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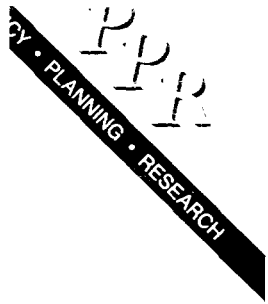
Food Subsidies

A Case Study of Price Reform in Morocco

Karim Laraki

LSMS Working Papers

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A Case Study of Price Reform in Morocco

Karim Laraki

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ABSTRACT

This paper presents an analysis of the costs and benefits of food subsidies in Morocco. It focuses on ways to reduce the financial costs without adversely affecting the standard of living and nutritional status of the poor. Part I describes the organization of the food-subsidy program in Morocco and presents descriptive statistics on food-consumption patterns there. It thus provides background material for Part II, which discusses the methodological issues involved in estimating the welfare and nutritional effects of price and tax reforms in developing countries. A model for estimating price elasticities from cross-sectional data is applied to results from the 1984-85 household consumption survey to quantify the effects of modifying the food-subsidy program in Morocco. Both real income and nutritional effects are used to evaluate the Moroccan program and, by extension, similar ones elsewhere.

TABLE OF CONTENTS

ACKNOWLEDGMENT

I. Food Consumption and the Food Subsidies Problem
in Morocco

1. INTRODUCTION

This study is concerned with the reform of the food-subsidy program in Morocco. The reform is part of a vast program of price and tax policy changes undertaken by the government of Morocco (GOM) since the early 1980's to decrease budget deficits and ease the strains caused by the economic and financial crisis the country has been facing during the last two decades.

The origins of the macroeconomic disequilibrium in Morocco and the need for reforming the food-subsidy program can be traced to the mid-1970s.[1] Externally, the burden on the Moroccan economy began with the economic crisis in the industrialized world and the war in the Sahara. At the same time the prices of imports, in particular petroleum products, were soaring while, the prices of most exported raw materials were decreasing. Internally, a dramatic increase in the proceeds from phosphate exports in the early 1970s[2] had encouraged the GOM to more than double government expenditures by expanding consumer subsidies and by increasing employment in the public sector. As can be seen from Table 1.1 the value of phosphate exports increased fivefold in 1973-1974. Proceeds from phosphate exports covered 49 percent of the value of total imports in 1974 as compared with a 17 percent yearly average from 1970 through 1973. However, phosphate prices plunged in 1975, while government expenditures kept increasing. The government deficit mushroomed by a factor of six in 1973-1975.

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[1] The discussion on the macroeconomic disequilibria and the adjustment policies followed by the GOM is based on Hamdouch (1987).

[2] Morocco is the world leading exporter of phosphate rock.

**Table 1.1: Evolution of Phosphate Exports
Between 1970 and 1985**

(a)	(b)	(c)	(d)	(e)	(f)
1970	572	23.1	16.5	3.3	5.0
1971	588	23.2	16.6	4.1	4.8
1972	673	22.8	18.8	4.8	4.7
1973	788	21.0	16.8	4.8	4.3
1974	4075	54.8	49.1	11.9	4.1
1975	3431	55.0	33.0	8.6	4.2
1976	2191	39.3	19.0	9.1	4.5
1977	2111	36.0	14.7	8.6	4.3
1978	2034	32.5	16.5	10.1	3.9
1979	2214	29.0	15.5	17.0	3.7
1980	3012	31.2	17.9	14.1	4.3
1981	3827	31.0	16.9	24.8	5.3
1982	3401	27.3	13.1	25.4	6.3
1983	2932	20.5	11.5	24.0	8.1
1984	4619	24.2	13.4	24.4	9.5
1985	4923	22.4	12.8	25.8	9.6
1986	3939	17.1	11.4	13.2	8.7

(a) Year
(b) Phosphate Exports (millions of DH).
(c) % of Total Exports.
(d) % of Total Imports.
Note:
(e) % of Crude Petroleum in Total Imports.
(f) Exchange Rate (Dirham per US $).
SOURCE: International Monetary Fund, International Financial Statistics, 1988.

Table 1.2: Evolution of Government Deficit and
Foreign Debt Between 1970 and 1985

(a)	(b)	(c)	(d)
1970	619	3622	5.0
1971	658	4026	4.8
1972	897	4338	4.7
1973	526	4177	4.3
1974	1348	4341	4.1
1975	3341	5168	4.2
1976	7217	7881	4.5
1977	7647	11723	4.3
1978	5773	13723	3.9
1979	6039	16071	3.7
1980	7184	20697	4.3
1981	10567	30557	5.3
1982	10630	40704	6.3
1983	7680	55387	8.1
1984	7500	75368	9.5
1985	10700	NA	9.6

(a) Year.
(b) Government Deficit (Millions of DH).
(c) Foreign Debt (Millions of DH).
(d) Exchange Rate (Dirhams per US $).

SOURCE: International Monetary Fund,
International Financial Statistics, 1988.

During the same period, the external debt increased by 24 percent and exceeded
$1 billion in 1975 (see Table 1.2).

Until 1983, the GOM attempted to rectify the disequilibrium in public
accounts without a heavy reliance on the World Bank and the International
Monetary Fund. In 1978-1980, the government implemented a stabilization
program. It included measures aimed at reducing the basic disequilibrium by
limiting imports, encouraging exports, and maximizing the inflows of hard
currencies from tourists and from Moroccans employed abroad. The balance-of-

payments deficit did decrease by 50 percent in 1978-1980 but the relief was only temporary. In the years 1980 through 1983 the deficit doubled, necessitating an increase in foreign borrowing. In 1983, the external debt reached $6.9 billion. It became imperative to turn to the World Bank and the International Monetary Fund for general as well structural adjustment programs.

Adjustment packages address four principal components of a nation's economy (see Thorbecke, 1987): 1) exchange rates; 2) monetary and fiscal policies; 3) trade policies; and, 4) wage and price policies. In Morocco, the balance-of-payment deficit is being controlled through a reduction of the money supply and a mobilization of savings. To reduce protectionism and orient industry toward exports, the GOM has adopted a policy of trade liberalization.

It is the fourth component of the adjustment program (specifically, price policy) that is of crucial importance to this study. Reform of the public-finance sector is altering a longstanding policy of government intervention. Two important and conflicting objectives of the GOM are to promote local agriculture and to provide consumers with low-priced food products. The first objective is motivated by a desire to reach a reasonable level of food self-sufficiency and to support the revenues of rural households. The second objective has some obvious nutritional motivations but is also a legacy of the post-colonial period. During that period a national consensus lead to a heavy governmental involvement in the economic and social activities of the country, especially in the urban sector. The GOM is now the nation's leading employer (with 70 percent of the urban work force). The

government subsidizes 40 percent to 50 percent of the housing of urban households; it provides free schooling to all students up to the university level; and, since December 1986 it has subsidized the newspapers of all political parties.

The food-subsidies program is part of this phenomenon of government intervention. Entitlement to cheap food is viewed by a large part of the population and by many government officials as a basic right. The price reform has a direct effect on the operation of the program. A vast reform of public finances is under way. A value-added tax was instituted to maximize tax revenues. Public enterprises are being reorganized through restrictions on civil service hiring and wage freezes for improved profitability. More important, the GOM has committed itself to the gradual elimination of consumer subsidies. Subsidies on meat and dairy products have been totally removed since the late 1970s. But attempts to increase prices for the most important staples (soft wheat, vegetable oil, and sugar powder) have been vehemently opposed and subsidies on these commodities remain.

It can be hoped that any macroeconomic adjustments will promote growth that will increase per capita income in the long run and thus help offset the effects of lost subsidies. However, as Berg (1987) reports, the per capita income of the poor increases slowly, and calorie intakes rise less than half as rapidly as income in many developing countries. It is therefore necessary to specifically include nutritional and standard-of-living considerations in structural adjustment programs. Better targeting of subsidies can help achieve this goal.

This paper is organized as follows: The organization of the subsidy program is presented in section 2. The problems generated by the subsidies and the approach I propose to follow to study the consequences of reform are discussed in section 3. Section 4 provides descriptive statistics on food consumption patterns and a first appraisal of the effects of the subsidies on various sociodemographic groups. Section 5 contains concluding remarks. The nutritional, welfare, and budgetary effects of the reform of the program are estimated in part II.

2. THE FOOD SUBSIDIES PROGRAM: ORGANIZATION AND COSTS

This section provides an analysis of the markets of the commodities involved in the subsidy program and describes the food-subsidy problem in Morocco.

2.1. The Organization of the Program

Although the organization of the program varies from one commodity to another, a general pattern reaches throughout all the programs. Farmers are usually helped by input subsidies and/or price-support programs, and consumption is subsidized at the retail level. Middlemen and the transformation industries buy farm products at support prices, sell them at subsidized prices, and are subsequently reimbursed by the government for the difference between the two prices, plus a fixed profit margin. The programs are not targeted. All farmers are supposed to sell at the same price and all consumers are supposed to buy at the same price.

The details of these mechanisms are well reflected by the configuration of the soft-wheat[3] market (Figure 1). The government, it is seen, intervenes at a first stage on the input markets. Fertilizer is subsidized, the credit rates are regulated, and mechanization is encouraged. Furthermore, the government sets a price support level (SP) at which licensed traders buy grain from the farmers. The latter can also sell their output on

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[3] Soft wheat is also the most expensive commodity in the program (see section 2.2). It is important to have a good understanding of the mechanisms regulating its market.

the free market at the market price (MP).[4] Because local production is low, the licensed traders import grain from world markets at the world price (WP). The licensed traders then sell the grain to the mills at a subsidized price (SBP), and the government reimburses them the difference between the support price and the subsidized price, plus their transportation and maintenance costs and a fixed profit margin. When world prices are lower than the support price, the traders reimburse to the government the difference between the two prices minus transportation and maintenance costs.

Similarly, the millers sell the soft-wheat flour[5] to wholesalers and bakeries at a "consumption price" (CP)[6] and receive from the government the difference between the subsidized price and the consumption price plus the milling costs and a fixed profit margin. The wholesalers and the bakeries then sell the flour and the bread, at fixed prices (CP'), to retail stores, who sell the products to consumers at official consumption prices (CP''). Note that, to the contrary of the licenced traders and the millers, the wholesalers, the bakeries, and the retailers sell their products at fixed prices but receive no compensation from the government for their processing costs. The significance of this point is discussed below.

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[4] The government also fixes support prices for maize, barley and hard wheat. These prices, however, have very little meaning because the free market prices are always much higher that the support prices. The consumption prices of these commodities are not subsidized.

[5] There are two kinds of soft wheat flour. The flour "Nationale" is less refined and cheaper than the flour "De Luxe".

[6] This official name is misleading. It is not the price paid by consumers.

FIGURE 1: Configuration of the Soft Wheat Market
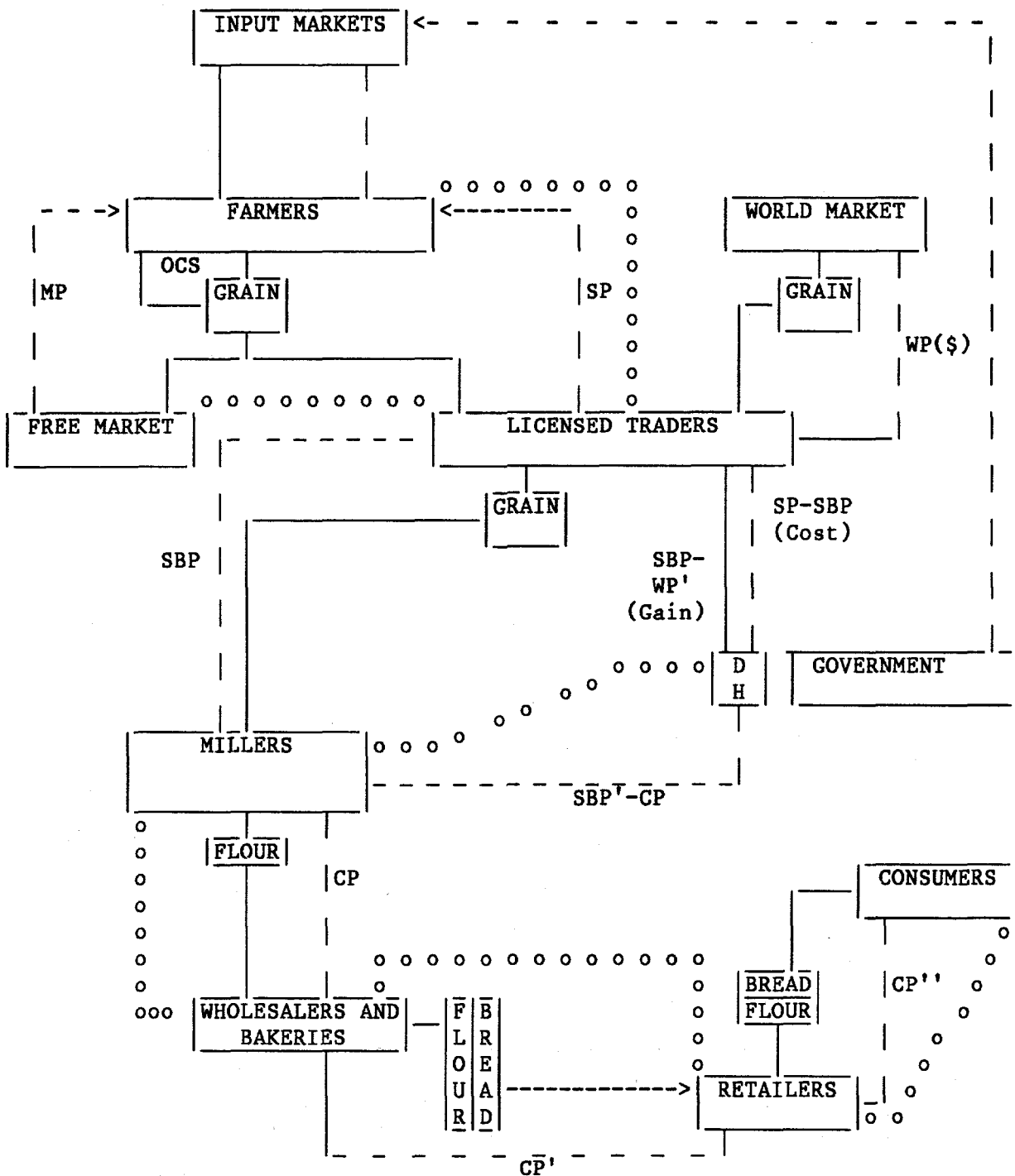
OCS	Own consumption	SBP'	SBP + costs of millers + margin
MP	(Free) market price	CP	Wholesale Consumption Price
SP	Support price	CP'	CP + wholesalers margin
SBP	Subsidized price	CP''	CP + retailers margin
SP'	SP + costs of licensed traders + margin	---	Transactions of farm products
		_ _	Monetary transactions
WP	World price	o o o	Speculative transactions
WP'	WP + costs of licensed traders + margin	DH	Dirham
		$	US dollar

Parallel to these official transactions there exist a number of speculative activities that are worth noticing. The farmers sell their output at the local markets when their farms are too remote from the collection centers of the licenced traders. The market price (MP) is generally lower than the support price (SP). The licensed traders are tempted to buy the grain on the free market at the low market price but claim, illegally, to the government they bought it at the high support price. Occasionally they even find it profitable to collect the grain themselves directly from remote farmers who are eager to sell their production at very low prices.

Illegal transactions also occur between the millers, the wholesalers, the retailers, and the consumers. They are more likely to occur in years of low production. Black market prices are then high, and the flour is traded at prices higher than those fixed by the government. The wholesalers and the retailers argue that they have to sell at black market prices because the official prices do not cover their costs and the government does not pay them maintenance and profit margins as it does to the millers and licensed traders.

Two other commodities are subsidized: sugar powder and edible oils. Their markets follow roughly the same pattern as the soft-wheat market. These commodities tend to involve fewer illegal transactions when the farms (for sugar) and the transformation industries (for sugar and edible oils) are government-owned or operated. The production price of sugar is guaranteed in the sense that the government buys all that is produced at a price announced during the planting season. The price of oil seeds is fixed by the government, but all the production is sold on the free market.

2.2. The Relationships between World Production and Consumption Prices

The Soft-Wheat Market

During the first half of the 1970s the government kept the support price low in an effort to control inflation. In 1976, however, the government decided to overvalue the local currency to lower import prices. The support price became higher than the world price. Since the early 1980s, world prices have been falling and the gap between the two prices has increased (see Table 2.1).

The effects of the relationship between world prices and support prices should be interpreted with care. As I have noted, many farmers sell their output on the free market and do not get the support price. According to Ministry of Agriculture estimates, 50 percent of the soft-wheat production is used for own consumption in the rural sector, 32 percent is sold on the free market, and only 18 percent is traded through government channels. In other words, at least 82 percent of the marketed output is sold at (low) free-market prices.

If the flour were to be sold to wholesalers at cost, the wholesale price of the flour "Nationale" would increase by about 60 percent (see Table 2.1). This would have immediate negative effects on consumption unless black market prices did not increase. As Thorbecke (1987) points out, if consumers have to buy most of their food on the black market, then an increase in the official consumer price may have a small negative effect on their real income. An increase in wholesale prices, however, would enable the mills to improve their financial situation and increase their milling capacity. That in turn might lower milling costs and, in the long run, decrease wholesale prices.

Table 2.1. Evolution of the Production, Consumption,
and World Prices of Soft Wheat Between 1980 and 1986 (DH/Ton)

	CIF World Price of Grain (Chicago)	Support Price of grain*	Subsidized Price of grain (Price paid by the mills)	Wholesale Price of Flour**	
				National	De Luxe
1980	688.9	1250	1282	940	1270
		(181.4)		N.A.)	(N.A.)
1981	732.3	1350	1432	1120	1500
		(184.4)		(62%)	(76%)
1982	764.94	1400	1435	1120	1500
		(183.0)		(60%)	(73%)
1983	1054.25	1400	1435	1120	2000
		(132.8)		(59%)	(96%)
1984	1228.13	1500	1535	1120	2000
		(122.1)		(56%)	(93%)
1985	1154.40	1800	1840	1320	2760
		(155.9)		(N.A.)	(N.A.)
1986	NA	2000	2050	1320	2760
	(NA)			(N.A.)	(N.A.)

* Percentage of world prices in parentheses.
** Percentage of milling costs in parentheses. The milling costs are
calculated by the government to determine the level of subsidies to be
given to the mills. They are assumed to be the same for all the mills.
The flour "Nationale" is less refined than the "De Luxe". Refer to text
for more details.

SOURCES: Office National Interprofessionel des cereals et des Legumineuses.

The wholesale prices of the flours, "Nationale" and "De Luxe", have been changing in opposite directions. The ratio of the wholesale price to the milling costs for the flour "Nationale" decreased from 62 percent in 1981 to 56 percent in 1984. It increased for the flour "De Luxe" from 76 percent to 93 percent during the same period. Thus flour "De Luxe" is sold almost at cost whereas the price of the less refined flour "Nationale" is increasingly subsidized.

The Sugar Market

Sugar production receives a high level of price support in Morocco. The government buys all production (of beets and cane) from farmers at guaranteed prices. Production prices of sugar beets and sugarcane are reported in Table 2.2. They cannot be compared with international prices, because beets and cane are not traded on world markets. However, according to Ministry of Agriculture estimates, the domestic price of raw sugar was 2.4 times higher than the international price in 1986. The estimate reflects the high level of support given to local production. As a result of the high prices, sugar production increased from 5,000 tons in the early 1960s to 200,000 tons in the 1970s to more than 400,000 tons since 1982. Production as a part of consumption has increased from 1.4 percent in 1963 to more than 60 percent since 1982.

Table 2.2 also compares the domestic and world prices of refined sugar. The ratio between the two prices has been increasing. The widening gap results from a downward trend in international prices and a rise in the domestic retail price of sugar powder: it increased in 1986 from DH 2640/ton

Table 2.2: Evolution of the Production, Consumption and World Prices of Sugar between 1981 and 1986 (DH/Ton).

	Guaranteed Beets	Price Cane	(a)	(b)*	(c)*	Domestic Retail Price Piece	Powder
1981	135	95	1039.35	34%	72%	2737.5	2060.0
1982	155	105	978.12	40%	89%	3307.5	1640.0
1983	155	105	1750.63	40%	55%	3307.5	2640.0
1984	175	120	2043.70	54%	74%	3307.5	2640.0
1985	190	140	1370.85	na	na	3307.5	2640.0
1986	215	160	1605.00	na	na	4230.0	3140.0

(a) CIF London spot price of white (refined) sugar.
(b) Ratio of subsidies to retail price: sugar cubes.
(c) Ratio of subsidies to retail price: sugar powder.
  * Ratios for the CAAMSA refinery. The level of subsidies is not the same for all refineries.
  See text for details.

SOURCES: Ministry of Commerce and Industry, Ministry of Agriculture

(a level at which it had stood since 1983) to DH 3140/ton. The domestic price of sugar powder was 1.2 and 1.9 times higher than the world price of refined sugar in 1984 and 1986 respectively. Such comparisons, however, can be misleading. The sugar industry is highly protected in almost every country of the world, but sugar is dumped on international markets. Consequently, if the guaranteed prices were eliminated, consumers would benefit greatly but local production would undoubtedly suffer.

Consumption is subsidized, but the amount of subsidies given to each refinery depends on the productivity of equipment and the raw materials used. Table 2.2 presents the level of subsidies compared with the retail

price for a refinery in the northwest of the country. Sugar powder made from beets is increasingly subsidized. The ratio of subsidies given to the refinery to the retail price increased from 34 percent in 1981 to 54 percent in 1984.

The Edible-Oils Market

The configuration of the edible-oils market is complex. Refineries use raw materials from three sources: locally produced grains (mostly sunflower), imported grains (soybeans and colza), and imported raw oil (made of soybeans or colza). Local production provides less than 10 percent of the oil consumed in the country. The domestic price of grains is fixed by the government. It is generally very low, but it has been an implicit support price since 1984 because world prices have been falling (see Table 2.3).

The retail price is the same regardless of the raw material used to produce the oil. However, the level of subsidies given to each refinery varies according to the kind of raw material used because some seeds give more oil than others. The average ratio of the total level of subsidies per ton to the retail price of oil is reported in Table 2.3. It has decreased from 30 percent in 1980 to 24 percent in 1983 and increased to 67 percent and 56 percent in 1984 and 1985 respectively.

Table 2.3: Evolution of the Production, Consumption and World
Prices of Oil between 1980 and 1986 (DH/Ton)

	CIF Rotterdam Spot Price - Sunflower Seeds	Production Sunflower	Price Seeds	Retail Price of Oil	(a)
1980	1441.89	1850		4535	30%
1981	1588.34	1850		4769	35%
1982	1686.63	2560		4769	24%
1983	2901.60	2700		6503	24%
1984	2731.30	3000		6503	67%
1985	2067.24	3700		7586	56%
1986	2000.00	4100		7586	N.A.

(a) ratio of total subsidies per ton to retail price of oil.

SOURCES: Ministry of Commerce and Industry, Ministry of Agriculture.

3. A FORMULATION OF THE FOOD-SUBSIDIES PROBLEM

The total cost of food subsidies (DH 3.5 billion)[1]/ in 1985 equaled

2.9 percent of the GNP and 10 percent of current government expenditures.

Although world grain prices have been falling, a high population growth rate

(2.5 percent a year) and low production levels have more than doubled the

costs of the program since 1980 (see Table 3.1). Soft wheat is by far the

most expensive commodity in the program: it represented two-thirds of the

total cost in 1985 (see Table 3.2).

Government revenues cannot keep up with these expenses. The

difference between the subsidized price and the consumption price for soft

wheat (see Figure 1) is never fully reimbursed to the millers. The millers

are in fact financing part of the program. They are in an intolerable

financial situation, and the rate of bankruptcies in the mills has increased

in the last six years. Furthermore, the government must borrow on

international markets (DH 150 billion of foreign debt in 1986) to pay for the

subsidies and other government expenditures. The budgets of other sectors are

cut, and the ministries and other state-owned agencies (the largest employers

of the country) have had to limit the number of high school and university

graduates they can recruit each year. Because of the economic crisis, the

private sector is unable to absorb a growing work force, and the unemployment

rate is soaring.

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[1]/ DH = US$.10.

**Table 3.1: Evolution of the Total Cost of the Food
Subsidies since 1980 (in millions of Dirham)
(Percentages of GNP in Parentheses)**

	1980	1981	1982	1983	1984	1985
Total Cost	1703	2200	4212	2840	3369	3500
% of GNP	(2.4%)	(2.8%)	(4.7%)	(2.9%)	(3.1%)	(2.9%)

**Table 3.2: Cost of Food Subsidies for Selected
Items, 1985 (in millions of Dirham)**

	Soft Wheat Flour	Sugar	Edible Oils	Total for all Items
Cost	2200	364	814	+3500
% of Total	62.8%	10.4%	23.2%	100%

SOURCES: ONICL and Caisse de Compensation.

It appears that the food-subsidies problem is three-dimensional, stemming from microeconomic, macroeconomic, and sociocultural sources. At the microeconomic level, the low productivity of Moroccan agriculture and severe rigidities in the marketing channels do not permit the domestic production to satisfy the needs of a rapidly growing population. Many small farmers are too remote from the markets to benefit from the price support program. As is reflected by the soft-wheat example, the middlemen buy the commodities from

the farmers at extremely low prices and resell them at the high official prices. As Pinstrup-Andersen (1985) argues, an improvement in the efficiency of food marketing may help increase producer prices and, at the same time, lower consumer prices. Ahmed and Rustagi (1984) find that a 25 percent reduction in marketing costs in Africa can result in a 50 percent increase in farm prices and a 13 percent decrease in consumer prices.

On the consumption side, the purchasing power of the poor is insufficient to conceive any price increases without some kind of compensatory program. Furthermore, the subsidies have shifted consumption patterns from commodities traditionally produced in Morocco (such as olive oil, barley, and hard wheat) to more expensive ones, usually imported in large proportions (such as vegetable oil and soft wheat). For example, the price of one liter of vegetable oil, a commodity that is imported and subsidized, is less than one-half the price of the same quantity of olive oil, a commodity traditionally produced in the country but not subsidized. Consumers substitute vegetable for olive oil, and local production is not encouraged. At issue, too, are the distributional aspects of the program. The subsidies are not targeted with the result that wealthy consumers benefit as much as, indeed perhaps more than, needy consumers.

At the macroeconomic level, the costs of the subsidies drain resources from in the public sector as well as the private sector of the economy. They severely affect the unemployment rate because, as noted, the government (the nation's leading employer) has limited the number of graduates it recruits its year. The private sector has not been able to absorb this growing work force.

At the sociocultural level, it is important to keep in mind that food subsidies are only part of a general phenomenon. The population and the government consider that it is the duty of the state to take charge of the health, employment, educational and nutritional needs of the people. Any reduction in food subsidies must go along with a compensatory program for the poor as well as a change in attitudes. The official media increasingly praise the virtues of the private sector. The topic of food subsidies, however, is still very much taboo. No one talks openly about removing the program. Because of the recent fall in world prices, the GOM feels less pressures to rapidly eliminate the subsidies. Announcement of such an elimination is continuously postponed.

This study addresses the consumption and distributional aspects of the problem. The study has three main objectives:

1. To analyze the relationship between the subsidies and food consumption patterns.

2. To assess who benefits from the program and who would be affected by a removal of the subsidies.

3. To determine how the program can be reformed (how can costs be decreased?) without sacrificing the main purpose of subsidies (i.e. guaranteeing that the poor have access to affordable food products).
For the last objective I investigate the possibility of subsidizing a good consumed primarily by low-income groups as a way of compensating the poor. If the objective is to alleviate poverty, the subsidy should be

targeted toward a commodity consumed mostly by the poor[8] (see Besley and

Kanbur, 1987). This point is emphasized in the 1986 World Bank Report on

Poverty and Hunger:

> The main determinant of a food's suitability for subsidy is the share
> of it that goes to the target population. If a good is consumed
> exclusively by the target group, the subsidy will be very efficient;
> a dollar's worth of subsidy will provide almost a dollar of added
> income to the target group. But if the target population consumes 30
> percent of a subsidized food, the subsidy is much less efficient.
> This efficiency varies according to the food chosen. In Brazil, for
> example, a dollar spent on subsidizing bread transfers about 18 cents
> to the low-income population and a dollar spent on subsidizing
> legumes, about 39 cents.... Food subsidies for consumers can be even
> more efficient if further selectivity is introduced by, say,
> subsidizing inferior grades consumed by the poor.

In this study I test the hypothesis that, if the objective is to

alleviate poverty, soft wheat is not suited for the subsidy program. I

investigate the possibility of subsidizing hard wheat and/or barley. These

two commodities are likely to be inferior or at least necessities.

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[8] See Pinstrup-Andersen (1988) for a topology of the programs available to
compensate the poor for the adverse effects of adjustment programs.

4. DESCRIPTIVE STATISTICS ON FOOD-CONSUMPTION PATTERNS IN MOROCCO

The Moroccan Statistical Office conducted a household consumption survey in 1984-85. This survey is the first data set available on consumption in Morocco since 1970 and covers four quarters (summer 1984 through spring 1985) for a sample of 14,000 households, representative of all regions of the country.[9] The data contain information on expenditures and quantities consumed for items in nine categories: food, clothing, housing, durables, medical, transportation, leisure, services, and tax payments. Information on various sociodemographic characteristics of each household such as sex, age, education, and profession of household members is also available.

Tables 4.1-4.3 contain descriptive statistics on the variables used in this study. Table 4.1 reflects demographic patterns common to most Third World countries. The population is young, and average household size is high (larger than 6). Most household members are in the age groups 18-34 and 0-5. There are more females in the older age groups (35 and older).

Tables 4.2 and 4.3 describe food-consumption patterns. The food budget is spent mostly on cereals (21.1 percent), meats (19.7 percent), and fruits and vegetables (13.7 percent). Soft wheat is heavily consumed accounting for 6 percent of the food budget. Food represents 50 percent of total expenditures. Food-consumption patterns by income groups are discussed below.

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[9] The survey is described in detail in "Enquête Nationale sur la Consommation et les Dépenses des Ménages", Ministry of Planning, Morocco.

The data reveal some significant regional differences not reported in the tables. The Central region (which includes Casablanca, Morocco's largest city) exhibits demographic patterns similar to those of the entire sample.

Table 4.1: Descriptive Statistics on the Demographic Variables

Age Groups	0-5	6-11	12-17	18-34	35-54	55-64	≥65
Males							
Mean	.521	.511	.441	.781	.441	.153	.147
	(.775)	(.768)	(.711)	(.967)	(.529)	(.363)	(.358)
Females							
Mean	.504	.499	.462	.896	.520	.165	.141
Stand Deviation	.769	.757	.716	.856	.542	.380	.361

Household size
Mean   6.182
Standard
Deviation 3.301

Per capita income, however, is 1.2 times higher than the national average. Consequently, food-consumption patterns are different. Cereal products become less important than meat products. The budget shares of barley and olive oil are half of what is observed in the rest of the country. On the other hand the consumption of meat, sugar, and fish is higher. The Northwest (which includes Rabat, the capital, and some other big cities like Tangier) reveals patterns similar to those in the Central region. The South provides a different picture. It is a poorer region, with per capita income equivalent

to 70 percent of the national average. Barley and sugar loaf are consumed more than in the rest of the country. The Northeast is also poor but not so much as the South. Per capita income is equal to 90 percent of the national

Table 4.2: Food Budget Shares

	Mean*	
Soft Wheat	.060	(.157)
Hard Wheat	.035	(.117)
Barley	.031	(.093)
Other Cereals	.085	(.100)
Dairy Products	.116	(.095)
Vegetable Oil	.065	(.065)
Olive Oil	.031	(.069)
Meats	.197	(.141)
Fish	.041	(.072)
Fruits and Vegetables	.137	(.078)
Sugar Loaf	.048	(.059)
Sugar Powder	.018	(.033)
Other Sugar	.022	(.460)
Spices and Tea	.103	(.067)

*Standard Deviation in parentheses

**Table 4.3: Per capita Total Expenditures and Total Food Expenditures
(in Dirhams per year)**

	Total Expenditures	Total Food Expenditures	Food Budget (% of Total)
Mean*	3260.13 (4621.94)	1813.21 (1921.27)	51.84 (17.94)

* Standard Deviations in parentheses.

average. However, barley is consumed less in the Northeast than elsewhere (2.6 percent of the food budget versus 3.1 percent for the whole sample). Hard wheat and fruits and vegetables are consumed more than in the rest of the country.

Table 4.4 reports the food budget shares of various commodities for five income groups. Meats and cereals are the most important commodities. They represent more than 40 percent of the budget of rural households and more than the third of the budget of urban households. The share of meat in the budget increases with income whereas the share of cereals is negatively correlated with income. Meat is a luxury and cereals are necessities. The share of meat in the food budget is high even for the low-income groups. This shows that the budget shares of expensive and nutritionally rich commodities may be high even among the poor. This phenomenon has also been observed in Latin American countries (see Musgrove, 1978).

In the urban sector, soft wheat is consumed more than any other cereal. In the rural sector, the three cereals (hard wheat, soft wheat and barley) have equal importance. Dairy products (luxuries), fruits and vegetables (necessities), and spices and tea (necessities) are also heavily

consumed in both sectors and by all income groups. It is interesting to note that, although Morocco has two coasts (the Mediterranean and the Atlantic) with considerable fish reserves, the consumption of fish is low. Its food-budget share is around 4 percent except for the high-income urban group, for which it exceeds 11 percent.

It has been noted that the share of the food budget in the total budget is around 50 percent. As should be expected, the share is higher in the rural sector and for the low-income urban group (54 percent) than for the

TABLE 4.4: Average Food Budget Shares*
by Income Group

	RURAL high	RURAL low	URBAN high	URBAN middle	URBAN low
SOFT-WHEAT	3.43	6.20	3.73	4.51	8.02
HARD-WHEAT	7.16	4.76	1.93	2.12	2.74
BARLEY	4.39	6.68	.41	.75	1.80
OTHERCER	5.20	8.23	6.27	8.20	10.82
DAIRY	11.14	8.50	14.93	14.44	11.75
VEG. OIL	5.85	6.70	5.75	6.36	7.00
OLIVE OIL	4.87	4.15	2.29	2.39	2.37
MEATS	23.62	16.55	25.83	23.60	17.22
FISH	3.68	2.30	11.01	4.96	2.85
FRUITS + VEG	10.92	12.34	12.42	15.15	15.45
SUGAR/LOAF	5.63	7.59	1.68	2.87	4.27
SUGAR/POWDER	.69	1.61	1.48	1.80	2.40
SUGAR/OTHER	2.22	1.65	3.01	2.82	2.15
SPICES + TEA	10.43	12.43	6.97	8.74	10.40
FOOD BUDGET**	54.51	54.97	42.24	49.40	53.36
PER CAPITA TOTAL CONSUMPTION***	3451.22	1531.85	8611.43	4009.20	2369.20

*   Percentage of total food consumption.
** Percentage of total consumption.
*** In Dirhams per year (Dh 1 = $ .10).

Table 4.5: Total Value of Subsidized Goods Purchased
by Each Income Group as a Percentage of
Total Purchases in the Sample

	RURAL high	RURAL low	URBAN high	URBAN middle	URBAN low
Soft wheat	14.3	4.3	39.1	26.3	16.1
Vegetable oil	25.1	9.7	33.8	20.6	10.9
Sugar/loaf	12.2	8.9	37.7	25.3	15.8
Sum of the three	20.6	8.2	35.7	22.7	12.9
Number of households	813	3248	1304	1955	3258

Table 4.6: Per Household Purchases of Subsidized Goods
by Income Group as a Percentage of the Sample's average
per Household Purchases

	RURAL high	URBAN low	URBAN high	URBAN middle	URBAN low
Soft wheat	185.5	13.9	316.9	142.4	52.3
Vegetable oil	326.4	31.5	274.3	111.5	35.3
Sugar/loaf	160.2	29.2	307.7	137.4	51.7
Sum of the three	267.9	26.7	289.1	122.7	41.8
Number of households	813	3248	1304	1955	3258

high and middle-income groups in the urban sector (42 percent and 49 percent, respectively).[10]/

The food-budget shares follow patterns comparable to what is observed in countries similar to Morocco. In Tunisia[11]/, cereals and edible oils account for 20 percent and 7 percent of the food budget, respectively. For meats the share is 20 percent, and for dairy products it is 9 percent. The share of dairy products is lower in Tunisia than in Morocco. For the other commodities, the averages are similar between the two countries.

The per capita total-consumption figures reveal big disparities across income groups and between the urban and the rural sectors. In the urban sector, the per capita total consumption of the high-income group is more than 3 times higher than that of the low-income group and more than twice that of the middle-income group. In the rural sector, the high-income group's per capita consumption is 2.2 times higher than that of the low-income group. The per capita consumption of the high and low-income groups in the urban sector is 2.5 and 1.5 times higher than the consumption of the same groups in the rural sector, respectively.

As Table 4.5 illustrates, the high-income groups (in the rural sector as well as in the urban sector) purchase the largest part of the subsidized items. Almost 40 percent of soft-wheat purchases in the sample go to the

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[10]/ The food budget share is essentially the same for the rural high-income group and for the rural low-income group. This is not consistent with Engel's law. See Laraki (1988) for a discussion.

[11]/ The figures for Tunisia are from "Enquête sur le Budget et la consommation des Ménages, 1980, Institut National de la Statistique, Tunis, Tunisia.

high-income urban group (20 percent of the urban households). In the rural sector, the high-income group (20 percent of the rural households) accounts for 25.1 percent of the total purchases of soft wheat. The corresponding figures for vegetable oil and sugar powder are 33.8 percent and 37.7 percent in the urban sector and 25.1 percent and 12.2 percent in the rural sector. The middle-income group (30 percent of the urban households) accounts for 26.3 percent of soft-wheat purchases, 20.6 percent of vegetable oil purchases, and 25.3 percent of sugar powder purchases.

In sum, 12.3 percent of the households (the high-income urban group) make fully 35.7 percent of the purchases of the three subsidized items, while 30.8 percent of the households (the low-income urban group) make only 12.9 percent of purchases. In the rural sector, 20.6 percent of the purchases of the subsidized items go to 7.7 percent of the households (the high-income group) and 8.2 percent go to 30.7 percent (the low-income group).

These figures do not account for the number of households in each income group. Because there are more households in the low-income groups than in the high-income groups, one would expect the former group to have higher total purchases than the latter. Despite this fact, the high-income group has the highest share of purchases although it has fewer households than the low-income groups.

To correct for the number of households in each income group, Table 4.6 reports the per household purchases of subsidized goods for each income group as a percentage of the sample's per household purchases. The high-income groups are by far the biggest purchasers of subsidized goods. Their per household purchases of the three subsidized goods represent 289 percent and

268 percent of the sample's average per household purchases in the urban and rural sectors, respectively. The comparable figures are 27 percent and 42 percent for the low-income rural and urban households, respectively.

It appears from the last two Tables that the current food-subsidies program is biased in favor of the high and middle- income groups, particularly in the urban sector. This should not come as a surprise because the program is not targeted. This does not mean that low-income households would not be hurt by a removal of the subsidies. Low-income households spend more on cereals than on other foods and have a higher food-budget share than high-income households. An increase in the prices of subsidized goods can have very adverse effects on the standard of living of the poor (Laraki, 1988).

5. CONCLUSIONS

The descriptive statistics of section 4 suggest that the benefits of the current subsidy program leak extensively to high-income groups because the subsidies are not targeted. However, low-income households devote substantial shares of their budget to the commodities currently subsidized. If the prices of these commodities are raised the income of the poor will decrease.

The urban low-income group can be compensated for the adverse effects of price increases by a subsidy on barley and/or hard wheat (see Part II). This might not help farmers. They produce large portions of their consumption and, furthermore, hard wheat is not inferior in the rural sector. Small farmers might be better helped by a price-support program for hard wheat. Such a program would increase production. The exact effect on poor farmers depends on whether the rural poor are net purchasers of food. If a large part of the food they consume is purchased, then a price support program will not necessarily help. Recent studies on India (Mellor, 1978), Sri Lanka (Sahn, 1984), and Thailand (Trairatvorakul, 1985) show that small farmers do not benefit from price increases.

In Morocco, 7 percent of the soft wheat consumed by the 8 percent poorest portion of rural households comes from own-production (Laraki, 1988). The figures are much higher for other commodities (50 percent for hard wheat and barley). The percentage for soft wheat is low because small farmers do not benefit from the price-support program for the reasons given in section 2. In addition, they see no incentive in producing what they consume, because the consumption price of soft wheat is very low. The picture is different for hard wheat and barley. A large portion of the food consumed by

the poor is produced and not purchased. An efficient price-support *program* for these commodities can be the appropriate mean of compensation for the poor in the rural sector (see Laraki, 1988).

II. The Nutritional, Welfare, and Budgetary Effects
    of Price Reform in Developing Countries:
            Food Subsidies in Morocco

6. INTRODUCTION

Food subsidy programs, which can be extremely costly deficit builders, are getting a hard second look in many countries. To cut costs and decrease budget deficits, governments must consider lowering the level of subsidies. The subsidies cost so much because they are seldom targeted toward the poor. A significant proportion of the budgets devoted to food subsidies actually goes to high-income groups since the rich spend more in absolute terms than the poor. Attempts to remove subsidies have been opposed, however, on the grounds that the poor spend higher proportions of their income on food than do the rich. An increase in food prices, it is maintained, will lower the standard of living of the poor.

Are the concerns of the protesters warranted? To what extent will the poor be affected by a removal of food subsidies (Berg, 1987, and Pinstrup-Andersen, 1987)? This paper addresses these issues and attempts to answer the question of whether a narrower targeting of subsidies can both benefit the poor and relieve budgetary strains.

In Morocco, food subsidies represent up to 10 percent of current government expenditures. A continuing economic crisis has embarked the government on a policy of gradually eliminating the subsidies. Subsidies on meat as well as butter and other dairy products have been removed since the late 1970's, but attempts to increase prices for the most important staples (soft wheat, vegetable oil, and sugar powder) have been vehemently opposed. Subsidies on these commodities are still in place.

This study investigates the potential effects of removing the remaining subsidies in Morocco. It also proposes measures that would reduce

the negative effects of consequent price increases on the poor. Three criteria are used to evaluate the price reform: First is its effect on real income of various income groups. Second is its effect on calorie consumption, because abolishing the subsidies may have serious nutritional effects, which are of interest to policy makers. The final criterion concerns the budgetary implications.

One way to compensate the poor for income and nutritional losses that result from price increases is to subsidize a nutritionally rich but economically inferior good. This would guarantee that the benefits of the subsidy would not leak extensively to high-income groups. Consequently the overall cost of the subsidy would be reduced. The nutritional, income and budgetary consequences of such a compensatory measure is calculated below.

Analyses of food expenditures require the estimation of price and income elasticities. Calculation of the latter is generally easy, whereas that of the former is cumbersome because of the lack of reliable time-series data in developing countries. However, many of these countries have good-quality budget surveys. Although data on prices are not reported in these surveys, I follow Deaton (1988) and show in section 7 how observations on expenditure levels and quantities demanded can be used to estimate price elasticities from the Morocco 1984-85 cross-section survey. Section 7 also describes the methodology used to evaluate (1) the welfare and nutritional effects of price increases on consumers and (2) the budgetary effects of such increases. The results are analyzed in section 8. Section 9 contains concluding remarks.

7. METHODOLOGICAL ISSUES

7.1. Estimation of Price Elasticities from Cross-Section Data

One solution to the non existence of price data in cross-section surveys is to use a Linear Expenditure System (LES). The LES was extensively used in the 1970's (see Betancourt, 1971, and Lluch, Powell and Williams, 1977).[1] It has the advantage of allowing for the estimation of own and cross-price elasticities with very little information on the price variables. The LES is, however, limited (Deaton and Muellbauer, 1984). All goods are assumed normal, i.e., they have positive income elasticities, and inferior goods cannot be allowed. Furthermore, all goods are gross complements, i.e. substitution effects are excluded. These are particularly undesirable restrictions since, as was explained above, an important component of this study is to determine which goods are consumed more by the poor than by the rich (i.e., which goods are economically inferior) and to investigate the substitution effects that result from price increases (i.e., which goods are substitutes and which are complements). Ability to predict the substitution effects is particularly crucial. If consumers respond to a price increase by switching to cheaper but nutritionally poor commodities, the nutritional impact of the increase can be devastating.

A flexible form for the demand system is necessary to avoid the limitations of the LES. I use Deaton and Muellbauer's (1980) Almost Ideal Demand System. Although prices are not available, I follow Deaton (1988) and

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[1] Lluch, Powell and Williams (1977) use the Extended Linear Expenditure System.

compute unit values as the ratio of expenditures to quantities consumed. The unit values can be used as substitutes for prices if correction is made for the measurement error and the quality choice inherent in the values.

A unit value is an endogenous variable affected by quality choices and by prices. Commodities such as edible oils are composed of goods (maize oil, olive oil, etc.) with different income elasticities. Richer households consume more expensive kinds of edible oils than do poorer households, so that unit values reflect quality choices.[2/] Similarly, price variations of the goods that compose the commodity determine the mix of the commodity. If the demand for a commodity is regressed on its unit value, the estimated parameter will be affected by simultaneity bias because the unit value is itself a function of income and prices.

Deaton's technique is a two-stage procedure. It uses the observation that in cross-section data "true" prices are constant within the primary sampling units of the survey (these are segments of villages or neighborhoods and are referred to as clusters). The demand and unit value equations can be written

$$q_{hc} = f(X_{hc}, Z_{hc}, P_c) \qquad (1)$$
$$v_{hc} = g(X_{hc}, Z_{hc}, P_c) \qquad (2)$$

where q is the quantity demanded, v is the unit value, X is income, Z is a vector representing the sociodemographic structure of the household, P is the

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[2/] The underlying assumption here is that prices indicate quality.

price vector, and h and c refer to households and clusters, respectively. The first stage of the procedure consists of estimating (1) and (2), with each variable redefined as the original variable minus its cluster mean. If the equations are linear in the parameters, they become

$$q^o_{hc} = f(X^o_{hc}, Z^o_{hc}) \tag{1'}$$

$$v^o_{hc} = g(X^o_{hc}, Z^o_{hc}) \tag{2'}$$

where ^{o} denotes deviations from cluster means. Because prices are constant within clusters, the price variable is eliminated and (1') and (2') give "within cluster" estimates of the income and demographic effects that do not require observations on prices. In the second stage of the technique (1') and (2') are used to redefine (1) and (2) as $q^{\cdot}_{hc} = q_{hc} - f^{\cdot}$ and $v^{\cdot}_{hc} = v_{hc} - g^{\cdot}$. $f^{\cdot}$ and $g^{\cdot}$ are the estimates of f and g from (1') and (2') while $q^{\cdot}$ and $v^{\cdot}$ are the original quantity and unit value variables purged of the effects of income and the sociodemographic variables. The remaining variation in the two variables is attributed to price differences between clusters, measurement errors in the variables and random effects within and between clusters. This allows for the identification of the price effects corrected for quality choice.[3] The equations I estimate are

$$w_i = a_{1i} + G_1 LogP + b_{1i} logX + M_1 \cdot S \tag{3}$$

$$logv_i = a_{2i} + G_2 LogP + b_{2i} logX + M_2 \cdot S \tag{4}$$

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[3] The algebraic formulation of the algorithm appears in Deaton (1988).

where w_i is the food budget share of good i,[4/] P is the vector of (unobserved)
prices, X is income (defined as total food consumption) and S is a vector of
sociodemographic variables. a_1, a_2, b_1, b_2, G_1, G_2, M_1 and M_2 are the
parameters to estimate.

7.2. The Nutritional Effects of Price Reform

The estimates of vector G_1 are used in the calculation of the
nutritional effects of price reform on consumers. The calorie intakes of each
household depend on the quantities consumed and the per unit calorie content
of the commodities. Consumers respond to a price increase of commodity i by
decreasing the consumption of that commodity and its complements and by
increasing the consumption of the substitutes of that commodity. The
nutritional effect depends, therefore, on the calories lost by decreasing the
consumption of i and its complements and by increasing the consumption of the
substitutes of i. The net effect depends on the calorie contents of all the
commodities. If the substitutes are nutritionally rich, the total number of
calories consumed remains unchanged and might even increase. If the
substitutes are nutritionally poor, calorie consumption might decrease
depending on the calorie contents of commodity i and its complements.

The price elasticity of calories demanded (Q_c) with respect to the
price of i is

[4/] The equations are estimated for the goods currently subsidized (soft
wheat, vegetable oil, and sugar powder) and for the potential inferior
goods (hard wheat and barley). Although not subsidized, sugar loaf and
olive oil are also included to investigate their substitutability with
sugar powder and vegetable oil, respectively. The survey does not
distinguish between the two kinds of soft-wheat flour, one more refined
than the other, that are subsidized.

$$e_{ci}=(\delta Q_c/\delta p_i) \ (p_i/Q_c)=\Sigma_j s_j e_{ji} \qquad\qquad (5)$$

where s_j is the share of commodity j in total calories consumed and e_{ji} is the price elasticity of the demand for j with respect to i. The effect of a price reform on calories consumed is then

$$dQ_c/Q_c= \Sigma_i e_{ci}(dp_i/p_i) \qquad\qquad (6)$$

Equations (5) and (6) show that the nutritional effect of a price change depends on two factors: the magnitudes and signs of the price elasticities of demand (i.e., which goods are complements and which are substitutes and to what extent), and the calorie contents of all the commodities consumed. If a commodity has a high share in caloric consumption, an increase in the price of the commodity can have negative nutritional effects unless cheaper but nutritionally rich substitutes are available.[5]

7.3. The Welfare Effects of Price Reform

If everything else is held constant, a price increase results in a decrease in purchasing power and is therefore equivalent to a decrease in real income. The effect of a price reform on consumers' welfare can be calculated by estimating the minimum amount of income by which a consumer must be

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[5] For the same reason, the price elasticity of demand for calories need not be negative. The sign of the elasticity depends on the magnitudes of the substitutability effects and on the calorie contents of the substitutes (see Sahn, 1988).

compensated after a price increase to be as well-off after the change as before. This can be computed by use of Hicks' (1956) compensating variation (CV) index (see Varian 1984). We follow the approach adopted by Braverman, Ahn, and Hammer (1983) for Korea and inspired from the new literature on the theory of tax reform (see Newberry and Stern, 1987). The welfare effect of a price change from p^0 to p^1 is defined as

$$CV = c(u^0, p^1) - c(u^0, p^0) \qquad (7)$$

where $c = \Sigma_i p_i q_i$ is the cost function, the relevant measure of real income, u is utility, and q_i is the Hicksian demand for i. In percentage terms, the effect of a price change on the real income is

$$\left(\delta \log c(u, P)\right) / (\delta \log p_i) = (1/c)\, (p_i q_i) \qquad (8)$$

which is w_i the share of i in total expenditures. Hence, the percentage change in the cost of living resulting from a price reform is

$$dc/c = W.P \qquad (9)$$

where W is the vector of budget shares and P is the vector of percentage price changes. It shows that the higher the share of a good is in total expenditures, the bigger is the effect on real income of an increase in the price of that commodity. It demonstrates that because the poor spend a higher

proportion of their income on food, food price increases can have significant negative effects on the welfare of low-income groups.

7.4. The Budgetary Effects of Price Reform

Government budgets depend on aggregate demand levels whereas household surveys provide quantities on a sample of the population. Aggregates published in national accounts cannot be used in conjunction with the price elasticities estimated from household surveys. That is because household surveys are of a microeconomic nature, while aggregates are macroeconomic (see Theil, 1954 and Deaton and Muellbauer, 1984). Furthermore, aggregate demand levels are not very accurate.

To avoid these difficulties, we construct a measure that does not require the use of aggregate demand levels in the computation of the effects of price changes on government budgets. The budgetary cost of subsidies on N goods is

$$B = \sum_n s_n Q_n \tag{10}$$

where $s_n = p_n^m - p_n^s$ is the level of the subsidy on good n (p_n^m is the market price and p_n^s is the subsidized price) and Q_n is the aggregate demand level of n. If prices are changed, aggregate demand levels vary and the change in Q_n is

$$dQ_n + \sum_j (\delta Q_n / \delta pj) \tag{11}$$

or in terms of elasticities

$$dQ_n + Q_n \Sigma_j e_{nj}(dpj/pj) \tag{11'}$$

where e_{nj} is the cross-price elasticity of demand for n with respect to j. Note that dQ_n incorporates the substitutability effects of the simultaneous change in prices. The effect of the price changes on the budget is then

$$dB/B + \Sigma_n[(s_n Q_n/B)(ds_n/s_n + \Sigma_j e_{nj} dpj/pj)] \tag{12}$$

The relationship in (12) can be computed without observations on the aggregate demand levels (Q_n) of the commodities currently subsidized. The term $s_n Q_n/B$ is the share of commodity n in the subsidies' budget. However, if the question under examination is the budgetary effect of a subsidy on a commodity that is currently not subsidized, it is necessary to estimate the aggregate demand level of the commodity (Q_g) and the level of the subsidy (s_g). Equation (12) becomes

$$dB/B = X + ds_g Q_g/B \tag{12'}$$

where X is the expression in (12) and $ds_g Q_g/B$ is the share of the cost of the subsidy on the new good (j) in the total budget (B).

8. ESTIMATION RESULTS

8.1. The Price and Income Elasticities

The 1984-85 household expenditure survey that we use to estimate price and income elasticities is described in Part I. Descriptive statistics on food consumption patterns are presented in the Appendix. Estimates of the effects of the demographic variables in equations (3) and (4) are also presented in the Appendix. Estimates of the income and quality elasticities are presented in Table 8.1 and show that soft wheat is inferior in the rural sector but not in the urban sector. The opposite phenomenon holds true for hard wheat. The French influence switched consumer preferences from hard wheat to soft wheat and hard wheat is now economically inferior in urban areas. In rural areas, however, a longstanding policy of low soft-wheat prices and high hard-wheat prices induces farmers (in particular, small holders with cash-flow problems) to produce hard wheat as a cash crop and buy soft wheat for consumption. Only large landholders can afford to consume hard wheat. Although not inferior, barley is a necessary good in the rural sector.[6] The quality effects vary between 0 (for homogenous commodities) and 0.15 (for heterogenous commodities).

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[6] Surprisingly, barley appears as a luxury item in urban areas. This could be due to the small number of households in the urban sample that report positive levels of barley consumption. The high income elasticity could be an anomaly of the data and should be interpreted with care.

Table 8.1: Income and Quality Elasticities

| | WHEAT | | | OIL | | SUGAR | |
	soft	hard	barley	vegetable	olive	powder	loaf
QUALITY							
RURAL	.02*	.15*	.13	.10*	.04	.06*	.14*
URBAN	.02*	.06	-.06	.07*	.13*	.04*	-.00
INCOME							
RURAL	-.57*	.32*	.31*	.99*	.29*	1.04*	.84*
URBAN	.15*	-3.48*	2.31*	.73*	1.12*	.82*	.67*

* Statistically significant at least at the 10 percent level.

The own-price elasticities (Tables 8.2 and 8.3) are high for
vegetable oil (in the rural and urban sectors) and sugar powder (in the urban
sector). Price increases for these commodities can result in substantial
savings in government budgets but also in perverse nutritional effects. Hard
wheat and barley are substitutes for soft wheat in the urban sector,
indicating that the nutritional effects of an increase in the price of soft
wheat can be mitigated by an increase in the consumption of hard wheat and
barley in urban areas. In the rural sector, barley is a substitute for soft
wheat but soft wheat and hard wheat are complements. An increase in the price
of soft wheat can result in a decrease in calorie consumption in rural areas,
because barley is nutritionally poor compared with soft wheat and hard
wheat. A unit of barley contains 78 percent of the calories contained in a
unit of soft wheat. The precise nutritional, welfare, and budgetary effects
of various scenarios of price reform are simulated in the next section.

Table 8.2: Matrix of Price Elasticities of Demand: Urban Sector
(t-ratios are in parenthesis)

	Soft Wheat	Hard Wheat	Barley	Vegetable Oil	Olive Oil	Sugar Loaf	Sugar Powder
Soft Wheat	-.694	.009	.039	-.221	.004	-.043	.553
	(23.953)	(.520)	(.794)	(1.899)	(.094)	(.537)	(3.657)
Hard Wheat	-.242	-.528	.468	-2.091	-.620	-1.052	4.141
	(1.425)	(4.775)	(1.547)	(3.012)	(2.266)	(2.195)	(4.552)
Barley	-1.024	-.090	-1.955	1.083	.362	-.310	-.477
	(8.738)	(1.237)	(9.685)	(2.358)	(2.009)	(.981)	(.806)
Vegetable Oil	-.015	-.024	.079	-.972	-.014	.084	-.016
	(1.002)	(2.502)	(2.997)	(15.885)	(.610)	(1.989)	(.211)
Olive Oil	-.562	-.056	-.204	.102	-.965	-.103	-.246
	(10.662)	(1.798)	(2.398)	(.520)	(12.291)	(.765)	(.970)
Sugar Loaf	-.209	-.004	-.123	.199	.181	-.770	-.075
	(9.590)	(.336)	(3.421)	(2.412)	(5.495)	(13.436)	(.705)
Sugar Powder	-.068	.073	.002	.150	.145	-.120	-.966
	(2.367)	(4.278)	(.051)	(1.405)	(3.447)	(1.629)	(7.006)

Table 8.3: Matrix of Price Elasticities of Demand: Rural Sector
(t-ratios are in parenthesis)

	Soft Wheat	Hard Wheat	Barley	Vegetable Oil	Olive Oil	Sugar Loaf	Sugar Powder
Soft Wheat	-.749	-.097	.185	.167	.245	.822	-.078
	(3.093)	(1.551)	(.671)	(.528)	(2.884)	(-2.445)	(.331)
Hard Wheat	-.096	-.346	.001	-.743	-.040	.444	.055
	(.763)	(10.492)	(.010)	(4.475)	(.911)	(2.551)	(.445)
Barley	-.281	-.203	-.358	.069	.151	-.719	.413
	(2.013)	(5.492)	(2.239)	(.379)	(3.106)	(3.679)	(2.925)
Vegetable Oil	-.009	.333	-.070	-1.194	-.083	.157	.058
	(.116)	(15.182)	(.737)	(10.647)	(2.831)	(1.345)	(.708)
Olive Oil	-.409	-.079	.250	-.019	-.467	-.478	.239
	(1.992)	(1.487)	(1.065)	(.074)	(6.511)	(1.687)	(1.200)
Sugar Loaf	-.145	-.200	.055	.310	.107	-.846	-.289
	(1.298)	(6.920)	(.423)	(2.202)	(2.741)	(5.685)	(2.749)
Sugar Powder	.120	.008	.197	-.327	-.049	-.154	-.320
	(.591)	(.152)	(.833)	(1.274)	(.700)	(.560)	(1.656)

8.2. Estimation of the Nutritional, Welfare, and Budgetary Effects of Price Reform in Morocco

The nutritional effects of various price policies are presented in Table 8.4.[7] The table shows that a 50 percent increase in the prices of the three subsidized commodities (scenario 1) provokes a decrease in caloric consumption of around 20 percent in the rural sector and between 7 percent (for the highest income decile) and 12 percent (for the lowest income decile) in the urban sector. Urban households are less affected than rural households because the former react to the price increase in soft wheat by substituting hard wheat (a nutritionally rich commodity), whereas the latter react by substituting barley (a nutritionally poor commodity). A subsidy on barley (scenario 3), however, does not compensate low-income groups in the rural sector. It switches consumption away from soft wheat and toward barley and results in significant nutritional losses.[8]

On the other hand, a subsidy on hard wheat (scenario 3') does compensate low-income groups in the urban sector. If the subsidy on soft wheat is kept and only the prices of vegetable oil and sugar powder are increased (scenario 2) the nutritional effects are much smaller. They range from -4 percent (for the poorest group) to -9 percent for (the richest group)

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[7] The demand equations are specified for seven goods. This does not allow for substitutability with "all other food" and can result in an overestimation of the nutritional effects. The calory contents information is from FAO (1982).

[8] This is in contradiction with the argument of Behrman and King (1987) who contend that the nutritional effects of price increases are negligible on the poor because the latter react to price increases by switching to cheaper but nutritionally rich commodities.

Table 8.4: Nutritional Effects of Various Price Policies: Effects on Caloric Consumption

Income Deciles (lowest to highest)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
RURAL SECTOR										
Scenario 1	-21.3%	-20.9%	-20.6%	-20.5%	-19.4%	-18.4%	-19.3%	-19.4%	-19.8%	-21.6%
Scenario 2	-3.9%	-5.2%	-5.9%	-5.7%	-4.4%	-4.1%	-4.8%	-5.1%	-6.0%	-9.0%
Scenario 3	-1.8%	-1.3%	-8%	-1%	-.7%	+0%	-.6%	-.6%	-.9%	-1.0%
Scenarios 1 & 3 combined	-23.1%	-22.2%	-21.4%	-21.5%	-20.1%	-18.4%	-19.9%	-20.0%	-20.7%	-22.6%
Scenarios 2 & 3 combined	-5.6%	-6.5%	-6.7%	-6.7%	-5.1%	-4.1%	-5.4%	-5.8%	-6.9%	-6.8%
URBAN SECTOR										
Scenario 1	-12.1%	-12.4%	-11.0%	-11.1%	-10.9%	-8.2%	-8.6%	-7.7%	-7.6%	-7.1%
Scenario 2	-4.1%	-3.4%	-4.3%	-4.0%	-5.4%	-6.6%	-5.8%	-6.5%	-6.4%	-6.7%
Scenario 3'	+4.8%	+4.9%	+4.4%	+4.3%	+3.6%	+3.8%	+1.6%	+1.7%	+1.7%	+1.7%
Scenarios 1 & 3' combined	-7.3%	-7.4%	-6.6%	-6.8%	-7.3%	-4.4%	-7.0%	-6.0%	-5.9%	-6.1%
Scenarios 2 & 3' combined	+8.8%	+8.4%	+8.8%	+8.4%	+9.0%	+10.4%	+7.3%	+8.2%	+8.1%	+7.6%

Scenario 1 :   50% increase in prices of all subsidized goods (soft wheat, vegetable oil, sugar powder).
Scenario 2 :   50% increase in prices of vegetable oil and sugar powder (subsidy on soft wheat remains).
Scenario 3 :   50% decrease in price of barley (subsidy on barley).
Scenario 3':   50% decrease in prices of barley and hard wheat (subsidy on barley and hard wheat).

in the rural sector and between -4 percent and -6.7 percent in the urban

sector for the same groups. World Bank estimates (World Bank, 1981) indicate

that average per capita calorie intakes provide close to 100 percent of the

standard requirements in Morocco. However, the estimates reveal nutritional

deficiencies among low-income groups and in rural areas. The situation could

be aggravated if no compensation were made for the calorie losses that the poor would experience if the subsidies were eliminated.

As for welfare, Table 8.5 shows that raising prices affects real income of the poor more severely than real income of the rich. Rural households need to be compensated by 7.4 percent (for the poorest 10%) to 1.9 percent (for the richest 10%) of real income if the prices of the three subsidized commodities are increased by 50 percent (scenario 1). In the urban sector, the compensation varies between 6.4 percent and 1.5 percent. Subsidies on barley in the rural sector (scenario 3) and on hard wheat and barley in the urban sector (scenario 3') mitigate these effects. They almost fully compensate all income groups for the welfare losses if the price of soft wheat is not changed while the prices of vegetable oil and sugar powder are increased (scenarios 2 and 3-3' combined).

With respect to budget, increasing by 50 percent the prices of the three subsidized commodities (scenario 1) is tantamount to eliminating the subsidies: the budget decreases by 100 percent. The results of Table 8.5 can also illustrate the leakage of the current subsidy system. Elimination of the subsidies (scenario 1) results in welfare losses higher for the poor than for the rich in relative terms: -7.4 percent versus -1.9% in the rural sector, and -6.4 percent versus -1.5 percent in the urban sector for the 10 percent richest and the 10 percent poorest, respectively. But in absolute terms, these percentages mean losses of DH 746 and DH 181 in the rural sector and DH 1053 and DH 285 in the urban sector for the 10 percent richest and the 10 percent poorest, respectively. The rich see their real income decrease by an

Table 8.5:   Real Income Effects of Various Price Policies

Income Deciles (lowest to highest)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
RURAL SECTOR										
Average per household total expenditures*	2456	4603	6256	7795	9355	11,115	13,409	16,342	20,818	39,2675
Scenario 1	-7.4%	-5.3%	-4.2%	-3.9%	-3.9%	-3.15%	-2.5%	-2.7%	-2.3%	-1.9%
Scenario 2	-2.7%	-2.8%	-2.9%	-2.6%	2.6%	-2.2%	-1.5%	-1.5%	-1.4%	-.5%
Scenario 3	+1.9%	+2.2%	+2.3%	+2.8%	+2.8%	+2.2%	+1.9%	+1.8%	+1.4%	+.5%
Scenario 1 & 3 combined	-5.5%	-3.1%	-1.9%	-1.6%	-1.6%	-.9%	-.6%	-.9%	-.9%	-.5%
Scenario 2 & 3 combined	-.8%	-.6%	-.6%	-.3%	-.3%	-0%	+.3%	+.3%	-0%	-0%
URBAN SECTOR										
Average per household total expenditures*	4462	7831	10,363	12,995	15,780	19,099	23,318	28,679	37,666	70,235
Scenario 1	-6.4%	-4.7%	-4%	-3.7%	-3.1%	-2.9%	-2.8%	-2.4%	-2.2%	-1.5%
Scenario 2	-2.7%	-2.5%	-2.4%	-2.4%	-1.8%	-1.7%	-1.6%	-1.3%	-1.2%	-.7%
Scenario 3'	+1.3%	+1.1%	+1.3%	+1.1%	+.8%	+1.0%	+.7%	+.4%	+.6%	+.3%
Scenario 1 & 3' combined	-5.1%	-3.6%	-2.6%	-2.9%	-2.3%	-1.9%	-2.1%	-2.0%	-1.6%	-1.2%
Scenario 2 & 3' combined	-1.3%	-1.4%	-1.1%	-1.3%	-1.0%	-7.1%	-.9%	-.9%	-.6%	-.4%

*   : in Dirhams per year.
Scenario 1 :   50% increase in prices of all subsidized goods (soft wheat, vegetable oil, sugar powder).
Scenario 2 :   50% increase in prices of vegetable oil and sugar powder (subsidy on soft wheat remains).
Scenario 3 :   50% decrease in price of barley (subsidy on barley).
Scenario 3': 50% decrease in price of barley and hard wheat (subsidies on barley and hard wheat).

amount four times higher than that of the poor, although in relative terms the latter are affected more than the former.

If the subsidy on soft wheat remains while the prices of vegetable oil and sugar powder are increased by 50 percent the budget is reduced by 35 percent (scenario 2).9/ This indicates that a total removal of current subsidies combined with a new subsidy on a blend of barley and hard-wheat flour (scenarios 1 and 3-3' combined) can result in a substantial saving to the government. The saving would amount to at least 35 percent because the poor consume hard wheat and barley more than soft wheat. A subsidy on a blend of hard wheat and barley must thus be cheaper than a subsidy on soft wheat.

9/ This is a realistic scenario and could be tantamount to the total elimination of the subsidies. Black market prices are widespread in the soft-wheat market (Laraki, 1988). If the subsidy on soft wheat is lifted, consumers might not notice the change if the resulting soft-wheat market price does not exceed current black market prices. When combined with subsidies on barley and/or hard wheat the scenario has negligible effects on the welfare and nutritional status of the poor.

9. CONCLUSIONS

This study illustrates a crucial dilemma inherent in non-targeted food subsidy programs. The benefits of these programs leak extensively to high-income households because inferior goods are seldom subsidized. This raises the cost of the programs. At the same time, low-income households tend to spend a higher proportion of their income on food than do high-income households. Any food price increases provoke negative welfare effects and substantial nutritional losses for poor households. This pattern accords with the findings for Sri Lanka, Uganda, Brazil, Colombia and Mexico, as reported in Pinstrup-Andersen (1988).

Simulations of various price policy reforms reveal that in the case of Morocco, low-income households can be partially compensated for the negative effects of price increases (on welfare grounds but not on nutritional grounds in the rural sector) by subsidies on barley (in the rural sector) and hard wheat (in the urban sector). However, the two sectors are not totally isolated from one another. Because hard wheat is a luxury item in the rural sector, a subsidy on the commodity in urban areas can benefit high-income groups in rural areas. To avoid this problem it might be more appropriate to subsidize a flour (but not the grain) composed of hard wheat, barley and any other grains giving the flour a dark color (dark baked products are inferior in Morocco). A marketing study could determine the feasibility of this solution. Import prices of grain and vegetable oil are now low. The time is ripe to move toward removal of current subsidies and development of a low-priced "inferior" flour. This would decrease the cost of the subsidies without hurting the poor.

The Moroccan government is seriously considering a subsidy on barley. Morocco has accumulated large stocks of barley during the last few years, especially in 1987-88, an exceptionally good year for the climate and for Moroccan agriculture. To help barley producers, who are generally small farmers, located in poor regions, the government has been bearing the storage costs of the surplus barley. It would be highly beneficial to the government, to consumers, and barley producers (who are poor farmers) to sell the surplus barley for consumption. The Ministry of Economic Affairs estimates that a barley flour could be sold at a price 25 percent lower than that of soft-wheat flour, at no cost to the government.

True, barley is nutritionally poorer than soft wheat. But, if a barley flour is cheap enough, consumers would determine the appropriate mix between soft-wheat flour (an expensive good) and barley flour (a cheap good).[10]

I have ignored the income effects that might result from price increases in the rural sector (see Singh, Squire, and Strauss, 1986). Because of the lack of data it is not possible to use a household production model to estimate the supply responses of farmers to food price increases. The effects of the price increases estimated in this paper could be reduced if the supply elasticities of Moroccan farmers were sufficiently high to increase the marketed surplus and consequently improve the real income of rural

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[10] It must be noted that barley is also used in livestock feed. The livestock industry could benefit from a subsidy on barley. However, barley cannot be used in high proportions in livestock feed because it contains acids that are harmful to the animals.

households. As Singh, Squire, and Strauss (1986) demonstrate, the magnitude of the bias that results from ignoring the production side of rural households is country specific. It depends, in part, on the supply elasticity of agricultural products.

Finally, Deaton's (1988) methodology shows that price elasticities can be obtained from budget surveys, which are the only source of reliable and detailed data for most developing countries. The price elasticities in combination with the welfare and nutritional indices presented in this paper can be applied in welfare analyses of situations relevant to various economies where tax and price policy reforms are under way.

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APPENDIX

TABLE A1: Food Budget Shares For Various Commodities

Income Deciles (lowest to highest)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
RURAL SECTOR										
Soft Wheat	.17	.08	.04	.04	.04	.03	.03	.04	.03	.04
Hard Wheat	.05	.05	.05	.04	.05	.06	.06	.07	.08	.10
Barley	.07	.07	.07	.07	.07	.07	.06	.06	.05	.04
Vegetable Oil	.07	.07	.07	.06	.06	.05	.04	.04	.04	.03
Olive Oil	.03	.03	.04	.04	.05	.05	.05	.05	.05	.04
Sugar Loaf	.09	.09	.09	.08	.08	.08	.07	.07	.07	.06
Sugar Powder	.03	.02	.02	.02	.02	.02	.01	.01	.01	.01
Share of Food Budget in Total Expenditures	.55	.63	.65	.65	.65	.63	.62	.61	.58	.48
URBAN SECTOR										
Soft Wheat	.14	.08	.06	.06	.05	.05	.05	.05	.05	.05
Hard Wheat	.03	.02	.03	.02	.02	.03	.02	.02	.02	.02
Barley	.02	.02	.02	.02	.01	.01	.01	.00	.01	.00
Vegetable Oil	.07	.06	.06	.06	.05	.05	.05	.04	.04	.03
Olive Oil	.02	.02	.02	.02	.02	.02	.02	.02	.02	.02
Sugar Loaf	.06	.05	.05	.04	.04	.04	.03	.03	.02	.02
Sugar Powder	.03	.03	.03	.03	.02	.02	.02	.02	.02	.02
Share of Food Budget in Total Expenditures	.54	.55	.53	.53	.52	.48	.47	.44	.41	.30

Table A2: Estimates of the Demographic Variables in the Share Equations: Rural Sector
(t-ratios are in parenthesis)

Males	Soft Wheat	Hard Wheat	Barley	Vegetable Oil	Olive Oil	Sugar Loaf	Sugar Powder
0-5	-.008	-.002	-.020	.023	-.013	-.011	.002
	(-.353)	(-.096)	(-.779)	(2.816)	(-.650)	(-1.145	(.325)
6-11	-.022	-.034	-.023	.012	.017	.007	-.001
	(-.852)	(-1.449)	(-.804)	(1.373)	(.793)	(.700)	(-.208)
12-17	-.018	.001	-.024	.021	.006	.006	.007
	(-.679)	(.045)	(-.801)	(2.243)	(.256)	(.566)	(1.041)
18-34	.037	-.003	-.020	.007	-.011	-.024	.002
	(1.675)	(-.177)	(-.874)	(1.036)	(-.605)	(-2.644)	(.471)
35-54	.066	.012	-.175	-.002	.004	-.021	.016
	(2.486)	(.557)	(-.618)	(-.239)	(.226)	(-2.000)	(2.470)
55-64	.064	.024	.043	-.020	.002	-.022	.001
	(2.202)	(.958)	(1.398)	(-2.143)	(.099)	(-1.878)	(.210)
65+	.042	.011	.022	-.009	-.048	-.013	.001
	(1.705)	(.505)	(.805)	(-1.119)	(-2.331)	(-1.273)	(.251)
Females							
0-5	.033	.021	-.029	.012	-.001	-.005	.007
	(1.368)	(-.986)	(-1.058)	(1.525)	(-.085)	(-.492)	(1.161)
6-11	-.016	.012	-.006	.027	-.015	-.001	.012
	(-.635)	(.517)	(-.219)	(3.013)	(-.713)	(-.105)	(1.718)
12-17	.013	-.040	.036	.026	-.017	-.005	.007
	(.513)	(-1.652)	(1.230)	(2.829)	(-.743)	(-.443)	(.955)
18-34	.049	.017	.016	.010	-.026	-.012	-.004
	(2.233)	(.872)	(.674)	(1.347)	(-1.359)	(-1.273)	(-.789)
35-54	.034	.025	-.008	-.000	-.029	.000	-.014
	(1.557)	(1.214)	(.339)	(-.057)	(-1.457)	(.018)	(-2.317)
55-64	.013	-.003	.015	-.005	-.007	.006	-.002
	(.608)	(-.016)	(.664)	(-.778)	(-.393)	(.722)	(-.448)
Log of Household Size	-.019	-.002	.001	-.011	-.040	-.055	-.004
	(-3.849)	(-.583)	(.274)	(-6.597)	(-9.503)	(-2.480)	(-3.281)

Notes: Each age group variable is defined as the ratio of the number of members in the age
group to total household size.

Table A3: Estimates of the Demographic Variables in the Unit Value Equations: Rural Sector
(t-ratios are in parenthesis)

Males	Soft Wheat	Hard Wheat	Barley	Vegetable Oil	Olive Oil	Sugar Loaf	Sugar Powder
0-5	.060	.598	-.005	-.006	.004	.488	.004
	(.691)	(.610)	(-.006)	(-.052)	(.094)	(3.067)	(.016)
6-11	.022	.971	.081	.239	-.620	.692	-.292
	(.247)	(.927)	(.084)	(1.801)	(2.266)	(4.021)	(-1.000)
12-17	.054	.411	-.726	.004	.362	.623	-.354
	(.577)	(-.377)	(-.741)	(.031)	(2.009)	(3.378)	(-1.173)
18-34	-.003	.003	.277	.084	-.014	.288	.329
	(-.035)	(.003)	(.307)	(.747)	(.610)	(1.972)	(1.363)
35-54	-.031	.094	-.779	.124	-.965	.209	.593
	(-.323)	(.084)	(-.797)	(.934)	(12.291)	(1.247)	(2.151)
55-64	.014	.444	-.699	.026	.181	.106	.122
	(.135)	(.348)	(-.584)	(-.180)	(5.495)	(.564)	(.394)
65+	.045	-.110	-.000	-.013	.145	.224	.250
	(.423)	(-.101)	(-.000)	(-.102)	(3.447)	(1.376)	(.850)
Females							
0-5	.021	.494	-.167	.095	.004	.436	.194
	(.250)	(.503)	(-.180)	(.765)	(.094)	(2.678)	(.737)
6-11	.006	.594	.747	-.081	-.620	.420	-.197
	(.076)	(.554)	(.761)	(-.612)	(2.266)	(2.431)	(-.692)
12-17	-.119	-1.283	.646	-.015	.362	.294	-.247
	(-1.290)	(-1.146)	(.673)	(-.111)	(2.009)	(1.639)	(-.862)
18-34	-.051	-.059	-.952	-.307	-.014	-.034	-.546
	(-.626)	(-.063)	(-1.098)	(-2.689)	(.610)	(-.235)	(-2.295)
35-54	.002	.224	-1.075	-.193	-.965	.046	-.405
	(.032)	(.233)	(-1.170)	(-1.624)	(12.291)	(.310)	(1.530)
55-64	.043	-.121	-.390	.000	.181	.191	-.312
	(.499)	(-.116)	(-.468)	(.003)	(5.495)	(.703)	(-1.211)
Log of House-hold Size	.019	.210	-.233	-.033	-.028	-.212	.068
	(1.267)	(1.244)	(-1.386)	(-1.312)	(-.707)	(-6.513)	(1.153)

Notes: Each age group variable is defined as the ratio of the number of members in the age group to total household size.

Table A4: **Estimates of the Demographic Variables in the Share Equations: Urban Sector**
(t-ratios are in parenthesis)

Males	Soft Wheat	Hard Wheat	Barley	Vegetable Oil	Olive Oil	Sugar Loaf	Sugar Powder
0-5	-.000	-.044	-.009	.006	.001	-.031	-.013
	(-.013)	(-.738)	(-1.016)	(.879)	(.125)	(-4.074	(-2.519)
6-11	.011	-.057	-.005	.010	.001	-.032	-.010
	(.632)	(-.928)	(-.552)	(1.251)	(.093)	(-3.958)	(-1.805)
12-17	.360	-.019	-.009	.003	-.014	-.031	-.001
	(1.963)	(-.308)	(-1.006)	(.452)	(-1.166)	(-3.695)	(-.319)
18-34	.398	.016	-.021	.000	-.005	-.040	-.013
	(3.018)	(.305)	(-3.045)	(-.001)	(-.616)	(-6.418)	(-3.270)
35-54	.061	.071	-.028	-.010	-.003	-.033	-.012
	(4.000)	(1.203)	(-3.460)	(-1.400)	(-.289)	(-4.574)	(-2.499)
55-64	.059	.095	.017	-.010	.000	-.011	-.014
	(3.306)	(1.397)	(-1.831)	(-1.177)	(.001)	(-1.371)	(-2.590)
65+	.029	-.037	-.005	-.008	.011	-.013	-.008
	(1.571)	(-.506)	(-.576)	(-.927)	(.944)	(-1.557)	(-1.443)
Females							
0-5	.008	-.026	-.010	.009	-.000	-.036	-.012
	(.510)	(-.432)	(-1.188)	(1.214)	(-.062)	(-4.655)	(-2.438)
6-11	.002	.007	-.014	.008	.000	-.016	-.018
	(.138)	(.126)	(-1.500)	(.957)	(.008)	(-1.972)	(-3.334)
12-17	.037	-.034	-.026	.008	-.000	-.037	-.008
	(2.065)	(-.557)	(-2.760)	(1.022)	(-.018)	(-4.491)	(-1.445)
18-34	-.000	-.003	-.023	.001	-.014	-.032	-.018
	(-.032)	(-.072)	(-3.070)	(.168)	(-1.521)	(-5.026)	(-4.284)
35-54	-.014	-.021	-.014	.021	-.004	-.020	-.013
	(.995)	(-.037)	(-1.929)	(3.045)	(-.433)	(-3.021)	(-3.003)
55-64	.002	-.075	-.007	.015	-.001	-.020	-.011
	(.138)	(-1.290)	(-.934)	(-2.109)	(-.144)	(-2.921)	(-2.509)
Log of House-hold Size	-.045	-.056	.006	-.007	-.000	-.000	-.005
	(-14.607)	(-5.528)	(3.881)	(-5.561)	(-.048)	(-.148)	(-5.456)

Notes: Each age group variable is defined as the ratio of the number of members in the age group to total household size.

Table A5: Estimates of the Demographic Variables in the Unit Value Equations:
Urban Sector
(t-ratios are in parenthesis)

Males	Soft Wheat	Hard Wheat	Barley	Vegetable Oil	Olive Oil	Sugar Loaf	Sugar Powder
0-5	.175 (1.776)	-.848 (-1.587)	-.147 (-.360)	-.071 (-2.405)	.436 (.940)	.273 (2.376)	.114 (1.131)
6-11	.083 (.789)	-.194 (-.355)	-.482 (-1.130)	.094 (.585)	.008 (.017)	.028 (.228)	.065 (.582)
12-17	-.036 (-.333)	-.780 (-1.407)	.130 (.282)	.167 (1.012)	.795 (1.529)	.144 (1.173)	.175 (1.504)
18-34	.112 (1.411)	-.492 (-1.031)	.063 (.188)	.131 (.987)	.402 (1.013)	.094 (.977)	.051 (.595)
35-54	.060 (.653)	.078 (.150)	.126 (.303)	-.053 (-.339)	.139 (.313)	.073 (.664)	-.044 (-.449)
55-64	.025 (.233)	-.921 (-1.531)	.255 (.534)	.234 (1.299)	.549 (1.127)	.014 (.121)	.004 (.039)
65+	.038 (.341)	-.813 (-1.258)	-.150 (-.331)	.111 (.597)	.421 (.777)	.015 (.116)	-.105 (-.892)
Females							
0-5	.124 (1.247)	-.194 (-.367)	.250 (.631)	.352 (2.308)	.216 (.470)	.421 (3.636)	.167 (1.595)
6-11	.039 (.374)	-.472 (-.878)	.012 (.029)	.120 (.750)	.009 (.019)	.183 (1.537)	.028 (.247)
12-17	.045 (.426)	-.293 (-.544)	.011 (.026)	.078 (.485)	.153 (.305)	.175 (1.414)	-.026 (-.239)
18-34	-.087 (-1.044)	-.737 (-1.567)	-.122 (-.363)	.050 (.367)	-.223 (-.550)	.005 (.053)	.031 (.356)
35-54	-.067 (-.781)	-.628 (-1.264)	-.255 (-.732)	.100 (.712)	-.135 (-.320)	-.002 (-.020)	-.084 (-.910)
55-64	.039 (.447)	-.418 (-.811)	-.147 (-.441)	-.058 (-.395)	.157 (.354)	-.074 (-.726)	.005 (.053)
Log of House hold Size	-.207 (-11.333)	-.167 (-1.853)	-.151 (-1.831)	-.205 (-7.213)	-.141 (-1.570)	-.113 (4.874)	-.111 (-5.629)

Notes:Each age group variable is defined as the ratio of the number of members in the
age group to total household size.

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