# SOME ASPECTS OF REGIONAL DIFFERENCES
## IN THE U.A.R. ( * )

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One of the basic goals of planning should be to decrease regional inequalities through increasing investments in the rural areas and giving a priority to projects aiming at developing relatively depressed regions. However, the plans in the U.A.R. did not so far allow explicitly for regional development, one of the reasons being the lack of regional data. The Ministry of Planning seems to become aware of this deficiency and some steps towards a remedy were taken. Two reports surveying the basic features of growth in the governorates over the period 1964/65 to 1967/68 were issued in December 1968 and December 1969. They provide the main source of data for the present study.

The main problems we have chosen to investigate in this paper are the explanation of variations in consumer spending between different governorates, the determination of the pattern of income distribution and the analysis of the degree of population internal mobility and of its determinants.

## 1. The Consumption Function.

The first question to be examined is the determination of an equation which explains variations in consumer savings. Consumer demand will increase or decrease with a fall or rise in the proportion of income which is saved. This question was given particular attention in the economic thinking which followed the

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great Depression of the 1930's. Keynes proposed an answer according to which consumption depends mainly on disposable income. We can base our reasoning on the assumption that there is a function $C = f(Y^D)$ which relates per capita consumption C and per capita disposable income $Y^D$. This consumption function also determines consumer saving which by definition is the unspent part of disposable income, i.e. $S = Y_D — C$, where S is per capita saving.

Keynes also indicates that «f» should be an increasing function, but should be such that the ratio $C/Y^D$ decreases as $Y^D$ increases. In other words, the portion of income saved should be greater when income is higher.

For this question, as for many others it is the examination of empirical data which provides the final answer by allowing us to verify the proposed assumption and eventually to determine the exact form of «f» if the assumption is accepted. If it is not, such an examination of the data suggests some other formulation.

Our source of information is the previously mentioned Second Report of the Ministry of Planning[1] which provides cross-section data about consumption per head and disposable income per head in each governorate. The sample used consists of twenty-two observations. The first twenty-one observations relate to consumption and disposable income per head in the big urban centers and in the governorates of Upper and Lower Egypt and the last observation represents the average per capita consumption and disposable income in the governorates of the borders (i.e. the Red Sea, the New Valley, Matruh and Sinai). Finally each observation consists of the average consumption expenditures and disposable income in current prices over three years 1964/65 to 1966/67. The year 1967/68 was disregarded for the circumstances of the war affected the relation between consumption and income [2].

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(1) « **Economic and Social Survey of the Governorates : Basic Features of Growth in the Governorates in the Period 1964/65, 1967/68** », Second Report, Dec. 1969, Ministry of Planning, U.A.R. (in Arabic). In what follows, this report will simply be referred to as the Second Report.

(2) For more details about the data used, see Table A. 1 in Appendix A.

The first and simplest model adopted was :

$$C_i = b + c \, Y^D_i + \varepsilon_i \tag{1}$$

according to which consumption per head $C_i$ in governorate i depends on disposable income per head $Y^D_i$ in the same governorate and on a set of other individually unidentifiable factors represented by the unobservable random variable $\varepsilon_i$. The numbers b and c are obviously the parameters whose values are to be determined.

$$C_i = 2.963 + 0.925 \, Y^D_i \qquad R^2 = 0.997$$
$$\phantom{C_i =} (0.125) \quad (0.00356)$$

which seemed all the more satisfactory since $R^2$ the square of the correlation coefficient was 0.997. The value 0.925 for the marginal propensity to consume seems however too high, which could be explained by the definition of disposable income and of savings adopted by the Second Report where the sums withheld by the government to allow for pensions and social security are considered as public savings rather than personal compulsory savings [3].

Model (1) assumes that the marginal propensity to consume is constant rather than decreasing as income increases. We then adopted a different formula for the consumption function to

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[3]   To have an idea of the order of magnitude of the sums which we believe are part of personal savings and which are not considered as such by the definition adopted by the Second Report, we may refer to the Report of the Ministry of Planning on the « Follow Up and Evaluation of Economic Growth in the United Arab Republic in 1966/67 », August 1968. This Report shows in Table 2 p. 157 the sums available to each sector through savings. Savings through social security amount over the period 1964/65 to 1966/67 to 349.7 million L.E., of these 15.3 million L.E. are half day's pay compulsory saving and should be added to personal savings, in addition 50% of the rest (i.e. 162.2 million L.E.) could safely be also added to personal savings, which would make a total of 177.5 million L.E. This sum alone exceeds the amount of personal savings mentioned by the Second Report, namely 141.6 million L.E. over the period 1964/65 to 1966/67. This clearly points to the fact that the estimated propensity to save (propensity of consume) would considerably increase (decrease) if the definition of personal savings is modified.

accord with the view that $C/Y^D$ decreases as disposable income per head increases, namely :

$$\frac{Ci}{Yi^D} = c + d \ Yi^D + \varepsilon \ i \qquad\qquad (2)$$

which implies a consumption function of the second degree in $Yi^D$, c and d are the parameters to be estimated and $\varepsilon$ i is the random error term.

The least squares estimates of model (2) were as follows :

$$\frac{Ci}{Yi^D} = 0.981 - 0.000414 \ Yi^D \qquad R^2 = 0.0658$$
$$\qquad\quad (0.00399) \quad (0.000349)$$

although the coefficient of $Yi^D$ in model (2) has the expected negative sign, it is insignificant. Therefore, the available Egyptian regional data do not support the hypothesis of a decreasing marginal propensity to consume at least within the range of observed disposable income per head and we may safely assume that consumption is linearly related to disposable income.

The next problem to investigate is the effect of urbanization on consumption. Does a change in the degree of urbanization shift the consumption function? Does this change affect the intercept term in the consumption function or does it affect the marginal propensity to consume ?

One way to deal with this problem consists in fitting a consumption relation in a straightforward fashion to figures related to urban governorates and another relation to non-urban governorates figures and then compare the resulting estimates. A more efficient procedure for evaluating the effect of urbanization on consumption would be to introduce the degree of urbanization as an explanatory variable, this variable being measured by the percentage of urban to total population in each governorate. A third procedure would be to introduce a dummy variable to account for the degree of urbanization; this dummy

variable takes on the value 1 for urban governorates and the value O for non-urban areas [4].

The last two procedures were preferred as being more efficient than the first.

The second procedure consists in fitting to the date the following relation :

$$Ci = b + c\ Yi^D + dUi + \varepsilon\ i \qquad (3)$$

where $Ci$ , $Yi^D$ are as defined previously and $Ui$ is an index of the degree of urbanization in governorate i. It represents the percentage of urban population over the three years 1964/65 to 1966/67 to total population over the same period. The results obtained were :

$$Ci = 3.179 + 0.914\ Yi^D + 0.0024\ Ui \qquad R^2 = 0.990$$
$$(1.331)\quad (0.1014)\qquad\quad (0.0424)$$

which reveal a highly insignificant coefficient for the degree of urbanization, although the coefficient of disposable income is still satisfactory and $R^2$ is quite high. The imprecision attaching to the estimate of the coefficient of U could be explained by the fact that this index is correlated to disposable income per head, the simple correlation coefficient between them being 0.767. The existence of multicollinearity makes the estimates of the separate effects of $Y^D$ and U on C meaningless. The high significance attaching to the coefficient of $Y^D$ in this relation is due to the definition of disposable income, consumption and savings which makes consumption overwhelmingly big as compared to savings.

The alternative procedure adopted consists in using instead of the preceding index of urbanization a dummy variable which takes on the value 1 for urban governorates and the value 0 for non-urban governorates. The number 1 was attached to the observations corresponding to the governorates of Cairo, Alexandria, Port-Said, Suez, Ismailia and the borders (Red Sea,

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(4)   See Table A-1 of Appendix A.

(5)

New Valley, Matruh and Sinai) where more than 50% of the population is urban, and 0 was attached to all other governorates where less than 50% of the population lives in urban areas. The estimates obtained were :

$$C_i = 3.640 + 0.910 \ Y_i^D - 0.618 \ D_i \qquad R^2 = 0.966$$
$$\phantom{C_i = } (2.533) \ (0.0530) \qquad\quad (1.612)$$

where $D_i$ is the value of the dummy variable in governorate i. This approach did not improve the estimate of the coefficient of the degree of urbanization.

We may then conclude that the data show no evidence that the consumption relation shifts in the way assumed; namely that it shifts parallel to itself in the plan of consumption and disposable income, due to the degree of urbanization. In other words, the available data do not support the hypothesis that the intercept term in the consumption function is affected by the degree of urbanization .

An alternative hypothesis to be tested is that the degree of urbanization affects the consumption relation through changing the marginal propensity to consume. The model adopted for this purpose is :

$$C_i = b + cY_i^D + dX_i + \varepsilon_i \qquad\qquad (4)$$

where $X_i = D_i \ Y_i^D$, $D_i$ being the dummy variable defined above. This gives the consumption function in urban governorates as :

$$C_i = b + (c + d) \ Y_i^D + \varepsilon_i$$

and the consumption function in rural governorates as :

$$C_i = b + c \ Y_i^D + \varepsilon_i$$

This relation gave the following least squares estimates :

$$C_i = 3.958 + 0.895 \ Y_i^D + 0.0160 \ X_i \qquad R^2 = 0.999$$
$$\phantom{C_i = } (0.548) \ 0.0120) \qquad\quad (0.0052)$$

The t-test applied to the individual coefficients shows that they are significant at the 99% confidence level.

These estimates show that the marginal propensity to consume in urban governorates 0.911 is significantly higher than the marginal propensity to consume in rural governorates 0.895. This divergence could be explained by a stronger demonstration effect and more varied needs in urban areas as compared to rural areas.

We may then conclude that consumption per head is reasonably well defined as a linear function of per capita disposable income, that consumption appears to be higher in urban governorates than it is in rural governorates (and consequently saving is lower) due to a higher propensity to consume, and that autonomous consumption, i.e. the intercept term in the consumption function does not seem to be affected by the degree of urbanization. Finally, Egyptian regional data gave no evidence of decreasing marginal propensity to consume as income increased.

## 2.   The Pattern of Income Distribution Among Governorates:

Now, we shall try to investigate the pattern of income distribution among governorates, and the changes in this distribution occurring from 1964/65 to 1967/68.

Ranking different governorates according to the level of personal income per head, it appeared — as expected — that the higher personal income governorates are the big urban centers : Cairo, Alexandria, Zuez and Port-Said, They are followed by Asswan which owes its privileged position to the construction of the High Dam and to tourism, then by the governorates which either have a relatively high urban population (over 30%) : Ismailia, Gharbia [5], or are situated near Cairo, having a high proportion of their inhabitants employed there and having their economic activity in general closely related to that of the capital

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(5)   Ismailia owes its high per capita income to the activity of the Suez Canal while Gharbia owes it mainly to the flourishing textile industries of Mehalla-El-Kubra.

(Qaliubia, Giza), come next the rural governorates and finally, lagging behind are the governorates of the borders [6],[7].

Changes in this ranking over the period considered are minor. The only noticeable change is the big relative advance of the governorate of the Red Sea where personal income per head increased from 35.2 L.E. in 1964/65 to 52.2 L.E. in 1966/67. i.e. increased by 48.3% while the average overall increase in personal income per head over the same period was 7% [8]. This increase in probably due to the oil field discoveries over the sixties in this area. Then, due to the circumstances of the 1967 war, this governorate regressed somewhat in 1967/68 and personal per capita income there fell to 48.7 L.E.

The next question to examine was whether regional inequality in income distribution has changed during the period under consideration — For this purpose we drew Lorenz curves for the years 1964/65, 1966/67 and 1967/68 relying on the Second Report of the Ministry of Planning — This report contains information about the relative distribution of population and of personal income among governorates[9]. Using these figures we computed the following table [10] :

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(6)    These governorates are mostly desert and their population is either nomad or else agglomerated in small urban centers.

(7)    For a complete ranking of the governorates according to the level of per capita personal income, see Table B-1, Appendix B.

· (8)    This big increase in personal income per head (see Table 4 p. 26 of the second Report of the Ministry of Planning, op. cit.) seems to be inconsistent with the figures of Table 3 p. 5 and Table 3 p. 23 of the same Report which show a constant percentage share of the governorate of the Red Sea in total population and in total personal income over this period; but this could be explained by the fact that total personal income in this area is so small that even its doubling would not affect much its proportion to total overall income.

(9)    See the Second Report of the Ministry of Planning, op. cit. Table 3 p. 5 and Table 3 p. 23.

(10)    For the details of these computations, see Appendix B.

### Table 1 : Cumulative Frequency Distribution of Population and Personal Income Over the Period 1964/65 — 1967/68

| Population (per cent) | Personal Income ( per cent ) | | |
|---|---|---|---|
| | 1964/65 | 1966/67 | 1967/68 |
| Lowest 10% | 7.3 | 7.3 | 6.8 |
| ,,       20 | 15.0 | 15.0 | 14.4 |
| ,,       25 | 18.9 | 18.8 | 18.3 |
| ,,       30 | 22.9 | 22.8 | 22.2 |
| ,,       40 | 31.0 | 30.8 | 30.3 |
| ,,       50 | 39.4 | 39.2 | 38.6 |
| ,,       60 | 47.9 | 47.8 | 47.2 |
| ,,       70 | 56.8 | 56.9 | 56.2 |
| ,,       75 | 61.5 | 61.5 | 60.9 |
| ,,       80 | 67.1 | 67.4 | 66.6 |
| ,,       90 | 83.1 | 83.5 | 83.3 |
| ,,      100 | 100.0 | 100.0 | 100.0 |

Comparison of the last three columns of the table reveals, as expected, that income distribution between different governorates has not changed much between the years 1964/65 and 1966/67, but it has tended towards greater inequality in 1967/68 relatively to the preceding year 1966/67. If we compare 1967/68 to 1964/65 it appears that the inequality has increased in the lower income governorates but has become smaller between the higher income governorates, namely Alexandria and Cairo.

This could also be observed by inspection of the Lorenz curves for the years considered. Using the information in Table 1, the following Lorenz curves were drawn:

Percent of Population
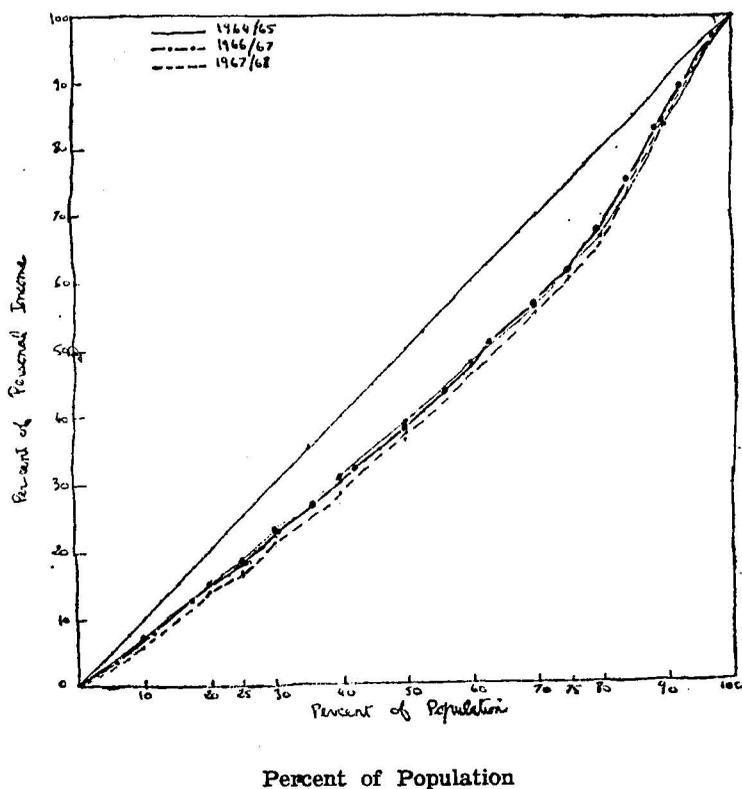
Inspection of these curves shows that the curves for 1964/65 and 1966/67 are very close to each other. They concide for the lower income regions, then the first lies above the second for the middle income governorates, finally they intersect and the second lies above the first for the higher income areas. Com-

paring the Lorenz curves for 1966/67 and 1967/68,, it appears that the first lies above the latter, reflecting a tendency towards more inequality of income distribution. The same applies to the curves for 1964/65 and 1967/68, with the difference that these curves intersect towards their right — hand end, reflecting greater equality of income distribution between the higher income regions.

However, these curves de not show in a definite manner whether income distribution between different governorates has tended to increase or to decrease. Concentration ratios were calculated to determine the degree of inequality of income distribution. The formula used for this ratio is [11] :

$$I = 10^{-4} \sum_{r=2}^{12} (Pr - 1\ Yr - Pr\ Yr - 1)$$

where I refers to the concentration ratio to be estimated, Pr is the cumulative frequency of population and $y^r$ is the cumulative frequency of personal income, r refers to the percentile. This ratio varies within the range 0 to 1, according to the degree of inequality of distribution. This ratio takes on the value 0 in the case of perfect equality of distribution, and in the case of absolute inequality the value of this ratio is 1.

The estimated ratios for 1964/56, 1966/67, 1967/68 were 0.158, 0.158, 0.169 respectively. These values point to a relatively small degree of inequality of income distribution between different governorates; in addition, we may infer that there was no tendency for the degree of inequality of distribution to change between 1964/65 and 1966/67 and that, it has tended to increase in 1967/68, although the change is minor .

These findings are somewhat surprising and they conflict with the current observation of the concentration of economic activities in few big urban centers, particularly Cairo and Ale-

(11) Ynetema, Dwight B., «Measures of Inequality in the Personal Distribution of Wealth and Income», **Journal of the American Statistical Association**, Vol. 28 (December 1933), 423 - 433.

xandria. It is true that the pattern of urbanization in developing countries is such that there appear slums in the big cities where the way and standard of living are not different from those in rural underdeveloped areas, and this could partly justify the low estimated values of the concentration ratios, but we still think that these findings are very surprising, which leads us to question the reliability of the data used.

Having investigated the pattern of income distribution between governorates we shall turn to the examination of population internal migration and to its determinants.

## 3. Internal Migration :

Figures of internal population movements over the sixties show a net outflow of population from the rural governorates of both Upper and Lower Egypt towards the urban governorates (Cairo, Alexandria, Port-Said, Suez, Ismailia) and towards Giza, Asswan and the borders. The governorates which receive a net inflow of population are either big urban centers (Cairo, Alexandria, Port-Said, Suez, Ismailia) or are located near big urban centers (Giza) or have a relatively high per capita income (the urban governorates and Asswan), or finally present more job opportunities (the Borders) [12].

Using the information given by the First and Second Reports, we tried to test the hypothesis that the major determinants of internal migration are the level of per capita income and the degree of urbanization. For this purpose, the following model was adopted :

$$M_i = a + b\,Y_i + c\,U_i + \varepsilon\,i \qquad\qquad (5)$$

where $M_i$ is the percentage of internal annual migration over the sixties. This percentage takes on positive values in the case of governorates receiving a net inflow of population and negative values in the case of governorates losing population through migration. $Y_i$ is average personal income per head in governorate i over the period 1964/65 to 1966/67. The year 1967/68 has been disregarded as the figures relative to these years seemed

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(12) See Table 8 p. 16 of «Features of **Regional Growth in the United Arab Republic over the Period 1964/65 — 1966/67** » First Report of the Ministry of Planning, December 1968 — This report will simply be referred to as the First Report.

to us doubtful[13], in addition to the fact that the circumstances of the war altered the pattern of internal migration particularly in the area of the Suez Canal and the governorates of Sinai and the Red Sea. $U_i$ is the percentage of urban population to total population over the period 1964/65 to 1966/67 in governorate i. Finally, a,b, and c are the parameters to be estimated and $\varepsilon_i$ is a random term.

Least squares estimates of this model were,

$$M_i = -1.6111 + 0.0181\ Y_i + 0.0144\ U_i \qquad R^2 = 0.685$$
$$\phantom{M_i = }(0.460) \qquad (0.01045) \qquad (0.00542)$$

The standard errors of the estimated coefficients reflect the uncertainty of the estimation which could be explained by the existence of an approximate linear relationship between the exogenous variables, namely the degree of urbanization and personal income per head. This relation expresses dependencies due to phenomena other than that described by model (5).

Taking this dependence into account we thought of using instead of model (5) a two-equation model, namely :

$$M_i = a + bY_i + \delta_i \qquad\qquad (6)$$

and   $Y_i = c + dU_i + \varepsilon_i$

where $M_i$  , $Y_i$ and $U_i$ are defined as previously; a,b,c and d are the parameters to be estimated; $\delta_i$, $\varepsilon_i$ are the error terms. In this model the endogenous variables are $M_i$ and $Y_i$; $U_i$ is the exogenous variable.

Using indirect least squares, i.e. applying simple least squares to the reduced form of model (6) we obtained :

$$Y_i = 39.380 + 0.398\ U_i$$
$$\phantom{Y_i = }(3.972) \qquad (0.0745)$$
$$M_i = -0.894 + 0.0215\ U_i$$
$$\phantom{M_i = }(0.195) \qquad (0.00366)$$

where  c = 39.380, d = 0.398, a + bc = -0.894, bd = 0.0215. Solving these equations simultaneously, the values of the struc-

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(13) The figures which seemed to us doubtful relate to rates of increase of personal income per head in the Suez Canal area. Personal income per head in Port-Said, e.g. increased in 1967/68 by 1% while it increased in 1966/67 by 0.1% only; the rates of increase of personal income per head in Ismailia were for these years 2.5% and 1.5% respectively. These rates could not be explained as the circumstances of the war decreased considerably the economic activity in the Canal area.

tural parameters could be obtained; they were found to be;
a = 3.0205, b = 0.0540, c = 39.380, d = 0.398. Therefore,
the estimated structural form was :

$$Mi = -3.021 + 0.0540 \ Yi \qquad\qquad (7)$$
$$Yi = 39.380 + 0.398 \ Ui$$

Alternatively, we estimated the parameters of the structural
form (6) using two-stage least squares which consists of taking
the least squares regression of Yi on the only exogenous variable
Ui and then replacing Yi in the first relation by its estimated
value in terms of Ui and applying least squares to this reformu-
lated relation. The first step was thus to compute $Yi = c +
dUi + \varepsilon i$. The estimated values of Yi are given by :

$$Yi = 39.380 + 0.398 \ Ui \qquad\qquad (8)$$

In the second step we substitute for the observed values of per
capita personal income the estimated values Yi and compute
the least squares regression of Mi over Yi. This latter was found
to be :

$$Mi = -3.0872 + 0.0553 \ Yi \qquad\qquad (8')$$
$$\quad\ (0.529) \quad\ \ (0.00919)$$

Examination of the results of both methods (7) and (8),
(8') reveals that the values obtained for the estimated coef-
ficients are not very different, in addition, they appear to be
significant, pointing to the fact the population mobility depends
on the level of personal income per head, in the sense that
higher income decreases the outflow of population from any
governorate and increases the inflow of people to the area. The
results show also that personal income per head is highly cor-
related with the degree of urbanization. Therefore, we may con-
clude that the available data point to the existence of rural-
urban migration, i.e. that people tend to shift from the rural
areas towards the urban areas, looking for more job opportuni-
ties and attracted by higher income prospects.

## 4.   Summary and Concluding Remarks :

To sum up our main findings, we may say about consump-
tion that :

1.   Consumption per head is linearly related to disposable
     income per head,

2.  The propensity to consume in urban governorates is higher than the propensity to consume in rural governorates and consequently the propensity to save is lower,

3.  The marginal propensity to consume, at least within the observed range of income, is not affected by chan- ges in disposable income per head.

Our study of income distribution between governorates showed that :

1.  The higher income governorates are the big urban centers,

2.  However, if we believe the estimated concentration ratios, income is not as unevenly distributed among governorates as one would expect a priori.

3.  The available data point to a tendency towards more inequality of distribution of personal income, although this increase is very slight as the period considered is short.

Finally, examination of the pattern of internal migra- tion showed that :

1.  Internal migration is of the rural-urban kind,

2.  Population mobility is a function of personal income per head.

Some of our findings however were quite unexpected and led us to question the reliability of the available data. For in- stance, the marginal propensity to consume was found to be too high, which is due to the definition of savings adopted by the Reports according to which part of what should be consi- dered as compulsory personal savings is counted as public sa- vings. Another example is the unexpectedly small degree of inequality of income distribution between governorates reflected by the estimated concentration ratios which make us doubt the accuracy of the data. These remarks are not meant to reduce the importance of the information contained in the two Reports of the Ministry of Planning. We do think however, that this kind of regional information is still hypothetical and more research is needed to improve these data and increase their accuracy and consequently their reliability.

# APPENDIX A
## TABLES

Table A-1 : Data used for the estimation of the consumption function

| Governorates | Observation no. 1 | Ci (2) | Yi D (3) | Ci/Yi D (4) | Ui (5) | Di (6) | Xi (7) |
|---|---|---|---|---|---|---|---|
| **Urban Governorates** | | | | | | | |
| Cairo | 1 | 80.7 | 85.4 | 0.944 | 100.0 | 1 | 85.4 |
| Alexandria | 2 | 76.7 | 81.0 | 0.947 | 100.0 | 1 | 81.0 |
| Port-Said | 3 | 70.6 | 72.6 | 0.971 | 100.0 | 1 | 72.6 |
| Suez | 4 | 75.5 | 76.4 | 0.985 | 100.0 | 1 | 76.4 |
| **Lower Egypt** | | | | | | | |
| Damietta | 5 | 46.1 | 47.2 | 0.975 | 26.4 | 1 | 0.0 |
| Dakahlia | 6 | 43.7 | 44.6 | 0.980 | 20.6 | 0 | 0.0 |
| Sharkia | 7 | 45.6 | 46.4 | 0.983 | 18.3 | 0 | 0.0 |
| Qualiubia | 8 | 49.3 | 49.8 | 0.990 | 31.2 | 0 | 0.0 |
| Kafr-El-Sheikh | 9 | 41.6 | 42.3 | 0.983 | 18.8 | 0 | 0.0 |
| Gharbia | 10 | 47.6 | 48.3 | 0.980 | 31.6 | 0 | 0.0 |
| Menufia | 11 | 45.1 | 46.9 | 0.990 | 16.2 | 0 | 0.0 |
| Behera | 12 | 42.1 | 42.9 | 0.981 | 17.9 | 0 | 0.0 |
| Ismailia | 13 | 50.5 | 50.9 | 0.994 | 52.8 | 1 | 50.9 |
| **Upper Egypt** | | | | | | | |
| Giza | 14 | 46.7 | 49.5 | 0.945 | 38.9 | 0 | 0.0 |
| Beni-Suef | 15 | 48.2 | 48.9 | 0.985 | 22.0 | 0 | 0.0 |
| Fayum | 16 | 45.6 | 46.2 | 0.988 | 21.4 | 0 | 0.0 |
| Menia | 17 | 47.0 | 47.5 | 0.985 | 19.8 | 0 | 0.0 |
| Assiut | 18 | 41.6 | 42.5 | 0.978 | 23.6 | 0 | 0.0 |
| Sohag | 19 | 41.5 | 42.0 | 0.989 | 20.2 | 0 | 0.0 |
| Kena | 20 | 43.2 | 43.6 | 0.991 | 18.9 | 0 | 0.0 |
| Asswan | 21 | 52.3 | 53.2 | 0.985 | 34.7 | 0 | 0.0 |
| The Borders[1] | 22 | 34.5 | 34.6 | 0.992 | 100.0 | 1 | 34.6 |

NOTES :

1.  The figures relating to this observation represent averages for the four governorates of the borders, namely : the Red Sea, the new Valley, Matruh and Sinai.

2.  Each number of this column $C_i$ represents the average consumption per head in governorate i over the period 1964/65 1966/67 in current L.E., this column was computed using the information in Table 10 p. 68 of the Second Report of the Ministry of Planning, **op. cit.**

3.  Each number of this column $Y_i$ D represents the average per capita disposable income in governorate i over the period 1964/65 - 1966/67 in current L.E., these numbers were derived from Table 4 p. 39 of the Second Report, **op. cit.**

4.  Each number of this column is the ratio of the corresponding two numbers in the third and fourth columns.

5.  Each number of the column $U_i$ represents the percentage of urban population to total population in governorate i over the period 1964/65 - 1966/67 — The figures are based on the information in Table 1 p. 2 and Table 4 p. 7 of the Second Report, **op. cit.**

6.  $D_i$ is a dummy variable which takes on the value 1 for the governorates where more than 50% of the population is considered as urban and the value 0 for all other governorates.

7.  $X_i$ is a dummy variable which is equal to the product of the corresponding $D_i$ by $Y_i$ D.

## Table A-2 : Figures used for the study of the pattern of internal migration

| Governorates | Observation No. i | Mi (1) | Yi (2) | Ut (3) |
|---|---|---|---|---|
| **Urban Governorates** | | | | |
| Cairo | 1 | 1.6 | 98.1 | 100.0 |
| Alexandria | 2 | 1.0 | 92.4 | 100.0 |
| Port-Said | 3 | 0.7 | 80.5 | 100.0 |
| Suez | 4 | 2.0 | 88.7 | 100.0 |
| **Lower Egypt** | | | | |
| Damietta | 5 | -0.6 | 50.1 | 26.4 |
| Dakahlia | 6 | — | 46.6 | 20.6 |
| Sharkia | 7 | -0.2 | 48.2 | 18.3 |
| Qaliubia | 8 | -0.1 | 55.3 | 31.2 |
| Kafr-El-Sheikh | 9 | -0.6 | 43.8 | 18.8 |
| Gharbia | 10 | -0.5 | 51.9 | 31.6 |
| Menufia | 11 | -1.1 | 49.3 | 16.2 |
| Behera | 12 | -0.2 | 45.6 | 17.9 |
| Ismailia | 13 | 0.8 | 54.5 | 52.8 |
| **Upper Egypt** | | | | |
| Giza | 14 | 0.7 | 53.8 | 38.9 |
| Beni-Suef | 15 | -1.3 | 50.9 | 22.0 |
| Fayum | 16 | -0.8 | 48.0 | 21.4 |
| Menia | 17 | -0.9 | 49.3 | 19.8 |
| Assiut | 18 | -0.2 | 44.1 | 23.6 |
| Sohag | 19 | -0.4 | 43.4 | 20.2 |
| Kena | 20 | -0.9 | 45.7 | 18.9 |
| Asswan | 21 | 1.0 | 60.2 | 34.7 |
| **The Borders** | | | | |
| | 22 | 0.4 | 37.4 | 100.0 |

**NOTES :**

1. The figures in this column represent the percentage internal annual migration during the sixties, they are taken from Table 8 p. 16 of the First Report of the Ministry of Planning, op. cit.

2. Each number of this column Yi represents the average personal income per head in governorate i over the period 1964/65 to 1966/67 in current L.E., these numbers are based on Table 4 p. 26 of the Second Report, op. cit.

3. This index is the same as in Table A-1.

## APPENDIX B

### On the Details of the Computation of the Frequency Distribution of Population and Personal Income

Our source of data here also are the Reports of the Ministry of Planning on Regional Growth.

Using Table 4 p. 26 of the Second Report, we ranked the governorates ascendingly according to personal income per head in the years 1964/65, 1966/67 and 1967/68. The rankings were as follows :

Table B-1 : Ranking of governorates ascendingly according to the level of per capita personal income in the years 1964/65, 1966/67, 1967/68.

| Rank | Governorates | | |
|---|---|---|---|
| | 1964/65 | 1966/67 | 1967/68 |
| 1 | Sinai | Sinai | Sinai |
| 2 | Matruh | Matruh | Matruh |
| 3 | Red Sea | New Valley | New Valley |
| 4 | New Valley | Sohag | Sohag |
| 5 | Sohag | Kafr-El-Sheikh | Assiut |
| 6 | Kafr-El-Sheikh | Assiut | Kafr-El-Sheikh |
| 7 | Assiut | Behera | Kena |
| 8 | Kena | Kena | Behera |
| 9 | Behera | Dakahlia | Dakahlia |
| 10 | Dakahlia | Fayum | Red Sea |
| 11 | Fayum | Sharkia | Fayum |
| 12 | Sharkia | Menufia | Sharkia |
| 13 | Menufia | Menia | Menufia |
| 14 | Menia | Damietta | Menia |
| 15 | Damietta | Beni-Suef | Damietta |
| 16 | Beni-Suef | Red Sea | Beni-Suef |
| 17 | Gharbia | Gharbia | Gharbia |
| 18 | Giza | Giza | Giza |
| 19 | Qualiubia | Ismailia | Ismailia |
| 20 | Ismailia | Qaliubia | Qaliubia |
| 21 | Asswan | Asswan | Asswan |
| 22 | Port-Said | Port-Said | Port-Said |
| 23 | Suez | Suez | Suez |
| 24 | Alexandria | Alexandria | Alexandria |
| 25 | Cairo | Cairo | Cairo |

Then using Table 3 p. 5 and Table 3 p. 23 of the Second Report which give respectively the relative distribution of population and of personal income between governorates and using also the preceding ranking of governorates, we could compute the following tables.

### Table B-2 : Cumulative Frequency Distribution of Population and Personal Income in 1964/65

| Governorates | Cumulative Frequency % | |
|---|---|---|
| | Population | Personal Income |
| Sinai | 0.5 | 0.3 |
| Matruh | 0.9 | 0.5 |
| Red Sea | 1.0 | 0.6 |
| New Valley | 1.2 | 0.7 |
| Sohag | 6.9 | 5.0 |
| Kafr-El-Sheikh | 10.6 | 7.8 |
| Assiut | 15.4 | 11.4 |
| Kena | 20.4 | 15.3 |
| Behera | 27.1 | 20.4 |
| Dakahlia | 34.6 | 26.5 |
| Fayum | 37.7 | 29.1 |
| Sharkia | 44.7 | 34.9 |
| Menufia | 49.6 | 39.1 |
| Menia | 55.4 | 44.0 |
| Damietta | 56.9 | 45.2 |
| Beni Suef | 60.0 | 47.9 |
| Gharbia | 66.4 | 53.5 |
| Giza | 71.8 | 58.5 |
| Qaliubia | 75.8 | 62.3 |
| Ismailia | 76.9 | 63.4 |
| Asswan | 78.6 | 65.1 |
| Port-Said | 79.5 | 66.4 |
| Suez | 80.4 | 67.7 |
| Alexandria | 86.3 | 77.0 |
| Cairo | 100.0 | 100.0 |

**NOTES :**

This table reveals inconsistencies in the data of the Second Report; to take an example of such inconsistencies personal income per head in the governorates of the borders is shown by Table 4 p. 26 of the Report to be :

in Sinai    34.6 L.E.      in the Red Sea     35.2 L.E.
in Matruh 34.9 L.E.      in the New Valley 36.6 L.E.

The percentage shares of these governorates of population and personal income are given by Table 3 p. 5 and Table 3 p. 23 as :

| Governorates | Percentage Share | |
| --- | --- | --- |
| | Population | Personal Income |
| Sinai | 0.5 | 0.3 |
| Matruh | 0.4 | 0.2 |
| Red Sea | 0.1 | 0.1 |
| New Valley | 0.2 | 0.1 |

From these figures we would expect personal income per head to be the same in Matruh and the New Valley and to be lower in Sinai and even lower in the Red Sea, which conflicts with the figures given by the Report for personal income per head.

### Table B-3 : Cumulative Frequency Distribution of Population and Personal Income in 1966/67

| Governorates | Cumulative Frequency % | |
| --- | --- | --- |
| | Population | Personal Income |
| Sinai | 0.5 | 0.3 |
| Matruh | 0.9 | 0.6 |
| New Valley | 1.1 | 0.7 |
| Sohag | 6.7 | 4.8 |
| Kafr-El-Sheikh | 10.4 | 7.6 |
| Assiut | 15.1 | 11.1 |
| Behera | 21.6 | 16.2 |
| Kena | 26.5 | 20.0 |
| Dakahlia | 34.1 | 26.0 |
| Fayum | 37.2 | 28.5 |
| Sharkia | 44.2 | 34.3 |
| Menufia | 49.0 | 38.4 |
| Menia | 54.6 | 43.1 |
| Damietta | 56.0 | 44.3 |
| Beni-Suef | 59.1 | 47.0 |
| Red Sea | 59.2 | 47.1 |
| Gharbia | 65.5 | 52.7 |
| Giza | 71.0 | 57.8 |
| Ismailia | 72.2 | 58.9 |
| Qaliubia | 76.3 | 62.7 |
| Asswan | 78.0 | 64.5 |
| Port-Said | 78.9 | 65.8 |
| Suez | 79.8 | 67.1 |
| Alexandria | 85.8 | 76.6 |
| Cairo | 100.0 | 100.0 |

### Table B-4 : Cumulative Frequency Distribution of Population and Personal Income in 1967/68

| Governorates | Cumulative Frequency % | |
| --- | --- | --- |
| | Population | Personal Income |
| Sinai | 0.5 | — |
| Matruh | 0.9 | 0.2 |
| New Valley | 1.1 | 0.3 |
| Sohag | 6.6 | 4.3 |
| Assiut | 11.2 | 7.7 |
| Kafr-El-Sheikh | 14.9 | 10.5 |
| Kena | 19.7 | 14.2 |
| Behera | 26.3 | 19.3 |
| Dakahlia | 33.9 | 25.3 |
| Red Sea | 34.0 | 25.4 |
| Fayum | 37.1 | 27.9 |
| Sharkia | 44.1 | 33.6 |
| Menufia | 48.8 | 37.6 |
| Menia | 54.4 | 42.3 |
| Damietta | 55.8 | 43.5 |
| Beni-Suef | 58.8 | 46.1 |
| Gharbia | 65.1 | 51.7 |
| Giza | 70.7 | 56.9 |
| Ismailia | 71.9 | 58.0 |
| Qaliubia | 76.0 | 61.8 |
| Asswan | 77.8 | 63.6 |
| Port-Said | 78.7 | 64.9 |
| Suez | 79.6 | 66.2 |
| Alexandria | 85.6 | 75.9 |
| Cairo | 100.0 | 100.0 |

## NOTES :

Inconsistencies of the kind referred to above are also noted for the data relative to years 1966/67 and 1967/68.

Finally, the figures of Table 1 in the text were derived from the three preceding Tables B-2, B-3 and B-4 by linear interpolation.