ON THE EFFECT OF SUBSIDIES TO BASIC COMMODITIES ON INEQUALITY IN EGYPT

by

Shlomo Yitzhaki

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Abstract

An analysis of the distributional impact of changes in subsidies to basic food commodities in Egypt is carried out. The main conclusions are the following:

(a) A reduction in subsidies to commodities that are distributed through cooperative stores can improve the performance of the system. This conclusion is not affected by choice of the welfare function that represents the preferences of the decision makers.

(b) Subsidies to commodities in the open market are not less important than subsidies to rationed commodities.
A recent study of The World Bank (1986) states: "Egypt probably has the lowest level of malnutrition among countries with comparable levels of per capita income. Egypt in effect is a vast welfare state which provides the bulk of its people cheap food, cheap oil, and, for those living in rent-controlled housing, cheap though insufficient shelter." (Report No. 6195-EGT, p-80)

There is no doubt that this is an important achievement. However, recent decline in the growth of the Egyptian economy caused by, among other things, the decline of the price of oil, remittances from abroad, and revenues from the Suez Canal and tourism have created a large deficit both in the budget and the balance of payments. These developments will eventually force the government to cut spending, and it seems reasonable to assume that a cut in food subsidies would be considered as a part of the government policy.

The challenge before the Egyptian government is to identify and to eliminate "redundant" subsidies: i.e. subsidies that do not improve the welfare of the poorest members of the society. By better targeting the subsidies to low income groups, a reduction in the deficit can be achieved without affecting the redistributional objectives of the existing policy.

The aim of this paper is to analyze the distributional impact of several subsidies to basic food items. Our aim is to rank subsidies according to their effectiveness in achieving the goal of decreasing poverty. The interest is in the effectiveness of the last dollar spent on the subsidy. Especially, our aim is to answer the following question: assume that one subsidy must be reduced by one Egyptian pounds, which alternative would have the smallest effect on the economic welfare of the low income groups in Egypt. By ordering the subsidies according to their effect on the economic
the low income group, we will be able to point out the desirable change in subsidies. Note, though, that distributional effects are not the only consideration governing the imposition of subsidies. Other issues, such as the deadweight loss introduced by the subsidies, the effect on the production side of the economy, and the administrative costs, play an important role too. However, a quantitative measure of the distributional effect is an important factor in any evaluation of the system.

In order to obtain quantitative results we have to define what we mean by economic welfare and the distributional effect of subsidies. In this paper, economic welfare is measured by income per capita (actually, by expenditure per capita) and the distributional effects are measured by the expected change in the Gini coefficient. The sensitivity of the ordering of the subsidies is examined by using the Extended Gini Coefficient, an index which enables us to stress low income groups.

Data limitations restrict our analysis to six commodities: sugar, cooking oil, tea, rice, lentils and beans. However, since each commodity is distributed by three channels, ration cards, cooperative stores and the open market \(^1\), we are actually dealing with 18 commodities. One major issue that we address is whether the use of rationed commodities and cooperatives improves the income distribution more than a regular subsidy to an open market commodity.

The methodology used in the paper is identical to the one presented in Yitzhaki (1987) which analyses the role of subsidies to basic food commodities in Israel. However, the implementation of the technique to Egypt raises a new methodological issue which seems to be relevant to other developing countries too. Several investigators have reported and discussed
the 'urban bias' in developing countries. For our purposes it is sufficient to say that investigators have found that the revealed preference of governments in developing countries is to favor the urban sector. If one accepts this bias, that is if one wants to analyze the distributional impact as viewed by the government, then this bias must be taken into account in defining the target population. Alternatively, one can take the position that the urban bias is unjustified and therefore defines the target population as the whole economy. This means that the investigator imposes his own views on the analysis, and his recommendations reflect his personal views. One can only hope that the urban bias does not figure prominently in the results, in which case one need not to decide whether to view himself as a 'positive economist' who considers the preference of the government as datum and hence includes the urban bias in the analysis or as a 'welfare economists' who performs an exercise in welfare economics, and treats all households as anonymous. Unfortunately, choice of target population does turn out to matter. In particular, when analyzing some of the subsidies the recommendation is to increase the subsidy (when concentrating on the urban population), while when looking at all of Egypt the conclusion is that the subsidy is inefficient and therefore should be reduced. In order not to impose our view with regard to the urban bias on the analysis, we first carry out the analysis for all Egypt, and later we perform a similar analysis on the urban and the rural sectors separately. Hence, readers can interpret the results according to their views.

The main findings of the paper are:

a. The most important channel of distribution, from an economic welfare point of view is the open market. The second important channel is the ration
card system, while the least important is the cooperative system. A cut of one dollar from the subsidy on cooperative store commodities accompanied by an increase of 31 cents on the subsidy to open market commodities would leave inequality (as measured by the Gini index) unaffected, while at the same time decrease the budget deficit by 69 cents. A cut of one dollar from the subsidy on rationed food accompanied by an increase in the subsidy to open market commodities of 91 cents will keep inequality intact.

b. Some conclusions are sensitive to the weight attached to the welfare of low income groups. The higher the weight given to the welfare of low income groups, the less important is the distributional impact of the subsidies to open market commodities and the more important is the distributional impact of the rationing system. However, the conclusion with regard to ineffectiveness of the cooperative system continues to hold for all possible weights that were attached to the welfare of low income groups.

c. The above conclusions are caused mainly by rural/urban differences. Hence, a policy maker who favors the urban population may reach different conclusions.

d. As to specific commodities, lentils and sugar in the open market are inferior goods. This means that the absolute amount spent on these commodities is declining as income rises. Hence these are the most important commodities for redistribution via subsidies. Tea in cooperatives has an elasticity which is greater than one which means that reducing a subsidy or alternatively imposing a tax reduces inequality.
The structure of the paper is the following: the next section provides a summary of the methodology, while the third section provides the main results. The fourth section is devoted to sensitivity analysis, while the fifth section deals with regional differences.

II. Decomposition of the Gini Coefficient

In this section we rely heavily on the decomposition of the Gini coefficient as presented in Lerman and Yitzhaki (1985) and in Stark, Taylor and Yitzhaki (1986) and the interpretation given to these decompositions in Yitzhaki (1987). Readers who are familiar with these papers can skip this section. Let \( y \) denote total family expenditure while \( x_i \) (\( i=1, \ldots, n \)) represent an expenditure item such as food, clothing etc. Assume that we have a cross-section sample so that these variables can be found for each family, then the extended Gini coefficient of total expenditure can be calculated using the following formula.

\[
G_y(v) = -\frac{v \text{ Cov}(y, [1 - F_y(y)]^{v-1})}{m_y}
\]

where \( G_y \) is the Gini coefficient of total expenditure, \( m_y \) represents mean expenditure, \( F_y(y) \) is the cumulative distribution of \( y \) and \( v>1 \) is a constant which represents inequality aversion. (For derivation of this formula and a geometrical interpretation, see Lerman and Yitzhaki (1984). The properties of the extended Gini coefficient are described in Yitzhaki (1983)).

The role of \( v \) can be seen by concentrating on the following cases:

a: If \( v=1 \), then the extended Gini represents indifference to inequality.
b: As $v \to \infty$ then the extended Gini approaches the attitude toward inequality represented by the Rawlsian criteria, that is it represents the attitude toward inequality of someone who is interested in maximizing the welfare of the poorest in the society.

c: If $v = 2$, then the extended Gini reduces to the standard Gini coefficient; which can be written as

\[(2) \quad G_y = \frac{2 \text{ cov}(y, F_y(y))}{m_y}\]

It can be shown that the difference among members of the extended Gini family is the weight which is attached to different segments of the income distribution. In this sense all members are similar in their properties. In order to simplify the presentation, the $v$ parameter is omitted from the rest of this section.

Utilizing the properties of the covariance, multiplying and dividing by $m_x$ and $\text{cov}(x_i, F_i(x_i))$ yields a decomposition of the overall Gini into:

\[(3) \quad G_y = \sum_i S_i R_i G_i\]

where $G_i$ is the Gini coefficient of income component $i$

$S_i$ is the share of income component $i$ in total income.

$R_i$ is the (Gini) correlation between income component $i$ and total income. $R_i = \frac{\text{cov}(x_i, F_y(y))}{\text{cov}(x_i, F_i(x_i))}$

The statistical and large sample properties of the term $R_i$ are discussed in Schechtman and Yitzhaki (1987). For our purposes it is sufficient to mention the following properties:

a: $R_i$ is equal 1 (-1) if $x_i$ is an increasing (decreasing) monotonic transformation of $y$. 
b: $R_i$ is equal zero if (in general) $x_i$ and $y$ are independent, or if $x_i$ is a constant.

c: If $x_i$ and $y$ are normally distributed variables then $R_i$ is equal to Pearson's correlation coefficient.  

As can be seen from the properties mentioned above, the properties of $R_i$ are a mixture of Pearson's and Spearman's correlation coefficient.

Equation (3) states that the contribution of each component to overall inequality depends on three parameters, the share of the component in total income, the Gini coefficient of the component and the Gini correlation of the component with total expenditure.$^{10}$

Our interest is in finding out the effect of small changes in expenditure components on overall inequality. For this purpose let me assume that expenditure component $i$ is multiplied by $(1+ \varepsilon)$ where $\varepsilon$ can be interpreted as a change in a tax or in a subsidy. Then we can write

$$x_i(\varepsilon) = (1+\varepsilon) x_i$$

and the overall Gini will be a function of $\varepsilon$.

Then one can show (see Stark, Taylor and Yitzhaki (1986)): $^{11}$

$$\lim_{\varepsilon \to 0} G_y(\varepsilon) = S_i R_i G_i - S_i G_y$$

and by measuring the change in relative terms:

$$\left( \frac{\partial G_y}{\partial \varepsilon} \right) / G_y = S_i R_i G_i / G_y - S_i$$

Equation (4) states that the percentage change in the overall Gini caused by a small change in the subsidy (tax) on expenditure component $i$ is
equal to the contribution of the component to overall inequality minus the contribution to overall income.

Equation (4) enables us to compare the effect on inequality of subsidies (taxes) with equal percentage rates that are imposed on different income sources. However, a fair comparison between subsidies should take into account the effect on the budget of the government. Hence, we may be interested in the effect of a dollar spent on (collected from) income source \( i \). Since the effect on the budget is a linear function of the tax base all we have to do is to divide equation (4) by the tax base, \( S_i \). That is the effect on inequality of a dollar collected from source \( i \) is:

\[
(5) \quad \left[ \frac{\partial G}{\partial \varepsilon} / G_y \right] S_i = \frac{R_i G_i}{G_y} - 1
\]

and a tax on income source \( i \) is progressive or regressive depending on whether the first component on the right hand side of equation (5) is higher or lower than one. As we show later this term can be interpreted as the income elasticity of income source \( i \).

Note that the derivatives are calculated at the point where the consumer is at equilibrium. At this point the Hicksian demand curve is the same as the Marshallian demand curve. So that for this case it does not matter whether we are looking at the Hicksian demand function (in order to compensate the individual so he will be at the same utility level) or whether a Slutsky compensation is proposed. 1/

Rewriting equation (5) in terms of covariances we get:

\[
(6) \quad \left[ \frac{\partial G}{\partial \varepsilon} / S_i G_y \right] = b_i m_y / m_i - 1
\]

where \( m_i \) is the mean of \( x_i \) and

\[
(7) \quad b_i = \frac{\text{cov}(x_i, F_y(y))}{\text{cov}(y, F_y(y))}.
\]
The term $b$ is the key variable in equation (7). Some of its properties are presented in Yitzhaki and Olkin (1987), where it is referred to as the Gini regression coefficient. The rest of this section is devoted to several alternative interpretations of $b$.

Let us start with a geometric interpretation of $b$. Consider a population which is ordered according to income and assume that the population is positioned uniformly along the horizontal axis. The height at each person's space is represented by his income and by his expenditure on the $i_{th}$ commodity. Then $b_i$ is the ratio of the slopes of the two regression lines. The numerator is the (average) increase in expenditure for an increase in the rank, while the denominator is the increase in income for an increase in rank. That is $b_i$ represents the marginal propensity to spend.

Alternatively, $b_i$ can be interpreted as a weighted average of the marginal propensity to spend. That is:

\[(8) \quad b_i = \int W(F(y)) X'_i(y) \, dy \]

where $X'_i(y)$ is the marginal propensity to spend on commodity $i$ and

\[(9) \quad W(F(y)) = \frac{F(y) (1-F(y))}{\int_0^\infty F_y(z) (1-F_y(z)) \, dz} \]

Equation (9) shows that the highest weight is given to the median individual, and that the weights are symmetric in the individual's rank in the population. For example the weight given to the second quantile is equal to the weight attached to the ninth quantile. \[8/\]
A third way of interpreting $b_i$ is based on nonparametric estimation of a regression coefficient, as developed by Sievers (1978). Consider the following linear model

$$x = a + \beta y + e$$

and assume that the errors are independent with zero mean and a finite variance. However, the distribution of the error term is unknown. Sievers suggests and investigates large sample properties of the following estimator of $\beta$:

$$b = \sum_i \sum_j |y_i - y_j| \frac{|(x_i - x_j) / (y_i - y_j)|}{\sigma^2}$$

The estimator of $\beta$ is the sum of all possible slopes calculated for any pair of $(x_i, y_i)$ weighted by the distance between them. As shown in Stark, Taylor and Yitzhaki (1986), this is the discrete version of (9) for the standard Gini. Therefore we can view $b$ as a nonparametric estimator of the marginal propensity to consume. It is worthwhile to note that there is a major difference between the various interpretations of the coefficient. However, these differences matter only if we try to statistically test the significance of the estimates, a subject which is beyond the scope of this paper. Having interpreted $b_i$ as a weighted sum of the marginal propensity to spend, the interpretation of the rest of equation (6) is straightforward. The first term on the right hand side of equation (6) is the marginal propensity to spend on commodity $i$ divided by the average propensity to spend --that is the income elasticity of commodity $i$. Therefore, the progressivity (regressivity) of a change in the tax on commodity $i$ depends on whether this
elasticity is greater or lower than one. In this sense, the methodology suggested in this section offers an operational meaning to the textbook approach to the distributional impact of subsidies. Note, however, that each extended Gini offers a different weighting scheme for constructing the income elasticities.

III. Distributional effect of subsidies in Egypt

Our aim in this section is to analyze the distributional effect of a small change in subsidies for six basic food items: sugar, cooking oil, tea, rice, beans and lentils.  The data set is composed of two surveys, one on the rural population (1389 observations) and the other on the urban population (980 observations), conducted by the International Food Policy Research Institute (IFPRI). The rural survey was conducted between December 1981 and March 1982, while the urban survey was conducted between April and June 1982. By weighting the sample according to the weights of the rural and urban population, a representative sample of the whole population is generated.

In order to take into account the household's size, the households are ranked according to income per capita. Each commodity is distributed through three channels, by ration cards, through cooperative stores and the open market. Home produced commodities are not taken into account, since a subsidy does not affect them. Hence we have to look at eighteen commodities, three for each commodity, according to the distributing channel.

Table 1 presents the distributional impact of a small change in the price of all six commodities that are distributed by the same channel. The first column presents the share of households' expenditure, and it can be seen that around 4 percent of income is spent on open markets commodities, and
about .5 percent on cooperative commodities. The second column presents the Gini correlation (hereafter corr-Gini). It is interesting to note that the open market has the lowest correlation with per capita income, while the expenditures on cooperative commodities reflects the highest correlation. In the third column the Gini of each type of expenditure is presented. The reason that these Ginis are relatively high is that they include households with zero purchases. Column 4 lists $P_i$, the proportion of individuals with positive expenditure, while column 5 presents the Gini among those with non-zero expenditure. As can be seen, 92 percent of all individuals used the rationed system, 41 percent used the cooperative system and 84 percent purchased in the open market. This indicates both that the rationing system reached almost all the population and, at the same time, that most of the population did not rely on the rationing system as their only source. The sixth column presents estimates of the income elasticities. The term income elasticity should be regarded with caution, as it does not represent, at least in the case of rationed commodities, a behavioral response. It represents the (average) marginal change in expenditure, relative to share of expenditure. Hence like every term in this paper, it should be viewed as the (Gini) income elasticity. The income elasticity of open market expenditure is .1 lower than the income elasticity of rationed commodities (.18). The income elasticity of cooperative commodities is the highest (.71). This outcome is a resultant of the low correlation of open market expenditures with income per capita. The last column, represents the effect of a one dollar increase in subsidies on the Gini index of per capita real income. The surprising results is that open market purchases are the most important. The ratio of these derivatives, yields the magnitude of changes in subsidies that will keep inequality
intact. A dollar increase in subsidies to open market expenditures, accompanied by a reduction of 3.18 dollars to cooperative commodities, keeps inequality intact, while at the same time saves 2.18 dollars in subsidies. Income inequality does not change if, alternatively, the one dollar increase in subsidies to open market expenditure is accompanied by 1.12 dollars worth of a reduction in subsidies to rationed food. These results, which portray the open market as the most important channel for redistribution, and the cooperative system as the least efficient are a bit surprising. Hence it is worthwhile to look more closely at the specific commodities to see whether these results are caused by one commodity.

Tables 2, 3, and 4 present the same decomposition for rationed commodities, cooperative commodities, and open market commodities, respectively. The decomposition in these tables is a direct decomposition of the expenditures on the specific commodities, hence adding up the contribution to inequality of commodities according to channels of distribution does not yield the Gini of the total. It yields the cov-Gini of the total with income. This procedure enables us to read directly from the tables the effect on overall inequality. The main conclusion from Table 2 is that one can divide the rationed commodities into two sets. The first set is composed of sugar, tea, and cooking oil, which are distributed in the same pattern, and affect 92 percent of the population. The income elasticity of these commodities is .15, which is lower than the income elasticity of all rationed goods combined. The second set is the set of commodities without any pattern. It includes lentils, which is an "inferior" good, and hence an ideal commodity for subsidization, but also includes rice, which has an income elasticity of .54, and therefore should not be subsidized at the margin.
Therefore one can conclude that a reduction of the subsidy on rationed rice will improve the performance of the rationing system.

Table 3 presents the same decomposition as before with respect to cooperative commodities. The performance of all commodities inspected is worse than the performance of any rationed commodity. Moreover, the income elasticity of cooperative tea is greater than one, implying that a decrease of the subsidy on this commodity, and (for example) redistributing the money saved by a proportional (negative) income tax decreases inequality. In other words, eliminating the subsidy would reduce inequality. Although the results for other commodities are not so extreme as in the case of tea, none presents an efficient method of improving the well-being of the poor. The justification for the cooperative system can't be based on the ground of improving the welfare of the poor in the society.

Table 4 presents the effect on inequality of open-market commodities. There are two inferior commodities, sugar and lentils. With the exception of tea, all other commodities are more effective than the rationed commodities. That is, in the case of sugar, cooking oil, rice, and beans, an increase of the subsidy on the open-market commodity financed by a decrease in the subsidy for rationed commodity decreases income inequality. However, there is a difference in the magnitude of improvement. The most effective subsidies are those on sugar and rice, while in the cases of beans and oil the changes in inequality will be small and given that there exists a sampling error, one can argue that although there is some improvement for beans and oil, the improvement is not statistically significant. The mere fact that the cooperative system and the rationing system are not performing far better than the open market in reducing inequality hints that those systems are not
efficient. Note that this conclusion was reached although the administrative aspects were ignored. Since the cost of administering the rationing and the cooperative system are probably higher than the cost of intervention in the open market, a general approach which would take these costs into account would strengthen the conclusion reached in this paper.

The ratios of the entries in the last column of tables 1-4 enable us to estimate the revenue effect of the following exercise: Assume that the subsidy on one commodity is increased while the subsidy on another commodity is decreased, such that overall inequality remains intact. What is the effect on the outlay on subsidies. For example, an increase of one dollar in the subsidy of open market sugar, (-1.04, see table 4, line 1) and a reduction of 3.67 dollars (-1.04/- .283, see table 1, third line) in subsidies for cooperative goods will leave inequality unaffected. This will save the government 2.67 dollars in subsidy for each dollar of transfer.

IV. Sensitivity analysis of the main results

The use of a summary measure of inequality requires, explicitly or implicitly, assumptions on distributional weights. At the same time, one can argue that behind any social policy there exist distributional weights. If these two sets of distributional weights happened to be the same, then the analysis based on the aggregate measure is meaningful. Otherwise the results may simply reflect the difference between the assumptions of the investigator and the preferences of the policy makers.

The use of the Gini coefficient as a measure of inequality is no exception. Therefore it is worth trying to see whether our conclusions would
change if we would have used other distributional weights to evaluate the distributional impact of subsidies.

The extended Gini offers a variety of distributional weights, depending on the parameter $v$. The regular Gini is a special case where $v=2$. The higher is $v$, the higher is the weight given to the lower income groups, and in the extreme case where $v \to \infty$ then the extended Gini represents the attitude toward inequality as viewed by the Rawlsian criteria. On the other hand when $v+1$ then the extended Gini represents indifference to inequality. Since the indices are similar, the analysis proceeds in a similar manner as above. In order to concentrate on the main points, Table 5 presents only the elasticities of the three main categories of commodities, estimated by using different parameters of $v$. As can be seen the income elasticity of rationed commodities declines with $v$ while the income elasticity of open market commodities increases with $v$. This means that the more we care about the welfare of the poor, the more important are rationed commodities relative to open market commodities. When $v$ is greater than 5, then the income elasticity of open markets commodities becomes higher than the income elasticity of rationed commodities, meaning that an increase in the subsidies to rationed food financed by an increase of the taxes on open market commodities decreases inequality. This conclusion is in contrast with the conclusion that we reached in the previous section, when the standard Gini was used to characterize the distributional weights. Therefore, it may be that the explanation for our results in the previous section is due to misrepresentation of the preference of the decision-makers regarding the welfare of the poor in Egypt.
Unlike the case of rationed commodities where no clear cut conclusion can be reached, the case of cooperative commodities offers a clear conclusion. Income elasticities of cooperative commodities do not portray a monotonic relationship with \( v \), which means that the beneficiaries from subsidies on these commodities are scattered along the income distribution. Under all weighting schemes examined, the income elasticity of cooperative commodities is higher than the income elasticities of open market or rationed goods. Therefore we can conclude that the decrease of subsidies on cooperative commodities, combined with a compensation of smaller amount by an increase in subsidies to open market or rationed goods, can preserve inequality and decrease the deficit in the budget.

An alternative way of examining the sensitivity of our conclusions to alternative weighting schemes is to ask whether there exists an additive social welfare function, with non-negative and declining marginal utility, that can negate our conclusions. One way of answering such a question is to utilize a methodology that was developed in Yitzhaki and Slemrod (1987) and is referred to as marginal conditional stochastic dominance. The procedure is based on the following proposition:

Consider a (small) increase in the subsidy for commodity A that is financed by an increase in the tax on commodity B, such that the tax revenue does not change. Then a necessary and sufficient condition for all additive welfare functions to show an increase in social welfare is that the concentration curve of commodity A is always above the concentration curve of commodity B. \(^{12/}\)

Our intention is to use this proposition in order to see whether it is possible to find out a social welfare function that can justify subsidies
to the cooperative system. Before we proceed it is worth mentioning that this is an extreme test, in the sense that in each comparison we allow a different welfare function to be used. That is, it is possible that we justify the subsidy on cooperative commodities by using one welfare function, and later justify the subsidy on rationed goods by another welfare function.

Figure 1 presents the Difference in concentration curves (hereafter, DCC curve) between open market commodities and rationed Goods. On the horizontal axis is the cumulative distribution of the population, ordered according to income per capita. On the vertical axis the DCC curve is plotted. The DCC curve is the vertical difference between the concentration curve of open market commodities and the concentration curve of rationed commodities. If the DCC curve does not intersect the horizontal axis, it means that the concentration curve of open market commodities is always above the concentration curve of rationed goods. As can be seen from Figure 1, The DCC curve intersects the horizontal axis from below, which means that there exists a welfare function for which the increase in the welfare of the lowest two deciles of the income distribution can justify an increase in the subsidy in rationed good financed by a tax on the open market goods. This confirms the conclusions that we reached by using the extended Gini.

Figure 2 presents the DCC curve of open market commodities minus cooperative goods. As can be seen, the curve intersects the horizontal axis in several places in the lowest decile. This implies that one can find a social welfare function which will not justify the cut in subsidies to cooperative commodities and transfer of the proceeds to subsidize open market commodities. However, since the curve is negative for only 12 observations it may be that this result is due to sampling error.
Figure 3 presents the DCC curve of rationed commodities minus cooperative commodities. As can be seen, the curve does not intersect the horizontal axis, which means that all additive social welfare functions will show that an increase of the subsidy on rationed commodities financed by a reduction in the subsidies for cooperative commodities increases welfare. Hence we may conclude that it is impossible to find a welfare function that will not justify a reduction in the subsidy for cooperative commodities. If there is an argument for subsidizing cooperative goods at the present rate, it cannot be based on distributional ground.

V. The distributional effect according to regions

Lipton (1979) alerted economists to the urban bias in many developing countries policy making. Although we are tempted to agree with Lipton that the urban bias is unjustified, one may also argue that the economist, whose role is to advise the government, should respect the preferences of the decision makers. To the best of my knowledge, no one has proposed a formal social welfare function with an urban bias. However, if we believe that there is an urban bias, and that economists should respect the preferences of the decision makers, then we have to account for an urban bias in the preferences of governments, whatever its origin. The methodology presented here is flexible enough to account for an urban bias. To illustrate this, we analyze an extreme case where the government cares only about redistribution in the urban sector. Does this radical change in preferences forces a change in the conclusions reached above?

The policy recommendations depend on one parameter, the income elasticity of the commodity. Table 6 presents the income elasticities of all
commodities for the urban and rural populations, using the weighting scheme of
the Gini coefficient. Surprisingly, for almost all the commodities, the
income elasticity for the whole economy is totally different than the income
elasticities of the urban or the rural populations. Since no restrictions
were imposed on the curvature of the Engel curves, such deviations may occur
because of the differences between the two populations. The mean income per
capita of the urban population is 1.8 times the mean income per capita of the
rural population. Hence in many cases when the income elasticity of the urban
population is lower than the income elasticity of the rural population, the
overall elasticity, which takes into account the difference between the rural
and urban populations, tends to be lower than both the elasticities of the
rural and urban populations. 14/

The case of cooperative commodities is a typical example that is
worth examining. The income elasticity of these commodities for the urban
population is .35 which is higher than the income elasticity for the rural
population (.20). The income elasticity for the whole population is .71.
Therefore, it is the difference between the rural and urban populations that
caus ed us to conclude that the cooperative system is inefficient on the
margin. A similar situation, although in reverse direction is the case of
open market commodities. Since the income elasticity for rural population is
higher than the income elasticity for urban population, the overall elasticity
is smaller than both elasticities, which explains the importance of the open
market commodities for redistribution through taxation. The rationed
commodities have similar elasticities for both populations, and a similar
income elasticities for the overall population. Hence the redistributio nal
effect of these commodities is not affected by the choice of population.
The conclusion from the above discussion is that the ranking of commodities according to their effectiveness as instruments for redistributions depends crucially on the target population. If we care only on redistribution in the urban population, then the rationed commodities are the most efficient instrument, the open market is less effective, while the cooperative system is the least important. However, the differences in the performances of the different commodities are less dramatic than in the case where the target population is all Egypt. In the last case the most effective channel for redistribution is the open market and the ineffectiveness of the cooperative commodities is much more pronounced. Therefore, the conclusion that a reduction in the subsidies to cooperative commodities accompanied by an increase in the subsidies to either the open market or the rationed commodities can decrease the deficit in the budget and at the same time does not deteriorate the redistributional impact of the subsidy system, remains intact.
Table 1: The Effect of a Small Change in Subsidies On Inequality, Egypt, 1981

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Total Expenditure 26.90 a/

Expenditure on:

- Rationed Food 2.3, $R_1 = 0.17$, $G_1 = 0.400$, $P_1 = 0.92$, $G_1^* = 0.348$, Income Elasticity $\frac{R_1 G_1}{G_o} = 0.18$, Effect on Inequality $\frac{R_1 G_1}{G_o} - 1 = -0.822$
- Cooperative 0.5, $R_1 = 0.35$, $G_1 = 0.780$, $P_1 = 0.41$, $G_1^* = 0.463$, Income Elasticity $\frac{R_1 G_1}{G_o} = 0.71$, Effect on Inequality $\frac{R_1 G_1}{G_o} - 1 = -0.283$
- Free Market 3.9, $R_1 = 0.06$, $G_1 = 0.636$, $P_1 = 0.84$, $G_1^* = 0.567$, Income Elasticity $\frac{R_1 G_1}{G_o} = 0.10$, Effect on Inequality $\frac{R_1 G_1}{G_o} - 1 = -0.900$
- Other Expenditure 93.4, $R_1 = 0.99$, $G_1 = 0.405$

Table 2: The Effect of a Small Change in Subsidies on Rationed Commodities, Egypt, 1981

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Table 3: The Effect of a Small Change in Subsidies on Cooperative Commodities, Egypt, 1981

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Table 4: The Effect of a Small Change in Subsidy on Open-Market Commodities, Egypt, 1981

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<td>$G_i$</td>
<td>$P_i$</td>
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Table 5: Income Elasticities According to Different Weighting Schemes

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Table 6: (Gini) Income Elasticities According to Region, Egypt, 1981

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Figure 1: The Difference Between the Concentration Curves of Open Market and Rationed Commodities

Cumulative Distribution of Population According to Per Capita Income
Figure 2: The Difference Between the Concentration Curves of Open Market and Cooperative Commodities

Cumulative Distribution of Population According to Per Capita Income
Figure 3: The Difference Between the Concentration Curves of Rationed Commodities and Cooperative Commodities

Cumulative Distribution of Population According to Per Capita Income
Endnotes

The cooperation of Harold Alderman in providing the 1981 Egyptian Survey and generously sharing his knowledge of the data set is gratefully acknowledged. I would also like to thank Joel Slemrod for his comments on an earlier draft and Reza Firuzabadi for research assistance.

1. For an excellent review and description of the rationing system in Egypt, see Alderman, Von Braun, and Sakr (1982).

2. See Michael Lipton (1979) for a critical view.


4. When dealing with rationed and cooperative commodities, the consumer is not free to choose the quantities, hence the meaning of an inferior good is that the marginal eligibility to receive to commodity is negative.

5. In the case of the extended Gini then the extended Gini correlation is defined as $\text{cov}(x_i, [1-F_y(y)]^{v-1})/\text{cov}(x_i, [1-F_i(x_i)]^{v-1})$. Properties a, b and c hold in this case too, See Stark, Taylor and Yitzhaki (1987).

6. Note that the share and the Gini correlation can be negative (e.g. taxes).

7. Note, however, that one way to introduce efficiency considerations into
the analysis, is to take into account only the change that will keep the consumer at the same utility level. In this case the higher the compensated elasticity of demand, the lower the compensation needed.

8. In the case of the extended Gini the weights will be:

$$\frac{[1 - F_y(y)] - [1-F_y(y)]^v}{\int_0^y \frac{[1-F_y(z)] - [1-F_y(z)]^v}{dz} dz}$$

In this case the weight function is asymmetric and the weights given to the marginal propensity to spend of low income groups are an increasing function of $v$.

9. Unfortunately, we don't have reliable data on specific items of bread and energy, which are major targets for heavy subsidization.

10. For a description of the samples, see Alderman and Von Braun (1984). (The urban population is assumed to be 44 percent of the overall population.)

11. Income is defined as total expenditure per capita per year.

12. The concentration curve $\phi_c(F)$ describes the percentage of overall expenditure on commodity $C$ that is spent by the poorest $F$ families. Its properties are discussed in Kakwani (1980), Nygard and Sandstrom (1981) and Yitzhaki and Olkin (1987).
13. It is assumed that the urban bias means that the government ignores the rural population. An alternative assumption is that the government tax the rural sector and transfers the proceeds to the urban sector. This possibility is ignored.

14. It is worth noting that the urban bias in subsidies in Egypt was detected by Alderman, Von Braun and Saker (1982) who used a conventional regression technique. Hence, the findings with regard to the urban bias are not related to the technique used in this paper.
References


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276. Korea’s Macroeconomic Prospects and Major Policy Issues for the Next Decade, by V. Corbo and S.W. Nam.


281. Mobility, Skill and Information, by O. Stark and E. Katz.


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