

APPENDIX R

ABSTRACTS FOR PH.D. DISSERTATIONS

ABSTRACT
THE EFFECTS OF IMPORT RESTRICTION ON
JAPANESE AGRICULTURAL PRODUCTION

By

Susumu Hondai

Because its balance of payments surplus grew, the Japanese government changed its import policies and removed import quotas on 25 of 49 imported agricultural products. But the Japanese farmers, the farmers' cooperatives and the agricultural economists strongly opposed the removal of these import quotas. They also wanted to keep the quotas that remained on the 24 other agricultural products and argued that the removal of any additional quotas would destroy Japanese agriculture.

Many economists believe that import quotas on agricultural products protect domestic farmers from foreign competition. But in this thesis, we questioned this belief and we hypothesized that some import quotas may adversely affect farmers. To find out how strong import quotas protect agricultural products, we investigated the mechanism of import restrictions and used the Cobb-Douglas production function to estimate the degree of protection on the Japanese wheat, pork, beef and dairy products. We used 1970 data compiled by the Japanese Ministry of Agriculture

and Forestry. We then estimated the production changes caused by the changes in import policy for four products--beef, milk, pork and wheat.

Our results showed that the difference between nominal and effective protection rates originates from (1) smaller duties on imported inputs and (2) the substitution of imported inputs for nontraded inputs of production. Since three of the above four agricultural products used imported inputs which have protection rates smaller than those of the three products, the effective protection rates on the three products were therefore significantly higher than the nominal protection rates. Also, production of the products with a high effective rate expanded faster than the one with a low effective rate. This fact showed that production resources moved from the product with a low effective rate of protection to the product with a high effective rate. Moreover, due to large utilization of imported inputs, the supply elasticity of the products is rather large. The investigation of the effects of tariff reductions on the domestic production showed that a small decline in import protection on pork may reduce production drastically.

Next, using a simultaneous market equilibrium model, we empirically tested the effects of the import quotas on an oligopolistic market, the Japanese dairy market, and a competitive market, the Japanese beef market. The results of simultaneous market models showed that an import quota

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on an oligopolistic market at the processing level does not protect farmers, but it does protect the oligopolistic processors. So if the Japanese government wants to attain higher economic efficiency and growth, it should remove some of the import quotas on its agricultural products.

ABSTRACT

SYSTEMS ANALYSIS AND SIMULATION STUDY OF NIGERIAN FORESTRY SECTOR: WOOD CONSUMPTION COMPONENT

By

Felix Izu Nweke

The current high world market prices for petroleum products and high rate of drilling for petroleum in Nigeria have generated rates of growth of income higher than anyone could have predicted a few years ago. The governments of Nigeria are investing this income in the education, agriculture, transportation, health, etc. sectors. These changes, if sustained, will result in an increased pace of modernization which will have important consequences for wood consumption.

The various Nigerian governments and other public bodies who own forest lands are currently investing heavily in forest plantations in their attempts to convert some of the natural forest reserves into forest plantations. It does not seem likely that forest land can be extended beyond the present forest reserves because of increasing demand for land from other sectors particularly agriculture, industrialization, urbanization, modern road construction, etc. Under such circumstances the supply of forest products can be increased only by intensive methods.

An insight into the future markets for the products is needed for decisions about heavy investments in forestry industries which

mature with long time lags. Such an insight involves descriptive knowledge of the time paths of wood consumption in the presence of rapidly changing income and government actions. Some of the objectives of this study were to formulate a generalized simulation model of the wood consumption component of the Nigerian forestry sector which can always be updated and used to estimate the annual consumption of wood products; to track annual consumption of wood products for Nigeria in the past from 1965 to 1974 and to project the same into the future from 1975 to 1990; and, to help provide a basis for prescribing actions which would lead to the attainment of the forestry sector objectives of providing the needs of the country in timber and other objectives. This thesis will hopefully contribute both descriptive knowledge for public and private investment decisions in the forestry sector as well as analytical tools that may subsequently be employed in prescriptive and predictive analysis.

The model of the entire forestry sector is specified in a general form but not formulated in detail. The model of the wood consumption component is formulated in detail and used to make projections of annual wood consumption from 1965 to 1990. The various wood products consumed in Nigeria are aggregated into unprocessed wood, processed wood, building board woodpulp, paper pulp, and fuelwood. Wood using subsectors are also aggregated into residential housing construction, non-residential building construction, farm construction, casket manufacture, bridge and vehicle construction, paper consumption, and fuelwood consumption subsectors. The variables which determine the consumption of those wood products in these uses are identified as rural-urban location, income, and educational attainment of individuals;

availability and relative prices of substitutes and complements for wood products in various uses; and public investments in education, agriculture, and other key sectors. The Nigerian population as well as some of the wood using subsectors are disaggregated into traditional, semi-traditional, and non-traditional groups and estimates of wood consumption made separately for each group to account for the differences in wood consumption due to rural-urban location, income, and educational attainment of individuals.

Historical projections of annual consumption of various wood products are made for the period 1965-1974. These backward projections are based on the actual recorded values of GDP, government investments, etc. Three sets of projections based on three assumed alternative rates of growth of GDP are made for annual consumption of the various wood products in the future of the period 1975-1990. Two consequences, one immediate and the other lagged, of changes in income and government spending on wood consumption are apparent from the projections. Wood consumption in residential housing construction subsector is particularly sensitive to the lagged consequences. The model was validated in an iterative manner on the basis of the objective tests of clarity, coherence, logical consistency, and workability of the information and concepts employed in or gained from the study. The projections generated with the model were also tested for consistency with available projections from other studies as well as with recorded experience in Nigeria and in some other parts of the world. These tests are not final as the passage of time will reveal further inconsistencies and information that we are not aware of at present.

ABSTRACT

NARROWING TAIWAN'S PER CAPITA FARM/NONFARM INCOME

GAP VIA INCREASED AGRICULTURAL PRODUCTION AND

GUARANTEED PRICES: PROJECTIONS AND ANALYSIS,

1973-1984

By

Raphael Shen

Over the past nineteen years, Taiwan's industrial production has been increasing at a steady annual rate of 14.7 percent. Agricultural production over the same time period saw a meager annual growth rate of 4.8 percent. Agriculture has fallen in relative importance within the economic structure in Taiwan. A succession of four-year economic development plans has been focusing its attention more on the expansion of secondary and tertiary sectors. As a result, the farmer's share of the rapidly increasing national per capita income has been steadily falling relative to a nonfarmer. The increasingly unfavorable income differential between farm and nonfarm people not only limits the purchasing power by farmers of industrial products, it also curtails the reinvestment ability of persons on farms. The main objective of this study is to provide decision makers with alternative per capita farm income consequences to various policy measures in the form of price support for selected major agricultural products. More specifically, this study: 1) constructs the hitherto unavailable time series data

on per hectare cash expenditures for the production of major crops in Taiwan, 1959-1972; 2) establishes projective relationships for yields of nine major crops and then projects the consequences of alternative production possibilities for the year 1973-1984; 3) projects through time four alternative per capita farm income streams and four resulting farm/nonfarm income ratios for the years 1973-1984; and, 4) makes recommendations concerning ways of closing the income gap between the farm and nonfarm populace through price support programs.

Due to the lack of detailed knowledge and data needed to construct structural equations, the projective equations set forth in this study do not weave into a system of "n" equations with "n" unknowns which can be reduced. Rather, the projective equations used in this study are probably partially reduced forms of unspecified and unknown structural equations. Each of the equations is distinct, and the endogenous variables are expressed as functions of exogenous, lagged endogenous or policy variables. Their strength is not in their individually estimated parameters as in their nonmonetary parameters and in having the estimated results fed into structural identities in a later stage.

In the projective equations, the per hectare yields of crops in time period "t" are the functions of their corresponding per hectare cash expenditures in "t", which are in turn the functions of policy determined prices of these respective crops in "t-1". Via structural identities, per hectare yields of these crops, together with their corresponding hectareages cropped and their respective prices during the time period, result in their contributions to total value product of crop productions. Incomes from cropping activities, in conjunction

with incomes from livestock raising activities constitute farm incomes from farming activities. The latter, added onto projected farm income from nonfarming activities, represents the total farm income. A comparison through time is then made of the per capita farm and nonfarm incomes to determine whether a given price support policy is adequate in its attempt to raise crop/livestock productions and to close the per capita farm/nonfarm income gap in Taiwan.

From the four projected per capita farm incomes consequent upon four alternative policy measures, it is concluded that policy alternatives I and II do not achieve the stated objective of closing income gaps between the two sectors of Taiwan's population. Policy alternative III projects rapid narrowing of the said income gap. But whether consumers of farm products will accept the proposed level of price support for selected agricultural products is subject to further consideration by policy makers. Projection results from alternative IV promise to raise agricultural productions and agricultural incomes in a more moderate pace than alternative III. Yet, policy alternative IV projects the narrowing of income gap between farm and nonfarm population in Taiwan during the period of projection. The study results suggest that the perennial problems of inability to consolidate/mechanize farms in Taiwan may "resolve themselves" in time as a by product of implementing policy alternatives III or IV. This study also points out the need for more detailed farm input data for future studies.

ABSTRACT
THE WORLD SUGAR ECONOMY
AN ECONOMETRIC ANALYSIS OF PRODUCTION AND POLICIES

By
Gordon Gemmill

The purpose of this thesis was to estimate supply and demand functions for sugar for each of the major producing and consuming nations of the world and to use these functions to develop a model which would show the impact of alternative trade-policies. The model and its components were designed to give solutions both in long-run equilibrium and in an annual, recursive mode. Special attention was given to developing supply functions for both beet and cane in the U.S.A., taking into account the restrictions on acreage frequently imposed under the Sugar Program. Because the free market for sugar is typified by cycles in supply and price, a function capable of generating these cycles was used in estimating supply from each of the major cane-producing nations.

The supply of sugar in the U.S.A. was found to be generally price elastic, long-run elasticities being 0.00 for Puerto Rico, 0.75 for Louisiana, 0.90 for beet in the North and North-East, 0.99 for Hawaii, 2.71 for beet in the West and North-West and 4.23 for Florida. The supply of beet-sugar in Europe ranged in price elasticity from approximately 0.30 for the Communist countries to 1.63 for France. The major cane-producing countries were found to have short-run price elasticity

of supply in the 0.10-0.74 range, while their long-run elasticities were constrained to a maximum of 1.00 during estimation.

The demand for sugar, examined for more than 70 countries using both time-series and cross-section data, was found to be generally both price and income inelastic. For the U.S.A. price elasticity was estimated to be approximately -0.03 and income elasticity 0.03. The range in price elasticities across countries was from -1.49 to 0.00 and in income elasticities was from 0.00 to 2.44.

In the complete model there were 75 consuming and 68 producing regions, together comprising the whole world. Regions were separated by trade-barriers and transportation costs. Quota agreements were treated as exogenous flows. The model was solved for long-run equilibrium under trade-policies ranging from a most likely set to a set with universal free trade.

Using the concepts of producer and consumer surplus, there was found to be a world gain of \$330 million from free trade in sugar, the U.S.A. gaining \$66 million, the EEC \$70 million and the cane-exporting nations \$639 million. The losers would be the traditional importers from the free market such as Japan, Canada and many African and Asian countries.

Should the U.S.A. continue its current policy of free trade, there was estimated to be a 24 percent reduction in domestic production and a 13 percent drop in domestic price. Consumers would gain \$330 million and producers and government would lose \$307 million. Should the EEC begin free trade it would suffer a 23 percent reduction in domestic production due to a 23 percent reduction in price. Consumers would gain

\$709 million and producers would lose \$525 million. Other policies which were considered included the formation of a cartel to raise prices by the cane-sugar exporting nations. Such a cartel was found to be very ineffective due to the elastic supply of (beet) sugar in the major importing nations.

The policy implications of the solutions depend on whether producers and consumers in the developed countries are prepared to face a fluctuating free-market price. Freer trade would reduce the incidence of very low prices on the free market but not affect high prices. Since the international gains from freer trade are large, the multilateral reduction of barriers to trade in sugar would be feasible in a new kind of International Sugar Agreement.

ABSTRACT

EFFICIENT ORGANIZATION OF THE FLUID MILK SUBSYSTEM OF SPAIN

By

Eduardo Diez-Patier

The fluid milk subsystem of Spain has been tightly regulated by the government since 1966. Although the regulations are being progressively modified in order to correct some of the maladjustments identified in the subsystem, elements of misregulation still seem to be present. It was hypothesized that the present regulations are leading to the construction of an excessive number of fluid milk processing plants which are, with a few exceptions, too small to achieve efficient operation. At the same time, these regulations provide no incentive to extend the system of compulsory hygienization of milk, established in 1966, to all the country.

The purpose of this study was to provide information to assist in developing relevant public policy that would help to improve the performance of the fluid milk subsystem of Spain and also to assist the participants in their planning. More specifically, the objectives were: (1) to analyze the organization of the fluid milk subsystem of

Spain; (2) to determine the effects of volume of production in individual plants upon the cost of processing fluid milk; (3) to determine the least cost number, location and size of fluid milk processing plants for Spain both for the 1973-74 marketing year and for 1978; and (4) to determine optimum interprovince price differentials for both raw and finished milk consistent with a minimum cost pattern.

The dairy subsector and fluid milk subsystem of Spain were defined and trends in milk production, consumption and import-export activities were reviewed. After a description of both the structure and government's role in the fluid milk market, a preliminary evaluation of the performance of the subsystem was made. Relative inefficiency, inadequate output levels, lack of sufficient consumer information, inadequate fluid milk product mix offered and elements of misregulation were found to be the main barriers to improved performance in the fluid milk subsystem of Spain.

Based on synthesized costs of in-plant fluid milk processing operations significant economies of size were found to be possible in Spain. The average unit processing cost decreased from 3.958 pesetas per liter of fluid milk for a plant processing 40,000 liters per day for an eight-hour workday, to 2.789 pesetas per liter for a plant processing 360,000 liters per day for an eight-hour workday, a decrease of about thirty percent, with most of the drop

being in the 40,000-120,000 liters category in which costs declined about twenty-two percent.

Using the fluid milk processing costs information obtained from the synthetic firm study and milk assembly and distribution cost data elaborated by the Ministry of Agriculture, a transshipment model was used to estimate the number, location and size of plants that minimized the aggregate assembly, processing and distribution costs for the actual 1973-74 milk marketings and fluid milk consumption, and the results were then compared with the minimum cost that could be attained under the existing pattern. Optimum number, locations and sizes of plants were also obtained for 1978, based on two alternative cost assumptions.

According to the least cost pattern obtained for 1973-74, twenty-two plants, processing a daily average volume of 316,316 liters per plant would have provided processed milk to all consumers at that year's consumption levels at an average cost of 4.07 pesetas per liter. The actual pattern of fifty-seven plants, processing a daily average of 80,975 liters per plant and providing an amount of processed milk which was less than two-thirds of the total milk consumed in fluid form in 1973-74 could have attained a minimum cost level of 4.61 pesetas per liter of processed milk. A more efficient product use allocation would have permitted the attainment, under 1973-74 conditions, of a unit cost of 4.56 pesetas per liter. Existing regulations, however, do not allow an optimum flow of

processed milk products from plants to consumption centers to take place and would not have permitted the attainment of these minimum costs.

For 1978, it was projected that 21.5 percent more milk than in 1973-74 will be needed for fluid consumption. If all the milk to be consumed in fluid form by 1978 were to be hygienized in fluid milk processing plants, the increase in processed milk needed with respect to the quantity supplied in the 1973-74 daily marketing year would be 83.3 percent. An optimum pattern of twenty-one plants, processing a daily average of 402,855 liters per plant could provide the needed amount of hygienized milk at minimum cost in 1978.

The study demonstrated relative economic advantages for moving toward a fluid milk processing industry which would be more concentrated and would have a greater capacity. While it would be very difficult to expect the dismissal of almost sixty percent of the plants existing in 1974, recommendations were made which would be helpful in keeping the subsystem from further deterioration under the present organization.

ABSTRACT

AN ANALYSIS OF RURAL FOOD DISTRIBUTION IN COSTA RICA

By

Michael T. Weber

The distribution of food supplies in rural areas and related marketing costs are potentially important, although relatively neglected variables in agricultural development research. Residents of rural villages and towns purchase nearly all of their food supply. Very few "subsistence" farmers actually home-produce their entire food supply. And as farmers become enterprise-specialized, the economic and timely availability of a purchased food supply to complement perquisites from individual farms becomes increasingly important as an input into a more modern and productive farm-level transformation process.

In this study, work on a rural food market design and evaluation project in Costa Rica provided the opportunity to examine rural distribution processes. Major goals of the analysis were to develop a conceptual framework for studying rural distribution as a component of regional and national food systems and to bring about a better understanding of

underlying micro-marketing behavioral relationships operating in rural areas.

In Costa Rica, a county government development institute--Instituto de Fomento y Asesoría Municipal (IFAM) --was established to provide long-term credit and technical assistance to local government units. Projects to build or remodel county seat public food markets were quickly proposed to IFAM. The fieldwork portion of this study focuses on food distribution in two of the rural counties for which market projects were prepared. A market structure-conduct-performance framework of analysis was used as a research tool for looking at a "rural distribution subsystem" unit of investigation. Primary data were collected among core subsystem participants: urban and rural consumers, retailers and wholesalers in each county. These data were analyzed for the purpose of (1) predicting and evaluating the impact of proposed public market projects in each county and (2) conceptualizing alternative reforms to solve existing problems and improve performance of overall county food distribution processes. A financial and economic or social benefit, cost analysis of proposed public markets was also done.

Findings of this diagnostic were that there are problems with the physical state of repair, general operation, and traffic congestion surrounding county seat public markets. Yet functions of these markets are declining and food merchants operating in them represent only one portion

of a more complex and dispersed retailing system servicing county residents. A large number of small-scale grocery outlets were identified in rural areas, and rural families were found to procure as much as half of their purchased food supply in them. Larger-scale retailer-wholesalers located in county seat central business districts were also found to be important components of the local distribution subsystems.

Major conclusions from the financial benefit/cost analysis are that the proposed new public market facilities would be poor investments. Internal rates of financial return were estimated to be less than 5 per cent on base-run calculations. From the economic benefit/cost analysis of primary and secondary (or dynamic) impacts of the proposed projects, it was also concluded that the investments were not advisable. Few socially desirable services could be realistically expected, both in terms of achieving narrow goals of improved productivity from market retailers and of achieving broader goals of improved performance from overall county food distribution processes, particularly from retailers outside public markets in rural areas and central business districts of each county seat.

A review of IFAM and individual county seat government project development and loan procedures concluded that IFAM ought to strengthen the analytical capabilities of project analysts and to be more attentive to establishing the

economic, financial, and administrative viability of specified projects.

Recommendations were formulated in four major areas:

1. Changes were suggested in the Naranjo and Puriscal market projects to solve existing problems with low-cost facility improvements and operations rule changes.
2. It was suggested that IFAM's market loan policy be altered to encourage counties to consider a broader range of marketing projects than just public markets and that IFAM strengthen short-run capability to supply technical assistance, both on specific public market and more general rural food distribution problem identification and project design.
3. It was suggested that IFAM revise agency operational procedures for the project development and loan review process. A problem identification, project design, and final preparation process was recommended with specific steps to follow in each stage. The basic goal here is to develop and apply IFAM's technical assistance at strategic times, so as to influence the type of project request which eventually is considered for financing.
4. A final recommendation suggested future research to develop alternative rural food distribution reforms for Costa Rica and other developing countries. Emphasis was placed on studying the economics of rural retailing under existing and alternative product supply arrangements with county and regionally located wholesalers.

ABSTRACT

COSTS AND RETURNS OF ALTERNATIVE RICE PRODUCTION SYSTEMS IN NORTHERN GHANA: IMPLICATIONS FOR OUTPUT, EMPLOYMENT AND INCOME DISTRIBUTION

By

Fred Everett Winch III

In recent years the demand for food in Ghana has increased faster than the ability of the agricultural sector to meet domestic food requirements. As a consequence, Ghana is relying on imports to supplement domestic production, although there are local efforts to stem the crisis.

The National Redemption Council, one such effort, has attempted to achieve self-sufficiency in food production through the "Operation Feed Yourself" (OFY) Program, the focus of which is the rice industry in the Northern Region. The bottomlands in the region, well suited to the production of rain-fed paddy and rice acreage, expanded from 28,000 to 90,000 acres between 1968 and 1974. The principal reasons for this dramatic acreage expansion are: (1) access to idle bottomlands, (2) increased use of tractor mechanization for land preparation, (3) subsidized inputs such as improved seed, fertilizer, and a government operated combine harvesting service, (4) prestige associated with expanding farm size, and (5) high private returns from rice farming.

There is a general lack of quantitative data on the costs, returns, output, employment, and income distribution implications of alternative

production technologies for major food crops. The objective of this study was to generate such micro data on the rice industry through a survey of 161 rice farms in the Northern Region. The Cost Route Survey Method was used to collect farm level data by continuously interviewing 161 farmers from May, 1973 through February, 1974. The costs and returns for five bottomland production systems and one upland rice system were then analyzed from both the financial (private) and economic, or national, point of view.

Financial rice enterprise budgets were prepared for each of the six production systems. A net cash return to operating capital, family labor and management was derived for each system. The budget data were also used to derive financial returns to (1) family labor, (2) operating capital expenditures, and (3) management, as well as cost of production.

Each production system was then analyzed from an economic point of view. The unsubsidized costs of nonlabor inputs were estimated, and the economic costs and returns were calculated for each of six rice production systems. The analysis showed that when market prices (financial analysis) are used to value resources, the 119 acre, capital intensive production system has the lowest cost of production (\$104 per ton). However, when economic prices are used, this system has the highest cost of production, the highest capital/labor ratio, and the largest government income transfer via capital input subsidies. Moreover, the economic analysis revealed that four of the five bottomland production systems are generating economic losses from the national point of view.

The next step was to compare the employment and income distribution implications of alternative rice production strategies. Our analysis revealed that there was a wide variation in the average man-hours per

acre among the five bottomland systems, from a high of 220 man-hours per acre for the 16 acre tractor hire system to a low of 38 man-hours per acre for the 119 acre tractor owner system. About three-fourths of the labor were employed in harvest activities.

The employment and income distribution implications of a shift from hand harvesting to combine harvesting were analyzed in detail. Our data revealed that manual harvesting requires 142 man-hours per acre, whereas combine harvesting requires 10 man-hours per acre. At current levels of combine subsidies, farmers are encouraged to adopt combine services. Yet as combine harvesting expands, 22,000 man-days are potentially displaced per 1000 acres harvested by combine. Thus, if, on the average, 60 percent of the labor requirements for harvesting are hired, we estimated that about \$12,700 would be lost by casual workers per 1000 acres harvested by combine.

The study also illustrates that the production strategies being pursued in the bottomlands of Northern Ghana are providing rice producers with high financial returns, but at a high cost to the Ghanaian economy. The key policy issue now facing Ghana is how to develop a low cost production strategy in light of a growing foreign exchange constraint and the need to reduce government subsidies to the rice industry. A hypothetical 35,000 acre Rice Production Campaign was used to illustrate the output, efficiency, employment, and income distribution implications of two production strategies: a small farmer strategy and a large farmer production strategy. Our analysis showed that with current input/output relationships, a large farm strategy would produce about 17 percent more output than a small farm strategy because of the higher yields on the large farms. Although there is only about a five percent difference in

aggregate income between the two strategies, the income distribution implications are substantially different. A small farmer strategy based upon an average rice enterprise of four acres would provide a net farm income of ₱240 for 8700 small farmers, while the large-farm, capital intensive strategy of 100 acre farms would generate over ₱6000 in net farm income for each of 350 farmers. In addition, a small farm strategy would generate aggregate employment of about one million man-days, whereas a large farm strategy would employ only 240,000 man-days, or 77 percent less labor. And a small farm strategy would generate about ₱55,000 in wages for casual labor compared with ₱200,000 in wages for the large farm strategy. Finally, under current subsidy policies about ₱2.8 million would be required to subsidize capital inputs for a 35,000 acre capital intensive strategy, whereas ₱0.9 million would be required for a small farm rice production campaign.

The study concludes by recommending that the Ministry of Agriculture embark on a major Rice Production Campaign for small farmers; it discusses ten recommended components of a small farm production campaign and points up the need for more research on the benefit incidence of agricultural development projects.

ABSTRACT

EVALUATION OF FOOD MARKET REFORM:

CORABASTOS-BOGOTA

By

Alvaro Silva

Bogotá, Colombia's capital and largest city, also has the country's fastest rate of population growth. Between 1950 and 1970, the population of Bogotá was quadrupled. Yet diagnostic studies in 1970, indicated that the food marketing system serving this city and its growing population, and particularly the channels serving middle and low income consumers, were changing slowly and performing unsatisfactorily.

Corabastos, a semi-public agency, was created in 1970 to formulate and implement programs in order to correct this situation by inducing innovations in the food marketing system. Initially, Corabastos followed a market improvement strategy recommended by the Latin American Planning Center (LAMP) of Michigan State University. Under this approach the following programs were formulated and implemented: construction and operation of a central wholesale market, neighborhood stores chains, commodity exchange, and market information. But later Corabastos set up a risky direct intervention program of buying, selling and processing, which produced huge financial losses. Initially, the shift in approach and later, the very difficult financial situation,

weakened the reform programs and prevented the formulation and implementation of new programs. Nevertheless, the population growth and the urbanization process continue and demands for faster changes are becoming apparent.

This research had the following objectives:

1. To identify the LAMP market reform approach and to conceptualize an evaluation framework for reforms attempted under that model.
2. To evaluate both the organization (Corabastos and subsidiaries) as an institution built to promote socially desirable changes in the food marketing system and the direct intervention programs which include fruit and vegetable processing and exports, beef processing and wholesaling and potato storing and wholesaling.
3. To evaluate the impact of the market reform program on the food marketing system in Bogotá's food shed area and, in particular, the impact of specific reform programs on farmers, assemblers, wholesalers, retailers and consumers. The market reform programs being evaluated were: operation of the new central wholesale market, commodity exchange, retailers' cooperative, wholesale-retail voluntary chains and market information.
4. To make recommendations on research methodology, market reform approach programs and institution building.

A modified structure, conduct and performance framework combined with an institution building approach was developed as a conceptual framework to guide the research activity. Data for the evaluation of the organization in charge of market reform were obtained from in-depth case studies with Corabastos' leaders and government officials,

from on-going contact with LAMP leaders and from a review of Corabastos files and financial statements. Data to assess the impact of the food market reform programs were collected by surveys of farmers, wholesalers and retailers in the area of influence of Bogota. In addition, in-depth case studies were conducted with farmers, merchants, truckers, wholesalers, institutional buyers and consumers in key roles. They were able to provide information which aided an understanding of the functioning of the reformed system as compared to the non-reformed system.

The Corabastos leader (1970-1974) had personal linkages with the president of the nation. These linkages and his political power in the Conservative party helped Corabastos to secure resources and implement programs in the early years. But, in later years, political pressures encouraged Corabastos to enter into direct intervention programs with high risks and subsidized prices, programs which produced huge financial losses and small social benefits. Corabastos did not have institutionalized linkages with the public sector. Therefore, a solution to the financial situation has been more difficult, although it seems forthcoming in mid to late 1976.

Corabastos market reform programs' operating costs and operating income seem to be close to breaking even, and their social benefits have been substantial. The food marketing system has become better coordinated, and volume and broadline wholesalers have gained scale and power and are becoming channel leaders. Nevertheless, there are oligopsonies in most markets but competition and innovation have improved and operational efficiency has significantly increased.

However, a significant percentage of the reform benefits has remained with the innovators.

Traditional channels have changed slowly and have prevented middle and low income consumers from taking full advantage of reform benefits. Consequently, operation of Corabastos' pilot wholesale-neighborhood store chains has indicated that there are significant opportunities to improve efficiency and innovation and to create countervailing power. Moreover, human resources development and new market institutions seem to be crucial to the support of new self-reinforcing changes in the food marketing system in the area of influence of Bogotá.

ABSTRACT

A LINEAR PROGRAMMING ANALYSIS OF SMALL SCALE INDUSTRIES IN SIERRA LEONE

By

Enyinna Chuta

Most African governments are becoming aware of the importance of rural and urban small scale industries. Recently, Sierra Leone government emphasized the need to assemble data on small scale industries in order to evolve a detailed development program. This study is a direct response to the request of the Sierra Leone government.

From March 1974 to August 1975, a two-phased survey of small industries was undertaken in Sierra Leone. The first phase of the survey enabled the statistical estimation of the underlying population of Sierra Leone small scale industries. In phase II, a twelve months survey was undertaken to assemble daily input-output data from 366 small scale industrial firms.

The results of the phase I survey revealed that the small scale industrial subsector of Sierra Leone consists of about 50,000 establishments, employing about 89,000 people and dominating the industrial sector of Sierra Leone. The dominant small scale industry is tailoring, followed by blacksmithing, carpentry, bakery, gara dyeing, etc. The bulk of the small scale industrial establishments (95 percent) are located in the rural areas. On the basis of the phase II survey data, a linear programming model was built, first, for evaluating the efficiency of resource use among the five major small scale industries, and second, to test the effects of alternative policies on the small

scale industrial subsector.

Two significant results emerged from the base run of the linear programming model. First, the results indicated inefficiencies in the existing patterns of resource allocation and highlighted inadequate knowledge about foreign markets. Second, due to the high cost of electricity, workshop rentals and wages, urban small scale industrial firms have absolute cost disadvantages when compared to firms in rural towns or villages.

The results of the sensitivity analyses of the open model revealed that on the aggregate, increasing the rate of interest on capital resulted in a decline in output, employment and profits of the small scale industry subsector. Also, higher level of capacity utilization altered the comparative advantage of small scale industries. While customs duty debates increased the profits and output of the subsector, raising the tariffs on competing imports distorted the patterns of comparative advantage, resulting in a decline of aggregate output and gara exports. Increasing the supply of labor to the subsector resulted in doubling the value of output, employment and profits.

With respect to specific industries, increasing the rates of interest and granting customs duty rebates resulted in increased output, employment and profits of the gara industry. Although higher rates of interest resulted in increased labor utilization, output also declined in the bakery industry. Finally, the analysis revealed that the blacksmithing industry will eventually become exclusively rural industry.

The policy implications of the results of the base run are that

Enyinna Chuta

first, an export market should be promoted for gara cloth; second, means should be found to transfer surplus iron scrap and bars in urban areas to blacksmiths in rural areas; and third, steps should be taken to reduce the high cost of electricity, housing and wage bills of the widely dispersed urban small scale entrepreneurs.

The results of the sensitivity analyses indicate that increasing the demand for small scale industry products and supply of trained manpower, and granting customs duty rebates on intermediate inputs are effective ways of increasing output, employment and profits of small scale industries in Sierra Leone. Raising interest rates and tariffs on capital and competing imports respectively cannot by themselves accomplish the desired results.

Further research efforts needed for improving the findings of this study include computations of demand elasticities for competing imports and labor, tracing the employment and growth implications of reinvested profits and examining the interaction of farm-nonfarm activities within the small scale industrial subsector.

ABSTRACT

AN ECONOMIC EVALUATION OF KOREAN LAND USE POLICIES WITH SPECIFIC REFERENCE TO AGRICULTURE, 1965-1985

By

Martin Edward Hanratty

Since 1962 the Korean economy has been expanding rapidly, drawing many thousands of rural residents into the nation's bustling cities. To keep pace both with the expanding urban population and to provide the infrastructure required by industry, the nation has been forced to convert substantial areas of prime agricultural land to nonagricultural uses.

In response to these conversionary pressures, a number of public policies have been adopted to control the speed, type, and direction of both agricultural and nonagricultural development. In many instances, due to the lack of adequate information, authorities have been forced to adopt specific policies without a careful consideration of alternatives.

To partially relieve this situation, the study examines the process of urban growth, reviews the various types of land use policies which have been adopted in countries around the world to control agricultural land conversion and examines and evaluates Korean land use policies adopted since 1948. In addition, the study develops a

simple technique, using existing land use data, to project the quantity of agricultural land which might be required under various land use policy options in and around Korea's ten major cities during the 1975 to 1985 period. The options examined are exclusive agricultural zoning, a mixed paddy and upland zoning approach, and development in the absence of zoning. The costs of conversion, under each policy assumption, are assessed using estimates of land rent, reclamation costs, and site preparation costs.

In the examination of past land use policies, it was discovered that Korea has depended extensively on the exercise of police powers, especially zoning, to control conversion. In some instances, such as the exclusive paddy land zoning ordinance administered by the Ministry of Agriculture and Fisheries, the use of land is so restricted that the enforcement of the law verges on confiscation without the payment of just compensation.

With the strong emphasis being placed on zoning little use has been made of alternative land use policies, such as government ownership, spending, and taxation. Examining land taxation, the data suggests that urban property is generally undertaxed while rather substantial evasion is occurring in the payment of agricultural property taxes and in the registration of land converted from agricultural to urban uses. This latter problem has resulted in questionable and inaccurate land use data.

Due to rapidly rising real incomes and rather stable urban land prices, per capita land demand, in and around Korea's major urban areas, has been expanding since 1970. This horizontal growth is estimated to consume 75 thousand hectares of additional agricultural

land, 45 thousand hectares of paddy and 30 thousand hectares of upland during the 1975-85 period. These losses would result in a minor decline in rice production of 19.4 thousand metric tons per year, 15 percent of the average annual increase, and the displacement of 80 thousand agricultural jobs and 10 billion won in agricultural income. The maximum cost of this conversion would reach 67.6 billion 1974 won, 12.3 billion in land rent, and 55.6 billion in reclamation costs. If only the converted paddy land lost were replaced, this latter cost would decline to 44.2 billion.

Examining the effects of conversion within a 20 kilometer radius of Busan, the research suggests that the limited land area available for development will preclude the effective enforcement of the exclusive paddy land zoning ordinance. While agriculture would be better off under this policy, losing 30 to 40 million per year, the nonagricultural sector, especially those groups concerned with urban development, would be much worse off. The research indicates that the most viable approach to zoning in this area would be a mixed zoning approach, which allows for the conversion of poorer quality paddy and upland.

The study concludes with a set of recommendations covering the formation of a central office of land use planning, suggested changes in the land use data retrieval and analysis system and the formulation of a new system of agricultural land use zones in and around urban centers.

ABSTRACT

ECONOMIC ANALYSIS OF ALTERNATIVE STRATEGIES FOR THE DEVELOPMENT OF SIERRA LEONE MARINE FISHERIES

By

Dean Allen Linsenmeyer

Alternative sources of animal and vegetable protein have been unable to provide an adequate quantity of high-quality protein to satisfy the broad-based effective demand. Consequently, Sierra Leone remains dependent on imported frozen fish to meet domestic needs while local stocks of marine fish are under-exploited. Given the government's commitment to greater self-sufficiency in fish, this study examines alternative strategies for stimulating small-scale and large-scale fisheries industries.

This research is the first micro-economic survey of small-scale marine fisheries in Sierra Leone and one of the first fishery surveys undertaken in West Africa which combines the micro-economic operations of small-scale producers, processors, wholesalers, and retailers into an integrated fish delivery system. The objectives of the study were to: (1) describe the micro-economic operations of alternative technologies currently practiced in fish production, processing, and marketing enterprises; (2) identify major constraints on improved performance of the fisheries production-delivery system; (3) through the development and execution of a linear programming

model to examine the aggregate impacts of alternative development strategies on (a) the level of output, employment, frozen fish imports, economic profits to the fisheries subsector, the subsectoral contribution to Gross Domestic Product and on (b) the choice of small-scale technology which is most profitable to the economy.

The field research was undertaken over a 12 month period from October, 1974 through September, 1975, covering 93 fishing firms in five randomly selected small-scale landing sites located in three coastal regions of Sierra Leone. The small-scale firms were grouped into nine representative firm types based on the type of production technology used. One of the five large-scale production firms based in Freetown was also interviewed to collect basic input-output data. Fish processors and traders were surveyed covering the major wholesaling-retailing channels between the selected producers and the four largest urban centers.

Micro-economic analysis of the data was conducted through the construction of basic enterprise budgets for each of the nine small-scale production firm types and for one large-scale firm type. The various processing, wholesaling and retailing firms were also analyzed using the enterprise budget technique. A linear programming model incorporated the budgetary data of these industries into an integrated production-processing-marketing system. This model was tested for consistency with the 1974 situation and then used to evaluate the effects of the following development strategies over the 1974-1980 period: (a) varying the resources available but maintaining the 1974 policies regarding the cost of capital and import duties, (b) encouraging small-scale fishing industries, (c) encouraging large-scale

Dean Allen Linsenmeyer

fishing industries, (d) actively discouraging large-scale fishing industries, and (e) closing the economy to frozen fish imports to force self-sufficiency by 1980.

It was found that a significantly higher proportion of the national labor force were employed in the fisheries subsector than had previously been estimated. Within the small-scale production industry, a major share of labor employment and production occurs in the October through March period. However there is considerable variation in the seasonal patterns of the different technological firm types.

A major contrast was found in the amount of capital used per unit of labor between the large-scale and small-scale industries. Although a considerable range of capital-labor ratios was evident between the different technological firm types, most of the types were quite closely clustered.

All small-scale firm types were economically profitable and capable of producing fish at considerably less cost per leone of fish landed than is capable by the large-scale firms. While frozen imports were found to be strongly competitive with large-scale production, they could not actively compete with low-cost small-scale output.

A strategy which encouraged the expansion of small-scale production was found to lower the required imports by 1980 from the level which would prevail if current policies were continued. This strategy of supporting small-scale expansion also resulted in higher levels of economic profits for the subsector as well as higher levels of subsectoral contributions to Gross Domestic Product than any other strategy tested. A strategy of self-sufficiency by 1980 while producing

a higher level of Gross Domestic Product and returns to the subsector was judged unrealistic in view of the substantial resource requirements. An accelerated growth in the trained labor supply, the amount of investment capital, and in the capital stock of boats were found as key factors in the expansion of the small-scale industry. Changes in pricing policy such as the cost of capital and import duties on frozen fish and fishing equipment, when implemented in isolation, had little effect on small-scale production but considerably more effect on the large-scale industry.

While some justification is possible for more fully utilizing current large-scale capacities, an expansion of large-scale productive capacities could not be supported by this study.

ABSTRACT

A MICRO-ECONOMIC ANALYSIS OF THE DETERMINANTS OF HUMAN FERTILITY IN RURAL NORTHEASTERN TANZANIA

By

James Edward Kocher

The purpose of this study is to analyze the relationships between socioeconomic characteristics of women in rural Africa and their fertility, and to quantify the absolute and relative importance of the major determinants of fertility, particularly those affected by socioeconomic change and development. The data were collected in late 1973 by interviewing the adult members of about 1500 households in four rural areas of northeastern Tanzania. These four areas were part of the sample of the 1973 National Demographic Survey of Tanzania. Two of the areas are in Moshi district in Kilimanjaro region and the other two are in Lushoto district in Tanga region.

The received theory of the determinants of fertility, and especially the theory as refined by the so-called Chicago school of economists, assigns a dominant role to demand variables (incomes, prices, preferences, and the opportunity cost of parents' time) in determining fertility. In contrast to received theory, the reformulation of the theory of the determinants of fertility in Chapter II assigns a dominant role to supply variables in the early stages of development while demand characteristics dominate only in later

stages. This reformulation postulates that socioeconomic transition affects fertility through a set of changes which initially cause the average number of surviving children (supply) to rise, somewhat later bring about a decline in the average number of children desired (demand), and eventually these changes cause parents in their later years of childbearing to find themselves in excess supply rather than excess demand situations. Continued development causes relative prices and preferences to shift further against children vis-a-vis other consumer goods and the absolute amount of excess supply of children (per parent) typically continues to increase until parents are motivated to try to prevent further births.

Survey data indicate that considerable change and development occurred in the study areas between about 1900 and 1973, but that there are now substantial socioeconomic differentials both among and within the areas. The theoretical framework indicates that some of these differentials should cause differentials in number of children born, number surviving, and number desired.

Separate supply and demand models of number of children born are constructed. Multiple regression analysis is the principal technique used to test the efficacy of both supply and demand models. Independent variables in the basic supply model are woman's current age, her age at marriage, the average number of months she breastfed, her number of deceased children, and whether or not she is married to a polygynous husband. Independent variables in the demand models are various proxies for household income (both current and permanent-- i.e., wealth), relative prices of children, and relative preferences for children. Multiple regression is also used to test models of the

determinants of the survival rate among a woman's children, her age at first marriage, and her reported duration of breastfeeding. The models are tested at the aggregate, district, and area levels.

Results of these analyses show that as expected, supply variables dominate while demand variables have as yet had very little to do with levels, differentials and changes in fertility in these four rural areas. The supply models at the aggregate level produce relatively large R^2 s and high levels of statistical significance for the independent variables. The R^2 for age group 30-39 is .45 and coefficients for all independent variables have the expected signs and are statistically significant at the .01 level. R^2 for age group 20-29 is .56 and coefficients for all independent variables except the dummy for polygyny have the expected signs and are significant at the .01 level.

Several formulations of the demand models are tested using various combinations of independent variables, but the R^2 s for all formulations are very low and few of the coefficients are statistically significant although most signs are in the expected directions. For age group 20-29 all R^2 s at the aggregate level are below .04 and they are all below .02 for age group 30-39.

Further analysis of this data--primarily by the use of discriminant function analysis--shows, however, that demand determinants are also changing as a consequence of socioeconomic development but that the expected positive relationship between income and desired number of children is weak or non-existent while the positive effect of development on the relative price of children seems to be rather strong. Thus, the effects of rural development in the study areas include a rise in the average number of surviving children and a

relatively weaker decline in the average number desired with the net effect on fertility to date depending on the mix of the changes in the supply variables.

A major policy implication of the analysis is the importance of specifying the stage of socioeconomic and demographic change or transition which the target population is in before deciding what types of policy interventions may be most suitable for inducing fertility decline. Policies which affect appropriate changes in supply variables can cause desirable but modest changes in both fertility and number of surviving children in the short run, but large and sustained declines in fertility require large reductions in demand for children which will result only from substantial development and major improvements in living conditions over the long run.

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