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AN ANALYSIS OF FOODGRAIN PRICE AND  
TRADE POLICY IN THE DOMINICAN REPUBLIC

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## ABSTRACT

The Dominican Republic presents a case study of heavy government intervention in the foodgrain sector. The key government agency involved in the marketing, pricing, and trade of the staple foodgrain, rice, is the Institute of Price Stabilization (INESPRE). This study examines INESPRE's activities and focuses on the Institute's pricing and import policy. The major rice and wheat price series are analyzed. The Dominican peso has become increasingly overvalued at the official rate of exchange, which affects comparisons of domestic and world price levels and also impacts on INESPRE's operations. Attention is also given to the important relationship between rice and fertilizer prices.

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Rice and wheat are the major foodgrains of concern. Rice is the staple food in the Dominican Republic. The average Dominican consumed 115 pounds of rice in 1981.<sup>1/</sup> Its consumption provides the largest single source of both calories and protein in the average diet. This pattern holds true even when the population is broken into income classes. Arroz (rice) and habichuelas (beans) are considered the national dish. However, the Dominican Republic remains a deficit producer in rice. Wheat is the second most important foodgrain, even though none is produced domestically. Wheat products rank fifth as a source of calories in the average Dominican diet, after rice, vegetable oils, plaintain, and sugar. Wheat products, primarily in the form of bread, rank second only to rice as a source of protein.<sup>2/</sup>

As in many developing countries, the Dominican government extensively intervenes in the marketing, pricing, and trade of the major agricultural commodities. Nowhere is the intervention more massive than for the dominant foodgrain, rice. The key government agency is the Price Stabilization Institute (el Instituto de Estabilizacion de Precios, referred to as INESPRES). INESPRES is the sole buyer of processed rice from the domestic rice mills, the primary carrier of stocks, and the monopolist importer of rice. The Institute sets the purchase price of rice from the mills and the wholesale selling price. INESPRES also buys some rough rice (paddy) at a stated price. The authority to control retail food prices is held by the Director General of Price Control (Direccion General de Control de Precios). Normal commercial wheat

imports are handled by Molinos Dominicanos, which is majority owned by the government and accounts for 90 percent of domestic flour production.

As INESPRES name implies, a key objective of Dominican food policy has been price stabilization for the basic commodities, particularly rice. Inherent in INESPRES price stabilization activities and import operations is the desire to provide a degree of food security. Especially for rice, the government's policies are designed to ensure that consumption of this staple does not fall too low, even in times of scarcity.<sup>3/</sup> Given the importance of rice, it is not surprising that self-sufficiency in that crop has been set as a national goal. The Dominican Secretariat of Agriculture (Secretaría de Estado de Agricultura - SEA) has made increasing rice production at a 6 percent annual rate an explicit objective of agricultural policy and planning. The broader agricultural goals of the country include increasing the nutritional level of the population, especially among the most nutritionally deprived, improving the level and distribution of income in rural areas, and reducing the overall level of agricultural imports. The Dominicans are also specifically looking for ways to reduce their wheat imports.<sup>4/</sup>

The literature on agricultural development has given increasing attention to the potentially critical effect of price policy on agricultural production.<sup>5/</sup> Under government intervention, relatively low agricultural prices have been a significant disincentive in many developing countries to enhanced food production. The distortion of prices below their free market level is politically attractive because it favors the politically active urban consumer. The impact of price

policy in a small, open economy cannot be understood without an examination of the country's trade policy, particularly the foreign currency exchange rate. A substantially overvalued currency is common among developing countries. Such an overvaluation can substantially discriminate against the agricultural sector. Agricultural exports are suppressed and food imports are biased upwards.<sup>6/</sup>

The focus of this paper is an analysis of the foodgrain price and trade policies of the Dominican Republic. To set the stage for this analysis, the next section provides a brief description of the Dominican foodgrain situation. Although the effect of tariffs on foodgrains is minor, the role played by the exchange rate is sufficiently crucial to understanding the impact of price policy that a section is devoted to that topic. The core of this paper is an analysis of INESPRES's operations and an assessment of their effect. In particular, an appraisal is undertaken of the key prices which affect foodgrains. Attention is also given to the important relationship between rice and fertilizer prices. The concluding section specifies the policy implications of this analysis.

#### THE DOMINICAN FOODGRAIN SITUATION

Table 1 provides data starting in 1970 on rice production, rice imports, and wheat imports. During this 12 year period, rice production increased 87 percent. The average annual rate of increase was a respectable 6.5 percent; the average rate of gain during the last five years was 6.6 percent. Overall, the Dominican Republic has been achieving its goal of a 6 percent rate of increase for rice production. During this

period the population growth rate was somewhat below 3 percent, so production was increasing supplies on a per capita basis. The poor crops during this period can primarily be related to weather factors. For example, a prolonged drought occurred in 1975.

Even with these gains though, the Dominican Republic has remained a deficit producer of rice. Rice was imported in all but two years. In addition, wheat imports have approximately doubled, increasing at an average annual rate of 8.3 percent. Rice and wheat are both preferred foods and, therefore, demand for these products has exceeded the rate of population growth. A strong positive income elasticity of demand has propelled the demand upward as the Dominican Republic enjoyed a growth in Gross Domestic Product (GDP) exceeding 7 percent per year during the last decade.<sup>7/</sup> In 1980, GDP reached an average per capita level of US \$1,245 (at the official exchange rate).<sup>8/</sup> The elasticity of demand for rice has been estimated as about 1.00 for the country. The estimate for wheat was .75.<sup>9/</sup>

Since a metric ton of wheat and rice are not equivalent in food value, Column (4) in Table 1 converts the wheat imports to an equivalent value in relation to rice on the basis of calories.<sup>10/</sup> Overall, the self-sufficiency ratio for rice has not improved. Rice self-sufficiency averaged 87 percent during both the first and last six years of this period. The index did decline during the early 1970's and then recovered. In addition, the self-sufficiency ratio for total foodgrains, rice and wheat (counted in its rice equivalent), which is given in Column (7), has shown no improvement. The Dominican Republic averaged 60 percent self-sufficiency in its basic foodgrains during both 1970-75 and 1976-81.

Rice is primarily produced on small farms, under irrigation. Three-fourths of Dominican rice production comes from 25,000 farms of less than five hectares.<sup>11/</sup> Thirty-three percent of rice production is from the Agrarian Institute (Instituto Agrario Dominicano) land reform farms.<sup>12/</sup> Some 95 percent of the area devoted to rice in the Dominican Republic is irrigated. The primary rice production region is the Cibao Valley located in the Northern part of the country. The eastern part of this valley, known as Vega Real, contains the country's best agricultural land. There were approximately 130 rice mills in the country in 1980, most producing a good quality, clean rice, with a low percentage of broken grains.<sup>13/</sup>

The Dominican rice yield averaged 2.67 metric tons (MT) per hectare over the period 1976-80. During this same period the yield was 5.04 MT/hectare in the United States, almost twice as high.<sup>14/</sup> This differential indicates the substantial room for expanded production in the Dominican Republic through increased yields. What is disconcerting is that Dominican rice yields have declined in comparison to the early 1970's, when they averaged 3.35 MT for the period 1971-75. In addition, there still appears to be a significant amount of land that is used less intensively for grassfed beef, dairy, and sugarcane production, which could be converted to rice production.<sup>15/</sup> This is true even in the Vega Real. Of course, conversion to rice would typically require investments in field leveling and irrigation systems. Many farmers use a "ratoon" system, letting the rice grow back after the first harvest to obtain a second crop. The resulting yield on the second harvest is substantially lower than on the first, or that would be obtained by replanting.<sup>16/</sup>

The Dominican government has encouraged rice production through programs of agricultural credit, agrarian reform, improved seeds, and access to government irrigation water. Recently, a comprehensive rice improvement program was instituted by the Dominican government. The goal of self-sufficiency is to be obtained by raising yields to approximately 3.5 MT per hectare and increasing the amount of land in rice cultivation. Emphasis is being given to efficient water use, improved weed and insect control, and the increased utilization of improved seeds and fertilizer.<sup>17/</sup>

#### TRADE POLICY AND THE EXCHANGE RATE

The most important aspect of trade policy for the foodgrain sector involves the foreign exchange rate. The Dominican Republic has a two-tier exchange rate. The Dominican peso has been officially pegged at the rate of RD\$1 = US\$1 (one peso = one dollar) since 1947. All exchange transactions through the Central Bank (Banco Central) take place at this rate. Because of an unfavorable balance of payments, there has been a shortage of foreign exchange (dollars) at the official rate.<sup>18/</sup> This situation has created an officially tolerated "parallel" market in which the rate of exchange freely fluctuates.

Prior to a new export incentive law, exporters were required to exchange their export earnings at the Central Bank at the official rate. Now some exporters of nontraditional exports are allowed to exchange a proportion of their earnings in the parallel market.<sup>19/</sup> The major sources of dollars to the parallel market are currency exchange by tourists, remittances from an estimated 500,000 Dominicans residing in

the U.S., and inaccurate invoicing by exporters and importers. The parallel market operates through exchange houses (casas de cambio). The parallel market must be used by importers when foreign exchange is not made available by the Central Bank. The Central Bank's dollar funds are an important instrument of government policy because they embody an increasingly substantial subsidy as the overvaluation of the currency increases.

Figure 1 examines the implications of this two-tier exchange rate. DD represents the demand for foreign currency and SS the supply of foreign currency (dollars). In a free market the equilibrium rate of exchange and quantity would be determined by their intersection. At the officially set rate of one peso to one dollar (PP), demand exceeds supply by the amount  $S_1S_2$ . The Central Bank, therefore, rations the official foreign exchange available. The resulting excess demand is forced onto the parallel market.

The Dominican balance of payments situation has seriously deteriorated recently. Due to the scarcity of foreign exchange, the government has turned more and more imports to the parallel market. An estimated 55 percent of currency exchange is now handled in the parallel market.<sup>20/</sup> The rate of exchange in the parallel market has risen sharply over the last year reaching RD\$1.50 = U.S.\$1.00 in April 1982. Devaluation has historically been considered politically unacceptable by the government in power. The currency crunch became so severe, though, that devaluation was aired as a possibility in the 1982 presidential campaign.

Table 2 in Column 1 gives the rate of exchange in the parallel market back to 1972. One can say with considerable certainty that the free market equilibrium rate would lie somewhere between the pegged rate and the parallel market rate. Accurately estimating the equilibrium rate requires information on the supply and demand functions in Figure 1, which is not available. With what appear to be a reasonable set of assumptions, Norberto Quezada derived an estimated equilibrium rate.<sup>21/</sup> Quezada weighted each exchange rate, the official and the parallel, by the proportion of currency transactions handled by that market. Accurate data on utilization of the parallel market are not available. Quezada used the best estimate available, that approximately 30 percent of trade was done in that market up through 1979. The average proportions used for 1980 (35 percent) and 1981 (47 percent) were extrapolations, such that the figure of 55 percent would be reached by the end of 1981. The resulting estimates of the free market equilibrium exchange rate are given in Column (2) of Table 2. The increasing overvaluation of the currency is obvious.

The effects of explicit tariffs on the foodgrain sector are not significant. Agricultural imports have been subject to a "code" or fixed tariff, which has usually been no more than 5 percent. INESPRES pays no tariffs, except on processed products, and then only the 5 percent tariff applies.<sup>22/</sup> For modern agricultural inputs, the tariff is 5 percent for agrochemicals, including fertilizers, and 20 percent for farm machinery.<sup>23/</sup>

## THE DOMINICAN PRICE STABILIZATION INSTITUTE

INESPRE which is an autonomous institution outside the normal government bureaucracy was established in December 1969.<sup>24/</sup> Its 1981 domestic purchases reached RD\$202.8 million and sales were RD\$307.3 million.<sup>25/</sup> Net sales were only RD\$11.3 million in 1970.<sup>26/</sup> The Institute has the responsibility to regulate and stabilize the domestic prices of agricultural commodities, allowing reasonable profit margins for efficient producers and distributors. Its activities have expanded to cover more than 20 agricultural products, including beans, corn, and edible oils. However, its rice operations remain most important. Rice accounted for 61 percent of its domestic purchases and 43 percent of its sales in 1981.<sup>27/</sup>

The Institute is effectively the monopsonist buyer and monopoly seller of rice in the country. On average, for the last five years, INESPRES has acquired over 85 percent of the domestic rice crop and it controls 100 percent of rice imports.<sup>28/</sup> INESPRES's operations must generally be self-financing. It is not able to rely upon a stable budget allocation from the central government as a source of financing. Therefore, INESPRES must give careful attention to the commercial implications of its transactions. In the past if the Institute suffered losses in its operations, it could seek a lump-sum subsidy from the government. However, the Central Bank has been unwilling to authorize such subsidies in recent years. INESPRES has increasingly relied on short and long-term bank and commercial credit.

The price levels at which INESPRES will purchase and sell the commodities under its authority are announced publicly. In the past,

these prices have not been changed frequently. At least for rice, the Director General of Price Control simultaneously announces the retail price. Although the Director General of Price Control does have the authority to enforce retail price controls, the number of inspectors is relatively small. Legal action has been used at times against store owners violating pricing levels, but overall the use of the state's police powers is a minor factor in price control.

INESPRE, in fact, controls prices by controlling supply. When there is upward pressure on retail rice prices, INESPRE will sell more inventory from its warehouses to stabilize prices. If stocks are low, INESPRE will import. Ultimately, then, INESPRE utilizes its authority over imports to bring supply into balance with demand at the mandated price level. These policies result in a very high level of intra-seasonal price stability for rice. On the other hand, although wheat flour is also subject to regulation, prices are frequently changed to assure some minimum level of profits for Molinos Dominicanos.<sup>29/</sup>

INESPRE can be visualized as pursuing the dual goals of price stabilization and profit maximization.<sup>30/</sup> INESPRE can make or lose money on the margin between its domestic purchase price and its sales price to wholesalers and large retailers. There is also the margin between the price at which imports are purchased and the sales price. Quezada saw this margin on imports as a variable levy. The core of the Institute's policies is to use this variable levy to stabilize domestic prices in relation to world prices. However, INESPRE cannot disregard its other objective because this variable levy could be a source of profit or loss to the agency. If import prices were above the Institute's

selling price during a prolonged period of importation, a government subsidy would be required.

INESPRE makes the majority of its domestic rice purchases in the form of milled grain from the country's private mills, who are required to sell all their output to the Institute. Each year though, INESPRE makes a small portion of its purchases directly from growers, buying rough rice still in the hull. In 1981, some 17,000 metric tons of rough rice were purchased, which represented 7.2 percent of INESPRE's rice purchases.<sup>31/</sup> Although INESPRE's milled rice purchases establish the basic price structure, its rough rice buying creates an absolute minimum price level for rice at the farm level. Processors are forced to pay a price at least as great as the Institute's rough rice price to obtain rice. INESPRE's rough rice purchases serve to police the rice miller's margin and prevent any exploitation of possible monopsony power held by local processors.<sup>32/</sup> Most farmers prefer to sell to the private millers because they typically pay a somewhat higher price than INESPRE for good quality rice.

The ratio of the farm-level rough rice price to INESPRE's milled purchase price has been quite stable. Table 3 shows this ratio over a nine year period. The farm-level rough rice price averaged 56.8 percent of the milled price during this period. The ratio was within two percentage points of this average figure in all but two years, 1977 and 1978. The average domestic milled price used here and in the next section of this paper was derived by dividing the total value of INESPRE's milled purchases by the quantity. This price, therefore, reflects a weighted average price of the various grades of rice purchased.

Most milled rice purchases are graded first quality, though. In 1981, 82.1 percent of INESPRES's domestic milled purchases and virtually 100 percent of its rice imports were first quality.<sup>33/</sup>

As might be expected, INESPRES's actions are politically very sensitive. They are caught between producers who feel prices are too low and urban consumers who react against higher prices. The Institute's pricing decisions are technically based on farm cost of production data. INESPRES's purchase prices are supposed to be set at levels which permit reasonable profit margins for efficient producers and processors. There are well known pitfalls to a cost of production approach to pricing, not the least of which is the tremendous range in costs between efficient and marginal producers. The question becomes whose costs of production to use as a basis. Who is an efficient and who is an inefficient producer? Not surprisingly, political factors play a major role in pricing decisions. Various agencies in the government lobby for their interests and constituencies. The Secretariat of Agriculture (SEA) typically pushes for higher prices; whereas the Director General of Price Control seeks to hold prices down. Such policy conflicts must be resolved at the highest level of government, in the Office of the President.

A particular aspect of INESPRES's pricing policy worth noting is that purchase prices are the same throughout the country. This policy is certainly preferable to setting differential rates based on cost of production differences. However, setting a single countrywide price also introduces inefficiency; albeit fairly minor in a country as geographically small as the Dominican Republic. In a free market a

a transportation differential would exist, such that producers and processors close to major markets were encouraged to produce more and those for who transportation costs were higher would receive lower prices.

The political vulnerability of INESPRES's position helps explain the high visibility given to the Public Sales Program (Los Programas de Ventas Populares). The Institute must see the Program as a major instrument of goodwill promotion, especially among urban consumers. Ventas Populares was started following the hurricane devastation in 1979, as a relief measure and as a means of preventing profiteering by private merchants. The Public Sales Program sends small vehicles through urban neighborhoods. They sell rice and other basic staples from INESPRES's warehouses directly to consumers. The foods are attractively priced, but prices are not set markedly below those of regular retail stores. Ventas Populares sales were RD\$12 million in 1981. The most important commodity sold is rice.<sup>34/</sup>

#### INESPRE'S PRICING POLICY AND IMPORTS

From the previous section, the Price Stabilization Institute's dominant role in foodgrain pricing and trade is clear. This section explores the historical record of INESPRES's price policy since the Institute became active in foodgrain markets in 1972.

#### Key Foodgrain Prices

Table 4 provides several key foodgrain price series for the Dominican Republic. Column (1) reports the average annual price at

which INESPRES purchased imported rice in each year. No rice was imported in 1979. This series represents the effective world rice price at the border for the Dominican Republic. Virtually all of the Dominican Republic's rice imports, as well as its wheat imports, come from the United States. Therefore, the high correlation between Column (1) and (2) should not be surprising. The differences that do occur are partially the result of differences in rice grade and the timing of import purchases during the year. In addition, there is the shipping charge between U.S. Gulf ports and the Dominican ports, principally Santo Domingo. The charge during the last three years has generally been between \$20 and \$30 per metric ton of grain with a cost over \$30 on a few shipments and as high as \$42.50 for one shipment.<sup>35/</sup>

Column (3) indicates the cost of imported rice based on the price given in Column (1), but assuming that INESPRES had to purchase dollars on the parallel market. INESPRES typically has access to foreign exchange through the Central Bank at the official exchange rate of RD\$1 = US\$1. In some years, though, the Institute has been forced to purchase foreign exchange for some of its imports on the open market. INESPRES bought 10.4 percent of its rice imports in 1975 with foreign exchange purchased in the parallel market, 11.8 percent in 1976, and 17.4 percent in 1977.<sup>36/</sup> In these years, the price given in Column (3) would be an overstatement, albeit small, since INESPRES was already using the parallel market for a portion of its rice imports.

A comparison of Columns (1) and (3) indicates the magnitude of the implicit subsidy embodied in INESPRES's access to dollars at the official exchange rate. With access to foreign exchange from the

Central Bank, the effective price to INESPRES is that in Column (1), whereas the marginal opportunity cost to the Dominican economy is that in Column (3). This implicit subsidy causes INESPRES to undervalue its imports in relation to their true cost to the economy. The effect is to distort the Institute's policy towards one overly favoring rice imports compared to domestic production. For example, in 1980, INESPRES's domestic purchase price, given in Column (4), and sales price, given in Column (5), were both greater than the price that was paid for imported rice of RD\$502 per metric ton. However, both domestic prices were actually substantially less than the imported rice price of RD\$633/MT, given in Column (3), using the parallel market exchange rate.

The price at which INESPRES bought and sold rice domestically would have been below the price of imported rice if INESPRES were forced to use the parallel exchange market, as shown in Column (3), in all but one of the last ten years, 1976. However, the price actually paid for rice imports, shown in Column (1), was below INESPRES's sales price in all but two of the last ten years. The relationship between the sales price, import price, and domestic purchasing price will be further explored in relation to Table 5 and 6 and Figure 2.

Column (6) gives the price paid for imported wheat.<sup>37/</sup> The next column translates this price into the effective price in relation to the nutritive value of wheat vs. rice, as was done in Table 1. Even when corrected for the lower caloric value per metric ton, the price of wheat has averaged less than 50 percent the price of rice during this period. Of course, milled rice need only be cooked before consumption, whereas the costs of milling and typically baking also must be added to wheat before human consumption.

Figure 2 tracks, for a ten year period, the prices at which INESPRES imported rice and bought milled rice domestically. The domestic rice price is converted into U.S. dollars at three alternative exchange rates: the official one to one rate, the parallel market rate, and the estimated equilibrium rate. The effective rice price at each of these exchange rates, which has been plotted in Figure 2, is given in Table 5. The import price is expressed in dollars per metric ton at the official exchange rate. The comparison in Figure 2 yields valuable insights into both the relative stability and comparative level of domestic prices in relation to world rice prices. The gap in the import price line between 1978 and 1980 is because no rice was imported in 1979.

Figure 2 reveals the considerable success INESPRES has had at stabilizing the domestic price in relation to inter-year world price fluctuations. The extent to which the domestic rice price was cushioned from the sharp world price increases of 1973 and 1974 and the subsequent price decline of 1975 and 1976 stand out. Overall, the domestic price has trended up, following world prices, but seemingly with a lag.

Above all, Figure 2 dramatically illustrates the significant impact of the overvaluation of the Dominican peso on the domestic purchase price in relation to the import (world) level. Although the true equilibrium exchange rate is not known with certainty, we can be assured that the price translated at the true equilibrium exchange rate would fall in the shaded area between Lines (2) and (4) and probably quite close to Line (3). The widening gap between Lines (2) and (4) over the period reflects the increasing overvaluation of the currency.

The price comparison at the official exchange rate is not unfavorable for domestic prices after 1975. The domestic price converted to dollars at a one to one rate has either exceeded or been approximately equivalent to the import price. However, when the overvaluation of the currency is corrected, the domestic purchase price consistently falls below the import price in all but a brief period around 1975. This comparison means that the Dominican government has paid more for imported rice in terms of its true cost to their economy than they have been willing to pay for domestic production. In a free open market, without exchange rate distortions, the domestic price would be on a par with the comparable world market (import) price.

#### INESPRE's Marketing Margins and Profits

Table 6 presents the operating margins on both INESPRES domestic rice purchases and imports. The distinguishing feature of the domestic margin is its narrowness. The margin is sufficiently small, less than 1 percent on average for the ten year period, that it would seem INESPRES must be subsidizing its domestic rice marketing operations. The wide fluctuations in the marketing margin on rice imports reflect INESPRES price stabilization policy. In 1973 and 1974, a period of very high world rice prices, the margin was heavily subsidized in order to hold the domestic consumer price down. The variations in the import margin reflected in this table embody the variable levy concept referred to by Quezada.<sup>38/</sup>

The potential inducement for INESPRES to import rice in most years is revealed by a comparison of the two margin series. Importing rice

has been a more profitable enterprise than buying domestically in six of the last ten years. The years, 1973 and 1974, were obvious exceptions, as was 1981, and there were no imports in 1979. The more attractive margin on rice imports reflects INESPRES's ability to obtain dollars at the official exchange rate for its imports. As discussed in relation to Table 4, this implicit subsidy causes INESPRES to undervalue its imports and distorts policy towards one overly favoring foodgrain imports.

During the ten year period 1972-1981, INESPRES's margin on cottonseed oil imports averaged 23 percent, and the margin on soybean oil imports averaged 19 percent, and on peanut oil, 15 percent. INESPRES appears to generate significant profits on its edible oil imports which can be used to finance other operations, including a possible subsidization of the domestic rice margin.<sup>39/</sup>

The gross profits calculated in Table 7 appear to confirm this conclusion. INESPRES has lost RD\$21.2 million on its rice operations over the last ten years. On the other hand, it has made some RD\$51.8 million on edible vegetable oils. Sugar is a special case in that INESPRES is the monopsony purchaser from the sugar mills for domestic sale. A 95 percent differential margin is charged on brown sugar and 85 percent on refined sugar, all but approximately 5 percent of which is transferred to the state electric utility company to subsidize its operation.<sup>40/</sup> The gross profits are quite close to zero for the other major crops.<sup>41/</sup>

## FERTILIZER PRICES

Recent work in agricultural development has found an important link between the rice-fertilizer price relationship in a country and the level of productivity in rice production. Timmer found a strong positive relation between rice yields and the rice price to fertilizer price ratio for a broad range of Asian rice producers.<sup>42/</sup> Not surprisingly, a significant direct relationship exists between the relative price of rice and fertilizer and fertilizer applications per hectare.<sup>43/</sup>

There is no reason to believe that the rice to fertilizer price relationship is any less crucial in its effect in the Dominican Republic. Over 90 percent of the area planted to rice is fertilized.<sup>44/</sup> However, over half this area is receiving less than the recommended applications.<sup>45/</sup> The recommendation is for an initial application of a complete fertilizer and a supplemental application of nitrogen. Fertilizer is the most expensive purchased input for the Dominican rice farmer. Fertilizer prices are not under government control, nor are other production inputs, except the price of rice seed and irrigation water. In 1977 fertilizer accounted for 20.7 percent of the cash costs of rice production, second only to contract labor at 31.7 percent. For the entire crop sector fertilizer represented only 12.5 percent of cash costs.<sup>46/</sup>

Table 8 gives rice prices, fertilizer prices, and the ratio of rice to fertilizer prices. Similar data for the United States are presented for comparative purposes. The available farm-level fertilizer price series for the Dominican Republic only goes back to 1976, and that information was only obtained after considerable effort. The price of

46 percent urea was chosen because it is widely used as the supplemental nitrogen application on rice. In 1976, the Dominican rice to fertilizer price ratio was highly favorable in comparison to the U.S. The deterioration of this ratio between 1976 and 1981 is striking. INESPRES's milled rice purchase price increased 24 percent during that period, but the price of 46 percent urea increased 108 percent.

In comparison, the price of urea only increased by 47 percent in the U.S. Because of the higher price increase for urea and the substantially lower price increase for rice in the Dominican Republic, the Dominican rice-fertilizer price ratio declined relative to that in the U.S. In 1980 and 1981, the ratio was less favorable than in the U.S.

For the four complete fertilizer mixes for which price data were available from 1976 to 1981 for the Dominican Republic, the increase averaged 86 percent. The price increase for urea seems to have been higher than for other fertilizers. Nevertheless, even at 86 percent, the price increase is over three times greater than the rice price increase.

Dominican rice producers have consistently complained about increases in their cost of production. Fertilizer prices undoubtedly overstate the overall inflation rate faced by the farmer, though. For example, the overall consumer price index for the country only increased 46.5 percent between 1976-1977 and 1981.<sup>47/</sup> This rate of increase is still well above the rate of increase in INESPRES's rice purchase price, though.

There was a sharp worldwide increase in fertilizer prices between 1976 and 1981. However, the even more rapid increase in prices in the

Dominican Republic than in the U.S. must be explained by indigenous factors. All fertilizer materials are imported into the Dominican Republic. There are only a handful of companies, all private, involved in fertilizer marketing. There are two blenders, who import bulk materials, FERQUIDO and FERSAN. Both sell at wholesale and retail. There are two other importers of bagged, granulated products, Kettle y Almanzar and F. R. Harman.<sup>48/</sup>

While the farm-level price of 46 percent urea increased 108 percent, as shown in Table 8, the f.o.b. import price of the same fertilizer went up only 52 percent between 1976 and 1981. The latter increase was very close to the 47 percent change experienced in the U.S. during the same period. Because the import price increased significantly less than the domestic price of urea, the margin between the import and farm-level price of 46 percent urea increased from 38 percent of the import price in 1976 to 89 percent in 1981.<sup>49/</sup> The small number of suppliers raises questions of oligopolistic pricing practices, which deserves further study.

#### POLICY IMPLICATIONS

The evidence indicates that the Institute of Price Stabilization has been quite successful at stabilizing prices. Under INESPRES's control, though, domestic rice prices appear to be suppressed below the free market level to the benefit of consumers and the detriment of producers. Artificially low commodity prices act as an implicit tax on agriculture. In the long-run, supply, and hence the consumer, suffers from inadequate agricultural prices.

Rice prices in the Dominican Republic, adjusted for the overvalued exchange rate, are below comparable world market (import) price levels, which would prevail in an open, free market economy. This suppression of prices below their free market equilibrium, which would accurately reflect the relative scarcity of products in the economy, creates inefficiencies and retards growth. The magnitude of the price distortion is not on the catastrophic scale witnessed in some Third World countries, though. Dominican rice production increased, after all, at a highly respectable rate in the 1970's. Recent price increases also provide an indication that the government may be achieving a growing awareness of the need to increase rice prices to promote production increases. In October 1981, INESPRES's purchase price for milled rice was increased approximately 7 percent.

A major element of distortion is introduced into the foodgrain sector by the increasing overvaluation of the Dominican peso at the official exchange rate. The overvalued exchange rate causes foodgrain imports to be underpriced in relation to domestic production. Imports of rice and wheat would be less with an equilibrium exchange rate and INESPRES would be prompted to increase domestic producer prices. INESPRES's privileged access to Central Bank dollars at the official rate subsidizes its rice imports and, hence, biases the Institute's policies towards a heavier reliance on imports than would otherwise occur. INESPRES's optimum institutional behavior, therefore, diverges from the social optimum in terms of economic efficiency.

Short of a devaluation, much the same effect can be achieved on INESPRES's operations by restricting its access to dollars from the

Central Bank. The severe foreign exchange situation has forced the government to take exactly this action. In June 1981, INESPRES was restricted to RD\$100 million of official exchange. In December 1981, the allowance was cut to RD\$80 million for 1982. By forcing INESPRES onto the parallel exchange market, the Institute must pay the full marginal cost of foreign exchange to the Dominican economy. The government could require that INESPRES finance all its imports through the parallel market.

Although commodity prices are controlled, fertilizer prices are not. The sharp increase in domestic fertilizer prices over the last several years has had a drastic impact on the rice-fertilizer price ratio and should be an issue of particular concern. The farm-level fertilizer price increases appear to be considerably in excess of that which can be explained by import costs. The Dominican Republic has only four fertilizer companies, which raises the issue of oligopolistic practices. A detailed analysis of fertilizer marketing is necessary before conclusions can be drawn, though.

Many developing countries are so sensitive to pressures from consumers that they pursue a strategy of low food prices to the detriment of domestic production. The Dominican Republic is subject to the same pressures. An increase in the producer rice price in the Dominican Republic must typically be accompanied by increased consumer prices. For example, the October 1981 rice purchase price increase was accompanied by a retail rice price increase.

Special concern must be given to the nutritional impact on low income consumers of increased food prices. The Dominican Republic,

however, has reached a per capita income level at which foodgrain prices need not be held at artificially low levels out of nutritional concerns for the majority of consumers. The largest number of the most impoverished households are rural, and many would benefit from the increased income stream generated by higher agricultural prices. In addition, consideration could be given to a targeted food program for those who need assistance in order to meet nutritional objectives. The current Public Sales Program (Ventas Populares) could be enlarged and redesigned so that the benefits reached primarily the poor.

If the Dominican Republic is to achieve its agricultural goals, including self-sufficiency in rice and reduced wheat imports, appropriate price and trade policies will have to be combined with the other elements of the country's agricultural development strategy. At a time when the country faces a serious trade deficit and foreign exchange shortage, it is increasingly unacceptable that the Dominican Republic should be a deficit producer of its staple foodgrain and that so much reliance should be placed on wheat imports.

## FOOTNOTES

1/ Instituto de Estabilizacion de Precios, Plan Operativo, 1982, "Programa De Arroz" (preliminary draft), Santo Domingo, p. 7.

2/ Secretaría de Estado de Agricultura (SEA), Plan de Desarrollo Agropecuario 1980-82, Santo Domingo, August 1979, pp. 76-81.

3/ Miguel Ceara Hatton, "Políticas de Comercialización Del INESPRES: 1978-1982," Santo Domingo, 1982, (mimeo made available to the author ) p. 67.

4/ Secretaría de Agricultura (SEA), op.cit., pp. 122 and 146. See also, Secretaría de Agricultura, Sub-Secretaría Técnica de Planificación Sectorial Agropecuaria, Plan Operativo, 1981, January 1981, pp. 12 and 15.

5/ See in particular, Theodore W. Schultz (ed.), Distortions of Agricultural Incentives, Bloomington: Indian University Press, 1978. Willis L. Peterson, "International Farms Prices and the Social Cost of Cheap Food Policies," American Journal of Agricultural Economics, Vol. 61, No. 1, February 1979, pp. 12-21.

6/ See in particular, G. Edward Schuh, "Effects of Some General Economic Development Policies on Agricultural Development," American Journal of Agricultural Economics, Vol. 50, No. 5, December 1968, pp. 1283-1293. And, G. Edward Schuh, "The Exchange Rate and U.S. Agriculture," American Journal of Agricultural Economics, Vol. 56, No. 1, February 1974, pp. 1-13.

<sup>7/</sup> World Bank, World Development Report, 1981, Washington, D.C., August 1981, p. 134.

<sup>8/</sup> United States Embassy, Santo Domingo, U.S. Department of State, "Foreign Economic Trends and Their Implications for the U.S.," February 1981, p. 3.

<sup>9/</sup> Norberto A. Quezada, Endogenous Agricultural Price and Trade Policy in the Dominican Republic, Ph.D. Thesis, Purdue University, August 1981, p. 219. In both cases the actual independent variable used was total consumption expenditure.

<sup>10/</sup> The extraction rate for flour from wheat is .72. One pound of bread flour contains 1656 calories; one pound of milled white rice contains 1647 calories. Therefore, one pound of wheat is equivalent to  $.72 (1656/1647) = .72$  lbs. of rice in caloric value. See, Food and Agricultural Organization, United Nations, FAO Trade Yearbook, 1979, p. 5. U.S. Department of Agriculture (USDA), Agricultural Research Service, Composition of Food, Agricultural Handbook No. 8, revised edition, December 1963. The protein content of white flour is higher than polished rice, but because of a better amino acid distribution the usable protein in rice is substantially higher. Rice also contains more niacin and calcium. See, Eileen T. Kennedy, Mohamed el Lozy, and Stanley Gershoff, "Nutritional Need," pp. 17-21 in James E. Austin (ed.), Global Malnutrition and Cereal Fortification, Ballinger: Cambridge, MA, 1979.

<sup>11/</sup> Lehman B. Fletcher and Eric Graber, Economic Growth, Equity, and Agricultural Development in the Dominican Republic, Monograph No. 12,

International Studies in Economics, Department of Economics, Iowa State University, Ames, IA, May 1980, p. 221.

12/ Secretaría de Estado de Agricultura, Subsecretaría Técnica de Planificación Sectorial Agropecuaria, mimeo tables, January 1982.

13/ Lehman B. Fletcher and Eric Graber, op.cit., p. 222.

14/ U.S. Department of Agriculture, Foreign Agricultural Circular FG-38-80, Washington, D.C., December 19, 1980.

15/ Gary S. Kemp, "An Agroeconomic Land Resource Assessment for Rice Production in the Dominican Republic," unpublished Ph.D. dissertation, Michigan State University, 1980.

16/ U.S. Department of State, U.S. Embassy, Santo Domingo, "Agricultural Attache's Report," DR-1061, September 22, 1981, p. 6.

17/ Lehman B. Fletcher and Eric Graber, op.cit., p. 300.

18/ U.S. Department of Commerce, International Trade Administration, "Marketing in the Dominican Republic," Overseas Business Reports, OBR 80-03, March 1980.

19/ U.S. Department of Commerce, International Trade Administration, "Foreign Economic Trends and Their Implications for the United States," FET 81-015, February 1981.

20/ César L. Romero, "Solución al Problema de Divisas," Listin Diario (a major Santo Domingo newspaper), January 28, 1982, p. 6.

21/ For a full discussion of this methodology, see Norberto Quezada, op.cit., pp. 70-86 and 97-105.

22/ Ibid., p. 65.

23/ Ibid., p. 44.

24/ See in particular, Arthur J. Mann, "Agricultural Price Stabilization Policy in a Developing Economy: The Case of the Dominican Republic," Social and Economic Studies Journal, Vol. 26, No. 2 (1977), pp. 190-201.

25/ INESPRES, "Memoria de Las Actividades Mas Relevantes Desarrolladas en el Año 1981," Santo Domingo, January 1982.

26/ Arthur Mann, op.cit., p. 191.

27/ INESPRES, "Memoria de Las Actividades ...".

28/ Norberto Quezada, op.cit., p. 165 and INESPRES, "Programa De Arroz," mimeo made available to the author, 1982, p. 8.

29/ Norberto Quezada, op.cit., p. 142.

30/ Ibid., pp. 148-192.

31/ INESPRES, "Memoria de las Actividades ... 1981," p. 14.

32/ Miguel Ceara Hatton, op.cit., pp. 17-18.

33/ INESPRES, Statistical tables made available to the author -- to serve as input to the Boletin Estadistico: 1981, Spring 1982.

34/ INESPRES, "Memoria de las Actividades ... en 1981," p. 37.

35/ Based on information supplied to the author by INESPRES on freight costs for shipments of rice and wheat 1979-1981.

36/ INESPRES, El Departamento de Estadísticas, "Compras de Divisas para Importacion," (table made available to author ).

37/ Wheat has been the major commodity imported under concessional terms, primarily through U.S. Public Law 480, Title 1. U.S. Department of Agriculture, Foreign Agriculture Service, Food for Peace: 1979 Annual Report on Public Law 480, Washington, D.C., 1981, Table 9.

38/ Quezada, op.cit., pp. 63-65.

39/ INESPRES, "Serie historica de las operaciones de comercializacion," (Statistical tables made available to the author by INESPRES, 1982).

40/ Norberto Quezada, op.cit., p. 168.

41/ The data necessary to calculate profits on wheat and flour imports by Molinos Dominicanos are not readily available.

42/ C. Peter Timmer, "The Political Economy of Rice in Asia: Lessons and Implications," Food Research Institute Studies, Vol. XIV, No. 4, (1975), pp. 419-431.

43/ C. Peter Timmer and Walter P. Falcon, "The Political Economy of Rice Production and Trade in Asia," in Lloyd G. Reynolds (ed.), Agriculture in Development Theory, New Haven: Yale University Press, 1975, pp. 373-408.

44/ Joe Free, Thomas H. Foster, and Conrad Kresge, Dominican Republic Fertilizer Situation, National Fertilizer Development Center, Tennessee Valley Authority, Muscle Shoals, Alabama, January 1976, p. 32.

45/ Banco Agricola, Departamento de Programcion, Sección de Politica Crediticia, Costos de Produccion de Los Cultivos Permanentes Y Temporeos Que Se Fomentan En La Republica Dominicana, February 1981.

46/ Norberto Quezada, op.cit., p. 45.

47/ Banco Central de la Republica Dominicana, Boletin Mensual,  
Vol. 35, No. 9 (September 1981), p. 155.

48/ Joe Free, Thomas H. Foster, and Conrad Kresge, op.cit., p. 46.

49/ Oficina Nacional de Estadística, "Importación de Trigo Y  
Fertilizantes," CETC #145 (data tables), Santo Domingo, April 16, 1982.

FIGURE 1. Foreign Currency Market

Rate of Exchange  
(pesos: dollars)

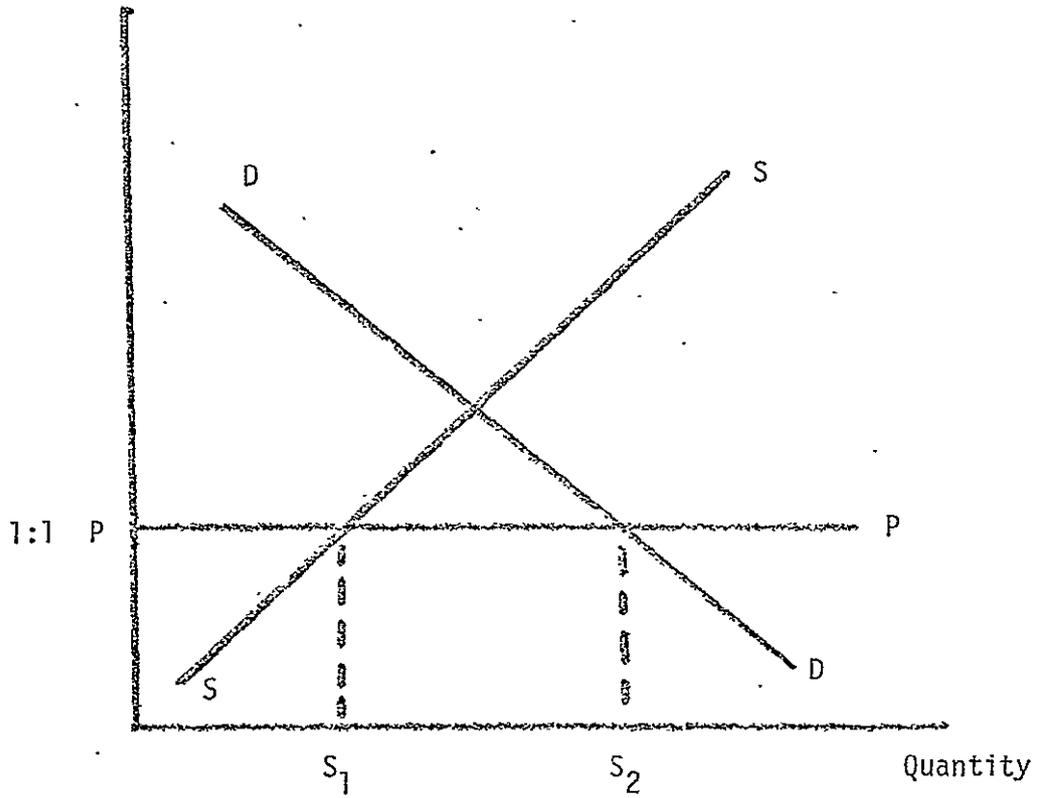
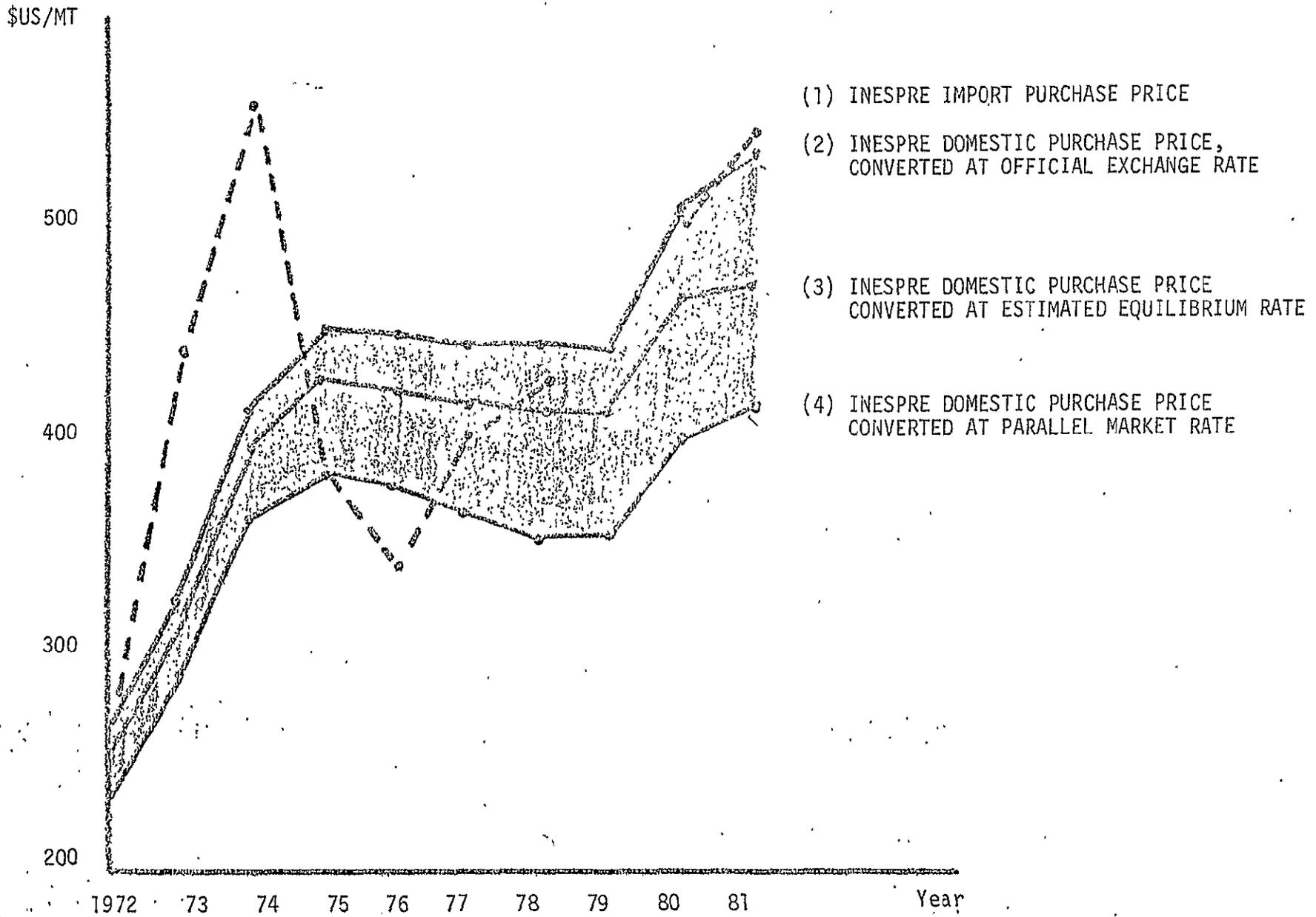


FIGURE 2. Rice Price Comparison



SOURCE: See Tables 4 and 5.

TABLE 1. Production and Imports (in 1000 MT)

	(1)	(2)	(3)	(4)	(5)	(6)
	Rice Production (milled equivalent) <u>a/</u>	Rice Imports (milled) <u>a/</u>	Wheat Imports (+ flour in wheat equivalent) <u>b/</u>	Rice Equivalent of Wheat Imports <u>c/</u>	Self- Sufficiency Ratio for Rice <u>d/</u>	Self- Sufficiency Ratio for Foodgrain <u>e/</u>
1970	139	1	79	57	.99	.71
1971	137	--	98	71	1.00	.66
1972	139	9	118	85	.94	.60
1973	149	30	121	87	.83	.56
1974	169	73	100	72	.70	.54
1975	142	50	126	91	.74	.50
1976	190	32	163	117	.86	.56
1977	180	65	111	80	.73	.55
1978	200	13	160	115	.94	.61
1979	220	--	144	104	1.00	.68
1980	230	40	158	114	.85	.60
1981	260	62	163	117	.81	.59

a/ SOURCE: U.S. Dept. of Agriculture, Foreign Agric. Service, Foreign Agricultural Circular, FG-38-80, Washington, D.C., December 19, 1980.

b/ SOURCE: Food and Agricultural Organization, United Nations, FAO Trade Yearbook (various issues). 1981 data: Secretaria de Estado de Agricultura, Subsecretaría Técnica de Planificación Sectorial Agropecuaria (mimeo).

c/ Wheat imports converted to their rice equivalent in terms of caloric value. See footnote 10 in the text.

d/ Rice Production/Rice Production + Rice Imports

e/ Rice Production/Rice Production + Rice Imports + Rice Equivalent of Wheat Imports.

TABLE 2. Foreign Exchange Rates (Pesos: Dollar)

	(1) Rate in the Parallel Market	(2) Estimated Equilibrium Rate
1972	1.119	1.037
1973	1.132	1.041
1974	1.140	1.043
1975	1.180	1.056
1976	1.199	1.062
1977	1.220	1.068
1978	1.252	1.078
1979	1.225	1.070
1980	1.261	1.091
1981	1.291	1.137

SOURCE: For 1972-1979, Norberto Quezada, Endogenous Agricultural Price and Trade Policy in the Dominican Republic, Ph.D. dissertation, Purdue University, August 1981, p. 105. For 1980 and 1981, Banco Central, Boletin Mensual, Santo Domingo, September 1981. The figure for 1981 was estimated with monthly data for January-August 1981 and January 1982.

TABLE 3. Ratio of Farm-Level Rice Price to INESPRES's Milled Purchase Price

<u>Year</u>	<u>Ratio</u>
1972	.57
1973	.56
1974	.56
1975	.56
1976	.55
1977	.60
1978	.62
1979	.55
1980	.55
1981	n.a.

SOURCE: The farm-level rice price series was made available by the Agricultural Economics Unit of the Central Bank. For the milled purchase price see Table 4, Column (4).

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TABLE 4. Comparative Foodgrain Prices<sup>a/</sup>

Year	(1) INESPRE Rice Import Purchase Price <u>b/</u>	(2) New Orleans F.O.B. Rice Price <u>c/</u>	(3) Parallel Market Rice Import Price <u>d/</u>	(4) INESPRE Domestic Rice Purchase Price <u>e/</u>	(5) INESPRE Rice Sales Price <u>f/</u>	(6) Wheat Import Price <u>g/</u>	(7) Rice Equivalent Wheat Price <u>h/</u>
1972	252	216	282	266	274	67	93
1973	476	397	539	327	330	135	188
1974	560	556	638	417	386	135	188
1975	388	419	458	455	455	181	251
1976	340	309	408	455	458	---	---
1977	405	333	494	448	454	197	274
1978	426	399	534	448	447	149	207
1979	---	381	---	443	451	150	208
1980	502	497	633	509	521	180	250
1981	545	573	703	536	560	189	262

<sup>a/</sup> RD\$(pesos) per metric ton (MT).

<sup>b/</sup> Total value of rice import purchases divided by quantity. SOURCE: INESPRES, Boletín Estadístico, 1980 and "Memoria de las Actividades Mas Relevantes Desarrolladas en el Año 1981", January 1981.

<sup>c/</sup> Milled Zenith No. 2, medium grain, miller to distributor, f.o.b. New Orleans. SOURCE: International Monetary Fund, International Financial Statistical Yearbook, 1980. The 1980 and 1981 data are U.S. No. 1, medium grain, f.o.b. mills, Southwest Louisiana and Arkansas (data which links well with IMF series). SOURCE: USDA, Agricultural Marketing Service, Rice Outlook and Situation, September 1981 and The Wall Street Journal (various issues). Converted to pesos at the official exchange rate.

<sup>d/</sup> Column (1) import price expressed in the peso (RD\$) cost of dollars purchased on the parallel exchange market.

<sup>e/</sup> Total value of domestic purchases divided by quantity for milled white rice. SOURCE: Same as Column (1), see b/.

<sup>f/</sup> Total value of INESPRES's rice sales divided by quantity. SOURCE: Same as Column (1), see b/.

<sup>g/</sup> Value of wheat (grain) imports divided by quantity. SOURCE: Oficina Nacional de Estadística, CETC #145 (data sheets) -- 1976 is not available.

<sup>h/</sup> Column (6) wheat import price with wheat converted to its rice equivalent in terms of caloric value at a .72 rate. See Table 1 and text footnote 10.

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TABLE 5. INESPRES Purchase Price for Milled Rice in Dollars (US\$/MT)

	Conversion at Official Exchange Rate <u>a/</u>	Conversion at Parallel Market Rate <u>b/</u>	Conversion at Estimated Equilibrium Rate <u>b/</u>
1972	266	237	256
1973	327	289	314
1974	417	366	400
1975	455	386	431
1976	455	379	428
1977	448	367	419
1978	448	358	416
1979	443	362	414
1980	509	404	466
1981	536	415	472

a/ See Table 4, Column (4).

b/ See Table 2.

TABLE 6. INESPRES Percentage Margins on Rice Sales

	(1) Domestic Margin <sup>a/</sup>	(2) Import Margin <sup>b/</sup>
1972	2.92	8.03
1973	.91	-44.24
1974	-8.03	-45.08
1975	0.0	14.73
1976	.66	25.76
1977	1.32	10.79
1978	-.22	4.70
1979	1.77	---
1980	2.30	3.65
1981	4.29	2.68
Average	.59	-2.11

<sup>a/</sup> Difference between the domestic sales and purchase price as a percent of the sales price. A minus sign indicates the sales price was below the purchase price.

<sup>b/</sup> Difference between the domestic sales price and import price, at the official exchange rate, as a percent of the sales price.

SOURCE: See Table 4.

TABLE 7. The Profitability of INESPRES's Operations: by Major Commodity (1972-1981 totals)<sup>a/</sup> (in millions of pesos)

	Value of:				gross profits <u>b/</u>
	domestic purchases	imports	sales		
1. white rice	709.4	172.2	860.4	-21.2	
2. maize	6.5	112.2	118.3	-.4	
3. sorghum	4.4	1.0	5.5	.1	
4. red beans	13.5	30.5	44.0	0	
5. black beans	7.4	--	7.2	-.2	
6. peanut oil	--	62.5	71.7	9.2	
7. soybean oil	--	105.0	124.4	19.4	
8. cottonseed oil	--	102.0	125.2	23.2	
9. sugar	240.8	--	362.5	121.7	

<sup>a/</sup> SOURCE: INESPRES, "Serie historica de la operaciones de comercializacion" (Statistical tables made available to the author by INESPRES, 1982).

<sup>b/</sup> Gross profits are defined as the value of sales minus the cost of domestic and imported purchases. Because a ten year period was dealt with, the change in stocks was not a concern.

TABLE 8. Rice and Fertilizer Prices (US\$/MT: monetary conversion at official exchange rate)

Year	Dominican Republic:			United States:		
	INESPRE Milled Rice Price <u>a/</u>	46% Urea (D.R.) <u>b/</u>	Ratio Rice/Fertilizer Price	U.S. Milled Rice Price <u>c/</u>	46% Urea (U.S.) <u>d/</u>	Ratio Rice/Fertilizer Price
1976	455	151	3.01	308	184	1.67
1977	448	168	2.67	338	186	1.82
1978	448	187	2.40	396	186	2.13
1979	443	227	1.95	386	203	1.90
1980	509	298	1.71	497	246	2.02
1981	<u>566</u>	<u>314</u>	1.80	<u>573</u>	<u>271</u>	2.11
% change (76-81)	+24%	+108%		+86%	+47%	

a/ See Table 4 for source.

b/ Secretaría de Agricultura (SEA), Departamento de Fomento Arrocerero, mimeo, March 2, 1982 (prices at SEA run agricultural input stores).

c/ U.S. Department of Agriculture, Economic Research Service, Rice Outlook and Situation (various issues). Price is for Milled, Medium-grain, U.S. No. 2, f.o.b. Southwest Louisiana Mills (in 100 lb. bags). 1981 prices are for Arkansas Mills (the two price series are equivalent), from The Wall Street Journal (various issues).

d/ U.S. Dept. of Agriculture, Economic Research Search, Crop Reporting Board, Agricultural Prices: Annual Summary (various issues). Price given is average for March 15, May 15, October 15, and December 15.

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APPENDIX A:

THE EFFECT OF TRADE AND CURRENCY EXCHANGE RATE  
POLICY ON THE DOMINICAN RICE ECONOMY:  
AN ECONOMETRIC ANALYSIS

to

AN ANALYSIS OF FOODGRAIN PRICE AND TRADE  
POLICY IN THE DOMINICAN REPUBLIC

The University of Minnesota  
Dominican Republic Price Policy  
Analysis Team\*  
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THE EFFECT OF TRADE AND CURRENCY EXCHANGE RATE  
POLICY ON THE DOMINICAN RICE ECONOMY:  
AN ECONOMETRIC ANALYSIS

by

Terry Roe

An econometric model of the Dominican rice economy was carried out to provide key insights into the effect of Dominican rice import-export and exchange rate policies on the Dominican rice economy during the period 1972 to 1979. More specifically, the objectives of this analysis are (a) to assess whether government intervention in the import-export market for rice during the period 1972 to 1979 has given rise to distortions in the price of rice and in the levels of rice consumption and production, (b) to obtain insights into the extent to which the domestic rice economy has been sensitive to currency exchange rates and (c) to evaluate whether a prohibition on rice imports and exports during the 1972 to 1979 period would have given rise to substantially higher consumer rice prices and lower levels of rice consumption relative to observed rice price and consumption levels.

The Dominican rice economy is analyzed in isolation of farm level markets which compete for resources allocated to rice production and in isolation of consumer level markets which are affected by and in turn affect the market for rice. For these and other reasons mentioned below the inferences drawn from the analysis are subject to several limitations. Nevertheless, the analysis yields plausible results and, in essence, suggests that (a) in the latter part of the 1970's, government intervention in the import-export market for rice did not have a large effect on the price of rice, nor on the levels of rice produced and consumed, (b) the rice economy was becoming increasingly

sensitive to possible currency exchange rate distortion during the latter part of the 1970's and (c), if a prohibition on foreign trade in rice had existed during the 1970's the results suggest that domestic rice production would have increased so that the impact on rice consumers would have been rather small especially in the latter part of the 1970's.

The analytical framework and procedures used in the analysis are present in the next section. Then, the analysis is presented in the order of the objectives of the study listed above. A summary of the analysis and implications to the future of the Dominican rice economy concludes the paper.

## II. ANALYTICAL FRAMEWORK

It is useful to show diagrammatically the features of the Dominican rice market that is of importance to our analysis. The retail price of rice ( $P_r$ ), the quantity of milled rice produced and marketed domestically ( $r \cdot Q_f$ ), (where  $r$  denotes the conversion of rough to milled rice) the quantity of milled rice consumed ( $Q_r$ ) and the amount of rice import ( $Q_I$ ) are depicted in figure A.1.a. The broken line represents the retail level supply function for milled rice produced in the country. This function was not estimated directly. Instead, it is derived from the farm level supply functions and the observed marketing margin for domestically produced rice. The solid line represents the domestic demand for milled rice at the retail level; the coefficient estimates of the per capita demand function appear in Table A.1. The retail level price of rice depends on the demand for rice, level of imports and on retail supply of rice from domestic production. Retail rice prices are also influenced by the costs associated with marketing domestic rice and the costs (subsidies) associated with the making of imported rice available to retail outlets.

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Figure A.1.a. Retail level market for milled rice

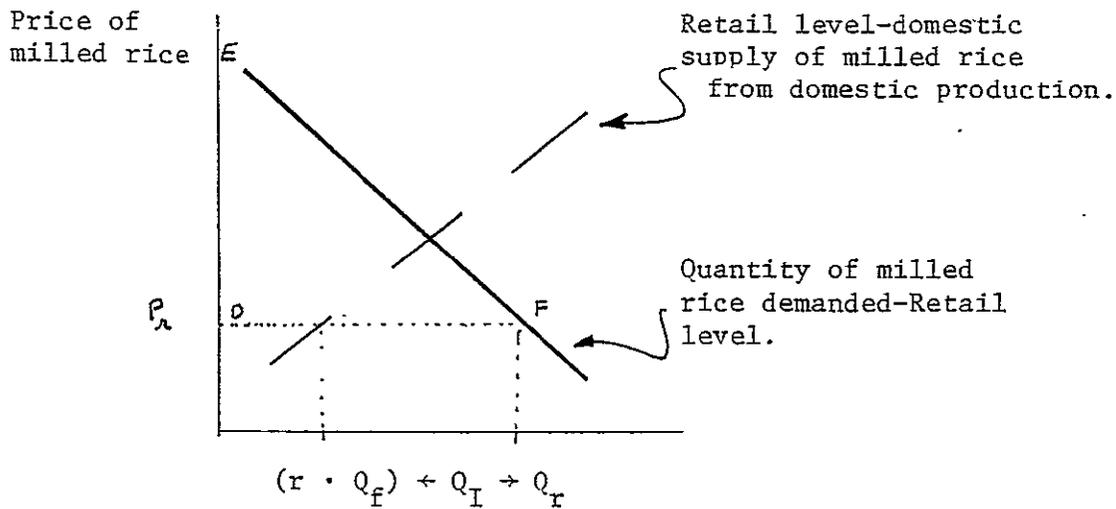


Figure A.1.b. Farm level market for rough rice

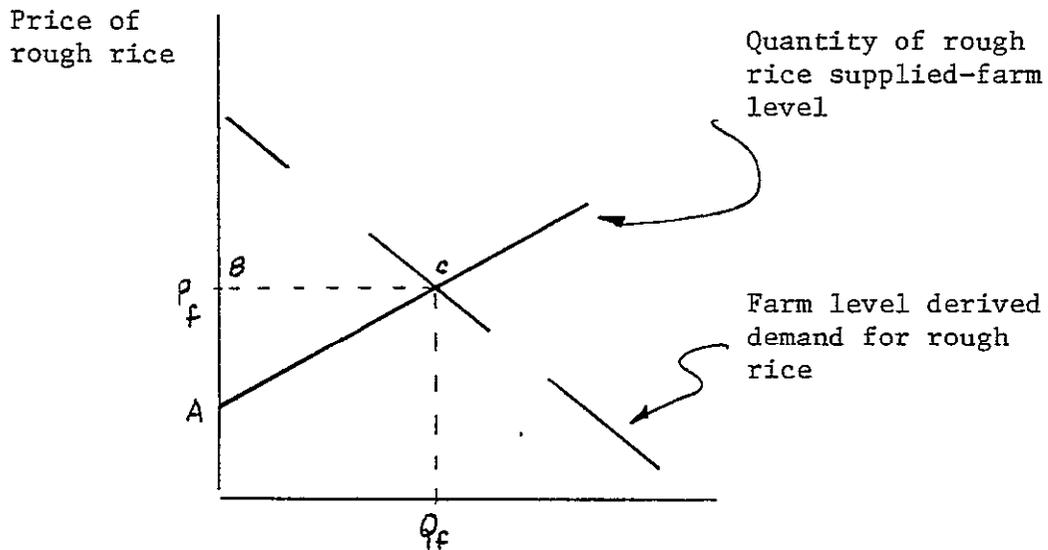


Table A.1. Coefficient estimates of annual milled rice demand, Dominican Republic, 1966-1980

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Dependent Variable: log of per capita  
rice consumption in M.T.

<u>Independent Variables</u> <sup>a/</sup>	<u>Coefficients</u>	<u>T-Ratio</u>
Log of retail price of rice/M.T.	-.857	-3.095***
Log of retail price of bread/M.T.	.246	1.116
Log of retail price of beans/M.T.	-.106	-.338
Log of consumer price of plantains/ 1000 units	.215	1.731*
Log of per capita expenditures in pesos	.503	1.769*
Constant Term	3.984	9.178***

R<sup>2</sup>: 75

D.W.: 1.8

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a/ All independent variable are divided by The Consumer Price Index.

"\*" and "\*\*\*" indicate statistical significance at the 90 and 99 percent level respectively.

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The retail level demand for milled rice appearing in figure A.1.a was estimated by regressing the logarithm of the quantity of milled rice consumed per capita on the logarithm of the retail prices of rice, bread, beans, plantains and per capita expenditures (Table A.1). The estimated coefficients can be interpreted as demand and income elasticities respectively. The results suggest that plantains are substitutes for rice in the Dominican diet. The coefficients associated with the price of bread and beans are not statistically significant, i.e., no inferences can be drawn from the model with regard to the effects of bread and bean prices on rice consumption.

The results also suggest that rice consumption is sensitive to the price of rice; on average, a one percent increase in rice price tends to decrease the per capita consumption of rice by about .86 percent. Rice consumption also appears to be sensitive to per capita expenditures, increasing by an average of about .5 percent per capita per one percent increase in total food expenditures. While they seem reasonable, the elasticities must be interpreted with caution because of the rather limited number of data points upon which these estimates are based.

Figure A.1.b depicts the farm level market for rough rice. The solid line represents the supply of rough rice; the coefficient estimates of which appear in Table A.2. The broken line represents the demand, on the part of rice millers, for rough rice at the farm level. The demand for rough rice at the farm level was not estimated and, hence, it is depicted as a broken line. As depicted in figure A.1.b the price of rough rice ( $P_f$ ) and the quantity of rough rice supplied ( $Q_f$ ) reflects the forces of supply and the derived demand for rice. The derived demand for rice at the farm level reflects the demand for rice at the retail level. It can shift depending on

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Table A.2. Coefficient estimates of annual production of rough rice regressed on real producer prices of rice, beef, rice production lagged one year and time trend, Dominican Republic, 1966 to 1981

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Dependent Variable: 1000's of Metric  
Tons of Rough Rice

<u>Independent Variables</u>	<u>Coefficients</u>	<u>T-Ratio</u>
Producer price of rough rice Pesos/M.T. ÷ wholesale index	.978	2.051*
Producer price of beef Pesos/M.T. ÷ wholesale index	-.114	-2.760**
Production of rough rice lagged one year	.679	3.606***
Time Trend	7.918	3.146***
Constant Term	-53.322	-.563

R<sup>2</sup>: 99.0

D.W.: 2.2

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"\*" "\*\*" "\*\*\*" indicate statistical significance at the 90, 95 and 99 percent levels, respectively.

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the cost of milling and transporting of rice and on the other marketing costs (and possible subsidies) associated with making milled rice available to consumers. The derived demand for rough rice also depends on the imports of milled rice. As the imports of milled rice increase, the price of milled rice at the retail level declines (figure A.1.a) causing the derived demand for milled rice to shift to the left; i.e., decreasing the farm level demand for domestically produced rice. Overvalued currency exchange rates also serve to shift the derived demand for rough rice to the left because lower exchange rates encourage imports of milled rice, which in turn, causes the retail price of rice to decrease.

The supply of rough rice depicted in figure A.1.b. was estimated by regressing the amount of rough rice produced as a linear function of the producer price of rough rice, the producer price of beef, rice production lagged one year and a time trend (Table A.1.). The results suggest that the production of rice is responsive to the price of rice (.978) with a direct price elasticity of .62 percent. The results also imply that the production of rice competes with resources allocated to the production of beef. The lagged supply response result (.679) seems reasonable in light of Dominican crop rotation practices. The time trend variable captures the effects of other unobservable variables correlated with time, which may include technical efficiency gains from the use of new varieties and yield increasing agronomic practices.

Essentially, the procedure followed is to use these two equations in the context of the markets depicted in figures A.1.a and A.1.b to simulate a "free trade" in rice policy, objective (a); alternative exchange rate policies, objective (b); and a policy of a prohibition on foreign trade in rice,

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objective (c), for each year 1972-1979. The results of the simulations are then contrasted to the observed level of rice prices, production, consumption and import levels of rice. Attention is focused on objective (a) in the next section.

### III. EFFECT OF RICE IMPORTS ON THE RICE ECONOMY

The effect of "free" export/import market trades in rice are simulated using the estimated farm level rice supply and retail level rice demand equations.<sup>1/</sup> The procedure involves estimating, for each year 1972 to 1979, the price that would prevail at the farm level if domestic rice producers were required to compete with rice available in the world market. In this instance, the farm level price of rice would be approximately equal to the price paid by INESPRES for imported rice (Column 1, table 4) at official exchange rates, less the price spread between the price paid by INESPRES for farm level rice and INESPRES's rice sales price to domestic retail distributors of rice, in rough rice equivalents.

Note the three major assumptions implied by the calculation; imports of rice are at (i) official exchange rates, (ii) the price spread implies that INESPRES maintains the same tax/subsidy to the performance of rice marketing functions that it has in the past, (iii) that the costs of marketing services associated with making imported rice available to distributors and retailers

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<sup>1/</sup> Free trade in the context of this study can be interpreted as the government requiring INESPRES and other government organizations involved in rice import/export activity to obtain rice from either the world market or from domestic rice producers, whichever is the least cost source of rice, after adjustments are made for milling costs, transportation costs and all of the other costs associated with making rice available to consumers.

of rice are the same for domestically produced rice as for imported rice. The effect of assumption (iii) is to cause our estimates of producer prices under free trade to be slightly lower than might actually prevail under free trade.

The results from simulating the effects of free foreign trade on producer level prices for rice, the percent changes in the quantity of rice produced and percent changes in producer revenue appear in Table A.3. A comparison of columns (1) and (2) suggest that INESPRES's rice policy has served to keep producer level prices higher than world market prices for six of the eight years during the period 1972 to 1979. The most significant distortions occurred in 1973-1974 when rising world market prices for rice were not passed on to rice producers.

The estimated percent change in rice production if farm level prices had been at their world market counterpart levels are reported in Column (4). These estimates are based on the results reported in Table A.1, hence they also depend on the observed level of beef prices, lagged production effects on supply and time trends in rice production. The results suggest that the quantity of rice produced would have only increased beyond observed levels during 1973 and 1974. Otherwise, it is estimated that the amount of rice produced relative to the amount actually produced would have decreased, ranging from a decrease of 6.6 percent in 1972 to a decrease of 13.4 percent in 1976. Results for the most recent years, 1977 to 1979 suggest, given the reliability of our empirical framework, that free trade under this official exchange rates have had virtually no effect on the amount of rice produced.

Table A.3. Simulation results of the effect of free foreign trade in rice on the farm level price and quantity of rough rice produced and producer revenues, Dominican Republic, 1972, 1979.

Column No.	Farm level price of rice per metric ton			Percent change in quantity of rice produced under free trade (4) <sup>c/</sup>	Percent change in estimated revenues to rice producers <sup>d/</sup> (5)
	Nominal Reported Price (1)	Estimated World Mkt. Equivalent			
		Nominal (2) <sup>a/</sup>	Real (3) <sup>b/</sup>		
Year					
1972	152	137.7	133.82	-6.6	-12.3
1973	182	276.9	233.87	37.1	80.9
1974	232	345.10	244.23	26.1	73.1
1975	253	209.45	188.80	-8.6	-17.4
1976	248	171.30	103.69	-13.4	-28.0
1977	269	237.15	126.41	-3.0	-10.0
1978	276	262.36	141.35	-3.4	-4.1
1979	286	294.45	145.26	-0.1	2.2

a/ Obtained by first subtracting the INESPRES rice sales price from column (1). This value equals the price spread which is then subtracted from the INESPRES and rice import price, in rough rice equivalents.

b/ Column (2) divided by the Dominican Republic wholesale price index.

c/ These values are obtained by substituting Column (3) into the supply equation reported in Table A.1 and computing percent change in quantity produced relative to reported production levels.

d/ These values are the producer surplus estimates (area ABC Figure A.1.b) under free trade relative to producer surplus estimated from reported prices.

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Accordingly, estimated changes in producer revenues (Column 5) suggest that producers were implicitly taxed fairly significantly during 1973 and 1974, when rising world market prices were not passed on to Dominican rice producers. Otherwise, revenues to rice producers tend to be higher than revenues would have been under foreign free trade. Again, in the recent years 1978, 1979, the results suggest that rice farmers are receiving revenues that are approximately equal to revenues they would otherwise realize under free trade at official exchange rates.

Results from simulating the effect of free foreign trade on rice imports are reported in Columns (2) and (3) of Table A.7. With the exception of years 1973 and 1974, the results suggest that rice imports under free trade would have exceeded the level of rice imports actually observed. For the years 1972, 1976, 1977 and 1978, rice imports would have more than doubled under free trade. It should be kept in mind that actual rice imports are a fairly small portion of total rice consumption, though.

The estimated effects of free foreign trade on rice consumption is reported in Table A.4. A comparison of Columns (1) and (2) reveals that with the exception of the years, 1973, 1974 and 1979, Dominican rice import policy has served to maintain consumer price levels above levels that are estimated to otherwise prevail under free trade. With the exception of the mentioned years, the difference in prices, however, appears not to be substantial. Since the retail level prices of rice would have likely been lower under free trade than observed price levels, the amount of rice consumed under free trade would have increased, with the exception of the years 1973, 1974 and 1978 (Column 4, Table A.4). Again, with the exception of 1973, 1974, the percent increase in the amount of rice consumed under free trade appears to be rather small.

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The percent change in "consumer surplus" (area EDF, figure A.1.a) and consumer expenditures on rice are reported in Columns (5) and (6) of Table A.4. Consistent with the above results, free trade in rice, while lowering prices and increasing rice consumption, would have slightly increased total consumer expenditures for rice ranging from 5.53 percent in 1979 to 25.39 percent in 1974. The positive values reported in Column (5) suggest that consumers would have been "better off" under free trade during the years 1972, 1975, 1976, and 1977 and "worse off" otherwise. However, it should be kept in mind that, with the exception of 1973 and 1974 these values are small and, therefore, the empirical model may not be sufficiently sensitive to permit the drawing of inferences for the remaining values.

#### IV. EFFECT OF CURRENCY EXCHANGE RATES ON THE RICE ECONOMY

The effect of currency exchange rates on the consumption, production and foreign trade is complex. The approach employed here is to simply adjust the cif price of rice according to the peso/dollar exchange rates reported in the Dominican parallel currency market and according to the estimated peso/dollar equilibrium exchange rates (see table 2). Then, the analysis reported in the previous section is repeated. At the parallel market rate of exchange, our results almost surely overstate the effect of an overvalued currency on the Dominican rice economy. The results of the analysis based on the estimated equilibrium exchange rate are viewed as the "likely result" of the effect of overvalued exchange rates on the rice economy.

An understanding of the results reported in this section can be motivated by recalling that the results of the previous section established that, with the exception of 1973 and 1974, farm and consumer level prices would have

Table A.4. Simulation results of the effect of free foreign trade in rice on consumer level prices and quantity of rice consumed, effect on consumer welfare and consumer expenditures, Dominican Republic, 1972, 1979.

Column No.	Retail level price per metric ton			Percent change in quantity of rice consumed under free trade	Percent change in estimated consumer Rice	
	Nominal Reported Price	Estimated World Mkt. Equivalent Nominal	Real		Welfare	Expenditures
	(1)	(2) <sup>a/</sup>	(3) <sup>b/</sup>	(4) <sup>c/</sup>	(5) <sup>d/</sup>	(6) <sup>e/</sup>
Year						
1972	337.3	315.3	269.95	8.11	0.86	3.98
1973	399.0	545	405.51	-22.13	-4.67	3.48
1974	493.8	667.8	439.05	-33.37	-15.01	-25.39
1975	568.8	501.8	288.23	0.87	3.02	-17.83
1976	564.4	446.4	237.70	14.96	4.57	-11.54
1977	573.2	524.2	247.50	9.28	1.35	2.45
1978	564.4	543.4	247.79	-1.06	-0.18	-0.07
1979	557.7	570.7	238.29	0.73	-0.68	5.53

a/ INESPRES rice import price in milled rice plus the margin estimated from retailer to consumers.

b/ Column (2) divided by the consumer price index.

c/ These values are obtained by substituting Column (3) into the demand equation reported in Table A.2 and computing percent changes in quantity consumed relative to reported consumption levels.

d/ These values are the consumer surplus estimated (area EDF Figure A.1.b) under free trade relative to consumer surplus estimated from reported prices.

e/ These values are obtained by computing consumer rice expenditures under free trade and rice expenditures observed (computed by multiplying observed price by observed quantities of rice consumed) and then by computing percentage change.

been somewhat lower under free trade and rice imports would have increased. That is, the implied policy followed during the 1970's was to slightly restrict rice imports to levels lower than might prevail at official exchange rates. Estimated equilibrium and parallel market exchange rates suggest that the Dominican currency is overvalued relative to the U.S. dollar. Thus, an overvaluation of the Dominican currency will tend to lower the price of imported rice. Hence, the Dominican policy of maintaining an overvalued exchange rate for the years 1972-1979, has in part "cancelled out" the effects of importing less rice than would have been imported under free trade at official exchange rates. These are the essentials of the results reported below.

The simulation results of the effect of free foreign trade in rice at equilibrium and parallel currency exchange rates on rice producers is reported in Table A.5, the effect on rice consumers in Table A.6 and the effect on rice imports is reported in Table A.7. Relative to the amount of rice actually produced, the effect of free foreign trade in rice at the equilibrium and parallel market levels of currency exchange rates are reported in Columns (7) and (8), Table A.5. Primarily with the exception of 1973 and 1974, the estimated amount of rice that would have been produced under free trade at equilibrium exchange rates ranges from 2.11 percent to 10.62 percent less than the amount of rice actually produced. Hence, under a simulated policy of free trade at estimated equilibrium exchange rates, the estimated amount of rice that would have been produced is closer to the amount actually produced than under a simulated policy of free trade at official rates of exchange. In other words, the restraint placed on INESPRES's imports of rice at official exchange rates has served to slightly offset the effect of an overvalued currency on the rice economy.

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Table A.5. Simulation results of the effect of trade with different exchange rates in rice on the farm level price and quantity of rough rice produced and producer revenues, Dominican Republic, 1972-1979.

Year	Farm Level Price of Rice						Percent changes in quantity of rice produced under trade with different exchange rates <sup>c/</sup>		Percent changes in estimated revenues to rice producer with different exchange rates <sup>d/</sup>	
	Reported		Estimated World Market Equivalent With Different Exchange Rates							
	Nominal	Real	Nominal <sup>a/</sup>		Real <sup>b/</sup>		At Equilibrium rate	At parallel market rate	At Equilibrium rate	At parallel market rate
			At Equilibrium rate	At Parallel Market rate	At Equilibrium rate	At Parallel Market Rate				
Column	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
1972	152	147.72	143.76	157.19	139.71	152.76	-3.89	2.08	-7.20	4.68
1973	182	153.72	289.59	317.74	244.58	258.36	41.84	47.88	93.50	110.34
1974	232	164.19	360.75	396.06	255.31	280.30	30.30	39.72	84.77	112.45
1975	253	143.51	223.57	254.85	126.81	144.55	-5.72	0.83	-11.91	0.77
1976	248	150.12	185.00	215.28	111.99	130.31	-10.62	-4.49	-23.36	-27.96
1977	269	143.39	255.05	295.07	135.95	157.28	0.03	6.81	-4.51	8.86
1978	276	148.71	283.95	332.13	152.99	178.95	-0.21	7.02	2.45	17.84
1979	286	141.10	315.56	362.31	155.68	178.74	2.11	8.10	7.88	20.90

a/ INESPRES rice sales price less column (1) equals the price spread which is subtracted from INESPRES rice import price at different exchange rates in rough rice equivalents.

b/ Columns (3) and (4) divided by the wholesale price index, respectively.

c/ These values are obtained by substituting columns (5) and (6) into the supply equation reported in Table A.1 and computing respective percent changes in quantities supplies relative to reported supply levels.

d/ These values are the respective producer surplus estimated (area ABC Figure A.1.a) under free trade with different exchange rates relative producer surplus estimated from reported prices.

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Table A.6. Simulation results of the effect of trade with different exchange rates in rice on consumer level price and quantity of rice consumed, effect on consumer welfare, and consumer expenditures, Dominican Republic, 1972-1979.

Year	Consumer Level Price of Rice						Percent changes in quantity of rice consumed under trade with different exchange rates <sup>c/</sup>		Percent changes in estimated consumer welfare and rice expenditures under trade with different exchange rates			
	Reported		Estimated World Market Equivalent with Different Exchange Rates									
	Nominal	Real	Nominal <sup>a/</sup>		Real <sup>b/</sup>				Consumer welfare <sup>d/</sup>		Rice expenditures <sup>e/</sup>	
			At Equilibrium rate	At Parallel rate	At Equilibrium rate	At Parallel rate			At Equilibrium rate	At Parallel rate	At Equilibrium rate	At Parallel rate
Column	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
1972	338.3	288.78	324.63	324.59	277.93	295.62	5.38	-0.05	0.82	-0.15	3.98	3.98
1973	399.0	296.88	564.52	607.83	420.03	452.26	-24.44	-29.09	-5.15	-6.08	3.48	3.48
1974	493.8	324.66	691.88	746.20	454.88	490.60	-35.37	-39.42	-15.42	-16.28	-25.39	-25.39
1975	568.8	326.71	523.53	571.64	300.71	328.34	-2.73	-9.79	2.34	0.96	-17.81	-17.81
1976	564.4	300.53	467.48	514.06	248.92	273.73	10.50	1.86	3.77	2.16	-11.54	-11.54
1977	573.2	270.63	551.74	613.30	260.50	289.57	4.59	-4.48	0.49	-1.20	2.45	2.45
1978	564.4	257.36	576.63	650.75	262.94	296.74	-5.97	-15.23	-1.14	-0.31	-0.07	-0.07
1979	557.7	232.86	603.18	675.10	251.85	281.88	-3.94	-12.78	-2.14	-3.35	5.52	5.52

a/ INESPRES rice import price at different exchange rates reported in Table 2.

b/ Columns (3) and (4) divided by the consumer price index, respectively.

c/ These values are obtained by substituting cols. (5) and (6) into the demand equation reported in Table A.1. and computing respective percent changes in quantities consumed relative to reported consumption levels.

d/ These values are the respective consumer surplus estimates (area DEF Figure A.1.a) under trade with different exchange rates, relative to consumer surplus estimated from reported prices.

e/ The product of estimated rice price and quantity divided by the product of observed rice prices and quantity, in percentage terms.

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Table A.7. Simulation results of the effects of free foreign trade and currency exchange rates on rice imports, Dominican Republic, 1972-1979.

Year	Imports Reported quantity (1000 MT)	Free Trade <sup>a/</sup> quantity (1000 MT)	At Equilib- rium <sup>b/</sup> quantity (1000 MT)	At Parallel Market <sup>c/</sup> quantity (1000 MT)
	(1)	(2)	(3)	(4)
1972	16.9	38.62	30.71	13.94
1973	31.05	-61.74 <sup>d/</sup>	-72.62	-89.55
1974	48.39	-68.08	-79.45	-104.14
1975	38.01	54.78	42.13	16.02
1976	31.70	90.38	75.21	44.37
1977	26.74	53.81	37.09	2.95
1978	2.78	8.20	-10.54	-48.43
1979	-4.86	-1.66	-19.48	-55.37

a/ Estimated level of imports under free trade at official peso/dollar exchange rates.

b/ Estimated level of imports under free trade at equilibrium levels of peso/dollar exchange rates.

c/ Estimated level of imports under free trade at the parallel market rate of exchange of the peso/dollar.

d/ A negative value indicates exports.

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A simulated policy of free trade at the parallel market rate of exchange (the case where foreign rice appears the most expensive to the Dominican economy) resulted in estimates of the amount of rice produced that exceeded the amount actually produced (Column 8). At the equilibrium rate of exchange, small amounts of rice would have been exported in 1978 and 1979. At the parallel rate of exchange, exports of rice in these years would have increased three fold.

The simulated policy of free trade at equilibrium exchange rates suggests that consumers would have faced higher prices for five of the eight years over which the simulation was performed (Columns (3) and (4), table A.6). Consequently, for those five years, less rice would have been consumed on a per capita basis relative to observed levels of consumption. At the parallel market rate of exchange, consumer prices for rice would have been higher than observed levels in seven out of eight years. In both the equilibrium exchange and parallel exchange rate simulation, consumer expenditures on rice would have decreased, but decreased by relatively small magnitudes (Columns (11) and (12), Table A.6).

#### V. THE EFFECT OF A PROHIBITION ON FOREIGN TRADE IN RICE ON THE RICE ECONOMY

The simulation of a policy which prevents foreign trade in rice involves determining the farm level prices and quantities of rough rice and the retail level prices and quantities of milled rice that clear markets at both the retail and farm levels. As in the previous simulations the price spread between the price paid by INESPRES for farm level rice and INESPRES's rice sales price is used as a measure of the farm-wholesale level marketing margin. Furthermore, the values of the variables reported in tables A.1 and A.2, namely, income

and the prices of bread and beans in the case of retail rice demand and the producer level price of beef, the time trend effect and the lagged effect of the previous years rice production on the current years rice production are taken at the values observed in each of the years 1972 to 1979.

The results of the simulation are reported in table A.8. A comparison of Columns (1) and (4) shows that in all years, the estimated production of rice exceeds the levels of rice actually produced. Increased production occurred because of higher rice prices which also exceeded the farm level prices for rice actually observed. The data in Columns (1), (2), (4) and (5) were used to compute the percentage change in estimated production and price levels relative to observed levels (figure A.2.a). Notice the effect of a prohibition in foreign trade causes fairly large percentage changes in farm level prices through about 1977. However, the trend of the percentage change in farm level prices is downward, approaching only a two to four percent difference from observed prices in 1978 and 1979. The average percent increase in farm level rice prices for the 1972 to 1979 period was 14.8 percent while the average increase in rice production is an estimated 25 percent.

The simulated effect of a prohibition in foreign trade of rice on consumers is reported in Columns (7) through Column (12) of table A.8 and in figure A.2.b. In most cases, the amount of rice consumed if foreign trade were prohibited is less than the actual amount of rice consumed. However, the average decrease in rice consumption is estimated to be a mere -4.6 percent. As shown in figure A.2.b, the largest decrease (approximately -20 percent) in rice consumption would have occurred in 1974, and then trended upward reaching consumption levels actually observed in 1979. While the estimated price of

rice would have exceeded the observed price levels in most years, the estimated prices under a policy of prohibition in rice imports/exports tend to converge to observed prices in 1978 and 1979.

An important "analytical" reason for this convergence is the lagged supply response coefficient (.679) reported in table A.2. The model implies that the large supplies generated from higher prices in the early 1970's gave rise to investments in rice production which tended to "pay-off" in later years. Unfortunately, lagged supply response coefficients are notoriously difficult to estimate without statistical biases.

These results, however, must be interpreted with caution for several reasons the most important of which is the partial equilibrium nature of the analysis. The supply analysis implies that with higher prices, farmers allocate more resources to rice production, resources that are most likely withdrawn from the production of other crops and livestock. Almost surely the supply of crops and livestock which compete for resources allocated to rice production would decrease, causing their prices to rise in retail markets. If the retail prices of crops and livestock products increased as their supplies decreased consumers would tend to consume more rice. These market interactions, which are ignored in this analysis, would almost surely alter the results obtained.

Nevertheless, the results of the policy simulation suggest that domestic rice production, under a prohibition of foreign trade in rice, could have increased to levels which would have significantly lessened the impact of the policy on rice consumers and largely eliminated the impact of the policy in the latter part of the 1970's.

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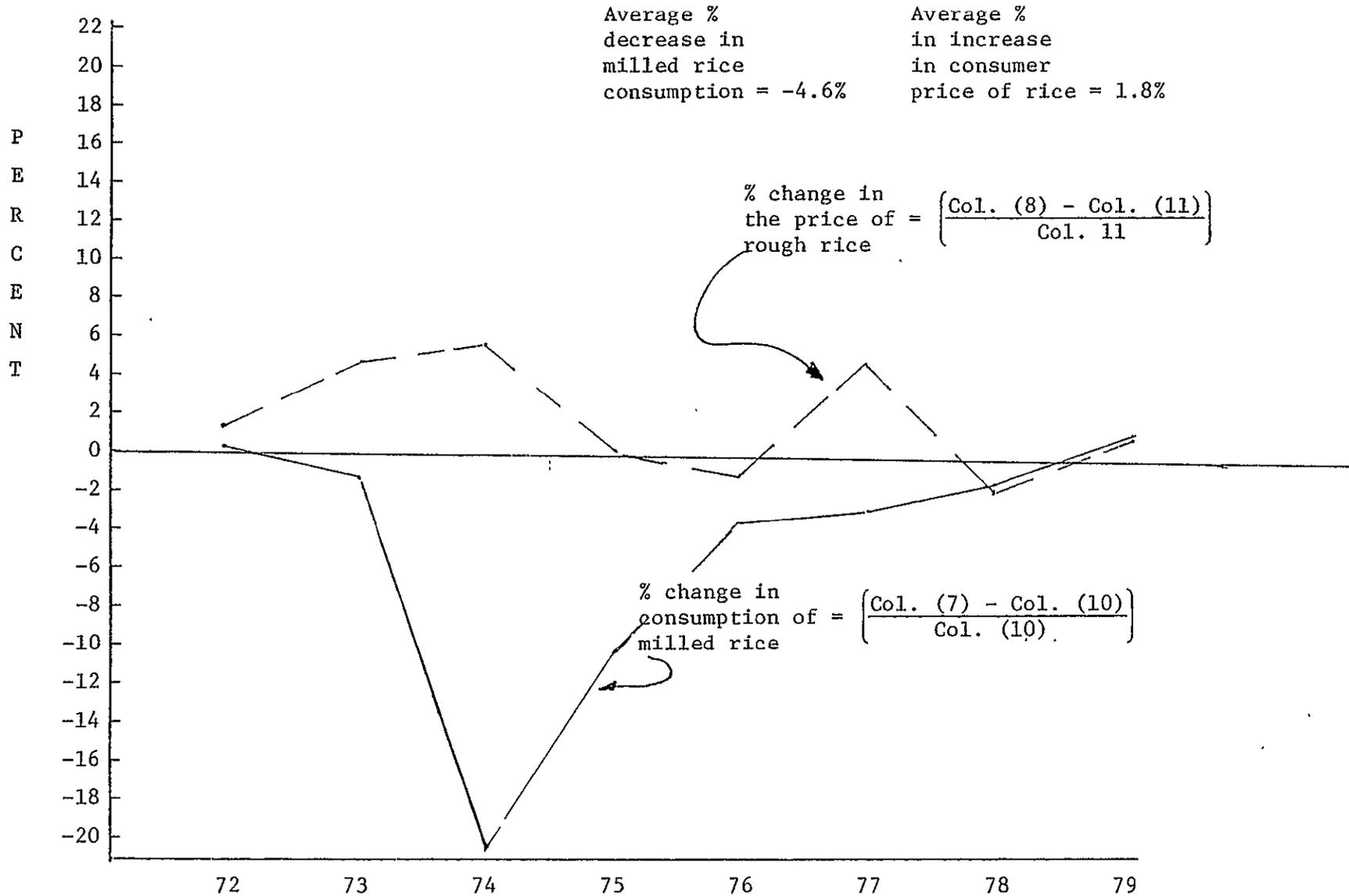


Figure A.2.b. Estimated percent change in the quantity of milled rice consumed and in the price paid by consumers for rice if no imports or exports of rice were permitted.

Source: Table A.8.

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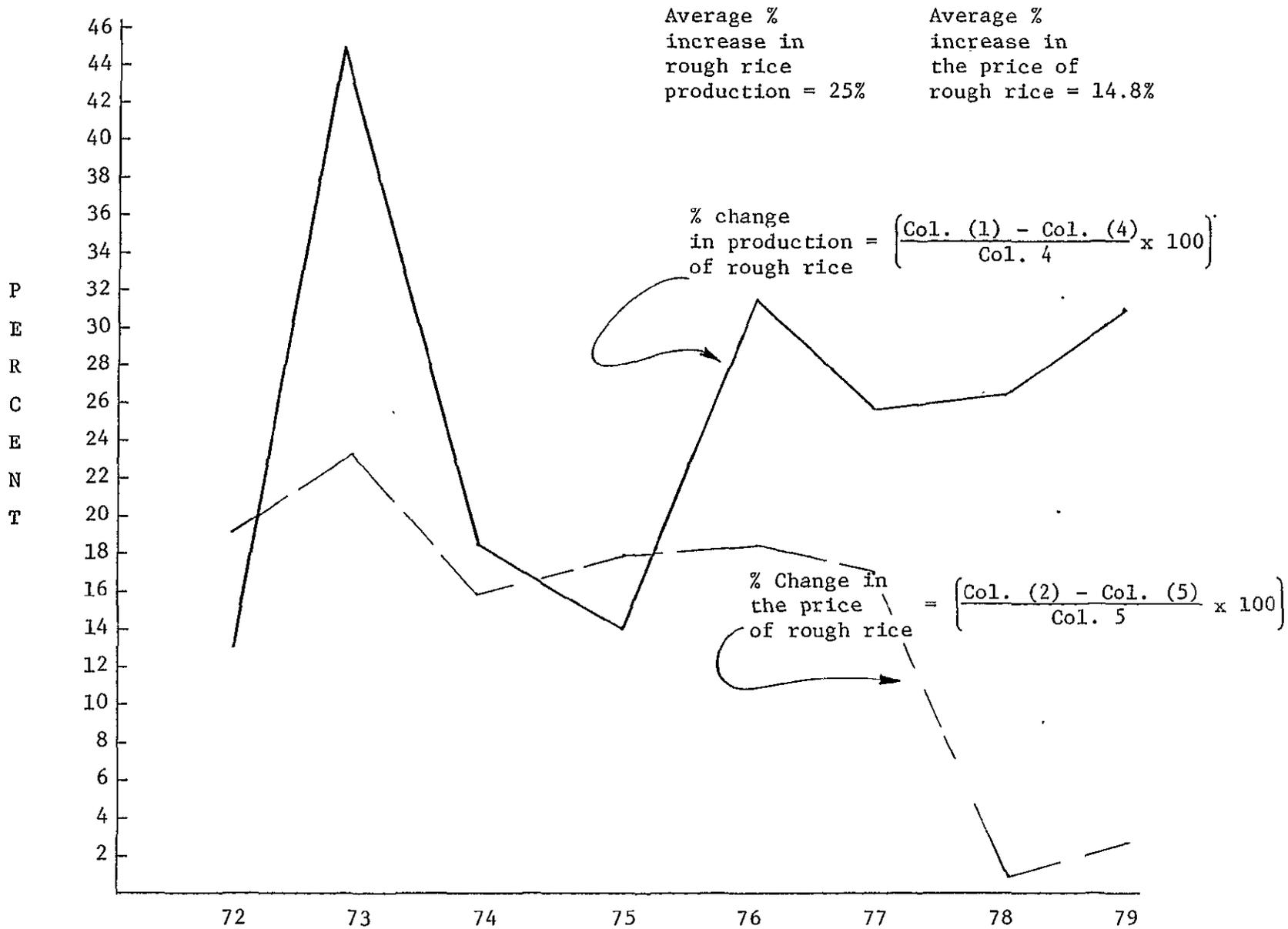


Figure A.2.a. Estimated percent change in the production and farm level price of rough rice if no imports or exports of rice were permitted.

Source: Table A.8.

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## VI. CONCLUSIONS

A farm level rice supply and a retail level rice demand equation were fit to Dominican data to identify the major factors explaining the amount of rice produced and consumed during the period 1966-1980. These equations were then used to provide key insights into the effect of Dominican rice import-export and currency exchange rate policy on the Dominican rice economy during the period 1972 to 1979. The analysis suggests that:

(a) in the latter 1970's, government intervention in the import-export market for rice did not have a large effect on the domestic rice economy in part because the rice import restrictions imposed on INESPRES countered the effect of an overvalued peso/dollar rate of exchange,

(b) the rice economy was becoming increasingly sensitive to possible currency exchange rate distortions during the latter part of the 1970's, and

(c) if a prohibition on foreign trade in rice had existed during the 1970's, domestic rice production would likely have increased so that the impact on rice consumers would have been rather small, especially in the latter part of the 1970's. In light of the limitations of this study no evidence was found which suggests that Dominican rice import-export and currency exchange rate policy during the latter part of the 1970's caused distortions in the level of rice production, consumption and rice prices that exceeded by six percent the observed levels during this period. This is an estimated level of distortion that is not statistically detectable by the empirical model used in the analysis.

The implications of this analysis for the economic performance of the rice economy are several. Even though policy induced distortions in the rice market appear to have been rather small during the latter 1970's, domestic

rice prices and hence rice production and consumption are nevertheless sensitive to rice imports. Rice imports appear to be influenced by, among other factors, foreign reserve holdings, the peso/dollar exchange rate, the restrictions imposed upon and the policies of INESPRES and the level of demand relative to domestic rice supply. Hence, the performance (in terms of consumers and producers welfare) of the rice sector will be linked to these factors as well as to the performance of other sectors of the economy, namely the export-foreign reserve earning sectors. In an open economy, overvalued currency exchange rates, tariffs, quotas and other policies which serve to encourage excessive imports of food and to subsidize import competing sectors of the economy, will tend to induce the allocation of resources away from those activities earning the highest social economic returns. It appears from our analysis that the net effect of these distortions will be to decrease the economic performance of the rice sector because it is an import competing sector, competing for resources allocated to export crops and competing in product markets with imported foods. Controls on INESPRES to restrict imports of rice will serve to counteract part of the negative effect of the distortions induced by an overvalued exchange rate.

The empirical results from fitting the demand for rice equation to data did not yield strong evidence to support the inference that wheat is a substitute for rice in the Dominican diet, as, however, has been found to be the case in several other countries. This result may be due to either difficulties with the data, statistical difficulties or both. To the extent that wheat products are substitutes for rice, excessive imports of wheat, induced by, for instance, an overvalued exchange rate, will result in an implicit tax on products of rice. Again, in light of an overvalued exchange rate, import restrictions placed on those agencies and firms responsible for importing wheat will serve to decrease this otherwise implicit tax on rice producers.

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The results from fitting the rice supply equation to data yields some evidence to suggest that technical advancements in domestic rice production have occurred during the 1970's. The analysis of a prohibition on rice imports and exports suggests that if world market prices for rice remain at their 1978-81 levels, rice producers can, for the most part, compete with producers of rice in other rice exporting countries. To maintain the competitive advantage for domestic markets, technical advancements in rice production which serve to decrease production costs will need to continue however. This study did not consider the affect of domestic rice marketing costs or subsidies on rice prices. The efficiency with which these marketing services are performed will also affect the capacity of the rice sector to compete with foreign producers of rice.

Table A.8. Simulation results of a prohibition in foreign trade in rice on producers and consumers of rice, Dominican Republic, 1972-1979.

Year	AT FARM LEVEL						AT RETAIL LEVEL					
	AUTARKY			OBSERVED			AUTARKY			OBSERVED		
	Quantity (1000 MT)	Price		Quantity (1000 MT)	Price		Quantity (1000 MT)	Price		Quantity (1000 MT)	Price	
(1)	Normal	Real	(4)	Normal	Real	(7)	Normal	Real	(10)	Normal	Real	
	(2)	(3)	(5)	(6)	(8)	(9)	(11)	(12)				
1972	241,545	181.499	176.383	214	152	147.716	157,004	342.529	293.261	156	337.3	288.784
1973	264,585	226.977	191.703	182	182	153.716	171,980	481.195	311.157	176	399.0	296.875
1974	274,692	269.285	190.577	232	232	164.190	178,550	522.085	343.251	217	493.8	324.655
1975	290,942	298.354	169.231	253	253	143.505	189,112	572.806	329.010	210	568.8	326.709
1976	325,215	292.297	176.935	248	248	150.121	211,390	556.088	296.107	222	564.4	300.532
1977	338,900	313.939	167.345	269	269	143.390	220,285	602.183	284.317	227	573.2	270.633
1978	348,554	280.509	151.136	276	276	148.707	226,560	548.952	250.320	231	564.4	257.364
1979	375,780	297.165	146.603	286	286	141.095	244,257	563.877	235.439	240	557.7	232.860

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