

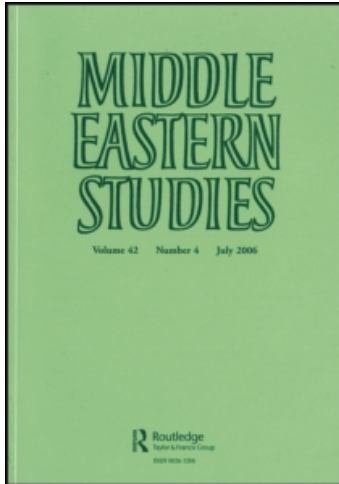
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Publisher Routledge

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Middle Eastern Studies

Publication details, including instructions for authors and subscription information:

<http://www.informaworld.com/smpp/title~content=t713673558>

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To cite this Article Al-Qudsi, Sulayman S.(1981) 'Pre and post-fiscal distributional patterns in Kuwait', Middle Eastern Studies, 17: 3, 393 – 407

To link to this Article: DOI: 10.1080/00263208108700479

URL: <http://dx.doi.org/10.1080/00263208108700479>

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Pre and Post-Fiscal Distributional Patterns in Kuwait

Sulayman S. Al-Qudsi

This paper addresses itself to the income distributional pattern that has emerged in Kuwait one-quarter of a century after the first oil shipment (1946) was exported. Since then, Kuwait has had to depend, to a large extent, on foreign labor to perform its daily activities. In 1972 about 53 per cent of the country's population and 70 per cent of its labor force were foreigners. Nearly ninety per cent of the foreign population came from neighboring Arab countries. The economy's oil wealth is owned by the state which is by far the largest single employer in the economy.¹ Public sector plays a predominant role and consequently has a considerable impact on the country's overall distributional pattern.

To identify the size distribution of income, we employ three statistical measures—the Gini coefficient, the variance of the logarithm of income and the Atkinson index. The data base we have is the 1972–3 demographic and budget survey kindly provided to us in its computerized raw and micro form by the Planning Board of Kuwait. A stratified sampling procedure was used to draw 1,163 households, representing about 1.12 per cent of the total households living in the country during the survey period. The nationality breakdown in the sample is similar to the actual breakdown (47 per cent Kuwaitis and 53 per cent non-Kuwaitis).

Section I below presents the pre-fiscal distributional pattern. In Section II the distributional impact of fiscal policy is quantified, followed by a discussion of the determinants of the current distributional pattern and the last section provides a summary and concluding remarks.

I. The Pre-fiscal Distribution

We take up in this section the pre-fiscal distribution, then in Section II we introduce the public sector to analyze the equity dimension of its functions. There are no income, wealth, inheritance or capital gain taxes in the country. Thus, the public sector's distributive role is restricted to the expenditure side (i.e., the basic source of revenue is oil, indirect taxes, investment income and fees from public utilities).

To give a statistical description of the pre-fiscal income distribution in the country, we scrutinize the Planning Board's 1972–3 microdata and present the deciles' share by components in Table (1). The richest decile gets 35.5 per cent of the total family income, consumes 26 per cent of the total consumption, earns 22.3 per cent of the total wage and salary payments, receives 79 per cent and 96 per cent of the total business and property incomes respectively and about 53 per cent of the total income from stock investments.

The poorest decile, on the other hand, receives just below two per cent of

the total income, consumes 2.8 per cent of society's total consumption, earns 2.3 per cent of the total wage and salary bill, receives two-tenths and nine-tenths of one per cent and nine-tenths of one per cent of society's business and property income and nothing of society's income from bonds and securities.

Using the World Bank's classification, Kuwait may be classified as a country with moderate inequality at a high per capita income. Moderate inequality, according to the World Bank's definition obtains when the poorest 40 per cent of the population receives between 12 and 17 per cent of society's income.² In Kuwait, the poorest 40 per cent receive 15 per cent, the middle 40 per cent receive 34.4 per cent and the top 20 per cent receive 50.6 per cent of society's total income.

We computed the Atkinson index of inequality (along with the Gini coefficient) for Kuwaitis, non-Kuwaitis and the total population. In Table 2 we present our results.

II. The Post-fiscal Distribution

To generate the post-fiscal distribution we employ a procedure that involves two major steps:⁵

- (1) Using the 1972-3 pre-fiscal distribution as a base, and
- (2) Adding government expenditures by family to the pre-fiscal distribution and then dividing the resultant family income by the number of family members.

Information on the government cash subsidy was obtained from our micro-data of 1972-3. Non-Kuwaitis as well as middle and upper income Kuwaitis are ineligible for cash subsidy. The distribution of government expenditures by category and family were constructed using estimates made by the Stanford Research Institute.⁶ Those estimates are for the same year as our microdata (1972-3) and are based on some confidential government statistics and reports.⁷ However, since the SRI estimates are in terms of five family quintiles, and not in terms of the i^{th} family or the i^{th} individual, a transformation of the SRI's aggregate data into the microdata was carried out in the following manner: (i) we divided our sample into five quantiles to correspond to the SRI's breakdown, (ii) the amount of in-kind subsidy that a family falling in the i^{th} quantile received was added to its income. The new resultant income level is the post-fiscal family income, (iii) to arrive at the individual income, we divided family income by family size.⁸

There are two conceptual problems associated with our estimates of the distributive role of government. First, we are assuming that each family that falls in the j^{th} quantile ($j = 1, \dots, 5$) receives the same amount of in-kind government subsidy. Second, our procedure contains an implicit utility function for evaluating the benefits of government expenditures across income classes. The tacit assumption is that marginal utility of income is constant across income levels.⁹ Despite these shortcomings, perhaps we could find some comfort in the knowledge that post-fiscal distributional studies continue to make the same assumption as we do.¹⁰

Table 3 shows estimates of the government benefits by quintile.

TABLE 1

KUWAIT PRE-FISCAL INCOME DISTRIBUTION IN
1972-73 BY COMPONENTS SHARE IN %

Family Decile	Total Income	Total Consumption	Wages and Salaries	Business Income	Property Income	Stock Investment Income (Bonds and Securities)
Poorest	1.9	2.8	2.3	.02	.09	0
2nd	3.2	4.0	3.7	.40	.7	0
3rd	4.4	5.1	4.9	.80	0	4.7
4th	5.5	7.0	6.7	.5	.1	2.0
5th	6.6	8.2	8.3	1.2	.3	0
6th	7.7	9.3	9.2	1.4	.9	1.1
7th	9.0	9.9	11.2	1.1	3.0	35.2
8th	11.2	12.7	12.3	7.6	5.3	0
9th	15.1	15.2	19.0	8.1	4.0	4.5
Richest	35.5	26.0	22.3	79.0	86.0	52.5

Source: Computed from Microdata of the Budget Survey 1972-73.

TABLE 2
 THE ATKINSON INDEX (3) THE GINI COEFFICIENT (4) AND
 THE VARIANCE OF THE LOGARITHM

	$\epsilon = 1$	$\epsilon = 2$	Gini Coefficient	Variance of The Logarithm
A. (a) Total Personal Income	.34	.51	.485	.62
(b) Kuwaitis	.36	.57	.483	.76
(c) Non-Kuwaitis	.22	.36	.469	.46
B. (a) Total Family	.288	.45	.471	.60
(b) Kuwaiti Families	.299	.48	.473	.70
(c) Non-Kuwaiti Families	.254	.403	.460	.45

TABLE 3

PERCENTAGE DISTRIBUTION OF BENEFITS

	Kuwaiti Family				Income Class				Non-Kuwaiti Family			
	Poor- est 20%	2nd 20%	3rd 20%	4th 20%	Poor- est 20%	Rich- est 20%	Rich- est 20%	Poor- est 20%	2nd 20%	3rd 20%	4th 20%	Rich- est 20%
Public Health	.20	.20	.20	.20	.20	.20	.20	.20	.20	.20	.20	.20
Public Education	.14	.19	.20	.22	.14	.25	.25	.14	.19	.20	.22	.25
Electricity Subsidy	.04	.13	.17	.21	.06	.46	.46	.06	.11	.17	.22	.25
Water Subsidy	.09	.10	.18	.18	0	.45	.45	0	.125	.125	.25	.50
Land Purchase	0	.09	.21	.30	0	.40	.40	0	0	0	0	0
Low-income Housing*	.25	.25	.25	.25	0	0	0	0	0	0	0	0
Bedouin Housing*	.83	.17	0	0	0	0	0	0	0	0	0	0
"Thousand Plot" Program*	0	0	1.0	0	0	0	0	0	0	0	0	0
Public Plot Sales	.10	.18	.18	.27	0	.27	.27	0	0	0	0	0
Cash Assistance	1.0	0	0	0	0	0	0	0	0	0	0	0

Source: Computed from Table C-11, p. C-34, SRI, *op. cit.*

*Discussed in Section III below.

Several observations are warranted on Table 3. First, notice that each row (for each group separately) sums to one. Second, in comparison with educational benefits and public health benefits, both water and electricity subsidies are negligible (the ratio of the total amount of water and electricity subsidy to the total amount of health and education subsidy is less than 8 per cent). Third, some entries take zero values indicating the total absence of subsidy in the given categories. Fourth, although the overall pattern of family subsidy looks regressive, two factors work to reverse the picture: (i) the fact that Kuwaitis have on the average larger families than non-Kuwaitis.¹¹ Total non-Kuwaitis, however, outnumber total Kuwaitis; (ii) perhaps more important from the inequality measurement point of view is the fact that government subsidy as a percentage of family income is much larger for poor families than for rich ones. As a matter of fact, Kuwaiti families falling in the poorest quintile typically receive more government in-kind subsidy than their earning in the market. This fact is illustrated below:

Government Benefits as a Ratio
of Family's Earned Income

	Poorest 20%	2nd 20%	3rd 20%	4th 20%	Richest 20%
Kuwaitis	1.33	.87	.43	.29	.11
Non-Kuwaitis	.76	.36	.19	.18	.10

Source: SRI, Ibid.

When we take the above observation into consideration, the overall picture that emerges is that these unequal proportionate additions to family (and individual) incomes would improve the inequality measure.¹² Table 4 summarizes the results on pre- and post-fiscal equality levels.

The table indicates that

(i) the pre-fiscal Kuwaiti per capita income is about 46 per cent and 31 per cent higher than the non-Kuwaiti and the total pre-fiscal per capita income respectively;

(ii) Kuwaiti post-fiscal per capita income is 27 per cent higher than its pre-fiscal level and 52 per cent higher than non-Kuwaiti post-fiscal per capita income. Post fiscal per capita income is 23 per cent higher than its pre-fiscal level for Kuwaitis. For the entire population post-fiscal per capita income is 26 per cent higher than its pre-fiscal level;

(iii) Public expenditure appears to be an effective redistributive tool insofar as it reduces society's level of inequality;

(iv) However, the government's distributional impact is not uniform between Kuwaitis and non-Kuwaitis. It appears that the government's policy is more effective in bringing about more pronounced changes in the Atkinson and Gini measures when it addresses itself to the Kuwaiti rather than to the non-Kuwaiti segment of the population. Closer examination, however, reveals that this result is not due to an inherent superiority of fiscal policy in curing inequality among Kuwaitis than among non-Kuwaitis. Two factors breed this result. First, and most obvious, is that the amount of post-

TABLE 4
PRE- AND POST-FISCAL INEQUALITY LEVELS

-- FAMILIES 1972-73 --

		$\epsilon = 1^*$	$\epsilon = 2^*$	Gini Coefficient	Variance of the Logarithm of income	Per Capita Income K.D.**
Pre-Fiscal	Total I	.288	.45	.471	.60	3012
Inequality	Kuwaitis I	.30	.48	.473	.70	3816
	Non-Kuwaitis I	.25	.40	.460	.45	2544
Post-Fiscal	Total I	.27	.43	.426	.55	4656
	Kuwaitis I	.25	.37	.43	.58	6072
	Non-Kuwaitis I	.22	.37	.423	.42	3240
-- The Entire Population 1972-73 --						
Pre-Fiscal	Total I	.34	.51	.485	.62	500
	Kuwaitis I	.36	.57	.483	.76	556
	Non-Kuwaitis I	.22	.36	.469	.46	380
Post-Fiscal	Total I	.26	.39	.425	.58	629
	Kuwaitis I	.24	.36	.428	.60	708
	Non-Kuwaitis I	.17	.27	.420	.41	467

*Notice that the Atkinson index depends crucially on the value assumed for ϵ . The chosen values above have no full scientific basis, since they embody personal ethical assumptions. Their merit is that they do this in a systematic way. See Layard, P.R. and A.A. Walters, Microeconomic Theory, McGraw-Hill 1978, pp. 47-50.

**1 K.D. \approx \$3.3 (1972).

I = Atkinson inequality index.

fiscal distributive dinars channelled to the Kuwaiti segment of the population is substantially larger than the amount allocated to the non-Kuwaiti segment. Since government's total investments in alleviating inequality is larger among Kuwaitis than among non-Kuwaitis, then total returns on her investments in Kuwaitis would expectedly be, *ceteris paribus*, larger than her returns on her non-Kuwaiti investments. The second, and perhaps less obvious factor, is that in relative terms the government's distributive policy is more progressive among Kuwaitis than among non-Kuwaitis. Take, for example, the poorest Kuwaiti quintile, who receive cash assistance denied the poorest non-Kuwaiti quintile. Additionally, we have seen earlier that government's subsidy to the poorest Kuwaiti quintile amounts to 133 per cent of that quintile's total earned income and that government's subsidy to the poorest non-Kuwaiti quintile amounts to only 76 per cent of the quintile's total earned income. Moreover, government's subsidy to the poorest Kuwaiti quintile is 12 times as much as its subsidy to the richest Kuwaiti quintile while the government's subsidy to the poorest non-Kuwaiti quintile is 7.5 times as much as its subsidy to the richest non-Kuwaiti quintile. These 'progressivity' differences are due, in the main, to the fact that specific programs are set up to help, by and large, the Kuwaiti poor only (e.g., public housing, cash assistance).

III. DETERMINANTS OF DISTRIBUTION IN KUWAIT

In this section we discuss the factors that we think are important in influencing the shape of Kuwait's size distribution of income. We think that several factors have contributed to the development of the present distribution pattern in the country. These are:

1. Demographic factors
2. Fiscal and monetary factors
3. Trade factors
4. Institutional rules.

Demographic factors refer to a basic fact about the population characteristics in Kuwait—the coexistence of the native with the non-Kuwaiti population. These are obvious demographic differences between the two groups. The birth rate, death rate and the natural increase are higher for Kuwaitis than for non-Kuwaitis as Table 5 shows.

TABLE 5

Rates per Thousand Population -1972-	Kuwaitis	Non-Kuwaitis	Total
Birth	48.3	40.8	45.2
Death	6.1	3.5	5.0
Natural Increase	42.2	37.3	40.3

Source: Kuwait's Annual Statistical Abstract 1977, Table 43.

The Kuwaiti family has on the average more members than the non-Kuwaiti family. As a result, the number of income-producing members in the Kuwaiti family is larger than its counterpart in the non-Kuwaiti family. Moreover, this number tends to rise as the family income increases. Table 6 illustrates these facts. (Columns 1, 2 and 3 pertain to Kuwaitis, while 5, 6 and 7 pertain to non-Kuwaitis.)

The rate of participation in the labor force for natives is about one-half that of the non-Kuwaitis (only 19.5 per cent of the natives are labor force participants compared to a 40.7 per cent rate for the non-Kuwaitis). Such differences would affect the earnings of each group and hence, the overall distributional pattern.

The importance of fiscal factors on income distribution was illustrated earlier in Section II above. The government's total distributive impact on the distribution of income in Kuwait takes two forms: (i) direct and (ii) indirect. Obvious examples of the direct impact are the government's wage policy, cash subsidy program and in-kind subsidy (e.g., education, health, water, electricity, and housing).

The public health program is known for its comprehensive coverage of the entire population. Medical care is provided free of charge (except for private hospital rooms). Kuwaitis could expect (and get) free education up beyond the college level. For non-Kuwaitis, public education is provided free of charge up until the secondary school. The University of Kuwait has a quota of the number of non-Kuwaitis admitted each year. Those who do not qualify (and/or are unable to manipulate the system) have to seek college education elsewhere. Schooling at the kindergarten level is provided free of charge for all Kuwaiti children. However, excludability is possible in the case of both the Kuwaiti poor and all non-Kuwaitis: the Kuwaiti poor because public transportation is not provided at the kindergarten level. The absence of busing causes some of the Kuwaiti poor to abandon this service altogether. In the case of the non-Kuwaitis, excludability is enforced by law.

Since the selling prices of both electricity and water to consumers are below their respective average costs to the producer (i.e., the government), consumers of these commodities enjoy a relatively fair amount of subsidy. The amount of this surplus or subsidy increases with the volume consumed since price discrimination is not practiced (i.e., excessive users are charged the same price as average users and peakload users are charged the same rate as off-peak users).

The government provides three types of housing programs which offer houses and land free or at low cost to Kuwaiti families. These are: (i) Low income housing which is built by the government and sold under attractive repayment conditions to individuals who have not participated in the land purchase program; (ii) Bedouin housing which is built and rented under the concept that such housing is most useful on an interim basis between nomadic and settled living conditions; (iii) The 'Thousand Plots' program which provides housing for senior government officials.

The indirect impact is less obvious, but nonetheless is important. When the government performs its day-to-day operations, it does that by contracting with domestic businessmen (to purchase office supplies and materials)

TABLE 6
 NUMBER OF FAMILIES AND INCOME-PRODUCING MEMBERS, 1972

(1) Monthly Income K.D.	(2) No. of Families	(3) No. of Income Producing Members	(4) $2 \div 1$	(5) No. of Families	(6) No. of Income Producing Members	(7) $5 \div 4$
Less than 50	76	79	1.0	109	110	1
50 - 69	45	55	1.2	159	172	1.1
79 - 99	55	59	1.1	391	363	1.2
100 - 149	164	188	1.1	373	502	1.3
150 - 199	228	277	1.2	290	442	1.5
200 - 249	154	211	1.4	181	282	1.6
250 - 299	116	179	1.5	156	248	1.6
300 - 399	136	264	1.9	142	242	1.7
400 - 599	155	372	2.4	108	194	1.8
600 - 999	90	214	2.4	49	76	1.6
over 1,000	64	201	3.1	15	22	1.5

Source: Ministry of Planning, Family Expenditure Surveys, April-September 1972, Tables 1 and 26.

and domestic construction companies (to build schools, hospitals, streets, etc.). A Kuwaiti economist argues that the government's contracts have been typically given to a 'few' well-known domestic enterprises.¹³ Such a concentration of the government's business in the hands of a few citizens reinforces inequality in the distribution of income. Moreover, it probably makes such concentration tendencies over time a positive function of the size of the government spending for items such as construction activities and general purchases. If this argument is correct, then inequality is built into the public sector expenditure policy. Unfortunately, data are not available on the distribution of government bids (quantity or volume in K.D.) among domestic contractors and construction companies to test this hypothesis.

Another example of the indirect distributional impact of government policy is the Land Purchase Program. According to this program, 'the government purchased the land on which construction or development was to take place at a very inflated price, and a minority of the nationals exploited the advantage of buying and reselling land at a very handsome profit. Even some officials, with inside knowledge of future developments, were reputed to have staked their claims on sites on which they knew construction was to take place.'¹⁴ The program has been condemned as a subsidy system for landowners, 'particularly the wealthy, since urban land, largely worthless fifteen years ago, has skyrocketed in value and now ranks among the most high priced in the world.'¹⁵

Monetary factors affect the overall size distribution through two basic variables: (i) the banking credit policy and (ii) the price level. Banks in the country have been handicapped by administrative ceilings on the domestic interest rate they could pay and earn, which created a gap between domestic and international interest rates. These interest rate differentials made it profitable for Kuwaiti money-holders to deposit their assets in foreign banks, earn the higher rate of return, then turn around and borrow money from local banks. This arbitrage process faced local banks with excessive demands for borrowing funds. It is not unreasonable to assume that the bank's managements, in cases of fund shortages would give priority to wealthy, sound borrowers leaving out middle and lower income class borrowers. Thus, small business and households were hit twice: once in their inability to take advantage of the arbitrage process, the other is their relative weakness in acquiring the necessary funds from domestic banks.¹⁶

Since price changes usually affect different income classes differently, its implications for equality are far-reaching. In Table 7 we use the microdata to construct a cost of living index for each quintile. The table illustrates that cost of living indices are markedly different for different quintiles. This points to the possibility that real differences between the rich and the poor might increase over time where the poor's cost of living undergoes the sharpest increases.

Trade policies in many LDC's have led to a worsening in income distribution.¹⁷ Such policies take various forms (e.g., intervention in the exchange rates, quotas, tariffs and invoices). While Kuwait does not interfere in the exchange rate or protect its 'potential' domestic industries behind high walls of custom duties, she does have a general licensing system on imports. Trade

TABLE 7
DISTRIBUTION OF FAMILY EXPENDITURE

OUT OF FAMILY INCOME ON:

Family Quintile	Food	Cloth.	Rent & Housing	Elec.	Hshld. Appls.	Trans.	Rec.	Med.	Misc.	Cost of Living Index, 1977 (1972 = 100)
Lowest	.473	.083	.216	.03	.047	.047	.024	.014	.023	148
2nd	.35	.081	.210	.022	.07	.10	.033	.013	.041	140
3rd	.31	.084	.20	.019	.076	.125	.04	.017	.038	137
4th	.256	.079	.183	.016	.085	.124	.043	.014	.04	131
Richest	.144	.063	.15	.01	.08	.085	.034	.01	.025	121

Date pertain to total families and were computed from micro-observations, 1972-73. The sum of the quintile's average expenditures over the nine commodities does not add up to 1.0 due to the presence of savings.

agents who acquire permits to import certain items from the world market enjoy a monopoly power due to restricted entry. However, the same agent (one person or relatives of one family or partners) could acquire several permits to import several commodities. Agents have benefited considerably during the fifties, sixties and seventies by the marked expansion in local business and the profit from purchasing materials abroad for the local market. 'At the same time, all the preparatory work and specifications were carried out by foreign consultants and the materials were ordered abroad . . . for which the agent automatically received commission with little or no effort on his part; nor was there any risk to the agent as he was not required to finance any of these transactions.'¹⁸

Institutional rules play a critical role in determining the distributional pattern of any society: 'The existing rules determine the distribution of entitlements and the distribution of entitlements determines the distribution of wealth.'¹⁹ A change in these rules which redistributes entitlements would change the distributional pattern. In Kuwait institutional rules have conferred upon Kuwaitis different entitlements from those conferred upon non-Kuwaitis: Non-Kuwaitis 'are allowed no political rights and are denied the ability to own land, houses, businesses, or even shares in corporations.'²⁰

According to the commercial law, non-Kuwaiti businessmen are required to have a Kuwaiti partner (whose nominal share of the business should be at least 51 per cent). In practice, however, many Kuwaiti partners are 'fake' partners in the sense that they do not contribute a penny towards the paid-in capital of the 'joint venture'. Such legal requirements confers franchise rights on Kuwaiti citizens. According to some estimates, 'the value of these rights when supplied by Kuwaiti citizens without any investment share or significant management participation in the business will typically amount to about 10 per cent of the profits. If the profits amount to 10 per cent of the value of production, then ownership rights are worth approximately 1 per cent of the gross domestic product of the economic sectors affected, or about K.D. 3 million per year. Entrepreneurs and business shareowners, who are generally in the highest income quintile, are the beneficiaries of these franchise rights.'²¹

IV. SUMMARY AND CONCLUSIONS

Due to the smallness of the country's domestic labor force and the failure of training and educational programs to cope with the demand for labor, skilled and unskilled workers have had to be brought from outside (mainly Arab) countries. Society's internal homogeneity has consequently been reduced and the distributional pattern impacted. The size distribution of income that has emerged may be categorized as moderately unequal.

The government's role in increasing per capita income through various fiscal policies has been prominent. Post-fiscal income distribution is slightly more equal than the pre-fiscal distributional pattern, pointing to the government's modest success in alleviating inequality, particularly among citizens. Public assistance programs are aimed mainly at the Kuwaiti segment of the population. While this has positive direct impact upon equality within

the Kuwaiti population, it tends to sharpen the income differences between Kuwaitis and non-Kuwaitis. Through its generous but discriminatory fiscal practices, the government is risking the creation of both 'welfare unemployment' whereby citizens are able to receive a salary without in fact working, and 'welfare underemployment'—i.e., the capacity of these same kind of people to work very little at their jobs so that productivity and efficiency are extremely low.²² Institutional, trade, and monetary factors contribute to the unequal distributional pattern.

NOTES

1. Public Sector employs over 65 per cent of the total Kuwaiti labor force and about 45 per cent of the non-Kuwaitis. *Annual Statistical Abstract* 1976, Table 35.
2. Chenery, H. *et al*, *Redistribution with Growth*, Oxford University Press, 1974.
3. The Atkinson measure is written as $I = 1 - \frac{Y_{ede}}{\mu}$, ($0 \leq I \leq 1$). Where I = inequality, Y_{ede} = the equally-distributed equivalent income, i.e., the income which if distributed to each member of society would make total welfare exactly equal to the welfare generated by the actual income distribution. Operationally, the index can be written as:

$$I = 1 - \left[\frac{\sum \frac{Y_i^{1-\epsilon}}{\mu}}{\mu} \cdot f(Y_i) \right] \frac{1}{(1-\epsilon)}$$

where ϵ is a measure of the degree of inequality-aversion in society. See Atkinson, A., 'On the Measurement of Inequality', *Journal of Economic Theory*, v. 2, No. 2, September 1970.

4. The Gini Coefficient ($0 \leq G \leq 1$), was computed using the formula:

$$G = 1 + (1/n) - (2/n^2\mu) [y_1 + 2y_2 + \dots + ny_n]$$

$$\text{for } y_1 \geq y_2 \geq \dots \geq y_n$$

where n is the number of observations, μ is the mean income level and y_i is the income of the i^{th} family (person). The variance of the logarithms of income is:

$$\text{Var} (\log Y) = (1/n) \sum_1^n (\log Y_i - \log \mu)^2.$$

See Sen A. *On Economic Inequality*, Oxford 1973.

5. Our procedure is similar to that employed by M. Reynolds and E. Smolensky, *Public Expenditures, Taxes, and the Distribution of Income: The United States 1950, 1961, 1970*. Academic Press, 1977, Chapter 3, p. 27.
6. Standford Research Institute. *Social and Economic Impacts of the Kuwait Government Compensation Increases of 1971-1972 and Recommended National Compensation Policies, A report prepared for the Planning Board of Kuwait*, SRI project no. 2340, 1974, Appendix C.
7. See S.R.I., *Ibid*.
8. Notice that this method, which is generally used in the literature, ignores the possibility that material requirements of people of different ages and sexes could be different.
9. H. Aaron and M. McGuire point out that: 'Allocation of public goods benefits by the number of families amounts to the assumption that the marginal utility of income is constant as income rises.' Their study showed that the selection of a utility function critically influences results. See H. Aaron and M. McGuire 'Public Goods and Income Distribution' *Econometrica*, v. 38, no. 6, November 1970, p. 918. Later work employed specific utility functions. See, for example, E. Smolensky, L. Stiefel, M. Schumundt and R. Plotnick, 'In-Kind Transfers and the Size Distribution of Income' in *Improving Measures of Economic*

- Well-Being*, M. Moon and Smolensky, E. (eds.), Academic Press, 1977.
10. See, for example, M. Reynolds and E. Smolensky, *op. cit.* Also E. Browning, *Redistribution and the Welfare System*, American Enterprise Institute for Public Policy Research, Washington, D.C., 1975. On LDC's see Webb, R. C., *Government Policy and the Distribution of Income in Peru, 1963-73*, Harvard University Press, Cambridge, Mass. 1977. Also M. Urrutia, 'Fiscal Policy and Income Distribution in Colombia' in *Income Distribution in Latin America*, A. Foxley (ed.) *op. cit.*, pp. 223-41. The pioneering work of Jallade, J. P., *Public Expenditures on Education and Income Distribution in Colombia*; World Bank for Reconstruction and Development, 1974, is an additional example.
 11. Each Kuwaiti family is composed, on the average, of eight members while six members is the average non-Kuwaiti family size. Source: Ministry of Planning *Aggregated Results of the Budget Survey*, March 1974, Table 122.
 12. See Atkinson, A., *op. cit.*, pp. 250-6.
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