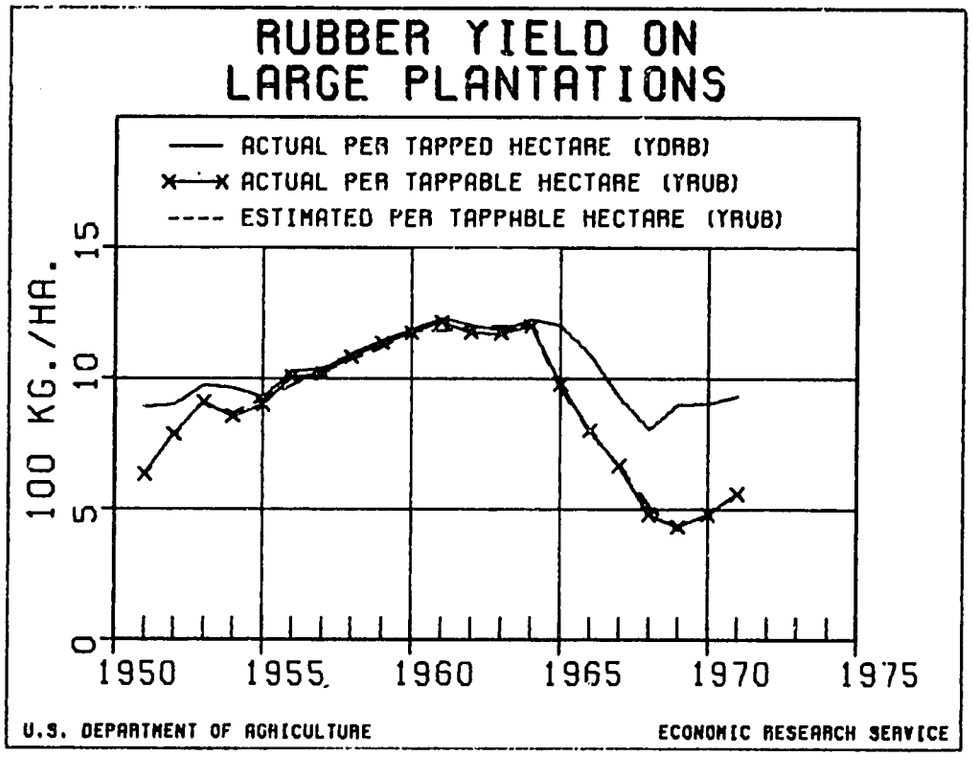

Figure 24

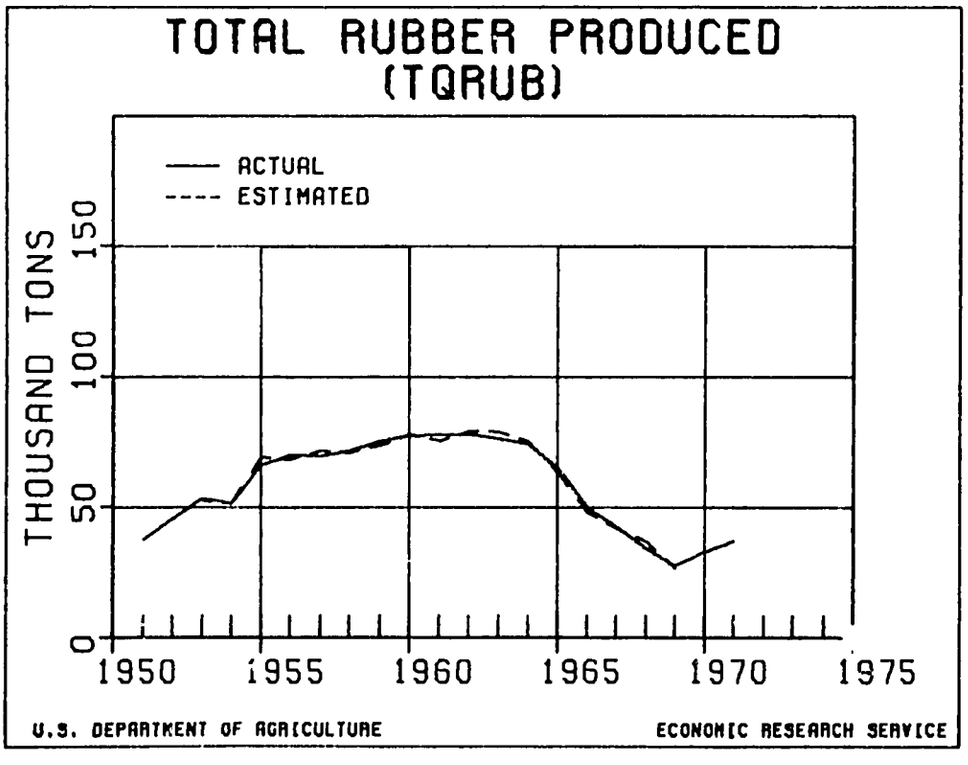

Figure 25

Computer programs operational in Washington and in Saigon are available to estimate multiple regression coefficients for the linear functions specified. A standard "ordinary least squares" program was used to perform transformations on the basic data, do preliminary analysis, and estimate the consumption function. This program is discussed in Appendix I.

A "polynomial distributed lag regression" program, discussed in Appendix I, was used to estimate the plantings, removals, and yield functions because these included several period lags as well as current values of certain variables. The program computes ordinary least squares estimates of the coefficients subject to constraints set up by the analyst relating to: (1) the number of lagged values of exogenous variables assumed to influence the current value of the dependent variable, and (2) the mathematical relationship between the coefficients for the various current and lagged exogenous variables.

A specification of the number of lagged variables to be considered and the degree of the polynomial determines the general mathematical form of what is known as the "lag structure." The polynomial restriction in the program might require, for example, that the regression coefficient for the variable lagged i periods (B_{t-i}) be:

$$B_{t-i} = a + b\,i + c\,i^2$$

In this case, the "lag structure" is based on a polynomial of degree 2 (a quadratic form).

The advantages of this special program arise because, quite often, a number of lagged values for certain variables logically influence the dependent variable and multicollinearity problems arise when the usual regression analysis programs are used. By placing a few restrictions on the general nature of the lag structure, the multicollinearity problems can be reduced. Also, there are often theoretical reasons for specifying a particular lag structure in advance and then testing to see if the data are consistent with the structure specified.

A number of different equations were estimated for each function using different combinations of explanatory variables. However only one equation for each function is discussed below since only one was included in the overall agricultural sector framework. The reasonableness of the individual equations in terms of economic theory was the most important criterion in choosing a "best" equation. Among those theoretically acceptable, further decisions were made based on the ability of different equations to predict the historical record, statistical significance of coefficients, and absence of serial correlation.

Supply Analysis

Total rubber production (TQRUB) is derived as a multiple of the production on large plantations (QRUB) since information was incomplete for small producers. The output of large plantations is computed as the product of the hectares of "tappable" area (TLA) and the yield per tappable area

(YRUB--see equation 4). The tappable area in a particular year (TLA_{t-1}) is defined as the previous year tappable area (TLA_{t-1}) plus the number of hectares of new 7-year-old trees coming into production (PLT_{t-7}--see equation 7), less reductions in tappable area due to the physical removal of trees (RML--see equation 8) plus "other adjustments to tappable area" (OATA) resulting from extreme damage or extreme age (see equation 6).

Available statistics for large rubber plantations (those with 500 or more ha.) provide a measure of planted area (PA), tapped area (TDA), and tappable but not necessarily tapped area (TLA), as well as new plantings (PLT) by area and year planted. Assuming that the change in planted area ($\Delta PA_t = PA_t - PA_{t-1}$) is equal the difference between new plantings (PLT_t) and removals (RML):

since $\Delta PA_t = PLT_t - RML_t$,

then $RML_t = PLT_t - \Delta PA_t$.

In this manner, available statistics permit derivation of a time series for RML. Given a measurement of TLA, PLT, and RML:

since $TLA_t = TLA_{t-1} + PLT_{t-7} - RML_t - OATA_t$,

then $OATA_t = PLT_{t-7} - RML_t - (TLA_t - TLA_{t-1})$

or $OATA_t = PLT_{t-7} - RML_t - \Delta TLA_t$.

Note that the tappable area identity assumes that 100 percent of RML involved removal of trees that were still physically tappable while OATA is included to allow for the possibility that some trees may shift from the tappable to the untappable category without being removed. The latter possibility implies that some removals may not, in fact, involve a reduction in tappable area contrary to the assumption in the identity. There is no way to eliminate this inconsistency without additional detailed accounting information from rubber producers' records or other sources.

The implication of the above inconsistency for projections using the rubber model is that, even if removals are accurately predicted, changes in tappable area year by year may be incorrectly predicted unless the necessary information on tree conditions and removal plans are known in advance. As an example, the 1963-68 cumulative total for OATA was 7,933 ha. This could have been due to war damages or extreme age. Whatever the cause, projections into the future should be made with an awareness that removals up to 7,933 ha. might occur without any further reduction in tappable area than had already occurred by 1968.

Plantings and Removals Theory

Planting new trees and removing old ones involves an investment of time and money in anticipation of income to be received from rubber sales in the future. It was assumed that, under "normal" conditions, rubber producers base

their decision to plant rubber trees on their expectation about the time pattern of income to be received during the productive years of the trees.

A long time series of expected future prices, yields, and costs is required if a present value of future income compared to initial investment cost criteria is used in deciding when to invest in rubber trees. The same kind of information is needed to make an investment decision involving either replanting old areas or expanding area planted without also removing old trees. The replanting decision is, however, complicated by the fact that removing trees for replanting means not only waiting for new trees to begin producing, but perhaps reducing current production by the act of removing a tree with some production potential left.

The above reasoning led to specification of the removals and plantings functions with current and lagged values of prices, wage rates, and yields as explanatory variables (see equations 7 and 8, page 74). These variables provide the basis for producers' expectations about future profitability of rubber production. Furthermore, these variables provide an indication of actual current and recent past net income and may, therefore, affect producers' abilities to finance further investment in rubber trees.

In addition to prices, wage rates, and yield, the plantings equation includes a dummy variable to allow for major shifts in security (DP). This variable takes on values of 1 or 2 in the years 1956-61 and zero in other periods. This was done to partially account for the very high level of plantings that occurred during this period. Time was also included in the removal equation to test the possibility of a long-term shift in removals. Preliminary examination of the removals series did not indicate that a security shifter was needed for removals, although theory indicates that removals, as well as plantings, would be affected in a similar way by war, especially if plantings involved the replanting of old areas.

The plantings equation is very satisfactory from a theoretical point of view. Increases in rubber prices and/or yield and decreases in wage rates result in an increase in the predicted plantings per year. Plantings are affected as expected yield (NY) increases and, over a period of 4 years, as the specially constructed earnings variable (PRBP) changes. Because there are four lagged values of PRBP in the equation, a one-time change in PRBP will not have its full effect on annual plantings until the fifth year.

It is essential to include the dummy variable, DP, in the plantings equation to account for the apparent favorable change in conditions from 1956 to 1961. This variable has a value of 1.0 for 1961 and 1956 through 1958, and a value of 2.0 in 1959 and 1960. In 1961, plantings are estimated to have been 1,676 ha. higher than they would have been if the situation on rubber plantations had been as poor as it was before 1956 or after 1961. Plantings in 1962 were estimated 3,352 ha. larger as a result of the favorable situation that year.

The only real problem associated with using the plantings function is that one must decide what value to give the shifter (DP) in making projections. It

can be assumed that the situation can never be any better than it was in 1959 and 1960; therefore, under "peaceful" or "normal" conditions, DP = 2 is the best we can expect. This is, of course, a matter of judgment. If there is considerable optimism regarding the future economic situation, in a given year, many more hectares could be planted than would be indicated by this function when the shifter DP = 2.

In the removals function, it is difficult to know what signs to expect because the removals theory is complicated by the fact that removals may involve a temporary loss in production as well as an investment.

The negative sign on earnings variable (PRBP) is consistent with the theory in that it is profitable to reduce annual removals when the current price is high. However, the expected sign for the sum of the PRBP coefficients is negative (-4.7 - .5 + 1.4 + 1.0 - 1.6 = -4.4), which would be inconsistent with a program of replanting trees as they become too old since higher prices eventually result in an increase in number of hectares to be replanted. It may be that more lagged values need to be specified for this function, which would hopefully result in estimates suggesting increased removals in the long-run when prices trend upward.

The combined negative effect of price and the negative sign for the time variable does fairly well in predicting history, but it would not be reasonable for long-term projections.

Yield Theory

Yields per tappable hectare are primarily a function of the actual number of hectares tapped and the variable inputs per hectare. The quantity of inputs depends mainly on variations in expected prices and costs, which are, in turn, determined largely by current and recent past values. Rubber trees are tapped throughout the year so current yields may be influenced by current prices. Past prices may also affect current yields if adjustments in inputs per hectare in previous years also affect inputs per hectare in the current year.

The above reasoning led to the functional specification for yield shown in equation 5, page 74. In addition to prices and wages, time was included to account for a possible trend, and a dummy shift variable was included to account for the devastating effect of the continuation of hostilities and subsequent labor shortages in the latter 1960's. The dummy variable took increasing values of 1, 2, 3, 4, and 5 beginning in 1965.

Positive signs for price coefficients in this model are consistent with theory and indicate that current price is much more important in explaining current yield than are past prices. The first four lagged prices do have an important effect on yield, however, which indicates yield adjusts to prices and returns in earlier years.

The equation predicts rising yields as wage rates increase, other variables held fixed. This is consistent with the notion that increased labor costs

(or shortages) result in the tapping of only the best trees, which could increase yield per tapped hectare as well as yield per tapper. However, it is possible that yields per tappable hectare would decline in this case because a smaller percentage of tappable area would be actually tapped.

The dummy variable was included to reflect the accumulative effect of continued hostilities on yields. The variable DY takes on increasing values beginning in 1965. By 1969 less than half the tappable area was being tapped, presumably because of labor shortage and security problems.

Setting the DY variable at 5 in 1960 reduces yield by 1,245 kg./ha. (5 x 249), which is more than the historical record for Vietnam. With DY set at zero, the equation predicts 1969 yield of 1,664 kg./ha., which is probably more than the maximum potential of currently planted trees. This fact, plus the positive time trend, makes this equation questionable for use in long-term projections.

Demand Analysis

In the model outlined earlier in this section, South Vietnam's total rubber production (TQRUB), based mainly on the production by large plantations (equation 3), is divided among domestic consumption (CRUB), exports (QREX), and other uses (OTRB) as shown in equation 1. Statistics were available for domestic consumption, exports, and total production. An explanation of "other uses of rubber" follows.

"Other uses of rubber" (OTRB) was measured as a residual equal to the excess of production over reported domestic consumption and exports. Conceptually, this residual would equal net inventory accumulation less imports based on a standard supply utilization balance equation in which supply (production plus imports plus beginning inventory) is equal to utilization (consumption plus exports plus ending inventory). The estimates of OTRB derived as a residual (see Appendix Table E-2) imply that there were large fluctuations in inventories before 1962 and a continuous increase in inventories from 1962-1970.

Results for the 1962-1970 period indicate that there is probably an inconsistency in the consumption, production, and export statistics since such a continuous increase in inventory seems unreasonable. In the Vietnam economic profile (page 144) consumption was derived as a residual using monthly statistics on inventory levels to estimate beginning and ending inventories for 1970. This procedure results in a consumption series different from the reported one without eliminating the need for OTRB. The decision was made to estimate the per capita consumption function based on the reported consumption of natural rubber and include the unexplained residual OTRB as a value to be assumed exogenously when making projections. This is not very satisfactory and further study of rubber statistics should bring about a more adequate reconciliation.

Domestic Demand Theory

The demand for rubber for domestic consumption is a derived demand. Producers of rubber products probably buy rubber in response to changes in the price of rubber products relative to the wholesale price of rubber and other input costs. This response may be limited by plant capacity in a given year. Furthermore, the retail price of these products may be affected by imports or import controls. Since the quantities and prices of these rubber products were not available from published basic sources, the demand analysis was built around variables for which information was available (see equation 2).

A demand function may be rationalized in which time (T60), wholesale price of rubber (PRBW), the consumer price index (CPI-X), and real per capita national income (RNIP) are explanatory variables for per capita consumption (PCRB). If both wholesale and retail prices are not affected by domestic demand conditions because of a perfectly elastic supply of rubber products, the per capita domestic consumption may be:

PCRB = f(PRBW/CPIX, RNIP, T60)

This assumes PRBW/CPIX is a valid proxy for the retail price of rubber products relative to other goods, and that T60 is a reasonable demand shifter.

World supply and demand conditions in this framework are exogenous outside forces which determine retail rubber product prices as well as wholesale prices of rubber. Either increased imports of rubber products or increased domestic production of these products are assumed to adjust in such a way that domestic prices equal world prices.

An alternative possibility is that the aggregate supply (and therefore per capita supply) of these products is not perfectly elastic. Per capita supply is a function of retail prices, wholesale prices (PRBW), other input prices, and a supply shifter (T60). The retail price of rubber is a function of per capita consumption (PCRB), income (RNIP), other prices (CPIX), and a demand shifter (T60).

If a retail-price-dependent demand function is substituted into the supply function, the reduced form PCRB predicting equation for per capita consumption has the same explanatory variables as before, but the interpretation is different. In this function the elasticity with respect to income, for example, is a "total" elasticity instead of the popular partial income elasticity of demand. Also, although the expected sign of the coefficient for T60 is positive in either case, the expected sign for CPIX (and therefore for PRBW/CPIX) is not determined by the theory.

The function for per capita domestic rubber consumption has no apparent problems but did predict 1966 consumption well below actual consumption in that year. This constant elasticity function indicates that, during 1960-1970, per capita consumption, on the average, increased at about 12 percent (continuously compounded). In addition, it increased 1.5 percent for each percentage point increase in real national income per capita. Furthermore,

the decrease in the wholesale price of rubber relative to the consumer price index increased consumption, on the average, 3 to 4 percent for each percentage point decrease in the price relative. In this function, increases associated with the passage of time (T60) could arise either from shifts in supply or demand, or both, if the equation is interpreted as a reduced form predicting equation.

Any exogenous annual rate of change can be introduced into the demand function by using only a fraction of the value of T60 that would occur if T60 were increased by one each year. Thus, if T60 in 1971 is specified as 11.5 instead of 12, the rate of change for that year is about 6 percent instead of 12 percent. To eliminate the annual shift, hold the value of T60 constant.

Export Demand Theory

In this model, wholesale prices and export prices are assumed to be determined independently of rubber production and inflation in Vietnam. Both prices are assumed to be determined, in a given year, by the combined effect of world natural rubber supply and demand and a predetermined GVN exchange rate policy.

Vietnamese production is considered too small to affect world prices; therefore, the demand for their rubber for export is perfectly elastic. All that is produced can be sold at the world price. This framework assumes that GVN exchange rate policy could affect rubber production only in the long-run, and that current exchange rates would not be affected by current production levels. However, due to the ability to hire labor and vary yield per tappable hectare, current exchange rate policy could conceivably affect current production. Nevertheless, the exchange rate was assumed to be an exogenous predetermined variable in the model.

The functions reported here were estimated using the published f.o.b. Saigon export price rather than the "piaster yield to exporters." However, the piaster yield more closely represents the price received by producers and should be used in future analysis and projections work.

Situation and Near-Term Prospects

A combination of low prices and low production estimated an all-time low value of rubber exports in 1972--$6.6 million. This compares to $10.4 million exports in the low production year of 1969. No change in the value of exports is projected for 1973 under an optimistic projection of rubber production.

Production in 1972 optimistically estimated around 32,000 to 32,500 M.T., assumed the low 1970 yield of 479 kg. per tappable hectare. If the 803 hectares of trees planted in 1965 survived and were tappable in 1972, tappable area could have been the highest since 1951--50,377 hectares. With consumption and other domestic use equal to 7,600 M.T., indicated exports in 1972 could have amounted to 24,900 M.T. worth $6.6 million at a projected low export price of $.2645/kg.

Yields in 1972 were estimated to be low because a smaller percentage of tappable area will likely be tapped due to increased hostilities. If the expected 803 hectares increase in tappable area failed to materialize, the lower production estimate of 32,000 was implied. Actual damages to existing trees and reductions in tapped area could have a considerably larger effect on output than suggested here. Therefore, production of 32,000 M.T. may be optimistic.

Historical Perspective

Changes in rubber production on large plantations have occurred primarily because of variations in yield per tappable hectare. Yield increased from 633 kg./ha. in 1951 to a record of 1,215 kg./ha. in 1961 and then declined to a low of 432 kg./ha. by 1969. During this time, tappable area remained almost constant at 58,000 to 59,000 ha. The stability of tappable area is deceptive, however, because there was a gross increase in potentially productive area of 20,087 ha. between 1953 and 1969 due to new plantings in the years 1946 to 1962. Removals amounting to 13,222 ha. offset about two-thirds of this gross increase and "other adjustments to tappable area" (OATA) offset most of the rest (Table 13).

Total rubber production increased from the 1969 low of 27,650 M.T. to 37,000 M.T. in 1971--the highest level since 1967. This resulted in an estimated export of 29,600 M.T., worth $9.4 million at the f.o.b. Saigon price of $.3172/kg. (RSS #1 quality French Franc area). This dollar value of exports is slightly lower than the $10.4 million for 1969, despite the increased production, because domestic use increased somewhat and the export price declined.

Production increased from the previous year level in both 1970 and 1971. This was due to increases in the tappable area and the yield per tappable hectare. Yield increases resulted from (1) increases in the percent of tappable area actually tapped from 48 percent in 1969 to 60 percent in 1971, and (2) a slightly higher yield per tapped area--934 kg./ha. in 1971. Tappable area increased because previously planted trees reached their seventh birthday during this time. This effect was partially offset by the replanting of old areas in 1971, which resulted in a decline in tappable area for 1970.

From 1951-69, the annual average level of the key supply variables were: new plantings (PLT) = 1,164 ha.; removals (RML) = 974 ha.; OATA = 395 ha.; and yield (YRUB) = 927 kg./ha. Removals per year (excluding an unexplained negative for 1954) ranged from 118 to 2,656 ha. Plantings had a range from 12 to 4,131 ha. per year. OATA had values ranging from -736 to 2,998 ha./yr. and, as stated previously, yield varied from 432 to 1,215 kg./tappable hectare.

Production on large plantations ranged from a high of 70,832 M.T. in 1961 to a low of 25,147 M.T. in 1969. This historical low for 1969 is partially due to the fact that only about 48 percent of the tappable area was tapped and that potential increases in tappable area amounting to 6,709 ha. were offset by "other adjustments to tappable area" (OATA) during the period 1953 to 1969. Total production on large and small plantations combined was 27,650 M.T. in 1969, or 10 percent larger than large plantation production alone.

Table 13.--Selected rubber statistics

Item	Variable name	1969 1/	1970 2/	1971 2/
Large plantations only				
1. Planted area (ha.)	PA	69,955	63,629	64,713
2. New plantings (ha.)	PLT	75	307	1,085
3. Change in area planted (ha.)	ΔPA	-777	-6,326	1,084
4. Removals, line 2 - line 3 (ha.)	RML	852	6,633	1
5. Tappable area (ha.)	TLA	58,175	56,580	59,574
6. New 7-year-old area (ha.)	PLT-7	1,002	764	1,125
7. Change in tappable area (ha.)	ΔTLA	337	-1,595	2,994
8. Other adjustments to tappable area, 6-4-7 (ha.)	OATA	-187	-4,274	-1,870
9. Production (M.T.)	QRUB	25,147	27,083	33,220
10. Tapped area (ha.)	TDA	27,972	29,956	35,554
11. Yield (kg./ha.):				
Per tapped hectare, 9÷10	YDRB	899	904	934
Per tappable hectare, 9÷5	YRUB	432	479	558
Large and small plantations combined				
12. Production (M.T.)	TQRUB	27,650	33,000	37,000
13. Ratio of total production to large plantation production, 12÷9	KR	1.0995	1.2185	1.1138

1/ From Appendix tables for rubber in this report based on published Vietnam yearbooks.
2/ From Rubber Growing in Vietnam at the End of 1971; author unknown.

In 1969, domestic use of rubber was a small but not unimportant part of total use. Reported domestic consumption of natural rubber has increased from a level of about 1,000 M.T. (.05 - .06 kg./person) in the latter fifties to a high of 4,331 M.T. (.29 kg./person) in 1966. The 1969 consumption of 4,016 M.T. (.24 kg./person) was 15 percent of total production. As previously discussed, "other uses of rubber" has become an important unknown factor which, in 1969, accounted for another 10 percent of production.

Domestic consumption and other uses of rubber in 1969 amounted to 6,819 M.T., leaving 20,831 M.T. for export. This is equivalent to $10.4 million at the 1969 f.o.b. Saigon price of 49.74 cents/kg. The U.S. dollar value of rubber exports was $50 million in the record production year of 1961. This high amount is due primarily to the fact that price that year was 20 percent higher than in 1969, or 59.9 cents/kg.

Illustrative Projections to 1977 11/

The prospects for rubber production and export earnings during the next 5 years are limited by the present planted area and the maximum potential yields for the type and age of trees now growing. A moderately optimistic projection of key variables indicates that total production could reach 67,500 M.T. by 1977. This is more than double the estimated 1972 level of 32,500 M.T. due to a projected doubling in yield per tappable hectare and a fractional increase in tappable area. The dollar value of exports is optimistically projected to increase from the estimated 1972 level of $6.6 million to possibly $15.5 million by 1977.

Tappable Area Projections.--Two alternative estimates for tappable area are derived from benchmark 1969 to 1971 estimates (Table 14). New plantings known to have occurred from 1965-1971 result in a gross increase in tappable area of 1,671 ha. by 1977 under Alternative I. 12/ Assuming removals plus OATA equal zero for the following years, tappable area increases from 59,574 ha. in 1971 to 61,245 in 1977, and then increases sharply to 62,330 in 1978. Under Alternative II, OATA and removals are assumed to exactly offset the potential increase so that tappable area is held constant at the 1971 level of 59,574 ha. This latter possibility could occur as a result of damages to plantings in 1972, for example. It is possible, of course, for fewer hectares to survive.

RML, which averaged 974 hectares/year from 1951-69, increased to 6,633 hectares in 1970. OATA averaged 395 ha./yr. from 1951-69, then became -4,274 hectares in 1970 and -1,870 hectares in 1971. This suggests that the current removals involve primarily removal of trees that were moved out of the "tappable" category without being removed in the latter 1960's. OATA in 1971, however, is difficult to explain. Since in 1971 RML = 1 hectare, the -1,870 ha. level for OATA implies trees are shifting from the untappable to the tappable category.

Projected Yield Per Tappable Hectare.--Yield increased from the 1969 low of 432 kg./ha. to 558 kg./ha. in 1971 due largely to the increase in percentage of tappable area actually tapped, which expanded from 48 percent in 1969 to 60 percent in 1971. Yield per tapped hectare increased little. Two alternative yield projections are used as explained below. Under Alternative I, the 1972 yield is assumed to be 479 kg./ha. to indicate a worsening of the conditions relative to 1971. This would increase to 1,100 kg./ha. by 1978. This assumes the new potential for trees currently planted is 1,100 kg./ha. with about 100 percent of the tappable area actually tapped. Under

11/ In many cases projected 1978 data are discussed in the narrative and the tables; because of the 7-year time lag from plantings to production, significant changes in the rubber situation cannot occur until 1978.

12/ Detailed discussions of the three alternatives assumed in this study are found on page 4.

Table 14.--Rubber tappable area and yield, large plantations only, 1969-71, and projections to 1978

Year	Plantings 7-years earlier (PLT_{-7})	Tree removals (RML)	Other adjustments to tappable area (OATA)	Tappable area (TLA) 1/	Yield per tappable hectare (YRUB) 2/
	Hectares				Kg./ha.
1969	1,002	852	-187	58,175	432
1970	764	6,633	-4,274	56,580	479
1971	1,125	1	-1,870	59,574	558
Alternative I					
1972	803	(RML + OATA = 0)		60,377	479
1973	312		"	60,689	485
1974	162		"	60,851	514
1975	12		"	60,863	600
1976	75		"	60,938	776
1977	307		"	61,245	982
1978	1,085		"	62,330	1,100
Alternative II					
Each year 1972-1978				59,574	479

1/ TLA = PLT_{-7} - RML - OATA.
2/ This is the same pattern of increases in yield assumed for the Rubber Development Program explained later.

Alternative II, the worst yield assumption, yields remain at the 1970 low level of 479 kg./ha. The implications of the above alternatives are shown in Tables 15 and 16.

Production Projections.-- Under Alternative I, the most favorable alternative specified above, production on large plantations (QRUB) would decline from the 1971 level of 33,200 M.T. to 28,900 M.T. in 1972 and then grow to 60,100 M.T. by 1977 (Table 15). Assuming an additional 12.5 percent for the small plantation contribution, indicated total production (TQRUB) in 1977 could reach 67,600 M.T. This is somewhat lower than the record 1961 production of 78,140 M.T. despite a larger tappable area, because the assumed maximum yield of 1,100 kg./ha. (compared to the 1961 yield for large plantations of over 1,200 kg./ha.) is lower. A lower yield can be rationalized on the basis of increased average age of trees.

Under the worst alternative (II), total production is projected to decline to 32,000 M.T. and to hold around that level. This is not as low as the 1969 production of 27,650 M.T. due to increases in tappable area for 1970 and 1971.

Table 15.--Rubber production, 1969-71 and projections to 1978

Year	Production on large plantations only (QRUB)		Total production (TQRUB)		Ratio, total production to that on larger plantations
	Alternative		Alternative		
	I	II	I	II	
	Metric tons				Ratio
1969	25,147	25,147	27,650	27,650	1.0995
1970	27,095	27,095	33,000	33,000	1.2179
1971	33,220	33,220	37,000	37,000	1.1138
1972	28,900	28,500	32,500	32,100	1.125
1973	29,400	28,500	33,100	32,100	1.125
1974	31,300	28,500	35,200	32,100	1.125
1975	36,500	28,500	41,100	32,100	1.125
1976	47,300	28,500	53,200	32,100	1.125
1977	60,100	28,500	67,600	32,100	1.125
1978	68,600	28,500	77,200	32,100	1.125

However, under continued bad security conditions, production could easily be much lower than 32,000 M.T.

Demand and Export Projections.--Exports are derived as the excess of production over domestic consumption and "other uses" in the rubber model. The quantity and dollar value of rubber exports based on the Alternative I production estimates and per capita consumption projections, using the estimated consumption function, are shown in Table 16.

Table 16.--Rubber domestic use and exports, 1969-70 and projections to 1978

Year	Total production (TQRUB)	Domestic consumption (CRUB)	Other uses (OTRB)	Exports (QREX)	Value of exports (EXRUS)
	Metric tons				Mil. U.S.$
1969	27,650	4,000	2,800	20,850	10.4
1970	33,000	4,600	4,800	23,600	9.6
1971	37,000	5,100	2,500	29,400	9.3
1972	32,500	5,100	2,500	24,900	6.6
1973	33,100	5,900	2,500	24,700	6.5
1974	35,200	6,500	2,500	26,200	6.9
1975	41,100	7,300	2,500	31,300	8.3
1976	53,200	8,100	2,500	42,600	11.3
1977	67,600	9,000	2,500	56,100	14.8
1978	77,200	9,900	2,500	64,800	17.1

The estimated consumption function (PCRB), working in conjunction with the Vietnam Econometric Framework, was used to compute total domestic consumption (CRUB) and exports (QREX) for 1968-1977. These estimates were then adjusted to be consistent with the "actual" consumption in 1970. This adjustment was necessary because the estimates of national income for 1968-70 were different from the national income estimates from the Bank of Vietnam used to derive the consumption function originally.

The consumption projections are affected by the fact that real per capita national income was projected to increase at an average annual rate of about 2 percent (Figure 26). Population was assumed to increase at 3 percent per year. The time trend in the consumption function was discontinued by setting the value of T60 = 11 for all projections (the 1970 value of T60 = 11).

Projected price assumptions are needed for the consumption function and later for the long-term projections using the plantings function. The 1970 f.o.b. Saigon export price of $.4054/kg. was projected to decline to $.2645/kg. based on an FAO projection that indicated a one-third reduction in world prices between 1970 and 1980. The price was already $.3172/kg. in 1971. The wholesale rubber price in Saigon was assumed to equal the piaster yield to exporters using the March 6, 1972, net exchange rate of 405.9 $VN/$US and the 1980 U.S. dollar price of $.2645. Thus, PRBW = 107.36 $VN/kg. The consumer price index was projected by the macroeconomic model to increase about 16 percent per year from 1970 to 1977.

The FAO price decline projection is based on the assumption that there will be general acceptance of yield stimulation techniques using ethylene gas by 1980. This should reduce the average cost of production which in the long run should determine price. However, in the relatively short time of 10 years (short for rubber supply analysis), world natural rubber producers may or may not be producing rubber in quantities that will be sold on the world market at the equilibrium price of 12 US¢/lb. (26 US¢/kg.). Summarizing both the FAO projections and projections by Behrman in the foreign demand section of this report, a "natural balance" in trade is projected. However, it was pointed out that a breakthrough in synthetics could cause natural rubber surpluses. A closer look at the FAO and Behrman econometric models would be required to see how much different prices could be in a specified number of years following assumed changes in technology and shifts in demand.

Using the above procedure and assumptions and extending the results to 1978, domestic consumption is projected to rise from 4,600 M.T. in 1970 (.263 kg./person) to 9,900 M.T. in 1978 (.429 kg./person). At the projected output level of 77,200 M.T., exports are projected to be 64,800 M.T. in 1978, worth 17.1 million U.S. dollars (at $.2645/kg.). The lower production projections of 32,100 M.T., discussed earlier, implies 70 percent fewer exports or 5.2 million U.S. dollars.

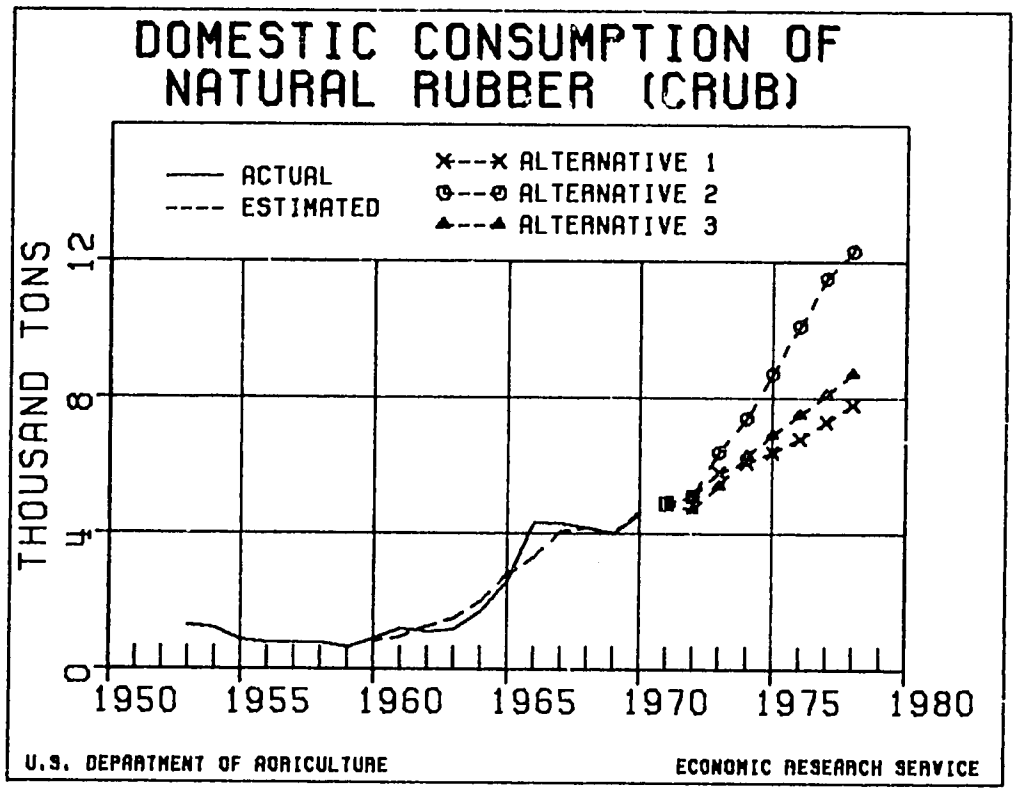

Figure 26

Illustrative Long-Term Projections

The demand and export projection procedure is the same for both long-term and short-term projections. However, additional assumptions and calculations must be made for the supply model since production projections can be affected by projections of new plantings. In this exercise, both exogenous and endogenous plantings estimates are used along with a mixture of removal and yield estimating assumptions and procedures.

The first of the two alternatives is based, as much as possible, on the published Rubber Development Program which showed only summary estimates for some of the variables in the rubber model already presented in this report. The specific pattern of removals and yields implied by the program was approximated from published information in order to show the year-by-year changes that occurred in arriving at the long-term result. The second alternative is based on the same program, except that new plantings are estimated each year using the plantings function estimated for the period 1951-64.

The following procedure was used for both alternatives. Appendix Tables E-11 and E-12 show the year-by-year calculations from 1970 to 1990. The statistics combine large and small plantations.

Table 17.--Long-term projections based on the Rubber Development Program, assumptions and results 1/

Assumptions for the base year (1970)	
1. Tappable area (ha.)	65,000
2. Tapped area (ha.)	35,000
3. Yield per tapped hectare (kg./ha.)	900
4. Production (M.T.)	31,500
Assumed accomplishments in 7 years (by 1977)	
1. Abandoned area restored (ha.)	30,000
2. Removals (ha.)	15,000
3. New plantings (ha.)	
a. Alternative I	50,000
b. Alternative II	2/
4. Yield attained (kg./ha.)	1,100
Accomplishments in 20 years (by 1990)	
1. Tapped area (ha.)	
a. Alternative I	75,000
b. Alternative II	65,000
2. Yield attained (kg./ha.)	
a. Alternative I	2,000
b. Alternative II	2,000
3. Production (M.T.)	
a. Alternative I	150,000
b. Alternative II	130,000

1/ All information in this table is for large and small plantations combined. Base year totals used in the Rubber Development Plan differ somewhat from those shown in the yearbooks.

2/ Both alternatives are based on the assumption of 50,000 ha. of new plantings, half planted by small plantations. Alternative II differs from I in that the timing of the plantings in the former case was determined by estimating annual plantings using the plantings function assuming the price-wage rate ratio was fixed at the 1970 level. Under Alternative II, only 23,000 ha. of new plantings occurred by 1977.

Production and Yield

Total production (TQRUB) was estimated directly using assumed values for yield per tapped hectare. Actual and expected yields per tappable hectare were calculated as equal to production divided by tappable area, or:

$$YRUB = NY = TQRUB/TLA$$

When projected new plantings become tappable (after 7 years), the yield for these new trees was assumed to be 2,000 kg./ha. Yield for the old area is projected to recover from a 1970 value of 900 kg./ha. to a maximum of 1,100 kg./ha. by 1975.

Tapped area was defined to equal tappable area, except that during the first 5 years, tapped area (TDA) is equal to the previous year tapped area plus rehabilitated area less removals (RML). Rehabilitated area is tappable area recently abandoned for security reasons. Tappable area (TLA) is the previous year area less removals. All tappable area is back in production (rehabilitated) by 1975. Thereafter:

$$TLA = TDA = TLA_{t-1} + PLT_{t-7} - RML$$

Plantings and Removals

New plantings and removals were specified by the Rubber Development Program. They assumed a net gain of 35,000 ha. by the seventh year; this includes 50,000 ha. of new plantings less 15,000 ha. of replantings. By this time some 30,000 ha. of tappable but initially untapped area would have been rehabilitated. Since the 1970 tapped area was 35,000, the maximum productive area was fixed at 100,000 ha. (35,000 + 35,000 + 30,000). However, as a program of replanting some old trees each year was assumed to continue, all 100,000 ha. might not be tapped at once.

After the initial 7 years, the removals and replantings were assumed to occur in such a way that all remaining pre-1971 trees were replaced by 1990, subject to the constraint that removals not exceed either newly planted area first coming into production or new plantings.

Under the second alternative, new plantings were estimated using the plantings function as illustrated in Appendix table E-10 for 1975. The first 7 year removal, replanting, and rehabilitation plan is the same as used under the Rubber Development Plan. The rule for later replantings was followed as well. A maximum net gain of 35,000 ha. was imposed under this alternative as it was under the Rubber Development Plan.

Prices for the Plantings Function

Appendix tables E-8 and E-9 show the derivation of the "price" variable for making projections in the plantings function. The function estimated for the 1951-64 period includes the variable PRBP = (PRBF/WRUB)X(NY). For the projections it was decided to update the 1964 f.o.b. price (PRBF) using the piaster yield time series data since these series diverge considerably in the late 1960's. The variable PRBF was about 77 percent of the PRBY variable in 1964; therefore, the 1970 value of PRBF was derived as 77 percent of the 1970 value of PRBY. The resulting 1970 price-wage rate ratio (.3006) was assumed constant for projections (Figure 27).

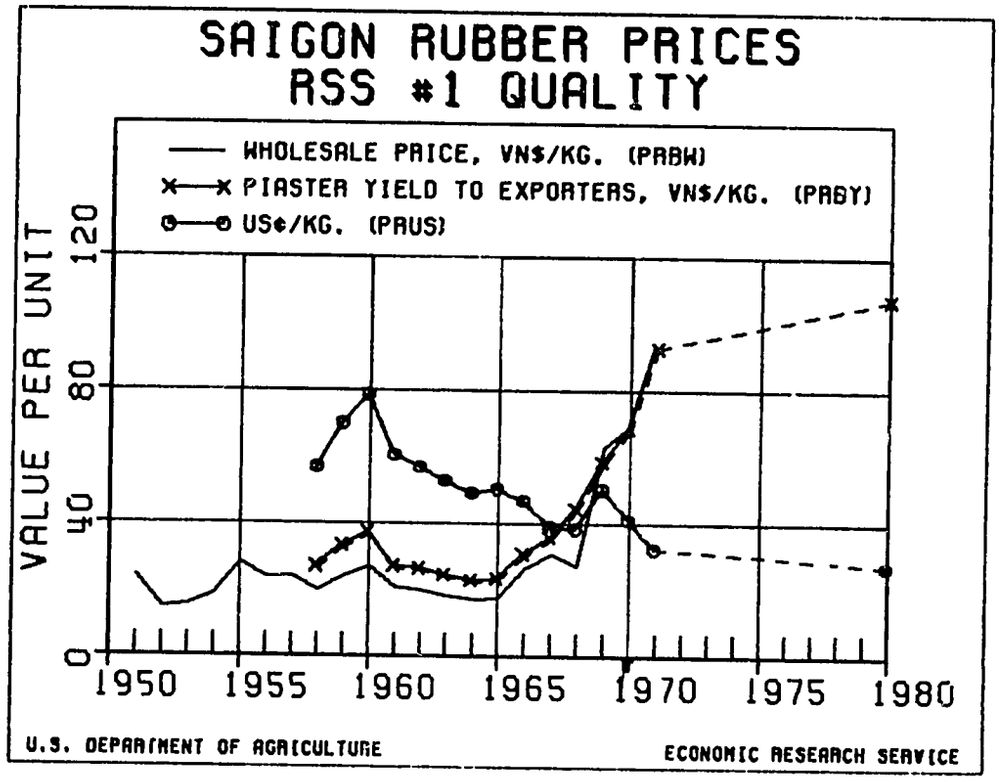

Figure 27

Projected Results

Under both alternatives, production grows from 31,500 M.T. in 1970 to 55,000 M.T. by 1977. However, production by 1990, under the second alternative, is only 130,000 M.T. compared to the Rubber Development Plan production of 150,000 M.T. This occurs because new plantings computed from the plantings function are less than those assumed by the Rubber Development Program (RDP) during the first 7 years. Under the RDP, the net gain of 35,000 ha. is assumed to be achieved by 1977. The plantings function does not generate a net gain of 35,000 ha. until 1983. Both alternatives result in a replacement of all old, low-yielding trees by 1990. Both yields are, therefore, at the assumed maximum of 2,000 kg./ha. by 1990 (Figure 28).

Both plans could eventually provide an annual production of 150,000 M.T. if a certain annual replanting plan is followed. For example, if it is desired to have trees replaced when they are 28 years old, some 3 1/2 percent of the 100,000 ha. total area (or around 3,500 ha.) must be removed and replanted every year (1/28 = .03571). Since replanted trees must be approximately 7 years old before they can produce rubber, 25,000 ha. could be out of production (7 X 3,571 = 24,999) each year. Tappable area would tend to remain at 75,000 ha. and production, therefore, would level off at 150,000 M.T. per year.

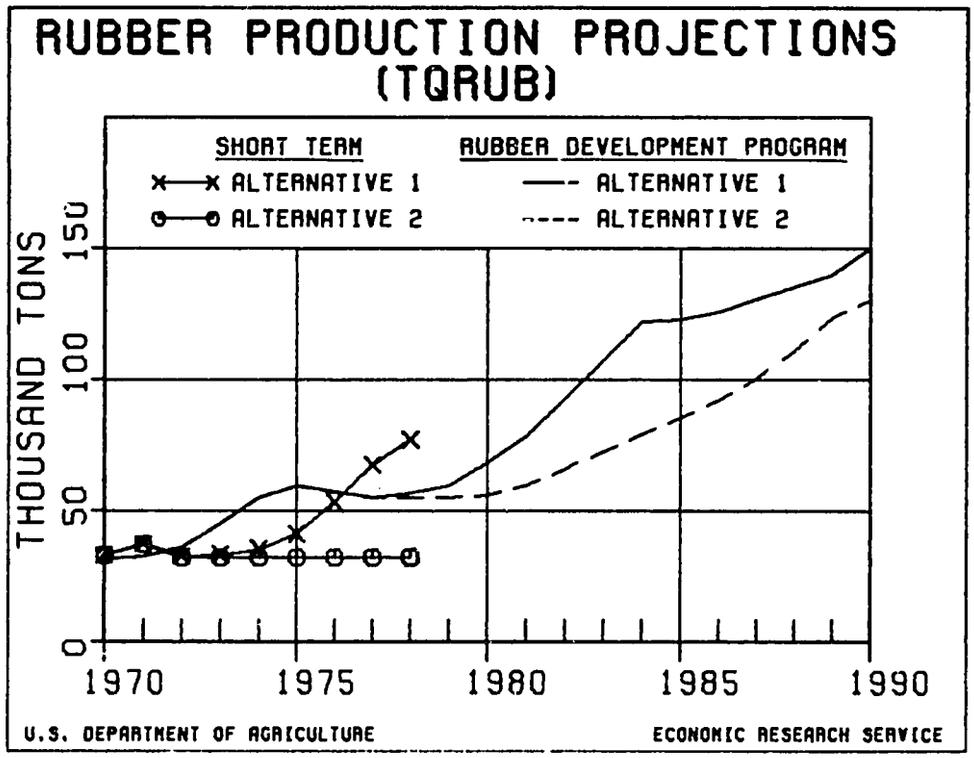

Figure 28

Use of the plantings generating function, and the 35,000 ha. net gain constraint, results in a slower growth in production than that specified by the RDP. However, both alternatives could yield the same output levels in the long run. The plantings function was generating new plantings at the rate of 10,000 ha. per year when the 35,000 ha. net gain constraint was applied.

Without the net gain constraint, the plantings function would be generating new plantings at the rate of about 20,000 ha. per year by 1993. When removals are less than 20,000 ha. per year, total area increases each year. However, if it is assumed that replantings equal to removals must represent 3.57 percent of total planted area, removals will increase as total area increases until removals equal 20,000 ha. At that time, total area would cease to expand. Total area would then be about 560,000 ha. (20,000/.0357), of which 140,000 ha. would be unproductive each year. With tappable area at 420,000 ha. and production at 2,000 kg./ha., 840,000 M.T. would be produced yearly.

Without the constraint, but assuming average yields of 1,500 kg./ha., plantings would be generated at the rate of only 12,000 ha. of replantings with 84,000 ha. of unproductive area each year. Since projected total production would level off around 378,000 M.T., it is obvious that projected yields have a big impact on plantings and production.

A total area of 400,000 hectares has been mentioned as the number "suitable" for rubber in Vietnam. This does not mean that rubber planters will find it profitable to plant that many hectares. Under the assumptions of this study, a maximum of 560,000 hectares are predicted using the plantings function and various assumptions concerning yield, price, and wage rates. Certainly the GVN could take steps to increase the piaster yield-wage rate ratio in the long-run to encourage rubber production, but this can only be done at the expense of growth elsewhere in the economy.

This study was not designed to provide answers regarding the optimum pattern of sector growth. A major shortcoming is the fact that the profitability of rubber relative to other products is not considered in the supply analysis. Thus, we must say that, assuming rubber is now, and continues to be, the most profitable alternative use of certain areas and that rubber prices and wages and yields are at specified levels, the above results.

A potentially important unknown factor for the rubber sector is the long-run impact of the new tapping technology related to the use of ethylene gas to stimulate latex flow. If this technique is widely adopted, it could significantly affect the cost of producing rubber in Vietnam relative to the cost in other countries. It is not clear exactly how this development would change the rubber supply function for Vietnam. We can, however, make the following statement. Projections of rubber production in this report are made under the assumption of current technology, except for the assumption that higher-yielding trees will be planted in the future. A decrease in the cost of producing rubber due to the new stimulation technology should increase projections above those reported here.

Summary and Implications

Overall Policy Implications

These long-term projections are based on the assumptions that: (1) the piaster yield-wage rate ratio is maintained by the GVN at the 1970 level; (2) small growers plant as many new trees as large planters; (3) there is a return to a "secure" situation; (4) yields of old areas will recover; and (5) new trees can achieve higher yields of up to 2,000 kg./ha. GVN policy could assure that all of these assumptions prevail in future years. The rubber model can be used to get some idea of the magnitude of changes implied by changing the assumptions.

With the prospect of a declining world price for rubber, GVN net exchange rate policy is of major importance. The projections imply an exchange rate that will be increased to offset any decreases in the world rubber price or any increases in wage rates or other input prices.

If the world rubber price declines by one-third between 1970 and 1980, the assumptions imply an increase of 50 percent in the exchange rate between 1970 and 1980 in order to maintain the piaster yield-wage ratio (1/.667 = 1.50).

If, in addition, wage rates doubled, the 1970 ratio could only be maintained by a 200 percent increase in the exchange rate (2 X 1.50 = 3.0). In this latter case, the 1970 exchange rate would have to increase from the 1970 effective rate of 167.4 piasters per U.S.$ to more than 502 piasters.

If the above world price and wage rate changes took place without corresponding adjustments in the exchange rate, the rubber model would suggest an annual rate of plantings of about 5,400 hectares, about a fifth lower than the 6,626 hectares projected under the Rubber Development Program (Alternative II). Thus, for 1980, a price-wage rate ratio two-thirds lower than 1970 results in a level of plantings a fifth lower. The elasticity of plantings with respect to price is indicated to be about .3 in this particular simulation.

It should be remembered, however, that a declining world price is an assumption based on worldwide adoption of cost-reducing technologies. It is possible that the cost of production in South Vietnam could be reduced by adopting the same technology. One might assume, in the absence of more information, that a decline in world rubber prices would be matched by a decline in the cost of production, thereby making it unnecessary to maintain the rubber price-wage rate ratio as assumed in the projections.

If GVN policy is to insure that total plantings are twice those of the large plantations, another 2,700 hectares of annual plantings are in question at the 1970 exchange rate. Thus, a low estimate of annual plantings by 1980 would be around 2,700 hectares, which is less than the historical record of 4,131 hectares in 1960.

The impact of a potential yield of 2,000 kg./ha. on new plantings does not affect plantings by 1980 to any great extent. However, in the longer run, government policies designed to help the realization of this level of yield would also affect the level of plantings. This was indicated earlier by demonstrating that the unconstrained plantings rate by 1993 could be 20,000 hectares, assuming a yield potential of 2,000 kg./ha. This rate compares with a 12,000 hectare rate if the maximum yield were only 1,500 kg./ha. This implies that the elasticity of plantings with respect to yield would be 2.0 for this particular simulation.

Finally, government policy can have important impacts on the way producers form expectations and react to them. In these projections, it was assumed that expectations and reactions to them would be similar to those during the 1950-70 period.

Implications for Exports

Export earnings, based on projections of supply and demand, show dollar earnings of around U.S.$17 million by 1978 for the short-term projections under Alternative I (Table 18). This compares with only U.S.$11 million under Alternative II based on the Rubber Development Program assumptions. Under the RDP conditions, export earnings are projected to increase to more than U.S.$30 million by 1990 as a result of projected new plantings.

Table 18.--Summary of illustrative projections

Item	Short-term projections		Rubber Development Program	
	Alternative		Alternative	
	I	II	I	II
1978 Results				
1. Production (M.T.)	77,200	32,100	56,800	55,000
2. Exports (M.T.)	64,800	19,700	44,400	42,600
3. Value of exports (Mil. U.S.$)	17.1	5.2	11.7	11.3
1990 Results				
1. Production (M.T.)			150,000	130,000
2. Exports (M.T.)			136,000	116,000
3. Value of exports (Mil. U.S.$)			36.0	30.7
1978 Differences due to:				
1. Low yield per tappable ha.		X		
2. Low level of tappable area due to:				
a. Removals			X	X
b. Loss of young trees		X	X	X

Projected consumption is based on the 1975 per capita use rate of .429 kg./person and population growth of 3 percent per year. Under these conditions, consumption increases from 4,600 M.T. in 1970 to 9,900 M.T. by 1978 to 14,000 M.T. by 1990.

Information in this report permits a large number of alternative export earnings projections under alternative assumptions for prices, yields, government policy, etc. In using the plantings function, the lags in production response figure importantly in the projections: it takes 5 years for the price, wage, or yield change to have its full impact on plantings and 7 years for plantings to have an effect on production and exports. Thus, rubber export earnings in the future must be preceded by policy implementations well in advance of hoped-for gains.

THE AGRICULTURAL SECTOR FRAMEWORK

This chapter discusses an agricultural sector model which pulls together the commodity analyses described earlier for rice, fish, hogs, and rubber and combines them with the framework for the Vietnamese general economy. This agricultural framework was then employed to (1) reconstruct estimates of the historic period, (2) approximate short-and long-run impact multipliers, and (3) provide projections for the 1972-1977 period.

Appraisal of the near-term prospects for a dynamic economic system implies a simultaneous consideration of interactions among demand, supply, and prices. Such a dynamic analysis of the agricultural sector cannot consider demand, supply, and price influences independent of each other. The utilization of a commodity must reflect demand pressures as well as the output response of producers and the short-and long-term price adjustments related to these economic stimuli. Moreover, commodity analyses must be integrated into a framework linking both the agricultural sector and the general economy.

In such an analytical model, changes in world and domestic demand and their associated prices, output levels, production costs, and noneconomic forces influence agricultural production and prices as well as output and the price level for the entire economy. Similarly, policies and developments influencing demand through taxes, monetary management, and trade policy also bring changes in the general economy which affect agricultural output and prices, and, therefore, farm income.

An agricultural sector analysis can vary from the informal judgments of the experienced analyst to the formal, detailed, sophisticated, computer model. The choice of techniques of analyses must be geared to resources available and the practical uses of the appraisal. An analysis of a weekly surge in rice prices will require special short-run analytical techniques and may rest heavily on the judgment of the experienced analyst who monitors market movements regularly. On the other hand, longer-run appraisals will be concerned with demand growth, the nature of producer response to economic forces, monetary-fiscal policy, and other changes in the general economy and their impact on agricultural prices.

Today's analytical techniques and computer facilities make possible more detailed and more realistic analytical frameworks than were feasible only a few years back. The model presented in this chapter (the one used for much of the sector appraisal discussed in earlier chapters) was built by integrating supply-demand-price analyses for major commodities into the national accounts for the general economy (Figure 29).

Figure 29 demonstrates the specific interaction points in the model used in the sector appraisal, with the arrows indicating the flow of forces. For example, the current rice price influences the pork sector (through pork demand), and the current pork price influences the rice sector as pork prices affect rice deliveries. Although the pork production obviously affects the index of livestock production, the specific linkage is not made in this particular model; therefore, the livestock index is assumed as predetermined.

VIETNAM FRAMEWORK--SECTOR LINKAGES

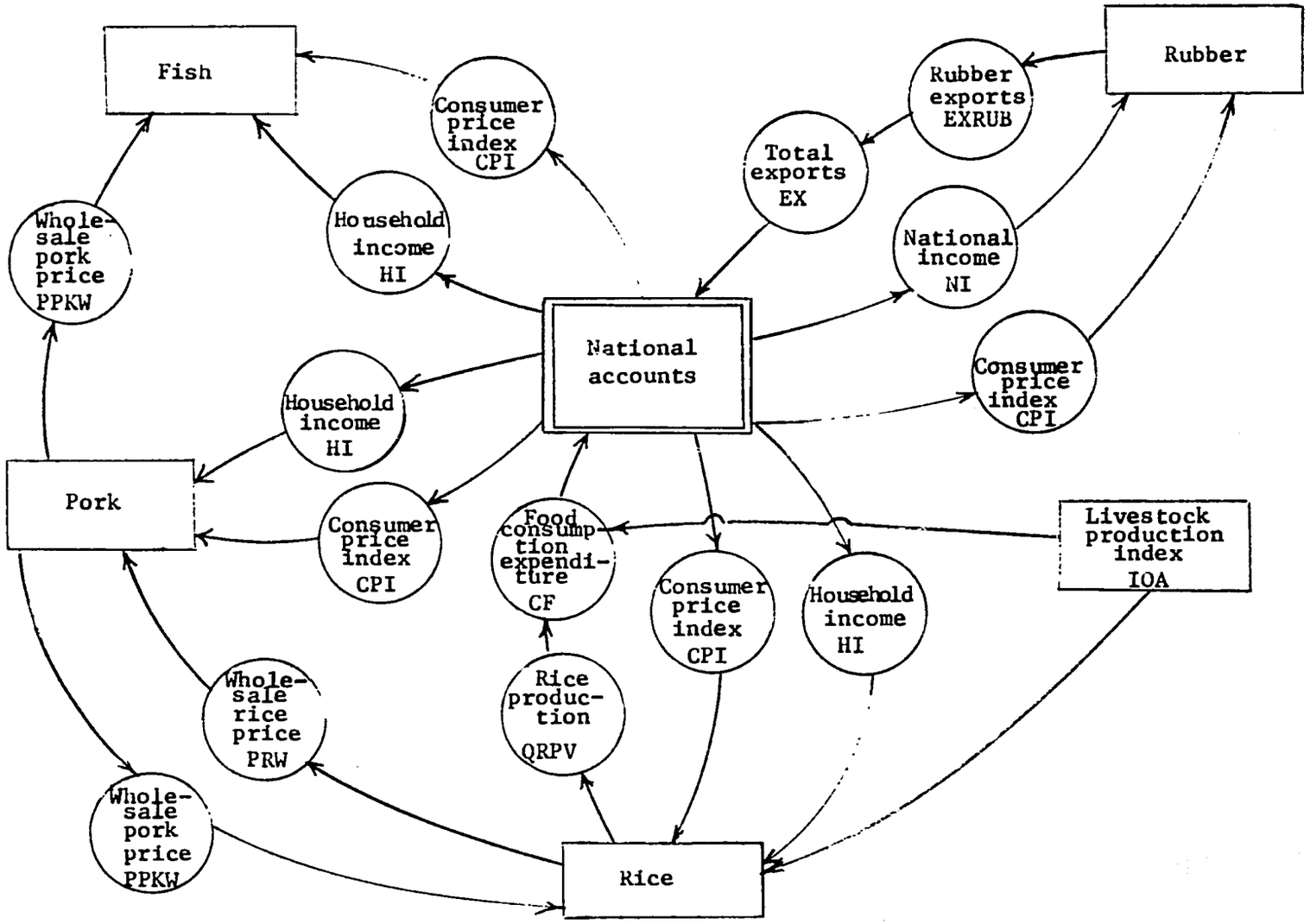

Figure 29

Each of the agricultural commodities linked to the national accounts has its own supply and demand (price) framework. Each commodity sector is recursive in nature; that is, the current year's production is determined by the previous year's price, and with production then determined for the current year, a price estimating equation determines the current year's demand relationship. A more detailed discussion of the individual fitted equations are found in the commodity chapters.

The framework illustrated is a partial model and only one of several that might have been constructed from alternative analyses in this report. Any such analytical framework oversimplifies detailed interrelationships. But it does give insights into the inner workings of the economy and serves to demonstrate our objective of emphasizing basic interrelationships between agriculture and the general economy.

The Vietnam model consists of three subsectors--the rice-pork-fish sector, the rubber sector, and the aggregated framework for the general economy. These sectors were tested individually and then merged into one system consisting of 48 equations for 48 endogenous variables. 13/ There were 68 predetermined variables assumed as generated outside the system. 14/ These predetermined variables (government expenditures, population, etc.) provided three sets of conditions or assumptions cited throughout the report. Their values make up the conditions assumed for this appraisal, and must be specified in detail for use in the model.

Methodology

Because of its size, the framework became virtually impossible to manipulate manually. The mechanics of handling such a system of equations required a simultaneous equation technique such as matrix inversion. However, matrix inversion has particular handling problems because new reduced form coefficients must be recomputed for any change in basic equations. A more flexible alternative technique--the Gauss-Seidel iteration solution technique--then was applied to the system.

The Gauss-Seidel technique uses the basic estimated equations (the same as those shown in the subsector discussions) which may be expressed in nonlinear terms, i.e. ratios, or logarithms, etc. Using these equations in an ordered sequence, the technique substitutes, round by round, values of the

13/ Econometric systems include two broad types of variables: (1) endogenous--those variables determined by the system, and (2) exogenous--those variables determined outside the system and therefore predetermined.

14/ Of the 68 predetermined variables, only 39 are considered basic to the system. The remaining 29 are also included as endogenous variables in the system. By providing for an endogenous variable to be predetermined, the system lends itself to projecting values of the remaining 47 endogenous variables while holding one endogenous variable at a predetermined value.

variables to be determined until it finds a complete set of endogenous values that represent a simultaneous solution. 15/ After that set is determined, the model moves on to the next time period where it picks up a new set of predetermined variables, and then repeats the round by round substitution until a simultaneous solution for the new period is determined. 16/

Simulating with the Model

The model was then used to simulate the historic period (1961-68). This test (shown graphically by charts in the subsector discussion) indicated reasonably good estimates from the entire system. A second simulation s.age then generated estimates of important components of the national accounts for 1969 to 1971. These simulated estimates were then assumed to be good working estimates of the components of the national accounts which were incomplete or considered provisional.

15/ Another important consideration concerning the system operation is the order in which the equations to be solved are arranged. Generally those equations with no endogenous variables should be set at the top of the order, followed by those with one endogenous variable. This is then followed by those with two endogenous variables, and so on, until the entire set of equations is included. A general rule of "equation ordering," then, is to graphically arrange the endogenous coefficients of the equations into a square matrix, and then, by row and column substitution, arrange the associated coefficients as nearly as possible in the lower left corner of the matrix. For example, given an initial set of equations where YØ(i) = endogenous variables and XØ(i) = exogenous variables:

(1)	YØ(Ø1)	YØ(Ø2)	YØ(Ø3)	YØ(Ø4)	XØ(Ø1)	XØ(Ø2)...
YØ(Ø1)	x				x	x
YØ(Ø2)	x	x		x		x
YØ(Ø3)	x	x	x	x		
YØ(Ø4)		x		x	x	

By substituting rows and columns, we can derive the following arrangement:

(1a)	YØ(Ø1)	YØ(Ø2)	YØ(Ø4)	YØ(Ø3)	XØ(Ø1)	XØ(Ø2)
YØ(Ø1)	x				x	x
YØ(Ø4)		x	x		x	
YØ(Ø2)	x	x	x			x
YØ(Ø3)	x	x	x	x		

The resulting arrangement then indicates that equation YØ(Ø1) should be first followed by YØ(Ø4), YØ(Ø2), and then YØ(Ø3).

16/ A simultaneous solution is considered to be reached in this version of the program when all the endogenous values are within .02 percent of their value in the previous round.

Step 3 in the simulations projected endogenous values for the succeeding 5-year period, i.e., 1972 to 1977. Alternative assumptions of predetermined variables were constructed to represent three possible paths of developments. These simulated projections were reviewed for consistency and adjusted where necessary until the most likely adjustment paths were estimated. The forecasts and projections presented in this report represent the output of this particular system.

Estimated Multipliers

Policy appraisal usually requires a consideration of alternative courses of action. Often judgments must be made quickly regarding the general impact of some major predetermined variables for both short-run and longer-run periods. The analytical system was used to compute the impact of changes of some important predetermined variables on gross national product, consumer income, rice production, and other variables determined in the system. Briefly, the impact multiplier indicates the effect of a given change in a predetermined variable on the endogenous variables in the system.

The multiplier effect is computed for the current period impact as well as for several succeeding time periods in order to approximate the longer-run impact when impacts stabilize. This longer run impact is important because the impact of policy decisions can be felt for several years before stabilization.

The basic model indicates that a 10-percent increase in real Government expenditures (G') has an initial impact as well as a longer-run impact of 2 to 3 percent on real gross national product (GNP'). Similarly, a 10-percent increase in real investment outlays (I') brings about an initial increase in GNP' around 1 percent and around 1-1/2 percent over a period of several years. Because of the lags involved in the livestock production cycle, a 10 percent change in livestock production has a long-run impact of 2 to 3 percent on real GNP' compared with a short-run impact of about 1 percent (Table 19).

It should be noted that the percentage changes are not directly comparable since they relate to very different bases. In general, the relatively small percentage changes in GNP usually imply fairly large multipliers relative to Government expenditures, investment, farm output, etc., when measured in piaster terms. This would be expected in an economy in which leakages into savings and taxes are small.

Framework Estimates of the Historic Period

1961 to 1968

The framework estimates for the 1961 to 1968 period appear in Table 20. Although many data series actually began before 1961, estimates for all equations for the entire model are available only from 1961 to date. The estimates shown for this period represent the interworkings of the entire model.

Table 19.--Summary of multiplier effects of selected predetermined variables

Variable	10 percent increase in--									
	Government (G')		Investment (I')		Tax rate (RevF)		Livestock (IOA)		Rice production	
	1st year	Long run	1st year	Long run	1st year	Long run	1st year	Long run	1st year	Long run
	Percent change									
Gross national product 1/	2.5	2.5	1.0	1.5	0.0	nil.	1.0	2.5	5.5	3.4
Imports 1/	-1.0	-1.0	nil.	nil.	0.0	nil.	-.5	-1.0	-1.9	-1.2
Nonfood consumption expenditure 1/	1.5	2.0	1.0	1.0	0.0	nil.	.5	1.5	3.6	2.2
Food consumption expenditure 1/	0.0	3.5	0.0	.5	0.0	-.5	2.0	4.5	10.0	6.1
Gross domestic expenditure 1/	2.0	2.0	1.0	1.0	0.0	nil.	1.0	2.0	4.2	2.3
Household income 1/	2.5	2.5	1.1	1.3	-1.5	-2.0	1.0	2.0	5.0	4.1
Rice production 2/	nil.	nil.	nil.	nil.	0.0	-.5	0.0	1.5	---	---
Rice price 3/	nil.	nil.	nil.	nil.	-1.0	-.5	.5	4.0	3.1	-14.1

1/ 1960 $VN. 2/ 1,000 m.t. 3/ $VN/100 kg.

Table 20.--Vietnam framework historic period estimates of endogenous variables 1961-68

Variable identification				Estimated values			
Description	Unit	Variable		1961	1962	1963	1964
		Name	Number				
DOMESTIC EXPENDITURE DEFLATOR	(1960=100)	PE	Y0(01)	101.3	105.3	112.7	124.8
IMPORT VALUE (REAL)	(BIL 1960 VN$)	M'	Y0(02)	8.6	16.0	22.1	15.7
GROSS NATIONAL PRODUCT (CURRENT)	(BIL VN$)	GNP	Y0(03)	84.7	89.3	91.7	123.3
GROSS NATIONAL PRODUCT (REAL)	(BIL 1960 VN$)	GNP'	Y0(04)	84.1	87.2	84.5	100.7
NONFOOD CONSUMPTION EXPENDITURE (REAL)	(BIL 1960 VN$)	CN'	Y0(05)	35.1	37.3	37.5	41.5
GROSS DOMESTIC EXPENDITURE (REAL)	(BIL VN$)	GDE'	Y0(06)	88.0	97.9	98.7	109.5
CONSUMER PRICE INDEX (EXCLU RENT)	(1963=100)	CPI	Y0(07)	86.4	90.1	96.9	108.4
FOOD CONSUMPTION (REAL)	(BIL 1960 VN$)	CF'	Y0(08)	30.8	33.3	34.8	35.1
IMPLICIT PRICE DEFLATOR	(1960=100)	PY	Y0(09)	100.7	102.4	108.5	122.5
HOUSEHOLD INCOME (CURRENT)	(BIL VN$)	HI	Y0(10)	68.6	75.6	79.5	105.2
NONFOOD EXPENDITURE PRICE DEFLATOR	(1960=100)	PNF	Y0(11)	99.1	102.5	108.8	119.2
FOOD EXPENDITURE PRICE DEFLATOR	(1960=100)	PF	Y0(12)	102.8	108.9	120.6	140.4
NATIONAL INCOME (CURRENT)	(BIL VN$)	NI	Y0(13)	69.8	74.3	76.4	102.7
GOVERNMENT EXPENDITURE PRICE DEFLATOR	(1960=100)	PG	Y0(14)	105.3	107.2	110.7	116.5
EXPORT PRICE DEFLATOR	(1960=100)	PEX	Y0(15)	95.2	95.9	98.7	106.0
INVESTMENT PRICE DEFLATOR	(1960=100)	PI	Y0(16)	103.3	105.6	110.0	117.0
NATIONAL INCOME (REAL)	(BIL 1960 VN$)	NI'	Y0(17)	69.3	72.6	70.4	83.8
HOUSEHOLD INCOME (REAL)	(BIL 1960 VN$)	HI'	Y0(18)	68.1	73.8	73.3	85.9
PERSONAL CONSUMPTION DEFLATOR	(1960=100)	PC	Y0(19)	100.8	105.5	114.5	128.9
CONSUMER PRICE INDEX (EXCLU RENT)	(1963=100)	CPIX	Y0(20)	86.6	90.7	98.3	111.0
RUBBER PLANTINGS	(HECTARES)	PLT-7	Y0(21)	573.2	-73.1	1396.9	1503.1
RUBBER TREE REMOVALS	(HECTARES)	RML	Y0(22)	511.4	1173.2	1120.4	771.4
RUBBER YIELD	(KG/HECTARE)	YRUB	Y0(23)	1215.0	1176.0	1172.0	1199.0
TAPPABLE AREA	(HECTARES)	TLA	Y0(24)	58033.9	58036.5	58214.0	58277.7
RUBBER PRODUCTION (LARGE PLANTATIONS)	(M.T.)	QRUB	Y0(25)	70511.1	68250.9	68226.8	69874.9
RUBBER PRODUCTION (TOTAL)	(M.T.)	TQRUB	Y0(26)	77787.9	77833.3	77205.4	74954.8
PER CAPITA RUBBER CONSUMPTION	(KG/CAP)	PCRB	Y0(27)	0.1	0.1	0.1	0.2
RUBBER CONSUMPTION	(M.T.)	CRUB	Y0(28)	1030.2	1288.1	1479.7	2275.5
RUBBER EXPORTS	(M.T.)	QREX	Y0(29)	83223.6	74279.2	69640.7	71811.3
RUBBER EXPORTS	(BIL 1960 VN$)	EXRUB'	Y0(30)	1.8	1.5	1.3	1.1
RUBBER EXPORTS	(MIL US$)	EXRUS	Y0(31)	49851.0	41722.6	36324.6	34799.8
RICE EQUIVALENT DELIVERIES	(1000 M.T.)	QDEL	Y0(32)	530.2	482.1	785.0	485.2
RICE DISAPPEARANCE	(KG/CAP)	QDV/N2	Y0(33)	194.0	197.7	199.3	216.6
ENDING SAIGON RICE STOCK CHANGE	(1000 M.T.)	*ESTK	Y0(34)	0.0	0.0	3.0	-46.0
WHOLESALE FISH PRICE (REAL)	(VN$/100KG)	PFSH'/CPI	Y0(35)	3303.7	3693.2	3257.7	4104.0
CONTROLLED PORK SLAUGHTER	(MIL.HEAD)	QPKC	Y0(36)	1.2	1.0	1.0	1.1
WHOLESALE RICE PRICE (REAL)	(VN$/100KG)	PRW/CPI	Y0(37)	546.0	558.5	535.6	505.0
WHOLESALE PORK PRICE (REAL)	(VN$/100KG)	PPKW/CPI	Y0(38)	2559.1	2971.8	2750.8	3166.5
FISH DOMESTIC DISAPPEARANCE	(MIL. M.T.)	QDF	Y0(39)	299.9	332.6	373.4	396.6
RICE EQUIVALENT PRODUCTION	(1000 M.T.)	QRPV	Y0(40)	2912.3	3103.6	3208.2	3131.1
TOTAL FISH CATCH	(MIL. M.T.)	QPF	Y0(41)	300.5	333.3	374.3	397.5
FISH-NET IMPORTS	(MIL. M.T.)	FNIMP	Y0(42)	-0.6	-0.7	-0.9	-0.9
RICE-NET IMPORTS	(KG/CAP)	RNIMP/N2	Y0(43)	-11.0	-6.0	-21.0	-3.0
DELTA PADDY HECTARES	(1000 HECTARES)	HD	Y0(44)	1669.3	1724.0	1752.4	1761.8
OTHER PADDY HECTARES	(1000 HECTARES)	HO	Y0(45)	744.0	779.5	808.4	825.0
DELTA PADDY YIELD	(KG/HECTARE)	YD	Y0(46)	2127.2	2194.5	2213.9	2140.1
OTHER PADDY YIELD	(KG/HECTARE)	YO	Y0(47)	1751.1	1782.4	1815.1	1755.2
ENDING SAIGON RICE STOCK	(1000 M.T.)	ESTK	Y0(48)	50.0	50.0	47.0	93.0

- Continued -

Table 20.--Vietnam framework historic period estimates of endogenous variables, 1961-68--Continued

Variable identification				Estimated values			
Description	Unit	Variable		1965	1966	1967	1968
		Name	Number				
DOMESTIC EXPENDITURE DEFLATOR	(1960=100)	PE	Y0(01)	143.2	208.8	267.7	327.6
IMPORT VALUE (REAL)	(BIL 1960 VNS)	M'	Y0(02)	21.7	45.1	51.6	50.0
GROSS NATIONAL PRODUCT (CURRENT)	(BIL VNS)	GNP	Y0(03)	150.6	247.9	349.0	384.0
GROSS NATIONAL PRODUCT (REAL)	(BIL 1960 VNS)	GNP'	Y0(04)	106.6	113.5	116.4	101.9
NONFOOD CONSUMPTION EXPENDITURE (REAL)	(BIL 1960 VNS)	CN'	Y0(05)	44.4	50.6	52.6	47.8
GROSS DOMESTIC EXPENDITURE (REAL)	(BIL VNS)	GDE'	Y0(06)	116.6	135.9	145.9	134.0
CONSUMER PRICE INDEX (INCLU RENT)	(1963=100)	CPI	Y0(07)	126.8	199.3	272.4	353.7
FOOD CONSUMPTION (REAL)	(BIL 1960 VNS)	CF'	Y0(08)	33.8	31.8	34.9	29.4
IMPLICIT PRICE DEFLATOR	(1960=100)	PY	Y0(09)	141.2	218.5	299.7	377.0
HOUSEHOLD INCOME (CURRENT)	(BIL VNS)	HI	Y0(10)	138.0	209.6	285.5	319.4
NONFOOD EXPENDITURE PRICE DEFLATOR	(1960=100)	PNF	Y0(11)	135.0	191.4	241.9	293.4
FOOD EXPENDITURE PRICE DEFLATOR	(1960=100)	PF	Y0(12)	172.4	303.3	439.8	595.0
NATIONAL INCOME (CURRENT)	(BIL VNS)	NI	Y0(13)	131.1	212.5	294.7	326.0
GOVERNMENT EXPENDITURE PRICE DEFLATOR	(1960=100)	PG	Y0(14)	125.2	156.5	184.6	213.2
EXPORT PRICE DEFLATOR	(1960=100)	PEX	Y0(15)	121.4	195.4	261.3	325.0
INVESTMENT PRICE DEFLATOR	(1960=100)	PI	Y0(16)	127.7	166.0	200.3	235.3
NATIONAL INCOME (REAL)	(BIL 1960 VNS)	NI'	Y0(17)	92.8	97.3	98.3	86.5
HOUSEHOLD INCOME (REAL)	(BIL 1960 VNS)	HI'	Y0(18)	97.7	95.9	95.3	84.7
PERSONAL CONSUMPTION DEFLATOR	(1960=100)	PC	Y0(19)	151.2	234.6	320.8	408.3
CONSUMER PRICE INDEX (EXCLU RENT)	(1963=100)	CPIX	Y0(20)	131.4	211.8	293.0	383.3
RUBBER PLANTINGS	(HECTARES)	PLT-7	Y0(21)	1947.4	3443.8	4385.6	2850.8
RUBBER TREE REMOVALS	(HECTARES)	RNL	Y0(22)	1083.3	1183.6	1409.1	1545.3
RUBBER YIELD	(KG/HECTARE)	YRUB	Y0(23)	979.0	802.0	667.0	479.0
TAPPABLE AREA	(HECTARES)	TLA	Y0(24)	57662.8	56925.0	58596.5	58517.9
RUBBER PRODUCTION (LARGE PLANTATIONS)	(M.T.)	ORUB	Y0(25)	56451.8	45653.9	39083.9	28030.1
RUBBER PRODUCTION (TOTAL)	(M.T.)	TORUB	Y0(26)	64801.1	48616.8	42155.9	34412.6
PER CAPITA RUBBER CONSUMPTION	(KG/CAP)	PCRB	Y0(27)	0.2	0.3	0.3	0.3
RUBBER CONSUMPTION	(M.T.)	CRUB	Y0(28)	3070.5	3779.2	4410.6	4647.5
RUBBER EXPORTS	(M.T.)	OREX	Y0(29)	57729.6	44612.6	37233.2	29180.0
RUBBER EXPORTS	(BIL 1960 VNS)	EXRUB'	Y0(30)	0.8	0.6	0.4	0.3
RUBBER EXPORTS	(MIL US$)	EXRUS	Y0(31)	28697.4	20575.3	14312.4	10995.0
RICE EQUIVALENT DELIVERIES	(1000 M.T.)	ODEL	Y0(32)	323.7	324.0	320.0	312.9
RICE DISAPPEARANCE	(KG/CAP)	ODV/N2	Y0(33)	221.8	219.1	206.7	205.6
ENDING SAIGON RICE STOCK CHANGE	(1000 M.T.)	*ESTK	Y0(34)	76.0	2.0	-88.0	-102.0
WHOLESALE FISH PRICE (REAL)	(VNS/100KG)	PFSHW/CPI	Y0(35)	4385.5	4892.1	4708.6	5313.0
CONTROLLED PORK SLAUGHTER	(MIL.HEAD)	OPKC	Y0(36)	1.0	1.2	1.2	1.1
WHOLESALE RICE PRICE (REAL)	(VNS/100KG)	PRW/CPI	Y0(37)	537.8	609.8	637.9	627.3
WHOLESALE PORK PRICE (REAL)	(VNS/100KG)	PPKW/CPI	Y0(38)	3541.9	3641.6	3573.0	3841.5
FISH DOMESTIC DISAPPEARANCE	(MIL. M.T.)	ODF	Y0(39)	378.8	386.6	424.5	466.1
RICE EQUIVALENT PRODUCTION	(1000 M.T.)	ORPV	Y0(40)	2913.1	2739.3	2867.7	2575.4
TOTAL FISH CATCH	(MIL. M.T.)	OPF	Y0(41)	379.6	386.1	423.8	449.7
FISH-NET IMPORTS	(MIL. M.T.)	FNIMP	Y0(42)	-0.8	0.5	0.7	16.4
RICE-NET IMPORTS	(KG/CAP)	RNIMP/N2	Y0(43)	8.0	26.0	44.0	38.0
DELTA PADDY HECTARES	(1000 HECTARES)	HD	Y0(44)	1666.4	1640.5	1651.7	1666.8
OTHER PADDY HECTARES	(1000 HECTARES)	HO	Y0(45)	778.0	732.0	702.6	670.4
DELTA PADDY YIELD	(KG/HECTARE)	YD	Y0(46)	2108.7	1967.6	2082.2	1882.2
OTHER PADDY YIELD	(KG/HECTARE)	YO	Y0(47)	1723.8	1827.3	1907.6	1723.1
ENDING SAIGON RICE STOCK	(1000 M.T.)	ESTK	Y0(48)	17.0	15.0	103.0	205.0

1969 to 1971

Many data series, particularly the national accounts, are not available since 1968, and in some cases are considered provisional. The framework was therefore used to generate an acceptable working set of estimates for the recent historic period (Table 21) before undertaking multiplier analysis and projection estimates.

Multiplier Analysis

The 1961 to 1971 set of estimates was then used to generate short and long-run impact multipliers. These impacts were approximated by (1) running the model for the entire period with one predetermined variable held constant, (2) running the model a second time with the predetermined variable held constant at a second level, and (3) then assuming that the computed differences between "round one" and "round two" estimates for the endogenous variables were approximations of the multipliers. The long-run effect was assumed to be demonstrated when the period to period estimates of the endogenous variables remained relatively constant. Usually this stability occurred within 5 to 7 time periods. The differences were then expressed as a percent of the mean of the particular endogenous variable (Table 19).

Illustrative Projections to 1977--Three Alternatives

Assumptions

Following the historic period analysis, the framework was then used to generate illustrative 5-year projections to 1977. These projections were based on three sets of alternatives. The alternatives were constructed to represent varying levels of optimism concerning economic activity over the next few years. Major assumptions under each alternative were:

ALTERNATIVE I (fairly optimistic)

1. Government expenditures decline 3 billion $VN per year.
2. Exports grow 10 percent per year.
3. Taxes and savings as a percent of GNP increase 2 percentage points per year.
4. Livestock increases 3 percent per year.
5. Additional paddy land reclaimed at 50,000 hectares per year.
6. Fishing boats increase 8 percent per year.
7. Limited hostility effect in 1972; none thereafter.

Table 21.--Framework estimates of endogenous variables, 1968-1971

Variable identification				1968	1969	1970	1971
Description	Unit	Variable Name	Variable Number				
DOMESTIC EXPENDITURE DEFLATOR	(1960=100)	PE	YO(01)	329	464	535	613
IMPORT VALUE (REAL)	(BIL 1960 VN$)	M'	YO(02)	46.6	63.8	55.3	54.5
GROSS NATIONAL PRODUCT (CURRENT)	(BIL VN$)	GNP	YO(03)	395	664	846	1,069
GROSS NATIONAL PRODUCT (REAL)	(BIL 1960 VN$)	GNP'	YO(04)	106	108	119	131
NONFOOD CONSUMPTION EXPENDITURE (REAL)	(BIL 1960 VN$)	CN'	YO(05)	48.4	52.2	54.0	57.7
GROSS DOMESTIC EXPENDITURE (REAL)	(BIL VN$)	GDE'	YO(06)	134	159	164	177
CONSUMER PRICE INDEX (INCLU RENT)	(1963=100)	CPI	YO(07)	356	561	680	820
FOOD CONSUMPTION (REAL)	(BIL 1960 VN$)	CF'	YO(08)	29.3	35.0	41.9	44.3
IMPLICIT PRICE DEFLATOR	(1960=100)	PY	YO(09)	374	614	712	815
HOUSEHOLD INCOME (CURRENT)	(BIL VN$)	HI	YO(10)	317	532	679	859
NONFOOD EXPENDITURE PRICE DEFLATOR	(1960=100)	PNF	YO(11)	295	410	471	539
FOOD EXPENDITURE PRICE DEFLATOR	(1960=100)	PF	YO(12)	600	1,000	1,239	1,520
NATIONAL INCOME (CURRENT)	(BIL VN$)	NI	YO(13)	335	562	716	905
GOVERNMENT EXPENDITURE PRICE DEFLATOR	(1960=100)	PG	YO(14)	214	278	312	349
EXPORT PRICE DEFLATOR	(1960=100)	PEX	YO(15)	326	508	589	687
INVESTMENT PRICE DEFLATOR	(1960=100)	PI	YO(16)	236	315	356	402
NATIONAL INCOME (REAL)	(BIL 1960 VN$)	NI'	YO(17)	89.5	91.7	100.7	111.0
HOUSEHOLD INCOME (REAL)	(BIL 1960 VN$)	HI'	YO(18)	84.8	86.6	95.4	105.4
PERSONAL CONSUMPTION DEFLATOR	(1960=100)	PC	YO(19)	410	647	807	965
CONSUMER PRICE INDEX (EXCLU RENT)	(1963=100)	CPIX	YO(20)	365	613	746	901
RUBBER PLANTINGS	(HECTARES)	PLT-7	YO(21)	2,794	1,002	764	1,125
RUBBER TREE REMOVALS	(HECTARES)	RML	YO(22)	2,656	852	6,633	.0001
RUBBER YIELD	(KG/HECTARE)	YRUB	YO(23)	449	432	479	558
TAPPABLE AREA	(HECTARES)	TLA	YO(24)	57,838	58,175	56,580	59,575
RUBBER PRODUCTION (LARGE PLANTATIONS)	(M.T.)	QRUB	YO(25)	23,969	25,132	27,102	33,243
RUBBER PRODUCTION (TOTAL)	(M.T.)	TQRUB	YO(26)	31,882	27,632	33,007	37,026
PER CAPITA RUBBER CONSUMPTION	(KG/CAP)	PCRB	YO(27)	.30	.31	.38	.38
RUBBER CONSUMPTION	(M.T.)	CRUB	YO(28)	4,931	5,077	6,649	7,166
RUBBER EXPORTS	(M.T.)	QREX	YO(29)	26,366	19,752	21,519	27,860
RUBBER EXPORTS	(BIL 1960 VN$)	EXRUB'	YO(30)	.24	.15	.12	.10
RUBBER EXPORTS	(MIL US$)	EXRUS	YO(31)	9,935	9,825	8,724	8,837
RICE EQUIVALENT DELIVERIES	(1000 M.T.)	QDEL	YO(32)	281	381	461	543
RICE DISAPPEARANCE	(KG/CAP)	QDV/N2	YO(33)	204	187	203	194
ENDING SAIGON RICE STOCK CHANGE	(1000 M.T.)	#ESTK	YO(34)	-102	196	-48	19
WHOLESALE FISH PRICE (REAL)	(VN$/100KG)	PFSHW/CPI	YO(35)	5,965	6,476	5,260	5,724
CONTROLLED PORK SLAUGHTER	(MIL.HEAD)	QPKC	YO(36)	.905	1.028	1.118	1.163
WHOLESALE RICE PRICE (REAL)	(VN$/100KG)	PRW/CPI	YO(37)	615	684	642	718
WHOLESALE PORK PRICE (REAL)	(VN$/100KG)	PPKW/CPI	YO(38)	4,248	4,447	3,908	4,255
FISH DOMESTIC DISAPPEARANCE	(MIL. M.T.)	QDF	YO(39)	444	568	671	728
RICE EQUIVALENT PRODUCTION	(1000 M.T.)	QRPV	YO(40)	2,567	3,003	3,481	3,724
TOTAL FISH CATCH	(MIL. M.T.)	QPF	YO(41)	428	554	669	728
FISH-NET IMPORTS	(MIL. M.T.)	FNIMP	YO(42)	16.4	14.9	1.40	.0001
RICE-NET IMPORTS	(KG/CAP)	RNIMP/N2	YO(43)	38.0	20.0	32.0	7.0
DELTA PADDY HECTARES	(1000 HECTARES)	HD	YO(44)	1,688	1,782	1,852	1,884
OTHER PADDY HECTARES	(1000 HECTARES)	HO	YO(45)	638	652	677	695
DELTA PADDY YIELD	(KG/HECTARE)	YD	YO(46)	1,882	2,140	2,392	2,455
OTHER PADDY YIELD	(KG/HECTARE)	YO	YO(47)	1,723	1,827	2,028	2,274
ENDING SAIGON RICE STOCK	(1000 M.T.)	ESTK	YO(48)	205	9	57	38

- Continued -

ALTERNATIVE II (very optimistic)

1. Government expenditures remain unchanged.

2. Exports grow 20 percent per year.

3. Taxes and savings as a percent of GNP increase 2 percentage points per year.

4. Livestock increases 3 percent per year.

5. Additional paddy land reclaimed at 100,000 hectares per year.

6. Fishing boats increase 15 percent per year.

7. Limited hostility effect in 1972; none thereafter.

ALTERNATIVE III

1. Government expenditures increase 5 billion $VN per year.

2. Exports remain unchanged from current level.

3. Taxes and savings as a percent of GNP remain unchanged from current level.

4. Livestock increase 3 percent per year.

5. No additional paddy land reclaimed.

6. Fishing boats increase 3 percent per year.

7. Severe hostility effects through 1973; none thereafter.

The detailed assumptions for the 68 predetermined variables in the model along with their 1971 and 1972 values are shown in Table 22. Of this group, 29 variables may be "predetermined" in the sense that predetermined values may be used in the framework for variables that generally are considered endogenous.

Framework Results

Detailed framework estimates of the projected endogenous variables for the three alternatives are shown in Table 23. Most of the results appear in the individual commodity sections along with detailed discussions.

Table 22.--Projection assumptions for predetermined variables--1973-77

Variable identification				1971 value	1972 value			Change each year from 1972 for alternative		
Description		Name	Number		I	II	III	I	II	III
GOVERNMENT EXPENDITURES	(BIL 1960 VN$)	G'	X0(01)	60.0	80.0	80.0	80.0	-3.0 bil.	n.c.	+5.0 bil.
TOTAL EXPORTS	(BIL 1960 VN$)	EX'	X0(02)	6.7	6.0	6.0	6.0	+10.0 %	+20.0%	n.c.
FACTOR PAYMENTS	(BIL 1960 VN$)	FP'	X0(03)	2.7	2.5	2.5	2.5	+10.0%	+20.0%	n.c.
TOTAL INVESTMENT	(BIL 1960 VN$)	I'	X0(04)	14.6	12.0	12.0	12.0	+8.0%	+15.0%	+3.0 bil.
EXPORTS LESS RUBBER	(BIL 1960 VN$)	EXOTH'	X0(05)	6.2	5.5	5.5	5.5	+10.0%	+20.0%	n.c.
FOREIGN AID	(BIL VN$)	A	X0(06)	30.0	37.0	37.0	37.0	-2.0 bil.	n.c.	+3.0 bil.
MONEY SUPPLY	(BIL VN$)	MO	X0(07)	162.9	208.4	208.4	208.4	+5.0%	+10.0%	+20.0%
IMPORT PRICE DEFLATOR	(1960=100)	PM	X0(08)	450.0	540.0	540.0	540.0	+50 pt.	+50 pt.	+50 pt.
REVENUE (TAX) FACTOR	(% OF GNP)	REVF	X0(09)	.129	.129	.129	.129	+.01 pt.	+.01 pt.	n.c.
SAVINGS FACTOR	(% OF GNP)	SAVF	X0(10)	.062	.062	.062	.062	+.01 pt.	+.01 pt.	n.c.
TRANSFER PAYMENTS	(BIL 1960 VN$)	TRANS	X0(11)	5.8	5.8	5.8	5.8	n.c.	n.c.	n.c.
BUSINESS TAX FACTOR	(% OF GNP)	BTAXF	X0(12)	.119	.119	.119	.119	+.01 pt.	+.01 pt.	n.c.
DEPRECIATION FACTOR	(% OF GNP)	DEPF	X0(13)	.034	.034	.034	.034	+.01 pt.	+.01 pt.	n.c.
SUBSIDIES	(BIL 1960 VN$)	SUB	X0(14)	.3	.3	.3	.3	n.c.	n.c.	n.c.
TOTAL POPULATION - SERIES 2	(MIL)	N2	X0(15)	18.7	19.3	19.3	19.3	+3.0%	+3.0%	+3.0%
RURAL POPULATION - SERIES 2	(MIL)	NR2	X0(16)	10.5	10.3	10.4	10.2	+.1 mil.	+.2 mil.	n.c.
URBAN POPULATION - SERIES 2	(MIL)	NU2	X0(17)	8.2	9.0	8.9	9.1	(N2-NR2)	(N2-NR2)	(N2-NR2)
LIVESTOCK INDEX	(1957-59=100)	IOA	X0(18)	149	154	154	152	+3.0%	+5.0%	+2.0 pt.
RETAIL CHICKEN PRICE (DEFLATED)	(VN$/100KG)	PCKR/CPI	X0(19)	8,319	7,500	7,500	7,500	n.c.	n.c.	n.c.
FISHING BOATS	(1000)	B	X0(20)	91.4	99.0	99.0	99.0	+8.0%	+15.0%	+3.0%
RUBBER PRICE (FOB SAIGON)	(VN$/KG)	PRUBF	X0(21)	25.29	21.16	21.16	21.16	n.c.	n.c.	n.c.
RUBBER OTHER TAPPABLE AREA ADJ.	(HECTARES)	DATA	X0(22)	-1,870	0	0	0	n.c.	n.c.	n.c.
RUBBER OTHER USE	(M.T.)	OTR	X0(23)	2,000	2,000	2,000	2,000	n.c.	n.c.	n.c.
TOTAL RUBBER PRODUCTION FACTOR	(1.0=LARGE PLAN.)	KR	X0(24)	1.1138	1.1250	1.1250	1.1250	n.c.	n.c.	n.c.
RUBBER EXPORTS	(US$ EQUIV)	PRUS	X0(25)	.3172	.2645	.2645	.2645	n.c.	n.c.	n.c.
IMPROVED RICE HECTARAGE	(100,000 HECTARES)	DIR	X0(26)	6.7	6.5	6.7	6.2	+.5 100,000	+1.0 100,000 1/	n.c.
RUBBER YIELD	(KG/TAP. H.)	NY	X0(27)	0	0	0	0	n.c.	n.c.	n.c.
WHOLESALE RUBBER PRICE	(VN$/KG)	PRBW	X0(28)	92.62	107.36	107.36	107.36	n.c.	n.c.	n.c.
RUBBER CUTTERS WAGES	(VN$/DAY)	WRUB	X0(29)	.0001	.0001	.0001	.0001	n.c.	n.c.	n.c.
TIME	(1951=1.0)	T51	X0(30)	21	22	22	22	+1.0 pt.	+1.0 pt.	+1.0 pt.
TIME (RUBBER CONSUMPTION)	(1960=1.0)	T60	X0(31)	11	11	11	11	n.c.	n.c.	n.c.
RUBBER YIELD DUMMY SHIFTER	(0 TO 4)	DY	X0(32)	0	0	0	0	n.c.	n.c.	n.c.
RUBBER PLANTINGS DUMMY SHIFTER	(0 TO 2)	DP	X0(33)	0	0	0	0	n.c.	n.c.	n.c.
TECHNOLOGY SHIFTER - RICE	(1960=60)	T'	X0(34)	79	80	80	80	+2.0 pt.	+2.0 pt.	+1.0 pt.
HOSTILITY LEVEL SHIFTER	(0 OR 1)	DHL	X0(35)	0	1.0	1.0	1.0	1973-77=0	1973-77=0	1973=1.0; 1974-77=0
OTHER YIELD FACTORS - DELTA	(NORMAL=100)	OUD	X0(36)	103	99	99	98	1973-77=100	1973-77=100	1973-77=100
OTHER YIELD FACTORS - OTHER	(NORMAL=100)	OUO	X0(37)	110	100	100	100	1973-77=100	1973-77=100	1973-77=100
RICE DELIVERY SHIFTER	(ONLY 1963=1)	D63	X0(38)	0	0	0	0	n.c.	n.c.	n.c.
TIME	(1960=60)	T	X0(39)	71	72	72	72	+1.0 pt.	+1.0 pt.	+1.0 pt.
IMPLICIT PRICE DELFATOR 2/	(1960=100)	PY	X0(40)	989	---	---	---			
GROSS NATIONAL PRODUCT (REAL) 2/	(BIL 1960 VN$)	GNP'	X0(41)	131.2	---	---	---			
NONFOOD CONSUMP EXPEND (REAL) 2/	(BIL 1960 VN$)	CN'	X0(42)	57.7	---	---	---			
FOOD CONSUMPTION (REAL) 2/	(BIL 1960 VN$)	CF'	X0(43)	44.3	---	---	---			

- Continued -

Table 22.--Projection assumptions for predetermined variables--1973-77--Continued

Variable identification				1971 value	1972 value			Change each year from 1972 for alternative		
Description		Name	Number		I	II	III	I	II	III
NATIONAL INCOME (REAL) 2/	(BIL 1960 VN$)	NI'	X0(44)	111.0	---	---	---			
HOUSEHOLD INCOME (REAL) 2/	(BIL 1960 VN$)	HI'	X0(45)	105.5	---	---	---			
FOOD EXPENDITURE PRICE DEFLATOR 2/	(1960=100)	PF	X0(46)	1,520	---	---	---			
NONFOOD EXPEND PRICE DEFLATOR 2/	(1960=100)	PNF	X0(47)	539	---	---	---			
DOMESTIC EXPENDITURE DEFLATOR 2/	(1960=100)	PE	X0(48)	613	---	---	---			
CONSUMER PRICE INDEX (INCLU RENT) 2/	(1963=100)	CPI	X0(49)	697	---	---	---			
RUBBER PLANTINGS (7 YEARS EARLIER) 2/	(HECTARES)	PLT-7	X0(50)	1,125	803	803	803	n.c.	n.c.	n.c.
RUBBER TREE REMOVALS 2/	(HECTARES)	RML	X0(51)	.0001	.0001	.0001	.0001	n.c.	n.c.	n.c.
RUBBER YIELD 2/	(KG/HECTARE)	YRUB	X0(52)	558	479	479	479	n.c.	n.c.	n.c.
PER CAPITA RUBBER CONSUMPTION 2/	(KG/CAP)	PCRB	X0(53)	.26	---	---	---			
TOTAL FISH CATCH 2/	(MIL. M.T.)	OPF	X0(54)	654	---	---	---			
DELTA PADDY HECTARES 2/	(1000 HECTARES)	HD	X0(55)	0	3/47.7	3/47.7	0	40.0 Thou.	80.0 Thou.	n.c.
OTHER PADDY HECTARES 2/	(1000 HECTARES)	HO	X0(56)	0	0	0	4/-52.75	10.0 Thou.	20.0 Thou.	n.c.
DELTA PADDY YIELD 2/	(KG/HECTARE)	YD	X0(57)	0	3/72.65	3/72.65	0	n.c.	n.c.	n.c.
OTHER PADDY YIELD 2/	(KG/HECTARE)	YO	X0(58)	0	0	0	4/-20.45	n.c.	n.c.	n.c.
CONTROLLED PORK SLAUGHTER 2/	(MIL.HEAD)	OPKC	X0(59)	1,115	---	---	---			
RICE-NET IMPORTS 2/	(KG/CAP)	RNIMP/N2	X0(60)	7.0	13	13	13	5/	5/	5/
WHOLESALE RICE PRICE (REAL) 2/	(VN$/100KG)	PRW/CPI	X0(61)	668	---	---	---			
FISH-NET IMPORTS 2/	(MIL. M.T.)	FNIMP	X0(62)	.0001	.0001	.0001	.0001	n.c.	-0.2 Thou.	n.c.
WHOLESALE PORK PRICE (REAL) 2/	(VN$/100KG)	PPKW/CPI	X0(63)	3,698	---	---	---			
WHOLESALE FISH PRICE (REAL) 2/	(VN$/100KG)	PFSHW/CPI	X0(64)	5,163	---	---	---			
RICE EQUIVALENT DELIVERIES 2/	(1000 M.T.)	QDEL	X0(65)	0	3/165	3/165	0	n.c.	n.c.	n.c.
ENDING SAIGON RICE STOCK CHANGE 2/	(1000 M.T.)	*ESTK	X0(66)	19	-25	-25	-25	n.c.	n.c.	n.c.
RICE EQUIVALENT PRODUCTION 2/	(1000 M.T.)	QRPV	X0(67)	3,794	0	0	0	n.c.	n.c.	n.c.
REAL IMPORTS 2/	(BIL 1960 VN$)	M'	X0(68)	54.5	70.0	70.0	70.0	-5.0 bil.	-2.0 bil.	+ 6.0 bil.

1/ IR variety hectares were increased 100,000 hectares per year to a peak of 1.0 million hectares.

2/ These variables are also included as endogenous or determined by the system. However, by using "0" for DEN(i), and "1" for DEX(i), a predetermined value may be used in place of the value determined by the system. These predetermined values are included in their appropriate data field in the exogenous set.

3/ For 1972 under Alternatives I and II the effects of including a "1" for the DHL5-8 variable were eliminated in the Delta hectares and yield equation as well as the deliveries function by adding back into the equation the positive value of the DHL coefficient in each equation. In the following years the increasing values of the estimated reclaimed paddy were used in the same data field.

4/ Under Alternative III for 1972, the impact of the DHL5-8 variable was assigned a value of "1" for the Delta region, and "2" for all others.

5/ Rice net imports were assigned the following predetermined values:

Alternative	1973	1974	1975	1976	1977
	Kg./capita				
I	25	12	5	0	0
II	18	4	0	-5	-5
III	38	46	35	25	15

Table 23.--Framework estimates of endogenous variables, 1972-77

Variable identification				Alternative I					
Description	Unit	Variable: Name	Variable: Number	1972	1973	1974	1975	1976	1977
DOMESTIC EXPENDITURE DEFLATOR	(1960=100)	PE	Y0(01)	760	960	1,034	1,086	1,139	1,195
IMPORT VALUE (REAL)	(BIL 1960 VN$)	M'	Y0(02)	70.0	75.0	60.0	55.0	50.0	45.0
GROSS NATIONAL PRODUCT (CURRENT)	(BIL VN$)	GNP	Y0(03)	1,336	2,047	2,385	2,714	3,094	3,536
GROSS NATIONAL PRODUCT (REAL)	(BIL 1960 VN$)	GNP'	Y0(04)	131	139	145	153	163	174
NONFOOD CONSUMPTION EXPENDITURE (REAL)	(BIL 1960 VN$)	CN'	Y0(05)	60.3	62.0	62.9	64.6	66.9	69.4
GROSS DOMESTIC EXPENDITURE (REAL)	(BIL VN$)	GDE'	Y0(06)	193	195	195	198	202	207
CONSUMER PRICE INDEX (INCLU RENT)	(1963=100)	CPI	Y0(07)	1,103	1,528	1,694	1,816	1,941	2,077
FOOD CONSUMPTION (REAL)	(BIL 1960 VN$)	CF'	Y0(08)	40.4	45.3	48.3	52.0	55.8	59.9
IMPLICIT PRICE DEFLATOR	(1960=100)	PY	Y0(09)	1,022	1,474	1,650	1,778	1,900	2,036
HOUSEHOLD INCOME (CURRENT)	(BIL VN$)	HI	Y0(10)	1,075	1,611	1,830	2,030	2,252	2,505
NONFOOD EXPENDITURE PRICE DEFLATOR	(1960=100)	PNF	Y0(11)	665	837	900	945	990	1,038
FOOD EXPENDITURE PRICE DEFLATOR	(1960=100)	PF	Y0(12)	2,096	2,975	3,321	3,578	3,841	4,125
NATIONAL INCOME (CURRENT)	(BIL VN$)	NI	Y0(13)	1,131	1,689	1,920	2,130	2,366	2,635
GOVERNMENT EXPENDITURE PRICE DEFLATOR	(1960=100)	PG	Y0(14)	419	515	550	575	600	627
EXPORT PRICE DEFLATOR	(1960=100)	PEX	Y0(15)	904	1,243	1,375	1,472	1,572	1,679
INVESTMENT PRICE DEFLATOR	(1960=100)	PI	Y0(16)	487	604	647	678	709	741
NATIONAL INCOME (REAL)	(BIL 1960 VN$)	NI'	Y0(17)	110.7	114.6	116.3	119.8	124.5	129.4
HOUSEHOLD INCOME (REAL)	(BIL 1960 VN$)	HI'	Y0(18)	105.2	109.3	110.9	114.2	118.5	123.0
PERSONAL CONSUMPTION DEFLATOR	(1960=100)	PC	Y0(19)	1,239	1,739	1,952	2,119	2,287	2,468
CONSUMER PRICE INDEX (EXCLU RENT)	(1963=100)	CPIX	Y0(20)	1,214	1,686	1,870	2,006	2,145	2,295
RUBBER PLANTINGS	(HECTARES)	PLT-7	Y0(21)	803	312	162	12	75	307
RUBBER TREE REMOVALS	(HECTARES)	RML	Y0(22)	.0001	.0001	.0001	.0001	.0001	.0001
RUBBER YIELD	(KG/HECTARE)	YRUB	Y0(23)	479	485	514	600	776	982
TAPPABLE AREA	(HECTARES)	TLA	Y0(24)	60,378	60,690	60,852	60,864	60,939	61,246
RUBBER PRODUCTION (LARGE PLANTATIONS)	(M.T.)	QRUB	Y0(25)	28,921	29,435	31,278	36,518	47,289	60,144
RUBBER PRODUCTION (TOTAL)	(M.T.)	TQRUB	Y0(26)	32,536	33,114	35,188	41,083	53,200	67,662
PER CAPITA RUBBER CONSUMPTION	(KG/CAP)	PCRB	Y0(27)	.38	.43	.43	.44	.46	.47
RUBBER CONSUMPTION	(M.T.)	CRUB	Y0(28)	7,373	8,486	8,848	9,321	9,946	10,594
RUBBER EXPORTS	(M.T.)	QREX	Y0(29)	23,163	22,628	24,340	29,763	41,254	55,067
RUBBER EXPORTS	(BIL 1960 VN$)	EXRUB'	Y0(30)	.05	.04	.04	.04	.06	.07
RUBBER EXPORTS	(MIL US$)	EXRUS	Y0(31)	6,127	5,985	6,438	7,872	10,912	14,565
RICE EQUIVALENT DELIVERIES	(1000 M.T.)	QDEL	Y0(32)	588	514	578	637	668	690
RICE DISAPPEARANCE	(KG/CAP)	QDV/N2	Y0(33)	205	195	191	192	195	202
ENDING SAIGON RICE STOCK CHANGE	(1000 M.T.)	#ESTK	Y0(34)	-25.0	.0001	.0001	.0001	.0001	.0001
WHOLESALE FISH PRICE (REAL)	(VN$/100KG)	PFSHW/CPI	Y0(35)	4,570	6,094	5,830	5,613	5,728	5,791
CONTROLLED PORK SLAUGHTER	(MIL.HEAD)	QPKC	Y0(36)	1.027	1.021	.998	1.114	1.029	.983
WHOLESALE RICE PRICE (REAL)	(VN$/100KG)	PRW/CPI	Y0(37)	654	745	780	791	788	755
WHOLESALE PORK PRICE (REAL)	(VN$/100KG)	PPKW/CPI	Y0(38)	3,800	4,605	4,545	4,401	4,575	4,677
FISH DOMESTIC DISAPPEARANCE	(MIL. M.T.)	QDF	Y0(39)	735	785	878	955	1,023	1,095
RICE EQUIVALENT PRODUCTION	(1000 M.T.)	QRPV	Y0(40)	3,375	3,678	3,947	4,237	4,533	4,833
TOTAL FISH CATCH	(MIL. M.T.)	QPF	Y0(41)	735	785	878	955	1,023	1,095
FISH-NET IMPORTS	(MIL. M.T.)	FNIMP	Y0(42)	.0001	.0001	.0001	.0001	.0001	.0001
RICE-NET IMPORTS	(KG/CAP)	RNIMP/N2	Y0(43)	13.0	25.0	12.0	5.0	.0001	.0001
DELTA PADDY HECTARES	(1000 HECTARES)	HD	Y0(44)	1,872	1,947	2,047	2,142	2,230	2,312
OTHER PADDY HECTARES	(1000 HECTARES)	HO	Y0(45)	672	699	756	829	911	998
DELTA PADDY YIELD	(KG/HECTARE)	YD	Y0(46)	2,268	2,393	2,425	2,457	2,489	2,521
OTHER PADDY YIELD	(KG/HECTARE)	YO	Y0(47)	2,053	2,105	2,136	2,168	2,199	2,231
ENDING SAIGON RICE STOCK	(1000 M.T.)	ESTK	Y0(48)	63.0	63.0	63.0	63.0	63.0	63.0

- Continued -

Table 23.--Framework estimates of endogenous variables, 1972-77--Continued

Variable identification				Alternative II					
Description	Unit	Variable		1972	1973	1974	1975	1976	1977
		Name	Number						
DOMESTIC EXPENDITURE DEFLATOR	(1960=100)	PE	YO(01)	760	963	1,077	1,186	1,302	1,428
IMPORT VALUE (REAL)	(BIL 1960 VN$)	M'	YO(02)	70.0	68.5	67.0	65.0	53.0	61.0
GROSS NATIONAL PRODUCT (CURRENT)	(BIL VN$)	GNP	YO(03)	1,346	2,160	2,833	3,654	4,617	5,772
GROSS NATIONAL PRODUCT (REAL)	(BIL 1960 VN$)	GNP'	YO(04)	131	147	164	184	204	225
NONFOOD CONSUMPTION EXPENDITURE (REAL)	(BIL 1960 VN$)	CN'	YO(05)	60.5	65.2	70.1	76.0	81.9	88.2
GROSS DOMESTIC EXPENDITURE (REAL)	(BIL VN$)	GDE'	YO(06)	193	206	219	235	250	265
CONSUMER PRICE INDEX (INCLU RENT)	(1963=100)	CPI	YO(07)	1,103	1,534	1,795	2,055	2,345	2,673
FOOD CONSUMPTION (REAL)	(BIL 1960 VN$)	CF'	YO(08)	40.8	47.0	53.1	60.2	66.7	72.8
IMPLICIT PRICE DEFLATOR	(1960=100)	PY	YO(09)	1,025	1,467	1,728	1,989	2,266	2,568
HOUSEHOLD INCOME (CURRENT)	(BIL VN$)	HI	YO(10)	1,084	1,700	2,175	2,734	3,364	4,092
NONFOOD EXPENDITURE PRICE DEFLATOR	(1960=100)	PNF	YO(11)	665	839	937	1,031	1,130	1,238
FOOD EXPENDITURE PRICE DEFLATOR	(1960=100)	PF	YO(12)	2,096	2,988	3,534	4,080	4,691	5,386
NATIONAL INCOME (CURRENT)	(BIL VN$)	NI	YO(13)	1,140	1,782	2,280	2,868	3,532	4,300
GOVERNMENT EXPENDITURE PRICE DEFLATOR	(1960=100)	PG	YO(14)	419	516	571	623	678	738
EXPORT PRICE DEFLATOR	(1960=100)	PEX	YO(15)	905	1,248	1,456	1,662	1,893	2,153
INVESTMENT PRICE DEFLATOR	(1960=100)	PI	YO(16)	488	606	673	736	804	877
NATIONAL INCOME (REAL)	(BIL 1960 VN$)	NI'	YO(17)	111.2	121.5	131.9	144.2	155.8	167.5
HOUSEHOLD INCOME (REAL)	(BIL 1960 VN$)	HI'	YO(18)	105.7	115.9	125.8	137.4	148.5	159.4
PERSONAL CONSUMPTION DEFLATOR	(1960=100)	PC	YO(19)	1,242	1,740	2,056	2,379	2,728	3,114
CONSUMER PRICE INDEX (EXCLU RENT)	(1963=100)	CPIX	YO(20)	1,215	1,693	1,983	2,271	2,593	2,956
RUBBER PLANTINGS	(HECTARES)	PLT-7	YO(21)	803	312	162	12	75	307
RUBBER TREE REMOVALS	(HECTARES)	RML	YO(22)	.0001	.0001	.0001	.0001	.0001	.0001
RUBBER YIELD	(KG/HECTARE)	YRUB	YO(23)	479	485	514	600	776	982
TAPPABLE AREA	(HECTARES)	TLA	YO(24)	60,378	60,690	60,852	60,864	60,939	61,246
RUBBER PRODUCTION (LARGE PLANTATIONS)	(M.T.)	QRUB	YO(25)	28,921	29,435	31,278	36,518	47,289	60,144
RUBBER PRODUCTION (TOTAL)	(M.T.)	TQRUB	YO(26)	32,536	33,114	35,188	41,083	53,200	67,662
PER CAPITA RUBBER CONSUMPTION	(KG/CAP)	PCRB	YO(27)	.38	.47	.53	.60	.68	.75
RUBBER CONSUMPTION	(M.T.)	CRUB	YO(28)	7,425	9,271	10,857	12,758	14,737	16,838
RUBBER EXPORTS	(M.T.)	QREX	YO(29)	23,111	21,843	22,331	26,326	36,463	48,823
RUBBER EXPORTS	(BIL 1960 VN$)	EXRUB'	YO(30)	.05	.04	.03	.03	.04	.05
RUBBER EXPORTS	(MIL US$)	EXRUS	YO(31)	6,113	5,777	5,906	6,963	9,644	12,914
RICE EQUIVALENT DELIVERIES	(1000 M.T.)	QDEL	YO(32)	588	525	590	648	697	734
RICE DISAPPEARANCE	(KG/CAP)	QDV/N2	YO(33)	205	189	191	205	219	234
ENDING SAIGON RICE STOCK CHANGE	(1000 M.T.)	*ESTK	YO(34)	-25.0	.0001	.0001	.0001	.0001	.0001
WHOLESALE FISH PRICE (REAL)	(VN$/100KG)	PFSHW/CPI	YO(35)	4,559	6,427	6,492	6,395	6,383	6,318
CONTROLLED PORK SLAUGHTER	(MIL.HEAD)	QPKC	YO(36)	1.027	1.020	0.981	1.142	1.179	1.249
WHOLESALE RICE PRICE (REAL)	(VN$/100KG)	PRW/CPI	YO(37)	656	805	838	787	732	674
WHOLESALE PORK PRICE (REAL)	(VN$/100KG)	PPKW/CPI	YO(38)	3,802	4,877	5,084	5,025	5,094	5,110
FISH DOMESTIC DISAPPEARANCE	(MIL. M.T.)	QDF	YO(39)	735	797	922	1,050	1,183	1,325
RICE EQUIVALENT PRODUCTION	(1000 M.T.)	QRPV	YO(40)	3,407	3,832	4,325	4,862	5,344	5,780
TOTAL FISH CATCH	(MIL. M.T.)	QPF	YO(41)	735	797	922	1,051	1,183	1,326
FISH-NET IMPORTS	(MIL. M.T.)	FNIMP	YO(42)	.0001	-.200	-.400	-.600	-.800	-1.000
RICE-NET IMPORTS	(KG/CAP)	RNIMP/N2	YO(43)	13.0	18.0	4.0	.0001	-5.0	-5.0
DELTA PADDY HECTARES	(1000 HECTARES)	HD	YO(44)	1,872	1,991	2,166	2,335	2,481	2,616
OTHER PADDY HECTARES	(1000 HECTARES)	HO	YO(45)	673	714	810	929	1,051	1,174
DELTA PADDY YIELD	(KG/HECTARE)	YD	YO(46)	2,289	2,439	2,503	2,567	2,613	2,640
OTHER PADDY YIELD	(KG/HECTARE)	YO	YO(47)	2,070	2,143	2,206	2,269	2,308	2,321
ENDING SAIGON RICE STOCK	(1000 M.T.)	ESTK	YO(48)	63.0	63.0	63.0	63.0	63.0	63.0

- Continued -

Table 23.--Framework estimates of endogenous variables, 1972-77--Continued

Variable identification				Alternative III					
Description	Unit	Variable		1972	1973	1974	1975	1976	1977
		Name	Number						
DOMESTIC EXPENDITURE DEFLATOR	(1960=100)	PE	Y0(01)	758	960	1,151	1,370	1,631	1,941
IMPORT VALUE (REAL)	(BIL 1960 VN$)	M'	Y0(02)	70.0	75.5	81.0	87.0	93.0	99.0
GROSS NATIONAL PRODUCT (CURRENT)	(BIL VN$)	GNP	Y0(03)	1,244	1.791	2,562	3,353	4,350	5.679
GROSS NATIONAL PRODUCT (REAL)	(BIL 1960 VN$)	GNP'	Y0(04)	125	128	137	139	140	142
NONFOOD CONSUMPTION EXPENDITURE (REAL)	(BIL 1960 VN$)	CN'	Y0(05)	58.6	60.5	64.2	65.8	67.3	68.8
GROSS DOMESTIC EXPENDITURE (REAL)	(BIL VN$)	GDE'	Y0(06)	187	196	210	218	225	233
CONSUMER PRICE INDEX (INCLU RENT)	(1963=100)	CPI	Y0(07)	1,100	1,527	1,971	2,521	3,228	4,139
FOOD CONSUMPTION (REAL)	(BIL 1960 VN$)	CF'	Y0(08)	36.7	37.8	43.1	44.0	44.4	45.2
IMPLICIT PRICE DEFLATOR	(1960=100)	PY	Y0(09)	992	1,397	1,869	2,411	3,100	3,998
HOUSEHOLD INCOME (CURRENT)	(BIL VN$)	HI	Y0(10)	1,001	1,443	2,067	2,707	3,514	4,589
NONFOOD EXPENDITURE PRICE DEFLATOR	(1960=100)	PNF	Y0(11)	663	837	1,001	1,189	1,413	1,679
FOOD EXPENDITURE PRICE DEFLATOR	(1960=100)	PF	Y0(12)	2,090	2,975	3,903	5,065	6,571	8,527
NATIONAL INCOME (CURRENT)	(BIL VN$)	NI	Y0(13)	1,053	1,517	2,170	2,840	3,685	4,810
GOVERNMENT EXPENDITURE PRICE DEFLATOR	(1960=100)	PG	Y0(14)	419	515	606	711	835	983
EXPORT PRICE DEFLATOR	(1960=100)	PEX	Y0(15)	902	1,242	1,595	2,033	2,595	3,320
INVESTMENT PRICE DEFLATOR	(1960=100)	PI	Y0(16)	487	604	716	844	996	1,177
NATIONAL INCOME (REAL)	(BIL 1960 VN$)	NI'	Y0(17)	106.2	108.6	116.1	117.8	118.8	120.3
HOUSEHOLD INCOME (REAL)	(BIL 1960 VN$)	HI'	Y0(18)	100.8	103.3	110.6	112.3	113.3	114.8
PERSONAL CONSUMPTION DEFLATOR	(1960=100)	PC	Y0(19)	1,213	1,660	2,166	2,742	3,464	4,392
CONSUMER PRICE INDEX (EXCLU RENT)	(1963=100)	CPIX	Y0(20)	1,211	1,686	2,178	2,788	3,573	4,584
RUBBER PLANTINGS	(HECTARES)	PLT-7	Y0(21)	803	312	162	12	75	307
RUBBER TREE REMOVALS	(HECTARES)	RML	Y0(22)	.0001	.0001	.0001	.0001	.0001	.0001
RUBBER YIELD	(KG/HECTARE)	YRUB	Y0(23)	479	485	514	600	776	982
TAPPABLE AREA	(HECTARES)	TLA	Y0(24)	60,378	60,690	60,852	60,864	60,939	61,246
RUBBER PRODUCTION (LARGE PLANTATIONS)	(M.T.)	ORUB	Y0(25)	28,921	29,435	31,278	36,518	47,289	60,144
RUBBER PRODUCTION (TOTAL)	(M.T.)	TORUB	Y0(26)	32,536	33,114	35,188	41,083	53,200	67,662
PER CAPITA RUBBER CONSUMPTION	(KG/CAP)	PCRB	Y0(27)	.36	.39	.45	.48	.50	.53
RUBBER CONSUMPTION	(M.T.)	CRUB	Y0(28)	6,924	7,840	9,258	10,095	10,919	11,856
RUBBER EXPORTS	(M.T.)	OREX	Y0(29)	23,612	23,274	23,929	28,989	40,281	53,806
RUBBER EXPORTS	(BIL 1960 VN$)	EXRUB'	Y0(30)	.06	.04	.03	.03	.03	.03
RUBBER EXPORTS	(MIL US$)	EXRUS	Y0(31)	6,245	6,156	6,329	7,667	10,654	14,232
RICE EQUIVALENT DELIVERIES	(1000 M.T.)	QDEL	Y0(32)	432	372	447	510	574	598
RICE DISAPPEARANCE	(KG/CAP)	QDV/N2	Y0(33)	205	194	196	197	188	176
ENDING SAIGON RICE STOCK CHANGE	(1000 M.T.)	#ESTK	Y0(34)	-25.0	.0001	.0001	.0001	.0001	.0001
WHOLESALE FISH PRICE (REAL)	(VN$/100KG)	PFSHW/CPI	Y0(35)	4,297	4,780	6,560	6,146	5,768	5,991
CONTROLLED PORK SLAUGHTER	(MIL.HEAD)	QPKC	Y0(36)	1.027	1.011	0.895	1.005	1.262	1.101
WHOLESALE RICE PRICE (REAL)	(VN$/100KG)	PRW/CPI	Y0(37)	640	727	731	721	790	878
WHOLESALE PORK PRICE (REAL)	(VN$/100KG)	PPKW/CPI	Y0(38)	3,612	3,929	4,923	4,664	4,342	4,645
FISH DOMESTIC DISAPPEARANCE	(MIL. M.T.)	QDF	Y0(39)	735	708	768	863	927	969
RICE EQUIVALENT PRODUCTION	(1000 M.T.)	QRPV	Y0(40)	3,099	3,069	3,425	3,534	3,598	3,692
TOTAL FISH CATCH	(MIL. M.T.)	QPF	Y0(41)	735	708	768	863	927	969
FISH-NET IMPORTS	(MIL. M.T.)	FNIMP	Y0(42)	.0001	.0001	.0001	.0001	.0001	.0001
RICE-NET IMPORTS	(KG/CAP)	RNIMP/N2	Y0(43)	13.0	38.0	46.0	35.0	25.0	15.0
DELTA PADDY HECTARES	(1000 HECTARES)	HD	Y0(44)	1,824	1,785	1,890	1,937	1,957	1,985
OTHER PADDY HECTARES	(1000 HECTARES)	HO	Y0(45)	617	579	616	650	680	723
DELTA PADDY YIELD	(KG/HECTARE)	YD	Y0(46)	2,150	2,202	2,347	2,347	2,347	2,347
OTHER PADDY YIELD	(KG/HECTARE)	YO	Y0(47)	2,011	2,046	2,067	2,067	2,067	2,067
ENDING SAIGON RICE STOCK	(1000 M.T.)	ESTK	Y0(48)	63.0	63.0	63.0	63.0	63.0	63.0

Listing of the Model

List of Equations

The list of equations in their machine language form is shown in Table 24. These equations identified by the list of variables are the same equations discussed in the commodity sections.

The list of equations is referred to as subroutine CEN. This subroutine is only one part of a larger computer program which employs the Gauss-Seidel iteration process.

List of Variables

Table 25 describes the endogenous (YO) variables determined by the framework and Table 26 gives the predetermined (XO) variables used in the framework. The identification lists include: (1) a short description of each variable; (2) the appropriate units of value the variable has in the framework; (3) the variable name, e.g. GNP' etc.; and (4) the variable number in the the framework, e.g. YO(Ø4), and XO(41). Those variables listed as both endogenous and predetermined are generally considered endogenous and therefore determined by the system. However, predetermined values may be entered into the framework for those endogenous variables appearing also as predetermined. This is particularly useful for projection purposes and for framework testings.

Table 24.--48-equation Vietnam model 1/

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RUBBER PLANTINGS                          (HECTARES)       PLT-7        YO(21)
      YO(21)=(-8474.7+1.2535*((X7(21)*X7(27))/X7(29))+.27989*((X8(21)
     1*X8(27))/X8(29))-.068529*((X9(21)*X9(27))/X9(29))+.20826*((X10(21)
     2*X10(27))/X10(29))+1.1103*((X11(21)*X11(27))/X11(29))+6.7151*
     3X7(27)+1676.1*XO(33))*DEN(21)+(DEX(21)*XO(50))+CONAD(21)

RUBBER TREE REMOVALS                      (HECTARES)       RML          YO(22)
      YO(22)=( 4252.7-4.7211*((XO(21)*XO(27))/XO(29))-.50919*((X1(21)*X1
     1(27))/X1(29))+1.4082*((X2(21)*X2(27))/X2(29))+1.0310*((X3(21)*
     2X3(27))/X3(29))-1.6406*((X4(21)*X4(27))/X4(29))-116.5*XO(30))
     3*DEN(22)+(DEX(22)*XO(51))+CONAD(22)

RUBBER YIELD                              (KG/HECTARE)     YRUB         YO(23)
      YO(23)=(244.49+6.9501*XO(21)+5.9563*X1(21)+4.8583*X2(21)+3.6561
     1*X3(21)+2.3499*X4(21)+.93958*X5(21)-.57488*X6(21)+34.186*XO(30)
     2-249.30*XO(32)+.18768*XO(29))*DEN(23)+(DEX(23)*XO(52))+CONAD(23)

TOTAL FISH CATCH                          (MIL. M.T.)      QPF          YO(41)
      YO(41)=(-61.97+1.794*XO(20)+0.0263*Y1(35)+0.7278*Y1(41)-60.57*
     1XO(35))*DEN(41)+(DEX(41)*XO(54))+CONAD(41)

DELTA PADDY HECTARES                      (1000 HECTARES) HD            YO(44)
      YO(44)=(691.28+0.395*Y1(44)+3.84*XO(34)+0.40*((1.49+0.616*(Y1(37)
     1* (Y1(20) *0.01)))/(Y1(20)*0.01))-95.4*XO(35))*DEN(44)+(DEX(44)*
     2XO(55))+CONAD(44)

OTHER PADDY HECTARES                      (1000 HECTARES) HO            YO(45)
      YO(45)=(-267.8+0.927*Y1(45)+17.13*XO(16)+0.31*((116.03+0.7545*
     1(Y1(37)*(Y1(20)*0.01)))/(Y1(20)*0.01))-52.75*XO(35))*DEN(45)+
     2(DEX(45)*XO(56))+CONAD(45)

DELTA PADDY YIELD                         (KG/HECTARE)     YD           YO(46)
      YO(46)=(-1287.4+37.11*XO(26)+136.0*XO(16)-145.3*XO(35)+20.06*
     1XO(36))*DEN(46)+(DEX(46)*XO(57))+CONAD(46)

OTHER PADDY YIELD                         (KG/HECTARE)     YO           YO(47)
      YO(47)=(-719.1+49.39*XO(26)+68.11*XO(16)-20.45*XO(35)+17.7*XO
     1(37))*DEN(47)+(DEX(47)*XO(58))+CONAD(47)

RICE EQUIVALENT PRODUCTION                (1000 M.T.)      QRPV         YO(40)
       YO(40)=(((YO(44)*YO(46))+(YO(45)*YO(47)))*0.0006) *DEN(40)+
     1(DEX(40)*XO(67))

INVESTMENT PRICE DEFLATOR                 (1960=100)       PI           YO(16)
      YO(16)=(44.20+0.5834*YO(01))+CONAD(16)

GOVERNMENT EXPENDITURE PRICE DEFLATOR     (1960=100)       PG           YO(14)
      YO(14)=(56.95+0.477*YO(01))+CONAD(14)

NATIONAL INCOME (CURRENT)                 (BIL VN$)        NI           YO(13)
      YO(13)=(YO(03)-(YO(03)*(XO(12)+XO(13)))-XO(14))+CONAD(13)

HOUSEHOLD INCOME (CURRENT)                (BIL VN$)        HI           YO(10)
      YO(10)=(YO(03)-(YO(03)*(XO(09)+XO(10)))-XO(11))+CONAD(10)

EXPORT PRICE DEFLATOR                     (1960=100)       PEX          YO(15)
      YO(15)=(-11.354+0.7954*YO(07)+1.8370*XO(21))+CONAD(15)

IMPORT VALUE (REAL)                       (BIL 1960 VN$)   M'           YO(02)
      YO(02)=(8.22-0.1175*YO(04)+2.4768*XO(06))*DEN(02)+DEX(02)*XO(68)
     1+CONAD(02)

DOMESTIC EXPENDITURE DEFLATOR             (1960=100)       PE           YO(01)
      YO(01)=(13.62+0.2636*YO(06)+2.845*XO(07)+0.1672*Y1(01))*DEN(01)
     1+(DEX(01)*XO(48))+CONAD(01)
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-Continued -

Table 24.--48-equation Vietnam model 1/--Continued

```
CONSUMER PRICE INDEX (EXCLU RENT)          (1963=100)       CPIX          YO(20)
      YO(20)=(-9.28+1.1097*YO(07))+CONAD(20)

GROSS NATIONAL PRODUCT (CURRENT)           (BIL VN$)        GNP           YO(03)
      YO(03)=((YO(04)*YO(09))*0.01)+CONAD(03)

NONFOOD EXPENDITURE PRICE DEFLATOR         (1960=100)       PNF           YO(11)
      YO(11)=(12.029+0.8589*YO(01))*DEN(11)+(DEX(11)*XO(47))+CONAD(11)

FOOD EXPENDITURE PRICE DEFLATOR            (1960=100)       PF            YO(12)
      YO(12)= -0.98918+1.49634*DLOG10(YO(01))
      YO(12)=(10**YO(12))*DEN(12)+(DEX(12)*XO(46))+CONAD(12)

CONSUMER PRICE INDEX (INCLU RENT)          (1963=100)       CPI           YO(07)
      YO(07)=(13.130+0.299*YO(11)+0.425*YO(12))*DEN(07)+(DEX(07)*XO(49))
     1+CONAD(07)

GROSS DOMESTIC EXPENDITURE (REAL)          (BIL VN$)        GDE'          YO(06)
      YO(06)=(YO(02)+YO(04)-YO(30)-XO(03)-XO(05))

NONFOOD CONSUMPTION EXPENDITURE (REAL)     (BIL 1960 VN$)   CN'           YO(05)
      YO(05)=(7.296+0.1729*YO(02)+0.3128*YO(04))*DEN(05)+(DEX(05)*
     1XO(42))+CONAD(05)

NATIONAL INCOME (REAL)                     (BIL 1960 VN$)   NI'           YO(17)
      YO(17)=(YO(04)-(YO(04)*(XO(12)+XO(13)))-((XO(14)/YO(09))*100.))*
     1DEN(17)+(DEX(17)*XO(44))

PERSONAL CONSUMPTION DEFLATOR              (1960=100)       PC            YO(19)
      YO(19)=((YO(08)*YO(12)+YO(05)*YO(11))/(YO(08)+YO(05)))

HOUSEHOLD INCOME (REAL)                    (BIL 1960 VN$)   HI'           YO(18)
      YO(18)=(YO(04)-(YO(04)*(XO(09)+XO(10)))-((XO(11)/YO(09))*100.))*
     1DEN(18)+(DEX(18)*XO(45))+CONAD(18)

GROSS NATIONAL PRODUCT (REAL)              (BIL 1960 VN$)   GNP'          YO(04)
      YO(04)=(-YO(02)+YO(05)+XO(04)+YO(08)+XO(01)+XO(03)+XO(05)+YO(30))*
     1DEN(04)+(DEX(04)*XO(41))

IMPLICIT PRICE DEFLATOR                    (1960=100)       PY            YO(09)
      YO(09)=(((YO(08)*YO(12)+YO(05)*YO(11)+XO(04)*YO(16)+XO(01)*YO(14)
     1-YO(02)*XO(08)+(XO(05)+YO(30)+XO(03))*YO(15))/YO(04)))*DEN(09)+
     2(DEX(09)*XO(40))

FOOD CONSUMPTION (REAL)                    (BIL 1960 VN$)   CF'           YO(08)
      YO(08)=(-12.4986+0.00775*(1.667*YO(40))+.0558*XO(18)+0.00277*
     1(YO(43)*XO(15)))*DEN(08)+(DEX(08)*XO(43))+CONAD(08)

PER CAPITA RUBBER CONSUMPTION              (KG/CAP)         PCRB          YO(27)
      YO(27)=(-14.443833+.121798*XO(31)-.318744*DLOG(XO(28)/(YO(20)*
     10.01))+1.483221*DLOG((YO(17)*1000.)/XO(15)))
      YO(27)=(DEXP(YO(27)))*DEN(27)+(DEX(27)*XO(53))+CONAD(27)

RUBBER CONSUMPTION                         (M.T.)           CRUB          YO(28)
      YO(28)=(YO(27)*XO(15)*1000.)

TAPPABLE AREA                              (HECTARES)       TLA           YO(24)
      YO(24)=(Y1(24)+YO(21)-YO(22)-XO(22))

RUBBER PRODUCTION (LARGE PLANTATIONS)      (M.T.)           QRUB          YO(25)
      YO(25)=((YO(24)*YO(23))/1000.)

RUBBER PRODUCTION (TOTAL)                  (M.T.)           TQRUB         YO(26)
      YO(26)=(XO(24)*YO(25))
```

- Continued -

Table 24.--48-equation Vietnam model 1/--Continued

```
RUBBER EXPORTS                          (M.T.)          QREX        YO(29)
      YO(29)=(YO(26)-YO(28)-XO(23))

RUBBER EXPORTS                          (BIL 1960 VN$)  EXRUB'      YO(30)
      YO(30)=((YO(29)*XO(21))/(YO(15)*10000.))

RUBBER EXPORTS                          (MIL US$)       EXRUS       YO(31)
      YO(31)=(YO(29)*XO(25))

CONTROLLED PORK SLAUGHTER               (MIL.HEAD)      QPKC        YO(36)
      YO(36)=(.963+0.072*(Y1(38)/Y1(37))+0.216*(Y2(38)/Y2(37))+0.011*
     1(X1(19)/Y1(37))-0.058*(X2(19)/Y2(37))-0.015*XO(39))*DEN(36)+
     2(DEX(36)*XO(59))+CONAD(36)

RICE-NET IMPORTS                        (KG/CAP)        RNIMP/N2    YO(43)
      YO(43)=(66.301-1.918*(YO(32)/XO(15))-0.074*Y1(48))*DEN(43)+
     1(DEX(43)*XO(60))+CONAD(43)

WHOLESALE RICE PRICE (REAL)             (VN$/100KG)     PRW/CPI     YO(37)
      YO(37)=(1299.3-7.197*YO(33)+3.276*X1(18)+62.268*(YO(18)/XO(15)))
     1*DEN(37)+(DEX(37)*XO(61))+CONAD(37)

ENDING SAIGON RICE STOCK                (1000 M.T.)     ESTK        YO(48)
      YO(48)=(Y1(48)-YO(34))

FISH-NET IMPORTS                        (MIL. M.T.)     FNIMP       YO(42)
      YO(42)=(75.17-1.943*XO(39)+2.745*XO(35)+0.0127*YO(35))*DEN(42)+
     1(DEX(42)*XO(62))+CONAD(42)

RICE EQUIVALENT DELIVERIES              (1000 M.T.)     QDEL        YO(32)
      YO(32)=(Y1(40)*(0.071+0.503*(YO(37)/YO(38))-0.044*XO(35)+0.084*
     1XO(38)))*DEN(32)+(DEX(32)*XO(65))+CONAD(32)

WHOLESALE PORK PRICE (REAL)             (VN$/100KG)     PPKW/CPI    YO(38)
      YO(38)=(815.1-802.6*YO(36)+0.6264*YO(37)+0.4533*YO(35)+12.62*
     1YO(18))*DEN(38)+(DEX(38)*XO(63))+CONAD(38)

WHOLESALE FISH PRICE (REAL)             (VN$/100KG)     PFSHW/CPI   YO(35)
      YO(35)=(8089.690-79.4281*(YO(39)/XO(17))-725.4869*XO(35)
     1+0.86180*YO(38)+145.1938*(YO(18)/XO(15)))*DEN(35)+(DEX(35)*XO(64))
     2+CONAD(35)

FISH DOMESTIC DISAPPEARANCE             (MIL. M.T.)     QDF         YO(39)
      YO(39)=(YO(41)+YO(42))

ENDING SAIGON RICE STOCK CHANGE         (1000 M.T.)     *ESTK       YO(34)
      YO(34)=(78.15+0.233*((Y1(40)+(YO(43)*XO(15)))-(Y2(40)+(Y1(43)*
     1X1(15)))))-0.217*YO(37))*DEN(34)+(DEX(34)*XO(66))+CONAD(34)

RICE DISAPPEARANCE                      (KG/CAP)        QDV/N2      YO(33)
      YO(33)= (Y1(40)/XO(15))+YO(43)+(YO(34)/XO(15))
```

1/ Many of the equations have supplementary variables included. These variables are DEN(i); DEX(i); and CONAD(i). The DEN and DEX variables are employed as "1" or "0" values to enable the particular equation to retain its generated value (DEN=1), or to take a preassigned exogenous value (DEX=1). This option allows some flexibility in manipulating the entire system. The CONAD variable is a device that permits the intercept of an equation to be shifted by a constant amount.

Table 25.--Glossary of endogenous variables

DOMESTIC EXPENDITURE DEFLATOR	(1960=100)	PE	YO(01)
IMPORT VALUE (REAL)	(BIL 1960 VN$)	M'	YO(02)
GROSS NATIONAL PRODUCT (CURRENT)	(BIL VN$)	GNP	YO(03)
GROSS NATIONAL PRODUCT (REAL)	(BIL 1960 VN$)	GNP'	YO(04)
NONFOOD CONSUMPTION EXPENDITURE (REAL)	(BIL 1960 VN$)	CN'	YO(05)
GROSS DOMESTIC EXPENDITURE (REAL)	(BIL VN$)	GDE'	YO(06)
CONSUMER PRICE INDEX (INCLU RENT)	(1963=100)	CPI	YO(07)
FOOD CONSUMPTION (REAL)	(BIL 1960 VN$)	CF'	YO(08)
IMPLICIT PRICE DEFLATOR	(1960=100)	PY	YO(09)
HOUSEHOLD INCOME (CURRENT)	(BIL VN$)	HI	YO(10)
NONFOOD EXPENDITURE PRICE DEFLATOR	(1960=100)	PNF	YO(11)
FOOD EXPENDITURE PRICE DEFLATOR	(1960=100)	PF	YO(12)
NATIONAL INCOME (CURRENT)	(BIL VN$)	NI	YO(13)
GOVERNMENT EXPENDITURE PRICE DEFLATOR	(1960=100)	PG	YO(14)
EXPORT PRICE DEFLATOR	(1960=100)	PEX	YO(15)
INVESTMENT PRICE DEFLATOR	(1960=100)	PI	YO(16)
NATIONAL INCOME (REAL)	(BIL 1960 VN$)	NI'	YO(17)
HOUSEHOLD INCOME (REAL)	(BIL 1960 VN$)	HI'	YO(18)
PERSONAL CONSUMPTION DEFLATOR	(1960=100)	PC	YO(19)
CONSUMER PRICE INDEX (EXCLU RENT)	(1963=100)	CPIX	YO(20)
RUBBER PLANTINGS	(HECTARES)	PLT-7	YO(21)
RUBBER TREE REMOVALS	(HECTARES)	RML	YO(22)
RUBBER YIELD	(KG/HECTARE)	YRUB	YO(23)
TAPPABLE AREA	(HECTARES)	TLA	YO(24)
RUBBER PRODUCTION (LARGE PLANTATIONS)	(M.T.)	QRUB	YO(25)
RUBBER PRODUCTION (TOTAL)	(M.T.)	TQRUB	YO(26)
PER CAPITA RUBBER CONSUMPTION	(KG/CAP)	PCRB	YO(27)
RUBBER CONSUMPTION	(M.T.)	CRUB	YO(28)
RUBBER EXPORTS	(M.T.)	QREX	YO(29)
RUBBER EXPORTS	(BIL 1960 VN$)	EXRUB'	YO(30)
RUBBER EXPORTS	(MIL US$)	EXRUS	YO(31)
RICE EQUIVALENT DELIVERIES	(1000 M.T.)	QDEL	YO(32)
RICE DISAPPEARANCE	(KG/CAP)	QDV/N2	YO(33)
ENDING SAIGON RICE STOCK CHANGE	(1000 M.T.)	*ESTK	YO(34)
WHOLESALE FISH PRICE (REAL)	(VN$/100KG)	PFSHW/CPI	YO(35)
CONTROLLED PORK SLAUGHTER	(MIL.HEAD)	QPKC	YO(36)
WHOLESALE RICE PRICE (REAL)	(VN$/100KG)	PRW/CPI	YO(37)
WHOLESALE PORK PRICE (REAL)	(VN$/100KG)	PPKW/CPI	YO(38)
FISH DOMESTIC DISAPPEARANCE	(MIL. M.T.)	QDF	YO(39)
RICE EQUIVALENT PRODUCTION	(1000 M.T.)	QRPV	YO(40)
TOTAL FISH CATCH	(MIL. M.T.)	QPF	YO(41)
FISH-NET IMPORTS	(MIL. M.T.)	FNIMP	YO(42)
RICE-NET IMPORTS	(KG/CAP)	RNIMP/N2	YO(43)
DELTA PADDY HECTARES	(1000 HECTARES)	HD	YO(44)
OTHER PADDY HECTARES	(1000 HECTARES)	HO	YO(45)
DELTA PADDY YIELD	(KG/HECTARE)	YD	YO(46)
OTHER PADDY YIELD	(KG/HECTARE)	YO	YO(47)
ENDING SAIGON RICE STOCK	(1000 M.T.)	ESTK	YO(48)

Table 26.--Glossary of predetermined variables

GOVERNMENT EXPENDITURES	(BIL 1960 VN$)	G'	X0(01)
TOTAL EXPORTS	(BIL 1960 VN$)	EX'	X0(02)
FACTOR PAYMENTS	(BIL 1960 VN$)	FP'	X0(03)
TOTAL INVESTMENT	(BIL 1960 VN$)	I'	X0(04)
EXPORTS LESS RUBBER	(BIL 1960 VN$)	EXOTH'	X0(05)
FOREIGN AID	(BIL VN$)	A	X0(06)
MONEY SUPPLY	(BIL VN$)	MO	X0(07)
IMPORT PRICE DEFLATOR	(1960=100)	PM	X0(08)
REVENUE (TAX) FACTOR	(% OF GNP)	REVF	X0(09)
SAVINGS FACTOR	(% OF GNP)	SAVF	X0(10)
TRANSFER PAYMENTS	(BIL 1960 VN$)	TRANS	X0(11)
BUSINESS TAX FACTOR	(% OF GNP)	BTAXF	X0(12)
DEPRECIATION FACTOR	(% OF GNP)	DEPF	X0(13)
SUBSIDIES	(BIL 1960 VN$)	SUB	X0(14)
TOTAL POPULATION - SERIES 2	(MIL)	N2	X0(15)
RURAL POPULATION - SERIES 2	(MIL)	NR2	X0(16)
URBAN POPULATION - SERIES 2	(MIL)	NU2	X0(17)
LIVESTOCK INDEX	(1957-59=100)	IOA	X0(18)
RETAIL CHICKEN PRICE (DEFLATED)	(VN$/100KG)	PCKR/CPI	X0(19)
FISHING BOATS	(1000)	B	X0(20)
RUBBER PRICE (FOB SAIGON)	(VN$/KG)	PRUBF	X0(21)
RUBBER OTHER TAPPABLE AREA ADJ.	(HECTARES)	OATA	X0(22)
RUBBER OTHER USE	(M.T.)	OTR	X0(23)
TOTAL RUBBER PRODUCTION FACTOR	(1.0=LARGE PLAN.)	KR	X0(24)
RUBBER EXPORTS	(US$ EQUIV)	PRUS	X0(25)
IMPROVED RICE HECTARAGE	(100,000 HECTARES)	DIR	X0(26)
RUBBER YIELD	(KG/TAP. H.)	NY	X0(27)
WHOLESALE RUBBER PRICE	(VN$/KG)	PRBW	X0(28)
RUBBER CUTTERS WAGES	(VN$/DAY)	WRUB	X0(29)
TIME	(1951=1.0)	T51	X0(30)
TIME (RUBBER CONSUMPTION)	(1960=1.0)	T60	X0(31)
RUBBER YIELD DUMMY SHIFTER	(0 TO 4)	DY	X0(32)
RUBBER PLANTINGS DUMMY SHIFTER	(0 TO 2)	DP	X0(33)
TECHNOLOGY SHIFTER - RICE	(1960=60)	T'	X0(34)
HOSTILITY LEVEL SHIFTER	(0 OR 1)	DHL	X0(35)
OTHER YIELD FACTORS - DELTA	(NORMAL=100)	OUD	X0(36)
OTHER YIELD FACTORS - OTHER	(NORMAL=100)	OUO	X0(37)
RICE DELIVERY SHIFTER	(ONLY 1963=1)	D63	X0(38)
TIME	(1960=60)	T	X0(39)
IMPLICIT PRICE DELFATOR	(1960=100)	PY	X0(40)
GROSS NATIONAL PRODUCT (REAL)	(BIL 1960 VN$)	GNP'	X0(41)
NONFOOD CONSUMP EXPEND (REAL)	(BIL 1960 VN$)	CN'	X0(42)
FOOD CONSUMPTION (REAL)	(BIL 1960 VN$)	CF'	X0(43)
NATIONAL INCOME (REAL)	(BIL 1960 VN$)	NI'	X0(44)
HOUSEHOLD INCOME (REAL)	(BIL 1960 VN$)	HI'	X0(45)
FOOD EXPENDITURE PRICE DEFLATOR	(1960=100)	PF	X0(46)
NONFOOD EXPEND PRICE DEFLATOR	(1960=100)	PNF	X0(47)
DOMESTIC EXPENDITURE DEFLATOR	(1960=100)	PE	X0(48)
CONSUMER PRICE INDEX (INCLU RENT)	(1963=100)	CPI	X0(49)
RUBBER PLANTINGS (7 YEARS EARLIER)	(HECTARES)	PLT-7	X0(50)
RUBBER TREE REMOVALS	(HECTARES)	RML	X0(51)
RUBBER YIELD	(KG/HECTARE)	YRUB	X0(52)
PER CAPITA RUBBER CONSUMPTION	(KG/CAP)	PCRB	X0(53)
TOTAL FISH CATCH	(MIL. M.T.)	QPF	X0(54)
DELTA PADDY HECTARES	(1000 HECTARES)	HD	X0(55)
OTHER PADDY HECTARES	(1000 HECTARES)	HO	X0(56)
DELTA PADDY YIELD	(KG/HECTARE)	YD	X0(57)
OTHER PADDY YIELD	(KG/HECTARE)	YO	X0(58)
CONTROLLED PORK SLAUGHTER	(MIL.HEAD)	QPKC	X0(59)
RICE-NET IMPORTS	(KG/CAP)	RNIMP/N2	X0(60)
WHOLESALE RICE PRICE (REAL)	(VN$/100KG)	PRW/CPI	X0(61)
FISH-NET IMPORTS	(MIL. M.T.)	FNIMP	X0(62)
WHOLESALE PORK PRICE (REAL)	(VN$/100KG)	PPKW/CPI	X0(63)
WHOLESALE FISH PRICE (REAL)	(VN$/100KG)	PFSHW/CPI	X0(64)
RICE EQUIVALENT DELIVERIES	(1000 M.T.)	QDEL	X0(65)
ENDING SAIGON RICE STOCK CHANGE	(1000 M.T.)	*ESTK	X0(66)
RICE EQUIVALENT PRODUCTION	(1000 M.T.)	QRPV	X0(67)
REAL IMPORTS	(BIL 1960 VN$)	M'	X0(68)

DEMAND ANALYSES OF HOUSEHOLD EXPENDITURE DATA

Demand analyses attempt to identify and measure major forces influencing how much food consumers will buy. Demand is not need, but need backed by purchasing power and a willingness to buy.

Demand expansion for food is determined in large measure by population growth, especially population backed by the ability and desire to buy. Obviously, the ability and willingness to buy is determined by consumer income, the relative price of a commodity, prices of closely competing products, and many other considerations influencing consumer preference for a commodity--cultural and religious taste preferences, health consideration, rural-urban differences in diet, distribution of income, age, and many others. Demand forces and their relative importance--elasticities--are discussed in the chapter on methodology and in each chapter on commodity analyses.

A rather comprehensive and apparently carefully-conducted survey was carried out from 1969 to 1970 for five major cities of South Vietnam. Household expenditures for food were surveyed each month. 17/ The sample plan included 1,800 households in Saigon and approximately 900 each in Can Tho, Dalat, Nha Trang, and Danang.

The survey provides possibly the most complete set of recent statistical information available on consumer preferences and the buying habits of urban households in South Vietnam. Basic data by household expenditure groupings and data on the number of persons per household for each city were manipulated on the computer to provide a rather complete set of information relating to urban families and their consumption patterns.

Because this special survey data is available, our main objective in this chapter is to examine differences in consumer preferences as reflected in income and expenditure patterns for urban households. Although no attempt was made to examine the survey information in complete detail, some useful and interesting results are available for more in-depth analyses for the major urban areas in Vietnam.

The major demand factor measured is buying power, but expenditure patterns also reflect the impact of cultural, religious, health, or other demand forces which may be closely correlated with household expenditure (income) levels. In an economy where savings are small, household expenditures and income are essentially the same. This will be especially so for the main range of the data--excluding the very low and very high income and expenditure levels. Urban consumer expenditure patterns and the expenditure elasticities computed

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17/ "Resultats De L'enquete Sur Budgets Familiaux Dans Les Principaux Centres Urbains Du Vietnâm." Published by the National Institute of Statistics in their Monthly Statistical Bulletin, No. 9, 1971.

By definition, a household was an extended family living together and contributing in common to the income and expenditures of the household.

for this appraisal are adequate indicators of consumer preferences for different types of food in South Vietnam. And, expenditure elasticities are reasonable proxies for income elasticities of the type usually computed and used in the United States and other countries.

Family Size and Expenditures

Summary data for all cities show the expected rise in average size of "family" as household expenditures increase. In the higher expenditure groupings, many households report more than 10 persons per unit. Average number of persons per household range from about 3 3/4 for those units spending less than 100,000 piasters per year, to 9 1/2 persons in households spending more than 400,000 piasters. Expenditures per household range from about 79,500 piasters average for those households spending under 100,000 piasters per year to an average of over 628,000 for those spending more than 400,000 piasters. Similar comparison data on a per capita basis range from around 21,000 piasters for the low to about 66,000 for the highest household expenditure group.

As expected, percent of total outlays spent for food declines from nearly 73 percent for those households spending less than 100,000 piasters to 54 percent for those with annual expenditures above 400,000 piasters. But the relative importance in the diet of such foods as cereals and cereal products, pork, fish, vegetables, and "eating out" merits individual attention.

Per capita expenditures for such staple foods as cereals and cereal products (mainly rice), fish, vegetables, and oils continue to rise for each higher household expenditure group. But gains are not as pronounced as they are for such foods as poultry, pork, beef, fruits, and others high in the consumer preference ranking (Table 27).

Elasticities for Major Foods

To measure relative consumer preference for major foods, per capita expenditures for each food group were related to per capita total expenditure, a reasonable proxy for income where household saving is very small. Expenditure elasticities computed in these relationships can be interpreted much as an elasticity of expenditure relative to income. 18/ The extent to which there

18/ The relationship of each expenditure item to total expenditures was expressed in logarithmic form as follows:

$$\log E_f = a + b \log E$$

where per capita expenditure for food (E_f) was expressed as a function of per capita total expenditure (E). In this double log relationship, (b) is the elasticity of per capita food expenditure relative to total per capita expenditure (income). These computations were carried out for the high and low household expenditure groups, all groups in each of the five cities, and the total of the five cities (urban Vietnam).

Table 27.--Vietnam urban households: Family size and annual household expenditures for selected cost of living items

Item	Household expenditure groups 1/					Total or average
	Under 100,000	100,000 to 200,000	200,000 to 300,000	300,000 to 400,000	Over 400,000	
Number of households	275	1,449	1,411	817	1,282	5,234
Persons per household (Number)	3.75	5.50	7.25	8.42	9.54	7.33
Expenditure per household (1,000 $VN)	79.41	157.54	251.47	350.77	628.20	324.20
Expenditure per person (1,000 $VN)	21.16	28.63	34.69	41.67	65.85	44.26
Food expenditure (% of total expenditures)	72.9	69.3	66.9	65.0	54.1	60.9
Cereals and products (")	18.6	15.6	13.2	11.3	7.8	10.7
Fish (")	14.6	12.4	11.2	9.7	7.2	9.3
Pork (")	8.7	8.7	8.6	8.6	7.6	8.2
Poultry (")	0.9	1.3	2.1	3.0	3.4	2.7
Fresh vegetables (")	8.9	7.5	6.8	6.2	4.4	5.7
Eating out (")	7.9	10.4	12.1	12.9	10.5	11.2
Food expenditure (1,000 $VN)	15.43	19.83	23.20	27.08	35.61	26.94
Cereals and products (")	3.93	4.47	4.58	4.70	5.15	4.74
Fish (")	3.09	3.56	3.87	4.06	4.76	4.10
Pork (")	1.84	2.48	2.97	3.60	5.05	3.62
Poultry (")	0.18	.37	.73	1.26	2.22	1.21
Fresh vegetables (")	1.87	2.15	2.36	2.56	2.87	2.50
Eating out (")	1.68	2.99	4.19	5.36	6.89	4.94

1/ Annual expenditures (piasters) per household for survey year 1969-70.

are dissavings at the lowest expenditure level, income elasticities are somewhat smaller than expenditure elasticities. Similarly, some savings at the high end of the income range would result in income elasticities somewhat higher than expenditure elasticities. But the basic interpretation of the data would remain essentially unchanged.

The income elasticity of demand for all food in urban Vietnam approximates .75. This suggests that a 10-percent increase in per capita total expenditure (income) results in an increase of 7 to 8 percent in real outlays for food. The indicated gain in food expenditures with a 10-percent increase in income is more than 8 percent for the low and around 6 1/2 percent for the higher household expenditure groups. Consumer preferences for the staple lower elasticity foods range from 0.2 to 0.5; 0.3 to 0.5 for the lower household expenditure groups and 0.2 to 0.3 for the higher income levels. However, most food groups show higher elasticities at the lower than at the higher income levels. These relationships of food expenditures to income run pretty much as would be expected for the major basic staple foods. Expenditures for pork and eggs generally range from 0.5 to 1.0 (with pork somewhat higher in Saigon), suggesting a strong consumer demand. The highest elasticity foods--those most responsive to income changes in buying power--include poultry, a highly-preferred meat, as well as beef, other meats, sugar products, and fresh fruit (Table 28).

Response of food expenditures to total expenditure (income) groups shows a clear consumer preference for poultry and pork over fish, though fish is more important in terms of expenditures than either in the diet. Poultry purchases expand rapidly in the higher income groups. Results were a bit surprising for "eating out," where expenditures were more responsive to income at lower than at higher income levels. Perhaps many of the higher income families have their food prepared at home and thus show less preference for eating out.

Elasticities for fresh fruit exhibit considerable instability; a number of possible explanations might be advanced. The data make no allowance for quality differences in fruits (or in other foods for that matter) purchased by low and higher income households. The high income families may be eating quite different fruits than lower expenditure households. But the economic significance may be much as desired since the higher priced foods purchased at high income levels may also require more resources to produce. In some regions, too, fruits consumed by the lower income households may be largely a "free good" plucked from a home garden. In this connection, food items reported in "home production" may be mostly fruits and vegetables which would greatly influence reported household outlays for fruits and vegetables. It was interesting that over 85 percent of total urban "value of home food production" for the lower household expenditure groups was in Dalat.

Outlays for soft drinks, alcoholic beverages, clothing, utilities, household equipment, and services are very responsive to rising incomes. Increases for these family living items account for much of the expenditures diverted from the more basic staple foods as incomes rise.

Table 28.--Per capita expenditure elasticities for high and low household expenditure groups 1/

Item	Household expenditures					
	Vietnam			Saigon		
	Under 300,000 piasters	Over 200,000 piasters	All groups	Under 300,000 piasters	Over 200,000 piasters	All groups
All food	.825	.655	.741	.862	.811	.830
Lower elasticity staple foods						
Cereals and products	.320	.186	.223	.321	.243	.260
Fish	.456	.328	.375	.539	.453	.472
Fresh vegetables	.470	.295	.380	.255	.420	.347
Edible oils	.354	.215	.255	.168	.306	.212
Moderate elasticity foods						
Pork	.970	.815	.895	1.186	.902	1.003
Milk and eggs	.791	.570	.682	.452	.656	.588
Coffee	.636	.434	.558	1.651	.792	1.036
High elasticity, pref. foods						
Beef	1.677	.704	1.122	2.990	.869	1.615
Other meats	2.427	.906	1.622	2.278	1.543	1.719
Poultry	2.792	1.640	2.282	2.971	1.845	2.489
Fresh fruit	1.450	.877	1.738	.974	2.646	2.129
Sugar products	1.422	1.654	1.550	1.547	2.291	2.121
Eating out	1.854	.732	1.239	1.395	.507	.839
Soft drinks	3.290	2.345	2.802	2.455	2.626	3.183
Alcoholic beverages	1.879	2.466	2.089	4.454	4.039	4.201
Clothing	2.138	1.630	1.840	2.309	1.804	2.106
Utilities	3.957	2.997	3,738	.896	2.650	2.766
Household equipment	.818	1.453	1.150	.816	1.308	1.042
Miscellaneous services	1.694	1.420	1.503	1.515	1.031	1.230

1/ The NIS survey of household expenditures (annual expenditures in piasters) in 1969-70.

Elasticities computed on the basis of a double log relationship ($\log E_f = a + b \log E$). The elasticities (b values) show the percent change in cost of living items with a 1 percent change in per capita total expenditure, a reasonable proxy for income in this study.

Regional Variations in Household Expenditures

The above characterization of household expenditure patterns is for all cities in the total urban sample. It is not necessarily representative of all cities; each city is unique to some extent. Saigon dominates the sample, accounting for a third of the families and population in the survey. For example, a stronger-than-average consumer preference for poultry, pork, soft drinks, alcoholic beverages, and clothing is exhibited in Saigon than in the other cities in the survey.

Can Tho appears most representative of any city--most like the average for Vietnam. This may be a bit surprising since the city makes up only about 15 percent of the sample.

Dalat shows up as the city of the wealthy. Per capita annual expenditure in the over 400,000 piaster household group averaged over 82,500 piasters compared to 65,850 for all families in the sample. Miscellaneous service expenditures may provide a key characteristic for Dalat: they average, for the high expenditure group, more than 27,620 piasters per capita compared with 12,580 for all urban families.

Nha Trang, a coastal city, reports much larger-than-average per capita outlays for fish. Pork and poultry, especially the latter, appear preferred over fish, although outlays for poultry are well below average. This probably reflects a restricted supply response in the area. Danang is also a coastal city, but fish consumption is about average, as is poultry, while pork consumption is well below average. However, beef consumption is highest in the city of Danang, which accounts for 30 percent of all beef consumption expenditures in the sample (see Appendix G for detail by city and income level).

Projections to 1977

We can demonstrate one common use of the cross-section data by carrying out a simple projection of food expenditures to 1977. The ingredients of the analysis include per capita urban expenditures for each food group (Table 29), the elasticity of food expenditures (Table 29), and a projection of household income. Real household income per capita is assumed to grow 2 percent per year from 1970 to 1977, an overall increase of about 15 percent in per capita real buying power.

What would be the approximate impact on changes in the urban diet given the consumer preference behavior exhibited in the cross-section food expenditure survey? Per capita food expenditure gains, in constant prices, of around 15 percent or more are indicated for poultry, the red meats, fresh fruit, sugar products, soft drinks, alcoholic beverages, and eating out (Table 29). Smallest gains relative to the projected 15 percent increase in per capita total expenditures occur for cereals, fish, fresh vegetables, and edible oils.

Such projections are useful indicators of probable demand induced by changes in the diet as incomes grow. But these changes do not necessarily coincide with possible changes in output which could change prices for major

Table 29.--Vietnam urban family consumption, 1969-70 and projections to 1977

Item	Annual per capita outlay	Expenditure elasticity	Projected annual expenditure, 1977 1/	
			Per capita	Percentage increase
	Piasters		Piasters	Percent
Per capita expenditure, total	44,259	1.0	50,900	15
Food 2/	26,951	.741	30,000	11
Cereals and products	4,740	.223	4,790	3
Beef	1,014	1.122	1,185	17
Pork	3,615	.895	4,100	13
Other meats	79	1.622	95	24
Poultry	1,210	2.282	1,620	34
Fish	4,100	.375	4,330	6
Milk and eggs	1,020	.682	1,120	10
Fresh fruit	1,085	1.738	1,370	26
Fresh vegetables	2,500	.380	2,645	6
Edible oils	1,135	.255	1,180	4
Sugar products	620	1.550	760	23
Coffee	265	.558	280	8
Soft drinks	113	2.802	160	42
Alcoholic beverages	385	2.089	500	31
Eating out	4,945	1.239	5,865	19

1/ Assuming real household expenditures would equal about 15 percent (about 2 percent per year, 1970-1977). Projected per capita piasters are in terms of 1969-70 price level.

2/ Total does not include small amount of home food production.

foods and thus modify per capita use. Changes in relative prices will influence the direct price impact on per capita use as well as the impact of changes in prices of competitive products. More complete analyses for rice, fish, hogs, and rubber take account of the output response as well as impacts of price and income on per capita use.

FOREIGN MARKET PROSPECTS

Ten years ago Vietnam exported substantial quantities of food and industrial products. Rice and rubber were by all odds the major export crops, but fish, cinnamon, pepper, fruits, vegetables, duck feathers, duck eggs, and

other products were also exported. Most of the foods were exported to nearby markets in South Asia. Rubber and other industrial exports went mainly to Europe.

In recent years Vietnam has been a substantial net importer of major foods because of war-related limitations on output and a war-swollen domestic market for food. Even with settlement of the conflict, it may be years before the economy can move toward stable peace time conditions.

Appraisal of the prospective expansion in domestic markets for food as related to output prospects points to a relatively short supply situation for the next 5 to 10 years. The population is growing at around 3 percent per year and the strong consumer preference for poultry and other animal products will step up demand for already scarce grains. Vietnam has tremendous resources available in agriculture, forestry, and fisheries. But, with production below domestic use, a huge effort will be required for her to reach and maintain self-sufficiency in the expanding domestic market.

To survive, however, the economy must export or find other ways to gain foreign exchange. This may require very aggressive government policies to curb domestic consumption and encourage exports. Otherwise, no large quantities of food exports are likely for 5 years or so. This does not, of course, rule out some gains in exports of special high-value seafoods, specialty fruits and vegetables, spices, forest products, rubber, and possibly other products.

Prospects in Nearby Markets

Prospects are good for Vietnamese exports of food to her traditional nearby markets. Vietnam is close to several countries with large urban populations. Per capita incomes within these large urban areas are sufficient to demand a much greater quantity of agricultural raw materials and food products than can be produced nationally because of limited agricultural land. The increasing demand for more food and fiber in these nearby markets provides excellent opportunities for Vietnamese products.

In 1970 five nearby countries--Hong Kong, Japan, Singapore, Republic of Korea, and Taiwan--imported over $6 million worth of agricultural raw material and food products, excluding fish and forest products. This was double the value imported in 1960 (see Table 30). Approximately 66 percent of the combined market is cereal grains, fruits, vegetables, natural fibers, and oilseeds.

Since 1960, the value of Hong Kong's agricultural imports has doubled; Japan's increased about 2.5 times; Taiwan's are up 3.5 times; and Korea's are 5 times larger. The total value of Singapore's imports of agricultural products, since 1960, has declined due to smaller rubber imports from Malaysia; but, substantially larger amounts of fruits, vegetables, meats, animal feeds, and animal and vegetable oils and fats were imported.

Table 30.--Imports of selected countries

SITC Group 1/		1960 Hong Kong	1960 Japan	1960 Rep. of Korea	1960 Taiwan	1960 Singapore	1970 Hong Kong	1970 Japan	1970 Rep. of Korea	1970 Taiwan	1970 Singapore
		Million U.S. dollars									
	FOOD										
00	Live animals	43.5	0.5	--	--	4.5	81.7	16.4	2.3	0.5	4.2
01	Meat	15.1	14.2	--	--	8.5	55.9	145.2	1.0	0.1	18.1
02	Dairy products & eggs	22.5	17.2	1.3	1.9	24.3	41.2	49.4	7.0	10.8	16.9
04	Cereals	55.6	291.1	20.6	20.8	51.8	91.8	1,048.8	244.8	75.5	62.2
05	Fruits and vegetables	46.3	33.3	0.2	0.8	38.7	110.7	309.3	1.9	5.7	70.2
06	Sugar	13.9	121.2	8.8	--	13.7	16.9	346.2	28.9	0.1	15.7
07	Coffee, cocoa, tea, spices	9.9	24.0	0.3	0.1	44.8	25.9	153.2	4.3	0.7	53.4
08	Animal feed	3.4	17.8	--	0.3	18.4	9.8	136.2	23.2	8.6	30.4
09	Misc. food preparations	7.3	5.5	0.4	0.8	2.8	14.1	16.4	5.5	0.3	4.9
11	BEVERAGES	5.3	2.5	--	--	5.8	26.0	17.4	0.8	0.4	13.8
	AGR'L RAW MATERIALS										
121	Tobacco, unmfg.	4.3	13.6	--	2.4	5.1	5.9	65.5	0.4	3.7	13.1
21	Hides and skins	0.8	41.4	0.5	1.1	1.0	4.9	102.2	3.4	3.5	1.2
22	Oilseeds	6.4	187.4	0.3	12.9	22.8	7.8	542.0	5.4	56.0	8.8
231.1	Natural rubber	5.0	143.0	6.3	1.4	444.5	3.6	129.4	13.2	8.0	213.6
261-265	Natural fibers	58.6	757.3	40.9	22.5	1.2	114.3	956.9	80.4	93.4	4.6
29	Crude animal & vegetable material, and other	27.2	22.6	1.7	6.2	10.7	41.0	90.5	5.8	5.5	15.4
4	Oils and fats	11.4	38.0	2.5	4.3	12.8	16.4	78.3	15.2	4.8	24.1
	TOTAL	336.7	1,730.6	83.8	75.6	711.7	668.0	4,203.5	443.7	277.6	570.7

1/ Standard international trade classification.

Ryukyu Islands

The Ryukyu Islands in 1970 imported 90,000 metric tons of rice, 30,000 M.T. of corn, and over 12,000 M.T. each of soybeans, pulses, and fresh oranges. The Islands were under trust supervision of the United States but recently reverted to Japanese control--making Japan an even larger market.

Japan

Japan is a large and fast growing market for foods and agricultural raw materials. During 1970, it imported over 15.3 million M.T. of grains. Three-fifths of the amount was corn and sorghum. Imports of grains over the past 10 years increased about a million M.T. annually. In addition, soybeans increased 200,000 M.T. and bananas 73,000 M.T. Oilcake and rubber increased by 33,000 M.T. and 11,000 M.T. respectively.

Republic of Korea

Korea is now importing more rice, corn, and wheat than ever before. Rice is a basic food for Koreans but the country has seldom produced a sufficient supply. In 1970 they imported about 770,000 M.T. of rice and, in 1971, over a million M.T. Increased demand for meat and eggs is also raising the feed-grain requirements beyond domestic production.

Hong Kong

Mainland China provides nearly all the 1.7 million head of swine, most of the live poultry and eggs, and about 30 percent of the rice that Hong Kong imports (see Table 31). Hong Kong also purchases rice from Thailand, Cambodia, and the United States. Rice demand has consistently been around 350,000 M.T. annually. Larger quantities of fresh fruit, coffee beans, and fresh and frozen pork and poultry are being consumed in Hong Kong. The demand for these and other food products remains strong.

Taiwan

Taiwan was not much of a market for food and fibers in the early 1960's. However, in 1969, the country imported 388,000 M.T. of rice, 472,000 M.T. of soybeans, and 17,000 M.T. of rubber. These imports, along with other food and agricultural raw materials, are expected to continue to climb as population and GNP increases.

Singapore

Singapore has been the center of a large re-export trade in Asia. Rubber was a large part of the trade. Malaysia and Indonesia, the two largest rubber

Table 31.--Hong Kong: Imports of selected commodities and principal country of origin, 1968-70

Commodity	Total	United States	Cambodia	China	South Africa	Taiwan	Thailand
	Metric tons						
Rice							
1968	314,065	41,025	15,120	105,047	--	--	123,007
1969	346,993	16,556	26,078	87,198	--	--	180,002
1970	344,611	11,454	21,245	92,550	--	--	183,823
Corn							
1968	142,119	--	11,385	1,098	--	--	128,354
1969	158,197	--	16,842	115	--	--	122,836
1970	162,916	--	12,160	561	--	--	102,622
Oranges							
1968	59,251	19,502	--	18,933	7,606	3,871	---
1969	65,859	34,810	--	16,801	4,075	5,325	--
1970	87,509	52,550	--	16,860	4,025	9,008	--
Swine 1/							
1968	1,749,480	--	300	1,738,321	--	8,919	--
1969	1,728,089	--	--	1,713,065	--	14,724	--
1970	1,749,480	--	--	1,633,055	--	39,111	--
Poultry meat							
1968	21,347	--	--	21,326	--	--	--
1969	14,454	1	--	19,342	--	--	--
1970	16,872	6	--	16,776	--	--	--
Pork							
1968	3,685	--	--	3,681	--	--	--
1969	3,864	--	--	3,853	--	--	--
1970	3,006	--	--	2,941	--	--	--

-- Continued

Table 31.--Hong Kong: Imports of selected commodities and principal country of origin, 1968-70--Continued

Commodity	Total	United States	Cambodia	China	South Africa	Taiwan	Thailand
	Metric tons						
Eggs in shell							
1968	42,366	--	--	38,640	--	--	1,540
1969	43,413	--	--	32,673	--	--	5,225
1970	46,609	--	--	37,822	--	--	4,787
Soybean oil							
1968	7,149	4,613	--	--	--	--	--
1969	1,593	1,547	--	--	--	--	--
1970	9,986	5,076	--	--	--	--	--
Peanut oil ...							
1968	14,200	211	--	8,669	4,115	--	207
1969	13,985	306	--	6,735	4,939	--	237
1970	12,262	--	--	3,189	5,352	--	1,175

1/ Swine in number of head.

producing countries, are increasingly shipping directly to consuming countries and by-passing Singapore, which prior to 1965 was part of Malaysia. Even without rubber, Singapore's imports of other food and agricultural raw materials have gone up over 33 percent since 1960. The values of meat, fruit, animal feed, edible oil, and fats imported more than doubled in the past decade.

Practically all commodities entering international trade face some price competition from competing countries in a given market. Indirect competition is also present from substitutable products. Exportable commodities from Vietnam will be confronted with such competition. In addition, an export commodity has to be from a reliable source, and the kind and quality the importing country demands.

Tables 32 and 33 give some indication of recent price competition between countries as reflected in the import price per unit. Other factors are also reflected in the unit price such as quality, trade preferentials and arrangements, transportation costs, and the availability of supply. Primary consideration has been given to indicating the relative size of market demand for groups of commodities as well as several specific commodities. Because of their highly changing positions, current factors--price, institutional arrangements, transportation, quality, and other related information--are not considered in depth. Emphasis is also given to the cash markets for products where Vietnam has potential export capabilities.

Tables 34 and 35 on Japanese and Hong Kong imports show, for the selected products, the country of origin. The price per M.T. is the import price calculated from the c.i.f. value and quantities of the product imported. These unit prices reflect the competitive differences among exporting countries shipping to those two markets. Differences are not limited strictly to product prices but reflect quality, negotiated arrangements, transportation costs, available supply, personal preference, and other factors. The tables reveal sources of supply--the countries with whom Vietnam, as an exporter, would have to compete with in the Japanese and Hong Kong markets.

World Demand Prospects for Rice, Coarse Grains, Oilseeds, and Rubber

Several studies provide a synthesis of the world demand prospects for rice, coarse grains, oilseeds, and rubber. In 1971, the USDA published a series of studies on world demand prospects. 19/ FAO also published a

19/ For this chapter the relevant studies are: Anthony S. Rojko, Francis S. Urban, and James J. Naive, World Demand Prospects for Grain in 1980 with Emphasis on Trade by the Less Developed Countries, FAER No. 75; Lyle E. Moe and Malek M. Mohtadi, World Demand Prospects for Oilseeds and Oilseed Products in 1980 with Emphasis on Trade by the Less Developed Countries, FAER No. 71, 1971; and Donald W. Regier and O. Halbert Goolsby, Growth in World Demand for Feed Grains: Related to Meat and Livestock Products and Human Consumption of Grain 1980, FAER No. 63.

Table 32.--Imports: Selected commodities by country, 1960

Commodity	Hong Kong			Japan			Ryukyu Islands		
	Quantity	Value	Price/ Unit	Quantity	Value	Price/ Unit	Quantity	Value	Price/ Unit
	1,000 M.T.	Mil. US$	US$/ M.T.	1,000 M.T.	Mil. US$	US$/ M.T.	1,000 M.T.	Mil. US$	US$/ M.T.
Rice	373	40.3	108	175	19.6	112	82	9.5	116
Corn	56	2.9	52	1,354	81.0	60	--		
Sorghum	--1/			45	2.4	53	--		
Pulses	75	7.0	93	95	9.2	97	--		
Soybean	20	1.9	95	1,128	107.4	95	11	0.9	82
Peanuts, shelled	12	2.6	217	6	1.3	217	--		
Onions	7	0.4	57	--			2	0.2	100
Oranges, fresh	38	7.4	195	--			3	0.6	200
Bananas	20	0.8	40	42	6.6	157	1	0.1	100
Lemons and limes	--			3	1.1	367	--		
Pineapple, fresh	--			1	0.2	200	--		
Coffee beans	3	2.0	667	11	8.6	782	--		
Copra	--			85	17.1	201	--		
Oilseed cake	6	0.5	83	1			3	0.4	120
Rubber	6	5.0	833	184	143.0	777	--		
Jute	--			53	12.1	228	--		
Pork, fresh	4	2.1	525	6	2.9	483	--		
Poultry, fresh	9	5.0	556	--			--		

-- Continued

Table 32.--Imports: Selected commodities by country, 1960--Continued

Commodity	Singapore 2/			Taiwan			Republic of Korea		
	Quantity	Value	Price/ Unit	Quantity	Value	Price/ Unit	Quantity	Value	Price/ Unit
	1,000 M.T.	Mil. US$	US$/ M.T.	1,000 M.T.	Mil. US$	US$/ M.T.	1,000 M.T.	Mil. US$	US$/ M.T.
Rice	730	83.0	110	15	1.7	113	--		
Corn	114	62.7	55	2	0.1	50	14	0.7	50
Sorghum	--			--			--		
Pulses	37	4.1	111	5	0.5	100	--		
Soybean	30	3.0	100	144	14.2	99	1		116
Peanuts, shelled	13	2.9	223	--			--		
Onions	36	2.5	69	--			--		
Oranges, fresh	18	4.2	233	--			--		
Bananas	--			--			--		
Lemon and Limes	--			--			--		
Pineapple, fresh	--			--			--		
Coffee beans	40	13.2	330	--			--		
Copra	120	20.9	174	--			--		
Oilseed cake	73	4.7	64	--			--		
Rubber	426	271.0	636	2	1.6	800	8	6.3	788
Jute	--			--			3	1.1	366
Pork, fresh	--			--			--		
Poultry, fresh	--			--			--		

1/ Dash means less than 500 M.T.

2/ Includes West Malaysia.

Source: Official customs annual trade publications.

Table 33.--Imports: Selected commodities by country, 1970

Commodity	Hong Kong			Japan			Ryukyu Islands		
	Quantity	Value	Price/ Unit	Quantity	Value	Price/ Unit	Quantity	Value	Price/ Unit
	1,000 M.T.	Mil. US$	US$/ M.T.	1,000 M.T.	Mil. US$	US$/ M.T.	1,000 M.T.	Mil. US$	US$/ M.T.
Rice	345	56.6	164	19	2.4	126	90	15.1	168
Corn	163	10.4	64	6,018	406.9	68	30	2.0	67
Sorghum	1/--			3,833	235.1	61	--		
Pulses	21	3.2	152	190	30.7	162	12	0.6	50
Soybeans	20	2.3	115	3,244	366.7	113	13	1.7	131
Peanuts, shelled	11	2.6	236	59	19.9	337	--		
Onions	12	0.8	67	22	3.0	136	5	0.4	80
Oranges, fresh	87	21.9	249	--			13	3.4	262
Bananas	29	1.7	59	844	144.1	171	--		
Lemons and Limes	--			54	24.1	446	--		
Pineapple, fresh	2	0.2	100	36	5.5	152	--		
Coffee beans	34	11.3	332	81	55.9	690	--		
Copra	--			127	26.8	211	--		
Oilseed cake	--			--			2	0.2	100
Rubber	4	1.7	43	308	129.5	420	--		
Jute	--			104	19.0	183	--		
Pork, fresh	16	8.5	531	17	21.0	1,235	1	0.4	400
Poultry, fresh	21	12.1	576	11	8.0	727	2	1.8	900

-- Continued

Table 33.--Imports: Selected commodities by country, 1970--Continued

Commodity	Singapore			Taiwan			West Malaysia			Republic of Korea		
	Quantity	Value	Price/Unit	Quantity	Value	Price/Unit	Quantity	Value	Price/Unit	Quantity	Value	Price/Unit
	1,000 M.T.	Mil. US$	US$/M.T.	1,000 M.T.	Mil. US$	US$/M.T.	1,000 M.T.	Mil. US$	US$/M.T.	1,000 M.T.	Mil. US$	US$/M.T.
Rice	281	33.8	120	--			230	32.7	142	7.7	145.4	189
Corn	10	0.7	70	388	23.6	61	122	7.4	61	214	15.1	71
Sorghum	--			--			--			--		
Pulses	20	3.4	170	24	3.0	125	30	4.5	150	--		
Soybean	62	7.6	123	472	52.3	111	17	2.2	129	30	3.5	117
Peanuts, shelled	2	0.5	250	--			7	1.2	171	--		
Onions	24	2.1	87	0.2	.01	50	37	3.2	86	--		
Oranges, fresh	36	7.8	217	--			13	2.9	223	--		
Bananas	21	0.7	33	--			--			3		
Lemons and limes	--			--			--			--		
Pineapple, fresh	41	8.0	195	--			--			--		
Coffee beans	14	5.0	357	--			3	1.6	533	--		
Copra	17	3.1	182	2	0.4	200	7	0.7	100	1	0.3	300
Oilseed cake	--			--			8	0.7	88	--		
Rubber	307	122.0	397	17		47	62	2.4	39	25	12.5	500
Jute	1	0.2	200	--			1	0.2	200	--		
Pork, fresh	1	0.5	500	--			--	0.1		8	11.5	1,437
Poultry, fresh	7	3.8	543	--			1	0.4	400	--	5.0	

1/ Dash means less than 500 M.T.

Source: Official customs annual trade publications.

Table 34.--Japan: Imports of selected commodities and principal countries of origin

Commodity and country	Unit	1970 Quantity	1970 Value	1970 Price/ Unit	1960 Quantity	1960 Value	1960 Price/ Unit
			1,000 US$	US$/ M.T.		1,000 US$	US$/ M.T.
Pork, total	M.T.	17,149	20,926	1,220	5,897	2,913	494
United States	"	7,589	8,931	1,177	1,423	740	520
Taiwan	"	4,533	5,119	1,129	150	102	680
Ryukyus	"	1,197	1,467	1,226	1,218	951	781
Canada	"	2,930	4,575	1,561	3,105	1,119	360
Poultry, total	M.T.	10,686	8,031	752	5	3	600
United States	"	4,546	3,925	863	--	--	--
China	"	1,847	1,197	648	--	--	--
Denmark	"	1,026	655	638	--	--	--
Corn, total	1,000 M.T.	6,018	406,892	68	1,354	81,040	60
United States	"	4,394	292,739	67	184	11,190	61
Thailand	"	536	36,958	69	314	18,538	59
Argentina	"	447	30,414	68	428	25,836	60
Rep. South Africa	"	375	27,900	74	254	15,204	60
Cambodia	"	6	383	64	93	5,663	61
Sorghum, total	1,000 M.T.	3,789	231,356	61	45	2,368	53
United States	"	2,188	134,339	61	45	2,358	52
Argentina	"	1,287	77,508	60	--	--	--
Bananas, total	M.T.	843,891	144,128	171	42,387	6,589	155
Taiwan	"	213,692	36,342	170	41,016	6,292	153
Ecuador	"	468,584	80,897	173	13	2	154
Pineapples, total	M.T.	35,609	5,517	155	899	175	195
Taiwan	"	32,541	4,867	150	--	--	--
Ryukyus	"	244	47	193	853	158	185

-- Continued

Table 34.--Japan: Imports of selected commodities and principal countries of origin--Continued

Commodity and country	Unit	1970 Quantity	1970 Value	1970 Price/ Unit	1960 Quantity	1960 Value	1960 Price/ Unit
			1,000 US$	US$/ M.T.		1,000 US$	US$/ M.T.
Coffee beans, total	M.T.	81,372	55,869	687	10,707	8,631	806
Brazil	"	31,717	21,253	670	3,059	2,362	772
Ivory Coast	"	11,841	4,925	420	46	19	413
Uganda	"	11,475	4,214	367	1,056	449	425
Colombia	"	7,661	9,381	1,225	2,488	2,524	1,014
Peanuts, shelled, total	"	59,007	19,817	336	6,154	1,334	216
United States	"	7,256	3,331	459	--	--	--
China	"	4,773	2,086	437	--	--	--
Indonesia	"	8,834	2,658	301	334	76	228
Peanut cake, total	M.T.	141,902	14,681	103	--	--	--
United States	"	9,936	986	99	--	--	--
India	"	92,281	10,372	112	--	--	--
Brazil	"	30,231	3,058	101	--	--	--
Other oilseed cake, total	M.T.	154,395	9,536	62	787	92	117
United States	"	37,324	2,200	59	787	92	117
India	"	60,360	3,428	57	--	--	--
Thailand	"	24,299	1,686	69	--	--	--
Copra, total	M.T.	126,937	26,781	211	85,271	17,117	201
Philippines	"	37,842	7,950	210	3,965	794	200
Indonesia	"	40,239	8,525	212	4,582	1,126	246
Sabah	"	101	19	188	49,768	9,713	195
Soybean, total	1,000 M.T.	3,244	365,767	113	1,128	107,437	95
United States	"	2,952	329,611	112	1,091	102,997	94
China	"	291	36,044	124	--	20	--

-- Continued

Table 34.--Japan: Imports of selected commodities and principal countries of origin--Continued

Commodity and country	Unit	1970			1960		
		Quantity	Value	Price/ Unit	Quantity	Value	Price/ Unit
			1,000 US$	US$/ M.T.		1,000 US$	US$/ M.T.
Rubber, total	M.T.	308,244	129,450	420	183,546	142,986	779
Thailand	"	135,944	56,403	415	41,672	33,428	802
Malaysia	"	109,065	44,908	412	109,569	84,209	769
Indonesia	"	35,949	14,000	389	5,233	3,448	659
Republic Vietnam	"	2,520	1,056	419	2,052	1,546	753
Jute, total	M.T.	103,731	19,008	183	53,120	12,102	228
Thailand	"	71,514	9,728	136	10,016	1,751	175
Pakistan	"	27,714	8,425	304	41,502	9,999	241

Table 35--Hong Kong: Average import price of selected products, 1968-70, and comparison by country of origin

	Total Value	Average price per unit						
		Total	United States	Cambodia	China	South Africa	Taiwan	Thailand
	1,000 US$	U.S. dollars/metric tons						
Rice								
1968	64,629	206	231	190	215	--	--	192
1969	65,021	187	211	174	228	--	--	173
1970	56,558	164	201	132	205	--	--	149
Corn								
1968	7,881	55	--	--	57	--	--	55
1969	9,312	59	--	--	43	--	--	59
1970	10,410	64	--	--	57	--	--	64
Oranges								
1968	13,670	231	379	--	99	196	224	--
1969	15,655	238	301	--	118	194	264	--
1970	21,899	250	290	--	139	211	270	--
Swine								
1968	36,564	21	--	--	21	--	32	--
1969	49,487	29	--	--	29	--	33	--
1970	54,153	31	--	--	32	--	30	--
Poultry								
1968	9,097	426	--	--	422	--	--	--
1969	9,438	653	2,000	--	482	--	--	--
1970	8,756	519	1,167	--	512	--	--	--
Pork								
1968	2,784	810	--	--	809	--	--	--
1969	3,338	864	--	--	863	--	--	--
1970	2,703	899	--	--	890	--	--	--

-- Continued

Table 35.--Hong Kong: Average import price of selected products, 1968-70, and comparison by country of origin--Continued

	Total Value	Average price per unit						
		Total	United States	Cambodia	China	South Africa	Taiwan	Thailand
	1,000 US$	U.S. dollars/metric tons						
Eggs in shell								
1968	17,053	403	--	--	401	--	--	436
1969	21,947	506	--	--	512	--	--	463
1970	22,306	479	--	--	479	--	--	424
Soybean oil								
1968	1,682	235	234	--	--	--	--	--
1969	334	210	207	--	--	--	--	--
1970	2,712	272	294	--	--	--	--	--
Peanut oil								
1968	5,454	384	346	--	373	418	--	116
1969	5,659	405	379	--	392	436	--	412
1970	5,434	443	--	--	459	420	--	426

comprehensive study on agricultural commodity projections to 1980. 20/ These two organizations have a continuing program of updating the projections from time to time. 21/ Other international organizations (OECD), universities, and individuals have also been concerned with such projections.

The following section synthesizes the results of these studies and interprets their findings in the line of recent events.

Rice

The outlook for expanded world rice trade is poor if the green revolution is successful and if population growth is reasonably restrained in the large rice consuming countries. This results in lower world import demand, a demand traditionally centered in less developed countries (LDC's). Import demand in the developed areas is expected to rise moderately, but the increase will be small relative to potential exportable supplies. Consequently, prices could be under downward pressure.

The impact of reduced import demand in the LDC's would center around the traditional rice suppliers, primarily in Southeast Asia. However, given the "thin" nature of world rice trade, any prolonged slowdown of the green revolution in rice, particularly in South Asia and East Asia, could have a serious impact on import demand for rice. While the general situation may tend towards lower prices in real terms, rice trade and prices in a given year could be quite volatile because of short run events. For instance, 1972-73 world import requirements are unusually high because of adverse developments in the Philippines, India, Thailand, Indonesia, Khmer Republic, Bangladesh, South Korea as well as South Vietnam. A relatively tight world market has followed several years of excess supplies brought about by surplus production in Japan. Japan has since adopted a policy to eliminate domestic rice surplus and, therefore, reduces its burdensome export disposal program.

Coarse Grains

The world market for coarse grains through the 1970's is expected to grow more than the market for rice. However, coarse grains prices in terms of real prices are not expected to be significantly higher than they were in the last decade. Production potential for all grains should remain larger than demand at current prices, although a strong and growing demand for livestock and livestock products in Japan and other major importing countries will expand the market. Any movement toward trade liberalization by major importers could result in a more rapid growth in demand for livestock products.

20/ Agricultural Commodity Projections, 1970-1980. Food and Agriculture Organization of the United Nations, Rome, 1971.

21/ The USDA is currently in the process of extending its projections to 1985. Any analytical organization using the information in this chapter should contact one of these organizations to determine whether later information is available concerning this topic.

Shifts toward self-sufficiency, such as is expected from the enlargement of the European Community (EC), would reduce world import demand. On the other hand, the world grain market would be strengthened if the USSR continues its current policy of importing grains. Therefore, markets for Vietnam's corn or sorghum will depend heavily on competitive prices and any special bilateral arrangements with importing countries. Competition from major exporting countries will remain great.

Oilseeds

The demand for high protein oilcakes is projected to increase as fast or faster than supply. However, supplies of oil associated with meal production are projected to increase faster than demand. The net effect of these two opposing trends is that prices for the individual oilseeds are likely to move in accordance with the relative values of both the meal and oil components. Thus, price prospects remain high for oilseeds with a high valued meal component (e.g., soybeans). Conversely, prospects are relatively less attractive for oilseeds with a low meal value (e.g., oil palm).

Rubber

The future of natural rubber depends on its competitive position relative to synthetic rubber. Recent developments are mostly favorable to natural rubber.

Potential output per unit area is greatly increased with cross-breeding of high-yielding clones and introduction of the yield stimulant "Compound Ethrel." These factors could reduce production costs 12 cents to 20 cents per pound. In addition, the Rubber Research Institute of Malaysia has developed a special tire rubber using natural latex which is being tested by the major tire manufacturers. Tests indicate that the product is a better tire rubber, with lower heat buildup as one of its attractive qualities.

Although synthetic producers have improved the properties of their products, they are faced with increasing costs due to inflation and the increased price of oil, their major raw material.

The FAO and Behrman studies project natural rubber demand to increase at a rate of 3.3 to 5.2 percent to 1980. The more recent developments mentioned above indicate that the lower estimate may be pessimistic.

THE AGRICULTURAL ECONOMY: AN ECONOMIC PROFILE

The Agricultural Industry

The agricultural industry includes much more than farming; it encompasses the whole range of economic activity involved in producing food and fiber, processing these materials into finished products, and finally marketing them.

Only a broad examination of the entire agricultural industry will provide an adequate basis for economic appraisals of the agricultural sector. Farming provides raw materials used in other sectors of the economy. In turn, farms rely on farm supply industries for fertilizer, chemicals, machinery, and equipment. Similarly, farm output directly supports industries which process, transport, and market food and fiber products originating on farms.

The agricultural industry of South Vietnam probably accounts for around two-thirds of the total value of goods produced. Also, around two-thirds of the total value of agricultural production represents the net contribution of farming, including the return to the farmers as well as shares for wages of hired laborers, interest, depreciation, rent, and taxes (Figure 30).

As the economy develops, the processing-marketing-transportation margin increases as a share of the agricultural industry. In developed economies, the marketing margin is very much enlarged. The war in South Vietnam has at various times caused damage to the marketing infrastructure. Urban markets have been cut off from some rural sources of supply. Farmers have produced less when they were unsure of marketing channels. But processing industries for sugar, tobacco, soft drinks, and alcoholic beverages have prospered in recent years in Saigon. These are geared, however, to imports of raw material rather than domestic production.

Of the total value of final products originating primarily on farms, possibly 80 percent are consumed as food products in the country. Most of the remainder includes nonfood items such as clothing for domestic use. Exports have been very small in recent years.

The Pattern of Agricultural Production

The value of agricultural production (Table 36) shows the importance of rice, the major subsistence crop, in the economy of South Vietnam. Rice accounts for more than a third of all agricultural production and around two-thirds of food crop production. The protein foods--fish and livestock products--are each about 20 percent of the total agricultural product. Combined output of rice, fish, and livestock products accounts for three-fourths of agricultural production. Fruits, vegetables, and tubers account for another 15 percent. Oilseeds, spices, rubber, tobacco, and forest products make up the remaining 10 percent.

The structure of agricultural production has been changing over the period studied. By 1970 estimated poultry production was around 3 times and fish around 2 1/4 times 1960 output. Paddy production increased about 10 percent over the decade. Meanwhile, rubber production in 1970 was around 40 percent of 1960 and secondary food crops (food crops other than rice) were down around a tenth. 22/ The decrease in rubber production is explained almost totally by the difficulties in production and transport during wartime. Unfavorable prices in the world market probably had much less to do with the decline.

22/ See Agricultural Production Indexes, Appendix F.

THE AGRICULTURAL INDUSTRY

Illustration Based on 1968 with Gross National Product of 385 Billion

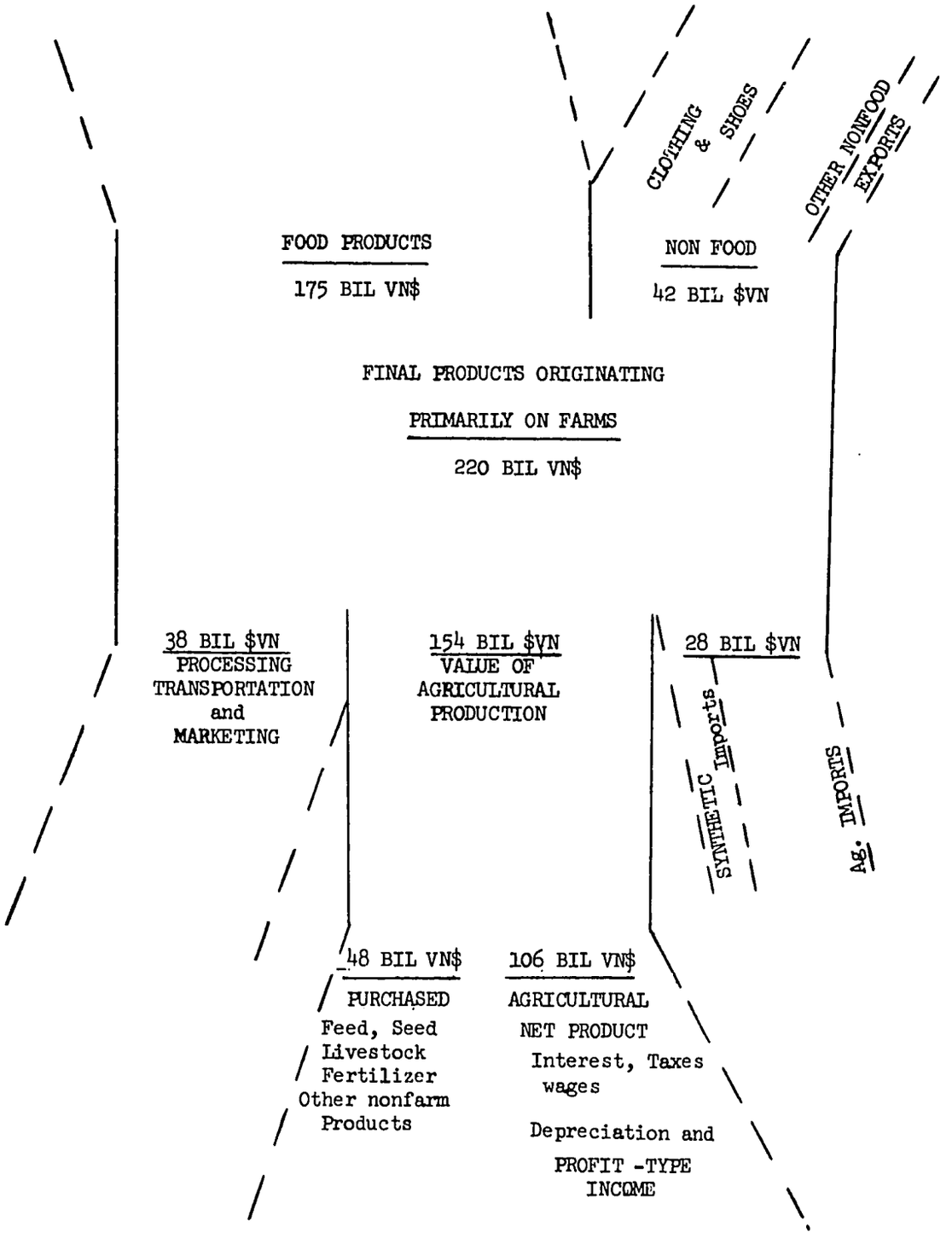

Figure 30

Table 36.--Value of agricultural production, 1968

Food commodities	Billion VN$	Percent	Nonfood commodities	Billion VN$	Percent
Rice	54.6	35.5	Rubber	1.50	--
Vegetables & tubers	13.7	8.9	Tobacco	1.80	--
Fruits	12.9	8.4	Fiber crops	0.70	--
Other crops	6.5	4.2	Forest products ...	1.00	--
Total food crops	87.7	57.1	Total nonfood ...	5.00	3.3
Livestock products	28.9	18.8	Total, food and nonfood commodities	153.7	100.0
Fish	32.1	20.9			
Total food	148.7	96.7			

Population, Urban and Rural

In 1970 population was estimated at 18 million. About two-thirds of these were in the Southern Region, which commences at the southern edge of the high mountains and plateaus which form the backbone of Vietnam. Some 25 to 30 percent of the population was in the eastern part of this Southern Region, which stretches south to the northern border of Long An Province, the narrowest section of the Southern Region, and includes Saigon. The western part of the Southern Region, commonly referred to as the Delta, is the most populous region, with around 35 to 40 percent of the population. Thirty-five percent of the population lives in the central area of Vietnam, which is divided longitudinally into the Central Lowlands with 30 percent and the Central Highlands with only 5 percent of the population.

There are currently two series on population published in Vietnamese sources. One series is based on reports from provinces and municipalities (N2). Another series is simply based on an assumed 2.6 percent population increase with a 3 percent increase in later years (N1). The estimated rate of increase was based on surveys conducted by the National Institute of Statistics. 23/

The N2 series tended to run lower than the N1 series and at varying rates during the decade. In some years, the two series are nearly equal; in others they are quite far apart. Year-to-year variations in the N2 series seem to be more logical relative to changes in domestic use during the decade. For some years, the N2 population series grows at unusual rates.

23/ See Agricultural Economics and Statistics Service, Agricultural Statistics Yearbook, 1959-70 (Saigon: 1959-1970), and National Institute of Statistics, Vietnam Statistical Yearbook 1967, 1969, 1970 (Saigon: 1967, 1969, 1970).

This may reflect variations in the number of people under government control. However, such variations may make economic sense in measuring variation in the size of the market.

The objective of the economic profile was to take two recent years of reasonably good security--1964 and 1970--and determine, as accurately as possible, detailed information on production, supply, distribution, and prices of agricultural products for Vietnam and for four major geographic regions. For this purpose, the population series used was the one which assumes a constant growth rate of 2.6 percent per year (N1). The extent of year-to-year variation is not especially important in this task; growth or change between the two periods is of primary interest. Since there is no regional breakdown in the constant growth (N1) series, regional population figures used in the profile are those reported by region for 1964 expanded on a proportional basis in order to sum to the N1 estimate for all of South Vietnam.

There is no urban-rural population breakdown by regions published in Vietnamese sources. However, there is such a breakdown in the Hamlet Evaluation Survey (HES) data for later years. 24/ The definition used for urban hamlet is based on the following guidelines: a population mass of 20,000 or more; a high population density; many shops and restaurants present; and business or commercial activity as the primary occupation. This definition would not include many small commercial hamlets scattered throughout the countryside of Vietnam. The rural population is, therefore, not the same as the agricultural population, but rural population is the closest approximation available.

To arrive at a rural population for 1964, the percentage change in the population of province capitals and autonomous cities was computed between 1964 and 1970 for each region (Table 37). This rate of change was applied to the HES urban population of 1970 to work back to the urban population of 1964. The bias in this exercise is to make the 1964 urban population too high. The rate of growth of smaller cities was larger than bigger cities, but no reading was available on many of the smaller cities. The rate of change between the two years may be biased somewhat on the low side.

The urban population was 26 percent of total population in 1964 and 36 percent in 1970. The rural population is about the same size both years, but a much larger percentage of the smaller 1964 population. Since 1964 and 1970 were chosen as years of relative stability on both sides of a period of great hostilities, a smooth progression throughout the intervening period cannot be assumed. The large influx of population into the cities probably occurred largely between the period 1965 through 1967. This trend may have been reversed slightly in 1969 and 1970. The largest difference in the regions between 1964 and 1970 was in the Delta, where estimated urban population tripled.

24/ Military Assistance Command, Vietnam, "Hamlet Evaluation Survey," computer copy of survey sheets. The National Institute of Statistics also reports rural-urban population estimates for 1964 and 1968.

Table 37.--Rural and urban population by region, 1964 and 1970

Year	South Vietnam total	Southwest	Southeast	Central Lowlands	Central Highlands
1964					
Total	15,711	6,316	3,979	4,722	694
Urban	4,168	400	2,499	1,979	190
Rural	11,543	5,916	1,480	3,643	504
1970					
Total	18,332	6,830	5,080	5,482	940
Urban	6,673	1,211	3,423	1,741	297
Rural	11,659	5,619	1,657	3,741	643

Land Base and Cultivated Area

South Vietnam has a total land area of about 17 million hectares, more than one-third covered by forests. Approximately 3 million hectares are under cultivation or have been tilled in the recent past. Another million hectares could be brought under cultivation with some changes in techniques and in crops grown, and perhaps greater incentives. 25/ The rest of the available land is either wasteland or would take considerable investment to be brought into cultivation.

Vietnamese cultivated area statistics double count all of the area that is double-cropped. The reported area supporting two crops of rice was 220,000 hectares in 1960-61 and 270,000 hectares in 1964-65. The increase was almost entirely in double-cropping in the Delta, an area of very little previous double-cropping. No further record on double-cropping is available.

Comparing cultivated area shows that there were 220,000 fewer hectares cultivated in 1970 than in 1964 (Table 38). By 1970, the cultivated area in rice increased in some regions because of the greater use of water pumps and new rice varieties with a short growing season. Thus, the total area abandoned because of the war could be larger than the 220,000 hectare decrease in cultivated land. Some estimates exceed a half million hectares.

Another significant factor observable from the data is the decrease in diversity of crops grown. Secondary and nonfood crops decreased by one-third, while rice area decreased only 2 percent.

25/ Discussion of preliminary findings of the Vietnam production response team, Fred Cooke, et al., Economic Research Service, USDA, in cooperation with USAID, May 1972.

Table 38.--1964 and 1970 regional cultivated area, rice, secondary food crops, and nonfood crops

	Unit	South Vietnam total	Southwest	Southeast	Central Lowlands	Central Highlands
1964 total						
Total	1,000 ha.	3,065	1,908	369	665	126
Rice	1,000 ha.	2,562	1,779	180	534	70
Secondary crops	1,000 ha.	352	124	68	124	39
Nonfood crops	1,000 ha.	151	5	121	7	17
Rural population	1,000	11,543	5,916	1,480	3,643	504
1964 per capita						
Total	Ha.	.266	.323	.248	.183	.254
Rice	Ha.	.222	.301	.120	.147	.143
Secondary crops	Ha.	.031	.021	.046	.034	.077
Nonfood crops	Ha.	.013	.001	.082	.002	.034
1970 total						
Total	1,000 ha.	2,844	1,963	292	506	81
Rice	1,000 ha.	2,511	1,854	191	418	48
Secondary crops	1,000 ha.	283	105	60	84	33
Nonfood crops	1,000 ha.	50	4	41	4	--
Rural population	1,000	11,659	5,619	1,657	3,741	643
1970 per capita						
Total	Ha.	.243	.350	.176	.134	.126
Rice	Ha.	.215	.330	.115	.111	.075
Secondary crops	Ha.	.024	.019	.036	.022	.051
Nonfood crops	Ha.	.004	.001	.025	.001	--

Regional differences in cultivated area between 1964 and 1970 are even more significant than the total difference because of greater variation among the regions. In the entire Southern Region, cultivated area in food crops increased. In the central area, however, it declined substantially.

In the Delta, cropped area was 60,000 hectares higher in 1970 than in 1964 and rice area was 75,000 higher. Rice area per capita was 9 percent higher in 1970. This increase reflected a smaller rural population in 1970 and the development of a small water pump that increased double-cropping in other areas. High-yielding rice varieties with a short growing season were introduced in the late sixties, allowing even more double-cropping.

In the eastern part of the Southern Region, cultivated area devoted to rice and secondary food crops was largely the same in 1964 and 1970. However, double-cropping also increased in this area and some producing areas were abandoned. Shallow wells with small pumps permitted considerable double-cropping. Nonfood crops, predominantly rubber, were the only crops for which planted area was reduced because of the war; the decrease was a very large 65 percent from 1964 to 1970.

Cultivated area in the Central Lowlands decreased 24 percent from 1964 to 1970, with rice area down nearly 22 percent and secondary crops 32 percent. On a per capita basis, the decline in cultivated area was 26 percent: 24 percent for rice and 35 percent for secondary crops. Agriculture in the Central Lowlands has been most heavily affected by the war. Moreover, the area benefited less than other regions from new rice cultivation techniques. Double-cropping was already at a high rate in this area, equivalent to about 40 percent of total hectares in rice. Available statistics show that there was as much adoption of new varieties here as elsewhere, but the shorter growing season did not encourage double-cropping as it did elsewhere; the high-yielding varieties have simply replaced traditional varieties.

Statistics for the Central Highland region probably are not very reliable, but it appears that cultivated area decreased because of dislocations by the war.

Production and Utilization

Yield Per Hectare

Rice yields have increased slightly in the last 2 years, but yields in 1969 and 1970 were not much higher than a decade earlier. Yields were mixed over the decade for other crops, with tea and soybeans increasing, sweet potatoes and mungo beans rising slightly, peanuts rising and then leveling off, corn trending down after an initial increase, vegetables and coconut yields largely unchanged, and sugarcane decreasing. Tobacco yields increased despite a decline in overall production. Rubber yields fell off.

Yield trends for rice are surprising since around a fourth of the area was planted to new high-yielding varieties by 1970. It is evident from the data that increases in production from 1967 through 1970 were due mainly to increases in cropped area rather than yield (Table 39).

Table 39.--Rice: Area in production and yield, 1959-1970

	Area in production	Total production	Yield
	1,000 ha.	1,000 M.T.	Kg./ha.
1959	2,269	5,041	2,220
1960	2,318	4,955	2,138
1961	2,353	4,607	1,958
1962	2,479	5,205	2,100
1963	2,538	5,321	2,099
1964	2,562	5,185	2,024
1965	2,429	4,822	1,985
1966	2,295	4,336	1,889
1967	2,296	4,688	2,042
1968	2,394	4,336	1,811
1969	2,430	5,115	2,105
1970	2,511	5,716	2,276

There seems to be no clear pattern in yields of crops other than rice over the decade. Apparently most variation in crop production has been due to changes in the area cropped. In turn, cropped area has varied primarily with the intensity of the war. There are regional differences in yields of most crops (Appendix Tables H-1 and H-2). In general, the fertile soil of the Delta produces the highest yields. The eastern part of the Southern Region has slightly lower yields. The Central Lowlands have still lower yields. The Highlands, with poorer resources and shifting cultivation practices, generally produce the lowest yields.

For oilseed crops, however, the Central Lowlands produces the highest yields. This is interesting because there is no apparent reason, except perhaps for cultural practices, why coconut yields should be higher in the same region where soybeans and peanuts produce highest yields. The Lowlands produce 50 percent of the 33,000 M.T. peanut crop grown in South Vietnam, but only 20 percent of the 100,000 M.T. coconut crop and 10 percent of the 7,000 M.T. soybean output. The Central Lowlands produces half of the 200,000 M.T. crop of manioc, even though yields in this region are only half those in the eastern part of the Southern Region. Apparently the Central Lowlands have a greater comparative advantage in manioc production.

Value of Agricultural Production

The value of agricultural production for 1964 and 1970, in terms of 1964 prices, is summarized, by regions, in Table 40. Poultry, fish, and hog production contributed most of the increase. Accelerated rice production also contributed significantly. Nonfood crops declined significantly because of a large decline in rubber production.

For commodities showing a substantial increase in production, such as livestock and fish, there are no corresponding increases reported in shipments from one region to another. Shipments of livestock into Saigon are approximately the same in 1964 and 1970. Reports of the fish catch at fishing centers were more than twice as high in 1970 as in 1964, but reported shipments of fish out of fishing centers were not higher. If shipping estimates have any validity, they raise strong questions about production estimates for fish and livestock products. It is not clear whether there actually was no difference in production or whether recent-year shipments are underreported.

The shrinking of cultivated area in the Central Lowlands has reduced production in the region. This region is the only one in which reported output was lower in 1970 than in 1964--some 10 percent lower. The largest percentage decrease was in secondary crops, but output of rice and livestock also decreased substantially. In 1964 farm output per person in rural Central Lowlands was somewhat, but not greatly, lower than in other regions in South Vietnam. However, on a per capita basis, farm output in the Central Lowlands in 1970 was only two-thirds that in other areas.

Most of the overall production increase from 1964 to 1970 was in the western part of the Southern Region, due mostly to increased production of livestock and fish.

Large increases in livestock, fish, and poultry production also were indicated for the eastern part of the Southern Region. These increases accounted for most of the gain in production since output of secondary food crops and nonfood crops decreased while rice production increased slightly. Per capita farm output also increased in the Eastern Region.

Supply and Utilization

In 1970 the South Vietnamese people consumed an estimated 3.2 million metric tons of grain for food, about a fourth of which was imported (see Appendix Table H-5). Imports included some 560,000 M.T. of rice, 250,000 M.T. of wheat, and 17,000 M.T. of other food grains. Feed use in 1970 was estimated at about 2 million M.T. of grain and bran, of which 140,000 M.T. or 7 percent were imported.

Although many South Vietnamese question whether much rice is fed in the Delta, available estimates suggest that around a million M.T. of paddy were fed in 1970. The Delta apparently had a very large per capita use of

Table 40.--Regional value of production, rice, secondary crops, livestock, fish, and nonfood crops, 1964 and 1970, 1964 prices 1/

Item	Unit	South Vietnam total	Southwest	Southeast	Central Lowlands	Central Highlands
1964 total						
Total value	Mil. $VN	45,947	25,466	6,512	12,042	1,927
Rice	Mil. $VN	20,169	13,872	1,566	4,454	277
Secondary food crops	Mil. $VN	7,673	3,131	1,458	1,808	1,276
Livestock, fish, poultry, and eggs	Mil. $VN	16,306	8,336	2,028	5,594	348
Nonfood crops	Mil. $VN	1,799	127	1,460	186	26
Rural population	1,000	11,543	5,916	1,480	3,643	504
1964 per capita						
Total	$VN	3,981	4,305	4,466	3,306	3,823
Food	$VN	3,825	4,283	3,414	3,254	3,772
Nonfood crops	$VN	156	21	987	51	52
1970 total						
Total value	Mil. $VN	51,860	31,332	7,419	10,870	2,239
Rice	Mil. $VN	22,026	15,925	1,732	4,132	237
Secondary food crops	Mil. $VN	7,138	2,861	1,264	1,463	1,550
Livestock, fish, poultry, and eggs	Mil. $VN	21,557	12,394	3,679	5,075	409
Nonfood crops	Mil. $VN	1,139	152	744	200	43
Rural population	1,000	11,659	5,619	1,657	3,741	643
1970 per capita						
Total	$VN	4,448	5,576	4,477	2,906	3,482
Food	$VN	4,350	5,549	4,028	2,852	3,415
Nonfood crops	$VN	98	27	449	53	67

1/ Computed from prices and quantities supplied by the Agricultural Economics and Statistics Service in their Agricultural Statistics Yearbooks and worksheets.

rice (well above 200 kg. per capita) in both 1964 and 1970, which suggests a significant nonfood use in this region. Paddy fed is probably predominantly the lower quality red rice grown in floating rice areas (Table 41).

Regional estimates of supply and distribution of rice depend largely on the accuracy of shipments data for rice. These data fit together fairly well in the total (i.e., it is not too unreasonable for 50,000 M.T. of rice to be shipped across borders in the export economy of 1964, nor for 13.5 thousand M.T. to be shipped in across borders in the import economy of 1970). Estimated per capita use generally appears too low for the Highlands and Saigon in 1964. Faulty shipments data, underreported production, or inaccurate population data may be the cause. Similarly, implied use in the Delta appears rather high.

Peanuts and soybeans are mostly eaten directly and not processed into oil and meal in Vietnam. In 1970 only about 3,000 M.T. of peanut oil was produced and no soybean oil (Appendix Table H-5). A large number of coconuts were processed, yielding about 7,000 M.T. of oil. Another 15,000 M.T. were imported, which made up 40 percent of the vegetable oil used in the country.

Practically all meat, fish, and fish products were produced and consumed in country in 1970 (Appendix Table H-5). The fish catch of 577,000 M.T. and estimated pork production of around 242,000 M.T. were the most important protein foods. All dairy products consumed in South Vietnam are imported. About 200,000 M.T. of whole milk equivalent in dairy products were imported in 1970.

About 450,000 M.T. of tubers and 11,000 M.T. of pulses were produced and consumed in South Vietnam in 1970 (Appendix Table H-5). An estimated 20,000 M.T. of sweet potatoes and 40,000 M.T. of cassava were fed to hogs, but perhaps 85 to 90 percent of the tubers were for human consumption.

Fruits estimated at 270,000 M.T. and vegetables at 218,000 M.T. were produced and consumed in country in 1970. In addition, about 9,000 M.T. of fresh and processed fruits and vegetables were imported.

Most stimulants and spices, including 4,000 M.T. of coffee and 5,400 M.T. of tea, were produced and consumed in South Vietnam in 1970 (Appendix Table H-5). On the other hand, practically all of the 107,000 M.T. of sugar consumed in the country was imported.

South Vietnam is nearly self-sufficient in forest products. Lumber production of 243,000 M.T. and fuelwood production of 101,000 M.T. were the most important forest products in 1970. Nearly 7,000 M.T. of wood and rattan were imported.

Domestic production of fiber crops in Vietnam is nearly nonexistent. Judging by scattered statistics on production of mulberry leaves, there was a silk industry which declined sharply after synthetics and other fibers began to be imported in substantial quantities. There are no statistics on

Table 41.--Rice: Estimated supply and utilization by five regions, 1964 and 1970

Item	South Vietnam total	Southern (west part)	Southern (east part)	Central Lowlands	Central Highlands	Saigon area 1/
	1,000 M.T. 2/					
1964						
Beginning stocks	98.2	51.1	--	--	--	47.1
Production	3,462.3	2,484.0	153.3	592.0	44.8	96.1
Shipments, in	---	--	53.8	134.4	51.9	523.2
Shipments, out	130.8	513.5	--	--	--	380.6
Official exports	3/(80.3)	n.a.	n.a.	n.a.	n.a.	n.a.
Across borders, out	3/(50.6)	n.a.	n.a.	n.a.	n.a.	n.a.
Apparent use	3,324.2	2,009.3	207.1	726.4	76.8	192.6
Ending stocks	105.5	12.3	--	--	--	93.2
Population (thousand)	15,715	6,316	1,626	4,722	694	2,353
Per capita use (kilograms)	212	318	127	154	111	82
1970						
Beginning stocks	11.9	3.4	--	--	--	8.5
Production	3,324.8	2,553.2	175.3	488.8	36.1	71.3
Shipments, in	566.4	--	56.7	489.3	.1	527.6
Shipments, out	--	417.6	--	--	--	80.7
Official imports	3/(552.8)	n.a.	n.a.	n.a.	n.a.	n.a.
Across borders, in	3/ (13.6)	n.a.	n.a.	n.a.	n.a.	n.a.
Apparent use	3,833.0	2,124.6	232.1	987.1	36.3	461.0
Ending stocks	70.0	13.4	--	--	--	56.6
Population 1/ (thousand)	18,332	6,830	1,936	5,482	941	3,144
Per capita use (kilograms)	209	311	120	178	39	147

1/ Including Gia Dinh Province.

2/ Whole grain rice and brokens, milled equivalent.

3/ Estimated

n.a. = Not available

silk production. The largest fiber import is cotton. Some 26,000 M.T. came into the country from the United States in 1970 under P.L. 480. Another 10,400 M.T. of synthetic fibers and 4,200 M.T. of cotton yarn and fabric were imported.

South Vietnam produces rubber and tobacco for industrial use (Appendix Table H-5). Three quarters of the 11,000 M.T. of tobacco used was produced in country; the rest was imported in 1970. Rubber is the only remaining substantial export. In 1970, 33,000 M.T. were produced and 23,000 M.T. were exported.

Food Balance

The data generated from estimated supply and distribution of major foods are used as a basis for an overall food balance for South Vietnam (Table 42). The Food and Agriculture Organization format for food balances is used so this table can be readily compared to previous work done by FAO on Vietnam and other countries. 26/

South Vietnamese used an estimated 1,654 calories per person per day from grains, 1,535 calories of this from rice. Estimated calorie consumption in grains was about 100 calories less per person per day than the 1964-66 average reported by FAO. Total consumption of all grains rose from the 1964-66 average to 1970, but not as much as population growth.

Consumption of other food crops was also lower in 1970. Consumption of starchy roots was down 5 calories from the 1964-66 average. Consumption of pulses, nuts, and oilseeds, at 28 calories per person per day, was lower than the 1964-66 average.

Fruits and vegetables are a special case. Estimated production of these items by FAO was much higher than published Vietnamese production estimates. Fruit use was estimated twic as high and vegetable use some nine times as high as would be indicated by Vietnamese production. Apparently FAO makes a substantial allowance for unreported subsistence production. Fruit trees and vegetable gardens would be the most likely crops to be undercounted in Vietnam because they are grown in kitchen gardens and in mixed lots not usually reported in production estimates. Since one purpose of this study is to see how published agricultural data fit together, Ministry of Agriculture statistics were used in estimating total food use. Much larger estimates might well be more reasonable.

Sugar is the only food crop for which calorie consumption is higher in 1970 than in the 1964-66 average. Sugar production in Vietnam has decreased rapidly to the point where almost all sugar was imported in 1970.

Nourishment obtained from animal products is much higher in the 1970 calculations than in the 1964-66 food balance done by FAO. Basically,

26/ FAO, Food Balance Sheets (Rome: FAO, 1971).

Table 42.--Food balance, 1970

Item	Total food use	Per capita consumption				
		Per year	Per day	Calories per day	Protein per day	Fat per day
	M.T.	Kg.	Grams	Number	- - - - Grams	- - - -
Cereals						
Wheat flour	180,390	9.8	27.0	94.5	3.2	0.4
Rice	2,852,042	155.6	426.3	1,534.7	28.6	3.0
Corn	31,435	1.7	1.7	17.0	.4	.2
Other cereals	16,924	.9	2.5	8.3	.3	.1
Total				1,654.5	32.5	3.7
Tubers						
Yam beans	6,220	.3	.9	.8	--	--
Sweet potato	219,750	12.0	32.8	31.9	.4	.1
Cassava	215,710	11.8	32.2	35.1	.3	.1
Potatoes	4,000	.2	.6	.4	--	--
Total				68.2	.7	.2
Sugar						
Refined & refined equivalent	132,011	7.2	19.7	76.4	--	--
Pulses, nuts, oilseeds						
Mungo beans	11,095	.6	1.7	5.7	.4	--
Soybeans	7,455	.4	1.1	3.7	.4	.2
Peanuts	24,485	1.3	3.7	14.2	.7	1.1
Coconuts	16,658	.9	2.5	4.4	--	.4
Total				28.0	1.5	1.7
Vegetables	217,952	11.9	36.6	7.3	3.7	--

-- Continued

Table 42.--Food balance, 1970--Continued

Item	Total food use	Per capita consumption				
		Per year	Per day	Calories per day	Protein per day	Fat per day
	M.T.	Kg.	Grams	Number	- - - - Grams	- - - -
Fruit						
Pineapple	33,325	1.8	5.0	1.6	0.2	0.1
Bananas	203,635	11.1	30.4	20.4	2.7	.1
Tree fruits, tropical	235,705	12.9	35.2	14.8	1.4	.4
Fruit imports	5,514	.3	.8	.4	--	--
Total				37.2	4.3	.6
Meat						
Cattle meat	19,740	1.1	3.0	6.8	.4	.5
Pork	256,240	14.0	38.4	144.4	3.8	14.2
Buffalo	13,543	.7	1.9	1.5	.2	--
Chicken	46,511	2.5	6.8	8.3	.8	.5
Duck	37,568	2.0	5.4	11.1	.5	1.0
Offals	25,000	1.4	3.8	5.4	.6	.3
Total				177.5	6.3	16.5
Eggs						
Chicken	16,560	.9	2.5	3.6	.4	.4
Duck	14,384	.8	--	2.1	.2	.3
Total	--	--	--	5.7	.6	.7
Fish	579,572	31.6	86.6	53.7	7.6	2.3
Milk	200,426	10.9	30.0	17.8	.1	.1
Oils and fats	25,229	1.4	3.8	31.4	--	3.8
Grand total				2,157.0	57.3	29.5

preliminary estimates of livestock and poultry production, even for the 1964-66 period, were much higher than FAO. Second-round approximations by the Ministry of Agriculture pare initial estimates of livestock production. However, South Vietnamese estimates of the fish catch for 1970 are much higher than in 1964-66.

Conclusions and Implications of the Economic Profile

The agricultural sector's importance in a developing economy extends well beyond farming. Farming provides the basic materials for a whole set of processing and marketing industries which make up a part of the agricultural industry. In order to build a healthy growing economy, South Vietnam's processing and marketing infrastructure will have to be closely related to domestic raw materials production and become less dependent on imported raw materials.

The pattern of growth in agricultural production in South Vietnam, based on very tentative estimates, shows a trend over the past decade toward production of more protein foods--poultry, fish, and, to some extent, pork. At the same time rice continues to be the most important food crop. Although this pattern may be unusual relative to development patterns of other less developed countries, it probably is not inconsistent with Vietnam's resource base and demand pressures of recent years.

The population of rural South Vietnam is a much smaller portion of the total now than in the mid-1960's. With the disruptions of war and a growing urban sector, Vietnam has become dependent on large agricultural imports, mostly donated. Either the rural-urban population ratio must shift toward more rural or the productivity of the present rural population must increase if the sector is to provide enough food and raw materials for the entire population.

Imports of agricultural products represented possibly 10 to 15 percent of total use in 1970; exports were fractional. In 1964 about 3 percent of domestic use was imported and about the same percentage was exported. Vietnam produced perhaps 75 percent of all grain used in 1970. Only about 40 percent of food oil used was produced in country. Vietnam imported most of whole milk equivalent in dairy products, 75 percent of the sugar used, and nearly all fibers used. This dependence probably increased in 1971 for all commodities except rice; rice imports were temporarily down. Only an increase in domestic production, along with some restructuring or direct curbs on consumer demand, will help solve this problem and move the country from dependence on imports.

Cropped area in the Central Lowlands region has decreased substantially--about 24 percent. In other areas where statistics are reliable, only the area in nonfood crops in the eastern part of the Southern Region has decreased. Agricultural production, like cultivated area, has suffered differently from effects of the war in each of the regions. In the Central Lowlands, agricultural production decreased 16 percent while population increased 17 percent from 1964 to 1970. In the Southern Region, however, production increased 20 percent while population increased 16 percent. There is obviously a very uneven distribution of effects of the war among the regions. This surely suggests something about the relative disruptions associated with the war, as well as the subsequent need for rehabilitation of people in these areas.

APPENDIX A.--GENERAL ECONOMIC DATA

Legend of Variables

Current Piaster Values

Ex. $GNP = CF + CN + I + G + EX + FP - M$

Deflated (Real) Piaster Values (1960 Piasters)

Ex. $GNP' = CF' + CN' + I' + G' + EX' + FP' - M'$

Variables

A = Foreign aid, Billion $VN

C = Private consumption, Billion $VN

C = CF + CN
CF = Food consumption, Billion $VN
GN = Nonfood consumption, Billion $VN

EX = Exports, Billion $VN

FP = Factor payments from abroad, Billion $VN

G = Government expenditures, Billion $VN

GDE = Gross domestic expenditure, Billion $VN

GDE = C + G + I

GT = Government transfer payments, Billion $VN

GT = GH + GI + GS
GH = Government transfers to households, Billion $VN
GI = Government interest payments, Billion $VN
GS = Government subsidies, Billion $VN

GNP = Gross national product, Billion $VN

GNP = GF + CN + G + I + EX + FP - M

HI = Household income, Billion $VN

HI = GNP - R - S + GH + d
R = Government revenue, Billion $VN
R = RB + RC + RH
RB = Indirect business taxes, Billion $VN
RC = Corporate taxes, Billion $VN
RH = Household transfers and taxes, Billion $VN
S = Gross savings, Billion $VN
S = SD + SC

SD = Capital consumption allowances, Billion $VN
SC = Corporate savings, Billion $VN
d = Statistical discrepancy, Billion $VN

I = Gross domestic investment, Billion $VN

IF = Fixed investment, Billion $VN

IS = Net change in inventories, Billion $VN

IND = Index of industrial production, 1960=100

IOA = Index of livestock production, 1957-59=100

M = Imports, Billion $VN

MO = Money supply, end of year, Billion $VN

NI = National income, Billion $VN

NI = GNP - RB - SD + GS
GNP = Gross national product, Billion $VN
RB = Indirect business taxes, Billion $VN
SD = Capital consumption allowance, Billion $VN
GS = Government subsidies, Billion $VN

N2 = Population as reported from provinces and cities, million

PC = Deflator index for personal consumption, 1960=100

PE = Deflator index for gross domestic expenditure, 1960=100

PF = Deflator index for food, 1960=100

PG = Deflator index for government expenditures, 1960=100

PI = Deflator index for investment, 1960=100

PM = Deflator index for imports, 1960=100

PN = Deflator index for national income, 1960=100

PY = Deflator index for gross national product, 1960=100

PEX = Deflator index for exports, 1960=100

PNF = Deflator index for nonfood, 1960=100

PIN = Personal income, Billion $VN

PIN = NI - SC - RC + GT
NI = National income, Billion $VN
SC = Corporate saving, Billion $VN
RC = Corporate taxes, Billion $VN
GT = Government transfer payments, Billion $VN

QPPV = Paddy production, 1,000 M.T.

R = Government revenue, Billion $VN

R = RB + RC + RH
RB = Business taxes, Billion $VN
RC = Corporate taxes, Billion $VN
RH = Household transfers and taxes, Billion $VN

S = Gross saving, Billion $VN

S = SD + SC

SD = Capital consumption allowance, Billion $VN

SC = Corporate saving, Billion $VN

Sources: National Accounts, Bank of Vietnam, and National Institute of Statistics Annual Reports.

Appendix table A-1.--National income account analyses in current piasters

(Accounts in Billion $VN)

Year	C	CF	CN	G	I	GDE	GNP
1960 ...	63.9	31.7	32.2	14.0	10.3	88.2	81.9
1961 ...	70.1	32.3	37.8	15.3	7.5	92.9	84.7
1962 ...	77.9	38.4	39.5	19.7	9.4	107.0	93.9
1963 ...	85.4	42.4	43.0	21.0	7.6	114.0	100.9
1964 ...	93.2	44.1	49.1	25.0	12.8	131.0	115.3
1965 ...	110.4	54.8	55.6	32.5	17.1	160.0	146.0
1966 ...	178.4	86.7	91.7	52.9	34.5	265.8	237.6
1967 ...	284.4	155.5	128.9	73.5	45.2	403.1	356.7
1968 ...	318.7	177.7	141.0	86.5	31.2	436.4	385.3

	HI	R	S	GT	QPPV	IOA	M
1960 ...	67.7	10.4	6.0	0.6	**4,955.0**	106.8	11.6
1961 ...	68.6	12.3	5.9	.7	**4,607.0**	110.4	12.5
1962 ...	79.3	12.3	6.2	.8	**5,205.0**	106.3	17.9
1963 ...	87.0	13.3	6.6	.5	**5,327.0**	120.0	21.0
1964 ...	98.9	16.1	8.1	.8	**5,185.0**	131.3	23.0
1965 ...	134.1	15.6	8.1	.8	**4,322.0**	149.6	28.6
1966 ...	201.1	27.2	15.6	4.1	4,336.0	140.5	76.0
1967 ...	291.8	48.1	20.0	2.4	4,688.0	148.7	110.7
1968 ...	320.4	50.6	19.9	4.8	4,366.0	123.6	105.8

Continued -

Appendix table A-1.--National income account analyses in current piasters--Continued

(Accounts in billion $VN)

Year	A_t	R_{t-1}	S_{t-1}	CN_{t-}	$\frac{R+S}{GNP_{t-1}}$	NU2
1960	4.52	10.0	5.8	30.0	20.0	2.8
1961	4.16	10.4	6.0	32.2	20.0	3.1
1962	7.28	12.3	5.9	37.8	21.5	3.3
1963	9.62	12.3	6.2	39.5	19.7	3.5
1964	7.80	13.3	6.6	43.0	19.7	3.7
1965	10.50	16.1	8.1	49.1	21.0	4.3
1966	20.28	15.6	8.1	55.6	16.2	4.7
1967	23.03	27.2	15.6	91.7	18.1	5.4
1968	21.71	48.1	20.0	128.9	19.1	5.9

	MG	EX	FP	G+I	EX+FP
1960	81.4	6.1	-0.8	24.3	5.3
1961	87.4	5.0	-.7	22.8	4.3
1962	89.6	5.4	-.6	29.1	4.8
1963	100.0	8.4	-.4	28.6	8.0
1964	114.6	7.8	-.5	37.8	7.3
1965	126.9	12.0	2.6	49.6	14.6
1966	268.3	30.5	17.4	87.4	47.9
1967	190.7	42.5	21.8	118.7	64.3
1968	168.6	28.2	26.4	117.7	54.6

Appendix table A-2.--National income account analyses, 1960 to 1968

(Accounts in Billion $VN at 1960 prices, price variables on base 1960=100)

Year	C'	CF'	CN'	G'	I'	GDE'	GNP'
1960 ...	63.9	31.7	32.2	14.0	10.3	88.2	81.9
1961 ...	66.2	28.9	37.3	14.8	7.3	88.3	81.7
1962 ...	71.5	33.7	37.8	18.5	8.8	98.8	89.3
1963 ...	72.4	34.1	38.3	19.0	7.3	98.7	90.0
1964 ...	76.4	34.1	42.3	21.6	11.3	109.3	99.0
1965 ...	78.3	34.2	44.1	24.9	13.4	116.6	108.0
1966 ...	77.9	39.4	48.5	33.9	19.5	131.3	108.5
1967 ...	87.0	34.4	52.6	37.4	21.0	145.4	110.7
1968 ...	77.7	29.8	47.9	42.4	14.3	134.5	105.8

	HI'	QPPV	IOA	IND	M'	MO	$\frac{R+S}{(GNP)_{t-1}}$
1960 ...	67.7	4,955.0	106.8	90.8	11.6	16.4	20.0
1961 ...	64.7	4,607.0	110.4	97.5	11.5	16.8	20.0
1962 ...	72.8	5,207.0	106.3	100.0	14.8	17.2	21.5
1963 ...	73.7	5,327.0	120.0	116.5	16.6	19.5	19.7
1964 ...	81.1	5,185.0	131.3	132.1	17.1	22.3	19.7
1965 ...	95.1	4,822.0	149.6	157.9	20.4	27.4	21.0
1966 ...	87.8	4,336.0	140.5	170.8	45.5	47.6	16.2
1967 ...	89.2	4,688.0	148.7	189.8	56.8	63.5	18.1
1968 ...	78.1	4,366.0	123.6	172.7	46.6	82.2	19.1

Continued--

Appendix table A-2.--National income account analyses, 1960 to 1968--Continued

(Accounts in Billion $VN at 1960 prices, price variables on base 1960=100)

Year	PE	PN	PC	PF	PNF	PG	PI
1960 ...	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1961 ...	105.0	104.0	106.0	112.0	101.0	104.0	102.0
1962 ...	108.0	105.0	109.0	114.0	105.0	106.0	107.0
1963 ...	116.0	112.0	118.0	124.0	112.0	111.0	104.0
1964 ...	120.0	116.0	122.0	130.0	116.0	116.0	114.0
1965 ...	137.0	135.0	141.0	160.0	126.0	130.0	128.0
1966 ...	202.0	219.0	229.0	295.0	189.0	156.0	177.0
1967 ...	277.0	322.0	327.0	452.0	245.0	196.0	216.0
1968 ...	325.0	364.0	410.0	596.0	294.0	204.0	219.0

	HI	PE_{t-1}	PC_{t-1}	I'+G'	EX'+FP'	A_t	$K=\frac{GDE}{MO}$
1960 ...	67.7	95.0	95.0	24.3	5.3	4.5	5.38
1961 ...	68.6	100.0	100.0	22.1	5.0	4.2	5.53
1962 ...	79.3	105.0	106.0	27.3	5.3	7.3	6.22
1963 ...	87.0	108.0	109.0	26.3	7.9	9.6	5.85
1964 ...	98.9	116.0	118.0	32.8	6.9	7.8	5.87
1965 ...	134.1	120.0	122.0	38.3	11.8	10.5	5.84
1966 ...	201.1	137.0	141.0	53.4	22.7	20.3	5.58
1967 ...	291.8	202.0	229.0	58.4	22.1	23.0	6.35
1968 ...	320.4	277.0	327.0	56.7	17.9	21.7	5.31

Appendix table A-3.--Gross national product by expenditure group, 1960 to 1968

Item	Variable identity	1960	1961	1962	1963	1964	1965	1966	1967	1968
		Billion $VN								
Private consumption	C	63.9	70.1	77.9	85.4	93.2	110.4	178.4	284.4	318.7
Food	CF	31.7	32.3	38.4	42.4	44.1	54.8	86.7	155.5	177.7
Nonfood	CN	32.2	37.8	39.5	43.0	49.1	55.6	91.7	128.9	141.0
Government expenditure	G	14.0	15.3	19.7	21.0	25.0	32.5	52.9	73.5	86.5
Public administration	--	8.5	9.2	10.2	11.5	13.0	12.0	15.0	24.6	27.6
National defense	--	5.5	6.1	9.5	9.5	12.0	20.5	37.9	48.9	58.9
Gross domestic investment	I	10.3	7.5	9.4	7.6	12.8	17.1	34.5	45.2	31.2
Investment fixed	IF	6.6	6.8	8.7	8.1	9.2	12.0	27.5	35.1	25.5
Net stock change	IS	3.7	.7	.7	-.5	3.6	5.1	7.0	10.1	5.7
Gross domestic expenditure	GDE	88.2	92.9	107.0	114.0	131.0	160.0	265.8	403.1	436.4
Exports	EX	6.1	5.0	5.4	8.4	7.8	12.0	30.5	42.5	28.2
Imports	-M	-11.6	-12.5	-17.9	-21.0	-23.0	-28.6	-76.0	-110.7	-105.8
Gross domestic product	--	82.7	85.4	94.5	101.4	115.8	143.4	220.2	334.9	358.8
Factor payments to abroad	FP	-.8	-.7	-.6	-.4	-.5	2.6	17.4	21.8	26.4
Gross national product	GNP	81.9	84.7	93.9	101.0	115.3	146.0	237.6	356.7	385.3
Net import, (M - EX)-FP	--	6.3	8.2	13.1	13.1	15.7	14.0	28.2	46.4	51.1
Gross domestic expenditure	GDE	88.2	92.9	107.0	114.0	131.0	160.0	265.8	403.1	436.4

Source: Vietnam Statistical Yearbook. Recent data from Estimates of National Income in Vietnam, National Bank of Vietnam, July 1971 and Revenue National Du Vietnam, Banque National du Vietnam, 1968.

Appendix table A-4.--Gross national income flow, 1960 to 1968

Item	Variable identity	1960	1961	1962	1963	1964	1965	1966	1967	1968
		Billion $VN								
Gross domestic expenditure	GDE	88.2	92.9	107.0	114.0	131.0	160.0	265.8	403.1	436.4
Net import (M-EX)-FP	--	6.3	8.2	13.1	13.1	15.7	14.0	28.2	46.4	51.1
Gross national product	GNP	81.9	84.7	93.9	101.0	115.3	146.0	237.6	356.7	385.3
Less:										
Indirect business taxes	RB	9.5	11.4	11.5	12.2	14.8	14.5	25.6	44.7	45.4
Capital consumption	SD	3.9	3.9	4.7	4.7	4.7	5.1	8.6	11.0	13.0
Plus:										
Subsidies	GS	.3	.3	.4	.1	.2	.7	.3	.2	.3
Equals:										
National income	NI	68.8	69.7	78.1	84.2	96.0	127.1	203.8	301.2	327.2
Less:										
Corporate saving	SC	2.1	2.0	1.5	1.9	3.4	3.0	7.0	9.0	6.9
Corporate taxes	RC	.6	.6	.5	.6	.6	.7	1.0	2.0	2.4
Plus:										
Transfers to households	GT	.2	.3	.3	.3	.5	1.0	2.8	1.3	4.2
Interest on debt	GI	.1	.1	.1	.1	.1	1.1	1.0	.9	.3
Equals:										
Personal income	PIN	66.4	67.5	76.5	82.1	92.6	125.5	199.6	292.4	322.4
Less:										
Household tax	RH	.2	.2	.2	.3	.3	.2	.4	.9	1.5
Transfer to government	--	.1	.1	.1	.2	.4	.2	.2	.5	1.3
Statistical discrepancy	d	1.6	1.4	3.1	5.4	7.0	9.0	2.2	.8	.8
Equals:										
Household income	HI	67.7	68.6	79.3	87.0	98.9	134.1	201.1	291.8	320.4
Less:										
Household saving	--	3.8	-1.5	1.4	1.6	5.7	23.7	22.7	7.4	1.8
Equals:										
Private consumption	C	63.9	70.1	77.9	85.4	93.2	110.4	178.4	284.4	318.6

Appendix table A-5.--Household and business income and government revenue, 1960 to 1968

Source	Variable identity	1960	1961	1962	1963	1964	1965	1966	1967	1968
		Billion $VN								
Gross national product	GNP	81.9	84.7	93.9	101.0	115.3	146.0	237.6	356.7	385.3
Less:										
Government revenue	R	10.4	12.3	12.3	13.3	16.1	15.6	27.2	48.1	50.6
Business taxes	RB	9.5	11.4	11.5	12.2	14.8	14.5	25.6	44.7	45.4
Corporate taxes	RC	.6	.6	.5	.6	.6	.7	1.0	2.0	2.4
Household transfers	RH	.3	.3	.3	.5	.7	.4	.6	1.4	2.8
Gross business saving	S	6.0	5.9	6.2	6.6	8.1	8.1	15.6	20.0	19.9
Capital consumption allowance	SD	3.9	3.9	4.7	4.7	4.7	5.1	8.6	11.0	13.0
Corporate saving	SC	2.1	2.0	1.5	1.9	3.4	3.0	7.0	9.0	6.9
Plus:										
Government transfers and subsidies	--	2.2	2.1	3.9	5.9	7.8	11.8	6.3	3.2	5.6
Government transfers	GH	.3	.4	.4	.4	.6	2.1	3.8	2.2	4.5
Subsidies	GS	.3	.3	.4	.1	.2	.7	.3	.2	.3
Statistical discrepancy	d	1.6	1.4	3.1	5.4	7.0	9.0	2.2	.8	.8
Equal:										
Household income	HI	67.7	68.6	79.3	87.0	98.9	134.1	201.1	291.8	320.4

Appendix table A-6.--Gross national product expenditures, by major categories, 1960 to 1968

Item	Variable identity	1960	1961	1962	1963	1964	1965	1966	1967	1968
		Billion $VN in 1960 prices								
Private consumption	C'	63.90	66.15	71.49	72.39	76.43	78.27	77.90	86.98	77.72
Government expenditure	G'	14.00	14.75	18.51	19.01	21.62	24.91	33.92	37.44	42.45
Gross investment	I'	10.30	7.34	8.76	7.28	11.22	13.43	19.49	20.95	14.27
Gross domestic expenditure	GDE'	88.20	88.24	98.76	98.68	109.27	116.61	131.31	145.37	134.44
Exports	EX'	6.13	5.68	5.88	8.28	7.35	9.90	14.61	15.32	9.11
Imports	M'	-11.57	-11.50	-14.78	-16.56	-17.13	-20.44	-45.51	-56.76	-46.56
Net import (M-EX) FP'	--	6.30	6.55	9.44	8.69	10.22	8.65	22.82	34.69	28.65
Gross domestic product	GDP'	82.70	82.42	89.86	90.40	99.49	106.07	100.41	103.93	96.99
Factor payments to abroad	FP'	-.83	-.73	-.54	-.41	-.44	1.89	8.08	6.75	8.80
Gross national product	GNP'	81.93	81.69	89.32	89.99	99.05	107.96	108.49	110.68	105.79

Appendix table A-7.--Price deflator indexes computed from current and constant (1960) piasters, 1960 to 1968

Item	Variable identity	1960	1961	1962	1963	1964	1965	1966	1967	1968
		(1960=100)								
Private consumption	PC	100.0	106.0	109.0	118.0	121.9	141.0	229.0	327.0	410.0
Government expenditure	PG	100.0	103.7	106.4	110.5	115.6	130.5	156.0	196.3	203.8
Gross investment	PI	100.0	102.2	107.3	104.4	114.1	127.6	177.0	215.8	218.6
Domestic expenditure	PE	100.0	105.3	108.3	115.5	119.9	137.2	202.3	277.3	324.6
Exports	PEX	100.0	88.0	91.8	101.4	106.1	121.2	208.8	277.4	309.4
Imports	PM	100.0	108.7	121.1	126.8	134.3	139.9	167.0	195.0	227.2
Gross domestic product	PE	100.0	103.6	105.2	112.2	116.4	135.2	219.3	322.2	370.0
Factor payments abroad	FP	100.0	96.0	111.1	100.0	114.0	138.0	215.4	323.0	300.0
Gross national product	PY	100.0	104.0	105.1	112.2	116.4	135.2	219.0	322.3	364.2
Net import (M-EX) FP	--	100.0	125.2	138.8	150.7	153.6	161.8	123.6	133.8	178.4
National income deflator ...	PN	100.0	103.8	104.8	112.9	116.6	136.1	233.1	363.3	421.0

Appendix table A-8.--Net domestic product at current prices by industrial origin, 1960 to 1968

Items	1960	1961	1962	1963	1964	1965	1966	1967	1968
	Billion $VN								
Agriculture, forestry and fishery	25.14	24.80	27.87	28.76	32.48	37.42	55.30	102.00	106.30
Mining, manufacturing and construction	9.39	10.13	10.60	11.85	12.77	15.92	21.75	23.87	26.95
Public utilities	4.22	4.73	4.92	4.92	5.95	7.30	9.27	13.76	9.53
Wholesale and retail trade	7.50	7.82	9.60	10.26	12.10	14.38	27.90	42.60	35.70
Banking and insurance ownership of dwellings	6.67	6.37	6.94	7.36	8.12	9.14	15.90	20.35	19.40
Government expenditure	11.58	12.62	16.25	17.62	21.35	30.41	47.28	63.54	76.40
Services and statistical discrepancies	9.10	7.71	7.00	7.92	7.64	13.96	17.62	24.22	39.60
Net domestic product at factor cost	73.40	74.18	83.24	88.70	100.41	128.55	194.99	290.35	313.80

Source: National Institute of Statistics and Bank of Vietnam.

Appendix table A-9.--Price deflator indexes for major industry groups, 1960 to 1968

Industry	1960	1961	1962	1963	1964	1965	1966	1967	1968
	(Index 1964=100)								
Agriculture, forestry, hunting and fishery	69	88	90	100	100	122	194	352	418
Mining and quarrying	100	100	100	100	100	100	200	300	400
Manufacturing	80	88	94	98	100	104	117	127	163
Construction	86	85	85	100	100	112	184	282	353
Electricity, gas and water	86	88	89	100	100	109	125	183	185
Transport, storage and communication	84	87	89	95	100	117	189	268	342
Wholesale and retail trade	85	89	92	98	100	115	182	254	323
Banking, insurance and real estate	80	89	100	91	100	114	180	254	331
Ownership of dwellings	85	89	94	97	100	115	184	254	324
Public administration and defense	87	89	92	95	100	112	134	171	119
Services	82	89	90	97	100	116	189	273	343
Statistical discrepancy	79	90	88	100	100	114	165	240	277
GD product factor cost	78	89	91	98	100	115	163	238	275

Source: IDA estimates of national income and product accounts.

Appendix table A-10.--Income per capita and population, 1960 to 1968

Item	Unit	Variable identity	1960	1961	1962	1963	1964	1965	1966	1967	1968
National income 1/											
Total (current)	Bil. $VN	NI	68.7	69.5	78.0	83.5	95.2	125.8	203.8	301.2	327.2
Per capita (current) ..	$VN	NI/N2	4,883	4,796	5,462	5,909	6,630	8,375	13,488	18,524	20,123
Per capita (real)	1960 $VN	NI'/N2	4,883	4,525	5,011	5,008	5,434	5,940	5,890	5,665	4,908
Household income 2/											
Total (current)	Bil. $VN	HI	67.7	68.6	79.3	87.0	98.9	134.1	201.1	291.8	320.4
Per capita (current) ..	$VN	HI/N2	4,812	4,734	5,553	6,157	6,887	8,928	13,309	17,946	19,705
Per capita (real)	1960 $VN	HI'/N2	4,812	4,466	5,095	5,218	5,645	6,332	5,812	5,488	4,806
Population 3/	Mil.	N2	14.07	14.49	14.28	14.13	14.36	15.02	15.11	16.26	16.26
Implicit price deflator 4/	1960=100	PC	100	106	109	118	122	141	229	327	410

1/ National income from NIS and Bank of Vietnam.

2/ Household income from national accounts, NIS and Bank of Vietnam.

3/ Estimates based on reports from provinces and municipalities.

4/ Implicit price deflator for private consumption expenditures.

Appendix table A-11.--National economy, selected analyses

Equation number	Dependent variable 1/	HI	QPPV	IOA	GNP'	M'	IND	GDE'	$\frac{R+S}{GNP}_{t-1}$	I'+G'	Constant	R_2	D.W.
1	CF'	.08944	.0059	.0305							-7.155	.899	2.3131
		.8035	5.995	.4458									
		.2188	.8836	.1194									
2	CF'	.1368	.00577								-6.4084	.8951	2.3712
		4.418	6.5987										
		.3347	.8640										
3	CF'		.00606	.0829							-7.5195	.8860	2.5093
			6.4975	4.1836									
			.9084	.3247									
4	CN'				.3128	.17294					7.2958	.9525	2.4989
					3.6711	3.0642							
					.7183	.1093							
5	CN'					-.01397	.0713	.1919			11.419	.9612	2.2893
						.1093	.7891	.8397					
						-.0088	.2300	.5091					
6	HI'							.4472	1.4870		-.2964	.6199	.8502
								2.8115	.7037				
								.6367	.3670				
7	HI				.8940				1.1604		-30.60	.8794	1.0648
					6.1513				1.0758				
					1.1013				.2864				
8	GDE'		.00629	.2099		.2904			.9835	1.0685	-11.828	.9964	2.2359
			2.0393	3.0822		1.2579			1.2570	3.6281			
			.2707	.2360		.0692			.1705	.3589			
9	GDE'									1.4031	59.400	.9680	1.691
										14.557			
										.4713			
10	C'		.00712	.2168		.2876					5.094	.9444	2.032
			2.6004	3.8690		4.1919							
			.4612	.3673		.1032							

1/ "t" values and elasticities (respectively) are shown below the regression coefficients.

Appendix table A-12.--National economy, selected analyses

Equation number	Dependent variable 1/	GNP'	M'	A	GDE'	$\frac{R+S}{(GNP)_{t-1}}$	HI'	Constant	R^2	D.W.
1	I'	.1474 1.324 1.1393	.1770 2.400 .3766					-6.4895	.8607	1.432
2	I'	.2731 3.5064 2.111				-1.3136 2.2724 -2.0342		11.612	.8532	2.027
3	I'	.3642 4.317 2.8146						-22.82	.7269	1.375
4	M'	1.2248 3.6711 4.4483						-92.300	.6582	1.0559
5	M'			2.3218 15.454 1.0496				-1.3277	.9715	1.991
6	I'				.17475 3.968 1.561	-.8951 1.5298 -1.386		10.380	.8765	1.812
7	M'				.80655 8.662 3.385			-63.845	.9147	1.314
8	CN'		.2619 5.4323 .1656				.23225 2.8056 .4329	16.996	.9333	2.196
9	CN'				.30544 12.045 .8106			8.019	.9540	2.285
10	I'				.17475 3.968 1.5609	-.8951 1.530 -1.3861		10.3800	.8765.	1.812

1/ "t" values and elasticities (respectively) are shown below the regression coefficients.

Appendix table A-13.--National economy, selected analyses

Equation number	Dependent variable 1/	GNP'	GDE'	PC	PE	K	Constant	R^2	D.W.
1	HI'	.8136 6.455 1.0023					-.1796	.8562	1.371
2	HI'		.3768 3.164 .5364				36.581	.5885	1.135
3	PF			1.5866 100.42 1.2660			-61.555	.9993	1.159
4	PNF			.6341 64.187 .7592			37.130	.9983	1.759
5	PC				1.3528 53.825 1.2128		-39.304	.9976	1.464
6	PE			.7374 53.825 .8225			29.382	.9976	1.448
7	PG				.4768 20.095 .5809		56.949	.9830	1.424
8	PI				.5834 14.3851 .6860		44.199	.9673	1.426
9	PE		3.7820 5.939 2.5665			-61.446 1.645 -2.1415	95.207	.8550	.8953

1/ "t" values and elasticities (respectively) are shown below the regression coefficients.

Appendix table A-14.--National economy, selected analyses

Equation number	Dependent variable 1/	CF'	HI	PC_{t-1}	CN'	PE_{t-1}	C'	GDE'	MO	Constant	R^2	D.W.
1 ...	PF	-5.501	1.0526	.9773						104.9	.9979	1.815
		3.3532	9.732	7.1170								
		-.7667	.6816	.6320								
2 ...	PF	-7.4084	1.7726							204.7	.9763	1.090
		1.5028	15.211									
		-1.0325	1.1479									
3 ...	PNF		.6686		-1.3351	.23015				78.306	.9939	3.344
			4.2842		1.2002	1.324						
			.6498		-.3665	.2089						
4 ...	PNF		.8627		-2.352					124.48	.9917	2.973
			15.1465		2.753							
			.8384		-.6455							
5 ...	PC		.9495			.5137	-2.0204			121.14	.9980	2.252
			8.9408			3.7292	3.2686					
			.7706			.3894	-.8161					
6 ...	PC		1.3219				-3.3365			235.41	.9925	1.203
			20.599				3.7038					
			1.0728				-1.3476					
7 ...	PE					.1672		.2636	2.8448	13.623	.9958	2.279
						.8272		.8356	4.1985			
						.1414		.1789	.5974			
8 ...	PE							.10225	3.3763	36.686	.9953	2.535
								.4237	16.126			
								.0694	.7090			
9 ...	PE					.9722		1.3328		-120.28	.9811	1.519
						7.7997		3.685				
						.8221		.0044				

1/ "t" values and elasticities (respectively) are shown below the regression coefficients.

Appendix table A-15.--National economy, selected analyses

Equation number	Dependent variable 1/	QPPV	IOA	G'	EX' & FP'	A_t	Constant	R^2	D.W.
1	GNP'	.01475	.2030	2.0532	2.3476	-3.4983	-36.450	.9888	1.846
		2.365	1.704	3.269	1.968	2.200			
		.7335	.2639	.5315	.2815	-.4354			
2	GDE'	.00393	.3293	.9831		1.0108	14.768	.9850	3.152
		.8252	3.3466	1.790		1.3597			
		.1691	.3704	.22022		.1089			

Equation number	Dependent variable 1/	GNP	R_{t-1}	S_{t-1}	G+I	GNP'	A_t	Constant	R^2	D.W.
3	R	.1227	.0908					-.6306	.9857	2.1538
		8.5741	.6524							
		.9546	.07293							
4	R	.1310						-.4459	.9847	1.7977
		21.218								
		1.0195								
5	S	.0711		-.5227				2.833	.9954	2.7608
		15.629		4.905						
		1.1817		-.4462						
6	S	.04985						1.836	.9772	2.462
		17.315								
		.8286								
7	G_t	.0114						.0778	.6768	2.354
		3.829								
		1.0400								
8	GDE				3.385			5.759	.9813	1.213
					19.140					
					.9712					
9	M'					-.1175	2.4768	8.216	.9733	2.257
						.622	8.4070			
						-.4266	1.1197			

1/ "t" values and elasticities (respectively) are shown below the regression coefficients.

Appendix table A-16.--National economy, selected analyses

Equation number	Dependent variable 1/	HI	QPPV	IOA	CN_{t-1}	GDE	$\frac{R+S}{GNP_{t-1}}$	GNP	A	Constant	R^2	D.W.
1 ...	CF	.5868	.0108							-66.426	.9827	.7892
		14.291	.9765									
		1.1927	.7082									
2 ...	CF	.6332	.01225	-.4381						-25.00	.9953	2.942
		23.6951	1.930	3.6492								
		1.287	.8028	-.7508								
3 ...	CN	.4170			.0139					5.475	.9954	2.716
		10.602			.1183							
		.9090			.0114							
4 ...	HI					.7218	.1995			1.754	.9969	1.590
						36.077	.1155					
						.9624	.0259					
5 ...	HI					.7205				5.906	.9969	1.643
						47.438						
						.9606						
6 ...	HI						.4985	.8233		-6.406	.9978	1.337
							.3404	42.695				
							.0648	.9780				
7 ...	HI							.8195		3.978	.9977	1.475
								55.655				
								.9735				
8 ...	MT							.2193	1.9633	-17.561	.9921	2.048
								5.492	3.083			
								.8630	.5252			
9 ...	MT	.2583							2.0613	-18.428	.9866	1.924
		3.920							2.3904			
		.8560							.5514			

1/ "t" values and elasticities (respectively) are shown below the regression coefficients.

APPENDIX B.--RICE DATA

Legend of Variables

Supply Variables

HV	=	Hectares of paddy, Vietnam (1,000)
HD	=	Hectares of paddy, West Delta (1,000)
HO	=	Hectares of paddy, all other provinces (1,000)
YV	=	Paddy yield, Vietnam (Kg./hectare)
YD	=	Paddy yield, West Delta (Kg./hectare)
YO	=	Paddy yield, all other provinces (Kg./hectare)
PRPV	=	Paddy price at provincial rice mills, Vietnam, $VN/100 kg.
PRPD	=	Paddy price at provincial rice mills, West Delta, $VN/100 kg.
PRPC	=	Paddy price at provincial rice mills, Central Lowlands, $VN/100 kg.
CPIX	=	Consumer price index (excluding rent) for working class families, Saigon, 1963=100
T'	=	Technology proxy increasing 1.0 per year, plus 1.0 for each 100,000 hectare increase in IR varieties, 1961=61.0
DIR	=	Hectares of improved rice varieties, Vietnam (100,000 hectares
DHL5-8	=	Dummy (0, 1) variable reflecting periods of war activities, (1965-68=1.0)
NR2	=	Rural population from series 2, NIS (million)
QF	=	Imports of chemical fertilizer, 3-year moving average centered, 1,000 M.T.
D63	=	Dummy (0, 1) shift for 1963; 1961-62=0.0; 1963=1.0; 1964-70=0.0
OUD	=	Other weather factors influencing yields, West Delta, 100 = normal conditions
OUO	=	Other weather factors influencing yields, all other provinces, 100 = normal conditions
QPPV	=	Quantity of paddy produced, Vietnam (1,000 M.T.)
QPPD	=	Quantity of paddy produced, West Delta (1,000 M.T.)
QPPO	=	Quantity of paddy produced, all other provinces (1,000 M.T.)
QRPV	=	Quantity of rice produced, Vietnam (1,000 M.T.), (QPPV x 0.6)

Demand Variables

QRPV	=	Quantity of rice produced, Vietnam (1,000 M.T.)
QDEL	=	Quantity of rice delivered to Saigon (1,000 M.T.)
QDV	=	Rice disappearance to all uses, Vietnam (1,000 M.T.)
QDC	=	Rice disappearance to commercial uses (Saigon deliveries; change in Saigon stocks; and net imports), (1,000 M.T.)
QDR	=	Rice disappearance to rural uses (QDV-QDC), (1,000 M.T.)
RNIMP	=	Net rice imports, Vietnam (1,000 M.T.)
ESTK	=	Saigon rice stocks, December 31 (1,000 M.T.)
QRSV	=	Quantity of rice supplied (QRPV, plus RNIMP, plus the change in ESTK), (1,000 M.T.)
PRW	=	No. 1 wholesale rice price, Saigon, $VN/100 kg.
PRR	=	No. 2 retail rice price, Saigon, $VN/100 kg.
PPKW	=	Wholesale pork price, Saigon, $VN/100 kg.
PFSHW	=	Wholesale price of fresh fish, Saigon, $VN/100 kg.
HI	=	Household income, current prices, $VN 1,000
HI'	=	Household income deflated by implicit consumer expenditure deflator, $VN 1,000, 1960=100
CPI	=	Consumer price index including rent for working class families, Saigon, 1963=100
N2	=	Population from series 2, estimates from provinces and municipalities, million
NU2	=	Urban population from series 2, million
IOA	=	Index of animal products output, 1959-61=100
SD	=	Dummy variable for security level and unusual noneconomic events
NI	=	National income, current prices, $VN 1,000
NI'	=	National income deflated by implicit consumer expenditure deflator, $VN 1,000, 1960=100

Appendix table B-1.--Data used for rice supply analysis

Year	Hectares			Yield			Paddy price deflated by Consumer Price Index--previous year		
	Vietnam	West Delta	Other	Vietnam	West Delta	Other	Vietnam	West Delta	Central Lowlands
	1,000			Kg./hectare			$VN/100 Kg.		
Variable name	HV	HD	HO	YV	YD	YO	PRPV/CPIX	PRPD/CPIX	PRPC/CPIX
1961	2,353	1,662	691	1,958	2,046	1,748	331	314	423
1962	2,479	1,753	726	2,100	2,228	1,789	406	387	522
1963	2,538	1,787	751	2,099	2,219	1,814	383	364	491
1964	2,562	1,779	783	2,024	2,148	1,742	353	337	453
1965	2,429	1,675	754	1,985	2,101	1,728	369	352	474
1966	2,295	1,629	666	1,889	1,916	1,824	350	304	473
1967	2,296	1,650	646	2,042	2,127	1,824	354	330	590
1968	2,394	1,746	648	1,811	1,896	1,630	431	371	500
1969	2,430	1,787	643	2,105	2,198	1,846	369	311	479
1970	2,511	1,854	657	2,276	2,367	2,021	478	436	503

	Technology	Improved varieties	Security shifter	Rural population	Unspecified weather factors affecting yields	
					West Delta	Other
				Mil.	Percent	
Variable name	T'	DIR	DHL5-8	NR2	OUD	OUO
1961	61	0	0	10.8	97	98
1962	62	0	0	11.0	99	99
1963	63	0	0	10.7	102	102
1964	64	0	0	10.6	99	99
1965	65	0	1	10.7	104	98
1966	66	0	1	10.4	99	105
1967	67	0	1	10.8	102	103
1968	68	0.4	1	10.4	94	93
1969	71	2.0	0	10.2	98	99
1970	75	5.0	0	10.2	105	102

Appendix table B-2.--Data used for rice demand analysis

Year	Domestic use: Total	Domestic use: Urban	Domestic use: Rural	Ending stocks	Rice production	Rice deliveries	Net imports	Rice prices: Retail	Rice prices: Wholesale #1	Rice prices: Paddy
	1,000 M.T.							$VN/100 Kg.		
Variable name	QDV	QDC	QDR	ESTK	$QRPV_{-1}$	QDEL	RNIMP	PRR	PRW	PRPV
1961	2,878	459	2,419	1/ 50	2,973	554	-155	680	519	396
1962	2,680	533	2,147	1/ 50	2,764	570	-84	650	520	403
1963	2,808	413	2,395	47	3,123	728	-323	650	529	383
1964	3,101	459	2,642	93	3,196	505	-49	770	550	407
1965	3,317	655	2,662	17	3,111	449	130	880	654	488
1966	3,329	757	2,572	15	2,893	321	434	1,340	1,050	809
1967	3,264	944	2,320	103	2,602	282	750	2,720	2,030	1,401
1968	3,364	853	2,511	205	2,813	302	653	2,820	2,073	1,441
1969	3,148	857	2,291	9	2,620	329	332	3,950	3,125	2,247
1970	3,589	937	2,652	57	3,069	416	568	5,320	4,023	2,902
1971										

Year	Wholesale pork price	Consumer Price Index	Population: Total	Population: Urban	Population: Rural	Per capita real income: National	Per capita real income: Household	Livestock inventory	Other		
	$VN/100 Kg.	Percent	Mil.			1,000 $VN		Percent			
Variable name	PPKW	CPI	N2	NU2	NR2	NI'/N2	HI'/N2	IOA_{-1}	DHL5-8	D63	SD
1961	2,179	90.4	14.5	3.1	11.4	4.52	4.56	105	0	0	1
1962	2,559	93.2	14.3	3.3	11.0	5.01	5.22	110	0	0	3
1963	3,412	100.0	14.1	3.5	10.7	5.01	5.49	106	0	1	3
1964	3,034	102.9	14.4	3.7	10.6	5.43	5.91	120	0	0	1
1965	4,025	119.7	15.0	4.3	10.7	5.94	6.60	131	0	0	1
1966	6,312	194.4	15.1	4.7	10.4	5.89	6.08	150	1	0	2
1967	10,117	279.0	16.3	5.5	10.8	5.66	5.57	141	1	0	1
1968	15,383	354.2	16.3	5.9	10.4	4.91	5.40	149	1	0	3
1969	16,704	431.6	16.5	6.3	10.2	5.01	5.89	124	1	0	1
1970	24,742	590.4	17.3	7.1	10.2	4.71	5.95	140	0	0	0
1971											

1/ Estimated.

Appendix table B-3.--Selected rice and paddy prices

	Consumer Price Index (1963=100)	Current prices					
		Saigon--rice			Provincial rice mills--paddy		
		Retail		Wholesale	West Delta	Central Lowlands	Farm value 1/
		#1	#2	#1			
	Percent	$VN/100 Kg.					
1960	85.0	n.a.	500	397	265	357	259
1961	90.4	n.a.	680	519	349	470	364
1962	93.2	n.a.	650	520	339	457	360
1963	100.0	n.a.	650	529	337	453	363
1964	102.9	n.a.	770	550	363	489	402
1965	119.7	n.a.	880	654	373	580	442
1966	194.4	1,970	1,340	1,050	687	1,230	579
1967	279.0	3,780	2,720	2,030	1,333	1,529	1,200
1968	354.2	3,980	2,820	2,070	1,213	1,870	1,250
1969	431.6	5,520	3,950	3,135	2,051	2,364	1,700
1970	590.4	7,780	5,320	4,023	2,467	3,209	n.a.
1971	697.3	8,188	5,853	4,799	2,938	3,398	n.a.

	Deflated by Consumer Price Index					
	Saigon--rice			Provincial rice mills--paddy		
	Retail		Wholesale	West Delta	Central Lowlands	Farm value 1/
	#1	#2	#1			
	$VN/100 Kg.					
1960	n.a.	588	467	312	420	305
1961	n.a.	752	574	386	520	403
1962	n.a.	697	558	316	426	336
1963	n.a.	650	529	337	453	363
1964	n.a.	748	534	353	475	391
1965	n.a.	735	546	312	485	369
1966	1,013	689	540	353	633	298
1967	1,355	975	728	478	548	430
1968	1,124	796	584	342	528	353
1969	1,279	915	726	475	548	394
1970	1,318	901	681	418	544	n.a.
1971	1,174	839	688	421	487	n.a.

1/ Bank of Vietnam data for farm value of output.

Appendix table B-4.--Rice: Rural and urban use, marketing years 1960-71

Year	Production	Domestic use							
		Total	Urban use				Rural use		
			Total	Deliveries	Net stock change	Net imports	Total	Food	Feed
	1,000 MT								
Variable name	QRPV	QDV	QDC	QDEL	ΔESTK	RNIMP	QDR	---	---
1960	3,024	2,684	226	566	---	-340	2,458	2,035	423
1961	2,973	2,818	399	554	---	-155	2,419	1,962	457
1962	2,764	2,680	486	570	---	-84	2,194	1,722	472
1963	3,123	2,808	413	728	8	-323	2,395	1,947	448
1964	3,196	3,101	410	505	-46	-49	2,691	2,173	518
1965	3,111	3,317	655	449	76	130	2,662	2,072	590
1966	2,893	3,329	757	321	2	434	2,572	1,892	680
1967	2,602	3,264	944	282	-88	750	2,320	1,630	690
1968	2,813	3,364	853	302	-102	653	2,511	1,782	729
1969	2,620	3,148	857	329	196	332	2,291	1,677	614
1970	3,069	3,589	936	416	-48	568	2,653	1,926	727
1971	3,430	3,587	686	529	19	138	2,901	2,143	758

Appendix table B-5.--Selected rice relationships 1/

I

Variable	PRW/CPI	IOA_{-1}	NI'/N2	DHL5-8	SD	K	R^2	D.W.
QDV/N2	-0.0510	0.5725	9.6645	-11.228		1,159.8	0.86	2.37
(t)	(1.6)	(3.3)	(2.0)	(1.9)				
[e]	[-.15]	[.36]	[.25]	[-.02]				
QDV/N2	-.0754	.3964	8.4863			154.73	.75	1.71
(t)	(2.2)	(2.3)	(1.4)					
[e]	[-.22]	[.25]	[.22]					
QDV/N2	-.1707	.2977	5.3487		-7.0862	247.49	.94	2.10
(t)	(6.8)	(3.9)	(2.0)		(5.3)			
[e]	[-.48]	[.19]	[.14]		[-.05]			
QDR	-.4640	10.2038	10.053	-258.69		1,489.7	.64	2.33
(t)	(.6)	(2.6)	(.1)	(1.9)				
[e]	[-.11]	[.53]	[.02]	[-.04]				
QDR	-1.0277	6.1456	-17.091			2,382.4	.37	1.65
(t)	(1.3)	(1.5)	(.1)					
[e]	[-.25]	[.32]	[-.04]					

See footnotes at end of table.

- Continued -

Appendix table B-5.--Selected rice relationships 1/--Continued

II

Variable	QDV/N2	IOA_{-1}	HI'/N2	PPKW/CPI	PFSHW/CPI	SD	NI'/N2	K	R^2	D.W.
PRW/CPI ..	-7.1972	3.2760	62.267					1,299.3	0.65	2.65
(t)	(3.0)	(2.4)	(1.3)							
[e]	[-2.45]	[.70]	[.59]							
PRW/CPI ..	-6.8883	2.9869	57.697	0.0099				1,265.2	.65	2.68
(t)	(2.2)	(1.3)	(1.0)	(0.2)						
[e]	[-2.35]	[.64]	[.55]	[.06]						
PRW/CPI ..	-6.9523	3.0057	60.123		0.0049			1,274.3	.65	2.69
(t)	(2.0)	(1.1)	(1.0)		(.1)					
[e]	[-2.37]	[.64]	[.57]		[.04]					
PRW/CPI ..	-4.5352	1.5443				-37.824	0.1080	1,360.4	.91	2.20
(t)	(4.2)	(1.6)				(3.9)	(0.1)			
[e]	[-1.60]	[.34]				[-.10]	[.002]			

- Continued -

See footnotes at end of table.

Appendix table B-5.--Selected rice relationships 1/--Continued

III

Variable	$\Delta(QRPV_{-1}$ + RNIMP)	PRW/CPI	DHL5-8	QDEL/N2	$ESTK_{-1}$	D63	PRW/PPKW	PRW	PPKW	$QRPV_{-1}$	K	R^2	D.W.
ΔESTK	0.2328	-1.2172	76.587								78.150	0.56	1.70
(t)	(2.7)	(0.6)	(1.3)										
[e]	[31.7]	[-186.1]	[43.8]										
ΔESTK	.1827	-.0182									-58.19	.43	1.58
(t)	(2.2)	(.1)											
[e]	[24.9]	[-15.6]											
RNIMP/N2 ...				-1.9182	-0.0741						66.301	.90	2.37
(t)				(7.3)	(0.4)								
[e]				[-4.3]	[-.03]								
$QDEL/QRPV_{-1}$			-.0480			0.0721	0.0588				0.1750	.82	1.96
(t)			(2.9)			(2.8)	(1.0)						
[e]													
QDEL						225.37		0.0825	-0.0195	0.2637	-298.27	.74	.87
(t)						(2.0)		(0.5)	(0.8)	(1.4)			
[e]						[-.05]		[.28]	[.39]	[1.73]			

- Continued -

See footnotes at end of table.

Appendix table B-5.--Selected rice relationships 1/--Continued

IV

Variable	H_{i-1} 2/	NR2	$(PRP_i/CPIX)_{-1}$ 2/	DHL5-8	T'	K	R^2	D.W.
HO	0.9267	17.13	0.3101	-52.75		-267.8	0.77	1.909
(t)	(2.5)	(0.3)	(0.7)	(1.9)				
[e]	[.94]	[.26]	[.22]	[-.03]				
HO	.7197	42.25		-40.02		-240.8	.74	1.577
(t)	(3.1)	(1.0)		(1.9)				
[e]	[.73]	[.64]		[-.02]				
HO	1.0014		.3866	-56.32		-175.3	.76	2.050
(t)	(3.9)		(1.2)	(2.4)				
[e]	[1.01]		[.27]	[-.03]				
HD	.4488		.7445	-35.31		688.0	.68	1.202
(t)	(1.8)		(1.5)	(1.0)				
[e]	[.34]		[.16]	[-.02]				
HD	.3951		.4005	-95.40	3.8455	691.8	.97	2.19
(t)	(4.4)		(2.4)	(7.3)	(2.5)			
[e]	[.24]		[.13]	[-.02]	[.18]			

See footnotes at end of table.

- Continued -

Appendix table B-5.--Selected rice relationships 1/--Continued

V

Variables	T'	QF	DIR	DHL5-8	NR2	OUD	K	R^2	D.W.
YD	38.73			-206.18	502.29		-5,671.3	0.86	1.438
(t)	(4.0)			(4.8)	(3.3)				
[e]	[.12]			[-.04]	[2.50]				
YD		1.706		-163.07	331.70		-1,696.0	.61	2.165
(t)		(1.5)		(2.2)	(1.2)				
[e]		[.17]		[-.03]	[1.65]				
YD			78.61	-104.52	315.55		-1,230.3	.78	1.954
(t)			(2.9)	(1.7)	(2.1)				
[e]			[.03]	[-.02]	[1.57]				
YD	24.40			-196.19	306.26	17.82	-4,432.1	.98	1.763
(t)	(4.6)			(9.9)	(3.8)	(4.9)			
[e]	[.76]			[-.04]	[1.53]	[.84]			
YD		1.615		-157.95	306.04	26.74	-4,077.6	.99	1.177
(t)		(9.1)		(14.1)	(7.4)	(16.0)			
[e]		[.17]		[-.03]	[1.52]	[1.26]			
YD			37.11	-145.27	135.96	20.06	-1,287.4	.91	2.107
(t)			(1.5)	(3.2)	(1.1)	(2.7)			
[e]			[.01]	[-.03]	[.68]	[.94]			

See footnotes at end of table

- Continued -

Appendix table B-5.--Selected rice relationships 1/--Continued

VI

Variable	T'	QF	DIR	DHL5-8	NR2	OUO	K	R^2	D.W.
YO	24.34			-85.85	179.03		-1,674.7	0.61	1.965
(t)	(2.2)			(1.7)	(1.0)				
[e]	[.90]			[-.02]	[1.05]				
YO		0.2308		-72.59	-98.92		2,821.3	.30	1.985
(t)		(0.2)		(1.0)	(.4)				
[e]		[.03]		[-.02]	[-.58]				
YO			59.66	-10.66	104.72		648.8	.66	2.336
(t)			(2.5)	(.2)	(.8)				
[e]			[.25]	[-.02]	[.61]				
YO	20.11			-82.63	129.22	18.12	-2,677.1	.96	1.950
(t)	(4.9)			(4.6)	(2.0)	(6.4)			
[e]	[.45]			[-.02]	[.07]	[.84]			
YO		.7301		-62.49	10.43	21.81	-626.8	.81	2.004
(t)		(1.1)		(1.5)	(.1)	(3.5)			
[e]		[.02]		[-.02]	[.69]	[1.10]			
YO			49.39	-20.45	68.11	17.70	-719.1	.99	2.876
(t)			(12.4)	(2.3)	(3.1)	(14.6)			
[e]			[.01]	[-.01]	[.11]	[.77]			

1/ Numbers in parentheses are "t" values. Elasticities are represented by [e].

2/ i = the region concerned, i.e. Hi = HD

Appendix table B-6.--Ordinary paddy price, monthly seasonal factors 1/

Area	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
	Percent											
Vietnam												
1964 ...	97.3	101.4	101.3	102.4	103.0	102.7	104.5	103.5	99.3	96.5	95.0	92.8
1965 ...	97.2	101.5	101.8	102.5	102.9	102.6	104.1	103.3	99.3	96.6	95.0	93.2
1966 ...	97.1	101.5	102.4	102.9	102.5	102.4	103.4	103.1	99.5	96.4	95.5	93.8
1967 ...	96.8	101.3	103.1	103.2	101.9	101.9	102.8	102.8	99.8	96.2	96.1	94.5
1968 ...	96.6	101.0	103.7	103.6	101.3	101.7	102.3	102.4	100.1	95.9	96.6	95.1
1969 ...	96.5	100.9	104.2	103.6	101.0	101.6	102.1	102.0	100.3	95.9	96.8	95.4
1970 ...	96.4	100.8	104.4	103.7	100.8	101.5	102.0	101.8	100.4	95.9	96.8	95.6
Southwest												
1964 ...	92.5	95.5	99.2	101.1	101.8	104.8	102.1	103.4	102.4	101.7	98.8	96.0
1965 ...	93.2	96.2	99.1	101.0	101.7	104.4	101.7	103.1	102.2	101.4	98.8	96.6
1966 ...	94.2	97.3	98.9	100.5	101.4	103.8	101.1	102.9	102.1	100.7	99.1	97.7
1967 ...	95.4	98.6	98.8	99.7	100.8	103.0	100.4	103.0	101.9	99.8	99.5	99.2
1968 ...	96.4	99.6	98.5	99.1	100.1	102.2	99.8	103.1	101.9	98.8	99.9	100.5
1969 ...	96.9	100.2	98.4	99.0	99.7	101.8	99.4	103.1	102.1	98.4	100.1	101.3
1970 ...	97.2	100.5	98.3	98.9	99.5	101.5	99.3	103.0	102.2	98.2	100.1	101.7
Southeast												
1964 ...	97.0	100.4	103.2	103.8	101.4	104.5	104.0	103.1	102.5	95.5	93.3	91.1
1965 ...	96.4	100.6	103.8	104.3	101.6	104.1	103.8	102.9	102.5	95.2	93.3	91.4
1966 ...	95.4	100.7	105.0	105.2	101.7	103.5	103.4	102.5	102.6	94.7	93.4	91.8
1967 ...	94.2	101.1	106.1	106.2	101.9	102.7	102.9	102.0	102.7	94.2	93.7	92.3
1968 ...	93.3	101.1	107.2	107.1	102.0	102.2	102.5	101.5	102.8	93.6	94.0	92.7
1969 ...	92.8	101.1	107.7	107.7	102.1	102.0	102.2	101.1	102.8	93.3	94.2	92.9
1970 ...	92.6	101.1	108.0	107.9	102.2	101.9	102.0	100.9	102.8	93.2	94.3	93.0
Central Lowlands												
1964 ...	98.2	101.7	103.9	98.1	98.8	96.7	102.4	109.1	105.7	97.8	93.6	94.0
1965 ...	97.7	101.8	104.3	98.6	99.1	96.8	102.4	108.6	104.9	97.8	93.5	94.0
1966 ...	97.1	102.3	104.6	99.8	99.3	97.1	102.3	107.7	104.0	97.7	93.8	93.8
1967 ...	96.3	103.0	105.0	100.8	99.6	97.6	102.2	106.5	103.0	97.4	94.2	93.7
1968 ...	95.8	103.7	105.3	101.9	99.7	97.9	102.1	105.7	102.0	97.3	94.5	93.6
1969 ...	95.5	104.1	105.6	102.4	100.0	98.0	102.2	105.3	101.2	97.3	94.5	93.7
1970 ...	95.3	104.3	105.7	102.6	100.1	98.0	102.2	105.1	100.7	97.3	94.6	93.7

1/ Provincial rice mills.

Appendix table B-7.--Wholesale price index of rice and paddy, Saigon, monthly seasonal factors

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
	Percent											
1952	94.6	93.1	91.7	91.9	94.8	95.4	100.1	108.8	109.6	110.3	107.0	102.0
1953	94.8	93.1	92.1	92.3	94.7	95.7	100.3	108.4	109.7	109.8	106.5	101.6
1954	94.9	93.2	92.9	93.0	94.4	95.8	100.9	108.1	109.9	109.3	105.7	101.4
1955	94.8	93.2	93.7	93.6	94.0	95.9	101.9	107.8	110.4	108.4	104.9	100.8
1956	94.6	93.2	94.2	93.8	93.8	96.1	103.0	107.9	110.8	107.5	104.3	100.6
1957	94.2	92.7	94.3	93.8	93.9	96.6	104.1	108.2	111.2	106.6	104.1	100.2
1958	93.7	92.2	94.3	93.6	94.6	97.6	104.8	108.5	110.8	105.8	103.9	100.2
1959	92.9	91.9	94.2	93.9	95.8	98.7	105.1	108.3	110.2	105.1	103.4	99.6
1960	92.5	91.9	94.3	94.6	97.4	100.3	104.8	107.6	108.7	104.2	102.4	98.9
1961	92.7	92.5	94.8	95.9	99.0	101.6	104.4	106.6	107.0	103.1	101.2	98.0
1962	93.4	93.7	95.7	97.3	100.4	102.5	104.0	105.5	104.9	101.8	100.0	97.5
1963	94.5	95.3	96.7	98.4	101.6	102.7	103.6	104.5	103.0	100.5	99.0	97.0
1964	95.7	96.9	97.8	99.5	102.5	102.4	102.8	103.4	101.6	99.6	98.2	97.0
1965	97.0	98.2	99.0	100.4	103.1	101.6	101.8	102.4	100.6	99.0	97.9	97.4
1966	98.0	99.3	100.0	101.1	103.1	100.5	100.9	101.3	100.0	99.1	98.1	98.3
1967	98.5	100.0	100.8	101.1	102.5	99.4	100.3	100.7	99.7	99.6	98.7	99.1
1968	98.5	100.5	101.3	101.1	101.5	98.5	99.9	100.1	99.8	100.5	99.6	100.0
1969	98.3	100.5	101.3	100.9	100.5	97.9	99.6	99.9	100.0	101.1	100.3	100.6
1970	98.1	100.6	101.2	100.6	100.0	97.7	99.4	99.8	100.2	101.5	100.6	100.8
1971	98.0	100.6	101.1	100.5	99.7	97.6	99.4	99.8	100.3	101.6	100.7	100.9

Appendix table B-8.--Ordinary paddy price, quarterly seasonal factors and seasonally adjusted prices

Region and year	Seasonal factors				Seasonally adjusted series			
	1	2	3	4	1	2	3	4
	Percent				$VN/100 Kg.			
Vietnam								
1964	101.4	103.4	100.8	94.3	375.3	381.3	409.7	438.0
1965	101.6	103.3	100.6	94.6	425.2	474.1	489.0	521.3
1966	101.7	103.0	100.3	95.3	604.5	703.9	914.6	1,002.2
1967	101.8	102.4	100.0	96.1	1,219.4	1,404.1	1,449.7	1,483.0
1968	101.8	102.0	99.7	96.8	1,507.2	1,421.2	1,430.3	1,519.5
1969	101.7	101.7	99.6	97.3	1,598.9	1,890.5	2,387.4	2,924.3
1970	101.7	101.5	99.5	97.5				
Southwest Delta								
1964	96.2	102.9	100.8	99.8	343.6	353.6	367.9	390.3
1965	96.7	102.6	100.6	100.0	368.5	417.4	428.9	430.4
1966	97.3	101.8	100.5	100.4	476.5	575.7	799.6	855.8
1967	98.1	100.7	100.4	101.0	1,196.1	1,371.1	1,370.8	1,338.2
1968	98.6	99.8	100.2	101.5	1,304.9	1,177.0	1,179.5	1,237.6
1969	98.9	99.3	100.2	101.9	1,365.8	1,631.0	2,252.6	2,760.0
1970	99.0	99.0	100.1	102.1				
Southeast Delta								
1964	99.9	105.4	102.5	92.1	366.2	387.0	409.7	453.3
1965	100.0	105.4	102.3	92.3	477.0	486.5	626.4	636.4
1966	100.2	105.0	102.1	92.8	730.3	795.6	924.4	1,018.9
1967	100.4	104.5	101.9	93.4	1,190.4	1,426.8	1,482.0	1,607.8
1968	100.4	104.1	101.7	94.0	1,763.4	1,750.3	1,754.0	1,771.3
1969	100.4	104.0	101.5	94.4	1,740.4	1,902.8	2,346.8	3,003.1
1970	100.3	103.9	101.4	94.6				
Central Lowlands								
1964	102.6	97.9	105.4	94.1	495.6	475.9	455.2	486.6
1965	102.5	98.3	105.0	94.2	565.5	623.9	738.2	832.4
1966	102.3	98.9	104.2	94.7	918.8	1,069.2	1,352.5	1,418.9
1967	102.1	99.6	103.3	95.2	1,486.5	1,551.2	1,559.6	1,609.8
1968	101.8	100.1	102.5	95.7	1,783.7	1,896.4	1,793.1	1,979.3
1969	101.7	100.5	102.0	95.8	2,038.9	2,146.9	2,337.6	2,893.8
1970	101.6	100.7	101.8	95.9				

Appendix table B-9.--Paddy prices, pork prices, and rice deliveries, quarterly seasonal factors

Year	Paddy prices 1/				Pork prices 2/				Rice deliveries			
	1	2	3	4	1	2	3	4	1	2	3	4
	Percent											
1960	111.4	94.9	98.9	95.3	99.7	100.4	103.2	96.5	140.0	105.3	76.4	78.7
1961	110.4	95.3	99.2	95.8	100.1	100.3	102.8	96.6	139.0	105.5	77.5	78.4
1962	108.5	96.6	99.6	96.1	100.6	100.1	102.1	97.2	137.3	105.9	79.6	78.4
1963	106.2	98.2	100.4	96.0	101.0	99.7	101.5	98.0	133.9	106.9	82.1	79.2
1964	103.9	100.0	100.8	95.8	101.5	98.7	101.3	99.1	129.0	107.7	85.4	81.1
1965	102.2	101.3	101.0	95.6	101.4	97.6	101.6	100.2	122.9	108.1	88.7	84.4
1966	101.4	102.2	100.7	95.8	100.9	96.6	101.9	101.4	117.1	106.8	92.4	87.6
1967	101.3	102.2	100.4	96.1	100.0	96.1	102.3	102.1	111.7	105.6	95.0	90.5
1968	101.5	101.9	100.0	96.8	99.5	95.9	102.5	102.5	108.2	104.2	97.1	92.0
1969	101.6	101.7	99.7	97.2	99.2	95.7	102.6	102.7	106.5	103.5	97.8	92.9

1/ Provincial rice mills, Vietnam.
2/ Saigon wholesale.

Appendix table B-10.--Rice: Supply and use, calendar years 1960-71

Item	Variable name	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971
		1,000 MT.											
Paddy													
Production 1/	$QPPV_{-1}$	5,041	4,955	4,607	5,205	5,327	5,185	4,822	4,336	4,688	4,366	5,115	5,716
Seed use (2%)	-	101	99	92	104	107	104	96	87	94	87	102	114
Hulls (21%)	-	1,059	1,040	968	1,093	1,119	1,089	1,013	910	984	917	1,074	1,200
Bran (12%)	-	605	595	553	625	639	622	579	520	563	524	614	686
Brokens (5%)	-	252	248	230	260	266	259	241	217	234	218	256	286
Rice													
Production (60%) .	$QRPV_{-1}$	3,024	2,973	2,764	3,123	3,196	3,111	2,893	2,602	2,813	2,620	3,069	3,430
Beginning stocks 2/	$ESTK_{-1}$	---	---	---	55	47	93	17	15	103	205	9	57
Imports	-	---	---	---	---	---	130	434	750	653	332	568	138
Exports	-	340	155	84	323	49	---	---	---	---	---	---	---
Net imports	RNIMP	-340	-155	-84	-323	-49	130	434	750	653	332	568	138
Ending stocks 2/ .	ESTK	---	---	---	47	93	17	15	103	205	9	57	38
Domestic use													
Total	QDV	2,684	2,818	2,680	2,808	3,101	3,317	3,329	3,264	3,364	3,148	3,589	3,587
Per capita (Kg.)	QDV/N2	190.7	194.4	187.7	198.7	216.0	220.8	220.3	200.8	206.9	190.3	207.1	201.7
Population (Thou.)	N2	14,072	14,494	14,275	14,133	14,359	15,024	15,112	16,256	16,259	16,543	17,333	17,784

1/ From paddy produced for current marketing year.

2/ Saigon stocks.

Appendix table B-11.--Paddy--hectares, yield, and production

	Unit	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971
Hectares													
Delta ...	1,000	1,590	1,662	1,753	1,787	1,779	1,675	1,629	1,650	1,746	1,787	1,854	1,948
Other ...	1,000	728	691	726	751	783	754	666	646	648	643	657	677
Total ...	1,000	2,318	2,353	2,479	2,538	2,562	2,429	2,295	2,296	2,394	2,430	2,511	2,625
Yield													
Delta ...	Kg./ha.	2,200	2,046	2,228	2,219	2,148	2,101	1,916	2,127	1,896	2,198	2,367	2,441
Other ...	Kg./ha.	2,001	1,748	1,789	1,814	1,742	1,728	1,824	1,824	1,630	1,846	2,021	2,318
Total ...	Kg./ha.	2,141	1,958	2,100	2,099	2,024	1,985	1,889	2,042	1,811	2,105	2,276	2,409
Production													
Delta ...	1,000 MT	3,498	3,400	3,906	3,965	3,821	3,519	3,121	3,510	3,310	3,928	4,388	4,755
Other ...	1,000 MT	1,457	1,207	1,299	1,362	1,364	1,303	1,215	1,178	1,056	1,187	1,328	1,569
Total ...	1,000 MT	4,955	4,607	5,205	5,327	5,185	4,822	4,336	4,688	4,366	5,115	5,716	6,324

Appendix table B-12.--Summary of paddy fed estimates

Year	(1) Per capita domestic rice disappearance	(2) Livestock index (previous year)	(3) Per capita rice domestic disappearance indicated for animal feed 1/	(4) Population series 2	(5) Indicated feed use (3) x (4)	(6) Feed use percent of base 2/
	Kg.	1959-61=100	Kg.	Mil.	1,000 M.T.	Percent
1960	190.7	100	30.0	14.1	423.0	58.2
1961	194.4	105	31.5	14.5	456.8	62.9
1962	187.7	110	33.0	14.3	471.9	64.9
1963	198.7	106	31.8	14.1	448.4	61.7
1964	216.0	120	36.0	14.4	518.4	71.3
1965	220.8	131	39.3	15.0	589.5	81.1
1966	220.3	150	45.0	15.1	679.5	93.5
1967	200.8	141	42.3	16.3	689.5	94.9
1968	206.9	149	44.7	16.3	728.6	100.3
1969	190.3	124	37.2	16.5	613.8	84.5
1970	207.1	140	42.0	17.3	726.6	100.0
1971	201.7	142	42.6	17.8	758.3	104.4

Year	(7) Total estimated paddy fed 3/	(8) Indicated per capita net rice disappearance (1) - (3)	(9) Indexes: Net disappearance 4/	(10) Indexes: Animal feed 5/	(11) Indexes: Total paddy fed 6/
	1,000 M.T.	Kg.	1964=100	1964=100	1970=100
1960	665	160.7	89.3	83.3	58.2
1961	718	162.9	90.5	87.5	62.9
1962	741	154.7	85.9	91.7	64.9
1963	705	166.9	92.7	88.3	61.7
1964	814	180.0	100.0	100.0	71.3
1965	926	181.5	100.8	109.2	81.1
1966	1,068	175.3	97.4	125.0	93.5
1967	1,084	158.5	88.1	117.5	94.9
1968	1,145	162.2	90.1	124.2	100.3
1969	965	153.1	85.1	103.3	84.5
1970	1,142	165.1	91.7	116.7	100.0
1971	1,192	159.1	88.4	118.3	104.4

1/ Livestock index times 0.3 (from domestic disappearance equation).
2/ Yearly estimate in column (5) as a percent of 1970 indicated feed use.
3/ R.J. Foote estimated that 1,142,000 M.T. of paddy was fed in 1970; this formed the base for the other annual estimates.
4/ Based on column (8) estimates.
5/ Based on column (3) estimates.
6/ Based on column (7) estimates.

Appendix table B-13.--Rice: Estimated commercial market quarterly supply and use 1960-1971 1/

Year and Quarter	Beginning stocks 2/	Deliveries 3/	Imports 4/	Exports 5/	Carryover stocks	Disappearance	Total population 6/	Per capita deliveries
	1,000 M.T.						Mil.	Kg.
1960								
I	---	194.3	---	72.0	---	122.3	12.0	16.2
II	---	151.2	---	121.1	---	30.1	13.1	11.6
III	---	155.8	---	108.5	---	47.3	14.1	11.0
IV	---	64.2	---	38.5	---	25.7	14.2	4.5
1961								
I	---	242.7	---	89.1	---	153.6	14.3	16.9
II	---	123.8	---	62.6	---	61.2	14.4	8.6
III	---	89.4	---	1.0	---	88.4	14.5	6.2
IV	---	97.9	---	1.7	---	96.2	14.4	6.8
1962								
I	---	188.4	---	.6	---	187.8	14.4	13.1
II	102.0	136.9	---	14.3	137.1	87.5	14.3	9.6
III	137.1	100.8	---	2.0	75.2	160.7	14.3	7.1
IV	75.2	144.3	---	67.0	55.1	97.4	14.2	10.1
1963								
I	55.1	260.5	---	42.6	153.4	119.6	14.2	18.4
II	153.4	218.9	---	111.9	157.1	103.3	14.2	15.5
III	157.1	146.	---	67.5	122.0	113.8	14.2	10.3
IV	122.0	102.0	---	100.5	47.1	76.4	14.2	7.2
1964								
I	47.1	176.4	---	---	115.6	107.9	14.3	12.4
II	115.6	144.6	---	---	156.9	103.3	14.3	10.1
III	156.9	109.0	---	---	154.1	111.8	14.4	7.5
IV	154.1	75.3	---	---	93.2	136.2	14.6	5.2
1965								
I	93.2	145.2	25.0	---	94.1	169.3	14.8	9.8
II	94.1	116.1	---	---	64.4	145.8	14.9	7.8
III	64.4	103.7	29.4	---	55.5	142.0	15.0	6.9
IV	55.5	84.3	75.1	---	16.9	198.0	15.1	5.6
1966								
I	16.9	94.7	139.0	---	73.2	177.4	15.1	6.3
II	73.2	99.9	72.9	---	49.4	196.6	15.1	6.6
III	49.4	67.4	126.8	---	41.8	201.8	15.3	4.4
IV	41.8	58.6	95.5	---	14.5	181.4	15.5	3.8
1967								
I	14.5	84.5	163.0	---	14.3	247.7	15.8	5.3
II	14.3	76.6	323.3	---	35.6	378.6	16.1	4.8
III	35.6	54.8	172.9	---	163.8	99.5	16.3	3.4
IV	163.8	66.3	91.2	---	103.4	217.9	16.3	4.1
1968								
I	103.4	46.4	245.8	---	144.0	251.6	16.3	2.9
II	144.0	61.9	151.5	---	173.6	183.8	16.3	3.8
III	173.6	88.4	178.0	---	207.9	232.1	16.3	5.4
IV	207.9	104.9	77.0	---	204.7	185.1	16.4	6.4
1969								
I	204.7	110.1	4.7	---	170.4	149.1	16.4	6.7
II	170.4	80.3	48.4	---	60.9	238.2	16.5	4.9
III	60.9	96.6	89.7	---	23.6	223.6	16.6	5.8
IV	23.6	41.9	188.7	---	8.5	245.7	16.8	2.5
1970								
I	8.5	110.6	160.1	---	17.7	255.0	17.0	6.1
II	17.7	92.0	146.9	---	29.5	220.2	17.2	4.9
III	29.5	113.4	136.0	---	45.1	213.0	17.4	5.3
IV	45.1	153.2	124.7	---	56.6	247.6	17.5	7.7

1/ 1960-63 data are from the USOM Annual Statistical Yearbook. Later years are from the USAID Econ. Data Book. Deliveries data are the same as the AESS Agricultural Statistics Yearbook except paddy is converted to rice by a factor of 0.6 rather than 0.667. 2/ From Vietnam Statistical Yearbook and USAID Econ. Data Book. 3/ From USOM Annual Statistical Bulletin and USAID Econ. Data Book. 4/ From Vietnam Statistical Yearbook and USOM Annual Statistical Bulletin for earlier years. 5/ Vietnam Statistical Yearbook. 6/ Quarterly estimates from population series 2 annual data.

APPENDIX C.--FISH DATA

Legend of Variables

PFSHW	=	Wholesale fish price, Saigon, $VN/100 kg.
PFR	=	Retail fish price (average of scaled and smooth fish), Saigon, $VN/100 kg.
PRW	=	Wholesale rice price, #1, Saigon, $VN/100 kg.
PPKW	=	Wholesale pork price, Saigon, $VN/100 kg.
QPF	=	Total fish catch, 1,000 M.T.
FIMP	=	Total fish imports, 1,000 M.T.
FEXP	=	Total fish exports, 1,000 M.T.
FNIMP	=	FIMP - FEXP = Fish - net imports
QDF	=	Domestic fish disappearance, 1,000 M.T. (QDF + FIMP - FEXP)
B	=	Fishing boats, Vietnam, 1,000
NI	=	National income, billion $VN
NI'	=	Real national income, billion 1960 $VN
CPI	=	Consumer price index, 1963=100
N2	=	Total population from series 2, million
NU2	=	Urban population from series 2, million
DHL5-8	=	Dummy 0/1 shift variable, 1965-68=1
T	=	Time trend, 1960=60

Appendix table C-1.--Fish analysis data

Year	Supply			Utilization				
				Domestic				
				Per capita				
	Production	Imports	Total	Total	Urban	Total	Exports	Net imports
	M.T.			Kg.		M.T.		
Variable name	QPF	FIMP		QDF/N2	QDF/NU2	QDF	FEXP	FNIMP
1960	262,915	---	262,915	18.6	93.4	262,502	413	-413
1961	304,315	---	304,315	21.0	97.3	303,682	633	-633
1962	332,215	---	332,215	23.2	101.1	331,488	727	-727
1963	364,873	---	364,873	25.8	105.3	364,010	863	-863
1964	397,015	---	397,015	25.7	99.0	369,151	864	-864
1965	375,015	---	375,015	24.9	87.4	374,191	824	-824
1966	380,544	505	381,049	25.2	81.4	381,049	---	505
1967	410,740	724	411,464	25.3	75.5	411,464	---	724
1968	407,080	16,372	423,452	26.0	72.4	423,452	---	16,372
1969	463,844	14,880	478,724	28.9	75.2	478,724	---	14,880
1970	577,450	1,416	578,866	33.4	81.4	578,900	---	1,416
1971	587,500	---	587,500	36.7	97.0	586,270	1,230	-1,230

Appendix table C-2.--Fish analysis data

Year	Fishing boats	Time	Security shifter	Population		National income		Saigon wholesale prices	
				Urban	All	Current	Deflated	# 1 Rice	Pork
	1,000			-- Million --		-- Billion $VN --		-- $VN/100 Kg. --	
Variable name	B	T	DHL5-8	NU2	N2	NI	NI'	PRW	PPKW
1960	50.0	60	0	2.81	14.07	68.7	68.7	397	2,054
1961	50.0	61	0	3.12	14.49	69.5	65.6	519	2,179
1962	50.0	62	0	3.28	14.28	78.0	71.6	520	2,559
1963	53.8	63	0	3.46	14.13	83.5	70.8	529	3,412
1964	56.5	64	0	3.73	14.36	95.2	78.0	550	3,034
1965	58.5	65	1	4.28	15.02	125.8	89.2	654	4,025
1966	65.2	66	1	4.68	15.11	203.8	89.0	1,050	6,312
1967	76.2	67	1	5.45	16.26	301.2	92.1	2,030	10,117
1968	78.0	68	1	5.85	16.26	327.2	79.8	2,073	15,383
1969	82.0	69	0	6.37	16.54	425.0	85.0	3,135	16,704
1970	88.2	70	0	7.11	17.33	565.0	81.6	4,023	24,742

Appendix table C-3.--Fish analysis data

Year	Consumer price index	Current prices					Deflated by CPI				
		At dock 1/	Wholesale	Retail			At dock	Wholesale	Retail		
				Ca'Loc'	Ca'Trô	Average			Ca'Loc'	Ca'Trô	Average
Variable name	1963=100	$VN/100 Kg.		---- $VN/Kg. ----			$VN/100 Kg.		---- $VN/Kg. ----		
	CPI		PFSHW			PFR		PFSHW/CPI			PFR/CPI
1958	84.0	N.A.	2,653	N.A.	N.A.	N.A.	N.A.	3,158	N.A.	N.A.	N.A.
1959	86.1	N.A.	2,451	41.6	41.6	41.6	N.A.	2,847	48.3	48.3	48.3
1960	85.0	800	2,632	39.0	35.0	32.0	941	3,096	45.9	41.2	37.6
1961	90.4	800	2,873	39.2	33.2	36.2	885	3,178	43.4	36.7	40.0
1962	93.2	800	3,115	41.5	33.6	37.6	858	3,342	44.5	36.1	40.4
1963	100.0	1,150	3,938	49.0	44.7	46.8	1,150	3,938	49.0	44.7	46.8
1964	102.9	1,137	3,898	50.5	49.9	50.2	1,105	3,788	49.1	48.5	48.8
1965	119.7	1,447	4,561	60.8	60.7	60.8	1,209	3,810	50.8	50.7	50.8
1966	194.4	3,817	9,422	125.9	132.2	129.0	1,963	4,847	64.8	68.0	66.4
1967	279.0	6,145	12,979	149.0	167.0	158.0	2,202	4,652	53.4	59.9	56.6
1968	354.2	8,932	21,042	244.0	267.0	255.5	2,522	5,941	68.9	75.4	72.1
1969	431.6	9,213	24,000	306.0	334.0	320.0	2,135	5,561	70.9	77.4	74.2
1970	590.4	12,250	32,042	363.0	399.0	381.0	2,075	5,427	61.5	67.6	64.5
1971	697.3	N.A.	36,000	424.0	434.0	429.0	N.A.	5,163	60.8	62.2	61.5

1/ Derived from Bank of Vietnam estimate of total fish catch value divided by total catch.

Appendix table C-4.--Selected fish relationships

Variable	QPF/NU2	FNIMP/NU2	NI'/N2	PPKW/CPI	DHL5-8	FNIMP	PFSHW/CPI	T	PRW/CPI	K	R^2	D.W.
PFSHW/CPI	-13.914	1.7383	18.593	0.9288						2,239.52	0.91	3.161
(t)	(1.1)	(1.1)	(.1)	(3.7)								
[e]	[-.30]	[.02]	[.02]	[.72]								
PFSHW/CPI	-14.676		18.914	.9337		27.900				2,282.3	.91	3.205
(t)	(1.2)		(.1)	(3.7)		(1.1)						
[e]	[-.31]		[.02]	[.72]		[.02]						
PFSHW/CPI	-32.06		624.7	.8261	-878.0	53.99				1,344.2	.93	3.100
(t)	(1.7)		(1.1)	(3.2)	(1.2)	(1.6)						
[e]	[-.69]		[.79]	[.64]	[-.10]	[.04]						
QDF/NU2 ..			9.3809	.0036	-20.141		-0.0069			66.231	.85	1.680
(t)			(1.5)	(.4)	(2.8)		(1.0)					
[e]			[.55]	[.13]	[-.10]		[-.32]					
QDF/NU2 ..			-4.2607	.0104			-.0180			151.79	.64	1.760
(t)			(.7)	(.8)			(2.2)					
[e]			[-.24]	[.37]			[-.83]					
FNIMP					2.7446		.0127	-1.9432		75.175	.73	1.870
(t)					(.9)		(2.9)	(1.8)				
[e]					[.46]		[19.6]	[-47.0]				
FNIMP					3.2845		.0162	-3.2460	0.0403	122.62	.80	2.062
(t)					(1.2)		(3.5)	(2.5)	(1.5)			
[e]					[.56]		[24.9]	[-78.5]	[8.45]			

APPENDIX D.--LIVESTOCK (PORK) DATA

Legend of Variables

PPKW	=	Wholesale pork price, Saigon, $VN/100 kg.
PRW	=	Wholesale rice price, #1, Saigon, $VN/100 kg.
PFSHW	=	Wholesale fish price, Saigon, $VN/100 kg.
PCKR	=	Retail chicken price, Saigon, $VN/100 kg.
QPKC	=	Controlled hog slaughter, Vietnam, million head
NI'	=	Real national income, billion 1960 $VN
HI'	=	Real household income, billion 1960 $VN
CPI	=	Consumer price index, 1963=100
N2	=	Total population from series 2, million
NU2	=	Urban population from series 2, million
T	=	Time trend, 1960=60

Appendix table D-1.--Hog supply/demand analysis data

Year	Controlled slaughter	Prices				Population		Real income		Consumer Price Index	Time
		Pork	Rice	Chicken	Fish	All	Urban	National	Household		
	Million	$VN/100 Kg.				Million		Billion $VN		1963=100	
Variable name ...	QPKC	PPKW	PRW	PCKR	PFSHW	N2	NU2	NI'	HI'	CPI	T
1960	1.181	2,054	397	4,040	2,632	13.55	3.1	68.7	67.7	85.0	60
1961	1.139	2,179	519	4,360	2,873	13.90	3.2	65.6	64.7	90.4	61
1962	.956	2,559	520	4,600	3,115	14.28	3.3	71.6	72.8	93.2	62
1963	.909	3,412	529	5,990	3,938	14.13	3.5	70.8	73.7	100.0	63
1964	1.091	3,034	550	6,400	3,898	14.36	3.7	78.0	81.1	102.9	64
1965	1.248	4,025	654	8,090	4,561	15.02	4.3	89.2	95.1	119.7	65
1966	1.093	6,312	1,050	14,790	9,422	15.11	4.7	89.0	87.8	194.4	66
1967	1.163	10,117	2,030	22,500	12,972	16.26	5.4	92.1	89.2	279.0	67
1968	.850	15,383	2,070	33,500	21,042	16.26	5.8	79.8	78.1	354.2	68
1969	1.060	16,704	3,135	36,425	24,000	16.54	6.4	85.0	83.3	431.6	69
1970	1.138	24,742	4,023	47,400	32,042	17.33	7.1	81.6	79.9	590.4	70

Appendix table D-2.--Selected pork data

Year	Controlled slaughter		Price index of pigs 1957-59 = 100	Selected prices								Consume Price Index (exclud rent)
				Current				Deflated by Consumer Price Index				
				Wholesale				Wholesale				
	Vietnam	Saigon		Saigon	Provincial markets	Saigon Slaughter House	Retail, Saigon boneless leg	Saigon	Provincial markets	Saigon Slaughter House	Retail, Saigon boneless leg	
	--- 000 ---			--- $VN/100 Kg. ---								1963=1(
1956	883.6	---	---	2,867	---	---	---	3,203	---	---	---	89.5
1957	929.5	---	---	2.375	---	---	---	2,794	---	---	---	85.0
1958	1,025.1	---	---	2,223	---	---	---	2,675	---	---	---	83.1
1959	1,024.6	---	---	2,319	---	---	---	2,715	---	---	---	85.4
1960	1,181.0	---	91.6	2,054	---	---	---	2,437	---	---	---	84.3
1961	1,139.3	---	95.5	2,179	---	---	---	2,418	---	---	---	90.1
1962	955.7	312.3	109.7	2,559	---	---	6,347	2,752	---	---	6,825	93.0
1963	909.2	330.6	141.5	3,412	---	---	7,190	3,412	---	---	7,190	100.0
1964	1,090.7	394.2	133.9	3,034	3,259	3,069	7,040	2,940	3,158	2,974	6,822	103.2
1965	1,247.5	413.9	159.4	4,025	3,852	4,088	9,210	3,286	3,144	3,337	7,518	122.5
1966	1,093.4	358.1	295.4	6,312	7,665	6,270	14,680	3,029	3,678	3,009	7,044	208.4
1967	1,163.3	369.3	435.9	10,117	10,436	9,950	23,400	3,311	3,415	3,256	7,657	305.6
1968	850.1	272.2	651.6	15,383	14,772	15,534	36,100	3,941	3,785	3,980	9,249	390.3
1969	1,060.5	354.8	726.4	16,704	18,393	16,150	39,500	3,555	3,914	3,437	8,406	469.9
1970	1,137.7	395.9		24,742	25,147		54,400	3,866	3,929		8,500	640.0

Appendix table D-3.--Hog prices at provincial markets, seasonal factors

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
	Percent											
	South (Western Region)											
1964	104.9	100.9	96.6	92.7	92.4	93.8	94.3	100.4	104.6	105.0	107.4	107.1
1965	105.0	100.7	96.3	92.4	92.7	94.0	94.5	100.8	104.7	105.2	107.3	106.9
1966	104.8	100.0	95.8	92.2	93.1	94.4	95.3	101.4	104.8	105.3	106.9	106.4
1967	104.4	99.1	95.5	92.2	93.8	94.9	96.1	102.0	104.4	104.9	106.2	105.5
1968	104.2	98.6	95.6	92.3	94.8	95.7	97.0	102.4	103.9	104.7	105.7	104.7
1969	103.9	98.2	95.9	92.5	95.7	96.2	97.5	102.6	103.3	104.2	105.2	104.1
1970	103.9	98.0	96.1	92.8	96.3	96.4	97.6	102.6	102.8	103.9	105.0	103.9
	South (Eastern Region)											
1964	102.1	102.5	98.7	95.8	94.8	95.4	98.5	101.7	101.5	101.7	102.8	104.5
1965	102.0	102.3	98.9	95.9	94.8	95.3	98.8	102.0	101.2	101.6	102.7	104.2
1966	101.5	102.2	99.6	95.8	95.3	95.3	99.5	102.3	101.0	101.2	102.5	104.0
1967	100.6	102.0	100.3	95.9	95.9	95.5	100.4	102.3	100.4	100.4	102.0	103.2
1968	100.0	102.1	101.1	96.4	96.7	95.9	101.2	102.1	99.8	99.8	101.7	102.7
1969	99.4	101.9	101.6	97.1	97.4	96.3	101.8	101.7	99.0	99.3	101.6	102.2
1970	99.3	101.8	102.0	97.5	97.8	96.5	102.1	101.3	98.5	99.0	101.6	102.0

Appendix table D-4.--Hog prices, seasonal factors

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
	Percent											
	Vietnam Provincial Markets											
1964	102.9	102.0	99.8	97.2	98.4	96.4	97.4	100.8	100.6	100.5	101.9	102.0
1965	103.0	101.8	99.8	96.9	98.5	96.4	97.8	101.2	100.8	100.6	101.9	102.0
1966	102.9	101.0	99.8	96.5	98.5	96.5	98.5	101.7	101.1	100.5	101.8	101.8
1967	102.7	100.0	99.7	96.1	98.7	97.0	99.3	102.2	101.2	100.2	101.3	101.2
1968	102.6	99.2	100.0	96.0	98.9	97.6	100.2	102.4	101.2	100.0	101.1	100.8
1969	102.5	98.6	100.2	96.1	99.1	98.2	100.8	102.2	101.0	99.8	100.9	100.4
1970	102.5	98.3	100.4	96.3	99.2	98.6	101.0	102.0	100.8	99.7	100.7	100.2
	Saigon Slaughter House											
1964	101.1	99.5	95.1	93.2	92.2	93.0	98.7	104.9	106.1	106.6	106.3	103.2
1965	100.8	99.5	95.2	93.1	92.5	93.4	99.0	105.1	106.0	106.3	106.0	103.0
1966	100.2	99.4	95.4	93.2	93.1	94.1	99.7	105.2	105.6	105.9	105.4	102.3
1967	99.4	99.2	96.0	93.5	94.1	94.8	100.3	105.2	104.8	105.2	104.6	101.4
1968	98.9	99.4	96.7	94.0	95.2	95.7	100.9	104.9	103.9	104.6	104.1	100.6
1969	98.6	99.6	97.4	94.3	96.1	96.2	101.2	104.7	103.0	104.1	103.7	100.1
1970	98.6	99.8	97.8	94.6	96.6	96.4	101.3	104.4	102.5	103.9	103.6	100.0

Appendix table D-5.--Selected pork supply relationships

Variable	$(PPKW/PRW)_{-1}$	$(PPKW/PRW)_{-2}$	$PPKW/PRW)_{-3}$	$PCKR/PRW)_{-1}$	$(PCKR/PRW)_{-2}$	$(PCKR/PRW)_{-3}$	T	K	R^2	D.W.
QPKC	0.1243	0.1350	-0.0061				-0.0347	1.9078	0.83	2.600
(t)	(4.3)	(4.1)	(.2)				(3.5)			
QPKC	.0963	.2789	.0453	-0.0081	-0.0908	-0.0043		-.1140	.91	1.648
(t)	(.9)	(2.2)	(1.0)	(.2)	(2.0)	(.1)				
QPKC	.0662	.0527	-.0645					.7555	.49	1.430
(t)	(1.7)	(1.5)	(1.4)							
QPKC	.0667	.0586						.3705	.36	1.286
(t)	(1.7)	(1.6)								
QPKC	.1258	.1376					-.0356	1.9104	.83	2.556
(t)	(4.9)	(5.0)					(4.4)			
QPKC	.0622	.2448		.0052	-.0827			.2238	.88	1.591
(t)	(1.1)	(6.0)		(.2)	(4.6)					
QPKC	.0724	.2159		.0107	-.0575		-.0151	.9634	.91	2.202
(t)	(1.3)	(4.6)		(.5)	(2.0)		(1.1)			

Appendix table D-6.--Selected pork demand relationships

Variable	QPKC	PPKW/CPI	PRW/CPI	PFSHW/CPI	PCKR/CPI	NI'	HI'	NU2/N2	K	R^2	D.W.
PPKW/CPI	-785.99		0.6562	0.3229	0.0980		8.8240		981.98	0.84	2.551
(t)	(.8)		(.4)	(.6)	(.3)		(.4)				
[e]	[-.27]		[.12]	[.42]	[.20]		[.22]				
PPKW/CPI	-802.65		.6264	.4534			12.618		815.11	.84	2.721
(t)	(.9)		(.4)	(2.8)			(1.0)				
[e]	[-.27]		[.11]	[.59]			[.32]				
PPKW/CPI	-2442.4		2.6384				32.534		1,733.8	.63	1.836
(t)	(2.4)		(1.4)				(2.3)				
[e]	[-.83]		[.47]				[.81]				
PPKW/CPI	-2375.7		1.9271			34.563			1,907.8	.63	1.957
(t)	(2.3)		(1.0)			(2.3)					
[e]	[-.80]		[.34]			[.86]					
QPKC		-0.0261	.0071			.0071		0.9863	1.0092	.54	2.206
(t)		(2.1)	(.1)			(1.4)		(.8)			
[e]		[-.77]	[.04]			[.52]		[.27]			
QPKC		-.0184	.0360			.0086			.7788	.49	1.676
(t)		(2.3)	(.6)			[1.9]					
[e]		[-.54]	[.18]			[.63]					

APPENDIX E.--RUBBER DATA

Legend of Variables

TQRUB	=	Total production of natural rubber (metric tons)
KR	=	Ratio of total rubber production to that on large plantations (ratio)
QRUB	=	Production of rubber on large plantations only (metric tons)
CRUB	=	Domestic consumption of rubber produced in Vietnam (metric tons)
PCRB	=	Per capita consumption of rubber produced in Vietnam (kg./person)
N_2	=	Population estimates based on reports from provinces and municipalities
QREX	=	Quantity of rubber exports (metric tons)
OTRB	=	"other uses of rubber" assumed equal the excess of total production over domestic consumption plus exports (metric tons)
EXRUB'	=	Value of rubber exports in 1960 prices based on f.o.b. Saigon current price, PRBF, and an all export price index, PEX, (billions of piasters)
EXRUS	=	U.S. value of rubber exports based on f.o.b. Saigon prices, PRUS, (U.S. dollars/kg.)
PA	=	Planted area. Area on which rubber trees are still standing (hectares)
PLT	=	Area planted with new rubber trees in a specified year assumed to increase planted area in that same year (hectares)
RML	=	Area from which rubber trees have been physically removed in a specified year assumed to reduce planted area in that year (hectares). This variable was derived from published statistics as $RML_t = PLT_t - (PA_t - PA_{t-1})$.
TLA	=	Tappable area. This is the area which has rubber trees capable of producing rubber (hectares)
TDA	=	Tapped area. This is the area that is actually tapped in given year. TDA is less than or equal to TLA depending on economic and security conditions.
OATA	=	"Other adjustments to tappable area" associated with the fact that previously tappable trees may become untappable due to extreme age, damage, etc. (hectares). OATA was derived from published statistics as follows: $OATA = PLT_{t-7} - RML - (TLA_t - TLA_{t-1})$
YRUB	=	Yield of rubber per tappable hectare (kg./ha.)

YDRB	=	Yield of rubber per tapped hectare. YDRB is greater than or equal YRUB depending on security and economic conditions that affect the percent of tappable area actually tapped (kg./ha.)
NY	=	Expected or "normal" yield of rubber per tappable hectare assumed to equal the trend value 1951-1969 (kg./ha.)
PRBF	=	Price of rubber, RSS #1, f.o.b. Saigon. An average export price for three market areas apparently converted to piasters on the basis of an exchange rate of 35/1 (piasters/dollar) before 1966 and on the basis of 80/1 thereafter (piasters/dollar)
PRBY	=	Piaster yield to rubber exporters with conversion to piasters based on the "actual" effective net exchange rate for rubber (piasters/kg.)
PRBW	=	Wholesale price of rubber in Saigon (piasters/kg.)
WRUB	=	Rubber cutters' cash wage rate per day (piasters/day)
PRBP	=	Adjusted price of rubber relative to the wage rate equal (PRBF/WRUB) x NY
CPI-X	=	Consumer price index of the working class in Saigon excluding rent (1963 = 1.000)
PRBD	=	Price of rubber relative to the consumer price index = PRBW/CPI-X
PRUS	=	U.S. dollar price of rubber RSS #1 f.o.b. Saigon (dollars/kg.)
NI'	=	Real national income valued in 1960 prices (billions of piasters)
RNIP	=	Real national income per capita (piasters/person)
T51	=	Series of numbers (time) equal to 1,2,3 .... (1951=1)
T60	=	Series of number (time) equal to 1,2,3 .... (1960=1)
DP	=	Plantings dummy variable equal to 1 or 2 for the years 1956-61 and zero elsewhere
DY	=	Yield dummy variable equal to 1,2,3,4,5 for 1965-69 and zero elsewhere

Appendix table E-1.--Rubber: Production, area and yield 1/

Item	1950	1951	1952	1953	1954	1955	1956	1957
Large and small plantations combined 2/								
Production (M.T.)	33,936	37,280	45,602	53,256	51,086	66,340	70,230	69,660
Planted area (Ha.)	63,400	63,285	62,245	62,296	63,752	75,060	75,100	74,900
Tapped area (Ha.)								
Yield per tapped hectare (Kg/Ha.)								
Large plantations only 2/								
Production (M.T.)	33,936	37,280	45,602	53,256	51,086	53,651	59,435	59,379
Planted area (Ha.)	63,400	63,285	62,245	62,296	63,752	63,060	63,096	62,934
Tapped area (Ha.)		41,741	50,610	54,671	52,995	58,155	57,682	57,334
Tappable area (Ha.)		58,852	58,019	58,564	59,767	59,633	59,119	58,326
Yield (Kg./Ha.):								
Per tapped hectare		893	901	974	964	923	1,030	1,035
Per tappable hectare		633	786	909	855	900	1,005	1,018

Item	1958	1959	1960	1961	1962	1963	1964
Large and small plantations combined 2/							
Production (M.T.)	71,660	75,380	77,560	78,140	77,870	76,180	74,200
Planted area (Ha.)	76,300	100,800	109,470	122,720	135,630	142,770	134,700
Tapped area (Ha.)				72,783	73,590	72,630	72,530
Yield per tapped hectare (Kg/Ha.)				1,087	1,058	1,049	1,023
Large plantations only 2/							
Production (M.T.)	62,662	65,611	68,211	70,832	68,283	67,318	69,169
Planted area (Ha.)	64,280	68,034	72,047	74,437	75,051	74,703	75,268
Tapped area (Ha.)	57,212	57,313	57,467	57,621	56,906	56,961	56,935
Tappable area (Ha.)	57,935	57,848	58,138	58,290	58,055	57,435	57,704
Yield (Kg./Ha.):							
Per tapped hectare	1,095	1,145	1,187	1,229	1,200	1,182	1,223
Per tappable hectare	1,082	1,134	1,173	1,215	1,176	1,172	1,199

Item	1965	1966	1967	1968	1969	1970	1971
Large and small plantations combined 2/							
Production (M.T.)	64,770	49,455	42,510	34,000	27,650	33,000	
Planted area (Ha.)	129,660	126,340	115,735	105,730	104,950	105,800	
Tapped area (Ha.)	64,925	56,720	53,595	41,410	36,970	39,240	
Yield per tapped hectare (Kg/Ha.)	998	872	793	821	748	840	
Large plantations only 2/							
Production (M.T.)	56,425	46,440	39,413	27,695	25,147	27,095	
Planted area (Ha.)	75,297	74,897	73,376	70,732	69,955		
Tapped area (Ha.)	47,042	42,769	42,690	34,414	27,972		
Tappable area (Ha.)	57,635	57,941	59,084	57,838	58,175		
Yield (Kg./Ha.):							
Per tapped hectare	1,200	1,086	923	805	899		
Per tappable hectare	979	802	667	479	432		

1/ Major sources include: Agricultural Economics and Statistical Service, Ministry of Land Reform, Agriculture, Fishery and Animal Husbandry Development, Agricultural Statistics,Yearbook, 1970 (and earlier issues).

National Institute of Statistics, Presidency of Republic of Vietnam, Directorate General of Planning, Vietnam Statistical Yearbook 1970 (and earlier issues).

United States Operations Mission to Vietnam, Division of Agriculture and Natural Resources, Vietnamese Agricultural Statistics, Saigon 1959.

2/ Statistics appear to be only for plantations of 500 Ha. or more ("large plantations") before 1955.

Appendix table E-2.--Production and disposition of rubber 1/

Year	Production	Consumption		Exports	Other 2/
		Amount	Per capita		
	M.T.	M.T.	Kg.	M.T.	M.T.
1950	33,936				
1951	37,280				
1952	45,602				
1953	53,256	1,308		59,472	-7,524
1954	51,086	1,205		55,932	-6,051
1955	66,340	868		65,202	270
1956	70,230	778	0.06289	63,634	5,818
1957	69,660	781	.05985	75,950	-7,071
1958	71,660	767	.05927	68,491	2,402
1959	75,380	638	.04626	78,427	-3,685
1960	77,560	914	.06496	70,121	6,525
1961	78,140	1,203	.08302	83,403	-6,466
1962	77,870	1,107	.07752	74,497	2,266
1963	76,180	1,169	.08273	68,926	6,085
1964	74,200	1,702	.11852	71,630	868
1965	64,770	2,608	.17364	58,161	4,001
1966	49,455	4,331	.28663	44,899	225
1967	42,510	4,294	.26408	37,704	512
1968	34,000	4,168	.25633	29,247	565
1969	27,650	4,016	.24281	20,831	2,803
1970	33,000	4,560	.26313	23,601	4,839

1/ Primary sources include: AESS, Agricultural Statistics Yearbook 1970 (and earlier issues). National Institute of Statistics, Vietnam Statistical Yearbook, 1970 (and earlier issues). USAID, Office of Joint Economic Affairs, Annual Statistical Bulletin, Saigon, (1966 and other issues).

2/ Production less consumption less exports.

Appendix table E-3.--Rubber prices and monetary yields to exporters

Year	Export price, RSS#1, FOB Saigon (French franc area) 1/			Effective net exchange rate for rubber 1/	Piaster yield 1/	RSS#1, Saigon price	
						Wholesale 3/	FOB 4/
	US¢/lb.	US¢/kg.	$VN/kg. 2/	VN/US	$VN/kg.	$VN/kg.	$VN/kg.
1947							32.29
1948							37.84
1949							37.36
1950							35.91
1951						24.10	24.10
1952						14.62	14.62
1953						15.37	15.37
1954						18.81	18.81
1955						27.87	27.87
1956						23.74	23.74
1957						23.92	23.92
1958	25.45	56.11	19.64	47.08	26.41	19.59	19.59
1959	31.48	69.40	24.29	47.08	32.67	23.97	23.97
1960	35.41	78.07	27.32	47.08	36.75	27.05	27.06
1961	27.17	59.90	20.96	43.93	26.32	20.60	20.59
1962	25.48	56.17	19.66	45.65	25.63	19.83	19.37
1963	23.66	52.16	18.26	45.65	23.80	18.06	17.92
1964	21.98	48.46	16.96	45.65	22.11	16.94	16.94
1965	22.55	49.71	17.47	45.65	22.70	17.36	17.36
1966	20.92	46.12	26.21	64.89	29.93	26.27	26.27
1967	17.44	38.44	30.77	91.41	35.14	30.74	30.47
1968	17.09	37.68	30.14	116.40	43.85	26.96	29.95
1969	22.56	49.74	39.78	116.40	57.88	62.86	39.86
1970	18.39	40.54	32.43	167.41	67.87	69.17	32.25
1971	14.39	31.72	25.39	291.99	92.62		
1972 (3-6-72)				405.99			
1980 5/	12.00	26.45		(405.99)	(107.36)		

1/ USAID, Vietnam, Office of Joint Economic Affairs, Annual Statistical Bulletin No. 11 (October 1968), and unpublished information from 1968-71.

The Piaster Yield is obtained from column 2 using the actual effective rate at which exporters were able to convert dollars to piasters in each month of the year. The reported prices and effective net exchange rates are averages for the year (column (5) = column (2) X Column (4).

2/ Converted from US#/Kg. to piasters using an exchange rate prior to June 1966 of 35/1 and since then using an exchange rate of 80/1.

3/ National Institute of Statistics, Vietnam Statistical Yearbook 1970 (and 1967-68 issue). 1969 and 1970 from National Institute of Statistics, Monthly Bulletin of Statistics, No. 2 (1972).

4/ AESS, Agricultural Statistics Yearbook 1970 (and earlier issues). This is the average export price in three market areas assumed equal the wholesale price 1951 to 1959. 1947-1951 based on changes in the price of rubber in New York.

5/ Based on FAO projections of changes in world price.

Appendix table E-4.--Data used to derive estimating equations for large plantations 1/

Year	PLT	RML	YRUB	NY	PRBF	PRBP 2/	WRUB	T51	DP	DY
	--- Ha. ---		-- Kg./Ha. --		-- $VN/Kg. --		$VN/Day			
1947	0	0	0	0	32.29	2,271	9	0	0	0
1948	0	0	0	0	37.84	2,395	10	0	0	0
1949	0	0	0	0	37.36	2,365	10	0	0	0
1950	0	0	0	0	35.91	1,895	12	0	0	0
1951	460	575	633	633	24.10	953	16	1	0	0
1952	727	1,767	786	750	14.62	686	16	2	0	0
1953	610	559	909	830	15.37	510	25	3	0	0
1954	722	-734	855	880	16.81	591	28	4	0	0
1955	132	824	900	920	27.67	712	36	5	0	0
1956	591	555	1,005	970	23.74	524	44	6	1	0
1957	1,497	1,659	1,018	1,020	23.92	530	46	7	1	0
1958	2,184	836	1,062	1,080	19.59	460	46	8	1	0
1959	4,016	262	1,134	1,030	23.97	525	47	9	2	0
1960	4,131	118	1,173	1,170	27.06	674	47	10	2	0
1961	2,794	404	1,215	1,215	20.59	521	48	11	1	0
1962	1,002	1,016	1,176	1,200	19.37	456	51	12	0	0
1963	704	1,112	1,172	1,200	17.92	414	52	13	0	0
1964	1,125	560	1,199	1,200	16.94	362	56	14	0	0
1965	802	774	979	980	17.36	304	56	15	0	1
1966	312	712	802	800	26.27	262	80	16	0	2
1967	162	1,683	667	670	30.47	181	113	17	0	3
1968	12	2,656	479	480	29.95	128	112	18	0	4
1969	75	852	432	430	39.86	126	136	19	0	5

1/ See Appendix J for a description of the variables and sources.
2/ PRBP=(PRBF/WRUB)X(NY).

Appendix table E-5.--Data used to derive estimating equations for rubber demand 1/

Year	CRUB	N_2	PCRB	PRBW	CPI-X	PRBD 2/	NI'/N_2	T60
	M.T.	1,000 Persons	Kg.	$VN/Kg.	Index' 63=1.000	$VN/Kg.	1960$VN	
1960	914	14,070	.06496	27.05	.853	32.09	4,883	1
1961	1,203	14,490	.08302	20.60	.901	22.86	4,525	2
1962	1,107	14,280	.07752	19.33	.930	21.32	5,011	3
1963	1,169	14,130	.08273	18.06	1.000	18.06	5,008	4
1964	1,702	14,360	.11852	16.94	1.032	16.41	5,434	5
1965	2,608	15,020	.17364	17.36	1.225	14.17	8,940	6
1966	4,331	15,110	.28663	26.27	2.084	12.61	5,890	7
1967	4,294	16,260	.26408	30.74	3.056	10.06	5,665	8
1968	4,168	16,260	.25633	26.96	3.903	6.91	4,908	9
1969	4,016	16,540	.24281	62.86	4.699	13.38	5,008	10
1970	4,560	17,330	.26313	69.17	6.400	10.81	4,711	11

1/See Appendix J for a description of variables and for sources.

2/PRBD = PRBW/CPI-X.

Appendix table E-6.--Derivation of removals (RML) and "Other Adjustments to Tappable Area" (OATA) for large plantations, (Hectares) 1/

Year	(1) PLT_t	(2) PA_t (-) PA_{t-1}	(3) RML Col. (1)-(2)	(4) PLT_{t-7}	(5) TLA_t (-) TLA_{t-1}	(6) OATA Col. (4)-(3)-(5)
1951	460	-115	575			
1952	727	-1,040	1,767		-806	
1953	610	51	559	368	545	-736
1954	722	1,456	-734	343	1,203	-126
1955	132	-692	824	161	-134	-529
1956	591	36	555	196	-514	155
1957	1,497	-162	1,659	153	-793	-713
1958	2,184	1,346	838	460	-391	13
1959	4,016	3,754	262	727	-87	552
1960	4,131	4,013	118	610	290	202
1961	2,794	2,390	404	722	152	166
1962	1,002	614	2/388	132	-235	2/-21
1963	764	-348	1,112	591	-620	99
1964	1,125	565	560	1,497	269	668
1965	803	29	774	2,184	-69	1,479
1966	312	-400	712	4,016	306	2,998
1967	162	-1,521	1,683	4,131	1,143	1,305
1968	12	-2,644	2,656	2,794	-1,246	1,384
1969	75	-777	852	1,002	337	-187
Subtotals						
1953-62						-1,037
1963-68						7,933
Grand total						6,709

1/ See the discussion of the analytical framework in the text for an explanation of the concepts in this table.

2/ The 1962 RML=1616 in Table J-4 implies OATA= -1249 instead of -21. RML=1616 was used in the initial analysis however RML=388 is the correct value.

Appendix table E-7.--Ratio of total rubber production to production on large plantations, 1950-1970 1/

Year	KR = TQRUB/QRUB	Year	KR = TQRUB/QRUB
1950	1.00000	1960	1.13706
1951	1.00000	1961	1.10317
1952	1.00000	1962	1.14040
1953	1.00000	1963	1.13164
1954	1.00000	1964	1.07273
1955	1.23651	1965	1.14790
1956	1.18163	1966	1.06492
1957	1.17314	1967	1.07858
1958	1.14360	1968	1.22766
1959	1.14889	1969	1.09953
		1970	1.21794

1/ Based on data in table J-1.

Appendix table E-8.--Derivation of the plantings "Price" variable 1960-1970 1/

Year	PRBY	PRBF col.(1) X .766169	WRUB	Col.(2)÷ col.(3)	NY	PRBP Col.(4)X col.(5)
	$VN/Kg.	$VN/Kg.	$VN/Day	Ratio	Kg./Ha.	Ratio
1960	36.75	28.16	47	.5991	1,170	701
1961	26.32	20.17	48	.4202	1,215	511
1962	25.63	19.64	51	.3851	1,200	462
1963	23.80	18.23	52	.3506	1,200	421
1964	22.11	16.94	56	.3025	1,200	363
1965	22.70	17.39	56	.3105	980	304
1966	29.93	22.93	80	.2866	800	229
1967	35.14	26.92	113	.2382	670	160
1968	43.85	33.60	112	.3000	480	144
1969	57.88	44.35	136	.3261	430	140
1970	67.87	52.01	173	.3006	485	146

1/ PRBP is different from that shown in table J-4 because the FOB price, PRBF, is derived as .766169 X PRBY where PRBY is the piaster yield to exporters and .766169 is the 1964 ratio PRBF÷PRBY.

Appendix table E-9.--Derivation of current "Price" variable for projections using the plantings function, 1970-1990

Year	Yield (NY) 1/	Adjusted price relative .3006 Xcol. 1 (PRBP) 2/	Year	Yield (NY) 1/	Adjusted price relative .3006 Xcol. 1 (PRBP) 2/
1970	485	146	1980	1,118	336
1971	514	155	1981	1,190	358
1972	600	180	1982	1,294	389
1973	776	233	1983	1,394	419
1974	982	295	1984	1,491	448
1975	1,100	331	1985	1,583	476
1976	1,100	331	1986	1,673	503
1977	1,100	331	1987	1,763	530
1978	1,100	331	1988	1,850	556
1979	1,100	331	1989	1,930	580
			1990	2,000	601

1/ Yield is computed each year in the projection procedure as shown in table J-12.
2/ PRBP is the rubber export price-wage rate ratio (PRBF÷ WRUB=.3006) multiplied times yield (NY). For projections with the plantings function the FOB export price of rubber (PRBF) is derived as .766169 X PRBY where PRBY is the piaster yield to rubber exporters. The ratio .766169 is the 1964 ratio PRBF÷PRBY.

In this projection the ratio PRBF÷WRUB=.3006 was assumed to be constant after 1970. The 1966-1970 calculations are shown in table J-8.

Appendix table E-10.--Example calculation of projected plantings using the plantings function, 1975

Variable symbol 1/	Regression coefficient 2/	Variable value 3/	Col. (2) X Col. (3)
			Hectares
Constant	-8,474	1	-8,474
PRBP	1.2535	331	415
$PRBP_{t-1}$	.2799	295	83
$PRBP_{t-2}$	-.0685	233	-16
$PRBP_{t-3}$	.2083	180	37
$PRBP_{t-4}$	1.1103	155	172
NY	6.7151	1,100	7,387
DP	.1676	2	3,352
Subtotal for large plantations			2,956
Total assumed for all plantations 4/			5,912

1/ PRBP is the current "price" variable derived in tables J-8 and J-9. Subscripts t-1 indicate lagged prices. NY is the actual yield per tappable hectare shown in table J-12. DP is the plantings function dummy variable assumed equal to 2 for projections.

2/ These are the coefficients for the indicated variables in the plantings function summarized in Appendix J.

3/ This is the value of the variables listed in the first column. See tables J-8 and J-9 for the entire price and yield time series.

4/ In this illustrative projection total new plantings were assumed to equal twice those of large plantations as in the Rubber Development Program.

Appendix table E-11.--Long-range projections: Rubber Development Program
Alternative I

Year	(1) Changes in tapped area: Increases 1/	(2) Changes in tapped area: Removals 2/	(3) New plantings 3/	(4) Tapped area 4/: Old	(5) Tapped area 4/: New	(6) Tappable area 5/	(7) Production 6/	(8) Yield per tapped hectare 7/
	1,000 Ha.						1,000 M.T.	Kg./Ha.
1970	0	0	0	35	0	65	31.5	900
1971	3	2	2	36	0	63	32.4	900
1972	7	3	3	40	0	60	36.0	900
1973	10	2	5	48	0	58	45.0	938
1974	5	2	10	51	0	56	55.0	1,078
1975	5	2	10	54	0	54	59.4	1,100
1976	0	2	10	52	0	52	57.2	1,100
1977	0	2	10	50	0	50	55.0	1,100
1978	2	2	2	48	2	50	56.8	1,136
1979	3	3	3	45	5	50	59.5	1,190
1980	5	5	5	40	10	50	68.4	1,368
1981	10	5	5	35	20	55	78.5	1,427
1982	10	5	5	30	30	60	93.0	1,550
1983	10	5	5	25	40	65	107.5	1,654
1984	10	5	5	20	50	70	122.0	1,743
1985	2	2	2	18	52	70	123.0	1,757
1986	3	3	3	15	55	70	126.5	1,807
1987	5	5	5	10	60	70	131.0	1,871
1988	5	5	5	5	65	70	135.5	1,936
1989	5	5	5	0	70	70	140.0	2,000
1990	5	0	0	0	75	75	150.0	2,000

1/ Includes an assumed rehabilitation of 30,000 Ha. abandoned area during the first 5 years and increases in area with trees in the seven year old and over group thereafter. This latter source of change comes from new plantings in column (3) seven year previous. 2/ Removals were assumed as specified for the first seven years and then set at the level necessary to replace all old area shown in column (4) by 1990 subject to the constraint that removals not exceed column (1) or column (3) plantings. 3/ Plantings during the first seven years are as specified by Rubber Development Program and thereafter set equal to removals. 4/ Old area is the previous old area in column (4) plus the increases in column (1) minus the removals in column (2) for 1971 to 1977. For 1978-1990 ignore column (1). New area is the previous area plus the increases in column (1) starting in 1978. 5/ Tappable area is the old tapped area plus new tapped area, column (4) plus column (5), from 1975 to 1990 and as shown before that. 6/ For 1970-77 production is column (8) times column (4). For 1978 on production is column (4) times 1100 Kg./Ha. + column (5) x 2000 Kg./Ha. 7/ Assumed values for 1970-77 and computed as column (7) ÷ column (6) thereafter. Yield per tapped hectare = yield per tappable hectare except 1970-1974 when the latter = 485 Kg./Ha, 514 Kg./Ha., 600 Kg./Ha., 776 Kg./Ha. and 982 Kg/Ha.

Appendix table E-12.--Long-range projections: Rubber Development Program Alternative II

Year	(1) Changes in tapped area: Increases 1/	(2) Changes in tapped area: Removals 2/	(3) New plantings 3/	(4) Tapped area 4/: Old	(5) Tapped area 4/: New	(6) Tappable area 5/	(7) Production 6/	(8) Yield per tapped hectare 7/
	1,000 Ha.						1,000 M.T.	Kg./Ha.
1970	0	0	0	35		65	31.5	900
1971	3	2	0	36		63	32.4	900
1972	7	3	0	40		60	36.0	900
1973	10	2	1	48		58	45.0	938
1974	5	2	4	51		56	55.0	1,078
1975	5	2	6	54		54	59.4	1,100
1976	0	2	6	52		52	57.2	1,100
1977	0	2	6	50		50	55.0	1,100
1978	0	0	6	50		50	55.0	1,100
1979	0	0	6	50		50	55.0	1,100
1980	1	1	7	49	1	50	55.9	1,118
1981	4	4	8	45	5	50	59.5	1,190
1982	6	5	9	40	11	51	66.0	1,294
1983	6	5	6	35	17	52	72.5	1,394
1984	6	5	5	30	23	53	79.0	1,491
1985	6	5	5	25	29	54	85.5	1,583
1986	6	5	5	20	35	55	92.0	1,673
1987	7	5	5	15	42	57	100.5	1,763
1988	8	5	5	10	50	60	111.0	1,850
1989	9	5	5	5	59	64	123.5	1,930
1990	6	5	5	0	65	65	130.0	2,000

1/ Includes an assumed rehabilitation of 30,000 Ha. abandoned area during the first 5 years and increases in area with trees in the seven year old and over group thereafter. This latter source of change comes from new plantings in column (3) seven year previous. 2/ Removals were assumed as specified for the first seven years and then set at the level necessary to replace all old area shown in column (4) by 1990 subject to the constraint that removals not exceed column (1) or column (3) plantings. 3/ New plantings under alternative II are derived from the plantings function discussed in the text until the net gain (new plantings less removals) totals 35,000 Ha. to date. Thereafter plantings equal removals. 4/ Old area is the previous old area in column (4) plus the increases in column (1) minus the removals in column (2) for 1971 to 1977. For 1978-1990 ignore column (1). New area is the previous area plus the increases in column (1) starting in 1978. 5/ Tappable area is the old tapped area plus new tapped area, column (4) plus column (5), from 1975 to 1990 and as shown before that. 6/ For 1970-77 production is column (8) times column (4). For 1978 on production is column (4) times 1100 Kg./Ha. + column (5) x 2000 Kg./Ha. 7/ Assumed values for 1970-77 and computed as column (7) + column (6) thereafter. Yield per tapped hectare = yield per tappable hectare except 1970-1974 when the latter = 485 Kg./Ha, 514 Kg./Ha., 600 Kg./Ha., 776 Kg./Ha., and 982 Kg/Ha.

APPENDIX F.--PRODUCTION AND PRICE INDEXES AND OTHER COMMODITY ANALYSES

Production Data--An Overview

Published estimates of production and prices for major crops are available by Province and major geographic area. Considerable data are also published for the commercial fish catch, forest products, and controlled slaughter of hogs, cattle, and buffalo. In addition, another important ingredient in the data mix is the evidence of an increase in production technology with the introduction of new breeds of hogs and improved poultry breeding stock.

There are no published production estimates for livestock and poultry; however, inventory numbers are reported in the fall of the year. Therefore, using available information and some rather heroic assumptions about the number of pig crops, hatchings, rates of lay, average liveweights, and related information, production rates were computed for major types of livestock (Tables F-24 to F-30). Such approximations may at least indicate trends and surely are better than no estimates at all.

Production estimates for livestock were combined with data on the fish catch, output of forest products, reported crop productions, prices, and hectares (from the Agricultural Economics and Statistics Service Yearbook of Agriculture) to form a set of indexes of production, prices, hectares, and yields as well as value aggregates for the decade 1960 to 1970. The index number and value aggregate calculations were based on a standard computer index number program developed by Hyman Weingarten.

Along with the individual crop indexes, two general crop groups were also computed. Group 1 crops included an index of paddy, rubber, other food, and other nonfood. Group 2 crop indexes were computed for paddy, vegetable and other, industrial and fiber products, beverages, as well as fruit and cane. Livestock production indexes were computed for hogs, cattle, buffalo, chicken, duck, chicken eggs, and duck eggs. Combined totals for livestock and poultry meat animals and total livestock are also shown. Fish price indexes used the dock, wholesale, and retail price levels while the fish quantity index used total fish catch. Forest products were broken into four major categories--lumber, fuels, tree products, and bamboo rattan.

Computation of Livestock Production Indexes

The production estimates derived by the authors used in computing livestock indexes are generally based on the beginning inventory as published by the Agricultural Economics and Statistics Service (AESS) and associated production factors. These production factors were related to controlled slaughter where possible, and incorporated information from the special survey of livestock made in 1969--particularly for the calf crop, pig crop, and rate of lay for chicken and ducks.

The previous year's inventory was multiplied by the production factor per inventory unit to derive an estimate of the number produced. This production-inventory factor was adjusted, beginning in 1965 for most livestock items, to reflect estimated increased productivity directly related to the import of improved hogs and poultry.

Indicated total slaughter was computed on the production estimate less death loss and the change in inventory. The estimated number of animals produced and an assumed average liveweight per animal provided a basis for approximating total liveweight production. Although these estimates and the procedure involved are based on rough judgments, hopefully they indicate production trends in the livestock sector over the last decade. The actual levels may be quite biased, but the direction of change probably is reasonably represented in the total livestock production index and may provide the basis for more refined future estimates.

The lack of production data for livestock represents a huge data gap for any kind of agricultural sector analyses. A growing livestock industry provides a major source of food for consumers as well as an expanding demand for relatively scarce grain supplies. The development and regular reporting of livestock production estimates should receive high priority in the work of AESS. In the meantime, cooperative effort between AESS and the animal husbandry staff of the Ministry may well develop livestock production estimates more realistic than the approximations reported here.

Aggregate Analysis of Other Food and Nonfood Crops

Rice and rubber production accounts for the major portion of total crop production. However, to round out a complete crop overview, some aggregated analyses were attempted to cover the remaining crops. These crops were grouped into two categories:

1. Other foods; i.e., food crops excluding rice (see Table F-2).
2. Other nonfood; i.e., nonfood crops excluding rubber (see Table F-3).

A simplified demand/supply analysis based on the production and price indexes indicated several significant relationships. The supply relationships suggested significant effects from lagged relative prices on the current year's production. Changes in the rural population as well as the hostility level variable also appeared to play important roles in production changes (see Table F-2).

Demand relationships were found to be more consistent for "other nonfood" than the "other food" demand relationships. Income levels appear to be significant in the demand for other food. The implied elasticity of demand with respect to price for the other food group at about -0.4 is somewhat higher than for rice. This price elasticity of demand for "other nonfoods" was more inelastic than the elasticity for "other food," varying from -0.2 to -0.4 (see Table F-3).

Legend of Variables

IPOF	=	Index of price for all food products excluding rice, 1964=100
IPONF	=	Index of price for all nonfood products excluding rubber, 1964=100
IQOF	=	Index of production for all food products excluding rice, 1964=100
IQONF	=	Index of production for all nonfood products excluding rubber, 1964=100
IN2	=	Index of total population, series 2, 1964=100
INR2	=	Index of rural population, series 2, 1964=100
INI'	=	Index of real (1960) national income, 1964=100
CPIX	=	Consumer price index, excluding rent, 1963=100
DHL5-8	=	Dummy 0/1 shift variable, 1965-68=1
T	=	Time trend, 1960=60

Appendix table F-1.--Data used for other food and nonfood supply/demand analysis

Year	Price Index		Production Index		Population Index		Real National Income Index	Consumer Price Index	Security shifter	Time
	Other food	Other nonfood	Other food	Other nonfood	Total	Rural				
Variable name ...	IPOF	IPONF	IQOF	IQONF	IN2	INR2	INI'	CPIX	DHL5-8	T
1960	66.5	86.1	100.9	117.5	98.0	105.9	88.1	84.3	0	60
1961	68.6	93.0	89.0	124.1	100.9	107.0	84.1	90.1	0	61
1962	78.2	95.2	90.2	110.9	99.4	103.5	91.8	93.0	0	62
1963	88.4	91.0	102.8	100.4	98.4	100.4	90.8	100.0	0	63
1964	100.0	100.0	100.0	100.0	100.0	100.0	100.0	103.2	0	64
1965	122.2	104.6	98.8	106.8	104.6	101.0	114.4	122.5	1	65
1966	184.0	360.0	93.7	75.2	105.2	98.1	114.1	208.4	1	66
1967	292.3	534.2	93.1	75.6	113.2	101.7	118.1	305.6	1	67
1968	347.5	582.1	89.7	69.8	113.2	97.9	102.3	390.3	1	68
1969	417.7	604.4	90.4	69.4	115.2	95.7	108.0	469.9	0	69
1970	517.7	619.4	92.2	71.8	120.7	96.1	104.6	640.0	0	70

Appendix table F-2.--Other food[1/] supply/demand relationships

Variable	IPOF/CPI	(IPOF/CPI)-1	INI'/N2	INR2	DHL5-8	T	K	R^2	D.W.
IQOF		0.3545				-1.3486	151.677	0.40	1.957
(t)		(1.8)				(2.3)			
[e]		[.32]				[-.92]			
IQOF		1.3679		2.6143		-16.1888	-280.7242	.71	2.670
(t)		(3.4)		(3.3)		(3.2)			
[e]		[1.25]		[2.78]		[-.06]			
IQOF		.6441			-6.3794	-1.6187	146.5632	.59	2.772
(t)		(2.7)			(1.8)	(3.0)			
[e]		[1.27]			[-.64]	[-1.06]			
IQOF		1.3361		2.4836	-15.7247	-.0958	-258.7645	.68	2.763
(t)		(2.3)		(1.3)	(2.0)	(.1)			
[e]		[1.22]		[2.64]	[-.06]	[-.07]			
IQOF/IN2	-0.0044		0.5049				.7957	.10	.584
(t)	(.8)		(.9)						
[e]	[-.43]		[.54]						
IQOF/IN2	-.0040		1.0048		-.1343		.3296	.34	1.253
(t)	(.8)		(1.7)		(1.6)				
[e]	[-.38]		[1.07]		[-.05]				

1/ Other foods include all food crops except rice.

Appendix table F-3.--Other nonfood supply/demand relationships 1/

Variable	IPONF/CPI	$(IPONF/CPI)_{-1}$	INI'/IN2	INR2	DHL5-8	T	K	R^2	D.W.
IQONF ...		-0.2117		4.0133	-6.1826		-283.944	0.92	2.231
(t)		(2.8)		(6.1)	(1.3)				
IQONF ...		-.0648				-5.4304	453.471	.88	2.488
(t)		(.6)				(5.2)			
IQONF/IN2	-0.0049		0.1138				1.3560	.39	3.169
(t)	(2.1)		(.1)						
IQONF/IN2	-.0022		.1713			-.0646	5.1844	.98	2.459
(t)	(4.8)		(1.1)			(15.5)			

1/ Includes all other nonfood except rubber.

Appendix table F-4.--Agricultural production indexes

(1964=100)

Year	Total agriculture and forestry	Crops					Livestock and poultry			Fish	Forest products
		Total	Paddy	Rubber	Other food	Other nonfood	Total	Meat animals	Poultry		
1960	87.6	94.5	88.9	104.5	100.9	117.5	71.2	80.8	46.0	66.2	123.0
1961	91.5	90.6	88.9	105.3	89.0	124.1	97.2	106.9	72.9	76.7	157.1
1962	95.4	97.8	100.4	104.9	90.2	110.9	95.8	101.7	80.6	88.7	105.0
1963	99.5	102.7	102.7	102.7	102.8	100.4	91.3	91.2	91.5	91.9	105.0
1964	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1965	97.1	94.8	93.0	87.3	98.8	106.8	106.2	108.7	99.6	94.5	97.3
1966	89.3	85.6	83.6	66.7	93.7	75.2	100.6	100.7	100.2	95.9	67.1
1967	91.8	89.0	90.4	57.3	93.1	75.6	98.3	97.4	100.6	103.5	53.5
1968	92.3	88.6	84.2	45.8	89.7	69.8	102.1	93.5	124.1	102.5	64.1
1969	100.4	92.8	99.4	37.3	90.4	69.4	119.0	105.5	147.1	116.8	101.4
1970		100.8	110.2	44.5	92.2	71.8	126.0	111.7	157.5	145.4	

Appendix table F-5.--Agricultural price indexes

(1964=100)

Year	Total agriculture and forestry	Crops					Livestock and poultry			Fish	Forest products
		Total	Paddy	Rubber	Other food	Other nonfood	Total	Meat animals	Poultry		
1960	71.5	68.8	64.4	113.6	66.5	86.1	80.6	79.6	84.2	70.4	80.0
1961	82.0	83.5	90.5	87.3	68.6	93.0	81.5	78.6	91.0	70.4	89.7
1962	88.1	87.2	89.6	104.6	78.2	95.2	97.9	95.9	103.8	70.4	110.2
1963	92.9	90.7	90.3	106.1	88.4	91.0	95.9	96.0	95.5	101.1	110.2
1964	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1965	118.3	113.3	110.0	101.5	122.2	104.6	130.8	129.7	134.0	127.3	134.5
1966	183.0	160.9	144.0	135.3	184.0	360.0	212.0	208.2	222.2	291.7	155.8
1967	313.9	293.5	298.5	145.9	292.3	534.2	290.1	285.1	303.4	540.5	178.2
1968	362.5	320.6	310.9	145.6	347.5	582.1	323.3	313.7	345.7	785.6	243.6
1969	470.0	414.6	422.9	182.3	417.7	604.4	520.7	434.0	717.9	810.3	253.4
1970		522.6	547.3	154.2	517.7	619.4	747.5	654.3	958.2	1,077.4	N.A.

Appendix table F-6.--Agricultural value aggregate of production

Year	Total agriculture	Crops					Livestock and poultry			Fish	Forest products
		Total	Paddy	Rubber	Other food	Other nonfood	Total	Meat animals	Poultry		
	Billion $VN										
1960	31.0	22.5	11.9	2.6	7.4	0.6	5.7	4.7	1.0	2.1	0.7
1961	37.4	26.2	16.8	2.0	6.7	.7	7.9	6.1	1.8	2.4	.9
1962	42.2	29.5	18.7	2.4	7.7	.7	9.3	7.1	2.2	2.7	.7
1963	45.9	32.2	19.3	2.4	10.0	.6	8.7	6.4	2.3	4.2	.8
1964	49.7	34.6	20.8	2.2	11.0	.6	10.0	7.3	2.7	4.5	.6
1965	57.2	37.2	21.3	1.9	13.2	.7	13.8	10.2	3.6	5.4	.8
1966	82.2	47.7	25.1	2.0	18.9	1.7	21.2	15.2	6.0	12.6	.7
1967	124.7	90.5	56.3	1.8	29.9	2.5	28.4	20.2	8.2	25.2	.6
1968	163.7	92.8	54.6	1.4	34.2	2.5	32.9	21.3	11.6	36.4	1.0
1969	239.2	133.2	87.6	1.5	41.5	2.6	61.7	33.3	28.5	42.7	1.6
1970	348.9	182.4	125.7	1.5	52.4	2.8	93.8	53.1	40.7	70.7	N.A.

Appendix table F-7.--Crops--Production and price indexes

(1964=100)

Year	All crops	Group I				Group II				
		Paddy	Rubber	Other food	Other nonfood	Paddy	Vegetables and other	Industrial and fiber	Beverages	Fruit & cane
						Production				
1960	94.5	88.9	104.5	100.9	117.5	88.9	78.4	107.3	85.2	118.4
1961	90.6	88.9	105.3	89.0	124.1	88.9	79.1	109.7	97.3	94.6
1962	97.8	100.4	104.9	90.2	110.9	100.4	93.3	106.3	89.5	87.7
1963	102.7	102.7	102.7	102.8	100.4	102.7	105.5	102.3	98.0	101.5
1964	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1965	94.8	93.0	87.3	98.8	106.8	93.0	100.4	90.8	93.4	83.1
1966	85.6	83.6	66.7	93.7	75.2	83.6	107.1	67.6	93.4	83.1
1967	89.0	90.4	57.3	93.1	75.6	90.4	116.7	61.1	87.2	76.8
1968	83.6	84.2	45.8	89.7	69.8	84.2	109.3	51.9	88.2	76.0
1969	92.6	99.4	37.3	90.4	69.4	99.4	110.2	46.3	97.4	76.1
1970	100.8	110.2	44.5	92.2	71.8	110.2	106.1	51.2	108.7	81.1
						Price				
1960	68.8	64.4	113.6	66.5	86.1	64.4	68.1	106.6	53.7	66.2
1961	83.5	90.5	87.3	68.6	93.0	90.5	69.7	86.9	49.4	69.6
1962	87.2	89.6	104.6	78.2	95.2	89.6	80.4	102.4	63.1	77.9
1963	90.7	90.3	106.1	88.4	91.0	90.3	86.8	102.5	83.6	89.9
1964	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1965	113.3	110.0	101.5	122.2	104.6	110.0	129.8	102.8	101.7	119.4
1966	160.9	144.0	135.3	134.0	360.0	144.0	233.3	194.2	94.5	155.4
1967	293.5	298.5	145.9	292.3	534.2	298.5	328.6	253.6	154.2	277.8
1968	320.6	310.9	145.6	347.5	582.1	310.9	399.5	272.3	190.7	323.8
1969	414.6	422.9	182.3	417.7	604.4	422.9	477.0	310.5	205.6	396.8
1970	522.6	547.3	154.2	517.7	619.4	547.3	605.4	293.1	237.8	488.6

Appendix table F-8.--Crops--Hectarage and yield indexes

(1964=100)

Year	All crops	Group I				Group II				
		Paddy	Rubber	Other food	Other nonfood	Paddy	Vegetables and other	Industrial and fiber	Beverages	Fruit & cane
						Hectarage				
1960	91.5	90.5	81.3	93.8	97.8	90.5	81.5	85.3	87.2	101.2
1961	92.7	91.8	93.7	94.3	113.8	91.8	87.9	98.4	94.3	98.2
1962	95.5	96.8	100.7	92.6	90.0	96.8	100.1	97.9	95.8	88.0
1963	99.0	99.1	106.0	98.7	100.5	99.1	105.1	104.6	96.5	94.7
1964	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1965	96.6	94.8	96.3	100.2	94.0	94.8	99.5	94.9	99.0	100.7
1966	90.3	89.6	93.8	91.8	70.1	89.6	91.8	85.5	87.1	91.9
1967	88.4	89.6	85.9	86.2	60.0	89.6	92.4	77.6	80.7	82.2
1968	85.7	93.4	78.5	70.9	51.6	93.4	86.7	69.7	82.8	60.4
1969	86.2	94.9	77.9	68.1	47.2	94.9	89.1	67.6	84.9	54.3
1970	88.3	98.0	78.5	67.8	43.4	98.0	87.4	67.4	84.2	55.3
						Yield				
1960	98.1	98.2	128.5	97.2	91.1	98.2	97.6	118.3	96.9	96.9
1961	94.8	96.7	112.3	90.4	90.5	96.7	92.7	106.6	99.4	89.1
1962	101.6	103.8	104.2	95.3	95.2	103.8	97.0	102.5	90.6	94.3
1963	103.0	103.7	96.9	101.7	97.6	103.7	106.7	97.2	97.7	98.6
1964	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1965	97.9	98.1	90.7	97.7	106.4	98.1	94.7	94.8	108.9	99.4
1966	94.6	93.4	71.0	97.6	98.1	93.4	104.9	78.3	108.1	98.1
1967	99.3	100.9	66.6	97.1	97.6	100.9	108.7	73.9	106.4	89.7
1968	92.1	90.1	58.4	97.8	98.7	90.1	110.5	67.2	106.5	88.6
1969	101.8	104.8	47.9	96.3	102.3	104.8	106.1	58.6	112.8	88.7
1970	107.8	112.5	56.6	98.2	107.9	112.5	105.5	66.1	127.6	92.5

Appendix table F-9.--Crops--Value aggregate of production

Year	Total crops	Group I				Group II				
		Paddy	Rubber	Other food	Other nonfood	Paddy	Vegetables and other	Industrial and fiber	Beverages	Fruit and cane
	Billion $VN									
1960	22.5	11.9	2.6	7.4	0.6	11.9	2.2	3.3	0.3	4.7
1961	26.2	16.8	2.0	6.7	.7	16.8	2.3	2.8	.3	3.9
1962	29.5	18.7	2.4	7.7	.7	18.7	3.1	3.2	.4	4.1
1963	32.2	19.3	2.4	10.0	.6	19.3	3.8	3.0	.6	5.5
1964	34.6	20.8	2.2	11.0	.6	20.8	4.2	2.9	.7	6.0
1965	37.2	21.3	1.9	13.2	.7	21.3	5.4	2.7	.8	7.0
1966	47.7	25.1	2.0	18.9	1.7	25.1	10.4	3.8	.6	7.8
1967	90.5	66.3	1.8	29.9	2.5	56.3	15.9	4.5	1.0	12.8
1968	92.8	54.6	1.4	34.2	2.5	54.6	18.1	4.1	1.2	14.8
1969	133.2	87.6	1.5	41.5	2.6	87.6	21.9	4.2	1.4	18.1
1970	182.4	125.7	1.5	52.4	2.8	125.7	26.7	4.3	1.8	23.8

Appendix table F-10.--Summary of crop production data 1/

Item	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970
	1,000 M.T.										
Paddy	4,606.9	4,607.0	5,205.0	5,326.7	5,185.0	4,821.7	4,330.4	4,668.4	4,366.2	5,155.0	5,715.5
Rubber	77.6	76.1	77.9	76.2	74.2	64.8	49.5	42.5	34.0	27.7	33.0
Potatoes	3.0	3.0	2.8	4.0	3.0	12.2	3.7	1.5	2.0	4.0	4.0
Pineapple	54.4	40.7	58.5	62.4	57.0	48.1	36.8	37.0	34.1	33.3	33.3
Bananas	160.0	160.0	161.8	185.7	236.8	207.7	177.2	167.6	164.1	183.8	203.6
Fruit trees	336.3	250.0	219.6	263.5	231.7	233.3	201.9	191.2	221.9	222.9	235.7
Black pepper	.4	.4	.5	.5	.6	.6	.4	.5	.4	.4	.4
Sesame	.4	.3	.7	1.0	.4	.2	.2	.3	.2	.2	.2
Yam beans	5.5	5.5	5.5	13.3	8.0	10.4	6.2	9.1	5.7	6.1	6.2
Watermelons	8.0	8.0	9.0	25.0	36.4	25.1	31.6	46.7	47.0	35.2	42.0
Other tubers	11.0	11.0	11.0	26.3	15.0	12.4	4.4	9.6	10.2	11.3	11.3
Coffee	2.9	3.4	3.1	3.6	3.4	3.5	3.1	3.3	3.0	3.6	3.9
Cacao	*	*	*	*	*	.1	*	*	*	*	*
Areca nuts	2.2	2.2	2.2	2.1	2.0	1.4	1.1	.9	.7	.4	.4
Sugarcane	999.6	932.1	872.3	964.2	1,055.2	1,092.8	935.7	770.0	426.1	321.4	335.7
Tea	4.5	4.9	4.5	4.7	5.4	5.9	5.2	4.2	4.8	4.9	5.5
Manioc	219.6	254.6	313.4	389.5	288.6	236.0	280.3	261.9	260.2	232.5	215.7
Corn	26.9	32.1	38.3	36.8	46.0	43.8	35.4	33.8	31.8	30.5	31.4
Mungo beans	7.2	8.0	10.4	10.7	12.0	11.9	14.4	19.9	13.4	11.7	11.1
Sweet potatoes	221.4	236.2	273.1	300.2	301.0	277.9	246.2	254.0	234.7	225.6	219.8
Peanuts	24.2	28.7	28.6	32.3	36.5	32.6	34.4	33.7	32.1	34.4	32.2
Coconuts	111.4	92.1	101.1	87.8	84.5	88.4	77.7	78.3	66.4	59.1	71.1
Soybeans	2.8	3.9	3.9	4.6	4.0	4.3	7.6	5.7	7.5	6.0	7.5
Vegetables	109.6	85.1	116.8	126.8	107.6	133.0	166.5	192.2	193.1	235.0	217.6
Kenaf	2.7	7.8	3.2	3.6	.7	2.7	.6	.2	.2	.1	.1
Jute	2.4	1.5	2.0	1.3	.9	.9	.8	.8	.5	.2	.2
Cotton	.4	.3	.3	*	*	*	*	*	*	*	*
Kapok	.3	.2	.6	.8	.7	.9	.7	.9	.8	.8	.8
Ramie	.2	.1	.1	.1	*	*	*	*	*	*	*
Lacquer resin	*	*	*	*	*	*	*	*	*	*	*
Mulberry	7.2	6.4	6.5	10.8	14.2	11.7	7.3	4.2	2.9	2.6	1.6
Tobacco	8.1	8.4	7.6	6.8	7.3	7.6	6.9	7.9	7.6	7.8	8.4

1/ AESS Annual estimates of production.
*Less than 50 M.T.

Appendix table F-11.--Summary of hectares of crop 1/

Item	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970
	Hectares										
Paddy	2,318.04	2,353.00	2,478.86	2,537.52	2,561.80	2,428.64	2,294.76	2,295.80	2,393.60	2,430.00	2,510.70
Rubber	109.47	126.21	135.63	142.77	134.70	129.66	126.34	115.74	105.73	104.95	105.80
Potatoes	.30	.30	.28	.21	.20	.07	.19	.10	.10	.20	.20
Pineapple	7.34	5.86	7.62	8.50	8.01	5.86	5.56	5.75	4.54	4.26	4.48
Bananas	16.00	16.00	15.82	17.15	18.14	18.49	18.12	17.86	17.73	19.21	19.96
Fruit trees	45.40	45.89	35.09	35.88	34.57	37.22	35.99	33.73	32.34	32.03	32.92
Black pepper	.42	.42	.38	.47	.47	.46	.39	.39	.34	.37	.34
Sesame	1.40	.70	1.62	2.48	.84	.67	.50	.55	.43	.37	.43
Yam beans	.70	.70	.70	1.32	1.25	1.57	1.14	1.47	1.10	1.16	1.26
Watermelons	1.00	1.00	1.16	2.57	4.40	2.58	3.44	4.56	4.51	3.44	4.20
Other tubers	3.00	3.00	2.90	3.46	3.00	3.85	.79	1.04	1.16	1.36	1.40
Coffee	9.76	10.35	10.41	10.70	11.12	10.80	10.23	10.24	10.00	9.48	9.36
Cacao	.65	.65	.64	.40	.30	.26	.16	.14	.10	.10	.10
Areca nuts	4.00	4.06	3.03	3.52	3.50	2.16	1.12	1.24	.98	.95	.86
Sugarcane	32.76	31.86	28.62	31.02	33.71	33.90	30.05	25.77	15.26	11.67	11.62
Tea	8.34	9.14	9.35	9.31	9.65	9.68	8.15	7.12	7.66	8.27	6.22
Manioc	34.11	41.02	48.56	51.57	43.00	43.02	38.96	36.50	35.13	32.15	30.38
Corn	28.45	30.00	36.12	36.66	37.00	36.18	29.16	28.96	28.76	28.56	28.64
Mungo beans	12.34	12.86	15.75	15.77	19.51	21.30	20.05	30.56	21.40	16.33	16.60
Sweet potatoes	36.41	42.15	48.59	47.19	48.00	43.25	39.48	37.80	34.52	34.85	32.86
Peanuts	28.44	30.90	33.58	35.28	35.00	31.72	30.64	30.15	29.68	31.30	30.24
Coconuts	41.82	42.34	43.42	43.63	41.58	40.39	39.02	38.11	29.90	32.96	32.25
Soybeans	4.26	5.94	5.53	6.02	6.05	5.38	6.61	7.56	7.62	6.54	6.84
Vegetables	9.50	7.31	8.08	9.06	8.77	11.72	12.00	13.54	13.62	16.68	17.85
Kenaf	3.43	7.80	4.15	4.40	.88	2.73	.66	.13	.20	.10	.10
Jute	1.90	1.53	1.44	.87	.88	.80	.74	.78	.56	.25	.25
Cotton	.62	.84	.42	.10	.10	.10	.10	.10	.10	.10	.10
Kapok	.47	.32	.87	1.94	1.96	2.00	1.54	1.28	1.19	1.18	1.15
Ramie	1.03	.16	.23	.10	.10	*	*	*	*	*	*
Lacquer resin	.75	.75	.75	.60	.55	.22	.10	.10	.10	.16	.16
Mulberry	1.50	1.53	1.31	1.88	2.04	1.79	1.40	.92	.66	.54	.34
Tobacco	9.48	9.39	9.00	7.96	10.28	8.54	7.15	8.46	8.10	8.27	8.52

1/ From Yearbook of Agricultural Statistics, AESS.
*Less than .50 hectares.

Appendix table F-12.--Summary of yield per hectare of crop 1/

Item	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970
	M.T./hectare										
Paddy	1.987	1.958	2.100	2.099	2.024	1.985	1.890	2.042	1.824	2.121	2.276
Rubber	.706	.619	.574	.534	.551	.500	.391	.367	.322	.264	.312
Potatoes	10.000	10.000	9.842	18.667	15.000	18.234	19.632	15.000	20.000	20.000	20.000
Pineapple	7.412	6.910	7.677	7.332	7.114	8.214	6.977	6.436	7.513	7.797	7.447
Bananas	10.000	10.000	10.226	10.826	13.054	11.232	9.782	9.382	9.254	9.566	10.205
Fruit trees	7.397	5.446	6.259	7.345	6.703	6.266	5.610	5.666	6.361	6.959	7.104
Black pepper	.921	1.000	1.368	1.153	1.277	1.301	1.128	1.205	1.266	1.176	1.236
Sesame	.265	.397	.446	.397	.476	.373	.454	.509	.546	.568	.546
Yam beans	7.657	7.657	7.914	10.076	6.400	6.643	5.476	6.216	5.146	5.290	4.936
Watermelons	8.000	6.000	6.000	9.735	8.273	9.704	9.170	10.240	10.410	10.216	10.000
Other tubers	3.667	3.667	3.768	7.666	5.000	3.223	5.506	9.269	6.653	6.263	8.071
Coffee	.300	.336	.300	.335	.306	.327	.300	.327	.300	.374	.419
Cacao	*	*	*	.050	.100	.346	.273	.321	.417	.500	.500
Areca nuts	.550	.553	.713	.596	.571	.639	1.013	.750	.679	.442	.506
Sugarcane	30.514	29.266	30.480	31.062	31.302	32.236	31.137	29.676	27.912	27.545	28.692
Tea	.543	.532	.466	.506	.556	.610	.639	.569	.623	.592	.675
Manioc	6.436	6.207	6.452	7.552	6.712	5.486	7.194	7.175	7.406	7.231	7.100
Corn	.944	1.070	1.060	1.005	1.243	1.211	1.213	1.166	1.104	1.069	1.096
Mungo beans	.561	.621	.660	.678	.615	.556	.719	.652	.624	.716	.668
Sweet potatoes	6.080	5.604	5.621	6.361	6.271	6.426	6.235	6.720	6.798	6.472	6.668
Peanuts	.850	.926	.850	.914	1.043	1.028	1.123	1.119	1.080	1.100	1.064
Coconuts	2.664	2.174	2.329	2.004	2.033	2.189	1.991	2.055	2.221	1.792	2.204
Soybeans	.666	.664	.711	.759	.661	.805	1.148	.749	.995	.911	1.091
Vegetables	11.500	11.642	14.466	13.983	12.275	11.344	13.874	14.194	14.174	13.915	12.188
Kenaf	.793	1.001	.782	.819	.841	1.009	.925	1.231	1.000	1.000	1.000
Jute	1.287	.954	1.416	1.543	1.017	1.074	1.066	.994	.936	1.000	1.000
Cotton	.614	.321	.624	.336	.333	.376	.444	.500	.500	.500	.500
Kapok	.549	.562	.747	.404	.363	.454	.474	.684	.693	.688	.704
Ramie	.202	.531	.587	.717	.750	1.000	.667	1.000	1.000	1.000	1.000
Lacquer resin	*	*	*	*	*	.100	.100	.100	*	*	*
Mulberry	4.604	4.206	4.954	5.735	6.966	6.553	5.243	4.614	4.496	4.741	4.632
Tobacco	.852	.891	.850	.857	.708	.887	.966	.933	.941	.942	.988

*Less than .05 M.T./hectare.

1/ From Yearbook of Agricultural Statistics, AESS

Appendix table F-13.--Summary of crop farm price data 1/

Item	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970
	$VN/Kg.										
Paddy	2.59	3.64	3.00	3.03	4.02	4.42	5.79	12.00	12.50	17.00	22.00
Rubber	33.17	25.47	30.53	30.96	29.19	29.64	39.50	42.60	42.50	53.20	45.00
Potatoes	15.00	15.00	15.50	12.90	16.50	24.00	32.00	43.00	55.50	60.00	80.00
Pineapple	4.42	4.43	4.39	4.80	5.70	10.00	15.00	24.00	26.00	30.00	44.00
Bananas	2.84	2.91	3.25	4.20	5.50	7.00	9.00	16.00	19.00	23.00	33.00
Fruit trees	10.84	11.78	11.40	12.43	13.54	15.00	17.00	35.70	40.00	50.00	57.50
Black pepper	132.55	164.20	186.15	169.00	175.50	179.00	193.00	225.00	250.00	300.00	445.00
Sesame	17.17	20.70	18.13	19.00	23.10	26.00	50.00	75.00	85.00	95.00	110.00
Yam beans	1.11	1.10	1.37	1.60	1.80	2.00	3.00	5.00	6.50	8.00	9.00
Watermelons	4.75	3.83	4.56	5.44	6.75	10.00	25.00	35.00	38.00	40.00	45.00
Other tubers	2.00	2.00	2.00	2.10	2.50	3.00	6.40	11.00	14.00	16.00	18.00
Coffee	104.50	95.79	125.16	110.00	120.00	120.00	85.00	115.00	160.00	180.00	200.00
Cacao	35.00	35.00	35.00	35.00	40.00	45.00	48.00	55.00	68.00	75.00	80.00
Areca nuts	51.23	53.50	55.61	53.00	55.12	65.00	145.00	172.00	180.00	195.00	205.00
Sugarcane	.31	.31	.62	1.07	1.07	1.30	2.20	3.00	4.00	5.00	5.50
Tea	42.50	31.00	25.60	40.00	55.60	58.00	70.00	136.00	150.00	160.00	190.00
Manioc	2.02	2.26	2.61	2.20	2.20	2.80	3.50	4.50	7.00	9.00	12.50
Corn	2.82	3.64	4.25	4.30	4.90	5.50	10.49	15.00	18.00	23.00	25.00
Mungo beans	13.22	13.67	19.73	16.53	21.40	24.70	38.95	60.00	68.50	76.00	115.00
Sweet potatoes	2.48	2.59	3.00	2.40	2.60	3.60	5.70	6.00	11.50	16.00	21.00
Peanuts	5.31	5.96	7.12	15.70	16.50	23.00	29.60	33.00	40.00	53.50	68.00
Coconuts	2.25	2.28	1.74	3.50	4.30	5.00	6.00	13.00	15.00	18.00	22.50
Soybeans	13.53	13.88	18.16	18.24	18.40	21.50	39.00	52.50	57.00	60.00	110.00
Vegetables	4.75	3.83	4.56	5.44	6.75	10.00	25.00	35.00	38.00	40.00	44.00
Kenaf	6.96	7.91	7.91	10.50	12.00	13.00	12.00	20.00	25.00	30.00	35.00
Jute	17.25	15.33	17.63	20.00	23.00	25.00	25.00	30.00	36.00	40.00	45.00
Cotton	25.00	24.63	27.20	27.20	29.92	32.00	45.00	56.00	60.00	65.00	70.00
Kapok	12.00	10.80	11.20	11.20	11.53	12.00	26.00	38.00	40.00	50.00	60.00
Ramie	10.99	16.00	16.00	18.00	20.16	32.00	93.00	120.00	125.00	135.00	145.00
Lacquer resin	65.00	65.00	65.00	65.00	75.00	65.00	90.00	115.00	140.00	155.00	165.00
Mulberry	15.90	20.00	20.00	20.00	25.00	30.00	150.00	210.00	230.00	240.00	250.00
Tobacco	66.63	73.22	74.16	69.40	75.50	76.00	78.00	198.00	236.00	250.00	275.00

1/ From Bank of Vietnam data with adjustments for selected years.

Appendix table F-14.--Fish--Production and price indexes, and value aggregate

Year	Price index			Production index	Value aggregate*
	Dock	Wholesale	Retail		
					Bil. $VN
1960	70.4	67.5	73.7	66.2	2.1
1961	70.4	73.7	72.1	76.7	2.4
1962	70.4	79.9	74.9	83.7	2.7
1963	101.1	101.0	93.2	91.9	4.2
1964	100.0	100.0	100.0	100.0	4.5
1965	127.3	117.0	121.1	94.5	5.4
1966	291.7	241.7	257.0	95.9	12.6
1967	540.5	333.0	314.7	103.5	25.2
1968	785.6	539.8	509.0	102.5	36.4
1969	810.3	615.7	637.5	116.8	42.7
1970	1,077.4	822.0	759.0	145.4	70.7

*Valued at dock price.

Appendix table F-15.--Forest products--Production and price indexes

(1964=100)

Year	Total	Lumber	Fuels	Tree products	Bamboo and rattan
Production					
1960	128.0	99.0	185.1	156.3	86.2
1961	157.1	113.5	261.2	97.3	64.4
1962	105.0	98.3	127.8	68.3	90.1
1963	111.5	118.1	115.4	53.1	74.1
1964	100.0	100.0	100.0	100.0	100.0
1965	97.3	99.0	104.5	82.8	52.1
1966	67.1	81.4	73.8	8.9	45.1
1967	53.5	66.0	59.3	5.9	39.9
1968	64.1	95.4	35.7	1.3	26.6
1969	101.4	159.0	32.2	1.7	32.4
Price					
1960	80.0	93.1	71.9	29.0	154.7
1961	89.7	101.0	83.9	34.7	160.6
1962	110.2	128.0	90.0	58.4	166.7
1963	110.2	125.6	84.5	78.0	165.5
1964	100.0	100.0	100.0	100.0	100.0
1965	134.5	135.8	117.6	186.0	152.4
1966	155.8	138.2	160.2	288.2	79.0
1967	178.2	177.0	142.1	274.9	155.8
1968	243.6	247.5	171.7	321.3	198.8
1969	253.4	255.0	223.3	243.6	255.6

Appendix table F-16.--Forest products--Value aggregate of production

Year	Total	Lumber	Fuels	Tree products	Bamboo and rattan
	Million $VN				
1960	652	336	255	40	21
1961	897	418	420	43	16
1962	737	459	220	35	23
1963	783	541	187	36	19
1964	637	365	192	65	15
1965	834	494	236	92	12
1966	666	410	226	25	5
1967	607	426	161	10	10
1968	995	861	117	9	8
1969	1,636	1,478	138	7	13

Appendix table F-17.--Livestock--Production and price indexes

(1964 = 100)

Year	Total livestock and poultry	Meat animals				Poultry				
		Total	Hogs	Cattle	Buffalo	Total	Chicken	Duck	Chicken eggs	Duck eggs
					Production					
1960 ...	71.2	80.8	81.8	81.7	65.9	46.0	40.8	52.4	43.7	64.5
1961 ...	97.2	106.9	108.7	106.3	88.2	72.9	70.6	71.1	75.7	87.5
1962 ...	95.8	101.7	100.6	109.9	96.5	80.6	78.9	78.9	79.0	97.1
1963 ...	91.3	91.2	88.6	102.1	98.8	91.5	91.1	88.5	91.1	101.1
1964 ...	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1965 ...	106.2	108.7	109.7	105.6	102.4	99.6	101.8	90.2	101.8	104.0
1966 ...	100.6	100.7	103.0	93.0	85.9	100.2	101.0	96.4	101.0	103.8
1967 ...	98.3	97.4	98.8	93.0	88.2	100.6	99.8	99.6	92.8	115.0
1968 ...	102.1	93.5	95.6	87.3	78.8	124.1	135.6	106.4	104.9	120.9
1969 ...	119.0	105.5	109.4	94.4	80.0	147.1	154.7	136.0	133.3	133.3
1970 ...	126.0	111.7	117.4	93.0	81.2	157.5	167.9	145.4	148.7	124.1
					Price					
1960 ...	80.6	79.6	80.0	82.2	68.3	84.2	81.9	93.1	84.7	77.8
1961 ...	81.5	78.6	74.3	101.7	83.1	91.0	84.4	116.6	84.7	83.3
1962 ...	97.9	95.9	92.9	111.3	98.4	103.8	100.0	133.2	88.6	83.3
1963 ...	95.9	96.0	95.4	98.6	98.4	95.5	93.2	100.0	100.0	94.1
1964 ...	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1965 ...	130.8	129.7	134.6	110.5	109.5	134.0	133.3	133.2	134.6	138.5
1966 ...	212.0	208.2	218.9	152.3	188.4	222.2	224.3	276.4	153.7	174.7
1967 ...	290.1	285.1	296.4	216.9	287.3	303.4	296.6	379.5	221.0	271.5
1968 ...	323.3	313.7	326.1	238.7	315.3	345.7	326.2	432.8	307.9	332.6
1969 ...	520.7	434.0	446.4	348.6	453.4	717.9	807.2	749.0	377.1	405.6
1970 ...	747.5	654.3	661.4	586.7	702.6	958.2	1,049.4	1,001.9	539.2	742.1

Appendix table F-18.--Livestock--Value aggregate of production

Year	Total livestock	Meat animals				Poultry				
		Total	Hogs	Cattle	Buffalo	Total	Chicken	Duck	Chicken eggs	Duck eggs
	Billion $VN									
1960	5.7	4.7	3.8	0.7	0.2	1.0	0.5	0.3	0.1	0.1
1961	7.9	6.1	4.7	1.1	.4	1.8	.9	0.5	.2	.2
1962	9.3	7.1	5.4	1.2	.5	2.2	1.2	.6	.2	.2
1963	8.7	6.4	4.9	1.0	.5	2.3	1.3	.5	.3	.3
1964	10.0	7.3	5.8	1.0	.5	2.7	1.6	.6	.3	.3
1965	13.8	10.2	8.5	1.2	.5	3.6	2.1	.7	.4	.4
1966	21.2	15.2	13.0	1.4	.8	6.0	3.6	1.5	.5	.5
1967	28.4	20.2	16.9	2.0	1.2	8.2	4.6	2.1	.6	.8
1968	32.9	21.3	18.0	2.1	1.2	11.6	6.9	2.6	.9	1.1
1969	61.7	33.3	28.2	3.3	1.8	28.5	19.5	5.8	1.5	1.7
1970	93.8	53.1	44.9	5.5	2.7	40.7	27.6	8.2	2.3	2.5

Appendix table F-19.--Summary of livestock price and production index data

Year	Hogs	Cattle	Buffalo	Chicken	Ducks	Chicken eggs	Duck eggs
				$VN/100 grams			
Farm price 1/							
1960	2.24	2.91	1.29	3.88	2.41	3.11	1.72
1961	2.08	3.60	1.57	4.00	3.02	3.11	1.84
1962	2.60	3.94	1.86	4.74	3.45	3.25	1.84
1963	2.67	3.49	1.86	4.42	2.59	3.67	2.08
1964	2.80	3.54	1.89	4.74	2.59	3.67	2.21
1965	3.77	3.91	2.07	6.32	3.45	4.94	3.06
1966	6.13	5.39	3.56	10.63	7.16	5.64	3.86
1967	8.30	7.68	5.43	14.06	9.83	8.11	6.00
1968	9.13	8.45	5.96	15.46	11.21	11.30	7.35
1969	12.50	12.34	8.57	38.26	19.40	13.84	10.29
1970	18.52	20.77	13.28	49.74	25.95	19.79	16.40
1971							
				1,000 M.T.			
Production 2/							
1960	168.8	23.2	16.8	13.5	11.4	3.5	8.0
1961	224.1	30.2	22.5	23.3	15.5	6.0	10.8
1962	207.5	31.2	24.6	26.1	17.2	6.3	12.0
1963	182.8	29.0	25.2	30.1	19.3	7.2	12.5
1964	206.3	28.4	25.5	33.0	21.8	7.9	12.4
1965	226.3	30.0	26.1	33.6	19.7	8.1	12.9
1966	212.5	26.4	21.9	33.4	21.0	8.0	12.9
1967	203.8	26.4	22.5	33.0	21.7	7.4	14.2
1968	197.2	24.8	20.1	44.8	23.2	8.3	15.0
1969	225.6	26.8	20.4	51.1	29.7	10.6	16.5
1970	242.2	26.4	20.7	55.5	31.7	11.8	15.3
1971							

1/ From Bank of Vietnam data.
2/ Based on increasing production per inventory factor.

Appendix table F-20.--Forest products: Production 1/

Year	Timber					Fuel wood	Charcoal
	Luxury wood	Class I wood	Class II wood	Class III wood	Other		
	M^3	M^3	M^3	M^3	M^3	M^3	M.T.
1960	5,676	23,342	167,732	99,204	22,928	878,862	61,552
1961	5,003	35,002	216,966	52,853	32,696	908,713	105,605
1962	6,199	40,170	179,630	32,531	32,452	571,377	44,311
1963	6,002	32,947	235,825	34,890	55,085	541,169	37,788
1964	3,616	28,919	212,049	25,203	30,281	560,580	28,085
1965	1,961	24,035	210,264	28,594	51,864	519,548	32,629
1966	1,629	16,580	168,112	32,649	42,989	404,644	21,079
1967	732	14,153	142,571	27,422	20,644	347,127	15,968
1968	3,285	25,313	204,466	29,493	23,917	239,853	8,023
1969	2,270	89,755	294,978	32,072	43,643	206,712	7,448

- Continued -

Appendix table F-20.--Forest products: Production 1/--Continued

Year	Rattan stalks	Bamboo	Cinnamon	Pine resin	Resin of chai	Oil of chai	Rattan leaves
	1,000 stalks	M^3	M.T.	M.T.	M.T.	1,000 litres	1,000 leaves
1960	3,773	52,428	1318.8	1,051	716.0	2,243	1,689
1961	4,045	30,801	608.0	1,294	787.0	3,937	2,045
1962	3,216	56,680	378.1	1,170	905.5	1,930	1,461
1963	3,678	43,925	301.6	899	903.8	1,768	1,236
1964	2,224	69,714	758.6	895	600.7	1,047	962
1965	1,808	33,571	593.0	1,101	504.9	304	868
1966	2,912	25,719	25.5	276	653.0	1,278	690
1967	1,657	26,151	3.0	298	587.0	16	493
1968	905	19,689	60.0	62	155.0	564	28
1969	941	24,097	1.5	40	211.0	483	480

1/ SOURCE: Worksheets of the National Bank of Vietnam.

Appendix table F-21.--Forest products: Prices 1/

Year	Timber					Fuel wood	Charcoal
	Luxury wood	Class I wood	Class II wood	Class III wood	Other		
	$VN/M^3	$VN/M^3	$VN/M^3	$VN/M^3	$VN/M^3	$VN/M^3	$VN/ton
1960	2,565	1,396	1,222	745	444	151	1,986
1961	3,100	2,180	1,150	1,050	650	174	2,480
1962	3,500	2,310	1,600	1,250	510	184	2,600
1963	3,044	2,042	1,586	1,016	828	150	2,800
1964	2,891	1,712	1,262	832	530	167	3,490
1965	3,573	2,585	1,671	1,053	847	204	3,965
1966	3,440	2,429	1,703	1,114	971	215	6,626
1967	4,227	2,915	2,223	1,512	1,137	231	5,091
1968	5,396	3,934	3,031	2,511	2,097	298	5,706
1969	5,290	3,992	3,128	2,665	2,281	450	5,985

- Continued -

Appendix table F-21.--Forest products: Prices 1/--Continued

Year	Rattan stalks	Bamboo	Cinnamon	Pine resin	Resin of chai	Oil of chai	Ratton leaves
	$VN/stalk	$VN/M^3	$VN/Kg.	---- $VN/M.T. ----		-- $VN/1,000 litres --	
1960	.381	323.6	13.0	6,715	3,052	6,190	1,274
1961	.710	325.0	15.0	6,000	3,501	6,000	1,500
1962	.750	327.3	32.4	6,500	3,700	6,000	1,500
1963	.723	308.0	50.0	6,000	4,000	7,000	2,200
1964	.200	190.1	62.9	8,000	5,460	6,880	1,780
1965	.123	329.0	130.0	8,718	5,741	6,821	1,108
1966	.394	142.0	299.7	9,221	7,161	7,047	1,000
1967	.458	314.1	333.3	11,500	8,581	10,417	1,250
1968	.493	389.5	433.3	12,290	10,000	10,128	1,500
1969	.654	500.5	280.0	11,875	7,033	11,488	2,000

1/ SOURCE: Worksheets of the National Bank of Vietnam

Appendix table F-22.--Crops index number components

Crop	Group I				Group II				
	Paddy	Rubber	Other food	Other nonfood	Paddy	Vegetables ground and oil crops	Industrial and fiber	Beverages	Tropical fruits and cane
Potatoes			X			X			X
Pineapple			X						X
Bananas			X						X
Fruit trees			X						X
Black pepper			X						
Sesame			X			X			
Yam beans			X			X			
Watermelons			X			X			
Other tubers			X			X			
Kenaf				X			X		
Jute				X			X		
Cotton				X			X		
Kapok				X			X		
Ramie				X			X		
Rubber		X					X		
Coffee			X					X	
Lacquer resin				X			X		
Cacao			X					X	
Mulberry				X			X		
Areca nuts			X				X		
Paddy	X				X				
Tobacco				X			X		
Sugarcane			X						X
Tea			X					X	
Manioc			X			X			
Corn			X			X			
Mungo beans			X			X			
Sweet potatoes			X			X			
Peanuts			X			X			
Coconut			X			X			
Soybeans			X			X			
Vegetables			X			X			

Appendix table F-23.--Livestock and forest products index number components

Livestock	Meat animals	Poultry	Livestock and poultry
Hogs	X		X
Cattle	X		X
Buffalo	X		X
Chicken		X	X
Ducks		X	X
Chicken eggs		X	X
Duck eggs		X	X

Forest products	Lumber	Fuels	Bamboo and rattan	Tree products	Total
Timber - high	X				X
Timber - #1	X				X
Timber - #2	X				X
Timber - #3	X				X
Timber - #4	X				X
Fuel wood		X			X
Charcoal		X			X
Rattan stalk			X		X
Rattan leaves			X		X
Bamboo			X		X
Cinnamon				X	X
Resin of pine				X	X
Resin of chai				X	X
Oil of chai				X	X

Appendix table F-24.--Summary of hog production and slaughter estimates

Year	Beginning inventory 1/	Production per inventory 2/	Estimated production 3/	Death loss 4/	Controlled slaughter	Inventory change 5/	Indicated total slaughter 6/	Average live-weight 7/	Indicated total liveweight: Slaughter	Indicated total liveweight: Production
	000	No.	000	000	000	000	000	Kg.	M.T.	M.T.
1961	3,620	.86	3,113	253	1,139	-269	3,129	72	225,288	224,136
1962	3,351	.86	2,882	235	955	-399	3,040	72	218,880	207,504
1963	2,952	.86	2,539	207	909	379	1,953	72	140,616	182,808
1964	3,331	.86	2,865	233	1,090	324	2,308	72	166,176	206,280
1965	3,655	.86	3,143	256	1,249	-182	3,069	72	220,968	226,296
1966	3,473	.85	2,952	243	1,093	-219	2,928	72	210,816	212,544
1967	3,254	.87	2,831	228	1,163	-69	2,672	72	192,384	203,832
1968	3,185	.86	2,739	223	850	368	2,148	72	154,656	197,208
1969	3,553	.87	3,091	249	1,060	218	2,624	73	191,552	225,643
1970	3,771	.88	3,318	264	1,137	186	2,868	73	209,364	242,214
1971	3,847	.89	3,424	277	1,148	224	2,923	74	216,302	253,376
1972e	4,071	.90	3,664	285				75		276,800

See footnotes Table G-30.

Appendix table F-25.--Summary of cattle production and slaughter estimates

Year	Beginning inventory 1/	Production per inventory 2/	Estimated production 3/	Death loss 4/	Controlled slaughter	Inventory change 5/	Indicated total slaughter 6/	Average live-weight 7/	Indicated total liveweight	
									Slaughter	Production
	000	No.	000	000	000	000	000	Kg.	M.T.	M.T.
1961	1,078	.14	151	22	65	33	96	200	19,200	30,200
1962	1,111	.14	156	22	78	8	8/170	200	34,000	31,200
1963	1,119	.13	145	22	74	64	8/160	200	32,000	29,000
1964	1,183	.12	142	24	69	-33	151	200	30,200	28,400
1965	1,150	.13	150	23	77	-49	176	200	35,200	30,000
1966	1,101	.12	132	8/44	72	-88	176	200	35,200	26,400
1967	1,013	.13	132	20	75	20	8/193	200	38,600	26,400
1968	1,033	.12	124	21	66	-79	182	200	36,400	24,800
1969	954	.14	134	19	81	-14	8/196	200	39,200	26,800
1970	940	.14	132	19	75	-32	145	200	29,000	26,400
1971	908	.15	136	18	76	-10	8/146	200	29,200	27,200
1972e	898	.14	126	18						25,200

See footnotes Table G-30

Appendix table F-26.--Summary of buffalo production and slaughter estimates

Year	Beginning inventory 1/	Production per inventory 2/	Estimated production 3/	Death loss 4/	Controlled slaughter	Inventory change 5/	Indicated total slaughter 6/	Average live-weight 7/	Indicated total liveweight: Slaughter	Indicated total liveweight: Production
	000	No.	000	000	000	000	000	Kg.	M.T.	M.T.
1961	754	.100	75	23	29	63	8/64	300	19,200	22,500
1962	817	.100	82	25	30	-14	74	300	21,300	24,000
1963	803	.105	84	24	35	45	8/79	300	23,700	25,200
1964	848	.100	85	25	38	-21	87	300	24,300	25,500
1965	827	.105	87	25	47	-94	156	300	46,800	26,100
1966	733	.100	73	22	48	18	8/106	300	31,800	21,900
1967	751	.100	75	23	42	-86	138	300	41,400	22,500
1968	665	.100	67	20	26	-18	65	300	19,500	20,100
1969	647	.105	68	19	34	-21	70	300	21,000	20,400
1970	626	.110	69	19	39	-61	111	300	33,300	20,700
1971	565	.125	71	17	42	-5	59	300	17,700	21,300
1972e	560	.130	73	17						

See footnotes Table G-30

Appendix table F-27.--Summary of chicken production estimates

Year	Beginning inventory 1/	Production per inventory 2/	Estimated production 3/	Death loss 4/	Inventory change 5/	Indicated total slaughter 6/	Average live-weight 7/	Indicated total liveweight: Slaughter	Indicated total liveweight: Production	Imported broilers: Number	Imported broilers: Quantity	Total: Slaughter	Total: Production
	000	No.	000	000	000	000	Kg.	M.T.	M.T.	000	M.T.	M.T.	M.T.
1961 ...	16,655	1.40	23,317	4,164	725	18,428	1.00	18,428	23,317	---	---	18,428	23,317
1962 ...	17,380	1.50	26,070	4,345	2,672	19,053	1.00	19,053	26,070	---	---	19,053	26,070
1963 ...	20,052	1.50	30,078	5,013	1,963	23,102	1.00	23,102	30,078	---	---	23,102	30,078
1964 ...	22,015	1.50	33,022	5,504	386	27,132	1.00	27,132	33,022	---	---	27,132	33,022
1965 ...	22,401	1.50	33,601	5,600	-159	28,160	1.00	28,160	33,601	---	---	28,160	33,601
1966 ...	22,242	1.50	33,363	5,560	-2,262	30,065	1.00	30,065	33,363	---	---	30,065	33,363
1967 ...	19,980	1.50	39,970	4,995	-323	25,298	1.10	27,828	32,967	---	---	27,828	32,967
1968 ...	19,657	1.70	33,417	4,914	348	28,155	1.20	33,786	40,100	3,677	4,680	38,466	44,780
1969 ...	20,005	1.80	36,009	5,001	43	30,965	1.30	40,254	46,812	3,346	4,258	44,512	51,070
1970 ...	20,048	1.90	38,091	5,012	-788	33,867	1.40	47,414	53,327	1,675(e)	2,132(e)	49,546	55,459
1971 ...	19,260	1.90	36,594	4,815	-260	32,039	1.40	44,855	51,232	---	---	44,855	51,232
1972(e)	19,000	1.90	36,100	4,750			1.40		50,540				50,540

See footnotes Table G-30
(e) estimated.

Appendix table F-28.--Summary of duck production estimates

Year	Beginning inventory 1/	Production per inventory 1/	Estimated production 3/	Death loss 4/	Inventory change 5/	Indicated total slaughter 6/	Average liveweight 7/	Indicated total liveweight	
								Slaughter	Production
	000	No.	000	000	000	000	Kg.	M.T.	M.T.
1961	9,948	1.30	12,932	1,194	1,087	10,651	1.20	12,781	15,518
1962	11,035	1.30	14,346	1,324	459	12,563	1.20	15,076	17,215
1963	11,494	1.40	16,092	1,379	1,498	13,215	1.20	15,858	19,310
1964	12,992	1.40	18,189	1,559	-378	17,008	1.20	20,410	21,827
1965	12,614	1.30	16,398	1,514	870	14,014	1.20	16,817	19,678
1966	13,484	1.30	17,529	1,618	455	15,456	1.20	18,547	21,035
1967	13,939	1.30	18,121	1,673	-197	16,645	1.20	19,974	21,745
1968	13,742	1.30	17,865	1,649	1,407	14,809	1.30	19,252	23,224
1969	15,149	1.40	21,209	1,818	-1,047	20,438	1.40	28,613	29,693
1970	14,102	1.50	21,153	1,692	373	19,088	1.50	28,632	31,730
1971	14,475	1.60	23,160	1,737	2,025	19,398	1.60	31,037	37,056
1972 e. .	16,500	1.60	26,400	1,980			1.60		42,240

See footnotes Table G-30

Appendix table F-29.--Summary of chicken egg production estimates

Year	Beginning inventory 1/	Production per inventory 2/	Estimated production 3/	Average weight per egg	Indicated total weight of production
	000	No.	000	Grams	M.T.
1961	16,655	8	133,240	45	5,996
1962	17,380	8	139,040	45	6,257
1963	20,052	8	160,416	45	7,219
1964	22,015	8	176,120	45	7,925
1965	22,401	8	179,208	45	8,064
1966	22,242	8	177,936	45	8,007
1967	19,980	8	159,840	46	7,353
1968	19,657	9	176,913	47	8,315
1969	20,005	11	220,055	48	10,563
1970	20,048	12	240,576	49	11,788
1971	19,260	13	250,380	50	12,519
1972	9,000	13	247,000	51	12,600

See footnotes Table G-30

Appendix table F-30.--Summary of duck egg production estimates

Year	Beginning inventory 1/	Production per inventory 2/	Estimated production 3/	Average weight per egg	Indicated total weight of production
	000	No.	000	Grams	M.T.
1961	9,948	16	159,168	68	10,823
1962	11,035	16	176,560	68	12,006
1963	11,494	16	183,906	68	12,505
1964	12,992	14	181,888	68	12,368
1965	12,614	15	189,210	68	12,866
1966	13,484	14	188,776	68	12,837
1967	13,939	15	209,085	68	14,218
1968	13,742	16	219,872	68	14,951
1969	15,149	16	242,384	68	16,482
1970	14,102	16	225,632	68	15,343
1971	14,475	16	231,600	68	15,749
1972	16,500	16	264,000	68	17,952

1/ Inventory previous year from AESS. 2/ Estimates of production per inventory based on consensus of AID and ERS estimates. 3/ Estimated number produced equals inventory number times production per inventory. 4/ Based on data in 1969 Special Livestock Survey. 5/ Ending inventory less beginning inventory. 6/ Production less death loss, less inventory change. 7/ Estimates based on consensus of AID and ERS estimates, generally reflecting improved management practices in recent years were appropriate. 8/ Selected data adjustments have been made to reflect nonrecurring events such as major disease epidemics, and unusual movements across borders.

APPENDIX G.--CONSUMER EXPENDITURES

Appendix table G-1.--Number and average size of urban families in the consumer survey by household expenditure group and city

Item and expenditure group	Saigon	Can Tho	Dalat	Nha Trang	Danang	Total
Number of Families						
Under 100,000	75	78	64	30	28	275
100,000 - 200,000	426	249	364	228	182	1,449
200,000 - 300,000	491	174	238	243	265	1,411
300,000 - 400,000	289	79	119	152	178	817
Over 400,000	518	208	113	247	196	1,282
Total	1,799	788	898	900	849	5,234
Average Family Size						
Under 100,000	3.52	3.72	3.88	3.73	4.21	3.75
100,000 - 200,000	5.28	5.57	5.77	5.26	5.70	5.50
200,000 - 300,000	7.04	7.36	7.63	7.14	7.31	7.25
300,000 - 400,000	8.10	7.76	8.65	8.64	8.88	8.42
Over 400,000	9.17	8.53	9.37	10.11	10.97	9.54
Total	7.26	6.78	6.96	7.62	8.04	7.33

Appendix table G-2.--Per capita expenditure elasticities by city for urban household expenditures, all groups

Item	Saigon	Can Tho	Dalat	Nha Trang	Danang	Vietnam
Food	.8295	.7350	.6135	.6231	.6937	.7408
Cereals and products	.2597	.3072	.2739	.1571	.1249	.2233
Beef	1.6147	1.1502	.6858	1.6348	.7049	1.1221
Pork	1.0029	.8992	.7368	.7043	.6466	.8953
Other meats	1.7188	1.0865	.6030	.9540	2.6929	1.6216
Poultry	2.4889	2.5043	1.3712	3.9204	2.5052	2.2819
Fish	.4719	.3327	.1353	.1938	.4553	.3747
Milk and eggs	.5877	.5055	.9547	.8308	.9795	.6817
Fresh fruit	2.1291	1.6838	1.4182	.9252	1.7184	1.7381
Fresh vegetables	.3473	.4326	.3266	.2390	.2022	.3804
Edible oils	.2124	.1899	.2145	.3416	.3140	.2552
Sugar products	2.1206	1.3016	1.0960	.6292	2.3897	1.5498
Coffee	1.0359	.7672	.6210	1.2347	-.2660	.5579
Soft drinks	3.1833	3.0059	1.5859	1.4086	1.9794	2.8015
Alcoholic Beverages	4.2013	2.7426	1.3448	2.9692	.2450	2.0887
Eating out	.8390	.8933	1.4838	1.9935	3.1086	1.2392
Home production	N.A.	.7027	-.7032	N.A.	N.A.	-.6752
Clothing	2.1061	2.3368	.9294	1.7580	2.6623	1.8397
Utilities	2.7661	4.5518	4.1600	4.7611	5.0216	3.7379
Housing and equipment	1.0424	1.4040	1.1234	1.1207	1.2857	1.1496
Miscellaneous services	1.2302	1.4737	1.7501	1.9110	1.4134	1.5032

Appendix table G-3.--Per capita expenditure elasticities by city for urban household expenditures under 300,000 piasters

Item	Saigon	Can Tho	Dalat	Nha Trang	Danang	Vietnam
Food	.8619	.8076	.8334	.8542	.8019	8254
Cereals and products	.3210	.6056	.2733	.3356	.0136	.3200
Beef	2.9903	.5898	1.2625	2.9176	.6659	1.6769
Pork	1.1861	1.0255	1.0404	.9757	.5840	.9702
Other meats	2.2779	.5539	2.9230	N.A.	5.1643	2.4274
Poultry	2.9707	2.8819	2.3292	7.0830	3.3168	2.7920
Fish	.5392	.0755	.0715	.4496	.9343	.4565
Milk and eggs	.4518	.2102	1.1957	1.5970	1.2753	.7906
Fresh fruit	.9741	1.5912	2.3228	.8661	2.1024	1.4504
Fresh vegetables	.2550	.1110	.4993	-.0744	.5444	.4699
Edible oils	.1684	.0640	.5262	.5420	.4215	.3542
Sugar products	1.5467	2.0614	1.4563	2.1217	2.1735	1.4216
Coffee	1.6508	.5227	1.2434	2.3287	-.8114	.6362
Soft drinks	2.4546	2.8093	2.9230	3.4003	N.A.	3.2896
Alcoholic beverages	4.4544	1.7628	2.8896	6.5730	-1.5628	1.8790
Eating out	1.3949	1.6144	2.7130	3.4102	4.6975	1.8539
Home production	N.A.	2.6861	N.A.	4.6742	N.A.	-.1487
Clothing	2.3086	3.3135	1.5497	1.6758	3.1154	2.1381
Utilities	N.A.	N.A.	6.0913	6.7798	6.3872	3.9568
Housing and equipment	.8163	.9449	.6370	.4558	1.2491	.8178
Miscellaneous services	1.5146	1.7078	1.7987	2.2989	1.3111	1.6936

Appendix table G-4.--Per capita expenditure elasticities by city for urban household expenditures over 200,000 piasters

Item	Saigon	Can Tho	Dalat	Nha Trang	Danang	Vietnam
Food	.8110	.6232	.4706	.4578	.5201	.6551
Cereals and products	.2431	.2246	.2602	.0320	.2582	.1862
Beef	.8688	1.4801	.3802	1.1635	.7164	.7036
Pork	.9022	.6273	.5791	.4172	.5856	.8154
Other meats	1.5431	2.8165	-.1023	2.3095	-1.0108	.9056
Poultry	1.8454	1.6290	.9242	1.6305	1.1504	1.6398
Fish	.4526	.5391	.1587	.1017	-.0017	.3277
Milk and eggs	.6564	.6675	.8035	.4272	.5265	.5697
Fresh fruit	2.6455	1.6575	.9886	.7850	1.2538	.8774
Fresh vegetables	.4197	.6177	.2280	.4122	-.1316	.2946
Edible oils	.3055	.3020	.0738	.3307	.1627	.2150
Sugar products	2.2910	.6632	.8672	-.0834	2.7829	1.6537
Coffee	.7922	.8762	.2847	.5797	.0996	.4342
Soft drinks	2.6261	2.8773	1.1022	.9763	1.7493	2.3449
Alcoholic beverages	4.0394	4.2564	.7332	1.3052	2.2913	2.4656
Eating out	.5071	.1872	.7882	1.0424	1.1691	.7324
Home production	N.A.	-1.6799	-.8523	.1691	N.A.	-1.0440
Clothing	1.8042	1.3731	.6057	2.0152	2.0760	1.6302
Utilities	2.6502	4.3993	2.9847	3.0290	3.6513	2.9970
Housing and equipment	1.3076	1.9974	1.3488	1.5791	1.2858	1.4529
Miscellaneous services	1.0308	1.4260	1.8492	1.5832	1.7328	1.4197

Appendix table G-5.1.--Per capita urban consumer expenditures by household expenditure group, Vietnam, 1/

Item	Annual expenditures per household $VN				
	Under 100,000	100,000 to 200,000	200,000 to 300,000	300,000 to 400,000	Over 400,000
	(1,000 $VN)				
Total expenditure	21.16	28.63	34.69	41.67	65.85
Food	15.43	19.83	23.20	27.08	35.61
Cereals and products	3.93	4.47	4.58	4.70	5.15
Beef	.37	.65	.84	1.05	1.35
Pork	1.84	2.48	2.97	3.60	5.05
Other meats	.02	.03	.07	.07	.12
Poultry	.18	.37	.73	1.26	2.22
Fish	3.09	3.56	3.87	4.06	4.76
Milk and eggs	.60	.80	.88	1.08	1.30
Fresh fruit	.30	.44	.62	.90	2.08
Fresh vegetables	1.87	2.15	2.36	2.56	2.87
Edible oils	.92	1.06	1.09	1.13	1.25
Sugar products	.19	.31	.38	.54	1.11
Coffee	.18	.20	.25	.27	.33
Soft drinks	.01	.03	.05	.10	.24
Alcoholic beverages	.07	.16	.17	.26	.82
Eating out	1.68	2.99	4.19	5.36	6.89
Home production	.17	.15	.16	.12	.08
Clothing	.69	1.34	1.98	2.71	5.65
Utilities	.03	.06	.23	.51	1.67
Housing and equipment	2.79	3.52	4.19	4.91	10.35
Miscellaneous services	2.22	3.88	5.09	6.47	12.58

1/ For the survey year 1969-70 in Saigon, Can Tho, Dalat, Nha Trang and Danang.

Appendix table G-5.2.--Per capita urban consumer expenditures by household expenditure group, Saigon 1/

Item	Annual expenditures per household $VN				
	Under 100,000	100,000 to 200,000	200,000 to 300,000	300,000 to 400,000	Over 400,000
	(1,000 $VN)				
Total expenditure	22.17	30.65	35.72	43.79	70.79
Food	16.02	21.69	24.01	29.18	42.11
Cereals and products	3.68	4.15	4.27	4.44	5.03
Beef	.19	.64	.74	1.06	1.40
Pork	2.18	3.29	3.81	4.68	7.09
Other meats	.0	.02	.03	.03	.08
Poultry	.21	.44	.92	1.70	3.44
Fish	2.65	3.25	3.40	3.75	4.64
Milk and eggs	.71	.86	.87	1.08	1.39
Fresh fruit	.31	.35	.52	.92	3.20
Fresh vegetables	2.03	2.25	2.28	2.49	3.04
Edible oils	.88	.98	.94	.97	1.15
Sugar products	.15	.23	.32	.61	1.60
Coffee	.10	.17	.22	.21	.36
Soft drinks	.00	.01	.04	.11	.27
Alcoholic beverages	.0	.05	.08	.23	1.34
Eating out	2.93	5.01	5.57	6.83	8.07
Home production	.0	.0	.0	.07	.03
Clothing	.57	1.07	1.77	2.87	6.25
Utilities	.11	.04	.24	.50	1.54
Housing and equipment	2.78	3.60	4.11	4.38	9.58
Miscellaneous services	2.69	4.25	5.59	6.86	11.30

1/ For the survey year 1969-70.

Appendix table G-5.3.--Per capita urban consumer expenditures by household expenditure group, Can Tho 1/

Item	Annual expenditures per household $VN				
	Under 100,000	100,000 to 200,000	200,000 to 300,000	300,000 to 400,000	Over 400,000
	(1,000 $VN)				
Total expenditure	20.84	27.32	33.07	43.45	55.90
Food	16.20	20.03	23.54	29.80	32.63
Cereals and products	3.44	4.60	4.48	4.48	5.05
Beef	.22	.25	.29	.50	.63
Pork	2.25	2.67	3.66	4.79	5.08
Other meats	.05	.03	.07	.01	.33
Poultry	.26	.36	1.04	1.98	2.44
Fish	3.83	4.04	3.95	4.81	5.24
Milk and eggs	.64	.72	.70	1.02	.99
Fresh fruit	.39	.56	.82	1.36	1.96
Fresh vegetables	1.44	1.45	1.52	1.95	2.10
Edible oils	.92	1.00	.94	1.10	1.10
Sugar products	.24	.49	.61	.92	.86
Coffee	.15	.18	.19	.29	.30
Soft drinks	.04	.07	.15	.38	.68
Alcoholic beverages	.03	.13	.06	.26	.56
Eating out	2.23	3.39	4.71	5.70	5.18
Home production	.09	.09	.34	.24	.14
Clothing	.37	.86	1.72	2.94	3.53
Utilities	.0	.00	.05	.29	.50
Housing and equipment	2.43	3.00	3.78	4.51	10.92
Miscellaneous	1.84	3.43	3.97	5.91	8.41

1/ For the survey year 1969-70.

Appendix table G-5.4.--Per capita urban consumer expenditures by household expenditure group, Dalat 1/

Item	Annual expenditures per household $VN				
	Under 100,000	100,000 to 200,000	200,000 to 300,000	300,000 to 400,000	Over 400,000
	(1,000 $VN)				
Total expenditure	20.99	26.84	33.72	41.92	82.52
Food	14.16	17.38	21.02	25.55	32.91
Cereals and products	4.42	4.78	5.03	5.53	6.42
Beef	.56	.73	1.02	1.18	1.46
Pork	1.24	1.97	2.02	2.89	3.63
Other meats	.0	.02	.04	.02	.03
Poultry	.19	.42	.57	.89	1.40
Fish	2.26	2.22	2.34	2.37	2.68
Milk and eggs	.63	.86	1.11	1.47	2.35
Fresh fruit	.22	.43	.66	.95	1.67
Fresh vegetables	1.72	1.92	2.18	2.37	2.70
Edible oils	.92	1.07	1.18	1.23	1.27
Sugar products	.25	.32	.50	.63	1.10
Coffee	.20	.29	.36	.46	.49
Soft drinks	.0	.02	.04	.04	.10
Alcoholic beverages	.11	.29	.43	.55	.85
Eating out	.82	1.54	2.97	4.65	6.52
Home production	.59	.51	.58	.32	.24
Clothing	1.23	1.92	2.56	3.42	4.61
Utilities	.0	.04	.18	.60	3.06
Housing and equipment	3.22	3.60	4.36	5.50	14.32
Miscellaneous services	2.39	3.90	5.60	6.84	27.62

1/ For the survey year 1969-70.

Appendix table G-5.5.--Per capita urban consumer expenditures by household expenditure group, Nha Trang 1/

Item	Annual expenditures per household $VN				
	Under 100,000	100,000 to 200,000	200,000 to 300,000	300,000 to 400,000	Over 400,000
	(1,000 $VN)				
Total expenditure	22.13	29.72	35.17	40.35	65.12
Food	15.72	20.40	23.31	25.33	31.10
Cereals and products	4.21	4.50	4.95	4.82	5.00
Beef	.16	.52	.58	.58	1.13
Pork	1.86	2.45	2.93	3.49	3.93
Other meats	.05	.02	.02	.05	.10
Poultry	.0	.09	.26	.44	.78
Fish	4.37	5.14	5.35	5.05	5.57
Milk and eggs	.39	.74	.79	.87	1.04
Fresh fruit	.34	.39	.52	.64	.87
Fresh vegetables	2.46	2.34	2.39	2.58	3.10
Edible oils	.97	1.17	1.24	1.14	1.46
Sugar products	.11	.22	.29	.21	.25
Coffee	.05	.09	.15	.13	.20
Soft drinks	.0	.07	.04	.04	.07
Alcoholic beverages	.0	.20	.17	.24	.40
Eating out	.75	2.46	3.51	4.88	7.07
Home production	.0	.02	.10	.17	.13
Clothing	1.07	1.63	2.36	2.22	7.35
Utilities	.0	.05	.25	.39	1.63
Housing and equipment	3.70	4.14	4.59	5.52	12.02
Miscellaneous services	1.63	3.49	4.65	6.88	13.02

1/ For the survey year 1969-70.

Appendix table G-5.6.--Per capita urban consumer expenditures by household expenditure group, Danang 1/

Item	Annual expenditures per household $VN				
	Under 100,000	100,000 to 200,000	200,000 to 300,000	300,000 to 400,000	Over 400,000
	(1,000 $VN)				
Total expenditure	19.14	28.35	34.42	38.78	55.71
Food	14.62	19.82	23.47	25.35	30.28
Cereals and products	4.40	4.29	4.47	4.51	5.03
Beef	.96	1.21	1.43	1.56	2.02
Pork	1.33	1.52	1.92	2.10	2.56
Other meats	.0	.06	.22	.22	.14
Poultry	.11	.45	.75	1.24	1.45
Fish	2.82	4.45	4.77	4.51	4.69
Milk and eggs	.41	.73	.85	1.04	1.14
Fresh fruit	.21	.51	.71	.85	1.31
Fresh vegetables	2.36	3.10	3.20	3.03	2.97
Edible oils	.97	1.19	1.23	1.32	1.35
Sugar products	.09	.28	.30	.52	1.22
Coffee	.47	.27	.31	.33	.33
Soft drinks	.0	.00	.02	.06	.06
Alcoholic beverages	.29	.10	.13	.14	.37
Eating out	.21	1.63	3.14	3.93	5.65
Home production	.0	.01	.0	.0	.0
Clothing	.27	1.01	1.64	2.31	4.58
Utilities	.0	.19	.38	.65	2.27
Housing and equipment	1.96	3.20	4.08	4.96	7.67
Miscellaneous services	2.29	4.13	4.85	5.51	10.92

1/ For the survey year 1969-70.

Appendix table G-6.1.--Per family urban consumer expenditures by household expenditure group, Vietnam 1/

Item	Annual expenditures per household $VN				
	Under 100,000	100,000 to 200,000	200,000 to 300,000	300,000 to 400,000	Over 400,000
	(1,000 $VN)				
Total expenditure	79.41	157.54	251.47	350.77	628.20
Food	57.91	109.12	168.16	227.92	339.72
Cereals and products	14.75	24.57	33.22	39.52	49.12
Beef	1.40	3.59	6.08	8.86	12.86
Pork	6.91	13.64	21.51	30.32	48.23
Other meats	.07	.15	.50	.63	1.19
Poultry	.69	2.03	5.29	10.59	21.21
Fish	11.61	19.57	28.05	34.17	45.37
Milk and eggs	2.26	4.40	6.35	9.11	12.38
Fresh fruit	1.14	2.40	4.47	7.55	19.85
Fresh vegetables	7.03	11.81	17.11	21.58	27.40
Edible oils	3.45	5.84	7.88	9.54	11.91
Sugar products	.71	1.68	2.77	4.58	10.55
Coffee	.66	1.13	1.79	2.24	3.11
Soft drinks	.04	.17	.37	.83	2.25
Alcoholic beverages	.26	.86	1.20	2.21	7.84
Eating out	6.30	16.46	30.39	45.16	65.70
Home production	.62	.85	1.18	1.04	.75
Clothing	2.60	7.35	14.36	22.79	53.87
Utilities	.10	.31	1.70	4.31	15.90
Housing and equipment	10.48	19.39	30.36	41.32	98.71
Miscellaneous services	8.32	21.37	36.89	54.43	120.00

1/ For the survey year 1969-70 in Saigon, Can Tho, Dalat, Nha Trang and Danang.

Appendix table G-6.2.--Per family urban consumer expenditures by household expenditure group, Saigon 1/

Item	Annual expenditures per household $VN				
	Under 100,000	100,000 to 200,000	200,000 to 300,000	300,000 to 400,000	Under 400,000
	(1,000 $VN)				
Total expenditure	78.04	161.75	251.59	354.74	649.00
Food	56.41	114.48	169.12	236.39	386.09
Cereals and products	12.95	21.89	30.04	35.93	46.14
Beef	.68	3.37	5.23	8.59	12.85
Pork	7.66	17.38	26.86	37.90	64.99
Other meats	.0	.08	.18	.25	.73
Poultry	.74	2.35	6.50	13.78	31.51
Fish	9.33	17.14	23.96	30.35	42.56
Milk and eggs	2.49	4.53	6.14	8.72	12.72
Fresh fruit	1.08	1.85	3.63	7.48	29.34
Fresh vegetables	7.15	11.87	16.04	20.19	27.83
Edible oils	3.11	5.15	6.59	7.88	10.50
Sugar products	.53	1.24	2.28	4.96	14.66
Coffee	.37	.89	1.55	1.72	3.33
Soft drinks	.0	.04	.28	.90	2.48
Alcoholic beverages	.0	.26	.59	1.87	12.26
Eating out	10.32	26.46	39.25	55.34	73.95
Home production	.0	.0	.0	.54	.25
Clothing	2.01	5.65	12.44	23.26	57.33
Utilities	.38	.22	1.71	4.07	14.12
Housing and equipment	9.77	18.98	28.95	35.44	87.84
Miscellaneous services	9.47	22.42	39.35	55.58	103.62

1/ For the survey year 1969-70.

Appendix table G-6.3.--Per family urban consumer expenditures by household expenditure group, Can Tho 1/

Item	Annual expenditures per household $VN				
	Under 100,000	100,000 to 200,000	200,000 to 300,000	300,000 to 400,000	Over 400,000
	(1,000 $VN)				
Total expenditure	77.48	152.20	243.44	337.16	477.56
Food	60.24	111.59	173.31	231.25	278.34
Cereals and products	12.78	25.62	33.01	34.77	43.09
Beef	.83	1.37	2.17	3.91	5.36
Pork	8.38	14.88	26.96	37.18	43.32
Other meats	.17	.18	.50	.06	2.79
Poultry	.95	1.98	7.67	15.35	20.79
Fish	14.22	22.51	29.08	37.35	44.68
Milk and eggs	2.39	4.00	5.18	7.88	8.42
Fresh fruit	1.46	3.13	6.01	10.58	16.72
Fresh vegetables	5.35	8.07	11.20	15.16	17.88
Edible oils	3.41	5.57	6.94	8.54	9.38
Sugar products	.90	2.73	4.49	7.13	7.33
Coffee	.54	1.00	1.38	2.23	2.59
Soft drinks	.13	.41	1.09	2.94	5.78
Alcoholic beverages	.12	.74	.44	2.05	4.81
Eating out	8.27	18.89	34.71	44.24	44.18
Home production	.32	.51	2.49	1.89	1.22
Clothing	1.38	4.78	12.69	22.85	30.14
Utilities	.0	.02	.37	2.24	4.26
Housing and equipment	9.03	16.70	27.81	34.96	93.11
Miscellaneous services	6.83	19.10	29.26	45.87	71.71

1/ For the survey year 1969-70.

Appendix table G-6.4.--Per family urban consumer expenditures by household expenditure group, Dalat 1/

Item	Annual expenditures per household $VN				
	Under 100,000	100,000 to 200,000	200,000 to 300,000	300,000 to 400,000	Over 400,000
	(1,000 $VN)				
Total expenditure	81.34	154.93	257.31	362.44	773.38
Food	54.85	100.29	160.39	220.93	308.38
Cereals and products	17.14	27.60	38.41	47.78	60.12
Beef	2.18	4.23	7.79	10.18	13.67
Pork	4.82	11.34	15.40	24.98	34.00
Other meats	.0	.13	.31	.15	.33
Poultry	.75	2.40	4.31	7.73	13.14
Fish	8.77	12.80	17.83	20.53	25.09
Milk and eggs	2.45	4.94	8.50	12.71	22.04
Fresh fruit	.85	2.49	5.02	8.24	15.70
Fresh vegetables	6.65	11.06	16.63	20.47	25.27
Edible oils	3.56	6.15	9.02	10.60	11.91
Sugar products	.98	1.85	3.81	5.49	10.28
Coffee	.79	1.69	2.75	3.99	4.57
Soft drinks	.0	.10	.29	.31	.91
Alcoholic beverages	.42	1.68	3.26	4.77	8.01
Eating out	3.19	8.87	22.65	40.25	61.08
Home production	2.28	2.94	4.40	2.74	2.27
Clothing	4.77	11.11	19.55	29.59	43.25
Utilities	.0	.24	1.38	5.21	28.70
Housing and equipment	12.48	20.79	33.26	47.53	134.18
Miscellaneous services	9.24	22.50	42.74	59.18	258.87

1/ For the survey year 1969-70.

Appendix table G-6.5.--Per family urban consumer expenditures by household expenditure group, Nha Trang 1/

Item	Annual expenditures per household $VN				
	Under 100,000	100,000 to 200,000	200,000 to 300,000	300,000 to 400,000	Over 400,000
	(1,000 $VN)				
Total expenditure	82.60	156.40	250.95	348.80	658.56
Food	58.69	107.39	166.34	219.01	314.50
Cereals and products	15.72	23.68	35.32	41.71	50.60
Beef	.59	2.76	4.14	5.03	11.43
Pork	6.93	12.89	20.91	30.18	39.70
Other meats	.18	.09	.15	.46	.97
Poultry	.0	.47	1.87	3.80	7.86
Fish	16.30	27.05	38.15	43.63	56.33
Milk and eggs	1.47	3.88	5.65	7.55	10.50
Fresh fruit	1.27	2.06	3.71	5.57	8.78
Fresh vegetables	9.20	12.31	17.09	22.27	31.38
Edible oils	3.61	6.14	8.83	9.89	14.76
Sugar products	.43	1.15	2.09	1.80	2.56
Coffee	.20	.47	1.10	1.10	1.99
Soft drinks	.0	.35	.31	.36	.70
Alcoholic beverages	.0	1.04	1.22	2.06	4.07
Eating out	2.79	12.97	25.05	42.17	71.54
Home production	.0	.08	.75	1.44	1.32
Clothing	4.01	8.57	16.88	19.16	74.31
Utilities	.0	.29	1.75	3.41	16.47
Housing and equipment	13.81	21.79	32.77	47.74	121.56
Miscellaneous services	6.09	18.35	33.20	59.48	131.71

1/ For the survey year 1969-70.

Appendix table G-6.6.--Per family urban consumer expenditures by household expenditure group, Danang 1/

Item	Annual expenditures per household $VN				
	Under 100,000	100,000 to 200,000	200,000 to 300,000	300,000 to 400,000	Over 400,000
	(1,000 $VN)				
Total expenditure	80.65	161.67	251.75	344.26	611.14
Food	61.63	113.03	171.65	225.00	332.13
Cereals and products	18.55	24.49	32.69	40.07	55.21
Beef	4.03	6.88	10.45	13.87	22.17
Pork	5.61	8.69	14.06	18.63	28.13
Other meats	.0	.34	1.60	1.97	1.50
Poultry	.45	2.59	5.52	11.01	15.88
Fish	11.89	25.36	34.87	40.00	51.39
Milk and eggs	1.73	4.19	6.21	9.20	12.47
Fresh fruit	.90	2.92	5.21	7.57	14.42
Fresh vegetables	9.95	17.66	23.40	26.86	32.59
Edible oils	4.07	6.80	9.01	11.68	14.76
Sugar products	.38	1.59	2.21	4.59	13.33
Coffee	1.97	1.56	2.30	2.91	3.65
Soft drinks	.0	.02	.18	.54	.63
Alcoholic beverages	1.24	.55	.98	1.25	4.01
Eating out	.86	9.31	22.97	34.86	62.01
Home production	.0	.07	.0	.0	.0
Clothing	1.12	5.77	12.03	20.53	50.29
Utilities	.0	1.08	2.79	5.81	24.86
Housing and equipment	8.26	18.25	29.82	44.06	84.10
Miscellaneous services	9.65	23.53	35.47	48.87	119.75

1/ For the survey year 1969-70.

Appendix table G-7.1.--Total urban consumer expenditures by household expenditure group, Vietnam 1/

Item	Annual expenditures per household $VN				
	Under 100,000	100,000 to 200,000	200,000 to 300,000	300,000 to 400,000	Over 400,000
	(Percent of total expenditures)				
Total expenditure	100.00	100.00	100.00	100.00	100.00
Food	72.93	69.26	66.87	64.98	54.08
Cereals and products	18.57	15.60	13.21	11.27	7.82
Beef	1.76	2.28	2.42	2.52	2.05
Pork	8.71	8.66	8.55	8.64	7.68
Other meats	0.09	.09	.20	.18	.19
Poultry	.87	1.29	2.11	3.02	3.38
Fish	14.62	12.42	11.15	9.74	7.22
Milk and eggs	2.85	2.79	2.52	2.60	1.97
Fresh fruit	1.43	1.52	1.78	2.15	3.16
Fresh vegetables	8.86	7.50	6.80	6.15	4.36
Edible oils	4.35	3.71	3.13	2.72	1.90
Sugar products	.90	1.07	1.10	1.31	1.68
Coffee	.83	.72	.71	.64	.49
Soft drinks	.05	.11	.15	.24	.36
Alcoholic beverages	.33	.54	.48	.63	1.25
Eating out	7.93	10.45	12.08	12.87	10.46
Home production	.78	.54	.47	.30	.12
Clothing	3.28	4.66	5.71	6.50	8.58
Utilities	.13	.20	.68	1.23	2.53
Housing and equipment	13.19	12.31	12.07	11.78	15.71
Miscellaneous services	10.47	13.56	14.67	15.52	19.10

1/ For the survey year 1969-70 in Saigon, Can Tho, Dalat, Nha Trang and Danang.

Appendix table G-7.2.--Total urban consumer expenditures by household expenditure group, Saigon 1/

Item	Annual expenditures per household $VN				
	Under 100,000	100,000 to 200,000	200,000 to 300,000	300,000 to 400,000	Over 400,000
	(Percent of total expenditures)				
Total expenditure	100.00	100.00	100.00	100.00	100.00
Food	72.28	70.78	67.22	66.64	59.49
Cereals and products	16.60	13.53	11.94	10.13	7.11
Beef	.87	2.08	2.08	2.42	1.98
Pork	9.81	10.75	10.68	10.68	10.01
Other meats	.0	.05	.07	.07	.11
Poultry	.94	1.45	2.58	3.89	4.86
Fish	11.96	10.59	9.52	8.55	6.56
Milk and eggs	3.19	2.80	2.44	2.46	1.96
Fresh fruit	1.38	1.14	1.44	2.11	4.52
Fresh vegetables	9.16	7.34	6.38	5.69	4.29
Edible oils	3.98	3.19	2.62	2.22	1.62
Sugar products	.68	.77	.91	1.40	2.26
Coffee	.47	.55	.61	.48	.51
Soft drinks	.01	.03	.11	.25	.38
Alcoholic beverages	.0	.16	.23	.53	1.89
Eating out	13.23	16.36	15.60	15.60	11.40
Home production	.0	.0	.0	.15	.04
Clothing	2.58	3.49	4.94	6.56	8.83
Utilities	.49	.14	.68	1.15	2.17
Housing and equipment	12.52	11.73	11.51	9.99	13.54
Miscellaneous services	12.13	13.86	15.64	15.67	15.97

1/ For the survey year 1969-70.

Appendix table G-7.3.--Total urban consumer expenditures by household expenditure group, Can Tho 1/

Item	Annual expenditures per household $VN				
	Under 100,000	100,000 to 200,000	200,000 to 300,000	300,000 to 400,000	Over 400,000
	(Percent of total expenditures)				
Total expenditure	100.0	100.0	100.0	100.0	100.0
Food	77.75	73.32	71.19	68.59	58.28
Cereals and products	16.50	16.83	13.56	10.31	9.02
Beef	1.07	.90	.89	1.16	1.12
Pork	10.81	9.78	11.07	11.03	9.07
Other meats	.23	.12	.21	.02	.58
Poultry	1.23	1.30	3.15	4.55	4.35
Fish	18.35	14.79	11.94	11.08	9.36
Milk and eggs	3.08	2.63	2.13	2.34	1.76
Fresh fruit	1.89	2.05	2.47	3.14	3.50
Fresh vegetables	6.91	5.30	4.60	4.50	3.74
Edible oils	4.40	3.66	2.85	2.53	1.96
Sugar products	1.16	1.79	1.85	2.11	1.54
Coffee	.70	.66	.57	.66	.54
Soft drinks	.17	.27	.45	.87	1.21
Alcoholic beverages	.16	.49	.18	.61	1.01
Eating out	10.68	12.41	14.26	13.12	9.25
Home production	.41	.34	1.02	.56	.26
Clothing	1.78	3.14	5.21	6.78	6.31
Utilities	.0	.02	.15	.66	.89
Housing and equipment	11.65	10.97	11.42	10.37	19.50
Miscellaneous services	8.81	12.55	12.02	13.60	15.02

1/ For the survey year 1969-70.

Appendix table G-7.4.--Total urban consumer expenditures by household expenditure group, Dalat 1/

Item	Annual expenditures per household $VN				
	Under 100,000	100,000 to 200,000	200,000 to 300,000	300,000 to 400,000	Over 400,000
	(Percent of total expenditures)				
Total expenditure	100.00	100.00	100.00	100.00	100.00
Food	67.43	64.73	62.33	60.96	39.87
Cereals and products	21.07	17.82	14.93	13.18	7.77
Beef	2.68	2.73	3.03	2.81	1.77
Pork	5.93	7.32	5.99	6.89	4.40
Other meats	.0	.09	.12	.04	.04
Poultry	.92	1.55	1.68	2.13	1.70
Fish	10.79	8.26	6.93	5.66	3.24
Milk and eggs	3.02	3.19	3.30	3.51	2.85
Fresh fruit	1.05	1.61	1.95	2.27	2.03
Fresh vegetables	8.18	7.14	6.46	5.65	3.27
Edible oils	4.38	3.97	3.50	2.93	1.54
Sugar products	1.20	1.19	1.48	1.51	1.33
Coffee	.98	1.09	1.07	1.10	.59
Soft drinks	.0	.07	.11	.09	.12
Alcoholic beverages	.52	1.09	1.27	1.32	1.04
Eating out	3.92	5.73	8.80	11.11	7.90
Home production	2.81	1.90	1.71	.76	.29
Clothing	5.86	7.17	7.60	8.17	5.59
Utilities	.0	.16	.54	1.44	3.71
Housing and equipment	15.34	13.42	12.92	13.11	17.35
Miscellaneous services	11.36	14.52	16.61	16.33	33.47

1/ For the survey year 1969-70.

Appendix table G-7.5.--Total urban consumer expenditures by household expenditure group, Nha Trang 1/

Item	Annual expenditures per household $VN				
	Under 100,000	100,000 to 200,000	200,000 to 300,000	300,000 to 400,000	Over 400,000
	(Percent of total expenditures)				
Total expenditure	100.00	100.00	100.00	100.00	100.00
Food	71.05	68.67	66.29	62.79	47.76
Cereals and products	19.03	15.14	14.07	11.96	7.68
Beef	0.71	1.76	1.65	1.44	1.74
Pork	8.39	8.24	8.33	8.65	6.03
Other meats	.22	.06	.06	.13	.15
Poultry	.0	.30	.75	1.09	1.19
Fish	19.73	17.30	15.20	12.51	8.55
Milk and eggs	1.78	2.48	2.25	2.16	1.59
Fresh fruit	1.54	1.32	1.48	1.60	1.33
Fresh vegetables	11.14	7.87	6.81	6.39	4.77
Edible oils	4.37	3.92	3.52	2.84	2.24
Sugar products	.52	.74	.83	.52	.39
Coffee	.24	.30	.44	.31	.30
Soft drinks	.0	.22	.12	.10	.11
Alcoholic beverages	.0	.66	.49	.59	.62
Eating out	3.38	8.29	9.98	12.09	10.86
Home production	.0	.05	.30	.41	.20
Clothing	4.85	5.48	6.72	5.49	11.28
Utilities	.0	.18	.70	.98	2.50
Housing and equipment	16.72	13.93	13.06	13.69	18.46
Miscellaneous services	7.38	11.74	13.23	17.05	20.00

1/ For the survey year 1969-70.

Appendix table G-7.6.--Total urban consumer expenditures by household expenditure group, Danang 1/

Item	Annual expenditures per household $VN				
	Under 100,000	100,000 to 200,000	200,000 to 300,000	300,000 to 400,000	Over 400,000
	(Percent of total expenditures)				
Total expenditure	100.00	100.00	100.00	100.00	100.00
Food	76.41	69.91	68.18	65.36	54.35
Cereals and products	23.00	15.15	12.99	11.64	9.03
Beef	4.99	4.26	4.15	4.03	3.63
Pork	6.95	5.38	5.59	5.41	4.60
Other meats	.0	.21	.63	.57	.25
Poultry	.55	1.60	2.19	3.20	2.60
Fish	14.75	15.69	13.85	11.62	8.41
Milk and eggs	2.14	2.59	2.47	2.67	2.04
Fresh fruit	1.12	1.81	2.07	2.20	2.36
Fresh vegetables	12.34	10.92	9.30	7.80	5.33
Edible oils	5.05	4.21	3.58	3.39	2.41
Sugar products	.46	.99	.88	1.33	2.18
Coffee	2.44	.96	.91	.85	.60
Soft drinks	.0	.01	.07	.16	.10
Alcoholic beverages	1.54	.34	.39	.36	.66
Eating out	1.07	5.76	9.12	10.12	10.15
Home production	.0	.04	.0	.0	.0
Clothing	1.39	3.57	4.78	5.96	8.23
Utilities	.0	.67	1.11	1.69	4.07
Housing and equipment	10.24	11.29	11.84	12.80	13.76
Miscellaneous services	11.96	14.56	14.09	14.19	19.59

1/ For the survey year 1969-70.

Appendix table G-8.1.--Total urban consumer expenditures by household expenditure group, Vietnam 1/

Item	Annual expenditures per household $VN				
	Under 100,000	100,000 to 200,000	200,000 to 300,000	300,000 to 400,000	Over 400,000
	(1,000 $VN)				
Total expenditure	21,838.65	228,279.94	354,824.80	286,581.53	805,353.00
Food	15,926.30	158,116.80	237,272.20	186,214.60	435,515.60
Cereals and products	4,056.10	35,605.10	46,878.20	32,287.90	62,976.30
Beef	385.40	5,199.90	8,575.80	7,234.90	16,481.20
Pork	1,901.50	19,759.40	30,353.40	24,767.40	61,836.10
Other meats	19.10	210.90	710.70	515.40	1,527.50
Poultry	190.00	2,944.20	7,470.50	8,651.70	27,186.90
Fish	3,192.80	28,350.10	39,575.40	27,913.30	58,158.30
Milk and eggs	622.30	6,370.80	8,955.70	7,440.00	15,868.80
Fresh fruit	312.90	3,472.50	6,304.20	6,170.40	25,443.20
Fresh vegetables	1,934.10	17,110.60	24,135.60	17,634.70	35,128.00
Edible oils	949.40	8,459.30	11,123.10	7,797.60	15,273.30
Sugar products	196.20	2,432.70	3,905.00	3,740.70	13,524.70
Coffee	182.00	1,634.20	2,529.80	1,831.10	3,986.30
Soft drinks	10.70	241.70	517.40	680.40	2,887.80
Alcoholic beverages	71.30	1,241.90	1,699.00	1,805.60	10,045.40
Eating out	1,731.40	23,855.70	42,875.70	36,892.70	84,225.80
Home production	171.10	1,227.80	1,662.70	850.80	966.00
Clothing	715.30	10,648.70	20,255.60	18,616.30	69,065.60
Utilities	28.50	450.30	2,399.90	3,523.50	20,383.60
Housing and equipment	2,881.50	28,100.40	42,833.40	33,759.10	126,542.60
Miscellaneous services	2,287.20	30,964.40	52,054.00	44,467.40	153,844.70

1/ For the survey year 1969-70 in Saigon, Can Tho, Dalat, Nha Trang and Danang.

Appendix table G-8.2.--Total urban consumer expenditures by household expenditure group, Saigon 1/

Item	Annual expenditures per household $VN				
	Under 100,000	100,000 to 200,000	200,000 to 300,000	300,000 to 400,000	Over 400,000
	(1,000 $VN)				
Total expenditure	5,852.95	68,906.44	123,532.00	102,518.73	336,180.20
Food	4,230.60	48,768.70	83,036.10	68,315.70	199,995.90
Cereals and products	971.30	9,323.30	14,748.70	10,383.00	23,898.60
Beef	50.90	1,435.50	2,569.40	2,481.70	6,654.00
Pork	574.40	7,404.20	13,189.50	10,952.80	33,664.90
Other meats	.0	34.80	89.80	73.00	377.70
Poultry	55.30	999.30	3,191.00	3,983.00	16,324.10
Fish	699.90	7,299.90	11,762.90	8,769.80	22,044.70
Milk and eggs	186.60	1,929.40	3,013.80	2,519.60	6,588.90
Fresh fruit	80.80	786.30	1,782.80	2,160.40	15,197.90
Fresh vegetables	536.40	5,056.10	7,875.20	5,833.70	14,414.10
Edible oils	233.10	2,196.00	3,234.60	2,278.40	5,440.70
Sugar products	39.80	527.90	1,120.90	1,432.30	7,592.50
Coffee	27.70	377.60	759.20	496.00	1,724.70
Soft drinks	.30	19.00	136.80	261.00	1,285.70
Alcoholic beverages	.0	109.50	290.00	540.60	6,348.80
Eating out	774.10	11,269.90	19,271.50	15,993.80	38,308.20
Home production	.0	.0	.0	156.60	130.40
Clothing	150.90	2,407.30	6,107.10	6,722.10	29,695.90
Utilities	28.50	93.70	841.60	1,175.10	7,311.60
Housing and equipment	733.00	8,085.90	14,214.40	10,243.30	45,502.70
Miscellaneous services	710.00	9,550.50	19,322.80	16,062.30	53,674.10

1/ For the survey year 1969-70.

Appendix table G-8.3.--Total urban consumer expenditures by household expenditure group, Can Tho 1/

Item	Annual expenditures per household $VN				
	Under 100,000	100,000 to 200,000	200,000 to 300,000	300,000 to 400,000	Over 400,000
	(1,000 $VN)				
Total expenditure	6,043.60	37,896.60	42,357.80	26,635.80	99,332.90
Food	4,699.00	27,785.80	30,155.60	18,269.00	57,894.00
Cereals and products	997.00	6,378.40	5,742.90	2.746.70	8,963.60
Beef	64.70	341.30	377.60	309.10	1,114.10
Pork	653.50	3,704.90	4,690.50	2,937.00	9,010.50
Other meats	13.60	44.80	87.40	4.40	579.70
Poultry	74.40	493.50	1,334.70	1,212.40	4,323.70
Fish	1,109.30	5,605.10	5,059.30	2,950.30	9,293.00
Milk and eggs	186.10	996.90	901.10	622.80	1,751.90
Fresh fruit	114.10	778.20	1,045.10	835.50	3,476.90
Fresh vegetables	417.40	2,008.90	1,948.80	1,197.60	3,719.60
Edible oils	266.00	1,387.00	1,208.10	674.80	1,950.10
Sugar products	70.40	678.80	781.80	563.30	1,525.30
Coffee	42.40	249.80	240.00	175.90	539.00
Soft drinks	10.40	101.30	188.90	232.40	1,201.70
Alcoholic beverages	9.40	184.60	76.40	162.20	1,001.00
Eating out	645.40	4,704.80	6,039.10	3,495.30	9,190.40
Home production	24.90	127.50	433.90	149.30	253.50
Clothing	107.70	1,191.00	2,208.10	1,804.80	6,269.30
Utilities	.0	6.00	64.60	176.70	886.50
Housing and equipment	704.30	4,157.80	4,838.60	2,761.60	19,366.70
Miscellaneous services	532.60	4,757.10	5,091.10	3,623.70	14,915.70

1/ For the survey year 1969-70.

Appendix table G-8.4.--Total urban consumer expenditures by household expenditure group, Dalat 1/

Item	Annual expenditures per household $VN				
	Under 100,000	100,000 to 200,000	200,000 to 300,000	300,000 to 400,000	Over 400,000
	(1,000 $VN)				
Total expenditure	5,205.80	56,394.90	61,240.70	43,130.60	87,392.10
Food	3,510.50	36,505.90	38,171.90	26,290.40	34,846.50
Cereals and products	1,097.00	10,047.60	9,140.40	5,686.20	6,794.00
Beef	139.30	1,541.30	1,853.60	1,211.60	1,544.80
Pork	308.60	4,129.50	3,665.50	2,973.20	3,841.50
Other meats	.0	48.80	74.60	18.20	37.00
Poultry	47.80	872.70	1,026.90	919.90	1,484.70
Fish	561.60	4,660.80	4,242.40	2,442.80	2,835.00
Milk and eggs	157.00	1,797.50	2,022.80	1,512.40	2,490.90
Fresh fruit	54.70	906.30	1,195.90	980.60	1,773.80
Fresh vegetables	425.60	4,024.30	3,957.10	2,435.90	2,855.50
Edible oils	228.00	2,239.50	2,146.10	1,261.90	1,345.40
Sugar products	62.70	673.70	907.20	653.20	1,161.10
Coffee	50.80	615.90	655.20	474.30	516.20
Soft drinks	.0	37.70	69.30	37.10	103.30
Alcoholic beverages	27.20	612.10	775.80	567.40	904.80
Eating out	204.00	3,229.10	5,391.60	4,789.80	6,902.30
Home production	146.20	1,069.10	1,047.50	325.90	256.20
Clothing	305.20	4,044.40	4,652.90	3,521.80	4,887.00
Utilities	.0	88.10	328.70	619.60	3,243.60
Housing and equipment	798.60	7,567.60	7,914.90	5,656.40	15,162.70
Miscellaneous services	591.60	8,188.90	10,172.40	7,042.30	29,252.30

1/ For the survey year 1969-70.

Appendix table G-8.5.--Total urban consumer expenditures by household expenditure group, Nha Trang 1/

Item	Annual expenditures per household $VN				
	Under 100,000	100,000 to 200,000	200,000 to 300,000	300,000 to 400,000	Over 400,000
	(1,000 $VN)				
Total expenditure	2,478.00	35,658.20	60,980.20	53,018.00	162,664.90
Food	1,760.60	24,485.70	40,420.90	33,289.80	77,681.50
Cereals and products	471.50	5,398.90	8,582.10	6,339.70	12,499.10
Beef	17.70	629.10	1,007.00	764.40	2,823.40
Pork	208.00	2,938.60	5,081.80	4,587.50	9,805.30
Other meats	5.50	21.10	36.00	69.90	239.10
Poultry	.0	106.80	454.80	577.00	1,942.30
Fish	489.00	6,168.50	9,271.40	6,631.10	13,912.80
Milk and eggs	44.20	885.20	1,372.90	1,147.20	2,593.60
Fresh fruit	38.10	469.90	900.70	847.20	2,169.20
Fresh vegetables	276.00	2,807.30	4,152.30	3,385.70	7,751.00
Edible oils	108.20	1,399.50	2,146.80	1,503.50	3,644.90
Sugar products	12.80	262.20	508.80	274.30	633.00
Coffee	5.90	107.70	266.40	166.80	491.60
Soft drinks	.0	79.50	75.50	54.00	173.50
Alcoholic beverages	.0	236.00	295.80	313.10	1,005.40
Eating out	83.70	2,957.20	6,087.30	6,409.40	17,671.40
Home production	.0	18.20	181.30	219.00	325.90
Clothing	120.20	1,955.00	4,100.80	2,912.90	18,355.70
Utilities	.0	65.40	426.20	518.30	4,069.10
Housing and equipment	414.40	4,967.20	7,964.30	7,256.00	30,026.10
Miscellaneous services	182.80	4,184.90	8,068.10	9,040.80	32,532.40

1/ For the survey year 1969-70.

Appendix table G-8.6.--Total urban consumer expenditures by household expenditures group. Danang 1/

Item	Annual expenditures per household $VN				
	Under 100,000	100,000 to 200,000	200,000 to 300,000	300,000 to 400,000	Over 400,000
	(1,000 $VN)				
Total expenditure	2,258.30	29,423.80	66,714.10	61,278.40	119,782.90
Food	1,725.60	20,570.70	45,487.70	40,049.70	65,097.70
Cereals and products	519.30	4,456.90	8,664.10	7,132.30	10,821.00
Beef	112.80	1,252.70	2,768.20	2,468.10	4,344.90
Pork	157.00	1,582.20	3,726.10	3,316.90	5,513.90
Other meats	.0	61.40	422.90	349.90	294.00
Poultry	12.50	471.90	1,463.10	1,959.40	3,112.10
Fish	333.00	4,615.80	9,239.40	7,119.30	10,072.80
Milk and eggs	48.40	761.80	1,645.10	1,638.00	2,443.50
Fresh fruit	25.20	531.80	1,379.70	1,346.70	2,825.40
Fresh vegetables	278.70	3,214.00	6,202.20	4,781.80	6,387.80
Edible oils	114.10	1,237.30	2,387.50	2,079.00	2,892.20
Sugar products	10.50	290.10	586.30	817.60	2,612.80
Coffee	55.20	283.20	609.00	518.10	714.80
Soft drinks	.0	4.20	46.90	95.90	123.60
Alcoholic beverages	34.70	99.70	261.00	222.30	785.40
Eating out	24.20	1,694.70	6,086.20	6,204.40	12,153.50
Home production	.0	13.00	0.0	0.0	0.0
Clothing	31.30	1,051.00	3,186.70	3,654.70	9,857.70
Utilities	.0	197.10	738.80	1,033.80	4,872.80
Housing and equipment	231.20	3,321.90	7,901.20	7,841.80	16,484.40
Miscellaneous services	270.20	4,283.00	9,399.60	8,698.30	23,470.20

1/ For the survey year 1969-70.

APPENDIX H.--ECONOMIC PROFILE

Appendix table H-1.--Production, area, and yield, 1964

Region commodity	Unit	South Vietnam	Southern Region West part	Southern Region East part	Central Lowlands	Central Highlands
FOODS						
Cereals						
Rice						
Production ...	M.T.	5,185,030	3,821,560	383,710	910,760	69,000
Area	Ha.	2,561,800	1,778,100	179,600	533,600	69,500
Yield	Kilos/ha.	2,024	2,149	2,136	1,707	993
Corn						
Production ...	M.T.	46,000	11,610	11,100	16,600	6,600
Area	Ha.	37,000	7,690	8,710	16,000	4,600
Yield	Kilos/ha.	1,243	1,510	1,285	1,038	1,435
Fruits						
Pineapple						
Production ...	M.T.	56,985	46,595	1,330	8,250	810
Area	Ha.	8,010	5,080	260	1,710	960
Yield	Kilos/ha.	7,114	9,172	5,115	4,825	844
Bananas						
Production ...	M.T.	236,800	174,720	18,680	40,400	3,000
Area	Ha.	18,140	11,600	2,000	3,830	710
Yield	Kilos/ha.	13,054	15,062	9,340	10,548	4,225
Fruit trees						
Production ...	M.T.	231,750	157,390	51,610	13,590	3,140
Area	Ha.	34,570	21,520	8,190	3,130	1,730
Yield	Kilos/ha.	6,704	7,314	6,302	4,342	1,815
Oilseeds						
Coconuts						
Production ...	M.T.	140,875	113,800	1,175	25,900	---
Area	Ha.	41,580	35,425	585	5,570	---
Yield	Kilos/ha.	3,388	3,212	2,008	4,649	---
Peanuts						
Production ...	M.T.	36,500	2,615	10,985	19,200	3,700
Area	Ha.	35,000	2,575	11,425	17,000	4,000
Yield	Kilos/ha.	1,043	1,016	961	1,129	---
Soybeans						
Production ...	M.T.	4,000	982	2,518	470	30
Area	Ha.	6,050	1,225	4,175	620	30
Yield	Kilos/ha.	661	802	603	758	1,000
Tubers						
Sweet potatoes .						
Production ...	M.T.	301,000	69,330	31,370	156,600	43,700
Area	Ha.	48,000	8,305	4,695	29,000	6,000
Yield	Kilos/ha.	6,271	8,348	6,682	5,400	7,283

Continued--

Appendix table H-1.--Production, area, and yield, 1964--Continued

Region commodity	Unit	South Vietnam	Southern Region West part	Southern Region East part	Central Lowlands	Central Highlands
Tubers						
Manioc						
Production ...	M.T.	288,600	42,590	110,410	120,100	15,500
Area	Ha.	43,000	4,980	9,520	26,000	2,500
Yield	Kilos/ha.	6,712	8,552	11,598	4,619	6,200
Stimulants						
Coffee						
Production ...	M.T.	3,420	---	470	100	2,850
Area	Ha.	11,120	---	3,450	670	7,000
Yield	Kilos/ha.	308	---	136	149	407
Tea						
Production ...	M.T.	5,380	---	100	530	4,750
Area	Ha.	9,650	---	230	2,320	7,100
Yield	Kilos/ha.	558	---	435	228	669
Pulses						
Mungo bean						
Production ...	M.T.	12,000	4,845	2,255	2,500	2,400
Area	Ha.	19,510	8,700	3,300	5,000	2,510
Yield	Kilos/ha.	615	557	683	500	956
Vegetables						
Production ...	M.T.	107,650	50,280	17,820	10,360	29,190
Area	Ha.	8,770	4,790	1,710	650	1,620
Yield	Kilos/ha.	1,227	10,497	10,421	15,938	18,019
Sugarcane						
Production ...	M.T.	1,005,190	406,740	373,150	273,510	1,790
Area	Ha.	33,710	11,390	9,795	12,430	95
Yield	Kilos/ha.	29,819	35,710	38,300	22,004	18,842
Black pepper						
Production ...	M.T.	600	345	215	20	20
Area	Ha.	470	163	247	40	20
Yield	Kilos/ha.	1,277	2,117	870	500	1,000
NONFOODS						
Fibers						
Jute						
Production ...	M.T.	890	890	---	---	---
Area	Ha.	875	875	---	---	---
Yield	Kilos/ha.	1,017	1,017	---	---	---

Continued --

Appendix table H-1.--Production, area, and yield, 1964--Continued

Region commodity	Unit	South Vietnam	Southern Region West part	Southern Region East part	Central Lowlands	Central Highlands
Fibers						
Cotton						
Production ...	M.T.	25	---	---	25	---
Area	Ha.	75	---	---	72	3
Yield	Kilos/ha.	333	---	---	347	---
Kenaf						
Production ...	M.T.	740	40	400	300	---
Area	Ha.	880	50	450	380	---
Yield	Kilos/ha.	841	800	889	789	---
Ramie						
Production ...	M.T.	45	---	10	35	---
Area	Ha.	60	---	10	50	---
Yield	Kilos/ha.	750	---	1,000	700	---
Kapok						
Production ...	M.T.	710	75	30	5	---
Area	Ha.	1,955	1,410	420	120	5
Yield	Kilos/ha.	363	53	71	42	---
Mulberry						
Production ...	M.T.	14,210	5,785	1,265	6,795	365
Area	Ha.	2,040	865	145	955	75
Yield	Kilos/ha.	6,966	6,688	8,724	7,115	4,867
Rubber						
Production ...	M.T.	74,200	---	73,100	130	970
Area	Ha.	134,700	---	117,070	650	16,980
Yield	Kilos/ha.	551	---	624	200	57
Tobacco						
Production ...	M.T.	7,275	1,995	2,290	2,950	40
Area	Ha.	10,275	2,225	2,925	5,075	50
Yield	Kilos/ha.	708	897	783	581	800
Total cultivated area		3,067,240	1,906,968	368,912	664,872	125,488
Total food		2,916,380	1,901,543	247,892	657,570	108,375
Total nonfood		150,860	5,425	121,020	7,302	17,113
Rural population ...	1,000	11,543	5,916	1,480	3,643	504
Per capita cultivated area	Ha.	.266	.322	.249	.182	.249
Per capita crops	Ha.	.253	.321	.167	.180	.215

Appendix table H-2.--Production, area, and yield, 1970

Region Commodity	Unit	South Vietnam	Southern Region West part	Southern Region East part	Central Lowlands	Central Highlands
FOODS						
Cereals						
Rice (Paddy)						
Production ...	M.T.	5,715,500	4,387,000	424,500	845,000	59,000
Area	Ha.	2,510,700	1,853,500	191,500	418,000	47,700
Yield	Kilos/ha.	2,276	2,367	2,217	2,022	1,237
Corn						
Production ...	M.T.	31,435	8,010	6,975	12,175	4,275
Area	Ha.	28,640	7,620	6,005	10,515	4,500
Yield	Kilos/ha.	1,097	1,051	1,161	1,158	950
Fruits						
Pineapple						
Production ...	M.T.	33,325	28,330	1,485	1,765	1,445
Area	Ha.	4,475	3,440	260	545	230
Yield	Kilos/ha.	7,447	8,235	5,712	3,238	6,283
Bananas						
Production ...	M.T.	203,635	156,580	18,180	26,075	2,800
Area	Ha.	19,955	13,050	2,405	3,850	650
Yield	Kilos/ha.	10,205	11,998	7,559	6,773	4,308
Fruit trees						
Production ...	M.T.	235,705	179,200	36,085	18,200	2,220
Area	Ha.	32,920	22,080	6,300	3,020	1,520
Yield	Kilos/ha.	7,159	8,116	5,728	6,026	1,460
Oilseeds						
Coconuts						
Production ...	1,000 nuts	118,450	102,760	1,230	14,460	---
Area	Ha.	32,250	28,235	440	3,575	---
Yield	Nuts/ha.	3,673	3,639	2,795	4,045	---
Peanuts						
Production ...	M.T.	32,185	1,240	13,645	15,800	1,500
Area	Ha.	30,240	1,185	14,360	13,200	1,495
Yield	Kilos/ha.	1,064	1,046	950	1,196	1,003
Soybeans						
Production ...	M.T.	7,455	1,180	5,305	810	160
Area	Ha.	7,050	1,340	4,840	710	160
Yield	Kilos/ha.	1,057	880	1,096	1,141	1,000
Tubers						
Sweet potatoes						
Production ...	M.T.	219,750	61,320	30,910	96,460	31,060
Area	Ha.	32,860	6,190	4,490	19,230	2,950
Yield	Kilos/ha.	6,697	9,906	6,884	5,016	10,529

Continued --

Appendix table H-2.--Production, area, and yield, 1970--Continued

Region commodity	Unit	South Vietnam	Southern Region West part	Southern Region East part	Central Lowlands	Central Highlands
FOODS						
Manioc						
Production ...	M.T.	215,710	32,950	81,935	93,550	7,275
Area	Ha.	30,380	3,075	8,315	17,675	1,315
Yield	Kilos/ha.	7,100	10,715	9,853	5,293	5,532
Stimulants						
Coffee						
Production ...	M.T.	3,925	---	570	---	3,355
Area	Ha.	9,360	---	2,200	100	7,060
Yield	Kilos/ha.	419	---	259	0	475
Tea						
Production ...	M.T.	5,545	---	45	285	5,215
Area	Ha.	8,215	---	105	1,380	6,730
Yield	Kilos/ha.	675	---	428	206	775
Cacao						
Production ...	M.T.	25	25	---	---	---
Area	Ha.	50	50	---	---	---
Yield	Kilos/ha.	500	500	---	---	---
Pulses						
Mungo bean						
Production ...	M.T.	11,095	4,690	2,680	2,795	930
Area	Ha.	16,600	7,170	3,755	4,250	1,425
Yield	Kilos/ha.	668	654	714	657	652
Vegetables						
Production ...	M.T.	217,550	74,800	35,530	34,310	72,910
Area	Ha.	17,850	5,790	3,185	3,655	5,220
Yield	Kilos/ha.	12,835	12,918	11,155	9,387	13,967
Sugarcane						
Production ...	M.T.	335,720	144,650	108,390	80,700	1,980
Area	Ha.	11,620	5,225	3,065	3,170	160
Yield	Kilos/ha.	28,891	27,684	35,363	25,457	12,375
Black pepper						
Production ...	M.T.	410	200	185	10	15
Area	Ha.	340	160	145	15	20
Yield	Kilos/ha.	1,206	1,250	1,276	667	750
NONFOODS						
Fibers						
Jute						
Production ...	M.T.	250	250	---	---	---
Area	Ha.	250	250	---	---	---
Yield	Kilos/ha.	1,000	1,000	---	---	---

Continued --

Appendix table H-2.--Production, area, and yield, 1970--Continued

Region commodity	Unit	South Vietnam	Southern Region West part	Southern Region East part	Central Lowlands	Central Highlands
NONFOODS						
Fibers						
Cotton						
Production ...	M.T.	40	---	---	40	---
Area	Ha.	80	---	---	80	---
Yield	Kilos/ha.	500	---	---	500	---
Kenaf						
Production ...	M.T.	80	---	80	---	---
Area	Ha.	80	---	80	---	---
Yield	Kilos/ha.	1,000	---	1,000	---	---
Ramie						
Production ...	M.T.	5	---	5	---	---
Area	Ha.	5	---	5	---	---
Yield	Kilos/ha.	1,000	---	1,000	---	---
Kapok						
Production ...	M.T.	810	795	15	---	---
Area	Ha.	1,150	1,120	30	---	---
Yield	Kilos/ha.	684	710	500	---	---
Mulberry						
Production ...	M.T.	1,575	1,530	---	---	45
Area	Ha.	340	310	---	---	30
Yield	Kilos/ha.	4,630	4,935	---	---	1,500
Rubber						
Production ...	M.T.	33,000	---	32,730	100	170
Area/exploited	Ha.	39,240	---	38,840	200	200
Yield	Kilos/ha.	841	---	843	500	850
Tobacco						
Production ...	M.T.	8,420	2,970	2,000	3,395	55
Area	Ha.	8,525	2,735	2,205	3,530	55
Yield	Kilos/ha.	987	1,086	907	962	1,000
Total cultivated area	Ha.	2,843,175	1,962,525	292,530	506,700	81,420
Food crops	Ha.	2,793,505	1,958,110	251,370	502,890	81,135
Nonfood crops	Ha.	49,670	4,415	41,160	3,810	285
Rural population ..	1,000	11,659	5,619	1,657	3,741	643
Per capita cultivated area	Ha.	.244	.349	.177	.135	.127
Per capita food crops	Ha.	.240	.348	.152	.134	.126

Appendix table H-3.--Regional value of production, livestock, and crop products, 1964

Commodity	Unit	South Vietnam	Southern Region West part	Southern Region East part	Central Lowlands	Central Highlands
FOODS						
Cereals						
Rice						
Production	M.T.	5,185,030	3,821,560	383,710	910,760	69,000
Price	$VN/100 kg.	388	363	408	489	401
Value	Mil. $VN	20,169	13,872	1,566	4,454	277
Corn						
Production	M.T.	46,000	11,610	11,190	16,600	6,600
Price	$VN/100 kg.	578	600	650	540	500
Value	Mil. $VN	266	70	73	90	33
Fruits						
Pineapple						
Production	M.T.	56,985	46,595	1,330	8,250	810
Price	$VN/100 kg.	260	242	289	323	445
Value	Mil. $VN	148	113	4	27	4
Bananas						
Production	M.T.	236,800	174,720	18,680	40,400	3,000
Price	$VN/100 kg.	305	260	410	435	500
Value	Mil. $VN	722	454	77	176	15
Fruit trees 1/						
Production	M.T.	231,730	157,390	57,610	13,590	3,140
Price	$VN/100 kg.	369	344	400	504	484
Value	Mil. $VN	854	541	230	68	15
Oilseeds						
Coconuts						
Production	1,000 nuts	140,875	113,800	1,175	25,900	---
Price	$VN/100 nuts	455	450	560	470	---
Value	Mil. $VN	641	512	7	122	---
Peanuts						
Production	M.T.	36,500	2,615	10,985	19,200	3,700
Price	$VN/100 kg.	994	1,190	890	1,010	1,090
Value	Mil. $VN	363	31	98	194	40
Soybeans						
Production	M.T.	4,000	982	2,518	470	30
Price	$VN/100 kg.	1,725	1,770	1,680	1,860	1,800
Value	Mil. $VN	69	17	42	9	1
Tubers						
Sweet potatoes						
Production	M.T.	301,000	69,330	31,370	156,600	43,700
Price	$VN/100 kg.	329	300	330	350	300
Value	Mil. $VN	991	208	104	548	131

- Continued -

Appendix table F-3.--Regional value of production, livestock, and crop products, 1964--Continued

Commodity	Unit	South Vietnam	Southern Region West part	Southern Region East part	Central Lowlands	Central Highlands
FOODS						
Tubers - Continued						
Manioc						
Production	M.T.	288,600	42,590	110,410	120,100	15,500
Price	$VN/100 kg.	224	260	200	230	250
Value	Mil. $VN	647	111	221	276	39
Stimulants						
Coffee						
Production	M.T.	3,420	---	470	100	2,850
Price	$VN/100 kg.	9,883	---	7,500	8,890	7,500
Value	Mil. $VN	258	---	35	9	214
Tea						
Production	M.T.	5,380	---	100	530	4,750
Price	$VN/100 kg.	10,631	---	13,960	9,290	10,720
Value	Mil. $VN	572	---	14	49	509
Other						
Mungo Bean						
Production	M.T.	12,000	4,845	2,255	2,500	2,400
Price	$VN/100 kg.	2,242	2,180	2,200	2,200	2,400
Value	Mil. $VN	269	106	50	55	58
Vegetables						
Production	M.T.	107,650	50,280	17,820	10,360	29,190
Price 2/	$VN/100 kg.	812	870	802	787	726
Value	Mil. $VN	874	437	143	82	212
Sugarcane 3/						
Production	M.T.	1,005,190	406,740	373,150	273,510	1,790
Price	$VN/100 kg.	92	121	89	37	160
Value	Mil. $VN	928	492	332	101	3
Black pepper						
Production	M.T.	600	345	215	20	20
Price	$VN/100 kg.	12,167	11,370	12,960	16,790	14,660
Value	Mil. $VN	73	39	28	3	3
Livestock-Poultry-Fish						
Hogs						
Inventory	1,000 head	3,332	1,799	298	1,117	118
Weight factor ..	4/	61.92	61.92	61.92	61.92	61.92
Production	1,000 M.T.	206,317	111,394	18,452	69,165	7,307
Price	$VN/100 kg.	3,179	2,947	3,427	3,339	3,652
Value	Mil. $VN	6,491	3,283	632	2,309	267

- Continued -

Appendix table H-3.--Regional value of production, livestock, and crop products, 1964--Continued

Commodity	Unit	South Vietnam	Southern Region West part	Southern Region East part	Central Lowlands	Central Highlands
FOODS						
Livestock-Poultry-Fish						
Cattle						
Inventory	1,000 head	1,183	379	102	654	48
Weight factor	5/	24.00	24.00	24.00	24.00	24.00
Production	1,000 m.t.	28,392	9,096	2,448	15,696	1,152
Price	$VN/100 kg.	2,380	2,135	2,274	2,624	2,593
Value	Mil. $VN	1,193	194	557	412	30
Buffalo						
Inventory	1,000 head	848	474	104	228	42
Weight factor	6/	30.00	30.00	30.00	30.00	30.00
Production	1,000 m.t.	25,440	14,220	3,120	6,840	1,260
Price	$VN/100 kg.	1,313	1,108	1,427	1,503	2,237
Value	Mil. $VN	334	158	45	103	28
Chickens						
Inventory	1,000	22,015	13,523	2,107	6,200	185
Weight factor	7/	1.50	1.50	1.50	1.50	1.50
Production	1,000 m.t.	33,022	20,284	3,160	9,300	278
Price	$VN/100 kg.	6,398	6,398	6,398	6,398	6,398
Value	Mil. $VN	2,113	1,298	202	595	18
Ducks						
Inventory	1,000	12,992	10,431	1,102	1,442	17
Weight factor	8/	1.68	1.68	1.68	1.68	1.68
Production	1,000 m.t.	21,827	17,524	1,851	2,423	29
Price	$VN/100 kg.	4,161	4,161	4,161	4,161	4,161
Value	Mil. $VN	908	729	77	101	1
Chicken eggs						
Inventory (chickens)	1,000	22,015	13,523	2,107	6,200	185
Factor	Eggs/year	8	8	8	8	8
Production	1,000	176,120	108,184	16,856	49,600	1,480
Price	$VN/100	246	244	279	236	299
Value	Mil. $VN	432	264	47	117	4
Duck eggs						
Inventory (ducks)	1,000	12,992	10,431	1,102	1,442	17
Factor	Eggs/year	14	14	14	14	14
Production	1,000	181,888	146,034	15,428	20,188	238
Price	$VN/100	188	185	196	206	202
Value	Mil. $VN	342	270	30	42	.5
Fish						
Production	M.T.	397,015	152,886	31,314	212,800	15
Price	$VN/100 kg.	1,100	1,400	1,400	900	700
Value	Mil. $VN	4,493	2,140	438	1,915	.1

- Continued -

Appendix table H-3.--Regional value of production, livestock, and crop products, 1964--Continued

Commodity	Unit	South Vietnam	Southern Region West part	Southern Region East part	Central Lowlands	Central Highlands
NONFOODS						
Fibers						
Jute						
Production	M.T.	890	890	---	---	---
Price	$VN/100 kg.	2,300	2,300	---	---	---
Value	Mil. $VN	20	20	---	---	---
Cotton						
Production	M.T.	25	---	---	25	---
Price	$VN/100 kg.	2,992	---	---	2,992	---
Value	Mil. $VN	.7	---	---	.7	---
Kenaf						
Production	M.T.	740	40	400	---	300
Price	$VN/100 kg.	1,200	1,200	1,200	---	1,200
Value	Mil. $VN	10	.5	5	---	4
Kapok						
Production	M.T.	710	675	30	5	---
Price	$VN/100 kg.	1,153	1,153	1,153	1,153	---
Value	Mil. $VN	8	8	.3	.1	---
Rubber						
Production	M.T.	74,200	---	73,100	130	970
Price	$VN/100 kg.	1,525	---	1,525	1,525	1,525
Value	Mil. $VN	1,132	---	1,115	2	15
Tobacco						
Production	M.T.	7,275	1,995	2,290	2,950	40
Price	$VN/100 kg.	6,515	4,000	9,750	5,720	6,270
Value	Mil. $VN	474	80	223	169	2
Charcoal 9/						
Production	M.T.	27,497	1,851	24,587	574	485
Price	$VN/100 kg.	320	462	308	248	332
Value	Mil. $VN	88	9	76	1	2
Lumber 10/						
Production	M^3	303,497	43,665	186,150	60,612	13,069
Price	$VN/$M^3$	219	219	219	219	219
Value	Mil. $VN	66	9	41	13	3

1/ Weighted average at two-thirds lemon, one-third orange price.
2/ Carrots, chinese cabbage, and onion prices, simple average.
3/ One-tenth of sugar price.
4/ For hogs 1.02 turnover times 90 kg. average liveweight equals 91.8.
5/ For cattle .15 turnover times 350 kg. average liveweight equals 52.5.
6/ For buffalo .12 turnover times 450 kg. average liveweight equals 54.0.
7/ For chickens 2.00 turnover times 1.45 kg. average liveweight equals 2.90.
8/ For ducks 1.48 turnover times 2.25 kg. average liveweight equals 3.33.
9/ Charcoal weighted by number of kilns in division between SW and SE.
10/ Lumber weighted by number of sawmills in division between SW and SE.

Appendix table H-4.--Regional value of production, livestock, and crop products, 197(

(Based on 1964 unit value)

Commodity	Unit	South Vietnam	Southern Region West part	Southern Region East part	Central Lowlands	Central Highlands
FOODS						
Cereals						
Rice						
Production ..	M.T.	5,715,500	4,387,000	424,500	845,000	59,000
Price	$VN/100 kg.	385	363	408	489	401
Value	Mil. $VN	22,026	15,925	1,732	4,132	237
Corn						
Production ..	M.T.	31,435	8,010	6,975	12,175	4,275
Price	$VN/100 kg.	573	600	650	540	500
Value	Mil. $VN	180	48	45	66	21
Fruits						
Pineapple						
Production ..	M.T.	33,325	28,330	1,485	1,765	1,745
Price	$VN/100 kg.	261	242	289	323	445
Value	Mil. $VN	87	69	4	6	8
Bananas						
Production ..	M.T.	203,635	156,580	18,180	26,075	2,800
Price	$VN/100 kg.	299	260	410	435	500
Value	Mil. $VN	609	407	75	113	14
Fruit trees 1/						
Production ..	M.T.	235,705	179,200	36,085	18,200	2,220
Price	$VN/100 kg.	366	344	400	504	484
Value	Mil. $VN	863	616	144	92	11
Oilseeds						
Coconuts						
Production ..	1,000 nuts	118,450	102,760	1,230	14,460	---
Price	$VN/100 kg.	453	450	560	470	---
Value	Mil. $VN	537	462	7	68	---
Peanuts						
Production ..	M.T.	32,185	1,240	13,645	15,800	1,500
Price	$VN/100 kg.	969	1,190	890	1,010	1,090
Value	Mil. $VN	312	15	121	160	16
Soybeans						
Production ..	M.T.	7,455	1,180	5,305	810	160
Price	$VN/100 kg.	1,717	1,770	1,680	1,860	1,800
Value	Mil. $VN	128	21	89	15	3
Tubers						
Sweet potatoes						
Production ..	M.T.	219,750	61,320	30,910	96,460	31,060
Price	$VN/100 kg.	326	300	330	350	300
Value	Mil. $VN	717	184	102	338	93

- Continued -

Appendix table H-4.--Regional value of production, livestock, and crop products, 1970--Continued

(Based on 1964 unit value)

Commodity	Unit	South Vietnam	Southern Region West part	Southern Region East part	Central Lowlands	Central Highlands
FOODS						
Tubers - Continued						
Manioc						
Production	M.T.	215,710	32,950	81,935	93,550	7,275
Price	$VN/100 kg.	224	260	200	230	250
Value	Mil. $VN	483	86	164	215	18
Stimulants						
Coffee						
Production	M.T.	3,925	---	570	---	3,355
Price	$VN/100 kg.	7,516	---	7,500	---	7,500
Value	Mil. $VN	295	---	43	---	252
Tea						
Production	M.T.	5,545	---	45	285	5,215
Price	$VN/100 kg.	10,658	---	13,960	9,290	10,720
Value	Mil. $VN	591	---	6	26	559
Other						
Mungo bean						
Production	M.T.	11,095	4,690	2,680	2,795	930
Price	$VN/100 kg.	2,199	2,180	2,200	2,200	2,400
Value	Mil. $VN	244	102	59	61	22
Vegetables						
Production	M.T.	217,550	74,800	35,530	34,310	72,910
Price 2/	$VN/100 kg.	798	870	802	787	726
Value	Mil. $VN	1,735	651	285	270	529
Sugarcane 3/						
Production	M.T.	335,720	144,650	108,390	80,700	1,980
Price	$VN/100 kg.	91	121	89	37	160
Value	Mil. $VN	304	175	96	30	3
Black pepper						
Production	M.T.	410	200	185	10	15
Price	$VN/100 kg.	12,927	11,370	12,960	16,790	14,660
Value	Mil. $VN	53	25	24	2	2
Livestock-Poultry-Fish						
Hogs						
Inventory	1,000 head	3,772	2,124	562	971	114
Weight factor	4/	64.24	64.24	64.24	64.24	64.24
Production	1,000 m.t.	242,313	136,446	36,103	62,377	7,323
Price	$VN/100 kg.	3,185	2,947	3,427	3,339	3,652
Value	Mil. $VN	7,608	4,021	1,237	2,083	267

- Continued -

Appendix table H-4.--Regional value of production, livestock, and crop products, 1970--Continued

(Based on 1964 unit value)

Commodity	Unit	South Vietnam	Southern Region West part	Southern Region East part	Central Lowlands	Central Highlands
FOODS						
Livestock-Poultry-Fish						
Cattle						
Inventory	1,000 head	940	291	108	489	52
Weight factor	5/	28.00	28.00	28.00	28.00	28.00
Production	1,000 m.t.	26,320	8,148	3,024	13,692	1,456
Price	$VN/100kg.	2,432	2,135	2,274	2,624	2,593
Value	Mil. $VN	640	174	69	359	38
Buffalo						
Inventory	1,000 head	627	314	116	168	29
Weight factor	6/	33.00	33.00	33.00	33.00	33.00
Production	1,000 m.t.	20,691	10,362	3,828	5,544	957
Price	$VN/100 kg.	1,624	1,708	1,427	1,503	2,237
Value	Mil. $VN	336	177	55	83	21
Chickens						
Inventory	1,000	20,048	12,654	3,015	3,998	381
Weight factor	7/	2.66	2.66	2.66	2.66	2.66
Production	1,000 m.t.	53,328	33,660	8,020	10,635	1,013
Price	$VN/100 kg.	6,398	6,398	6,398	6,398	6,398
Value	Mil. $VN	3,412	2,154	513	680	65
Ducks						
Inventory	1,000	14,102	10,947	1,586	1,540	29
Weight factor	8/	2.25	2.25	2.25	2.25	2.25
Production	1,000 m.t.	31,730	24,631	3,568	3,465	65
Price	$VN/100 kg.	4,161	4,161	4,161	4,161	4,161
Value	Mil. $VN	1,320	1,025	148	144	3
Chicken eggs						
Inventory (chickens)	1,000	20,048	12,654	3,015	3,998	381
Factor	Eggs/year	12	12	12	12	12
Production	1,000	240,576	151,848	36,180	47,976	4,572
Price	$VN/100	249	244	279	236	299
Value	Mil. $VN	598	370	101	113	14
Duck eggs						
Inventory(ducks)	1,000	14,102	10,947	1,586	1,540	29
Factor	Eggs/year	16	16	16	16	16
Production	1,000	225,632	175,152	25,376	24,640	464
Price	$VN/100	189	185	196	206	202
Value	Mil. $VN	426	324	50	51	1
Fish						
Production	M.T.	577,450	296,344	107,558	173,548	---
Price	$VN/100 kg.	1,250	1,400	1,400	900	---
Value	Mil. $VN	7,217	4,149	1,506	1,562	---

- Continued -

Appendix table H-4.--Regional value of production, livestock, and crop products, 1970--Continued

(Based on 1964 unit value)

Commodity	Unit	South Vietnam	Southern Region West part	Southern Region East part	Central Lowlands	Central Highlands
NONFOODS						
Fibers						
Jute						
Production	M.T.	250	250	---	---	---
Price	$VN/100 kg.	2,300	2,300	---	---	---
Value	Mil. $VN	6	6	---	---	---
Cotton						
Production	M.T.	40	---	---	40	---
Price	$VN/100 kg.	2,992	---	---	2,992	---
Value	Mil. $VN	1	---	---	1	---
Kenaf						
Production	M.T.	80	---	80	---	---
Price	$VN/100 kg.	1,200	---	1,200	---	---
Value	Mil. $VN	1	---	1	---	---
Kapok						
Production	M.T.	810	795	15	---	---
Price	$VN/100 kg.	1,153	1,153	1,153	---	---
Value	Mil. $VN	9	9	---	---	---
Rubber						
Production	M.T.	33,000	---	32,730	100	170
Price	$VN/100 kg.	1,529	---	1,525	1,525	1,525
Value	Mil. $VN	504	---	499	2	3
Tobacco						
Production	M.T.	8,420	2,970	2,000	3,395	55
Price	$VN/100 kg.	6,069	4,000	9,750	5,720	6,270
Value	Mil. $VN	511	119	195	194	3
Charcoal 9/						
Production	M.T.	5,840	229	4,364	795	482
Price	$VN/100 kg.	308	462	308	248	332
Value	Mil. $VN	18	1	13	2	2
Lumber 10/						
Production	M^3	405,528	78,394	160,375	6,587	160,171
Price	$VN/$M^3$	219	219	219	219	219
Value	Mil. $VN	89	17	36	1	35

1/ Weighted average at two-thirds lemon, one-third orange price.
2/ Carrots, chinese cabbage, and onion prices, simple average.
3/ One-tenth of sugar price
4/ For hogs 1.02 turnover times 90 kg. average liveweight equals 91.8
5/ For cattle .15 turnover times 350 kg. average liveweight equals 52.5
6/ For buffalo .12 turnover times 450 kg. average liveweight equals 54.0
7/ For chickens 2.00 turnover times 1.45 kg. average liveweight equals 2.90
8/ For ducks 1.48 turnover times 2.25 kg. average liveweight equals 3.33
9/ Charcoal weighted by number of kilns in division between SW and SE.
10/ Lumber weighted by number of sawmills in division between SW and SE.

Appendix table H-5.--Supply and use of agricultural products, Vietnam, 1970 1/

Item	Supply			Utilization				
					Domestic use			
	Production	Imports	Total	Exports	Total	Food	Feed	Processing and manufacturing
	M.T.							
Fiber								
Jute	250	---	250	---	250	---	---	250
Jute yarn	---	2	2	---	2	---	---	2
Cotton	40	25,797	25,837	---	25,837	---	---	25,837
Kenaf	80	---	80	---	80	---	---	80
Ramie	5	---	5	---	5	---	---	5
Kapok	810	---	810	---	810	---	---	810
Other imports								
Synthetics, non-retail yarn equivalent 4/	---	5,625	5,625	---	5,625	---	---	5,625
Regenerated fibers, non-retail yarn equivalent 4/	---	4,766	4,766	---	4,766	---	---	4,766
Cotton, unbleached yarn equivalent 4/	---	4,215	4,215	---	4,215	---	---	4,215

- Continued -

Appendix table H-5.--Supply and use of agricultural products, Vietnam, 1970 1/--Continued

Item	Supply			Utilization				
					Domestic use			
	Production	Imports	Total	Exports	Total	Food	Feed	Processing and manufacturing
	M.T.							
Oilseeds								
Coconuts	98,708	---	98,708	---	24,677	24,677	---	74,031
Copra	14,500	1,550	16,050	---	---	---	---	16,050
Copra cake (by-product)	7,250	4,068	11,318	---	---	---	11,318	---
Coconut oil	7,250	---	7,250	---	---	7,250	---	---
Peanuts	32,185	---	32,185	---	---	24,485	---	8,700
Peanut oil	2,900	---	2,900	---	---	2,900	---	---
Soybean	7,455	---	7,455	---	7,455	7,455	---	---
Soybean meal	---	6,456	6,456	---	---	---	6,456	---
Sesame	235	---	235	---	235	235	---	---
Other imports								
Refined vegetable oil and refined oil equivalent of other oil imports 4/	---	15,079	15,079	---	15,079	15,079	---	---

- Continued -

Appendix table H-5.--Supply and use of agricultural products, Vietnam, 1970 1/--Continued

Beginning stocks	Supply			Utilization				
					Domestic use			
	Production	Imports	Total	Exports	Total	Food	Feed	Processing and manufact.
	M.T.							
Livestock, livestock products, fish:								
Pork (liveweight)	242,214	---	242,214	---	242,214	242,214	---	---
Cattle meat (liveweight)	26,400	---	26,400	---	26,400	26,400	---	---
Bones	110	---	110	110	---	---	---	---
Buffalo (liveweight)	20,700	---	20,700	---	20,700	20,700	---	---
Chicken (liveweight)	55,459	---	55,459	---	55,459	55,459	---	---
Duck (liveweight)	31,730	---	31,730	---	31,730	31,730	---	---
Feathers	310	---	310	310	---	---	---	---
Chicken eggs	11,788	---	11,788	---	11,788	11,788	---	---
Duck eggs	15,343	---	15,343	---	15,343	15,343	---	---
Fish	577,450	1,416	578,866	---	578,866	411,141	---	167,725
Prepared fish								
Dried and salted	13/62,413	1,441	63,854	10	63,844	63,844	---	---
Nuoc mam	14/123,107	---	123,107	---	123,107	123,107	---	---
Other imports								
Prepared meat 15/	---	6,061	6,061	---	6,061	6,061	---	---
Dairy products	---	---	---	---	---	---	---	---
Whole milk equiv. 4/	---	200,426	200,426	---	200,426	200,426	---	---

- Continued -

Appendix table H-5.--Supply and use of agricultural products, Vietnam, 1970 1/--Continued

Item	Supply					Utilization						
						Domestic use						
	Beginning stocks	Production	Imports	Total	Exports	Total	Food	Feed	Waste	Seed	Processing and manufact.	Ending stocks
	1,000 M.T.											
Grains												
Paddy	---	5,115.0	---	5,115.0	---	1,498.0	---	1,142.0	256.0	100.0	3,617.0	---
Rice	11.9	2,351.0	559.1	2,992.0	---	2,852.0	2,852.0	---	---	---	2/ .005	70.0
Rice paper	---	.005	---	.005	.005	---	---	---	---	---	---	---
Brokens and bran (by-product)	---	614.0	---	614.0	---	614.0	---	614.0	---	---	---	---
Corn (food)	---	31.4	---	31.4	---	31.4	31.4	---	---	---	---	---
Other food grain												
Imports	---	---	---	---	---	---	---	---	---	---	---	---
Wheat and wheat	---	---	---	---	---	---	---	---	---	---	---	---
Flour equivalent 3/	---	---	250.5	250.5	---	250.5	250.5	---	---	---	---	---
Cereal groats, meat and other cereal flour	---	---	16.9	16.9	---	16.9	16.9	---	---	---	---	---
Buckwheat and millet	---	---	.03	.03	---	.03	.03	---	---	---	---	---
Rye	---	---	.01	.01	---	.01	.01	---	---	---	---	---
Grain imports for feed and manufacture												
Corn (feed)	---	---	116.6	116.6	---	116.6	---	116.6	---	---	---	---
Barley	---	---	6.5	6.45	---	6.45	---	---	---	---	6.5	---
Malt											8.9	
Brewers grains (by-products)	---	---	---	---	---	---	---	5.0	---	---	---	---
Wheat Bran (by-product of imported wheat when processed)	---	---	---	---	---	---	---	18.0	---	---	---	---

- Continued

Appendix table H-5.--Supply and use of agricultural products, Vietnam, 1970 1/--Continued

Item	Supply			Utilization			
	Production	Imports	Total	Exports	Domestic use		
					Total	Food	Feed
	M.T.						
Tubers and Pulses							
Yam beans	6,220	---	6,220	---	6,220	6,220	---
Sweet potatoes	219,750	3	219,753	---	219,753	197,778	5/21,975
Cassava	215,710	---	---	---	215,710	172,568	6/43,142
Potatoes	4,000	---	4,000	---	4,000	4,000	---
Mungo beans	11,095	---	11,095	---	11,095	11,095	---
Fruits and Vegetables							
Pineapple	33,325	---	33,325	---	33,325	33,325	---
Bananas	203,635	---	203,635	---	203,635	203,635	---
Tree fruits, tropical	235,705	627	236,332	1	236,332	236,332	---
Vegetables	217,550	9	217,559	10	217,549	217,549	---
Other Imports							
Fresh fruit and fresh fruit equivalent of all fruit and nut imports 4/	---	5,514	5,514	---	5,514	5,514	---
Canned vegetables and canned vegetable equivalent of all preserved vegetable imports 4/ 7/	---	402	402	---	402	402	---

- Continued -

Appendix table H-5.--Supply and use of agricultural products, Vietnam, 1970 1/--Continued

Item	Supply			Utilization			
					Domestic use		
	Production	Imports	Total	Exports	Total	Food	Processing & manufacturing
	M.T.						
Stimulants, Condiment, Spice							
Coffee	3,925	---	3,925	---	3,925	3,925	---
Tea	5,545	---	5,545	108	5,436	5,436	---
Cacao bean	25	---	25	---	---	---	25
Cocoa powder 8/	21	24	45	---	23	23	22
Cocoa butter 9/	---	1	1	---	1	1	---
Chocolate food prep. 10/	33	4	37	10	27	27	---
Black pepper	410	---	410	---	410	410	---
Sugar cane	335,270	---	335,720	---	335,720	271,720	64,000
Sugar	5,000	102,311	107,311	---	107,311	107,311	---
Other Imports							
Seasonings, mixed equiv. 4/	---	158	158	---	158	158	---
Sugars, mixed, confectionary equiv.	---	226	226	---	226	226	---
Forest Products							
Lumber 11/	243,316	36	243,316	---	243,316	---	243,316
Charcoal	5,840	---	5,840	---	5,840	---	5,840
Fuel wood 11/	101,098	---	101,078	---	101,078	---	101,078
Rattan (stalk)	917,000	---	917,000	---	917,000	---	917,000
Strips for plaiting	---	550	550	40	510	---	510
Bamboo 11/	45,652	---	45,652	---	45,652	---	45,652
Pine resin	56	34	90	---	90	---	90
Resin of chai	429	---	---	---	429	---	429
Cinnamon	122	8	130	59	71	71	
Water palm (leaves)	370,000	---	370,000	---	370,000	---	370,000
Rattan (leaves)	475,000	---	475,000	---	475,000	---	475,000
Other Forest Products Imports							
Other wood imports 12/	---	6,366	6,366	---	6,366	---	6,366
Other resin imports	---	49	49	---	49	---	49

- Continued -

Appendix table H-5.--Supply and use of agricultural products, Vietnam, 1970--Continued

Item	Supply				Utilization					
						Domestic use				
	Beginning stocks	Production	Imports	Total	Exports	Total	Food	Feed	Processing and manufacturing	Ending stocks
Industrial Products Nonfood										
Tobacco	---	8,420	2,762	11,182	---	11,182	---	---	11,182	---
Cigarettes	---	11,182	7	11,189	---	11,189	---	---	11,189	---
Rubber	4,310	33,000	2	37,312	23,601	10,109	---	---	10,109	3,602
Unvulcanized sheets and plates	---	---	25	25	---	25	---	---	25	---
Unvulcanized Other forms	---	---	13	13	---	13	---	---	13	---
Vulcanized thread and cord	---	---	8	8	---	8	---	---	8	---
Vulcanized strip sheets	---	---	2	2	---	2	---	---	2	---
Vulcanized piping and tubing	---	---	40	40	---	40	---	---	40	---
Synthetic	---	---	287	287	---	287	---	---	287	---

- Continued -

Appendix table H-5.--Supply and use of agricultural products, Vietnam, 1970--Continued

1/ Quantities shown in product weight.
2/ Rice paper for export, total rice paper production unknown.
3/ Flour converted to wheat at 1.37 rate.
4/ Value weighted.
5/ 10 percent estimate.
6/ 20 percent estimate.
7/ Fresh vegetable imports had a high unit value--could not be used as weight.
8/ 1.18 m.t. cacao bean per m.t.
9/ 1.33 m.t. cacao bean per m.t.
10/ .70 m.t. cacao bean per m.t.
11/ Converted from M^3 and stere using 1 cubic meter and 1 stere = .6 m.t.
12/ From Agricultural Statistical Yearbook, 1970, page 18.
13/ 1 m.t. prepared fish from 1.6 m.t. fresh fish.
14/ 1 m.t. nuoc mam using 167 kg. of fish.
15/ Butter converted at 21.7 rate, cheese at 7.6.

APPENDIX I.--COMPUTER PROGRAMS

An important facet in carrying out the objectives of this study was to insure the use of an electronic computer as the principal computational tool. Plans were formulated to get a number of computer programs operational at Saigon data processing installations; namely, the USAID and MACV computer centers. Certain computer programs were basic to the development of the Vietnam analytical framework. These programs primarily involve such statistical and econometric techniques as multiple regression analysis, seasonal variation analysis, index number construction, and model estimation. These are described briefly in this Appendix.

The BLS Least Squares Program

In "fitting" an equation, the analyst seeks to determine how closely the variation of a set of predetermined or known variables in an equation tracks or "explains" the variation in the dependent variable. This, of course, relates to the importance or "significance" of factors that have been selected as the independent set. A number of statistical measures aid in this type of examination.

The BLS Least Squares Program derives such statistics. This general purpose computer program for multiple linear regression utilizes the least squares technique. It calculates the structural parameters of an equation as well as other summary statistics for analyzing the implications of that equation and for testing hypotheses about its precision.

The program, developed at the U.S. Bureau of Labor Statistics, accepts up to 30 variables and as many observations as can be stored on one reel of magnetic tape. However, a maximum of only 20 variables can be used in any one equation. The program allows the user to select for estimation any relationships from among the 30 variables. Any variable can be designated as dependent and any set of variables as the predetermined set. For greatest processing efficiency, the user should collect all relevant variables of a study into one data set. He may then formulate as many combinations of explanatory variables as he needs to represent equations that will test his hypotheses.

Options for transforming input data also are available within the 30-variable limitation. These include such transformations as computing the powers, reciprocals, logarithms, first differences, or lags of variables, as well as the sums, differences, products, and ratios of any two variables.

Output from the program can be divided into four categories of summary statistics.

A. Statistics for assessing interrelationships among the variables.

   1. Arithmetic means
   2. Cross-product matrix

3. Simple correlation coefficients
4. Standard deviations

B. Statistics for testing the statistical significance and implications of an equation.

1. Regression and beta coefficients
2. Standard errors of the regression coefficients
3. Partial correlation coefficients
4. T-values for regression coefficients
5. F-statistic for testing the significance of all coefficients
6. Standard error of estimate
7. Elasticities
8. R^2 uncorrected and corrected for the degrees of freedom
9. Durbin-Watson statistic

C. Error vectors for observing the stability of the computations.

D. Statistics for examining the results of the equation.

1. Tables of observed and calculated Y's and their residuals
2. Total sum of squares
3. Regression sum of squares
4. Error sum of squares
5. Sum of residuals
6. Plot of residuals standardized by the standard error of estimate

The BLS Polynomial Distributed Lag Regression Program

In examining economic relationships, it frequently is desirable to obtain parameter estimates for equations that contain current and successive lagged values for one or more variables. Such equation specifications describe distributed lag relationships. The BLS Polynomial Distributed Lag Regression Program is a general purpose computer program designed to compute the parameters of such relationships.

In general, a distributed lag relationship is one in which the effects of certain known variables on the dependent variables are said to be distributed over time and last for a number of time periods. If the length of the lag is large, say three periods or more, it becomes difficult to estimate due to the multicollinearity among the lagged values of the predetermined variables. A number of methods have been proposed to circumvent this problem. One of the most popular is attributed to Almon 1/ and modified by Tinsley 2/. This

1/ Almon, Shirley. "The Distributed Lag Between Capital Appropriations and Expenditures," Econometrica, pp. 178-196, January 1965.

2/ Tinsley, P.A. "An Application of Variable Weight Distributed Lags," Journal of the American Statistical Association, Vol. 62, pp. 1277-1289, 1967.

program developed at the U.S. Bureau of Labor Statistics permits the measurement of a mathematical curve used to compute weights for the lagged periods under consideration.

A data set of 20 variables with 100 observations is the maximum size that can be accommodated by the distributed lag program. This variable count includes variables constructed by the program to satisfy the degree of the polynomial specified by the user. The number of observations are adjusted internally to allow for a specified length of lag.

Output from the program generally is similar to that produced by the BLS Least Squares Program described above. Such basic statistics as the means, standard deviations, and correlations are derived for all variables in the data set. Raw data initially read by the computer are displayed along with the internally-constructed data.

For each equation, a section of output displays regression coefficients, standard errors, t-values, partial correlation coefficients, elasticities, etc. This represents the solution of the polynomial for the adjusted data series. A second section displays similar statistical measures for lagged variables alone that can be associated with the unadjusted data series. Regression coefficients presented in this section are interpreted as the weights associated with each lagged variable. Another section of output shows the sum of the weights used in normalizing the weights for each lagged variable.

The X-11 Seasonal Adjustment Program

Early in a study, a researcher may desire to investigate the existence and manner of repetitive patterns of a time series. The X-11 Seasonal Adjustment Program developed at the U.S. Bureau of the Census performs this type of analysis. Two versions are operational, one to handle monthly data series and a second to handle quarterly data.

An underlying assumption of this procedure is that the original time series consists of seasonal, trend-cycle, and irregular components. The seasonal component is the intra-year pattern of change that repeats from year to year; trend-cycle is a measure of long-term movements in the series; and the irregular component is a measure of random fluctuations due to sudden and unusual events such as strikes or unseasonable weather conditions. Census experience has indicated that these components are related in a multiplicative fashion for most national economic series. The program's primary objective is to isolate the seasonal component and remove its effects from the original data series.

The ratio to moving average method is the basis for the Census procedure. This computation consists of developing a moving average to smooth the time series and derive a preliminary estimate of trend-cycle. Ratios of the original series to trend-cycle estimates produce preliminary estimates of seasonal factors. The X-11 program makes several iterations with successive estimates of the components to improve its estimation of extreme values. After extremes

have been identified and adjusted, final estimates of the seasonal, trend-cycle, and irregular components are produced along with the seasonally-adjusted series. This information is summarized and printed in tabular form.

Monthly (or quarterly) time series can begin and end at any point in the year, but there must be at least 3 and not more than 30 years of data. Information on input and output requirements are given in a U.S. Census publication, Technical Paper No. 15, "X-11 Variant of the Census Method II Seasonal Adjustment Program," revised February, 1967. Computational steps are detailed and sample output is shown in this publication.

The Weighted Index Construction Program

Another computer program computes weighted indexes using the conventional formulas for deriving Laspeyres, Paasch, and Fisher's Ideal indexes. For a price index, where quantities are fixed as weights, basic formulas are (where P=price, Q=quantity, and base year is indicated by the o-subscript and a current year by the i-subscript):

Laspeyres: P_iQ_o/P_oQ_o

Paasch : P_iQ_i/P_oQ_i

For quantity indexes, where prices are fixed as weights, the formulas are:

Laspeyres: P_oQ_i/P_oQ_o

Paasch : P_iQ_i/P_iQ_o

Fisher's Ideal Index, in either case, is the square root of the product of the Laspeyres and Paasch indexes.

This program currently is limited to 20 years of data. Varying combinations of as many as 50 commodities may be processed for successive subgroups of commodities. The user may derive indexes for one or more components by specifying the appropriate control information.

Each subgroup of the data set is identified and value aggregates (PQs) are presented in a table along with price and quantity indexes for each year of the time series.

The Vietnam Econometric Model Program

This computer program has been tailored specifically to derive estimates for a multi-equation system that attempts to quantify supply-demand relationships for principal Vietnamese agricultural commodities and incorporate them into the country's system of national accounts. The basis for solution is the Gauss-Seidel technique, a useful iterative procedure for deriving the equilibrium solution for a set of linear and nonlinear equations. Systems of

equations may be solved also by matrix inversion or by substitution methods. However, such methods are not as practical for large-scale models. In the Gauss-Seidel procedure, an initial approximation to the solution is entered and a first set of estimates is derived. These preliminary results are substituted in the next iteration. The process continues until differences in successive approximations for all unknown variables are within some pre-set tolerance--in this program, .0002. When this criterion is met, the system is solved.

The three primary sectors of the Vietnam model investigated were rice-pork-fish, rubber, and national accounts. Each sector was tested separately to insure convergence in a base year of their respective sets of equations. When this proved successful, equations for all sectors were merged into one system. The final system contains 48 equations, 48 variables endogenous to the system, and 68 predetermined variables that can be assumed generated by forces outside the system. The test for convergence was repeated for the full system and, after it was satisfied, a time path of estimates for the historical period was computed.

Once convergence is attained, the program can be used for projection purposes. Projections are derived simply by entering actual data for a starting year together with estimates of successive sets of predetermined data to cover the desired time period.

Another option provides for modifying a specific known variable and calculating the impact of that change on the entire system. To do this, results from two rounds of computations--before and after the selected variable is changed--are held internally and differences computed for each endogenous variable in the system. These differences provide approximations of short- and long-run impacts resulting from the change.

The program has a subroutine identified as CEN that contains the estimating equations of the system. References to the variable names as DEN(I), DEX(I), and CONAD(I) are program coding devices for activating or adjusting portions of an equation to agree with changing assumptions. DEN and DEX references appearing in several equations are 0/1 devices that permit a given equation either to take a number assigned to it as a predetermined variable or to maintain its computed value. Generally, an equation's solved value is used by the system. In such cases, therefore, DEN would be assigned a "1"; DEX for the same equations would assume a value of "0." If it were desired to enter some predetermined value for the equation (for example, holding the price of rice constant over a projection period), DEX would have a value of "1" and be associated with the predetermined value for that equation and DEN would assume a value of "0." CONAD is used to adjust the level or constant term of an equation.

Within subroutine CEN, endogenous variables in the equation are identified as follows:

YO(I) = i^{th} endogenous variable in the starting year

Y1(I) = i^{th} endogenous variable lagged 1 year

Y2(I) = i^{th} endogenous variable lagged 2 years

etc.

Similarly,

XO(I) = i^{th} predetermined variable in the starting year

X1(I) = i^{th} predetermined variable lagged 1 year

X2(I) = i^{th} predetermined variable lagged 2 years

etc.