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IN MEXICO

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FOOD SUBSIDY PROGRAMS
IN MEXICO

by

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CONTENTS

Foreword	vi
1. Major Consumer-Oriented Food Subsidy Programs	1
2. Fiscal Cost and Welfare Effects of the Maize Subsidy Scheme	12
3. Conclusions	39
Appendix: Methodology	41
Bibliography	43

TABLES

1. Comparison of tortilla prices, 1965-83	3
2. Intensity of consumption coefficients (ICC)	4
3. Ranking of subsidized food products in the consumption basket in the total population and by income decile, 1977	6
4. CONASUPO and free market sales of maize, 1978-79	14
5. Fiscal behavior of CONASUPO, 1965-82	17
6. Fiscal burden of CONASUPO, 1970-82	18
7. Distribution of subsidies among crops, 1971-79	19
8. Subsidy net of transaction costs as a ratio of the total subsidy, 1971-79	20
9. Average income, patterns of expenditure, and consumption shares by socioeconomic group, 1977	23
10. Average income, patterns of expenditure, and consumption shares of maize and nonmaize agricultural producers, 1977	25
11. Imputed hourly wage rate for producing tortillas at home, 1977-83	26
12. Shares of average monthly income of maize producers that are derived from maize and spent on maize, by socioeconomic group, 1977	27
13. Coefficients for the intensity of consumption and production (ICC and IPC)	28
14. Potential changes in the per capita expenditures on maize and tortillas as the result of the income effect of a small increase in the price of maize, 1977	32
15. Potential changes in the per capita expenditures on tortillas and maize as the result of the income effect of a small increase in the price of tortillas, 1977	33

16. Potential changes in the per capita expenditure on other basic foods as the result of the income effect of small changes in the price of maize and tortillas, 1977	34
17. Potential effects of subsidies on the distribution of income and on real income	35

FIGURES

1. CONASUPO's intervention	15
2. Target and nontarget populations of the 1977 Household Income Survey	22

FOREWORD

Studies of food subsidies are an important part of IFPRI's research portfolio. Their primary purpose is to help governments of developing countries assess how current and alternative subsidy policies affect human nutrition, food consumption, income growth and distribution, fiscal costs, agricultural production, and foreign trade. Results from studies in several countries have been published as IFPRI's research reports. This working paper series was initiated to meet requests for additional information on the nature, implementation, and effects of subsidies in various countries. The food subsidy papers complement IFPRI's research reports on the subject by providing detailed descriptive analyses of operational and implementation issues and impact.

Consumer-oriented food subsidy programs take many forms. Some result in lower food prices for all consumers, others are targeted to certain groups. Benefits, costs, and cost-effectiveness vary among program types, and efforts by a particular government to either reduce costs or increase benefits may be more successful if based on experiences from various programs in other countries. A variety of subsidy programs for food exists in Mexico. The design and content vary among commodities and include general price subsidies for certain food staples, subsidized milk rations, government-owned, low-price retail stores, and direct food distribution.

In this working paper, Nora Lustig describes the various subsidy programs of Mexico and analyzes their fiscal costs, benefits, and the distribution of benefits among population groups. Dr. Lustig, who is professor of economics at El Colegio de México, Mexico City, undertook the research reported here while a consultant to IFPRI. The research reported in this paper was funded by the United Nations Development Programme (UNDP).

Per Pinstруп-Andersen

1. MAJOR CONSUMER-ORIENTED FOOD SUBSIDY PROGRAMS

INTRODUCTION

This paper distinguishes between general food subsidy programs and those oriented to specific target groups.¹ The target-oriented programs are then separated into food stamp and food distribution programs. This distinction is made because different fiscal costs are associated with each program type. Everything else being equal, the ranking from most to least expensive is general price subsidies, targeted price subsidies, food stamps, and direct distribution programs.

The most widespread food subsidy program in Mexico is the general price subsidy on basic food products such as maize, tortillas, wheat flour, and bread. In addition, there are various targeted and semi-targeted programs, such as the special stores where goods are sold at a discount or no value-added tax is charged (for example, the special stores for government employees); the food stamp programs (such as milk ration cards); and the direct distribution programs (such as the Ministry of Public Health's supplementary food project).

In general, food subsidies in Mexico are meant to protect the purchasing power of urban wage earners through a system of price controls and to diminish pressure for higher wages. The poorest and most undernourished sectors of the population live in rural areas and in small towns or sections of the cities where the controlled prices are more difficult to enforce. This may explain why few studies have estimated the nutritional impact of these subsidies. The objectives underlying their implementation appear to focus more on price and social stability than on nutrition.

GENERAL PRICE SUBSIDIES

A number of basic food products are subject to price controls at the same time that some fundamental inputs used in their production are subsidized. Such a scheme has placed a tremendous fiscal burden on the government, and benefits for lower-income groups are dubious.

¹The classifications follow those in Shlomo Reutlinger and Marcelo Selowsky, Malnutrition and Poverty: Magnitude and Policy Options (Baltimore: Johns Hopkins University Press, 1976).

At present, the most important general food subsidy, given its significant role in the Mexican diet and its relative fiscal cost, is the one on tortillas. Their price is kept under strict control to protect the purchasing power of the low-income population. Similar schemes are in operation for other major food products, including beans, cooking oil, crackers and noodles, pork, poultry and eggs, rice, sugar, and wheat bread. There are many other food and nonfood products that fall under price controls without an explicit subsidy: the benefit to the consumer is transferred from some other population group. Examples of these are canned fruits and vegetables, coffee, ham, and tuna fish.

The subsidies on beans, maize, oil, rice, sorghum, soybeans, sugar, tortillas, and wheat are discussed in this report. The Comisión Nacional de Subsistencias Populares (CONASUPO) is the government agency in charge of implementing all subsidies except sugar.

Subsidy on Tortillas

Tortillas and beans are the basic staples of the Mexican diet, and tortillas are the major source of calories for low-income groups. In rural areas tortillas are usually made at home, either out of homegrown or purchased maize or purchased dough. City dwellers, on the other hand, generally buy them from corner stores called tortillerías. This difference has important implications for the welfare effects as well as the cost effectiveness of the tortilla subsidy.

In general, the subsidy scheme, which began in the mid-1960s, works in this way. The government purchases maize at a given price and sells it to mills at a lower price. The government absorbs all the distribution and storage costs. Then the processed goods (tortillas, maize flour, and maize dough) are sold to the public at prices set by the government (see Table 1). After 1973 the difference between the purchase and sale prices became substantial.

In a subsequent section a more detailed description of the costs and benefits of the maize subsidy is presented, but an explanation is necessary here. If the controlled price were enforced without exception, the beneficiaries of this program would include almost everyone in Mexico.

A general price subsidy favors the poor when they consume relatively more of the subsidized good than higher-income groups. The Intensity of Consumption Coefficient (ICC) is a measure of the relative distribution of benefits from a general price subsidy.² The ICC can be measured using a Lorenz-like diagram. Instead of having the

²For a more detailed discussion of these indexes, see the Appendix.

Table 1--Comparison of tortilla prices, 1965-83

Year	Guaranteed Price	Average Rural Price	Average CONASUPO Sale Price	Import Price	Tortilla Price
		(Mex \$/ton)			(kilogram)
1965	940	959	815	872	1.15
1966	940	918	807	801	1.15
1967	940	940	840	791	1.15
1968	940	934	857	779	1.15
1969	940	894	878	855	1.15
1970	940	905	901	957	1.15
1971	940	900	879	1,407	1.15
1972	940	902	907	1,036	1.15
1973	1,200	1,100	993	1,352	1.15
1974	1,500	1,463	1,319	1,936	1.80
1975	1,900	1,863	1,658	1,912	2.20
1976	2,340	2,167	1,882	1,700	3.60
1977	2,900	2,837	2,418	2,528	3.60
1978	2,900	2,912	2,451	2,820	3.60
1979	3,480	3,550	2,478	3,100	4.20
1980	4,450	4,791	3,122	3,340	4.20
1981	6,550	5,569	3,798	3,840	5.50
1982	8,850	n.a.	6,550	n.a.	11.00
1983	10,200 ^a	n.a.	6,550	n.a.	15.50
1983	16,000 ^b	n.a.	6,550	n.a.	n.a.

Source: CONASUPO (1965-81); for 1981 and 1982, Ministry of Commerce, internal document, June 1983.

Note: Everything is in current prices; n.a. means not available.

^aValid until May 8.

^bValid after May 9.

share of income on the y axis, however, the share of consumption of the commodities under consideration are placed there.³ The values of

³These indexes have a shortcoming, however; this result is unequivocally true only when the ICC or the Intensity of Production Coefficient (IPC) declines as incomes rise. Otherwise there may be trade-offs among the poor that are not reflected in the size of the index. But so long as the inverse relationship between the target and nontarget populations holds, indexes are a good summary indicator of the welfare effects of the two groups as a whole.

the index are given by the ratio between the area defined by the ICC and the perfect equality triangle. Because the population is ranked by income on the x axis, the larger the ICC, the more likely is the consumption of that commodity by the poor.⁴ Moreover, because some commodities may be consumed mainly by the poor, the ICC can be larger than unity (the curve may extend beyond the diagonal). If so, a general subsidy on such commodities implies a progressive distribution of fiscal resources.

If the ICC is used as a criterion, the distribution of benefits from general price subsidies is less favorable for the poor if the subsidy is on tortillas than if it is on lard, maize, rice, or solid brown sugar called piloncillo (see Table 2).⁵ Moreover, in Table 3

Table 2--Intensity of consumption coefficients (ICC)

Food Product	Coefficient
Maize	1.1600
Brown sugar (<u>piloncillo</u>)	1.0062
Lard	0.9908
Maize flour	0.9768
Beans	0.9605
Maize dough (<u>nixtamal</u>)	0.9339
Refined sugar	0.9075
Rice	0.8834
Tortillas	0.7965

Source: Nora Lustig, "Distribution of Income, Food Consumption and Fiscal Cost of Alternative Policy Options," in The Political Economy of Income Distribution in Mexico, ed. P. Aspe and P. Sigmund (New York: Holmes and Meier, 1983).

Note: For a definition of the coefficient, see the Appendix of this report.

⁴For a more detailed description of the ICC, see D. McCarthy, "Food and Nutrition Planning: Pakistan," Discussion Paper 12, International Nutrition Policy and Planning Program, Center for International Studies, Massachusetts Institute of Technology, Cambridge, Mass., 1978; and the Appendix of this report.

⁵See Nora Lustig, "Distribution of Income, Food Consumption and Fiscal Cost of Alternative Policy Options," in The Political Economy of Income Distribution in Mexico, ed. P. Aspe and P. Sigmund (New York: Holmes and Meier, 1983).

another indicator that uses an index combining frequency and proportion of expenditure shows that tortillas occupied the 18th, 22nd, and 12th places, respectively, for the lowest three income deciles; while maize in grain ranked first. For the population as a whole, however, tortillas ranked 4th, and maize in grain ranked 12th. This ranking occurs because families in the lowest three deciles are rural and mostly produce their tortillas at home. Thus, they do not benefit much from the tortilla subsidy.

Furthermore, the lowest income deciles may not receive benefits because of distortions in the price control system. First, not all mills have access to subsidized maize: 10,000-14,000 of the 36,000 officially registered tortillerías acquire subsidized maize.⁶ Second, of the total allotment of the subsidized maize, 64 percent goes to urban centers in five states and Mexico City, which receives 36 percent of the total. Thus, more subsidized maize ends up in places where the population has relatively higher incomes. Moreover, in urban areas there is no attempt to limit the distribution of the subsidized maize to the poorer people. Retailers with no access to subsidized maize disregard the controlled price and charge substantially more.⁷

Wheat-Derivatives Subsidy

The mechanics of the wheat subsidy scheme are similar to those for the maize subsidy. The main differences are that wheat is purchased directly by flour manufacturers, rather than by CONASUPO, and the subsidy is paid after the producer demonstrates that the flour has been used to make basic foodstuffs, such as white breads, noodles, or crackers.

First, flour industry owners purchase wheat from producers or intermediaries at the guaranteed price. Part of the costs are absorbed by CONASUPO, and when the domestic supply is insufficient, CONASUPO imports more. Then manufacturers convert the wheat into flour and sell it at a subsidized price to bakeries and to noodle factories. The government reimburses part of the cost according to the proportion of total flour that has been sold to make bread, crackers, and noodles. This subsidy does not include any specialty bread, pastry, or pasta.

⁶It is estimated that the number of tortillerías may actually be 60,000 if unregistered tortillerías are included.

⁷According to a recent survey, which covered the 60 largest cities in Mexico and parts of the rural areas, in 20 cities tortillas were sold at more than \$15 per kilogram and in the remaining 40 cities the price oscillated between \$13 and \$18. In the rural sector the price ranged from \$13-\$30 per kilogram. At the time of the survey the controlled price equaled \$11; in July 1983 the controlled price was changed to \$15.50 per kilogram, and in June 1984 to \$21.

Table 3--Ranking of subsidized food products in the consumption basket in the total population and by income decile, 1977

Food Product	Income Decile 1		Income Decile 2		Income Decile 3		Total Population	
	Rank	Percent of Total Food Expenditures	Rank	Percent of Total Food Expenditures	Rank	Percent of Total Food Expenditures	Rank	Percent of Total Food Expenditures
Beans	2	7.62	2	6.71	2	5.99	5	3.18
Beef	8	4.42	3	5.60	3	7.18	1	11.32
Cooking oil	10	3.20	10	3.16	8	3.39	10	2.77
Crackers	23	0.87	25	1.24	25	1.33	29	1.23
Eggs	13	2.11	8	2.95	5	3.28	3	4.12
Maize in grain	1	28.75	1	21.54	1	15.64	12	4.67
Milk (pasturized)	34	0.60	33	0.84	29	1.77	7	5.42
Milk (unpasturized)	20	2.18	12	3.71	11	4.03	20	2.74
Noodles	21	0.99	18	1.48	15	1.62	18	1.17
Pork	14	2.88	19	2.75	21	2.41	13	3.05
Poultry	24	1.81	23	2.17	22	2.63	9	4.27
Rice	15	1.61	14	1.89	10	2.14	15	1.30
Sugar (brown)	7	2.60	7	2.52	14	1.89	26	0.96
Sugar (refined)	12	2.06	16	1.97	24	1.51	30	1.01
Tortillas	18	1.83	22	2.80	12	4.02	4	4.78
White bread	22	1.27	20	1.91	19	2.07	14	2.06

Source: Nora Lustig, "Distribución del Ingreso y Consumo de Alimentos en México," Demografía y Economía 24 (No. 2, 1980).

Notes: Rank was calculated by combining expenditure, weight, and frequency consumed. Income decile 1 is the lowest decile. Total population indicates all 10 deciles are included.

In turn, bakeries and other stores must sell their products manufactured with the subsidized flour at the controlled price set by the Ministry of Commerce. Although this subsidy is designed to protect those with low incomes, the proportion consumed by those with higher incomes is high. Furthermore, the subsidized goods are not a very important part of the diets of the lowest three deciles (see Table 3). Moreover, manufacturers seeking higher profits use part of the subsidized flour to produce goods not subject to control.

Bean Subsidy

The price subsidy on beans is very important because beans are the major source of protein in diets of the Mexican poor. Whereas maize is often obtained by the rural poor in the form of unsubsidized raw maize, made into tortillas at home, the lower income deciles have better access to the general subsidy on beans.

The government purchases beans on the domestic or international market at the prevailing price and then sells them to the packager or directly to consumers at a lower price without adding distribution and storage costs. In principle, the beans are sold to consumers at a controlled price set by the Ministry of Commerce. In general, the subsidy scheme is put into practice in the same way as the subsidies on tortillas and wheat. Perhaps the most important difference is that the proportion of beans sold directly to the consumer is far higher than that of maize.

Because it is a general price subsidy, everyone who consumes beans is a beneficiary, but the question of whether the program benefits the poor relatively more than other groups still remains. Table 2 shows that beans have a considerably higher ICC than tortillas: the index is close to unity in the case of beans and equals 0.7965 for tortillas. In addition, beans rank second in the diet of the lowest three deciles (see Table 3).

Even though it is more difficult to divert subsidized beans for illegal purposes, one of the problems associated with this program is that it is more difficult to enforce price controls on unpackaged beans, and this is the most frequent form of consumption for lower-income groups. Overall, however, it seems that a beans subsidy is a much better candidate for a progressive general price subsidy than tortillas or bread.

Cooking Oil, Oilseed, and Rice Subsidies

There are a number of other food products subject to price control for which the only subsidy consists of CONASUPO absorbing the costs of commercialization, distribution, and storage. These are oilseeds, raw vegetable oil, and rice. The public buys rice and cooking oil at the controlled price set by the Ministry of Commerce. In terms of benefits the subsidy on rice may be more progressive because its ICC ranking is high (see Table 2).

Sorghum and Soybeans Subsidies

Although Mexicans seldom consume sorghum and soybeans directly, they are major inputs in the production of animal feed. Thus the subsidy programs for sorghum and soybeans play a fundamental role in supporting the price control regimes for eggs, meat (especially chicken), and milk.

This is perhaps the most regressive general price subsidy implemented by CONASUPO given that the largest proportion of the final products subject to control--eggs, beef, chicken, pork, and pasteurized milk--is consumed by those in the upper income strata.⁸ As with beans, maize, and wheat, CONASUPO sells the sorghum and soybeans at a price lower than the purchase price and absorbs all costs associated with commercialization, distribution, and storage.

Sugar Subsidy

Sugar consumption may be the quickest way to generate calories, but from a health standpoint it is the least advisable, particularly when ingested in large quantities. This is especially relevant for Mexico, which has one of the highest indexes for per capita consumption of sugar in the world.

The mechanism of the sugar subsidy is different from the others discussed here because the government participates in the production process itself. The state-owned enterprise, Azucar, S.A., produces more than 70 percent of the nation's sugar and owns 56 of Mexico's 70 sugar mills. Irrespective of ownership, the mills purchase sugarcane at the guaranteed price and sell the final product to consumers at the controlled price. The subsidy consists of the lower profit margins or losses that result. In the case of losses, mills receive credit at subsidized rates to cover financial requirements for maintenance and expansion.

In terms of relative benefits to low-income consumers, sugar is theoretically a good candidate. The ICC rating for refined sugar is about 0.90 (see Table 2). But, even though this subsidy benefits lower-income groups, the program may reinforce poor eating habits. In addition, a high proportion of the subsidized sugar is used in the production of commodities such as soft drinks, although such uses are against the law.⁹

⁸For an estimate of the equity effect of these subsidies, see P. García-Alba and J. Serra-Puche, Financial Aspects of Macroeconomic Management in Mexico, Joint Research Program Series 36 (Tokyo: Institute of Development Economics, 1983), p. 81.

⁹Some Mexican nutritionists, however, have argued that soft drinks should be considered part of the basic diet because drinkable water is not available to most of the lower-income population.

TARGET-GROUP ORIENTED SUBSIDY PROGRAMS

At the other end of the spectrum are target-oriented programs such as special stores, ration cards, and direct distribution projects. The special stores use two kinds of discriminatory schemes: "hard" discrimination, in which a credential system is used to allow access to the stores, and "soft," in which self-selection occurs because of location.

Special Stores

Government intervention in the final stage of food distribution occurs at both wholesale and retail levels. The government-owned Impulsora del Pequeño Comercio, S.A. (IMPECSA), a branch of CONASUPO, reduces wholesale costs of government-run retail stores and small private shops by simplifying how they acquire goods. The cost of the program is not an actual outlay but consists of the opportunity costs of the capital required. IMPECSA appears to have shown a small profit from its inception in 1977.

IMPECSA has 204 storage facilities in about 200 cities. From these facilities, goods--mostly basic foodstuffs--are distributed to public stores and to participating small private groceries.

IMPECSA qualifies as a target-oriented program because most participating stores are located in low-income urban neighborhoods. Estimates show that retail prices in these stores are on the average 10 to 12 percent lower than those in nonparticipating stores; in some cases the reduction can be as much as 30 percent. The importance of the special stores system is hard to determine because the actual number of beneficiaries has not been estimated. However, estimates show that more than 25 percent of total sales of grocery goods are made through these channels.

Distribuidoras Conasupo, S.A. (DICONSA) is CONASUPO's distribution system. It has six regional branches encompassing 11,200 stores, 9,000 of which are in rural areas and 2,200 in cities. The DICONSA stores are primarily located in the poorest urban neighborhoods and marginal zones in rural areas. Despite the relatively small proportion of urban stores, their sales volume is 3.9 times higher than their rural counterparts.

The DICONSA stores sell items at prices 5 percent lower than prevailing market prices in Mexico City, 10 percent lower than those in other urban centers, and up to 35 percent lower than those in rural areas. The cost should be estimated as the opportunity cost of fixed and working capital.

In addition, other special stores employ credential systems to qualify consumers for subsidized purchases. These include stores where only identified government employees may shop, stores associated with various ministries and major public enterprises (such as PEMEX, the oil industry), and stores within the university system. They not

only sell goods at discount prices but also eliminate the value-added tax. The main beneficiaries are urban families in the lower middle-income group.

Food Stamp Programs: CONASUPO Milk Ration Cards

CONASUPO imports powdered milk, and its subsidiary, LICONSA, reconstitutes it. It is then distributed to LICONSA stores where eligible consumers can purchase a daily amount of milk shown on their ration cards. Criteria for receiving ration cards include income and the number of children, pregnant or breastfeeding women, and elderly in the family. Consumer committees made up of community volunteers recommend potential program recipients who are then screened by social workers. Initially this program served only Mexico City, but it has been expanded to include Guadalajara, Merida, Monterrey, and Oaxaca.

According to a study by the Harvard Institute of International Development,

. . . the program is reaching low-income consumers, however, not the poorest segments. . . . What is clear is that the milk program is providing an economic benefit to large numbers of low-income families. . . . It may also be providing nutritional benefits, but these are unclear. If more of the lowest income group could be drawn into the program, the chances for nutritional effects might rise. . . .¹⁰

Other more recent evaluations show that the percentage of families in the Federal District of Mexico City that benefited from the program rose from 25 percent to 43 percent from 1977 to 1982.¹¹

Given the high price elasticity of milk among the poor and because the general subsidy on milk is regressive, this product is a good candidate for a target-group-oriented policy.¹²

Direct Distribution Projects

A series of projects also exist that directly distribute food to specific groups.

Two programs, serving more than 380,000 recipients and adminis-

¹⁰Beatrice Rogers et al., Consumer Food Price Subsidies, Nutrition Intervention in Developing Countries, Study V (Cambridge, Mass.: Oelgeschlager, Gunn and Hain, 1981).

¹¹Mexico, Secretary of Commerce, internal document.

¹²See Nora Lustig and A. Martín del Campo, "Price and Subsidy Policies in Mexico: An Analysis of CONASUPO's Intervention," El Colegio de México, Mexico City, 1983 (mimeographed), p. 83.

tered by the Ministry of Education, provide food, shelter, and education for Indian children. In 1982 the expenditure for food for the two programs was \$32.50 per child per day, a total of \$4,567 million in 1982 pesos for the year.

The World Hunger Program, sponsored by the United Nations and the Food and Agriculture Organization of the United Nations, and the Ministry of Public Health have carried out a series of projects designed to improve the living conditions of the rural poor. These joint ventures began in 1967. In 1982 they covered 11,754 rural communities of more than 200 but less than 5,000 inhabitants. These projects consist of two complementary subprojects--one aimed at increasing production of basic foodstuffs and building infrastructure and the other at providing supplemental food. The supplementary aspect of the project provided in 1982 the equivalent of two glasses of milk a day free of charge to small children (60,000 daily rations) and distributes canned meat, cooking oil, and dry fish--enough for a five-member family--in exchange for each day worked in the production side of the project. The cost of this program in 1982 was estimated at U.S.\$12.9 million for The World Hunger Program and U.S.\$6.9 million for the Mexican government.

In addition to these projects, children in day-care centers and schools receive free meals through the Departamento de Integración de la Familia (DIF) and the Instituto Mexicano del Seguro Social (IMSS). However, no systematic information on their coverage or estimates of their effects are available.

2. FISCAL COST AND WELFARE EFFECTS OF THE MAIZE SUBSIDY SCHEME

The Mexican government began regulating the prices of staples in the 1930s.¹³ The objectives of this long-standing intervention are twofold: in rural areas to protect the small farmers (campesinos) against speculators and drastic price decreases, and in urban areas to protect the purchasing power of poor consumers against rising food prices.

The government tries to achieve its goals in three ways: first, by purchasing basic grains at guaranteed (support) prices and subsidizing some of the inputs used by producers; second, by maintaining price controls on staples and giving subsidies on some fundamental input to the industries that produce them; and third, by participating directly in the production and marketing of basic foodstuffs.

The most significant subsidy scheme at present is the one on maize. And the maize subsidy scheme absorbs the largest portion of CONASUPO's resources dedicated to food.¹⁴ The main reasons for the large subsidies on maize are that maize is the major crop of smallholders, and maize in its various processed forms constitutes the major source of calories for the poor.

Recently, however, policymakers, concerned with lowering the government's deficit have criticized this program because of its expense and untargeted character. Here empirical information is used to estimate the program's fiscal costs and to analyze the welfare effects for the rural poor, in particular. Four indicators are used for the latter purpose: purchasing power, measured by the size of the budget share and the maize-based income share for the target population; the equity effect, measured by the share of total consumption and production captured by the target population; the consumption effect, measured by the income effect of a change in the price of maize and tortillas; and the income distribution effect, measured by the changes in the income shares of the various income groups.

¹³For a historical description of government price interventions, see D. Barkin and G. Esteva, El Papel del Sector Público en la Comercialización y Fijación de Precios de Los Productos Agrícolas (CEPAL/Mex/1051), June 1981.

¹⁴For a description of the CONASUPO system, see Lustig and Martín del Campo, "Price and Subsidy Policies in Mexico."

HOW THE MAIZE SUBSIDY SCHEME WORKS

The general workings of the maize subsidy scheme was described in the first chapter.¹⁵ In practice the program is carried out as follows. The agricultural cabinet periodically sets the guaranteed price for producers, the subsidized price for millers, and the consumer price, and it estimates the domestic surplus of maize that would prevail under the administered prices.

On this basis and depending on existing stocks, the Cabinet determines the amount of imports needed to keep supplies in balance with domestic requirements. Once this amount is determined, CONASUPO buys from domestic producers at the guaranteed price however much is needed to support this price.¹⁶ The amount purchased has an upper bound set by the limitations in transportation and storage capacity and the availability of circulating capital.

CONASUPO stores the imported and the domestically purchased maize in a government-run chain of rural warehouses called Bodegas Rurales CONASUPO (BORUCONSA). The grain is then transported at CONASUPO'S expense to urban centers and stored in government-owned warehouses called Almacenes Nacionales de Depósito (ANDSA).

CONASUPO delivers allotments of maize to mills weekly. The size of the allotments is determined by the market coverage of each mill. However, not all mills have access to subsidized maize. It has been estimated that about half of the marketed maize is not sold through CONASUPO, and therefore is not sold at subsidized prices.¹⁷ Besides tortilla makers, CONASUPO also sells subsidized maize to other economic agents, including maize flour factories. In addition, some is sold directly to consumers. Table 4 shows these various allocations.

¹⁵Similar schemes are in operation for other major food products such as: beans, cooking oil, crackers and noodles, pork, poultry and eggs, rice, sugar, and wheat bread. See Lustig and Martín del Campo, "Price and Subsidy Policies" for a description of the mechanism in each case. There are many other food and nonfood products that are subject to the price control regime but are not accompanied by any evident subsidy scheme. Examples of controlled food products, for example, are canned fruits and vegetables, canned ham, canned tuna fish, and coffee.

¹⁶CONASUPO is the sole importer of maize.

¹⁷This allotment scheme may reinforce inequality in the distribution of the benefits of the subsidy because it does not discriminate among millers in terms of the population they serve. Therefore, the unsubsidized grain may go to millers who sell tortillas to the poorer sectors for more than the controlled price.

Table 4--CONASUPO and free market sales of maize, 1978-79

Maize Distribution	Quantity	Share of Total
	(1,000 tons)	(percent)
Total supply	6,955	100.0
CONASUPO	3,350	48.0 of total
Intermediate inputs	2,685	80.2 of CONASUPO
Maize mills	1,680	62.6 of intermediate inputs
Flour factories	885	33.0 of intermediate inputs
Other	120	4.4 of intermediate inputs
Final consumption	665	19.8 of CONASUPO
Free Market	3,605	52.0 of total
Intermediate inputs	1,550	43.0 of free market
Maize mills	1,120	72.3 of intermediate inputs
Flour factories	0	0.0
Other	430	27.7 of intermediate inputs
Final consumption	2,055	57.0 of free market

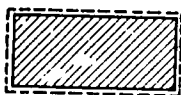
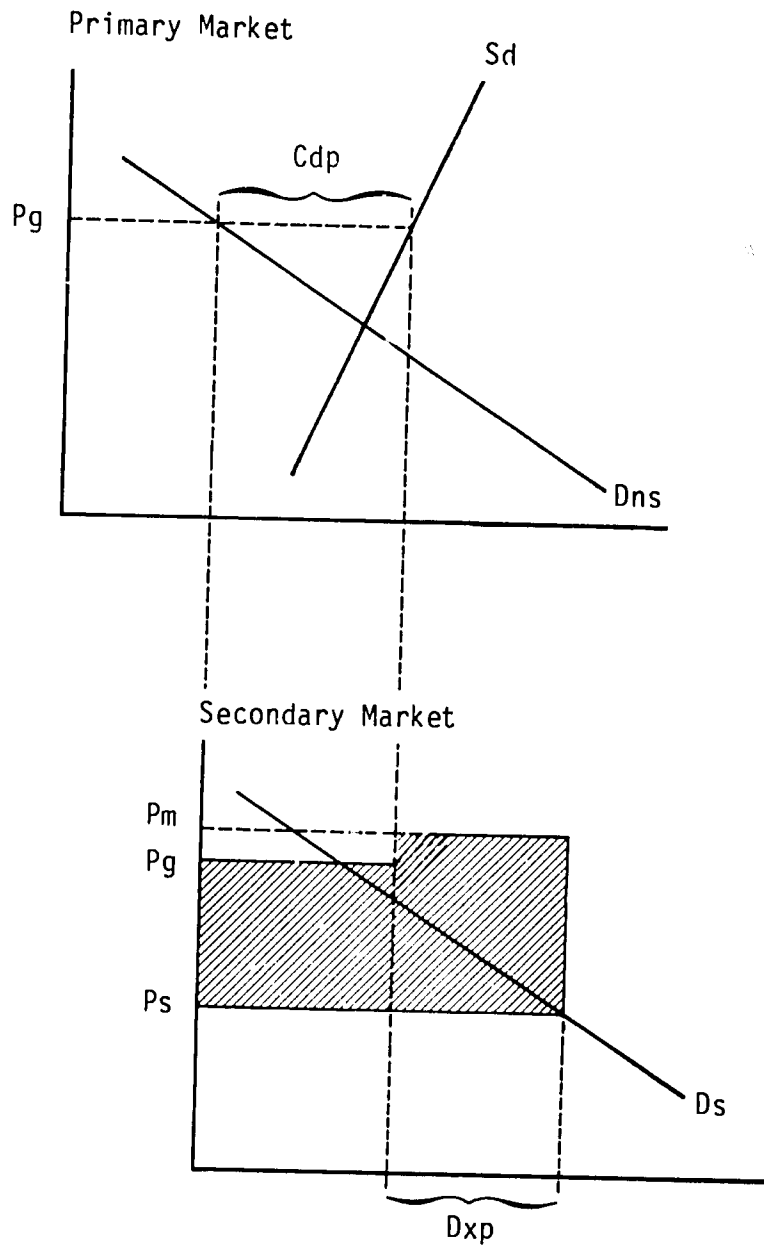
Source: México, Coordinación General de Desarrollo Agroindustrial, "El Desarrollo Agroindustrial y los Sistemas Alimentarios Básicos: Maíz," in Documentos Técnicos para el Desarrollo Agroindustrial Report No. 11 (Mexico City: Secretaría de Agricultura y Recursos Hidráulicos, 1982), p. 85.

Note: All flour factories are government operated.

Mills convert the maize into nixtamal. Those that have integrated production systems use this dough to make tortillas that are then sold to the public at the controlled price. Those without machines to make tortillas sell their dough to tortillerías, which in turn sell tortillas to the public at the controlled price (see Table 1). As mentioned earlier, only 10,000-14,000 tortillerías of the 36,000 registered have access to subsidized maize. Moreover, of the total allotment of the subsidized maize, 64 percent goes to the urban centers of five states and Mexico City. Those millers who have to purchase maize at the unsubsidized market price tend to sell their tortillas at more than the controlled price.

Figure 1 shows a simplified diagrammatic description of CONASUPO's intervention in the maize market. The assumption is that CONASUPO operates in two segmented markets. In the primary market, D_{ns} is the demand function of the nonsubsidized sector; P_g is the

Figure 1--CONASUPO's intervention



CONASUPO'S Loss from Price Differentials

Note: The price of imports is not higher than the guaranteed price in every year.

guaranteed price, which the government sets; S_d is the domestic supply; and C_{dp} is the amount that must be purchased by CONASUPO if the guaranteed price is to be sustained.

CONASUPO sells its domestic crop purchases to the mills at the subsidized price, P_s . If the quantity demanded at the subsidized price, D_s , is higher at that price level, CONASUPO restores equilibrium by importing the difference or by decreasing its stocks. The imported amount is D_{xp} (CONASUPO's external purchases), bought at the international price P_m . If, however, the subsidized demand were lower, CONASUPO would have to increase its inventories. The shaded area is CONASUPO's loss due to price differences and volume of operation. Storage, commercialization, and administrative costs must then be added to obtain the total cost of the subsidy. As will be seen, the main source of this cost is not always the price differential.

FISCAL COSTS OF THE MAIZE SUBSIDY

CONASUPO's Deficit

The government's dual objective of providing subsidies to both producers and consumers has resulted in an increasing operational deficit for CONASUPO. Table 5 shows this deficit between 1965 and 1982. Compared to other government agencies, CONASUPO had one of the highest deficits during the period. In absolute terms the deficit rose in the late 1970s; however, CONASUPO's share has not increased (see Table 5, column 2). On the average, more than 30 percent of total transfers from the central government to the public sector organizations have gone to CONASUPO to finance this deficit (see Table 5, column 3).

However large CONASUPO's deficit has been, it has not exceeded 1.4 percent of GDP, including the agency's capital outlays, and it has on the average stayed below 0.5 percent (see Table 6). Moreover, CONASUPO's total deficit has generally been less than 10 percent of the total government deficit (see Table 6).¹⁸ These numbers are important because they indicate the potential contribution that eliminating food subsidies in Mexico would make to solving the fiscal problems faced by the government.

Sources of Fiscal Costs

The total costs of various food subsidies are disaggregated to determine how much goes to maize. This total, however, does not include the net outlays incurred by the rest of CONASUPO's activities,

¹⁸It should be noted that these estimates, as well as the ones that follow, do not include the costs of subsidizing agricultural inputs because these programs are carried out by other agencies.

Table 5--Fiscal behavior of CONASUPO, 1965-82

Year	Operational Deficit of CONASUPO (current Mex \$/million)	CONASUPO Deficit as a Share of Total Deficit ^a	Transfers to CONASUPO as a Share of Total Transfers (percent)	Transfers to CONASUPO as a Share of Total Public Expenditures ^b
1965	738	40.0	16.4	1.2
1966	1,119	60.7	25.0	1.1
1967	1,221	344.0	22.4	1.1
1968	764	561.8	27.4	1.0
1969	1,198	n.a.c	34.8	1.7
1970	650	n.a.c	34.7	1.4
1971	665	152.9	33.0	1.5
1972	659	61.4	31.1	1.3
1973	1,828	45.8	16.2	0.8
1974	5,653	49.8	35.7	2.3
1975	8,731	67.5	30.8	1.7
1976	3,261	33.2	21.4	0.9
1977	7,424	46.5	22.0	1.3
1978	10,520	75.5	34.8	2.0
1979	6,778	60.8	32.0	1.6
1980	27,827	66.3	58.8	2.4
1981	80,374	59.8	40.5	2.8
1982	82,882	49.5	32.1	2.4

Source: México, Secretaría de Hacienda y Crédito Público, Estadísticas Hacendarias del Sector Público: 1965-1982 (Mexico City: SHCP, 1983).

^aIncludes all public enterprises under budgetary control except PIMEX.

^bTotal expenditure includes current plus investment outlays.

n.a. means not applicable: an overall surplus of operation existed.

Table 6--Fiscal burden of CONASUPO, 1970-82

Year	Deficit as a Share of GDP		Deficit as a Share of the Total Fiscal Deficit With Capital Outlays
	With Capital Outlays	Without Capital Outlays	
	(percent)		
1970	0.15	0.34	9.0
1971	0.14	0.40	16.3
1972	0.12	0.21	4.3
1973	0.27	0.31	4.5
1974	0.63	0.80	11.0
1975	0.79	1.00	10.0
1976	0.24	0.27	2.7
1977	0.40	0.41	6.0
1978	0.45	0.46	6.9
1979	0.22	0.23	3.1
1980	0.65	0.66	8.4
1981	1.37	1.37	9.3
1982	0.90	0.90	5.0

Source: México, Secretaría de Hacienda y Crédito Público, Estadísticas Hacendarias del Sector Público: 1965-1892 (Mexico City: SHCP, 1983); and national accounts.

such as direct production of foodstuffs, the milk ration program, and retail store operations. Thus, the share of the maize subsidy in CONASUPO's total deficit cannot be determined, but only its relation to the net expenses associated with other crops. Table 7 shows that maize has absorbed the highest share of subsidy outlays: since 1973 maize's share has been approximately 45 percent. However, it declined drastically in the early 1970s at the same time that funds for sorghum and oilseeds rose substantially.

The total fiscal costs of the program can be classified according to their sources: the price differential, which is the difference between the guaranteed price and the subsidized price; the volume differential, which is the difference between quantities bought and sold; and the "pure" transaction costs, which include transportation, storage, distribution, and management costs. Surprisingly, the major contribution to the maize subsidy's cost has not always been the difference between purchase and sale in prices and volume. Table 8 shows that this component has generally been well below 50 percent of the

Table 7--Distribution of subsidies among crops, 1971-79

Year	Beans	Maize	Oilseeds	Rice	Sorghum	Wheat	Total
			(percent)				
1971	3.4	70.6	9.4	... ^a	0.6	16.0	100
1972	2.0	85.9	1.3	0.2	2.5	8.1	100
1973	0.2	41.4	31.4	1.2	0.5	25.3	100
1974	5.7	42.2	3.9	2.9	6.7	38.6	100
1975	24.2	44.5	6.2	1.8	10.6	12.7	100
1976	5.0	44.7	19.3	4.5	8.0	18.5	100
1977	2.6	45.9	21.9	1.5	16.8	11.3	100
1978	6.6	41.6	18.0	2.6	13.5	17.7	100
1979	... ^a	50.5	7.3	... ^a	21.2	21.0	100

Source: Mexico, Office of Advisers to the President, internal document, 1981.

^aThere was a surplus in this year.

total and even showed a positive sign in 1976, indicating that the value of sales was higher than the value of purchases.¹⁹

In summary, although CONASUPO's deficit has risen continuously in the past, it is still a relatively small proportion of the GDP, amounting to about one-tenth of the total government deficit. Second, although maize absorbs the largest portion of CONASUPO's resources dedicated to crops, its share declined sharply in the early 1970s, whereas the shares absorbed by sorghum, wheat, and oilseeds rose substantially. Third, of the total cost of the subsidy the net transfer generally accounts for much less than 50 percent with the remainder being pure transaction costs.

WHO BENEFITS?

Given the major role maize plays as both a source of income and of calories for the poor, the difference in the way maize is consumed in rural and urban areas, and the characteristics and cost of the current subsidy scheme, the analysis of the welfare implications of the program is of particular relevance.²⁰ This analysis, addressing four questions, has been carried out using information from the 1977 household budget survey.

¹⁹This trend, however, may have changed somewhat in recent years, given that the price differential has increasingly widened.

²⁰Two welfare aspects that are left unexamined here are first, the effects of the subsidy scheme on the rate of profit of the millers, and second, the effects of price controls on tortillas and the higher government deficit due to the subsidy.

Table 8--Subsidy net of transaction costs as a ratio of the total subsidy, 1971-79

Year	Beans	Maize	Oilseeds	Rice	Sorghum	Wheat
	(percent)					
1971	3	17	33	a	-260	22
1972	356	29	-200	-80	-5	142
1973	-75	25	85	-10	-33	54
1974	47	59	-39	20	53	72
1975	65	20	-14	31	...	37
1976	-155	-8	26	9	-74	-7
1977	-253	0	36	7	5	-15
1978	60	34	26	41	21	32
1979	a	38	7	a	27	19

Source: Calculated from data obtained from CONASUPO's internal documents.

Note: Transaction costs are strictly related to transportation, storage, and administrative costs. The negative entries mean that for that year there was a surplus in the price and volume differential, but the overall subsidy was positive (with a net loss). The ellipsis indicate a nil or negative amount.

^aThere was a surplus.

The first question--does the current scheme reach the most needy groups?--can be answered by looking at the effects of the subsidy on purchasing power. This is measured by the size of the budget share of the commodity multiplied by the change in price. Under the assumption of a fixed shopping basket (a fixed amount of maize or tortillas and other commodities), the budget share multiplied by the change in price measures the amount (as a proportion of the initial income) by which a consumer would have to be compensated after a price change in order to be as well off as before. If the price change is the same for all consumers, then the budget share is sufficient to indicate the effect on the purchasing power of the target population. When consumers are also producers of a commodity, say, maize, then the purchasing power effect is measured as the net effect; that is, the budget share is subtracted from the maize-based income share.

The second question--does the current scheme use a large share of scarce fiscal resources to subsidize those who do not need it?--deals with the equity dimension of the subsidy: how the fiscal resources are distributed between the target and nontarget populations and within the target population itself. To estimate the effects on equity of the maize subsidy scheme, two indexes are used: the

intensity of consumption coefficient (ICC) and the intensity of production coefficient (IPC). The IPC is defined as ICC (previously defined) except consumption is replaced by production.

The answer to the third question--what would the effects on consumption be if the subsidized price were changed?--is calculated using estimates of the marginal budget shares. To analyze the fourth question--what potential changes in the distribution of income are implied by the subsidy scheme?--the results of several simulation experiments from a general equilibrium model of the Mexican economy are examined.²¹

Defining the Target Population

According to the 1977 Income Expenditure Survey, the poorest households--those with incomes below the prevailing minimum wage--were smallholders or agricultural workers in rural areas, and either self-employed or hired workers in the informal subsectors of commerce, manufacturing, and services in urban areas.²² These groups constitute the target population.

To capture the heterogeneous nature of the effects of the maize-subsidy scheme on the target population due to differences in the composition of income by source and the patterns of expenditure, the target group has been classified according to productive activity, occupational position, and income. Agricultural producers who primarily raise maize are separated from the rest. This classification procedure yields eight categories in the target population and eight in the nontarget (see Figure 2).

Effects on Purchasing Power

Table 9 shows the dualistic pattern that exists in the consumption of maize by the target and nontarget populations: the consumption of unprocessed maize declines and that of tortillas rises with the degree of urbanization. It is clear from the proportions of total expenditures that the subsidy on tortillas plays an important role in protecting the purchasing power of the metropolitan poor (urban poor in large cities, groups 12 and 13) and less of a role in protecting

²¹For a more detailed description, see William Gibson, Nora Lustig, and Lance Taylor, "Impactos Distributivos de las Políticas del Sistema Alimentario Mexicano en un Marco de Equilibrio General," in Distribución del Ingreso en México, Ensayos (Mexico City: Banco de México, Subdirección de Investigación Económica y Bancaria, 1982).

²²The 1977 Income Expenditure Survey was carried out by the Ministry of Programming and Budgeting and is the latest one available. See Nora Lustig, "Distribución del Ingreso y Consumo de Alimentos: Estructura, Tendencias y Requerimientos Redistributivos a Nivel Nacional," Demografía y Economía 50 (1982).

Figure 2--Target and nontarget populations of the 1977 Household Income Survey

					Category
Agriculture	Agricultural producers	Maize	Total income < minimum wage	Maize-based income < expenditure on maize	1. Net buyers ^a
			Total income ≥ minimum wage	Maize-based income ≥ expenditure on maize	2. Low income ^a
		Other crops	Maize based income ≤ minimum wage	3. High income	
	Maize-based income > minimum wage		4. Surplus		
	Hired agricultural workers	Crop-based income ≤ minimum wage	5. At or below subsistence ^a		
		Crop-based income > minimum wage	6. Surplus		
	Nonagriculture	Urban	Total income < minimum wage	Workers	7. Agricultural workers ^a
Other				8. Marginal workers ^a	
Total income ≤ two minimum wages and ≥ one			9. Marginal other ^a		
Total income > two minimum wages			10. Medium income		
Metropolitan			Total income < minimum wage	Workers	11. High income
		Other		12. Marginal workers ^a	
		Total income ≤ two minimum wages and ≥ one	13. Marginal other ^a		
		Total income > two minimum wages	14. Medium income		
		High income	15. High income		
Unemployed					16. Unemployed

Notes: The minimum wage in 1977 was about \$2,700 per month--approximately U.S.\$120. Metropolitan households include only urban households in Mexico City, Guadalajara, and Monterrey. Urban households include all nonagricultural households except those in Mexico City, Guadalajara, or Monterrey. The "marginal other" include all urban and metropolitan households whose total income was below the minimum wage and whose head of household was either self-employed or an employer.

^aThis group constitutes part of the target population.

Table 9--Average income, patterns of expenditure, and consumption shares by socioeconomic group, 1977

Socioeconomic Group ^a	Income	Auto-consumption ^b	Share of Households in Group	Proportion of Total Expenditure			Share of Consumption		
				Food ^c	Auto-consumption	Maize Tortillas	Maize	Tortillas	
	(Mex \$/month)			(percent)					
Agriculture	2,172	207	25.0	48.0	7.7	7.2	1.5	57.7	9.4
Workers (7)	2,122	110	12.9	55.0	4.4	8.3	2.2	31.6	6.7
At or below subsistence (1, 2, 3, 5)	1,562	262	10.2	49.4	11.8	8.1	0.7	22.1	1.6
Surplus (4,6)	5,700	575	1.9	27.9	8.6	2.7	0.9	40.0	1.1
Urban	4,968	43	35.5	43.7	0.8	1.3	2.1	30.9	39.6
Marginal workers (8)	1,771	36	6.8	58.5	1.7	5.8	3.6	10.2	5.0
Marginal other (9)	1,396	81	4.5	56.1	4.2	6.8	2.7	7.2	2.2
Medium income (10)	3,790	29	12.8	51.6	0.6	1.3	3.2	8.5	17.3
High income (11)	9,597	51	11.4	37.3	0.5	0.4	1.3	5.0	15.1
Metropolitan	7,369	13	27.8	36.4	0.2	0.1	1.9	2.4	40.2
Marginal workers (12)	2,370	14	3.1	52.1	0.5	0.6	5.3	0.6	4.4
Marginal other (13)	2,073	13	1.5	52.7	0.5	0.7	5.3	0.1	2.1
Medium income (14)	4,424	8	11.3	45.0	0.2	0.1	3.2	0.8	17.6
High income (15)	12,193	19	11.8	32.0	0.1	0.1	1.1	0.9	16.1
Unemployed workers (16)	4,488	48	11.7	41.1	0.9	1.3	1.9	9.0	11.8
Total	4,882	77	100.0	42.5	1.4	1.5	1.9	100.0	100.0

Source: Mexico, Ministry of Program and Budget, Household Income Survey (Mexico City: Ministry of Program and Budget, 1977).
Notes: Metropolitan refers to large cities, urban to other urban areas.
^aNumbers in parentheses refer to categories listed in Figure 2.
^bThis is consumption of a household's own production.
^cDoes not include autoconsumption.

other urban poor (groups 8 and 9) and the agricultural workers (group 7). The low-income farmers (groups 1, 2, and 5 in Table 10), however, are unaffected by the subsidy and make tortillas at home.

How can this duality be explained? First, home-produced tortillas, whether from homegrown or purchased maize, generally involve a smaller cash outlay. And in some rural areas, homemade tortillas are not a choice but a necessity because there are no nearby tortilla factories. When ready-made tortillas are not available, home production has to continue even if the cash outlay for maize exceeds the controlled price of an equivalent amount of tortillas. The imputed wage for making tortillas at home is very low (see Table 11), and it declines as the spread between the price of maize and the price of tortillas narrows. However, as long as the wage is positive and higher than feasible alternative sources of income, tortillas from the corner store are unlikely to replace homemade tortillas, especially for people whose cash income is very small.²³

The effect on purchasing power of a change in the price of maize may be estimated from the budget shares. Given the budget shares for maize in Table 9, an increase in the price of maize hurts real income, especially of the rural poor (groups 8 and 9). An increase in the price of maize, however, also implies a rise in income for poor producers (group 2). In fact they are important net beneficiaries of such an increase. In Table 12 the effects on the net purchasing power of groups 1-4 are estimated as measured by the difference between the maize-based income share and the budget share of maize.

This contradiction in welfare implications arises because maize is both an important source of income and a major consumption item of the poor, and the present subsidy scheme does not benefit consumers of maize in grain. Keeping the price of maize low would have a positive effect on poor net consumers, but it would harm poor net producers; the opposite would occur if the price of maize were increased. Thus, a change in the price of maize in one direction would improve the standard of living for one subset of the very poor but at the expense of another subset.

One option open to the government would be to compensate the losers with funds obtained by taxing the nontarget population. The criteria for deciding whether the price should be kept high or low, however, must not be based on the fiscal costs of compensation alone.²⁴ There are other important targets involved in an active

²³This is especially true where there are no employment opportunities or where the woman cannot leave the home because her activities cannot be replaced.

²⁴In the sample, the fiscal cost of the compensation would be almost the same for net consumers and for net producers (considering only the target population).

Table 10--Average income, patterns of expenditure, and consumption shares of maize and nonmaize agricultural producers, 1977

Socioeconomic Group ^a	Income	Auto-consumption ^b	Share of Households in Group	Proportion of Total Expenditure				Share of Consumption	
				Food ^c	Auto-consumption	Maize	Tortillas	Maize	Tortillas
	(current Mex \$/month)			(percent)					
Maize producers	2,031	330	9.7	46.0	12.1	6.8	0.6	21.5	1.5
At or below subsistence	1,446	275	8.3	49.0	13.2	8.9	0.5	17.9	0.9
Net buyers (1)	967	182	1.2	64.0	10.1	30.1	0.3	8.1	0.1
Low income (2)	1,080	265	6.0	48.9	15.4	5.1	0.4	7.2	0.4
High income (3)	4,006	433	1.1	42.8	9.8	4.4	0.8	2.6	0.4
Surplus (4)	5,531	667	1.4	38.7	10.1	3.3	0.7	3.6	0.6
Nonmaize agricultural producers	3,015	231	2.4	46.1	6.3	4.4	1.3	4.5	1.1
At or below subsistence (5)	2,077	207	1.9	49.9	7.4	6.6	1.3	4.1	0.7
Surplus (6)	6,507	325	0.5	40.3	4.7	0.9	1.3	0.4	0.4

Source: Mexico, Ministry of Program and Budget, Household Income Survey (Mexico City: Ministry of Program and Budget, 1977).

^aNumbers in parentheses refer to categories list in Figure 2.

^bThis is consumption of a household's own production.

^cDoes not include autoconsumption.

Table 11--Imputed hourly wage rate for producing tortillas at home, 1977-83

Year	Imputed Wage	Minimum Wage	Ratio of Minimum Wage to Imputed Wage
(current Mex \$)			
1977	0.56	13.30	23.9
1978	0.56	15.00	27.0
1979	0.62	17.25	27.8
1980	0.32	20.38	62.9
1981	0.52	26.25	50.1
1982	1.70	35.00	20.5
1983 (January)	1.29	45.50	32.2
1983 (May)	-0.48	56.88	n.a.
1983 (October)	0.32	65.38	204.3

Source: México, Coordinación de Desarrollo Agroindustrial, "El Desarrollo Agroindustrial y los Sistemas Alimentarios Básicos: Maíz," in Documentos Técnicos para el Desarrollo Agroindustrial, Report No. 11 (Mexico City: Secretaría de Agricultura y Recursos Hidráulicos, 1982), p. 104.

Notes: The imputed hourly wage is calculated as the difference between the official price per kilogram of tortillas and the "cost price" of home-producing maize divided by 2.5, since it is estimated that it takes women, on the average, about 2.5 hours to make a kilogram of tortillas. The "cost price" was estimated using a coefficient of transformation equal to 0.761615 of raw maize per kilogram of tortillas. The hourly minimum wage is equal to the daily minimum wage for the Federal District of Mexico City divided by eight hours.

guaranteed price policy for maize. One, for example, might be to expand production and productivity, thus reducing the dependency on imports of this basic crop. In addition, the expansion in production resulting from better maize prices could generate more employment; thus the compensation process may partially occur without involving government outlay.

The previous analysis indicates that there is a large sector of the poor, especially in rural areas, that are not reached by the subsidy scheme because they make their own tortillas from unprocessed maize purchased at the market price. Thus, as long as the actual or perceived opportunity cost of family labor is close to zero, this group of the target population will not benefit from the subsidy on tortillas and will suffer when the price of maize rises. The beneficiaries include the poor net producers (whenever government intervention results in higher maize prices) and poor urban consumers who buy tortillas at subsidized prices.

Table 12--Shares of average monthly income of maize producers that are derived from maize and spent on maize, by socioeconomic group, 1977

Group	Average Monthly Income	Households		Maize-based Income as a Share of Total Income	Maize Expenditures as a Share of Total Expenditure	Income from Maize Less Expenditures on Maize
		Number	Distribution			
	(current Mex \$)				(percent)	
Target						
1	967	141	12.9	22.0	30.0	-8.1
2	1,080	675	61.6	67.0	5.8	61.2
Nontarget						
3	4,006	123	11.2	16.0	4.4	11.7
4	5,531	157	14.3	88.0	3.3	84.7

Source: Mexico, Ministry of Program and Budget, Household Income Survey (Mexico City: Ministry of Program and Budget, 1977).

Notes: It is assumed that the share in total expenditures is the same as in total income, and that the sale price equals the purchase price. The target groups are maize producers who are at or below subsistence. Target group 1 is producers who are net buyers of maize target group 2 includes producers whose total household income is below the minimum wage. Among the groups that are not targeted is group 3, producers whose total household income is at or above the minimum wage, and group 4, which includes those who produce a surplus of maize.

Effects on Equity

Wherever the ICC is greater than unity (a larger share of the commodity is consumed by the poor), the fiscal funds involved in a general consumer subsidy are distributed progressively. An earlier study shows that the only food products with ICCs greater than one were unprocessed maize and piloncillo (see Table 13).²⁵ The ICC for tortillas is less than unity (equal to 0.7965) and occupies the tenth place if the food products are ranked from highest to lowest. Thus it appears that a general subsidy on tortillas is not the best choice from an equity point of view.²⁶

It may be argued, however, that the general subsidy on tortillas is mainly an urban subsidy and that the relevant index is the ICC for the urban population only, which is 0.8922. Thus a general subsidy on tortillas, even if confined to urban areas, still implies a relatively regressive distribution of fiscal funds.

Table 13--Coefficients for the intensity of consumption and production (ICC and IPC)

Commodity	Consumption	Production
Beans	0.9605	0.3339
Brown sugar(piloncillo)	1.0062	. . .
Lard	0.9908	. . .
Maize	1.1600	0.4291
Maize dough	0.9339	. . .
Maize flour	0.9768	. . .
Oilseeds	. . .	0.2616
Refined sugar	0.9075	. . .
Rice	0.8834	n.a.
Tortillas	0.7965	. . .
Wheat	. . .	0.1582

Source: Nora Lustig and A. Martín del Campo, "Price and Subsidy Policies in Mexico: An Analysis of CONASUPO's Intervention," El Colegio de México, Mexico City, 1983 (mimeographed).

Notes: The ellipses indicate "not applicable"; n.a. means not available.

²⁵See Lustig "Distribution of Income."

²⁶This is true even under ideal conditions where everyone has access to subsidized tortillas. Distortions introduced by inefficiency or corruption may make the subsidy even more inequitable.

What is the equity effect of the guaranteed price policy for maize, assuming that it does improve the price paid to producers?²⁷ According to information from the Agricultural Census, maize is the most "peasant-intensive" crop, that is, it has a higher IPC than other crops (see Table 13).²⁸ This means that the resources devoted by the government to the guaranteed price policy are distributed more progressively for maize than for other crops (wheat and oilseeds, for example). The problem with maize, however, is that it is largely consumed by low-income groups. Whenever government intervention results in a higher maize price, a large share is purchased at the new higher price by consumers whose incomes are as low or lower than those of the producers who benefit from the higher price. The net equity effect of an increase in the price of maize on the target population is calculated by subtracting the losses from the benefits. This is done by computing the net intensity of production coefficient (NIPC). It is measured by the difference between the IPC and the ICC computed for the target population. If the NIPC is negative, the target population taken as a whole loses more than it gains from the price increase in maize; the converse is true if the NIPC is positive.

One problem remains, however. To make the indexes comparable, the IPC must be adjusted to reflect the market share of the target population in total domestic sales; and the ICC must be corrected so that the purchases of maize are considered as a final good only (that is, the proportion of maize that is used as an intermediate good is subtracted). To adjust the IPC, the maize-based income share of the target population (groups 1 and 2) is used, which is close to 40 percent. The consumption share of maize as a final good, excluding autoconsumption, is estimated to be close to 40 percent as well.²⁹

²⁷One aspect not addressed here is whether the government guaranteed price policy on maize constitutes a subsidy to producers or not. According to estimates by Norton, the maize producers were implicitly taxed except in 1967, 1968, 1981, and 1982. However, in estimates comparing the guaranteed price with the international price, it is assumed that producers would be better off if there was free trade. In such calculations, the role of intermediaries is ignored. See Roger Norton, "Policy Issues in Mexican Agriculture," The World Bank Report, January 1984, pp. 2-14.

²⁸It is assumed that the supply response is either zero or the same for all producing classes. If this is not the case and the supply response is correlated to income, the size of the IPC is overestimated. In addition, the IPC as currently measured does not capture any shift of producers from other crops to maize.

²⁹See México, Coordinación de Desarrollo Agroindustrial, "El Desarrollo Agroindustrial y los Sistemas Alimentarios Básicos: Maíz," in Documentos Técnicos para el Desarrollo Agroindustrial, Report No. 11 (Mexico City: Secretaría de Agricultura y Recursos Hidráulicos, 1982).

With these adjustments, the NIPC for the target population is calculated to be -0.1406. Thus, the target population as a whole is hurt by a rise in the price of maize. Only the low-income small farmers (group 2) benefit from such a rise because they are net sellers of maize.³⁰

As previously mentioned, the maize subsidy scheme has been criticized on two grounds. On the one hand, some policymakers in Mexico, especially those concerned with the macro performance of the government, have argued that government intervention in maize, a primary market, has a negative effect on the net buyers who are also very poor. On the other hand, the subsidy on tortillas is criticized because it does not effectively discriminate in favor of the poor. Thus, they conclude that large amounts of fiscal resources are devoted to a program that actually does not fulfill its purpose: to protect the real income of the poorest sectors of the population. The empirical evidence presented in this section shows that there is some basis for these concerns. However, there is no easy solution. Even though a more discriminatory system for tortillas would be preferred on the basis of equity considerations, the current subsidy on tortillas cannot be removed without generating serious problems for the poor, especially those in urban and metropolitan areas, unless an alternative program is introduced. A large portion of the target population would be hurt by an increase in the price of maize, and the net equity effect within the target population of a rise in the price of maize is regressive.³¹ A higher price, however, does carry important benefits for the poor farmers and it would also help diminish the country's dependence on maize imports.

Effect on Consumption

By examining the potential income effect of a change in the price of maize and tortillas, the role the maize subsidy scheme plays in improving the food intake of the poor can be approximated. However, the Income Expenditure Survey does not reflect the nutritional status of the population because it has no information either on prices or quantities consumed. In addition, an attempt to obtain estimates of

³⁰One may argue that this result is analogous to the findings on the purchasing power effect. This is not necessarily so, because the net buyers in the target population (groups 1, 5, 7, 8, 9, 12, and 13) may have had only a small share of the total consumption of maize, and thus the gains that accrue to net sellers from a rise in the price of maize may have more than compensated for the net buyers' losses.

³¹Equity might be somewhat improved if the positive effects on employment resulting from a supply response to a higher guaranteed price are considered.

price elasticities econometrically using an Extended Linear Expenditure System³² did not succeed for this grouping of the population.³³

Tables 14 and 15 show estimated income effects from a small rise in the price of maize and tortillas. Because maize producers have a positive effect on the income side and a negative one on the expenditure side, the net effect is calculated. (The methodology is explained in the Appendix.) Table 14 indicates that an increase in price has significant effects on the consumption of maize for net buyers--negative but small--and for below-subsistence farmers--positive and large. The relative benefit for the below-subsistence farmers surpasses the negative impact on the net buyers' consumption. Moreover, an increase in the price of maize seems to lead to an important improvement in the diets of below-subsistence maize producers, not only for maize but also for other basic foodstuffs. Because their incomes rise, this group will spend about 14 percent more for food (see Table 16). The rest of the target population, especially in rural areas (groups 1, 2, 5, and 7), decreases its expenditure on other basic foods.³⁴ Thus, there is a definite welfare trade-off associated with the guaranteed price policy for maize. To avoid the negative impact for either group, a scheme of compensations has to be designed.

It is interesting that, compared to maize, an increase in the price of tortillas does not lead to changes in their consumption or in spending on other basic foods for either the urban or rural target population. Without allowing for the substitution effect, the "true" change in consumption patterns after the price of tortillas rises is elusive. But if the substitution effect is minimal, it seems that a rise in tortilla prices would result in deteriorating food intake for urban marginals in groups 8 and 9.

Given their relative effects on consumption, it seems that a price subsidy for unprocessed maize would be more important from a nutrition viewpoint than a price subsidy for tortillas, even though those groups who spend a substantial share of their total expenditures on tortillas would suffer. This could be the case for the urban non-metropolitan poor who expend about 5 percent of their budgets on tortillas (see Table 9).

³²See Constantino Lluch, Alan A. Powell, and Ross A. Williams, Patterns in Household Demand and Saving (London: Oxford University Press, 1977), Chapter 2.

³³For the poor groups there were several goods that had a negative "subsistence expenditure" whose sum surpassed the positive ones by yielding a negative total. This result generates a methodological breakdown. Even if the estimates were acceptable, there are problems in using a Frisch-based method of estimating price elasticities for very disaggregated commodities because of the assumption on "want-independence" that has to be made.

³⁴The basic foods include beef, chicken, cooking oil, milk and some milk products, other cereals, rice, and sugar.

Table 14--Potential changes in per capita expenditures on maize and tortillas as the result of the income effect of a small increase in the price of maize, 1977

Group	Maize			Change as a Percentage of Initial Consumption	Tortillas	
	Absolute Change				Absolute	Change as a Percentage of Initial Consumption
	Expenditure	Income	Net			
(Mex \$)			(Mex \$)			
Target						
Rural						
1	-1.53	1.05	0.48	-0.35	n.s.	0
2	-0.09	0.94	0.85	3.10	0.08	0.28
5	n.s.	...	...	0	n.s.	
7	i.g.	...	...	i.g.	-0.07	-0.13
Urban						
8	n.s.	...	...	0	-0.04	-0.10
9	n.s.	...	...	0	-0.11	-0.22
12	n.s.	...	...	0	n.s.	n.s.
13	n.s.	...	...	0	-0.00	-0.15
Nontarget						
Rural						
3	n.s.	...	...	0	n.s.	0
4	n.s.	...	...	0	n.s.	0
6	n.s.	...	...	0	n.s.	0
Urban						
10	i.g.	...	...	i.g.	-0.01	-0.08
11	i.g.	...	...	i.g.	-0.00	-0.01
14	n.s.	...	...	0	n.s.	0
15	n.s.	...	...	0	i.g.	i.g.

Source: Mexico, Ministry of Program and Budget, Household Income Survey (Mexico City: Ministry of Program and Budget, 1977). See the Appendix for the method of estimation.

Notes: i.g. means inferior good; n.s. means the coefficient is not significant. The ellipses indicate a nil or negligible amount. The groups are described in Figure 2.

Table 15--Potential changes in the per capita expenditures on tortillas and maize as the result of the income effect of a small increase in the price of tortillas, 1977

Group	Tortillas		Maize	
	Absolute Change (Mex \$)	Change as a Percentage of Initial Consumption	Absolute Change (Mex \$)	Change as a Percentage of Initial Consumption
Target				
Rural				
1	n.s.	0	-0.0114	-0.01
2	-0.0005	0.02	-0.0054	-0.02
5	n.s.	0	n.s.	0
7	-0.0130	0.11	i.g.	i.g.
Urban				
8	-0.0205	0.08	n.s.	0
9	-0.0415	0.18	n.s.	0
12	n.s.	0	n.s.	0
13	0.0464	0.12	n.s.	0
Nontarget				
Rural				
3	n.s.	0	n.s.	0
4	n.s.	0	n.s.	0
6	n.s.	0	n.s.	0
Urban				
10	-0.0224	0.06	i.g.	i.g.
11	-0.0224	0.01	i.g.	i.g.
14	n.s.	n.s.	n.s.	0
15	i.g.	i.g.	n.s.	0

Source: Mexico, Ministry of Program and Budget, Household Income Survey (Mexico City: Ministry of Program and Budget, 1977). See the Appendix for the method of estimation.

Note: The groups are described in Figure 2. i. g. means inferior good; n.s. means the coefficient is not significant.

Table 16--Potential changes in the per capita expenditure on other basic foods as the result of the income effect of small changes in the price of maize and tortillas, 1977

Group	Maize			Change as a Percentage of Initial Consumption	Tortillas	
	Absolute Change		Net		Absolute Change	Change as a Percentage of Initial Consumption
	Expenditure	Income					(Mex $)	(Mex $)
Target						
Rural						
1	-8.95	6.14	-2.80	-4.00	-0.07	-0.10
2	-1.14	11.95	10.81	13.70	-0.07	-0.09
5	-2.53	...	-2.53	-5.10	-0.30	-0.28
7	-2.47	...	-2.47	-2.30	-0.45	-0.42
Urban						
8	-1.73	...	-1.73	-1.20	-0.90	-0.64
9	-2.62	...	-2.62	-1.70	-1.03	-0.66
12	-0.11	...	0.11	-0.06	-1.17	-0.62
13	-0.04	...	0.04	-0.02	-1.68	-0.82
Nontarget						
Rural						
3	-0.73	2.93	2.21	1.90	-0.14	-0.11
4	-0.86	19.53	11.30	11.30	-0.10	-0.06
6	-0.30	...	-0.30	-0.15	-0.41	-0.20
Urban						
10	-0.60	...	-0.60	-0.30	-1.48	-0.63
11	-0.12	...	-0.12	-0.04	-0.46	-0.14
14	-0.04	...	-0.04	-0.02	-1.05	-0.39
15	-0.01	...	-0.01	-0.00	-0.19	-0.06

Source: Mexico, Ministry of Program and Budget, Household Income Survey (Mexico City: Ministry of Program and Budget, 1977). See the Appendix for the method of estimation.

Note: The groups are described in Figure 2. The ellipses indicate not applicable because in principle these are not maize producers.

The Maize Subsidy and the Income Distribution Effect

It is important to distinguish the income distribution effect from the equity effect because fiscal resources are sometimes distributed regressively even though income distribution is more equitable than it was before the policy was implemented.

The income distribution effect can be estimated using a multisector general equilibrium model of the Mexican economy.³⁵ A general equilibrium approach is very useful because it illustrates the effects caused by interaction factors. The equations and a general description of the assumptions and mechanisms of the model are included in the Appendix. Table 17 shows the impact on the distribution of income of two alternative policy simulations on the seven social groups included in the model: small farmers (1), agricultural workers (2), large farmers (3), nonagricultural workers (4), nonagricultural capital owners (5), merchants (6), and urban marginals (7). These groups do not exactly correspond to the 15 used in previous sections because this model was developed independently. Roughly speaking, the equivalencies are

<u>Model</u>	<u>Survey (Table 10)</u>
Group 1	Groups 1, 2, 5
Group 2	Groups 3, 4, 6
Group 3	Group 7
Group 4	Group 10, 14
Group 5	
Group 6	Group 11, 12
Group 7	Group 8, 9, 12, 13

The first simulation captures the essential policy recommendations made by the Sistema Alimentario Mexicano (Mexican Food System) in 1980.³⁶ Its main thesis was that the relative stagnation in the domestic production of maize and the pervasiveness of rural poverty are the result of long-standing adverse terms of trade for the maize-producing subsector. To combat these problems, the Sistema Alimentario proposed an increase in the guaranteed price for maize and in the subsidies on fertilizers, improved seed, and credit.

Thus, simulation 1 hypothesizes a 15 percent rise in the guaranteed price of beans and maize, and subsidies of 30 percent on the price of fertilizers and 75 percent on improved seeds for beans and maize. The subsidies on the consumption of final goods remain the

³⁵Sec Gibson, Lustig, and Taylor, "Impactos Distributivos de las Políticas del Sistema Alimentario Mexicano."

³⁶The Mexican Food System was created by former president José López Portillo to redesign a strategy for Mexico's rural sector, especially the neglected maize-producing sector.

Table 17--Potential effects of subsidies on the distribution of income and on real income

Group	Base Distri- bution	Simu- lation 1	Simu- lation 2	Effects on Real Income	
				Simu- lation 1	Simu- lation 2
(percent of total income)					
Rural	12.0	13.4	12.6	...	...
Peasants	4.1	4.6	4.4	17.04	11.87
Agricultural workers	3.1	3.0	3.1	0.26	3.13
Agricultural capitalists	4.9	5.8	5.1	20.89	5.92
Urban	87.9	86.6	87.4	...	...
Nonagricultural workers	37.4	36.7	37.1	0.20	1.86
Nonagricultural capitalists	30.7	30.4	30.5	1.20	1.99
Merchants	14.2	13.9	14.1	0.53	2.38
Urban marginals	5.6	5.6	5.6	1.01	2.74

Source: William Gibson, Nora Lustig, and Lance Taylor, "Impactos Distributivos de las Políticas del Sistema Alimentario Mexicano en un Marco de Equilibrio General," in Distribución del Ingreso en México, Ensayos (Mexico City: Banco de México, Subdirección de Investigación Económica y Bancaria, 1982).

Note: Simulation 1 implies a subsidy of 0.30 on fertilizers and of 0.75 on improved seed for maize and beans production and an increase of 15 percent in the guaranteed prices and a 2 percent increase in output. Simulation 2 is identical to Simulation 1 except that imports fill the excess demand for other agricultural products, so that the domestic price remains constant.

same. The simulation results in Table 17 imply an increase in the income shares of the rural groups. The intrarural distribution of income improves for the small and large farmers but worsens for the agricultural workers. Agricultural workers lose both relatively and absolutely: they are the only ones whose real income declines under the conditions in simulation 1.

Large farmers do better in relative and absolute terms than poor farmers. Nonetheless, the improvement for the latter is still substantial, indicating that they also are major beneficiaries of the policies recommended by the Sistema Alimentario Mexicano.

Initially, these results seem consistent with previous conclusions indicating that agricultural workers lose purchasing power if maize prices rise. The model results show a relative and absolute loss in real income for agricultural workers despite a rise in rural employment following the assumed supply response to the higher guaranteed price.

However, the negative effect on agricultural workers is not due to the rise in the price of maize. The short-run assumption made in the model is that the output of other agricultural products is fixed.³⁷ When the guaranteed price is increased along with the subsidies on seed and fertilizers, this generates a rise in the income of small as well as large farmers. This rise in income is translated into a rise in demand for all sectors. Because it is assumed there is excess capacity in the nonagricultural sectors, higher demand results in higher production, but there is no direct effect on the price they pay for maize. The converse occurs in the other agricultural products sector: only a rise in prices clears the excess demand. (This rise also explains the sharp increase in the relative and absolute incomes of the large farmers.) Higher prices for other agricultural products are transferred to the processed food sector through cost pressures. Other agricultural products and processed food are a relatively important share of the consumption basket of the agricultural workers, thus explaining the decline in their real or absolute incomes.

To illustrate this, another simulation is carried out in which excess demand for other agricultural products is assumed to be satisfied by imports, while prices remain constant. The last two columns of Table 17 show that eliminating the bottleneck in this sector by allowing imports gets rid of the negative effect on agricultural workers. Moreover, the real income of the agricultural workers now increases. And, when the price of other agricultural products is held constant by allowing the excess demand to clear, the profits accruing to the large farmers are much lower than in the previous simulation. Thus the increases in both the relative and absolute incomes of this group are much smaller, and the small farmers benefit the most.

³⁷The supply response in beans and maize is introduced exogenously, and it is assumed that it occurs because the rise in the guaranteed price is announced beforehand.

The results here seem to be much more optimistic than the previous analyses of the effects of a rise in the guaranteed price for maize and beans, provided imports clear the market of other agricultural products. First, those analyses did not take into account the indirect effect on employment, which has a positive influence on the income of the agricultural workers. Second, and more important given the main concern of this study, in the model all small farmers are lumped together in a single category. In actuality, they are quite different. In this analysis the small farmers who are net buyers are distinguished from those who have a surplus, and it is shown that the former can be substantially harmed by a rise in the price of maize. Third, in the general equilibrium framework the implicit subsidy hidden in the low imputed wage to home producers of tortillas is not calculated.

Moreover, as mentioned earlier, a progressive result in the distribution of income from a particular policy is consistent with a regressive distribution of the fiscal outlay. The results obtained in simulation 2 and those on the equity effect seem to indicate that this would be the case with the maize subsidy scheme.

3. CONCLUSIONS

If the objective is to make the maize subsidy program more progressive and cost effective, there seem to be two logical steps that may be taken. The first is to make the subsidy on tortillas more targeted. Removing the general subsidy on tortillas, however, would be politically difficult, because this subsidy has a fundamental symbolic value to Mexicans and is perceived as an indicator of the direction of government policies. One viable alternative would be to decrease the general subsidy on tortillas and to increase the subsidy on maize flour. In comparison to tortillas and maize dough, the government can oversee the production and distribution of flour more effectively, and it is less perishable. At present maize flour is not an important item in the consumption basket of the urban poor. However, this could change if relative prices changed (that is, if the low cost of flour made it cheaper to make tortillas than to buy them) and if a proper advertising and information campaign were simultaneously undertaken. A general subsidy on maize flour also has the advantage of being self-targeting. The ICC for maize flour occupies the fourth place when the ICC are ranked from highest to lowest, and at 0.97 its value is almost equal to unity.³⁸ The subsidized price of flour for final consumption should at least be equal to that used for industrial purposes; otherwise, most of the benefits would be captured by the millers.

Second and foremost, the subsidy would be brought to the net purchasers of unprocessed maize in rural and semirural areas, especially small farmers who are net purchasers of maize.³⁹

However, the small farmers' benefits from a rise in the price of maize in real income and consumption are substantial. Moreover, if the rise in the price of maize results in increased maize production, the employment effect may partially offset the negative impact on net purchasers. To make the subsidy scheme more equitable and to improve the living conditions of the net purchasers, the government could implement a scheme to compensate them if necessary. The cash constraint that prevents the rural poor from purchasing tortillas (and thereby benefiting from the subsidy) could be removed, thus elimi-

³⁸An ICC equal or higher than unity implies that the benefits of the subsidy are progressively distributed.

³⁹Such a rise could result from the guaranteed price policy or other phenomena such as seasonal variation in supply or bad weather.

nating the situation where improvement in living standards of the poor net producers of maize are paid for by the poor net consumers.

This compensation could be in the form of a direct transfer or an inframarginal program to provide additional food through ration shops, food stamps, or on-site distribution. Because the end results are equivalent, the decision as to which specific program to implement should depend on administrative costs and the costs of policing the program, as well as the particular requirements of the places where the programs are to be implemented.

Such a scheme, however, implies further government outlays at a time when Mexico's fiscal situation would make any expenditure unwelcome unless compensated by revenue. If the political problems can be overcome, some revenues could be obtained from funds saved by targeting the tortilla subsidy. Since 1973, however, the share of subsidies going to maize has decreased, while wheat and sorghum products have ranked below the subsidy on tortillas.⁴⁰ Wheat and sorghum subsidies could be made more targeted,⁴¹ and revenues saved as a result could then be used to finance the compensatory program for the net purchasers of maize. Another alternative might be to finance this compensatory program through more progressive direct taxation schemes.

⁴⁰García-Alba and Serra-Puche, Financial Aspects of Macroeconomic Management in Mexico.

⁴¹For example, subsidized wheat flour could be sold in CONASUPO stores and an egg ration card system, similar to that operating for milk, could be introduced.

APPENDIX: METHODOLOGY

DEFINITIONS OF IPC AND ICC

The Intensity of Production Coefficient (IPC) is measured with a Lorenz-like diagram except that the share of the crop's output produced by each x percentage of the population is on the y axis, rather than the usual share in total income. The population is ranked by income from lowest to highest.

The IPC is equal to the ratio between the area defined by this relation (the percent of population x to that of production y) divided by the perfect equality triangle. This ratio is close to zero when all production is carried out by the highest decile of the population; it is equal to unity when the proportion produced by each x percentage of the population is identical to the latter (that is, the "lowest" 60 percent produces 60 percent of the crop and the "highest" 40 percent produces a corresponding 40 percent); and the IPC is greater than unity when production is concentrated in the poorer of the population groups.

The Intensity of Consumption Coefficient (ICC) is analogous to the IPC except that on the y axis the share of total consumption is measured by each x percentage of the population.

REGRESSION RESULTS

To compute the consumption effect, the marginal propensities for spending on maize, tortillas, and other basic foods are estimated by applying a simple regression model to the 16 socioeconomic groups. Thus the functional form is estimated:

$$g_{ij} = a_{ij} + b_{ij} y_j + j,$$

where $i = 1, \dots, 12$ goods and $j = 1, \dots, 16$ groups, and where g_{ij} is the expenditure on good i by households in group j , and y_j is the income of households in group j . Both g_{ij} and y_j are measured in per capita adult equivalent units. The scales from the National Institute of Nutrition were used to transform the members into adult equivalent units.

CALCULATING THE NET INCOME EFFECT

The income effect of a change in price is equal to:

$$\partial q_i / \partial p_j = -m_i q_j,$$

where m_i is the marginal propensity to consume good i out of total expenditure and q_i is the initial consumption of good i .

When the commodity is also produced, a rise in its price induces the following increase in the consumption of good i :

$$\partial q_i / \partial p_j = m_i q_j^*,$$

where q_j^* is the initial production of commodity j . Thus, the net income effect is equal to

$$\partial q_i / \partial p_j = m_i (q_j^* - q_j).$$

GENERAL EQUILIBRIUM MODEL

The model used for the simulations described in the section on the income distribution effect is a short-run computable general equilibrium model. The main theoretical characteristics of such a model are described in Taylor.⁴² It includes eight sectors and seven social groups. The sectors are maize and beans, other agricultural products, petroleum, fertilizer, processed food, other industry, services, and commerce. The social groups are small farmers, agricultural workers, large farmers, urban workers, nonagricultural capital owners, merchants, and urban marginals.

The two agricultural sectors have a given supply, and equilibrium in these two markets is brought about by changes in price. For this reason, they are called flexible price sectors. In the six nonagricultural sectors, prices are determined by a markup over costs as in Kalecki, and are called fixed price sectors. Assuming that there is excess capacity, output in these sectors is determined by effective demand.

The money wage is exogenously given and the real wage depends on the resulting price level. Employment is fixed in the agricultural sectors (unless an exogenous supply response is introduced) and depends on output in the rest of the sectors. Capital is defined as a sector of heterogeneous goods that are domestically produced or imported. Investment is given exogenously in real terms, and savings adjust to the nominal investment through changes in output and in the distribution of income.

The description of the two types of price determination implies that in the first two sectors the burden of adjustment falls completely on prices, whereas for the remaining six it falls completely on quantities.

⁴²Lance Taylor, Macro Models for Developing Countries (New York: McGraw-Hill, 1979).

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