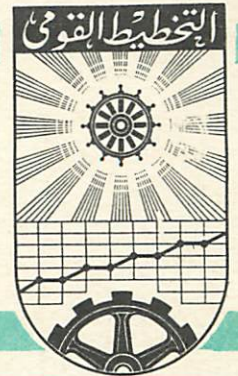# UNITED ARAB REPUBLIC

THE INSTITUTE OF NATIONAL PLANNING

التخطيط القومي

Memo. No. 1024

The Projection of Total Expenditure of

Private Households in the ARE Till

1980

By

Dr. Hans Waschkau

November 1972.

1 . Preliminaries

National planning as it is taken in socialist countries aims ex-
clusively at rising the standard of living of the people. All planning
activities and in general all economic activities are being done for the
benefit of the country and its inhabitants. Accepting this starting po-
int the planning of the people's welfare ought to be highlighted to na-
tional planning. Following from that planning of individual consumption
has to be considered more or less as the first step of national planning
i.e. the needs and the demand of the individuals are the nucleus of na-
tional planning.

The consumption (we are only considering individual consumption)
is mainly based on the income for the individuals, hence income planning
will be one of the important parts of national planning. Up till now there
are no official information (statistical figures) available about individual
income in the past thus planners will get into difficulties if they want to
deal with income planning. To overcome this present difficulty planners
might made use of information about total expenditure of households as well as
of individuals which share about 90% of the disposable income in the ARE.
Experiences have been made that the total expenditure represent an accept-
able and reasonable explanatory variable for consumption. That is why we
were dealing with the analysis and the projection of total expenditure and
remembering the starting point the projection (including the analysis) of
total expenditure ought not to be an unimportant subject of national plann-
ing.

2 . Statistical and other information used in the projection

    In this section we are going to list information used in the pro-
jection supplemented by some comments.

(i) The following figures were estimated by the Ministry of Planning
      (Follow-up Reports).

| Year | Total expenditures | | | |
| | Fixed Prices[1) | | Current prices | |
	Absolut	Rate of growth %	Absolute	Rate of growth %
1964/65	1462.9	-	1462.9	-
1965/66	1503.8	2.8	1583.3	8.2
1966/67	1505.7	0.1	1632.7	3.1
1967/68	1564.2	3.9	1762.5	8.0
1968/69	1611.0	3.0	1807.1	2.5
1969/70	1702.8	5.7	1939.6	7.3

1) Fixed prices of 1964/65.

Table (1)

    Figures related to the periods before 1964/65 had been cal-
culated by a different method than those related to the periods
given in table 1, hence we considered figures before 1964/65 as
useless ones for our purposes.

(i i) Table 2 gives the rates of growth of population based on the research "Estimates of population in the ARE[*]

Period	Rates of population growth %		
	Total	Urban	Rural
1960/65	2.66	4.09	1.78
1965/70	2.78	4.09	1.83
1970/75	3.10	4.40	2.02
1975/80	3.26	4.55	2.02

Table (2)

(iii) On an average the annual rate of growth of total expenditure for 1970 till 1980 is supposed to be about 5%, which is backed by figures given in the "Programme of National Action" (July 1971). According to this programme[**] the annual average rate of growth of individual income per capita should be nearly 2%. Total expenditure spent by the individuals share the biggest part of the individual income, hence we adopted the two-percent rate also for total expenditure per capita. Finally, the following rates can be determined.

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[*] INP memo., No. 642, series 25 (arabic), 1971.

[**] Published by the Ministry of Information (engl.) 1971, p. 41.

Period	Rates of growth of		
	Popu-lation	Per capita expenditure	total expenditure
1970/75	3.10	2.00	5.16
1975/80	3.26	2.00	5.33

Table (3)

Figures in the last column were calculated by the equation:

$$r_e = (1 + r_p)(1 + r_c) - 1 \qquad (1)$$

r_e = rate of growth of total expenditure, r_p = rate of growth of population, r_c = rate of growth of per capita expenditure. At the same time the 5% rate we accepted for total expenditure from 1970 till 1980 shows that it brings about an increase of per capita expenditure for both urban and rural population because the latters' rates of growth are less than 5% (see table 2).

(i v) By the aid of the equation (Z_t = expenditure)

$$Z_{75/80} = 1,940 \cdot 1.05^{10} \qquad (2)$$

one gets <u>3.160 mio L.E.</u> for 1979/80. The first figure on the right hand side of (2) comes from table 1 (last row).

(v) The following information given in tables 4 and 5 are known from
the family budget surveys 1958/59 and 1964/65

| Year | Percentages of expenditure spent by | |
	Urban population	Rural population
1958/59	51.32	48.68
1964/65	52.93	47.07

Table (4)

| Year | Per capita annual expenditure spent by | | | |
| | Urban population | | Rural population | |
	abs.	rate of growth	abs.	rate of growth
1958/59	48.84	5.61	27.21	6.82
1964/65	67.77	--	40.43	--

Table (5)

There are two points coming from the last tables which should
be emphasized. With respect to the above-mentioned period it can
be stated:

* The share of expenditure spent by the urban population was
going up whereas that for the rural poulation was
going down. In addition to that the former share is greater
than the latter one.

*   The per capita expenditure of the urban population are greater than those of the rural population but the annual rate of growth of the urban population is less than that for rural population.

3 . The procedure of the projection

The projection does not aim only at forecasting the expenditure for the whole population but should give the chance to split the expenditure according to urban and rural population. That is why one had to deal with two problems.

3.1 Projection of total expenditure for the whole population

The general function the projection is based on is an exponential one

$$z_t = \alpha_o\, e^{\alpha_1 t + \alpha_2 t^2} \tag{3}$$

having variable rates of growth

$$r_z(t) = \frac{dz_t}{z_t\, dt} = \alpha_1 + 2\alpha_2 t \tag{4}$$

z_t denotes total expenditure with respect to period t, $r_z(t)$ means the rate of growth (being a function of t) from period t to $(t + 1)$, α_o, α_1 and α_2 stand for constant parameters, e is the basis of natural logarithms and t takes the values 1, 2, 3, ... Equ. (4) gives the growth from one year to the next one, but often it is necessary to have the rate of growth from period t to period $(t + i)$ having $i \neq 1$. The rate between

these two periods is given by:

$$r_{t,t+i} = \sqrt[i]{e^{\alpha_1 i + \alpha_2 (2\,it + i^2)}} - 1 \qquad (5)$$

This equ. follows from equ. 4 because of

$$d\ln Z_t = (\alpha_1 + 2\alpha_2 t)\, dt$$

and

$$\int_t^{t+i} d\ln Z_t = \alpha_1 \int_t^{t+i} d\tau + 2\alpha_2 \int_t^{t+i} \tau \, d\tau$$

One gets

$$\frac{Z_{t+i}}{Z_t} = e^{\alpha_1 i + \alpha_2 (2\,it + i^2)}$$

and finally equ. (5)

The total expenditure are supposed to grow continously over time due to population growth and increasing demands of the people. Therefore we have the following restrictions concerning equ. (4).

(i) $0 < r_Z(t) < +\infty$

(i i) α_1 and α_2 must not be negative at the same time.

(iii) If $\alpha_1 < 0$, hence

$$|\alpha_1| < 2\alpha_2 t.$$

If $\alpha_2 < 0$, hence

$$|\alpha_2| < \frac{\alpha_1}{2t}$$

The trend function (3) was estimated according to two different concepts.

First concept:

The information we used were given by total expenditure at current prices (table 1) supplemented by the figure 3,160 mio L.E. for 1979/80 mentioned in point (iv) of the previous section. By the aid of least squares method we got (t = 1 for 1964/65).

$$Z_t = 1,395.65 \; e^{0.0562 \, t - 0.0003 \, t^2} \tag{6}$$

and

$$r_Z(t) = 0.0562 - 0.0006 \, t \tag{7}$$

showing decreasing rates of growth (negative slope in equ. 7).

Table 6 gives the estimates (projections) of total expenditure and the annual rates of growth from 1964/65 till 1979/80. The figure for 1970/71 estimated by the Ministry of Planning which we could not allow for in the calculations is given as 2083.7 mio L.E., this means an error of 2.34% (related to our estimate) which might be acceptable. But on the other hand it may not be excluded that the difference is partly caused by an actual higher price rise than that involved in our estimations.

Due to this concept we have the following average annual rates of growth

Period	Rates of growth
1969/70-74/75	5.20
1974/75-79/80	4.87
1969/70-79/80	5.04

Year	Total expenditure mio L. E.	Rates of growth %
1964/65	1,475.9 (1,462.9)	5.56
65/66	1,559.7 (1,583.3)	5.50
66/67	1,647.2 (1,632.7)	5.44
67/78	1,738.5 (1,762.5)	5.38
68/69	1,833.7 (1,807.1)	5.32
69/70	1,932.9 (1,939.6)	5.26
70/71	2,036.1	5.20
71/72	2,143.5	5.14
72/73	2,255.1	5.08
73/74	2,370.9	5.02
74/75	2,491.1	4.96
75/76	2,615.7	4.90
76/77	2,744.8	4.84
77/78	2,878.4	4.78
78/79	3,016.6	4.72
79/80	3,159.3 (3,160.0)	4.66

Table (6)*

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* Figures in brackets represent the information we used for esti-
mating function (6).

<u>Second concept</u>:

On the contrary to the first concept which started in the year 1964/65 the second one has its origin in year 1969/70. We used 3 information:

(1) The total expenditure at current prices for 1969/70 (table 1), 1,940 mio L.E.

(2) The total expenditure at current prices for 1979/80 (point iv of the previous section) 3,160 mio L.E.

(3) It has been assumed that the rate of growth of total expenditure with respect to the first half till 1975, is less than that with regard to the second half from 1974/75 till 1979/80, but on an average this rate should be about 5% for the whole period from 1969/70 till 1979/80.

A part from that the rate of growth of expenditure till 1974/75 is supposed to guarantee an increase of per capita expenditure of both urban and rural population. The highest rate of growth of population during this period is 4.40%, namely for urban population (see table 2). Subsequently, the rate of growth up to 1974/75 must be greater than 4.40% and less than 5%. We fixed the mean of the two bounds 4.7% as the rate of growth till 1974/75.[*]

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[*] Having this rate of 4.7% that one for the period from 1974/75 till 1979/80 must be about 5.3% in order to get the average of 5% for the whole period.

Using this rate and the figure given in point 1. We get a figure for 1974/75 by means of the equation.

$$Z_{74/75} = 1,940 \cdot 1.047^5 = 2,450$$

Eventually, three figures were at our disposal:

Year	Total expenditure mio L.E.
1969/70	1,940
1974/75	2,450
1979/80	3,160

Function (3) was estimated by means of a simultanous equation system.[*]

$$\log Z_t = \log \alpha_0 + (\alpha_1 \tau + \alpha_2 \tau^2) \log e$$

$$\log Z_{t'} = \log \alpha_0 + (\alpha_1 \tau' + \alpha_2 \tau'^2) \log e \qquad (8)$$

$$\log Z_{t''} = \log \alpha_0 + (\alpha_1 \tau'' + \alpha_2 \tau''^2) \log e$$

where τ, τ' and τ'' represent the years 1969/70, 1974/75 and 1979/80. As it is known from the trend calculus we put

$$\tau = 0 \qquad \tau' = 5 \qquad \tau'' = 10$$

Now, we have for (8)

$$Z_0 = \alpha_0 = 1,940$$

$$\log Z_5 = \log \alpha_0 + (5 \alpha_1 + 25 \alpha_2) \log e$$

$$\log Z_{10} = \log \alpha_0 + (10 \alpha_1 + 100 \alpha_2) \log e$$

$$(Z_5 = 2,450, \ Z_{10} = 3,160)$$

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[*] The decadal logarithms have been used.

The final results are

$$Z_t = 1,940 \; e^{0.04458\,t + 0.00042\,t^2} \qquad\qquad (9)$$

$$r_Z(t) = 0.04458\,t + 0.00084\,t \qquad\qquad (10)$$

indicating that the rates of growth increase over time (positive slope in equ. 10).

Table 7 shows the projections of total expenditure and the annual rates of growth from 1969/70 till 1979/80.

Year	Total expnditure mio L.E.	Rates of growth %
1969/70	1,940.0	4.46
1970/71	2,029.1	4.54
1971/72	2,124.4	4.63
1972/73	2,225.8	4.71
1973/74	2,334.1	4.79
1974/75	2,449.6	4.88
1975/76	2,573.0	4.96
1976/77	2,704.8	5.02
1977/78	2,845.8	5.13
1978/79	2,996.6	5.21
1979/80	3,158.0	5.30

Table (7)