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Price Changes and their Effect on Consumption in Conakry

Policy Implications from an Estimation of Demand

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PRICE CHANGES AND THEIR EFFECT ON CONSUMPTION IN CONAKRY: POLICY IMPLICATIONS FROM AN ESTIMATION OF DEMAND

INTRODUCTION

Structural adjustment programs subject economies to dramatic changes in price structures. Both aggregate prices and relative prices change with the implementation of reforms such as exchange rate devaluation and market liberalization. What has remained far from clear in most countries where dramatic reforms have taken place is to what extent (and how) the consumption and welfare of the public have been affected by specific price changes.

This paper undertakes demand analysis on new data from the ENCOMEC/CFNPP household survey of Conakry to examine consumption patterns and assess the effect of prices on consumption. In addition to analyzing consumption behavior and presenting demand parameters, this paper uses empirical estimates to address two separate policy-relevant issues. The first issue concerns the effect that changing the tariff on imported rice would have on consumption, expenditure, and caloric intake. The second issue is retrospective and focuses on the effect that price changes observed over the recent reform period have had on consumption, expenditure, and caloric intake among the urban population.

EXPENDITURE SHARES

A basic picture of the consumption pattern among the population of Conakry emerges from expenditure share data collected by the ENCOMEC/CFNPP household survey in 1990/91 and presented in Table 1.[1] On average, as much as 50 percent of all household expenditure is spent on food. Among the lower quintiles this percentage is higher; among the bottom 30th percentile the mean share to food is 57.12 percent. The food item with the largest expenditure share, on average, is imported rice. While imported rice constitutes a 7.05 percent budget share for the population as a whole, this percentage is as high as 11.51 percent for the poorest 30th percentile since imported rice represents the cheapest calorie source (see Appendix Table A.1). Other food items of particular importance, especially for the poorest 30th percentile, are fish (8.76 percent), vegetables (8.59 percent), bread (5.25 percent), and butter and oil (3.33 percent). Within nonfoods, expenditures on housing, domestic fuel, and transport account for the largest shares both among the average population and among poorer households (Government of Guinea, undated). Among the poorest 30th percentile, housing accounts for 14.88 percent of total per capita expenditure, domestic fuel accounts for 6.70 percent, and transport for 6.31 percent.

These expenditure shares, derived from the ENCOMEC/CFNPP survey, differ markedly from the weights that have been used by the Government of Guinea to compute the CPI. The weights used for the CPI calculation are presented in

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[1] Housing expenditures include an imputed value for rent given non-reporting of rent value by many households.

Table 2.[2] They were derived from a quick survey, in 1988, of expenditures from 300 households (Government of Guinea, undated). In particular the share attributed to food by the GOG, at 0.419, is low compared to the ENCOMEC/CFNPP data share of 0.506. With the exception of imported rice, fish, beverages, sugar, and spices, all other food commodity shares appear to have been underweighted in the calculation of the CPI. On the other hand, the shares of all nonfood commodities, and especially that of housing, appear to have been overweighted in the computation of the CPI. Unless it can be argued that the consumption bundle in rural areas is much more heavily composed of nonfoods than that in urban areas, which seems unlikely, the current CPI weights used by the GOG likely introduce a bias in the calculation of the inflation rate and of real consumer prices and incomes.

DEMAND ANALYSIS

Information on expenditure shares, in conjunction with data on prices, can begin to tell a story on the welfare changes that come with price changes. Expenditure shares, however, do not remain constant in the face of price changes. Demand theory shows that the income effects and substitution effects that result from relative price changes result in consumers switching expenditure between commodities. Moreover, poorer consumers act very differently from richer consumers.

The existence, now, of detailed household level consumption data from Conakry in the form of the ENCOMEC/CFNPP dataset allows a detailed examination

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[2] The weights have been reaggregated from disaggregated shares to form commodity groups comparable to ours.

of empirically determined elasticities of income and of prices among consumers in Conakry. Demand estimation enables a calculation of the magnitude of these parameters, an exercise which has rarely been done in Africa (and never before in Guinea), primarily due to the lack of data. These demand parameters will serve as important tools in assessing policy reform and their effect on consumption through price changes in Guinea.

Methodology

Price and income elasticity estimations were derived using the Almost Ideal Demand System (Deaton and Muellbauer 1980). The estimating equations use budget shares as the dependent variables:

$$w_i = \alpha_i - \zeta_i H + \sum_j^n \beta_{ij} \ln P_j + \gamma_i \ln (\chi/P^*) + \epsilon_i$$

$\forall i = 1, n = 1$

where $\ln P_j^* = \sum w_i \ln P_j$ and

w_i = commodity group share
P_j = commodity group prices
X = household per capita expenditure
H = household size.

The Almost Ideal Demand System (AIDS) was run using a Three-Stage Least Square econometric model in which per capita expenditure was treated as an endogenous variable and instrumented accordingly. Symmetry and homogeneity restrictions, as dictated by demand theory, were imposed on the system. The

sample used was that of 1,557 households that cooked at home.[3] Yet since some of these households did not consume certain commodities (see Appendix Table A.2), the selectivity bias among the sample of consumers, inherent in the decision to consume or not to consume a given commodity, was corrected for using the estimated inverse Mills ratio as an instrument (Heien and Wessells 1990). Details on the sample used, the variables created, the estimation techniques employed, and interim outputs are laid out in Arulpragasam and del Ninno (forthcoming). The final model parameter estimates are presented in Appendix Table A.3.

Income Elasticities

Income elasticities indicate the percent change in the consumption of a good resulting from a percent change in income. Table 3 presents estimated income elasticities by quintile, as well as for the entire sample, for the poorest 30th percentile, and for the sample of households used for estimation (that of households that cook).[4]

The last two columns in Table 3 tell an important story with strong policy implications. First, and perhaps not surprisingly, the commodities

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[3] Excluded "noncooking" households are defined as those who purchase no cereals (other than bread), roots, or tubers, and no fish or meat (other than for sardines (canned) and eggs). Effectively this removes those one person households who only eat breakfast or snack foods at home and otherwise eat away from home. These households have a structurally different consumption and expenditure pattern that does not respond to price changes between food commodities. (See Arulpragasam, del Ninno, and Sahn 1992).

[4] Elasticities for "all cookers" used the estimated parameters and the dependent means (expenditure shares) from the estimated model, whereas elasticities for the five quintiles, "all", and "bottom 30th percentile" used the estimated parameters in conjunction with the dependent means (expenditure shares) for each of the respective samples.

that will respond most strongly to income increases (or declines) are nonfoods, beverages, and meat and dairy. These are "luxury" goods: a one percent increase in income will result in a more than one percent increase in the consumption of these goods. Among the total sample of cookers (used to estimate the model), the income elasticity of nonfood was 1.437, that of beverages 1.420, and that of meat and dairy 1.239. These income elasticities, which are even larger for the poorest 30th percentile of the population, imply that any income transfer or income gain among these poor will result in a more than proportional increase in the expenditure share on these commodities, and therefore in a less than proportional increase in the share of commodities with a low price per calorie.

Second, among the staples, imported rice has the lowest income elasticity. Among the sample of cookers, a ten percent increase (decrease) in income will not even result in a one percent rise (fall) in consumption. Given the high budget share of imported rice, to some extent this reflects a satiation of demand at the mean.

Imported rice, however, has the most important variation in income elasticity across expenditure groups. The income elasticity among the poorest 30th percentile is 0.369, five-fold greater than the elasticity at the mean. A breakdown by quintile shows that in fact whereas the poorest two quintiles

have elasticities of 0.410 and 0.202 respectively, with the third quintile the elasticity of imported rice becomes negative, indicating an inferior good.[5] The only other commodities for which there is a notably higher income elasticity among the poorest 30th percentile are bread, sugar, and condiments (spices), other "basic" foods that constitute the "basic" diet among the poor in Conakry. The difference in income elasticities between the poorest 30 percentile and the mean for these commodities, however, are not as marked as that for imported rice.

Such sharp differences in the income elasticities between the bottom percentiles and upper percentiles for imported rice have important policy implications. For example, such a structure would indicate that if a Government objective were to target poorer consumers through a market intervention, (low-quality) imported rice would be an appropriate commodity through which to do so. Due to the income effect, a lowering of the price of imported rice, for example, would tend to increase consumption specifically among poorest consumers, while even decreasing the uptake of imported rice among the rich. The market would thus self-target a subsidy on such a commodity directly to the poor.

A third revelation from Table 3 is that the income elasticities for all other staples are much higher than those for imported rice. The income elasticity for bread is 0.397 among the sample used for the estimation

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[5] A negative income elasticity for rice for certain quintiles has been documented in some other countries (Dixon 1982, Williamson-Gray 1982). In Conakry these negative elasticities for the upper quintiles are also likely capturing a serious quality effect. At the higher quintiles (especially quintile 5), more consumers are consuming high-priced, high-quality rice rather than low-priced, low-quality rice, thereby exaggerating the expenditure elasticity vis-à-vis a quantity elasticity measure.

compared to the 0.069 income elasticity for imported rice. For the bottom 30th percentile too, the income elasticity for bread, 0.514, is higher than that of imported rice, 0.369. Imported rice also has a low income elasticity relative to "other grains, roots, and tubers," which has an elasticity slightly greater than one across all expenditure groupings.

The income elasticity of imported rice is also much lower than that of local rice, regardless of the household's expenditure level. At 0.65 among the estimated sample, the income elasticity of local rice is ten times that of imported rice. This observation is empirical confirmation that local and imported rice are perceived by consumers as very different commodities.

The high income elasticities observed for domestic staples suggests an additional conclusion. An increase in incomes in Conakry, and likely throughout Guinea, could have a strong effect in stimulating local agriculture by increasing demand for local foods (rather than imported rice). In other words, from the demand-side at least, there are strong linkages between income growth and local production, and thus also between the urban and rural sectors. These linkages, including the responsiveness of the supply-side, are to be analyzed in greater detail in work underway (Arulpragasam, forthcoming).

Own-Price Elasticities

Own-price elasticities indicate the percent change in the consumption of a good resulting from a percent change in the price of that good. Table 4 presents estimated own-price elasticities by quintile, as well as for the entire sample, for the poorest 30th percentile, and for the sample of households that cook.

Consumption of local rice, along with that of beverages and nonfoods, are very responsive to price changes, with price elasticities (whose absolute values) are greater than one. A ten percent decrease (increase) in the price of local rice will result in a 18.7 percent increase (decrease) in its consumption. Other local staples (other grains, roots, and tubers) also have a high (in absolute value terms) own-price elasticity of -0.872. Other commodities with high (absolute value) price elasticities are meat and dairy, fruits, and butter and oil.

These estimates reiterate the policy imperatives of lowering marketing and transport costs of local foods in Guinea. A lowering of the retail price through more efficient marketing can result in the stimulation of local production through a large increase in urban demand for these domestic crops. Conversely, an increase in the retail price of local rice and crops such as cassava and fonio, whether it be due to weather-related supply shocks or policy-generated cost increases in production or marketing, will result in a sharp drop in urban consumption. This is due in part to the ample supplies of substitutes for domestic staples on the urban market.

The commodities with the lowest (absolute value) own-price elasticities are imported rice and sugar, with elasticities of -0.455 and -0.447 respectively (among the sample used for estimation). The relatively inelastic demand for these commodities reflects that they are basic to the diet and thus least responsive to price changes. Other foods in order of increasing (absolute value) own-price elasticities are bread (-0.604), vegetables (-0.608), spices (-0.642), and fish (-0.692), all basic components of the Conakry diet.

By necessity, the poor are more responsive to price changes than the average population. For example, there is a greater than 10 percent differential in price responsiveness between the poorest 30th percentile and the average population in the demand for sugar and for bread. The difference in responsiveness, however, is most marked in the case of the basic staple, imported rice. Whereas a 10 percent increase (decrease) in the price of imported rice will result in a 4.5 percent decrease (increase) in the consumption of imported rice among the average population, it will result in a 6.1 percent decrease (increase) in consumption among the poorest 30th percentile. Calculations by quintile show that own-price elasticity from imported rice ranges from -0.628 for the poorest quintile to -0.143 for the fourth quintile.[6]

This large own-price elasticity differential by expenditure group for imported rice, coupled with the disproportionate share that poorer consumers spend on imported rice, imply that the poor will be much more affected by any policy or exogenous factors that affects the price of imported rice than will be richer consumers. Moreover, these price elasticities once again show that a policy intervention in the pricing of imported rice can effectively target poor consumers.

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[6] As discussed in an earlier footnote, for quintile 5 the own-price elasticity for imported rice likely captures important quality effects as rich consumers buy more high quality imported rice varieties at higher prices than low-priced, low-quality varieties.

Cross-Price Elasticities

Cross-price elasticities indicate the percent change in the consumption of one good resulting from a percent change in the price of another. A positive cross-price elasticity indicates that an increase in the price of one good results in an increase in the consumption of the other, and that therefore the two goods are substitutes. A negative cross-price elasticity indicates that an increase in the price of one good results in a decrease in the consumption of the other, and that therefore the two goods are complements. Table 5 presents the entire matrix of elasticities, including all cross-price elasticities, estimated by using the Almost Ideal Demand System model on the sample of 1,557 households.

Most of the cross-price effects estimated by the model are relatively small. Several cross-price elasticities, however, appear to be quite important. Of greatest policy significance are the cross-price effects between local and imported rice. Not only are the two goods clearly substitutes, but the effect of the price of imported rice on the demand for local rice is large. A 10 percent increase in the price of imported rice results in a 9.68 percent increase in the demand for local rice.[7] The magnitude of this elasticity is extremely relevant to the debate both in Guinea, and throughout West Africa, regarding the protection of local rice production. These empirical estimates show that the protection of local farmers, in the form of a tariff on imported rice for example, will clearly

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[7] Conversely, a 10 percent increase in the price of local rice results in a 2.12 percent increase in the demand for imported rice.

generate substantial urban demand for local rice.[8] The estimates say nothing, though, about supply responsiveness.

Additional cross-price effects to highlight are the complementarity of local rice and "meat and dairy," and the positive relationship between the price of local rice and the consumption of butter and oil and between the price of bread and local rice consumption. Bread and local rice thus act as substitutes. The price of non-foods, moreover, has a relatively large effect on the consumption of most foods. In particular, an increase in the price of nonfoods decreases consumption of local rice, other grains, roots, and tubers, fruits, and beverages. These are all commodities that are luxury goods with income elasticities larger than one. Conversely an increase in the price of nonfoods increases the demand for fish, bread, and sugar.

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[8] The same is not true, however, for other local grains, roots and tubers.

SIMULATION METHODOLOGY

The estimation of demand system coefficients permits a focused study of the consequences of price policy and price changes on consumption and welfare. These demand estimates account for substitution effects and income effects related to a price change and thereby allow for varying expenditure and consumption shares as prices change. Moreover, the estimation results of the sophisticated Almost Ideal Demand System allows us to develop a spreadsheet-based model that permits simple simulation exercises to return rich results. The model developed here can serve as a powerful tool for policy analysis.

The simulations that follow use a model based on the AIDS estimated coefficients presented in Appendix Table A.3. The model takes as an input a vector of logged real prices (or the percentage change of prices from the base year) for each of 13 food commodity groups and for nonfoods (Appendix Table A.4). A logged real per capita expenditure variable and a household size variable also enter as inputs. The model then predicts expenditure shares on the basis of the AIDS parameter estimates and translates these to real expenditures. Expenditures are translated into per capita calories using a calorie/expenditure conversion vector based on price changes from the mean price per calorie per commodity group as estimated from the ENCOMEC/CFNPP data for a given sample (Appendix Table A.1). In the analysis that follows, the focus is on three samples, that used in the AIDS estimation (cookers), that of the poorest 30th percentile, and that of the second richest quartile.

EFFECTS OF CHANGING THE TARIFF ON IMPORTED RICE

A policy proposal that has been under discussion in Conakry over the last few years has been to increase the tariff on imported rice. Some argue that domestic rice production suffered with the flood of rice imports in the late 1980s and that increasing the tariff (even beyond the 20 percent level of 1990) would be one way to protect the sector. On the other hand, as our estimated elasticities reveal, there are likely to be important consumption and welfare implications to changing the price of imported rice.

We first examine, in Table 6, the impact of a 25 percent tariff increase (beyond the 1990 levels) on consumption in Conakry. Table 6 lays out 1990 base-runs for the average population, the poorest 30th percentile, and the second richest quartile, based on the estimated mean per capita expenditure levels for these groups, the observed mean purchasing price indices for each group (Appendix Table A.4), and the observed mean real price per calories for each group (Appendix Table A.1).

The base runs show the high concentration of expenditure share of the poorest 30th percentile on imported rice. At 12.30 percent, this expenditure share is much higher than the average population's 5.79 percent. In caloric terms, the poorest 30th percentile's total caloric share from imported rice is even larger, at 47.81 percent. While the poor receive about half of their calories from this cheap calorie source, the average population receives 38.03 percent of its calories from imported rice. The average population receives a higher share of calories from local rice, other grains, roots, and tubers, bread, and meat than do the poor. Other than from imported rice, the poor derive large shares of their calories from butter and oil, fish, and

bread. At 54.01 percent, nonfoods constitute a much more important expenditure share for the average population than it does for the poorest 30th percentile, which spends only 38.72 percent on nonfoods and 61.28 percent on food.[9]

The simulation run presented in Table 6 increases the price of imported rice by 25 percent of its base level as a result, say, of a tariff increase. With the real per capita expenditure level kept constant, the expenditure shares change. For all three samples, the shares spent on commodities such as local rice increase as consumers switch to substitutes. The argument that a tariff on imported rice will increase the demand for local rice stands true: the calorie share to local rice among the average population increases from 7.33 percent to 9.25 percent, representing an actual increase in calorie (quantity) uptake of 24.8 percent. A 25 percent increase in the tariff on imported rice therefore has an almost equal increase in the demand for local rice.

In the case of imported rice, however, despite increased expenditure shares due to the higher price, the quantity or calorie shares fall with a substitution away from imported rice due to its higher price. Whereas the average population's expenditure share to imported rice rose from 5.79 percent to 6.73 percent, its calorie share from imported rice fell from 38.03 percent to 35.75 percent.

The 25 percent price increase of imported rice has a negligible effect on the mean caloric uptake of the average population. Per capita daily calorie

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[9] The nonfood commodity group includes food consumed away from home and thus carries a calorie component. Food away from home was not included as a separate equation in the AIDS estimation due to the difficulties of assigning it a meaningful price.

consumption falls by 1 percent, from 2,462 to 2,435, for the average population and by 1 percent, from 2,636 to 2,675, for the second richest quintile. The average consumer and the richer consumers effectively diversify away from the commodity whose price has increased and into other commodities which provide them with calories.

Poorer consumers, however, are less successful at adapting to the price increase of the cheapest staple. Given the poor's higher own-price elasticity and higher initial shares of imported rice compared to the average population, total calories from this commodity drop more precipitously (by 13.4 percent) than for the average population. Moreover, since income elasticities are higher across most commodities for the poorest 30th percentile. the calorie decline from most commodities due to the income effect is greater for the poorest 30th percentile compared to the average population. Indeed, whereas total calorie consumption falls by 1 percent for the average consumer due to the 25 percent price increase for imported rice, it falls on average by 5.25 percent for the poorest 30th percentile. Moreover, given the low base per capita intake level of 1,638 calories per day, this drop to 1,552 calories per capita represents a serious danger for the nutrition and welfare of the poor, given that 2,200 calories is considered the benchmark adult daily caloric requirement (WHO,FAO).

What is the income value of the welfare loss to the poor from the imposition of a 25 percent tariff on imported rice? Presented another way, what would be the income transfer necessary to compensate the poor for the welfare loss they would suffer from the imposition of such a tariff? Table 7 addresses this question. As a point of departure, using the means from the bottom 30th percentile as the simulation model inputs, Table 7 calculates a

poverty line, defined here as the per capita real expenditure level associated with a consumption of 2,002 calories per capita. The base poverty line expenditure is calculated as 20,800 GNF per capita.[10] For someone at the poverty line, a 25 percent increase in the tariff on imported rice would result in a 3.5 percent drop in total daily per capita caloric intake, from 2,002 calories to 1,931, for the reasons discussed above.

Table 7 next computes a "compensated poverty line expenditure," namely the expenditure level that allows the consumer to return to a 2,002 calorie per capita level after the 25 percent imported rice price increase. Despite the fact that calories fell by 71 calories per capita per day, the per capita income increase required to compensate this loss is as high as 1,700 GNF per capita per month, or 8.2 percent of the base poverty line expenditure. Even though calories can be bought at a much cheaper cost than the 1,253 GNF per 1,000 calories at the margin here (see Appendix Table A.1), consumers will not only buy cheap calories with any marginal increase in income, but, as discussed earlier, will also buy other commodities, especially those such as nonfoods and beverages that have a high income elasticity.

After a 25 percent price increase and a 1,700 GNF income transfer, consumers will once again be consuming 2,002 calories, but with a reallocation of expenditure and calorie shares. Due to the price increase, 40.54 percent of calories will come from imported rice as compared to the pre-tariff share of 44.72. The share of calories from local rice increases from 5.65 percent

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[10] The expenditure level related to this poverty line is above the actual mean per capita expenditure level of the bottom 30th percentile but below the mean per capita expenditure level of the average population. The companion bulletin (No. 11) discusses the poverty line computation and its significance in greater detail.

to 7.46 percent, while the share from other grains, roots, and tubers, and bread increase marginally.

This simulation re-emphasizes that a 25 percent increase in the price of imported rice constitutes a large welfare loss for the poor. In addition to the calorie loss of 3.5 percent, the associated welfare loss at the poverty line measured in income terms is even larger, at 8.2 percent. While there are legitimate arguments to protecting the domestic rice sector (or raising government revenue) with an import tariff, policy-makers contemplating such a tariff may want to seriously consider protecting the poor from income and calorie losses through targeted measures.

Conversely, it is also important for policy makers to understand that a complete elimination of the 1990 rice import tariff of 20 percent, while perhaps undermining fiscal and agricultural production objectives, would have significant positive welfare effects in Conakry. Table 8 shows that a 20 percent reduction in the price of imported rice would raise the mean per capita caloric intake of the poorest 30th percentile from 1,638 calories per day to 1,734 calories per day, a 5.86 percent increase that will be expected to put a number of people above the poverty line (as defined in terms of expenditures required to attain the 2,002 daily per capita caloric mark).[11] Moreover, the poverty line associated with the 2,002 daily per capita calorie level will fall from GNF 20,800 per capita per month to GNF 18,900.

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[11] Further empirical analysis can determine what percentage of the population would move above the poverty line, so defined, by a policy that reduces the price of a given commodity such as imported rice. (See the companion bulletin No. 11).

PRICE CHANGES AND CONSUMPTION CONSEQUENCES (1986-1990)

The economic reform program that was undertaken in Guinea commencing in 1986 has led to significant structural changes in the country's economy. Moreover, policies that ranged from exchange rate devaluation, tariff reform, the elimination of subsidies, and the liberalization of producer prices and of domestic and import markets have had large consequences in the movement of prices, both in absolute and relative terms (see Arulpragasam and Sahn 1991). How have these price changes affected the welfare of consumers in Conakry? The demand parameters estimated from the AIDS model, by means of the simulation model created with these parameters, allow us to address this important issue and arrive at some understanding of the consumption consequences of the reform-driven price movements of recent years.

Price Trends Over the Reform Period

Little is known about price trends prior to the dramatic economic reforms and devaluation of 1986. Since 1986, however, the Government of Guinea has collected disaggregated monthly price data from Conakry markets for the purposes of computing the national CPI. Nominal and real price indices for food commodity groups and aggregate nonfoods for the years 1986 through 1990 are presented in Table 9.

Nominal prices have risen dramatically over the reform period, in part due to incremental nominal devaluations throughout the period (see Arulpragasam and Sahn 1991). After a dramatic 33.7 percent increase in the

CPI over 1987, the annual inflation rate remained between 26 and 27 percent between 1988 and 1990.

The trends in real prices, however, have differed among commodity groups. Three observations stand out. First, the price of important imported commodities, most notably imported rice, have risen in real terms. The real price of imported rice increased by 22 percent over the period between 1986 and 1990. Sugar prices, similarly, have increased by 25 percent, although bread prices (domestically produced from imported wheat) increased by only 3 percent. These trends suggest that the gradual devaluation of the exchange rate has been important in driving inflation. Moreover, while it suggests a possible depreciation in the real exchange rate, the rising real price of imported foods certainly reflects increases in trade restrictions since the initial liberalization of these restrictions in 1986. For example, the import tariff on rice was raised to 20 percent of c.i.f. in 1989; the tariff on wheat flour and sugar was 18 percent. Moreover in 1990 the GOG imposed the requirement that a deposit on imports had to be paid in advance to the BCRG in order to access foreign exchange. These policies effectively raise the retail price of imports. (See Arulpragasam and Sahn 1991).

A second observation from the price series in Table 9 is that the price of local rice is affected by the price movements of foreign rice. This is most clearly evident in the local rice price response to the imported rice price spike of 1988 brought about by a crisis in the importing and pricing of foreign rice (See Arulpragasam and Sahn 1991).

The third notable observation is that, with the exception of local rice, the real prices of other domestically produced food groups have declined over the period between 1986 and 1990. While real fruit prices have generally

remained at their 1986 level, the aggregate real price of roots, tubers and cereals (other than rice) declined by 38 percent between 1986 and 1990. Real vegetable prices declined by 25.6 percent over the period. Meat and dairy real prices fell by 11 percent, and butter and oil real prices declined by 25.5 percent.[12] The only predominantly domestic food that experienced a sharp real price increase was fish.

In addition to reflecting the relative price increase of imported foods, this observed trend of declining real prices of most domestic produce likely also reflects the elimination of barriers and regulations on internal trade, the lowering of transport costs from the interior, and increased competition in marketing. More than any other, this observation is perhaps a promising signal of a recovery of Guinean agriculture and markets.

Consumption Consequences

What have been the effects of these price movements over the reform period on consumers in Conakry? Table 10 compares consumption at real 1987 prices relative to consumption in 1990 at real 1990 prices, assuming constant real 1990 expenditure levels.[13, 14] The price index vector of real December 1987 prices (1990=100) from Table 9 was used for the simulation exercise. In

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[12] While the latter two groupings include some imported goods, they are predominantly composed by domestic produce such as whole chickens and goats in the case of "meat and dairy" and palm oil in the case of "butter and oil".

[13] 1987 prices were used rather than 1986 prices because it is believed that the data collection effort became more reliable after the first year of price data collection.

[14] In the absence of reliable income data the simulation initially assumes the real per capita expenditure level of 1990.

essence, most real prices were lower in 1987 relative to 1990, with the exception of other cereals, roots, and tubers, meat and dairy, vegetables, butter and oil, and beverages. The real price of nonfoods was about equal.

Table 10 shows that, on net, upon accounting for the price changes of all commodity groups and assuming constant real expenditure levels, the calorie uptake in 1987 was roughly the same as it was in 1990 for the average consumer. In fact the estimated 1987 mean daily per capita caloric uptake level was 1.6 percent lower than in 1990, implying that average consumers were marginally better off with prices in 1990 than in 1987. The price changes over time result in a greater share of calories coming from other grains, roots, and tubers, from vegetables, and from butter and oil in 1990 as compared to 1987.

The more interesting story comes upon examining the distributional implications of the price movements since 1987. While the mean per capita caloric intake increased by 1 percent for the second richest quintile between 1987 and 1990, the mean per capita caloric intake declined by 4.2 percent for the poorest 30th percentile over that period (assuming constant 1990 real per capita expenditures). The primary price-related factors to which a decline in the welfare of the poor can be attributed are the real price increases between 1987 and 1990 of imported rice by 16 percent, of bread by 13 percent, of fish by 14 percent, and of sugar by 20 percent. These are all important commodities in the food consumption bundle of the poor.[15]

Although we are able to address the effect of price changes on consumption over this reform period, a more definitive conclusion about

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[15] In particular, Table 10 suggests that given 1987 prices poor, consumers would have been consuming over 50 percent of their calories from imported rice.

changes in welfare status is not possible due to the absence of reliable data on real income levels and their changes over the reform period. Nevertheless, it is possible to quantify the extent to which real incomes of the poor need to have risen to at least have kept their calorie consumption levels constant over this period. Table 11 presents the 1990 poverty line of 20,800 GNF, discussed earlier, which at 1990 prices permitted the attainment of a daily per capita caloric level of 2,002 calories. Table 11 also presents calculations of the real per capita expenditure level for a 1987 poverty line associated with the attainment of 2,002 calories per capita per day at 1987 real prices. In 1987 the poverty line defined in real expenditures per capita would have been 19,800 GNF. In other words, for consumers at the poverty line, real expenditures must have grown by 1,000 GNF per capita, or by 5 percent, for calorie consumption levels not to have fallen between 1987 and 1990. Given a growth in the CPI of approximately 102 percent over this period, nominal per capita income needs to have grown by 107 percent for caloric uptake of those on the poverty line to have remained unchanged.

It is difficult to determine whether in fact per capita expenditure and income levels have grown by that much. That real incomes may have grown by 5 percent in Conakry is clearly feasible. Data on the public sector show that real government wages have more than doubled between 1987 and 1990 (Arulpragasam and Sahn 1991). However this was at the cost of large-scale layoffs. Whether private sector growth between 1987 and 1990 has provided jobs and increased real incomes to compensate for real price changes during this period is an empirical question that is open to question.

SUMMARY AND CONCLUSIONS

A number of policy-relevant conclusions have been brought to light in this study of expenditures, prices, and the consumption effects of price change in Conakry.

Expenditure shares from the ENCOMEC/CFNPP 1990/1991 data point to the extreme importance of imported rice in the urban diet, especially among the poor. Moreover, expenditure shares from this dataset differ markedly from the weights used by the GOG for CPI computation. In particular, the weight given to food in the CPI seems to be understated. The GOG should consider revising these weights accordingly.

Income elasticities computed from demand estimates reveal that nonfoods, beverages, and meat and dairy have elasticities greater than one, suggesting that incremental income changes will affect the consumption of these "luxury" commodities relative to others.

Domestic staples have high income and own-price elasticities. An increase in incomes in Conakry could therefore have a strong effect in stimulating local agriculture by increasing the demand for local foods. High own-price elasticities for local staples argue for policies that lower the retail price of these commodities (by lowering marketing and transport costs, for example) which would result in a large increase in their urban demand.

The own-price and income elasticities of local rice are much higher than those of imported rice. These differences indicate that local and imported rice are perceived very differently by consumers. Nevertheless, the cross-price elasticity between imported and local rice is positive and high. An increase in the price of imported rice would result in a strong substitution

toward local rice. Such an observation lends credence to an argument that a tariff on imported rice would protect the domestic rice sector by increasing its demand.

Among all commodity groups, imported rice exhibits the lowest income elasticity and second lowest own-price elasticity at the mean. Both its income and own-price elasticities increase sharply at lower expenditure levels. If a Government objective were to target poorer consumers through a market (price) intervention, (low-quality) imported rice would be an appropriate commodity through which to do so. Conversely, much higher elasticities and shares to imported rice among poorer consumers also means that they will be most affected by changes in the price of imported rice and most vulnerable to such changes from the standpoint of food security.

A simulation model, presented in this paper, uses estimated demand parameters to examine some policy issues. We first examined the effects of changing the tariff on imported rice. A 25 percent increase in the tariff for imported rice would increase urban demand for local rice by about 25 percent, without changing the calorie consumption of the average consumer by more than one percent.

Poorer consumers, however, will suffer disproportionately due to the price increase associated with such a tariff increase. The caloric consumption of the poorest 30th percentile would fall by 5.25 percent to average 1,552 calories per capita per day. For those on the poverty line (2,002 calories per capita per day) the calorie loss from a 25 percent increase in the income tariff, measured in per capita expenditure terms (or in terms of the income that would be required to compensate this calorie loss),

is 1,700 real 1990 GNF, or 8.2 percent of the base poverty line expenditure level.

Conversely, eliminating the 20 percent tariff level that existed in 1990 would have increased the mean per capita caloric intake of the poorest 30th percentile by 5.86 percent, or lowered the poverty line expenditure level (associated with a per capita daily intake of 2,002 calories) by 9.1 percent, to GNF 18,900 from GNF 20,800 in real 1990 terms.

The objectives of protecting the urban poor and protecting the local rice sector from imports are therefore conflicting. Any attempts at the latter may justify concurrent welfare policies targeted at protecting the consumption of the poor from the effects of an increase in the price of imported rice.

This paper undertook a further analytical exercise to examine how consumption in Conakry must have changed with the change in real prices over the reform period, between 1987 and 1990. Assuming constant real expenditures, the real price changes over this period were found to have marginally increased calorie consumption of the average consumer (by 1.6 percent). However the distributional consequences of price movements over this period were not neutral. While the mean per capita caloric intake increased by 1 percent for the second richest quintile between 1987 and 1990, the mean per capita caloric intake for the poorest 30th percentile <u>declined</u> by 4.2 percent over the period (assuming constant 1990 real per capita expenditures). The poor were hurt by increases in the real price of imported rice, bread, sugar, and fish. To the extent that the real price of imported commodities rose due to increased protectionism, reform per se is not to blame. Our conclusion, nevertheless, points to the vulnerability, with

reform, of the poor to world prices, real exchange rate movements, and tariff levels.

The above exercise examined the welfare effects, solely, of real price changes between 1987 and 1990, but assumed constant real expenditure levels. It is difficult to come to a definitive conclusion on welfare changes with reform in Conakry over this period due to the non-existence of income data over time. Nevertheless, our analysis showed that, given observed real price changes, households among the poorest 30th percentile would have suffered a real welfare loss between 1987 and 1990 if, over this period, their real per capita expenditure level did not increase by more than 5 percent in real terms, or by more than 107 percent in nominal terms.

REFERENCES

Arulpragasam, Jehan. Forthcoming. "The Impact of Trade, Exchange, and Price Policy Reform on Food Consumption in Conakry: A MultiMarket Model".

Arulpragasam, Jehan and Carlo del Ninno. Forthcoming. *An Almost Ideal Demand System Estimation for Conakry*. Washington DC: Cornell Food and Nutrition Policy Program.

Arulpragasam, Jehan, Carlo del Ninno, and David E. Sahn. 1992. "Household Consumption in Conakry: Expenditures, Calories, and Prices". *ENCOMEC Findings, Bulletin No. 5*, May 1992. Washington DC: Cornell Food and Nutrition Policy Program.

Arulpragasam, Jehan and David E Sahn. 1991. *Economic Reform in Guinea: Adjusting for the Past*. Draft. Washington DC: Cornell Food and Nutrition Policy Program.

Dixon, John A. 1982. "Food Consumption Patterns and Related Demand Parameters in Indonesia: A Review of Available Evidence". *Rice Policies in Southeast Asia Project Working Paper 6*. Washington DC: International Food Policy Research Institute.

Deaton, Angus and J. Muellbauer. 1980. "An Almost Ideal Demand System:. *The American Economic Review*. Vol. 70, 312-326.

Government of Guinea. Undated. "Rapport sur les conditions de vie des ménages de Conakry de 1986 à 1988." Conakry: MPCI/DNSI.

Heien, Dale and Cathy Roheim Wessells. 1990. "Demand Systems Estimation with Microdata: A Censored Regression Approach". *Journal of Business and Economic Statistics*, July 1990. Vol. 8, No. 3, 365-371.

Williamson-Gray, Cheryl. 1982. "Food Consumption Parameters for Brazil and Their Application to Food Policy". *Research Report 32*. Washington DC: International Food Policy Research Institute.

Table 1 - Expenditure Budget Shares by Per Capita Expenditure Quintile

	Quintiles						
	1	2	3	4	5	All	Bottom 30th Percentile
	Percent						
Local Rice	1.69	1.36	1.93	1.42	0.97	1.48	1.57
Imported Rice	12.33	9.11	6.76	4.70	2.35	7.05	11.51
Other Coarse Grains, Roots, Tubers	1.86	2.17	2.31	2.13	1.74	2.04	1.97
Bread	5.41	4.85	4.40	3.47	2.41	4.11	5.25
Meat	4.12	6.15	6.83	7.25	6.05	6.08	4.69
Fish	9.13	7.64	7.14	5.93	3.44	6.65	8.76
Milk and Dairy Products	1.28	2.25	2.53	2.68	2.48	2.24	1.59
Vegetables	8.69	7.96	7.59	6.14	3.82	6.84	8.59
Fruits	1.93	2.62	3.04	3.65	3.36	2.92	2.19
Butter and Oil	3.40	3.31	2.84	2.39	1.62	2.71	3.33
Spices	3.36	2.72	2.45	2.02	1.13	2.34	3.15
Sugar	1.85	1.71	1.56	1.19	0.88	1.44	1.89
Beverages	0.96	1.57	1.45	2.06	2.89	1.79	1.11
Food Away From Home	1.54	1.50	2.07	4.19	5.14	2.89	1.52
Fuel	6.81	6.19	5.27	4.18	3.00	5.09	6.70
Domestic Consumables	3.26	3.02	2.95	2.90	2.41	2.91	3.18
Clothes and Shoes	2.52	4.44	4.80	5.24	6.18	4.64	2.97
Housing, Hh Durables, Utilities, Taxes	15.45	13.77	13.90	14.32	15.92	14.67	14.88
Personal, Discretionary, Recreation	5.31	6.86	8.72	10.09	16.69	9.53	5.52
Transport	5.92	7.37	7.93	10.64	14.33	9.24	6.31
Education	1.40	1.47	1.41	1.04	0.85	1.23	1.47
Health	1.79	1.95	2.11	2.35	2.33	2.11	1.85
Total	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Food share	57.55	54.92	52.91	49.23	38.28	50.58	57.12
Total Expenditure (GNF)	11,961	18,643	25,400	36,040	82,418	34,892	13,699
N	345	345	345	345	345	345	518

Source: CFNPP/ENCOMEC 1990/91 Survey Data.

Table 2 - Expenditure Shares Used for CPI Weights

	Share of Total Expenditures		Share of Food Expenditures	
Food	0.419		1.000	
Local Rice		0.007		0.016
Imported Rice		0.090		0.214
Roots, Tubers, Other Cereals		0.008		0.018
Bread		0.031		0.074
Meat		0.032		0.075
Fish		0.071		0.169
Milk and Dairy		0.010		0.024
Vegetables		0.032		0.077
Fruits		0.002		0.004
Butter and Oil		0.047		0.113
Spices		0.059		0.140
Sugar		0.013		0.032
Beverages		0.010		0.024
Food Away From Home		0.008		0.020
Nonfood	0.581			
Housing		0.226		
Clothes and Shoes		0.070		
Transport		0.120		
Health		0.094		
Personal, Discretionary, Recreation		0.071		

Source: MPCI

Table 3 - AIDS Estimated Income Elasticities of Food Commodities

	All	Quintiles 1	2	3	4	5	Bottom 30th Percentile	All Cookers
Local Rice	0.614	0.663	0.582	0.705	0.60	0.415	0.638	0.652
Imported Rice	-0.031	0.41	0.202	-0.076	-0.574	-2.088	0.369	0.069
Other Grains, Root, Tubers	1.069	1.075	1.064	1.061	1.066	1.081	1.071	1.062
Bread	0.379	0.529	0.474	0.42	0.266	-0.06	0.514	0.397
Meat and Dairy	1.256	1.394	1.253	1.227	1.214	1.25	1.339	1.239
Fish	0.244	0.449	0.341	0.295	0.152	-0.463	0.426	0.314
Vegetables	0.402	0.53	0.486	0.461	0.334	-0.071	0.524	0.46
Fruits	1.116	1.176	1.13	1.112	1.093	1.101	1.155	1.114
Butter and Oil	0.337	0.471	0.456	0.367	0.248	-0.109	0.46	0.396
Spices	0.11	0.381	0.236	0.153	-0.028	-0.84	0.339	0.193
Sugar	0.215	0.391	0.341	0.277	0.054	-0.291	0.401	0.248
Beverages	1.386	1.722	1.439	1.477	1.335	1.238	1.623	1.42
Nonfoods	1.406	1.482	1.456	1.432	1.386	1.317	1.478	1.437

Notes: Elasticities computed from 3SLS coefficient estimates from AIDS model (presented in Table A.2). Elasticities for 5 Quintiles "all", and "poorest 30th percentile" use estimated coefficients with dependent means of respective samples. Elasticities for "all cookers" uses dependent means from sample used for estimation.

Source: CFNNP/ENCOMEC 1990/91 Survey Data.

Table 4 - AIDS Estimated Own-Price Elasticities of Food Commodities

	All	Quintiles 1	2	3	4	5	Bottom 30th Percentile	All Cookers
Local Rice	-1.969	-1.846	-2.049	-1.74	-2.005	-2.471	-1.909	-1.874
Imported Rice	-0.404	-0.628	-0.522	-0.382	-0.143	0.639	-0.607	-0.455
Other Grains, Roots, Tubers	-0.858	-0.844	-0.867	-0.875	-0.864	-0.833	-0.853	-0.872
Bread	-0.593	-0.685	-0.651	-0.618	-0.523	-0.323	-0.676	-0.604
Meat and Dairy	-0.947	-0.907	-0.948	-0.956	-0.959	-0.949	-0.923	-0.952
Fish	-0.665	-0.742	-0.702	-0.685	-0.631	-0.399	-0.734	-0.692
Vegetables	-0.571	-0.654	-0.625	-0.609	-0.526	-0.263	-0.65	-0.608
Fruits	-0.976	-0.963	-0.973	-0.977	-0.982	-0.98	-0.967	-0.977
Butter and Oils	-0.784	-0.824	-0.819	-0.793	-0.757	-0.65	-0.821	-0.801
Spices	-0.607	-0.72	-0.66	-0.625	-0.549	-0.21	-0.703	-0.642
Sugar	-0.423	-0.55	-0.514	-0.468	-0.307	-0.058	-0.557	-0.447
Beverages	-1.203	-1.374	-1.23	-1.249	-1.177	-1.128	-1.324	-1.221
Nonfoods	-1.053	-1.023	-1.034	-1.043	-1.061	-1.088	-1.025	-1.041

Notes: Elasticities computed from 3SLS coefficient estimates from AIDS model (presented in Table A.2). Elasticities for 5 Quintiles "all", and "poorest 30th percentile" use estimated coefficients with dependent means of respective samples. Elasticities for "all cookers" uses dependent means from sample used for estimation.

Source: CFNNP/ENCOMEC 1990/91 Survey Data.

Table 5 - AIDS Estimated Price and Income Elasticities

	Price Elasticities													Income Elasticity
	Local Rice	Imported Rice	Other Grains, Roots, Tubers	Bread	Meat and Dairy	Fish	Vegetables	Fruits	Butter and Oil	Spices	Sugar	Beverages	NonFood	
Local Rice	-1.874	0.968	-0.050	0.146	-0.215	-0.098	-0.076	-0.083	0.438	-0.012	0.213	0.098	-0.108	0.652
Imported Rice	0.212	-0.455	0.016	-0.023	0.021	0.045	0.050	0.055	0.034	0.037	-0.034	-0.006	-0.022	0.069
Other Grains, Roots, Tubers	-0.043	-0.023	-0.872	-0.046	0.058	0.075	0.078	0.043	-0.074	-0.002	-0.036	0.016	-0.238	1.062
Bread	0.061	-0.068	-0.009	-0.604	-0.015	0.050	0.020	0.011	0.040	0.020	-0.030	-0.026	0.154	0.397
Meat and Dairy	-0.049	-0.073	0.011	-0.042	-0.952	-0.047	-0.010	-0.020	-0.020	-0.005	-0.035	-0.007	0.013	1.239
Fish	-0.016	0.029	0.040	0.032	0.025	-0.692	0.014	0.021	0.041	0.020	-0.011	-0.001	0.184	0.314
Vegetables	-0.013	0.021	0.037	0.008	0.057	0.003	-0.608	0.029	-0.069	-0.019	0.023	0.032	0.040	0.460
Fruits	-0.053	0.063	0.032	-0.015	-0.050	-0.007	0.025	-0.977	-0.063	-0.012	0.043	0.021	-0.121	1.114
Butter and Oil	0.245	0.063	-0.041	0.057	0.015	0.094	-0.171	-0.042	-0.801	0.004	0.027	0.053	0.102	0.396
Spices	0.000	0.102	0.018	0.041	0.077	0.065	-0.036	0.014	0.011	-0.642	0.012	0.042	0.103	0.193
Sugar	0.239	-0.188	-0.035	-0.077	-0.122	-0.049	0.131	0.111	0.057	0.018	-0.447	-0.079	0.195	0.248
Beverages	0.085	-0.135	0.014	-0.110	-0.056	-0.086	0.074	0.030	0.066	0.034	-0.090	-1.221	-0.026	1.420
Nonfood	-0.016	-0.110	-0.020	-0.031	-0.015	-0.054	-0.068	-0.017	-0.025	-0.027	-0.012	-0.001	-1.041	1.437

Notes: Elasticities calculated from parameter estimates of Almost Ideal Demand System utlilizing ENCOMEC sample of 1,557 households that cook.
The AIDS model was estimated using a 3SLS procedure in which total per capita expenditure was instrumented.
Selectivity bias of consumers versus nonconsumers of each commodity group was corrected for using a Heckman procedure outlined in Heien and Wessells (1990).
Commodity group specific price indices were computed and then deflated by asurvey-generated monthly CPI. Missing prices were replaced by cluster mean prices.
For a detailed discussion of the estimation methodology refer to Arulpragasam and del Ninno (forthcoming).

Source: CFNNP/ENCOMEC 1990/91 Survey Data.

Table 6 - Welfare Effects of a 25 Percent Increase of the Tariff on Imported Rice.

	Average Population				Poorest 30th Percentile				Second Richest Quintile			
	Base Run		Simulation Run		Base Run		Simulation Run		Base Run		Simulation Run	
	Expenditure Shares	Calorie Shares	Expenditure Shares	Calorie Shares	Expenditure Shares	Calorie Shares	Expenditure Shares	Calorie Shares	Expenditure Shares	Calorie Shares	Expenditure Shares	Calorie Shares
Local Rice	1.43	7.33	1.78	9.25	1.66	5.31	2.02	6.81	1.47	7.00	1.82	8.80
Imported Rice	5.79	38.03	6.73	35.75	12.30	47.81	13.31	43.68	5.74	35.81	6.64	33.62
Other Grains, Roots, Tubers	2.36	4.09	2.35	4.11	2.15	2.02	2.14	2.12	2.41	4.01	2.40	4.05
Bread	3.47	9.22	3.40	9.13	5.32	8.47	5.28	8.87	3.62	9.04	3.54	8.96
Meat and Dairy	9.55	6.94	9.41	6.91	7.16	1.91	6.99	1.97	9.82	4.14	9.69	4.15
Fish	6.02	8.25	6.06	8.39	9.97	9.36	10.06	9.97	6.40	7.69	6.42	7.82
Vegetables	6.56	5.41	6.59	5.49	9.57	5.28	9.63	5.61	6.95	5.23	6.96	5.31
Fruits	3.09	3.53	3.13	3.62	2.59	2.04	2.63	2.19	3.25	3.58	3.29	3.68
Butter and Oil	2.43	11.29	2.47	11.60	3.83	11.86	3.88	12.70	2.56	10.76	2.59	11.05
Spices	2.12	0.17	2.17	0.17	3.63	0.25	3.71	0.27	2.33	0.08	2.37	0.08
Sugar	1.21	3.50	1.14	3.34	2.02	3.51	1.97	3.60	1.30	3.53	1.23	3.38
Beverages	1.90	0.06	1.85	0.06	1.08	0.02	1.03	0.02	1.99	0.06	1.94	0.06
Nonfood (Incl. Food Away From Home)	54.07	2.19	52.91	2.16	38.72	2.15	37.35	2.19	52.16	9.09	51.11	9.04
Total Expenditure and Total Calories	34,892	2,462	34,892	2,435	13,699	1,638	13,699	1,552	36,040	2,675	36,040	2,636

Notes:
* The simulation increases the real price of imported rice by 25 percent, keeping real expenditures constant.
* Simulation runs for the average population are based on coefficients estimated on the sample of 1557 households that cook.
* Simulation runs for the poorest 30th percentile of the Conakry population are based on coefficients estimated on the sample of households that cook and on the mean expenditure shares, household size, per capita expenditure levels, prices, and lambda values of the poorest 30th percentile among all 1725 households in the sample.
* Simulation runs for the 2nd richest (4th) quintile of the Conakry population are based on coefficients estimated on the sample of households that cook and on the mean expenditure shares, household size, per capita expenditure levels, prices, and lambda values of the 4th quintile among all 1725 households in the sample.

Source: CFNNP/ENCOMEC 1990/91 Survey Data.

Table 7 - Income Transfer Necessary to Maintain Household at the Poverty Line With a 25 Percent Increase in the Tariff on Imported Rice.

	At Mean Expenditure		At Base Poverty Line Expenditure		At Base Poverty Line Expenditure with 25% Tariff Increase on Imported Rice		At Compensated Poverty Line Expenditure with 25% Tariff Increase on Imported Rice	
	Expenditure Shares	Calorie Shares	Expenditure Shares	Calorie Shares	Expenditure Shares	Calorie Shares	Expenditure Shares	Calorie Shares
Local Rice	1.66	5.31	1.43	5.65	1.78	7.33	1.74	7.46
Imported Rice	12.30	47.81	9.26	44.72	10.27	41.15	9.70	40.54
Other Grains, Roots, Tubers	2.15	2.02	2.21	2.58	2.20	2.66	2.21	2.79
Bread	5.32	8.47	4.26	8.41	4.22	8.64	4.02	8.58
Meat and Dairy	7.16	1.91	8.05	2.67	7.88	2.71	8.05	2.89
Fish	9.97	9.36	7.87	9.18	7.96	9.63	7.56	9.54
Vegetables	9.57	5.28	7.86	5.38	7.93	5.63	7.61	5.64
Fruits	2.59	2.04	2.73	2.68	2.77	2.82	2.80	2.97
Butter and Oil	3.83	11.86	3.08	11.84	3.13	12.50	2.99	12.45
Spices	3.63	0.25	2.76	0.24	2.84	0.26	2.67	0.25
Sugar	2 02	3.51	1.55	3.34	1.49	3.34	1.41	3.28
Beverages	1.08	0.02	1.37	0.03	1.32	0.03	1.37	0.03
Nonfood (Incl. Food Away From Home)	38.72	2.15	47.58	3.28	46.21	3.31	47.88	3.57
Total Expenditure and Total Calories	13,699	1,638	20,800	2,002	20,800	1,931	22,500	2,002

Notes: * Base simulation runs for the poorest 30th percentile of the Conakry population are based on coefficients estimated on the sample of households that cook and on the mean expenditure shares, household size, per capita expenditure levels, prices, and lambda values of the poorest 30th percentile among all 1725 households in the sample.

Source: CFNNP/ENCOMEC 1990/91 Survey Data.

Table 8 - Welfare Effects of a 20 Percent Decrease (Elimination) of the Tariff on Imported Rice.

	Average Population				Poorest 30th Percentile				Second Richest Quintile			
	Base Run		Simulation Run		Base Run		Simulation Run		Base Run		Simulation Run	
	Expenditure Share	Calorie Share	Expenditure Share	Calorie Share	Expenditure Share	Calorie Share	Expenditure Share	Calorie Share	Expenditure Share	Calorie Share	Expenditure Share	Calorie Share
Local Rice	1.43	7.33	1.07	5.51	1.66	5.31	1.31	3.94	1.47	7.00	1.12	5.30
Imported Rice	5.79	38.03	4.85	39.76	12.30	47.81	11.29	51.82	5.74	35.81	4.84	37.47
Other Grains, Roots, Tubers	2.36	4.09	2.38	4.10	2.15	2.02	2.16	1.92	2.41	4.01	2.42	4.00
Bread	3.47	9.22	3.54	9.38	5.32	8.47	5.37	8.07	3.62	9.04	3.70	9.17
Meat and Dairy	9.55	6.94	9.69	7.03	7.16	1.91	7.32	1.85	9.82	4.14	9.95	4.17
Fish	6.02	8.25	5.98	8.18	9.97	9.36	9.88	8.77	6.40	7.69	6.39	7.62
Vegetables	6.56	5.41	6.53	5.37	9.57	5.28	9.50	4.95	6.95	5.23	6.94	5.19
Fruits	3.09	3.53	3.04	3.48	2.59	2.04	2.55	1.90	3.25	3.58	3.21	3.50
Butter and Oil	2.43	11.29	2.39	11.09	3.83	11.86	3.77	11.04	2.56	10.76	2.53	10.56
Spices	2.12	0.17	2.06	0.16	3.63	0.25	3.55	0.24	2.33	0.08	2.28	0.07
Sugar	1.21	3.50	1.27	3.68	2.02	3.51	2.07	3.40	1.30	3.53	1.37	3.69
Beverages	1.90	0.06	1.95	0.06	1.08	0.02	1.14	0.02	1.99	0.06	2.03	0.06
Nonfood (Incl. Food Away from Home)	54.07	2.19	55.23	2.23	38.72	2.15	40.09	2.10	52.16	9.09	53.21	9.20
Total Expenditure and Total Calories	34,892	2,462	34,892	2,467	13,699	1,638	13,699	1,734	36,040	2,675	36,040	2,695

Notes: *The simulation decreases the real price of imported rice by 20 percent, keeping real expenditures constant.
*Simulation runs for the average population are based on coefficients estimated on sample of households that cook.
*Simulation runs for the poorest 30th percentile of the Conakry population are based on coefficients estimated on sample of households that cook and on the mean expenditure shares, household size, per capita expenditure levels, prices, and lambda values of the poorest 30th percentile among all 1725 households in the sample.
*Simulation runs for the 2nd richest (4th) quintile of the Conakry population are based on coefficients estimated on sample of households that cook and on mean expenditure shares, household size, per capita expenditure levels, prices, and lambda values of the 4th quintile among all 1725 households in the sample.

Source: CFNNP/ENCOMEC 1990/91 Survey Data.

Table 9 - Commodity Price Indices for Conakry, 1986 - 1990

	1986			1987			1988			1989			1990		
	Nominal 86=100	Real 86=100	Real 90=100	Nominal 86=100	Real 86=100	Real 90=100	Nominal 86=100	Real 86=100	Real 90=100	Nominal 86=100	Real 86=100	Real 90=100	Nominal 86=100	Real 86=100	Real 90=100
Local Rice	100.00	100.00	103.97	107.98	80.76	83.97	205.48	121.66	126.49	177.87	83.58	86.90	260.16	96.18	100.00
Imported Rice	100.00	100.00	81.97	136.63	102.19	83.76	226.53	134.12	109.94	257.03	120.78	99.00	330.00	122.00	100.00
Roots, Tubers, Other Cereals	100.00	100.00	161.25	113.49	84.88	136.87	124.27	73.58	113.64	142.95	67.17	108.31	167.75	62.02	100.00
Bread	100.00	100.00	97.38	119.05	89.04	86.70	190.48	112.77	109.81	238.10	111.88	108.94	277.78	102.70	100.00
Meat and Dairy	100.00	100.00	112.39	122.93	91.94	103.34	156.56	92.69	104.06	183.01	85.99	96.53	240.66	88.97	100.00
Fish	100.00	100.00	61.88	185.10	138.44	85.67	260.09	153.99	95.29	308.69	145.05	89.75	437.13	161.61	100.00
Vegetables	100.00	100.00	134.39	151.67	113.44	152.45	134.34	79.54	106.89	153.72	72.23	97.07	201.26	74.41	100.00
Fruits	100.00	100.00	100.62	129.31	96.72	97.32	220.34	130.45	131.27	215.94	101.47	102.10	268.81	99.38	100.00
Butter and Oil	100.00	100.00	134.25	106.26	79.47	106.69	153.82	91.07	122.26	156.15	73.38	98.50	201.48	74.49	100.00
Spices	100.00	100.00	79.54	121.92	91.19	72.53	287.94	170.48	135.59	324.62	152.54	121.32	340.08	125.73	100.00
Sugar	100.00	100.00	79.75	134.17	100.35	80.03	275.08	162.86	129.88	272.25	127.93	102.02	339.17	125.39	100.00
Beverages	100.00	100.00	140.89	106.32	79.52	112.04	114.05	67.52	95.14	163.73	76.93	108.39	191.98	70.98	100.00
Nonfood	100.00	100.00	103.17	126.99	94.98	98.00	156.28	92.53	95.46	207.80	97.64	100.74	262.17	96.92	100.00
Food Index	100.00	100.00	95.91	143.00	106.96	102.58	186.40	110.36	105.85	219.77	103.27	99.04	282.02	104.27	100.00
Nonfood Index	100.00	100.00	103.17	126.99	94.98	98.00	156.28	92.53	95.46	207.80	97.64	100.74	262.17	96.92	100.00
Aggregate Index (CPI)	100.00	100.00	36.97	133.70	133.70	49.43	168.90	168.90	62.44	212.81	212.81	78.68	270.49	270.49	100.00
Annual CPI Growth Rate (%)				33.70			26.33			26.00			27.10		

Notes: *Aggregate CPI is directly from the MPCI as are data on shares and prices.
*Commodity group specific price indices were calculated by author from disaggregated price and share data and aggregate price index data from MPCI.
*Prices for all years are from the month of December.

Source: MPCI and author's calculations.

Table 10 - Welfare Effects Assuming Real Price Vector of December 1987 Relative to Actual Survey Prices (1990)

	Average Population				Poorest 30th Percentile				Second Richest Quintile			
	Base Run (1990 Prices)		Simulation Run (1987 Prices)		Base Run (1990 Prices)		Simulation Run (1987 Prices)		Base Run (1990 Prices)		Simulation Run (1987 Prices)	
	Expenditure Shares	Calorie Shares	Expenditure Shares	Calorie Shares	Expenditure Shares	Calorie Shares	Expenditure Shares	Calorie Shares	Expenditure Shares	Calorie Shares	Expenditure Shares	Calorie Shares
Local Rice	1.43	7.33	1.30	8.07	1.66	5.31	1.53	5.57	1.47	7.00	1.34	7.68
Imported Rice	5.79	38.03	4.89	38.96	12.30	47.81	11.33	50.46	5.74	35.81	4.88	36.61
Other Grains, Roots, Tubers	2.36	4.09	2.57	3.30	2.15	2.02	2.36	1.55	2.41	4.01	2.62	3.21
Bread	3.47	9.22	3.21	9.99	5.32	8.47	5.04	8.87	3.62	9.04	3.37	9.79
Meat and Dairy	9.55	6.94	9.94	7.10	7.16	1.91	7.56	1.87	9.82	4.14	10.19	4.20
Fish	6.02	8.25	5.72	9.29	9.97	9.36	9.62	10.12	6.40	7.69	6.12	8.66
Vegetables	6.56	5.41	7.88	4.33	9.57	5.28	10.84	3.76	6.95	5.23	8.29	4.13
Fruits	3.09	3.53	3.13	3.74	2.59	2.04	2.64	2.05	3.25	3.58	3.29	3.75
Butter and Oil	2.43	11.29	1.98	8.76	3.83	11.86	3.36	9.37	2.56	10.76	2.12	8.42
Spices	2.12	0.17	1.71	0.19	3.63	0.25	3.21	0.30	2.33	0.08	1.93	0.09
Sugar	1.21	3.50	1.07	3.93	2.02	3.51	1.87	3.90	1.30	3.53	1.17	3.99
Beverages	1.90	0.06	2.00	0.05	1.08	0.02	1.19	0.02	1.99	0.06	2.08	0.05
Nonfood (Incl. Food Away from Home)	54.07	2.19	54.62	2.29	38.72	2.15	39.45	2.15	52.16	9.09	52.60	9.43
Total Expenditure and Total Calories	34,892	2,462	34,892	2,422	13,699	1,638	13,699	1,707	36,040	2,675	36,040	2,653

Notes:
* The simulation changes all real prices to their December 1987 levels (see Table 9), keeping real expenditures at their 1990 levels.
* Simulation runs for the average population are based on coefficients estimated on the sample of 1557 households that cook.
* Simulation runs for the poorest 30th percentile of the Conakry population are based on coefficients estimated on the sample of households that cook and on the mean expenditure shares, household size, per capita expenditure levels, prices, and lambda values of the poorest 30th percentile among all 1725 households in the sample.
* Simulation runs for the 2nd richest (4th) quintile of the Conakry population are based on coefficients estimated on the sample of households that cook and on the mean expenditure shares, household size, per capita expenditure levels, prices, and lambda values of the 4tn quintile among all 1725 households in the sample.

Source: CFNNP/ENCOMEC 1990/91 Survey Data.

Table 11 - Real Income Growth Necessary to Have Maintained Household at the Poverty Line Given Price Changes Between 1987 and 1990

	At Mean Expenditure		At 1990 Poverty Line Expenditure with Survey (1990) Prices		At 1990 Poverty Line Expenditure with 1987 Prices		At 1987 Poverty Line Expenditure with 1987 Prices	
	Expenditure Shares	Calorie Shares	Expenditure Shares	Calorie Shares	Expenditure Shares	Calorie Shares	Expenditure Shares	Calorie Shares
Local Rice	1.66	5.31	1.43	5.65	1.29	5.98	1.32	5.92
Imported Rice	12.30	47.81	9.26	44.72	8.30	46.99	8.66	47.49
Other Grains, Roots, Tubers	2.15	2.02	2.21	2.58	2.42	2.03	2.41	1.96
Bread	5.32	8.47	4.26	8.41	3.97	8.90	4.10	8.89
Meat and Dairy	7.16	1.91	8.05	2.67	8.45	2.66	8.35	2.55
Fish	9.97	9.36	7.87	9.18	7.52	10.06	7.77	10.07
Vegetables	9.57	5.28	7.86	5.38	9.14	4.03	9.34	3.99
Fruits	2.59	2.04	2.73	2.68	2.78	2.75	2.76	2.65
Butter and Oil	3.83	11.86	3.08	11.84	2.61	9.25	2.70	9.27
Spices	3.63	0.25	2.76	0.24	2.34	0.28	2.44	0.28
Sugar	2.02	3.51	1.55	3.34	1.40	3.71	1.46	3.74
Beverages	1.08	0.02	1.37	0.03	1.48	0.03	1.44	0.03
Nonfood (Incl. Food Away from Home)	38.72	2.15	47.58	3.28	48.31	3.34	47.26	3.17
Total Expenditure and Total Calories	13,699	1,638	20,800	2,002	20,800	2,038	19,800	2,002

Notes: * Base simulation runs for the poorest 30th percentile of the Conakry population are based on coefficients estimated on the sample of households that cook and the means expenditure shares, household size, per capita expenditure levels, prices, and lambda values of the poorest 30th percentile among all 1725 households in the sample.

*Prices for all years are from the month of December.

Source: CFNNP/ENCOMEC 1990/91 Survey Data.

Table A.1 - Real Price Per 1000 Daily Kilo-Calorie (Deflated by CPIFIN01)

	Quintiles						
	1	2	3	4	5	All	Bottom 30th Percentile
1 Local Rice	86.96	86.91	92.81	94.31	95.73	91.86	87.42
2 Imported Rice	71.60	72.08	71.64	72.00	72.28	71.90	71.72
3 Other Coarse Grains, Roots, Tubers	303.06	268.01	251.27	270.12	274.53	273.16	296.36
4 Bread	175.14	174.88	178.81	179.94	180.92	177.92	175.25
5 Meat	741.57	773.08	772.03	779.28	803.79	773.87	755.90
6 Fish	286.09	303.14	329.06	373.92	467.14	345.59	296.77
7 Milk and Dairy Products	1875.84	1894.66	1821.37	1835.28	1721.89	1822.01	1897.93
8 Vegetables	489.38	520.36	548.95	596.56	749.60	573.41	505.40
9 Fruits	338.61	384.88	386.96	408.07	538.99	412.95	353.41
10 Butter and Oil	89.27	94.14	100.10	106.87	121.73	101.59	89.97
11 Spices	3989.55	4180.64	3923.67	13674.42	4847.68	6036.59	3979.50
12 Sugar	160.28	162.65	162.59	165.39	164.36	163.04	160.52
13 Beverages	15755.08	15579.37	15947.11	15836.75	15308.59	15684.35	15694.56
14 Food Away From Home	212.97	217.99	239.10	259.45	299.35	253.21	218.61

Note: Averages have been calculated including only actual purchases by households

Source: CFNPP/ENCOMEC 1990/91 Survey Data.

Table A.2 - Number of Households Consuming Each Food Commodity Group

	Whole Sample	Cookers Sample	Whole Sample	Cookers Sample
n	1725	1557	1725	1557
	(number of households)		(percent of sample)	
Rice	1525	1525	88	98
Local Rice	512	512	30	33
Imported Rice	1370	1370	79	88
Other Grains	1412	1412	82	91
Bread	1522	1424	88	91
Meat and Dairy	1572	1480	91	95
Fish	1519	1501	88	96
Vegetables	1549	1533	90	98
Fruits	1485	1391	86	89
Oils	1508	1480	87	95
Spices	1524	1514	88	97
Sugar	1492	1410	86	91
Beverages	1577	1450	91	93

Source: ENCOMEC.

Table A.3 - Almost Ideal Demand System Estimation for Conakry: 3SLS Model Results

	Dependent Mean	Intercept	Local Rice	Imported Rice	Other Grains, Roots, Tubers	Bread	Meat and Dairy	Fish	Vegetables	Fruits	Butter and Oil	Spices	Sugar	Beverages	Nonfood	Expend	HHSIZE	LAMBDA
Local Rice	0.0164	0.0438*	0.0144**	0.0154**	0.0009	0.0022	0.0040*	0.0020	0.0017	0.0014	0.0070**	-0.0003	0.0034**	0.0014	-0.0044*	-0.0057**	-0.0004*	0.0498**
Imported Rice	0.0781	0.8558**	0.0154**	0.0369**	0.0004*	0.0049*	0.0049	0.0018	-0.0018**	0.0021	0.0004	0.0010	-0.0037*	-0.0017	-0.0370**	-0.0727**	-0.0020**	-0.0487**
Other Grains, Roots, Tubers	0.0226	0.0144	-0.0009	0.0004	0.0029**	0.0010	0.0014	0.0018	0.0019*	0.0010	0.0018*	0.0000	-0.0008	0.0004	-0.0047**	0.0014	0.0001	-0.0157**
Bread	0.0423	0.3188**	0.0022**	0.0049*	0.0010	0.0157**	0.0029*	0.0002	0.0011	0.0003	0.0009	0.0002	0.0018*	-0.0014**	-0.0059**	-0.0254**	-0.0009**	-0.0311**
Meat and Dairy	0.0892	-0.1219**	0.0040*	0.0048*	0.0014	0.0029*	0.0082	-0.0027	0.0007	0.0012	0.0012	0.0001	-0.0028**	0.0003	0.0114**	0.0213**	0.0002	-0.0424**
Fish	0.0733	0.8128**	0.0020	0.0018	0.0018	0.0012	0.0027	0.0189**	0.0028*	0.0000	0.0014	0.0001	-0.0018**	0.0009	-0.0109**	-0.0503**	-0.0028**	-0.0323**
Vegetables	0.0757	0.5158**	0.0017	-0.0018	0.0019*	0.0011	0.0007	0.0028*	0.0288**	0.0010	0.0084**	0.0024**	0.0011	0.0017*	-0.0188**	-0.0409**	-0.0027**	-0.0377**
Fruits	0.0298	0.0013	0.0014	0.0021	0.0010	0.0003	0.0012	0.0000	0.0010	0.0008	0.0018**	-0.0003	0.0013**	0.0007	-0.0020	0.0034	0.0000	-0.0194**
Butter and Oil	0.0298	0.2247**	0.0070*	0.0004	0.0018*	0.0009	0.0012	0.0014	0.0084**	0.0018**	0.0054**	-0.0003	0.0004	0.0013*	-0.0057**	-0.0180**	-0.0011**	-0.0184**
Spices	0.0258	0.2573**	0.0003	0.0010	0.0000	0.0002	0.0001	0.0001	0.0024**	0.0003	0.0003	0.0087**	0.0000	0.0007	-0.0074**	-0.0208**	-0.0018**	-0.0134**
Sugar	0.0150	0.1388**	0.0014**	0.0017*	0.0008	0.0018	0.0028**	0.0018*	0.0011	0.0013**	0.0004	0.0000	0.0081**	0.0014**	0.0028**	-0.0113**	-0.0006**	0.016[illegible]**
Beverages	0.0164	0.0490**	0.0014	-0.0017	0.0004	0.0014**	0.0003	0.0009	0.0017	0.0007	0.0013	0.0007	-0.0014**	-0.0034**	0.0029*	0.0089**	-0.0004**	-0.0089**
Nonfood1	0.4858		0.0044	0.0370	0.0047	0.0059	0.0114	0.0109	0.0188	0.0020	0.0057	-0.0074	-0.0028	0.0029	0.0831	0.2122	0.0000	

Notes: Results of Almost Ideal Demand System model estimated using Three-Stage Least Squares estimate instrumenting for per capita expenditure.
Data used is ENCOMEC-CFNPP 1990/1991 data for Conakry. The sample is that of 1,557 households that cook at home.
Model run imposing symmetry and adding-up restrictions as per demand theory.
Selectivity bias related to the consumption/non-consumption decision was corrected for by including the probit-estimated lambda variable (see Heien and Wessel 1990).
For a detailed presentation of variables and estimation procedure see Arulpragasam and del Ninno (forthcoming).
1 Nonfood parameters are computed as residuals since their column totals necessarily sum to zero by the adding-up constraint.
* Significant at the 10% level
** Significant at the 5% level.
System-weighted R^2 = 0.2368.

Table A.4 - Deflated Commodity Price Index by Quintiles Faced by Households

	1	2	3	4	5	All	Bottom 30th Percentile
1 Local Rice	0.911	0.910	0.935	0.924	0.949	0.926	0.908
2 Imported Rice	0.924	0.939	0.925	0.936	0.923	0.929	0.933
3 Other Coarse Grains, Roots, Tubers	0.895	0.901	0.926	0.915	0.969	0.921	0.900
4 Bread	0.914	0.915	0.934	0.936	0.943	0.928	0.914
5-7 Meat & Dairy	0.891	0.908	0.893	0.905	0.913	0.902	0.901
6 Fish	0.883	0.911	0.964	0.983	0.980	0.944	0.891
8 Vegetables	0.929	0.970	1.001	1.025	1.007	0.986	0.952
9 Fruits	0.836	0.905	0.949	0.964	1.021	0.935	0.858
10 Butter & Oil	0.919	0.908	0.940	0.923	0.967	0.931	0.911
11 Spices	0.983	0.951	0.956	1.020	1.012	0.985	0.959
12 Sugar	0.917	0.924	0.935	0.941	0.938	0.931	0.918
13 Beverages	0.920	0.914	0.928	0.924	0.925	0.922	0.919
Non Foods[3]	0.910	0.949	0.978	1.029	1.133	0.933	0.910
Total	345	345	345	345	345	1725	518

Note: 1) Index for each household is computed as $\sum_{j=1-y}\left(\frac{P_{ij}}{P^{*}_{j}} * w_{ijk}\right)$

where w_{ijx} = expenditure share of commodity j in commodity group k for household i.
P_{ij} = price of commodity j paid by household i.
P^{*}_{j} = mean price of commodity j across all households.
y = number of commodities in commodity group k.

2) Missing observations have been replaced with cluster prices.
3) Non Food prices calculated for cooking households.

Source: CFNPP/ENCOMEC 1990/91 Survey Data.