MACRO FEATURES OF THE EGYPTIAN ECONOMY, 1960 — 1973

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An analysis of the sources and uses of resources available to any country for consumption and investment is essential to an appraisal of its economic performance. It may explain the difficulties encountered in certain periods and help form a judgement on the short and medium term prospects of the economy.

In this paper we have tried to assess some aspects of the macro economic problems of the Egyptian economy by building up a simple econometric macro model of the national income determination type. This model quantifies the effect of the main determinants of private consumption, investment, government final consumption expenditures and imports on these variables. It also permits forecasting the level of these variables given the expected magnitude of their main determinants.

1 — The Model

A — *Model formulation*

The simplified keynesian model used contains seven equations in seven endogenous variables and three predetermined variables.

The endogenous variables are :

NI_m = national income in current market prices
NI_f = national income at current factor costs
M = value of imports of goods and services
C = final private consumption
I = gross capital formation (which includes gross fixed capital formation and the increase in stocks)
G = government final consumption expenditures
T = indirect taxes net of subsidies

The predetermined variables include one lagged endogenous variable and two exogenous variables, they are ;

C_{-1} = final private consumption of the previous year
(E+F) = the sum of the value of exports of goods and services (E) and the net factor income from the rest of the world (F)
A = net current transfers from the rest of the world

In addition to the identity between national income and national expenditure, and to the definitional equation expressing national income in market prices as the sum of national income at factor costs and net indirect taxes, the model includes five stochastic equations corresponding to the last five endogenous variables, namely :

1 — an import function
2 — a consumption function
3 — an investment function
4 — a government consumption expenditure function
and 5 — an indirect taxation function

B — *Data used*

The sources of our data are the Follow-up Reports of the Egyptian Ministry of Planning and the Yearbook of the National Accounts Statistics (various years) of the U.N. The statistics used cover a period of 14 years from 1960/61, the year when the First Five-Year Plan started, until 1973/74[1] and refer to the main aggregate of the model namely, national income in current market prices and at factor costs[2], private and government consumption expenditures, gross capital formation, exports and imports of goods and services, net factor income from the rest of the world, net current transfers from the rest of the world and net indirect taxes. Gross national savings have been computed as the difference between national income in market prices and both private and government consumption expenditures[3].

All figures used are expressed in current prices, although constant price figures are preferable. However, due to the lack of a suitable price deflator, we had to rely on the available figures expressed in current prices.

C — *Identification state of the Model and the method of estimation*

Applying the identification rules to the structural equations of the model, it appears that both the order and rank conditions for identification are satisfied. However, the last five equations of the model appear to be over-identified.(4) The over-identification of these functions in the structural model make the application of the method of indirect least squares inappropriate, as it is impossible in this case to derive unique estimates of the structural parameters from the estimated reduced from parameters.

Hence, we estimated the structural parameters by applying the ordinary least squares (OLS) directly to the structural equations. But, as well-known, this method applied to simultaneous equations systems yields biased estimates. The source of this bias is the existence of endogenous variables in the set of explanatory variables of some functions in the model.

We have then estimated the model using the two-stage least squares method (2SLS) which is considered to be the most important single equation technique for the estimation of over-identified models(5). This method aims at the elimination, as far as possible, of the simultaneous equation bias due to the random component in the endogenous variables used as explanatory variables. This random component is correlated with the error terms of the structural equations and thereby causes the appearance of the simultaneous equations bias. The method consists in applying ordinary least squares in two stages. In the first stage we apply OLS to the reduced form equations to obtain estimates of the reduced form coefficients which are used to compute estimated values for the endogenous explanatory variables. In the second stage, these computed values are used instead of the observed values of the endogenous variables as explanatory variables in the original equations. Applying OLS to the transformed structural equations, we obtain the 2-SLS estimates of the structural parameters.

The results of the computations with both the methods of OLS and of 2-SLS are given below for comparison.

II. — Discussion of Results

Various forms for the import function, the consumption function, the investment function, the Government consumption expenditures function and the indirect taxation function are tried. In what follows the main computational results are examined and their economic implications are discussed. The other two equations, namely the identity of national income and net national expenditure and the relation between national income at factor costs and in market prices need not be discussed as these relationships do not require any measurement.

A — The Import Function

The following specification of the import function was first used (1) $M = m_o + m_1 NIm + m_2 (E + F) + m_3 A + e_m$ where m_o , m_1, m_2, m_3 are the parameters to be estimated, e_m is an unobservable random variable representing the other individually unidentifiable factors affecting imports. This relationship expresses imports as a function of national income in market prices, of foreign exchange earnings from exports plus net factor income from abroad and finally of net current transfers from abroad which consist of transfers of Egyptians working abroad and aid, mainly grants from Arab states to compensate for the losses incurred since 1967 by the closure of the Suez Canal. The introduction of A as an explanatory variable in the function was meant to test whether increased liquidity due to transfers from abroad and the resulting increased possibility to finance more imports affected the value of imports. The observed data did not support such a hypothesis, as the coefficient of A in the import function was found to be highly insignificant as shown by the following OLS estimates[6].

(1') $M = 0.0889\ NIm + 0,702\ (E+F) + 0.0506A \qquad R^2=0.885$

$\qquad\qquad (0,0526) \qquad (0,292) \qquad (0,341)$

The effect of current transfers from abroad was also tested through the introduction of a dummy variable A_d taking on the value O from the beginning of the period till 1966 and the value I from 1967 to the end of the period. The use of this dummy variable was meant to test whether the inflow of current transfers from abroad to Egypt, which occurred heavily since

1967, tended to shift the import function prevailing prior to 1967. This hypothesis found no support from the available figures, as the coefficient of A_d was insignificant[7]. The variables A and A_d were therefore dropped from the import function and the alternative specification used was :

(2) $M = mo + m_1 NIm + m_2 (E+F) + e_m$

which gave the following OLS estimates :

(2') $M = 0{,}0952\ NIm + 0{,}688\ (E=F)$ $\quad R^2 = 0{,}883$

$\qquad\qquad (0{,}0269) \qquad (0{,}264)$

The 2.SLS estimates of equation (2) were found to be :

(2'a) $M = 0{,}0917\ NIm + 0{,}721\ (E+F)$[8] $\quad R^2 = 0{,}873$

$\qquad\qquad (0{,}0282) \qquad (0{,}275)$

These estimates are of the same order of magnitude as the OLS estimates

In all the cases, the constant term was found to be statistically insignificant and was therefore dropped. The marginal propensity to import was found to be 0.0917, i.e. 9.17% which is rather low in comparison with the marginal propensity to consume discussed in the following section. Increased foreign exchange earnings due to higher exports or net factor incomes from abroad tend to shift the import function upwards and thereby increase the average propensity to import.

These empirical results show that growing import requirements for capital and intermediate goods as well as for consumption can only be sustained, **ceteris paribus,** by export growth of appropriate magnitude. Current transfers from abroad have not significantly affected imports during the period under study.

B —The Consumption Function

Two specifications of the consumption function were fitted to the data, namely ;

(3) $\qquad C = a_o + a_i NIf + a_2 (NI_f)_{-1} + e_c$

where as, a_1, a_2 are the parameters to be estimated $(NIF)_{-1}$ is the highest previous income which happens to be here lagged

national income at factor costs[9]. The second specification was :

(4) $$C = a_0 + a_1 \, NIf + a_3 \, C_{-1} + e_c$$

where C_{-1} is the highest previous consumption which similarly reduces to lagged private consumption expenditures[10]. This formulation corresponds to Milton Friedman's permanent income hypothesis[11]. Friedman suggested that permanent income could be approximated by an exponentially weighted average of past incomes, a formulation which, making use of Koyck transformation[12], leads to an autoregressive equation of the form (4) above. In this case, C_{-1} is assumed to represent consumption habits as they are at the beginning of any year.

The OLS estimates of formulation (3) were as follows :

(3') $$C = 0.375 \, NIf + 0.409 \, (NIf)_{-1} \qquad R^2 = 0.989$$

$$(0.197) \qquad (0.204)$$

This shows a short term marginal propensity to consume of 0,375 and of 0,784 in the long run. However, the accuracy of the results is not outstanding as both coefficients in the fitted relation are not significant at the 95% significance level. The constant term in (3) has been eliminated as it appeared to be non-significant. The fact that the constant term was not found to be markedly different from zero, shows that the ratio C/NIf is approximately constant over long periods.

The use of formula (4) gave the following OLS estimates :

(4') $$C = 0.380 \, NIf + 0.501 \, C_{-1} \qquad R^2 = 0.992$$

$$(0.132) \qquad (0.169)$$

The marginal propensity to consume in the short run is almost the same as before (= 0.380) and the long term propensity is 0.380/(1-0.501) = 0.762. Both coefficients in (4') are significant at the 95% significance level. The propensities would have been higher if data for disposable income rather than national income at factor costs had been used[13].

The latter equation (4') was preferred to the previous equation (3') because it gives more reliable results from the statistical point of view and the two equations are derived from **a priori** equally satisfactory models.

The 2-SLS estimates of the coefficients of formula (4) were as follows :

(4'a) $C = 0.0818\ NI^*_f + 0.879\ C_{-1}$ [14] $R^2 = 0.986$

(0.290) (0.369)

The low degree of accuracy of the coefficient of NI^*_f in the preceding function may be explained by multicollinearity. As NI^*_f is itself calculated from a function where C_{-1} appears as a major explanatory variable of NI^*_f, it is not possible to assess the separate effects of NI^*_f and C_{-1} on current consumption C, and we have to use only one of the two variables as an explanatory variable in the consumption function which has accordingly been estimated as :

(4''a) $C = 0.770\ NI^*$ [15] $R^2 = 0.978$

(0.0332)

the constant term was not significant and was therefore dropped, the marginal propensity to consume is 77%, and the absence of the constant term indicates that the average propensity to consume is constant. Using C_{-1} alone as an explanatory variable, the results were :

(4'') $C = 131.7 + 0.983\ C_{-1}$ $R^2 = 0.986$

(60.2) (0.0358)

C — The Investment Function

The observed figures for the period under study did not show any strong correlation between investment and national income or investment and current transfers from abroad. The respective coefficients of determination were found to be equal to 0.683 and 0.362. However, investment appeared to be highly correlated with imports ($R^2 = 0.874$). The dependence of investment on imports is further illustrated by the abrupt fall in investment between 1965 and 1968. During this period, investments dropped from 446 million L.E. in 1965 to 318 million L.E. in 1968 due to the inability to finance growing imports. Egypt was forced to check the growth of its imports as a result of the withdrawal of U.S. aid in the mid-sixties, the foreign exchange drain arising from the Yemen war and later, the Arab-Israeli

war in 1967. The value of imports fell accordingly from 532 millions in 1965 to 446 millions in 1968.

The following specification was first fitted to the data

$$I = i_o + i_1 \, NIm + i_2 \, M + e_i \quad (16)$$

The coefficient of NIm in the OLS estimate of this relation was highly insignificant. In fact, during the period under study, the level of investments seems to have been determined independently of the current level of income and according to long-run considerations implicit in the policy-makers' mind. These investments were implemented to the extent that the necessary import requirements for these investments were available.

As the coefficient of NIm was not significant, the following relation was fitted instead of the preceding specification :

$$(5) \qquad I = i_o + i_2 \, M + e_i$$

and the OLS estimates obtained were :

$$(5') \quad I = 75.4 + 0.603 \, M \qquad R^2 = 0{,}874$$

$$(36.529) \quad (0.0691)$$

investment expenditures independent of imports are not significant and can be discarded.

The 2-SLS estimates corresponding to the preceding specification were :

$$(5'a) \quad I = 0.0647 \, M^* \quad (17) \qquad R^2 = 0.867$$

$$(0.0730)$$

here also, investment expenditures independent of imports are not significant and have been ignored. The estimated coefficient of imports in (5'a) is not significantly different from the corresponding estimate in (5') and they both show that an increase in imports by 100 L.E. is necessary to achieve an increment in investments of 60 to 65 L.E.

D — The Government Consumption Expenditures Function

Government consumption expenditures were expressed as a function of government receipts which are either internal or ex-

ternal. Net indirect taxes were considered to be an indicator of internal receipts. External receipts are either receipts from exports after adding net factor income payments from the rest of the world (as almost all exports have been channeled since 1961 through the public sector) or net current transfers from the rest of the world. The specification of the government consumption expenditures function used was accordingly :

$$G = g_o + g_i T + g_2 (E + F) + g_3 A + 2 e_g \quad (18)$$

The estimated coefficient of (E+F) appeared to be insignificant and was therefore dropped from the relationship which became :

$$(6) \qquad G = g_o + g_i T + g_3 A + e_g$$

with OLS estimates given by

$$(6') \quad G = 174.114 + 1.066T + 1.307 A \qquad R^2 = 0.953$$
$$(50.279) \quad (0.223) \quad (0.364)$$

and the 2-SLS estimates were as follows :

$$(6,a) \quad G = 88.763 + 1.518 T^* + 0.625 A \ (19) \qquad R^2 = 0.974$$
$$(46.591) \quad (0.220) \quad (0.343)$$

Government spending has been growing steadily over the period under study — as shown by the steady increase of G/NIm(20) — although arm purchases are not recorded and Government expenditures abroad tend to be understated. In addition, these expenditures appear to be highly correlated with the amount of current transfers from abroad ($R^2 = 0.874$). This leads us to think that current transfers received from abroad have been mainly used to finance the growth of Government expenditures during the period under consideration. This conclusion is further supported by our previous findings, namely that there was no evidence of any accurate relationship between these transfers and other expenditures items, particularly investments.

Finally, public consumption has also been financed by indirect taxation which rose considerably both in absolute terms and in relation to national income.(21)

E — The Indirect Taxation Function

Indirect taxes, net of subsidies, were expressed as a function of national income at factor costs, i.e.

(7) $$T = t_o + t_1 N_f + e_t$$

The OLS estimates of this function were :

(7') $$T = 223.302 + 0.234\ NI_f \qquad R^2 = 0.909$$
$$(52.39) \quad (0.0224)$$

which shows that a one pound increase in national income at factor costs leads to an increase in net indirect taxes of almost a quarter of a pound. The negative constant term indicates that at very low levels of national income at factor costs, the Government pays net indirect subsidies.

The 2-SLS estimates were as follows :

(7'a) $$T = 216.026 + 0.232\ NI^*_f$$ [22] $$R^2 = 0.968$$
$$(29.381) \quad (0.0127)$$

the estimates are of the same order of magnitude as the OLS estimates.

F — The Implicit Savings Function

An alternative way of looking at a country's macro-economic problems is to examine the saving behaviour. An analysis of aggregate savings behavior in the case of Egypt is essentially a discussion of Government policy. During the period 1960-1973, the implementation of the plan involved raising the investment ratio mainly through an increase in public investments. The 1961 nationalizations were a convenient instrument for the transfer of an important source of private savings, namely the profits of the modern private sector, to the State and they offered an opportunity for raising the savings rate on the assumption that the Government's savings propensities are higher than in the private sector. However, the national savings ratio failed to increase during this period, and even showed a decreasing trend[23],[24].

As mentioned previously, savings have been calculated as

the difference between national income in market prices and both private and Government consumption expenditures. Calculated as a residual, the figures for savings catch all the statistical errors and important omissions in the accounts, especially arms purchases and special Government expenditures abroad. However, they give an approximate idea of the savings behavior.

Using the specifications (4) and (6) for the consumption function and the Government consumption expenditures function, we may deduce that :

$$(8)\quad S = NIm - C - G = -(a_0 + g_0) + (1 - a_1)\,NI_f + (1 - g_1 T - a_3 C_1 - g_3 A - (2_c + 2_g)$$

which gives a marginal propensity to save equal to $(1\text{-}a_1)$ on the assumption that all other variables are constant, if the other endogenous variables are allowed to change, the marginal propensity to save becomes : $(1\text{-}a_1) + 1\text{-}g_1)t_1$. Numerically, making use of the 2-SLS estimates (4"a) and 6'a), we obtain the following implicit savings function :

$$(8'a)\quad S = 88.763 + 0.230\ NI^*_f - 0.518\ T^* - 0.625A$$

These results imply a marginal propensity to save as high as 0,230 disregarding the effect of both indirect taxation T and net current transfers from the rest of the world A. Introducing the effect of indirect taxation, the marginal propensity to save drops to 0.110 and savings are further decreased by the introduction of the effect of the exogenous variable A. The considerable rise in indirect taxation between 1960 and 1973 instead of reducing the share of aggregate consumption in the economy, was used to finance larger public consumption as shown by (6') and (6'a). Current transfers from abroad seem also to have a negative effect on savings as they were used to finance increased Government expenditures.

The relation between indirect taxation, current transfers from abroad and the other two predetermined variables (C_{-1} and (E+F) and the savings ratio has been further investigated by regressing the observed average propensity to save APS on these variables.

The relation between the savings ratio and indirect taxation was found to be :

$$(9)\quad APS = 0.140 - 0{,}000136\ T \qquad R^2 = 0.400$$
$$(0.0168)\ (0.0000447)$$

which shows a significant inverse relationship between the two variables. In fact, despite a considerable rise in indirect taxation the savings ratio failed to increase. Increased taxation was related to the growing needs of public consumption rather than to the objective of raising the share of savings in national income and thereby increasing the share of savings in national income and thereby increasing the resources available for investment.

Net current transfers from abroad do not appear to have increased savings, on the contrary, it seems that they were used to finance increased consumption, particularly public consumption. The estimated relationship between the savings ratio and A was :

$$(10) \quad APS = 0.119 - 0.000268\ A \qquad R^2 = 0.583$$
$$(0.00532)\ (0.0000632)$$

Savings in Egypt are substantially determined by Government policy and it seems that the Government's saving effort is less rigorous when greater foreign resources are available[25]. The observed negative relationship between the savings rate and current transfers from abroad may also be explained by the fact that the desire to achieve development without sacrificing the growth of private consumption, together with population growth and the expansion of public consumption and the relatively slow growth of national income tended to reduce the savings rate. In the same time, the Arab-Israeli conflict and the consequent closure of the Suez Canal, induced higher foreign resource flows, particularly from other Arab Countries, to compensate for the losses incurred. Therefore, the observed negative correlation between the savings rate and net current transfers from abroad cannot be totally attributed to causality but also to exogenous factors which simultaneously made for higher foreign resource flows and lower savings rate[26].

An increase in previous consumption was also found to have a negative effect on the current savings ratio :

$$(11) \quad APS = 0.177 - 0.0000482\ C_{-1} \qquad R^2 = 0.505$$
$$(0.0242)\quad (0.0000144)$$

which is not a surprising result. Finally, there was no evidence of any significant relationship between exports and net domestic factor incomes from abroad and the savings ratio.

These results imply that increased indirect taxation, increased flows of net current transfers from abroad and increased lagged consumption are associated with a downward shift of the savings function. There was no evidence of such a shift as a result of increased exports and net domestic factor incomes from abroad.

G — The Reduced Form Model

The reduced form parameters measure the **total effect**, direct and indirect, of a change in the predetermined variables on the endogenous variables after taking account of the interdependences among the jointly dependent endogenous variables, while the structural parameters indicate only the **direct effect** of the explanatory variables on the dependent variables in the equations.

The reduced form parameters have been calculated in two different ways :

1 — Through direct estimation of the reduced form coefficients.

2 — Through indirect estimation by deriving the reduced form parameters from the structural parameters estimated previously either through OLS or through 2-SLS.

The second method is more efficient because it takes into account all the *a priori* restrictions imposed by the structure on the parameters and incorporated into the structural models.

Disregarding constant terms, the results were as shown in the following table :

Estimates of the Reduced Form Parameters

Endogenous variables	*	Coefficients of the Predetermined Variables		
		C_{-1}	E + F	A
NIm	1	1.416	1.333	—
		(0.0733)	(0.454)	
	2	0.949	1.376	2.475
	3	1.317	0.997	0.837
NIf	1	1.1406	1.0868	—
		(0.0727)	(0.450)	
	2	0.769	1.115	2.006
	3	1.069	0.809	0.679
M	1	0.129	0.839	—
		(0.0411)	(0.254)	
	2	0.0903	0.819	0.236
	3	0.121	0.812	0.0768
C	1	0.983	—	—
		(0.0353)		
	2	0.793	0.424	0.762
	3	0.983	—	—
I	1	—	0.961	—
			(0.122)	
	2	0.0544	0.494	0.142
	3	0.0782	0.525	0.0497
G	1	0.403	0.373	0.695
		(0.0741)	(0.253)	0.334)
	2	0.192	0.278	1.807
	3	0.376	0.285	0.865
T	1	0.302	—	—
		(0.0269)		
	2	0.180	2.261	0.469
	3	0.248	0.188	0.158
Implicit savings S	1	—0.030	0.960	—0.695
	2	—0.036	0.674	—0.094
	3	—0.042	0.712	—0.028

* (1) are the estimates derived from applying directly least squares to the reduced form, the numbers between brackets under the estimates are their standard deviation.

(2) are the estimates derived from OLS estimates of the structural parameters.

(3) are the estimates derived from 2-SLS estimates of the structural form using (4") as an estimate of the consumption function.

Taking into account the previous results which point to a relatively low propensity to consume (0.380 in the short run and 0.762 in the long run according to OLS estimates and 0.770 according to 2-SLS estimates) and a low propensity to invest (0.0574 according to OLS estimates and 0.0593 according to 2-SLS estimates)[27], one would expect a low multiplier effect of consumption and investment on national income, particularly that investments depend on imports, so that any increase in investment is realized at the cost of leakages outside the economy due to the necessity of imports to investments.

The multiplier effect of the predetermined variables on the main endogenous aggregates is also low, as shown by the previous table. It is interesting to observe the effect of current transfers from abroad on these aggregates.

The least squares method applied directly to the reduced form equations dit not show any significant effect of the transfers on any of the endogenous variables with the exception of Government spending which was found to increase by 69,5 L.E. for each extra 100 L.E. of current transfers from abroad. This confirms the result found previously, namely that current transfers have been used to finance government consumption expenditures rather than increase investments on private consumption. Finally, savings appear to be inversely related to net current transfers from abroad.

The reduced form parameters derived from 2-SLS estimates of the structural form show that 100 L.E. of net current transfers from abroad increase the country's current resources (NIm + M) by less than their amount $(0.837 + 0.0768) \times 100 = 91.38$ L.E.). This increase is mainly spent by the Government. Government consumption expenditures increase by 86,5 L.E. for each additional 100 L.E. of net current transfers. The effect of these transfers on investments is much smaller, they increase by 4,97 L.E. for each additional 100 L.E. of A. National income at factor costs is increased by 67,9 L.E. for each extra 100 L.E. of current transfers while net indirect taxes are increased by 15,8 L.E. Finally, net current transfers from abroad appear to have a negative effect on savings[28] and their effect on private consumption is negligible.

The impact of exports and net factor incomes from abroad is different, as income from exports seems to have been used to finance imports and investments rather than to finance increased consumption expenditures by the Government, as shown by the estimates of the coefficients of (E+F) in the previous table.

The direct least squares estimates of the reduced form showed no significant effect of the variable (E+F) on any expenditures item except investments and imports, thereby increasing national income in market prices by 133.3 L.E. for each additional 100 L.E. from exports or net factor incomes abroad. The contribution of experts earnings to savings is positive.

The reduced form parameters obtained from the 2-SLS estimates of the structural parameters, point qualitatively to the same result, namely that a 100 L.E. increase in exports plus net factor incomes from abroad increases national resources by 180.9 L.E. (99.7 L.E. for NIm and 81.2 L.E. for M). A 100 L.E. increase in (E + F) increases mainly private consumption (62.3 L.E.) and investment (52.5 L.E.). Government spending also increases but by less than the previous two aggregate (28.5 L.E.). Savings also rise as a result of additional exports proceeds.

Finally, increased previous consumption has a multiplier effect on national resources of 1.438 (=1.317 for NIm and 0.121 for M). This is mostly reflected on current consumption (which rises by 98.3 L.E. for each additional 100 L.E. of C_{-1}), investments increase slightly by 7.82 L.E. and Government expenditures are raised by 37.6 as a result of 100 L.E. of additional logged consumption. The total effect of C_{-1} on savings is negative.

III — Concluding Remarks

Private consumption, during the period under study, was dependent on the level of income and on consumption habits, it has been growing in absolute terms but its share in national income showed no evidence of an increasing trend. The share of private consumption in national income fluctuated around 67.5% in the range between 72.8% and 64.4%.

Public consumption has been growing steadily and its share in national income grew also from 17.5% in 1960 to 28.1% in 1973. This increase was financed through increased taxation and using net current transfers from abroad. The considerable rise in indirect taxation instead of reducing the share of aggregate consumption in the economy[29] was used to finance larger public consumption. Current transfers from abroad made little contribution to economic growth, as they were mainly used to finance increased public consumption, and their effect on savings was found to be negative.

Investments depended on imports which, in turn, depended on the ability to finance them through exportation. Exports were checked by the growth of private and public consumption which reduced the residual of national product available for exports and by the loss of external markets due to the inefficiency in marketing these exports. Current transfers from abroad seem to have been ineffective in financing imports and investments and the share of public consumption in national income seems to have grown at the expense of the share of investments.

Under these circumstances the prospects of economic development for Egypt are bleak, unless the savings rate is raised in the most abrupt manner which is not likely due to population pressures and to the external conflicts that the country has to face, which in turn lead to the growth of both private and public consumption. The alternative opened for the economy is to receive more aid and to use it rationally for purposes of economic development unless some spectacular discovery of oil fields or other exportable primary products occurs.

APPENDIX

Table I. — Basic Data used

(in million L.E.)

Years[1]	NI_m [2]	NI_f	T	M	C	G	I	(E+F)	A	S[3]	Surplus on current a/c[4]
1960	1461	1365	96	299	996	256	226	282	1	209	—16
1961	1513	1411	102	325	1102	247	251	239	—	164	—86
1962	1679	1557	122	421	1171	318	300	311	—	190	—104
1963	1882	1733	148	492	1247	402	372	352	4	233	—136
1964	2192	1953	239	468	1463	437	382	390	3	292	—75
1965	2388	2109	279	532	1583	482	446	395	—	323	—137
1966	2459	2159	300	453	1633	488	386	407	31	338	—15
1967	2510	2265	245	443	1763	562	342	287	86	185	—71
1968	2657	2300	357	446	1807	645	318	341	128	205	23
1969	2927	2508	419	547	1940	717	416	381	145	270	—21
1970	3086	2641	445	600	2066	794	437	382	123	226	—94
1971	3275	2822	453	625	2208	883	420	390	129	184	—106
1972	3403	2943	460	649	2237	905	467	443	131	261	—75
1973	3634	3188	446	729	2339	1020	502	502	258	275	31

Notes : (1) Years beginning July 1

(2) Including consumption of fixed capital and the statistical discrepancy.

(3) S = NIm — C — G

(4) Surplus on current account = (E + F) + A — M

Sources : Follow-Up Reports of the Ministry of National Planning and the Yearbook of National Accounts Statistics of the United Nations (various years).

Table 2. — Ratios of the main Aggregates to National Income in Market Prices.

Year	C/NIm	G/NIm	I/NIm	T/NIm	M/NIm	(E+F)/ NIm	A/NIm	S/NIm
1960	0,682	0,175	0,155	0,066	0,205	0,193	0,0007	0,143
1961	0,728	0,163	0,166	0,067	0,215	0,158	0,0000	0,108
1962	0,697	0,189	0,179	0,073	0,251	0,185	0,0000	0,113
1963	0,663	0,214	0,198	0,079	0,261	0,187	0,0021	0,124
1964	0,667	0,199	0,174	0,109	0,214	0,178	0,0014	0,133
1965	0,663	0,202	0,187	0,117	0,223	0,165	0,0000	0,135
1966	0,664	0,198	0,157	0,122	0,184	0,166	0,013	0,137
1967	0,702	0,224	0,136	0,098	0,176	0,114	0,034	0,074
1968	0,680	0,243	0,120	0,134	0,168	0,128	0,048	0,077
1969	0,663	0,245	0,142	0,143	0,208	0,130	0,050	0,092
1970	0,669	0,257	0,142	0,144	0,194	0,124	0,040	0,073
1971	0,674	0,270	0,128	0,138	0,191	0,119	0,039	0,056
1972	0,657	0,266	0,137	0,135	0,191	0,130	0,038	0,077
1973	0,644	0,281	0,138	0,123	0,201	0,138	0,071	0,076

Note : The identities :

$$1 \equiv \frac{C}{NIm} + \frac{G}{NIm} + \frac{I}{NIm} + \frac{(E+F)}{NIm} - \frac{M}{NIm}$$

and

$$\frac{M}{NIm} + \frac{S}{NIm} \equiv \frac{I}{NIm} + \frac{(E+F)}{NIm}$$

are not holding for all years due to approximation and rounding errors

1) OLS estimates of the structural form :

$$NIm + M = C + G + I + (E+F)$$

$$NIm = NIf + T$$

$$M = 0.0952\ NIm + 0.688\ (E+F) \qquad R^2 = 0,883$$
$$(0,0269) \qquad (0,264)$$

$$C = 0.380\ NIf + 0.501\ C_{-1} \qquad R^2 = 0,992$$
$$(0.132) \qquad (0.169)$$

$$I = 0.603\ M \qquad R^2 = 0,874$$
$$(0.0662)$$

$$G = 174.114 + 1.066\ T + 1.307A \qquad R^2 = 0,953$$
$$(50.279) \quad (0.223) \quad (0.364)$$

$$T = 223.302 + 0.234\ NIf \qquad R^2 = 0,909$$
$$(52.39) \quad (0.0224)$$

2) 2-SLS estimates of the structural form :

1st stage

$$NI^*m = 1.416\ C\text{-}1 + 1.333\ (E+F) \qquad R^2 = 0,988$$
$$(0.0733) \qquad (0.454)$$

$$NI^*f = 1.141\ C\text{-}1 + 1.087\ (E+F) \qquad R^2 = 0,982$$
$$(0.0727) \qquad (0.450)$$

$$M^* = 0.129\ C\text{-}1 + 0.839\ (E+F) \qquad R^2 = 0,868$$
$$(0.0411) \qquad (0.254)$$

$$T^* = -183.964 + 0.302\ C\text{-}1 \qquad R^2 + 0,920$$
$$(45.284) \qquad (0.0269)$$

2nd stage

$$NIm + M = C + G + I + (E+F)$$

$$NIm = NIf + T$$

$$M = 0.0917\ NI^*m + 0.721\ (E+F) \qquad R^2 = 0.873$$
$$(0.0282) \qquad (0.275)$$

$$C = 0.770\ NI^*f \qquad R^2 = 0.978$$
$$(0.0332)$$

or

$$C = 131.7 + 0.983\ C\text{-}1 \qquad R^2 = 0,986$$
$$(60.2) \quad (0.0358)$$

$$I = 0.647\ M^* \qquad R^2 = 0,867$$
$$(0.073)$$

$$G = 1.518\ T^* + 0.625\ A \qquad R^2 = 0,974$$
$$(0.209) \qquad (0.328)$$

$$T = -216.026 + 0.232\ NI^*f \qquad R^2 = 0,968$$
$$(29.381) \quad (0.0127)$$

FOOTNOTES

(1) Fiscal years beginning July 1st.

(2) The figures include consumption of fixed capital and also a statistical discrepancy to achieve the identity between the sources and uses of annual resources available.

(3) Savings could have been calculated as the difference between gross investment and the value of the balance of payments deficit on current account. The estimates thus obtained are different from the estimates we used to the extent that the statistical discrepancy component of national income is not zero. Our estimates here contain the error component on the ground that it is a part of national income that is not explicitly consumed and it seems more logical to leave it in the estimates of savings — anyway, this statistical discrepancy is only a small fraction of national income which does not exceed 1%.

(4) This means that the number of variables excluded from each of these equations but included in other equations is greater than the number of equations of the model less one.

(5) H. Theil, "**Estimation and Simultaneous Correlation in Complete Equation Systems**", The Hague Central Planning Bureau (Mimeographed), 1953 and R.L. Basmann, "A Generalized Classical Method of Linear Estimation of Coefficients in a Structural Equation", Econometrics, Vol. 25, 1957, pp. 77 - 83.

(6) The corresponding 2-SLS estimates were as follows :

$$(1'a) \qquad M = \underset{(0.0533)}{0.0741}NI^*m + \underset{(0.300)}{0.758}\,(E+F) + \underset{(0.344)}{0.137}A \qquad R^2 = 0.875$$

where NI*m was estimated from the following relationship

$$(a) \qquad NI^*m = \underset{(0.0733)}{1.416}C_{-1} + \underset{(0.454)}{1.333}\,(E+F) \qquad R^2 = 0.988$$

(7) The OLS estimates were as follows :

$$M = \underset{(0.0321)}{0.0826}\,NIm + \underset{(0.372)}{0.744}\,(E+F) + \underset{(105.519)}{9.186}A_d \qquad R^2 = 0.845$$

and the 2-SLS estimates were found to be

$$M = 0.0435\ NI^*m + 1.0128\ (E+F) + 67.215A \qquad R^2 = 0.916$$
$$(0.0378) \quad (0.440) \quad (63.351)$$

where NI*m was estimated from equation (a) given in the preceding footnote

(8) NI*m was estimated from the following relationship :

(a) $$NI^*m = 1.416C_{-1} + 1.333\ (E+F) \qquad R^2 = 0.988$$
$$(0.0733) \quad (0.454)$$

using an alternative estimate of NIm, namely

(b) $$NI^{**}m = 1.331C_{-1} + 1.385\ (E+F) + 0.457A \qquad R^2 = 0.989$$
$$(0.137) \quad (0.468) \quad (0.616)$$

The import function was found to be :

(2'b) $$M^* = 0.0922\ NI^{**}m + 0.718\ (E+F) \qquad R^2 = 0.874$$
$$(0.0280) \quad (0.273)$$

However, estimates (2'a) were preferred to (2'b) as the coefficient of A in (b) is not significant.

(9) J.S. Duesenberry : **Income, Saving and the Theory of Consumer Behavior,** Cambridge, Massachussets, 1949 - also, F. Modigliani : «Fluctuations in the Saving Income Ratio : A Problem in Economic Forecasting", NBER, **Studies in Income and Wealth,** Vol. II, New-York, 1949.

(10) T.M. Brown: "Habit Persistence and Lags in Consumer Behavior" **Econometrics,** July 1952, pp. 355 - 371 and T.E. Davis "The Consumption Function as a Tool for Prediction" **Review of Economics and Statistics,** August 1952, pp. 270 - 277.

(11) M. Friedman: **A Theory of the Consumption Function,** Princeton, 1957.

(12) L.M. Koyck : **Distributed Lags and Investment Analysis,** Amsterdam, 1954.

(13) The marginal propensity to consume was found in another study by the author (see : "Some Aspects of Regional Differences in the U.A.R. **«L'Egypte Contemporaine»,** January 1971) to be as high as 0.925 on the basis of cross section data for the Egyptian Governorates on average consumption and average disponible income over the period 1964/65 to 1966/67.

This difference between the two estimates can partly be accounted for by the fact that the first study relies on figures of disposable income, while the present study uses figures on national income at factor costs, and partly by the fact that the figures for personal savings in the first study do not include the sums withheld by the Government to allow for pensions and social security which are considered as public savings rather than personal compulsory savings.

(14) NI*f was estimated from the following :

$$NI^*f = \underset{(0.0727)}{1.141\ C_{-1}} + \underset{(0.450)}{1.087\ (E+F)} \qquad R^2 = 0.982$$

Using an alternative estimate for NIf

$$NI^{**}f = \underset{(0.131)}{1.0114\ C_{-1}} + \underset{(0.447)}{1.165\ (E+F)} + \underset{(0.588)}{0.696\ A} \qquad R^2 = 0.985$$

The 2-SLS estimates of the consumption function (4) were accordingly

$$C^* = \underset{(66.538)}{124.871} + \underset{(0.275)}{0.0986\ NI^{**}f} + \underset{(0.351)}{0.857\ C_{-1}} \qquad R^2 = 0.986$$

(15) The consumption function estimates derived by using NI**f rather than NI*f (see the preceding footnote) were found to be :

$$C^* = \underset{(0.0339)}{0.767\ NI^{**}f} \qquad R^2 = 0.977$$

i.e. the marginal propensity to consume is 76.7% and the average propensity to consume is constant.

(16) The OLS estimates of this function were found to be:

$$I = \underset{(53.772)}{105.65} + \underset{(0.0384)}{0.0275\ NIm} + \underset{(0.231)}{0.407\ M} \qquad R^2 = 0.758$$

(17) M* is estimated from the relationship :

$$M^* = \underset{(0.0411)}{0.129\ C_{-1}} + \underset{(0.254)}{0.839\ (E+F)} \qquad R^2 = 0.868$$

using another estimate for M, namely :

$$M^{**} = 1.031\ (E+F) + 0.536\ A \qquad R^2 = 0.851$$
$$(0.235) \qquad (0.197)$$

the 2-SLS estimates were found to be as follows :

$$I^* = 123.0 + 0.622\ M^{**} \qquad R^2 = 0.787$$
$$(42.588) \quad (0.0977)$$

(18) The OLS estimates of this function were :

$$G = 0.892T + 0.468\ (E+F) + 1.31A \qquad R^2 = 0.962$$
$$(0.247) \quad (0.334) \qquad (0.348)$$

the constant term being insignificant has been discarded.

(19) T^* is given by :

$$T^* = -183.964 + 0.302\ C_{-1} \qquad R^2 = 0.920$$
$$(45.284) \quad (0.0269)$$

(20) See Table 2 in the Appendix.

(21) See the column corresponding to T in Table 1 and that corresponding to T/NIm in Table 2 of the Appendix.

(22) NI^*f is given by the first relation in footnote (14). Using $NI^{**}f$ given by the second relation of the same footnote, the indirect taxation function was estimated as :

$$T^* = -196.990 + 0.236\ NI^{**}f \qquad R^2 = 0.914$$
$$(48.164) \quad (0.0219)$$

These estimates are not significantly different from the estimates given in (7'a).

(23) See the last column of Table 2 in the Appendix.

(24) R. Mabro **The Egyptian Economy, 1952 - 1972,** Clarendon Press, Oxford, 1974.

(25) Rahman, Griffin, Weisskopf use the same kind of implicit savings function. Anisur Rahman "Foreign Capital and Domestic Savings. A Test of Haavalmo's Hypothesis with Cross Country Data", **Review of Economics and Statistics,** February 1968 ; Griffin and Enos "Foreign Assistance : Objectives and Consequences" **Economic Development and Cultural Change,** April 1970 ; Griffin "Foreign Capital, Domestic Savings and Eco-

nomic Development" **Bulletin,** Oxford University, Institute of Economics and Statistics, May 1970 T. Weisskopf "Impact of Foreign Capital Inflow on Domestic Savings in Underdeveloped Countries" **Journal of International Economics,** February 1972.

(26) Papanek "The effect of Aid and other Resource Transfers on Savings and Growth in Less Developed Countries", **Economic Journal,** September 1972 - also, "Aid, Foreign Private Investment, Savings and Growth in Less Developed Countries", **Journal of Political Economy,** January/February 1973.

(27) Using (2') and (5'), these two coefficients were respectively computed as the product of the marginal propensity to import and the coefficient of imports in the investment function.

(28) The results of the derivation of the reduced form parameters from the OLS estimates of the structural parameters are given for comparison. As the OLS estimates of the structural parameters are biased, the reduced form parameters derived from them will also be biased. Although, they differ significantly in magnitude, they also show that the multiplier effect of A on Government expenditures is highest (=1.807) while it is much smaller on other variables particularly investments (=0.142). The contribution of A to national income is sizeable here as it reaches 2,475 for NIm and 2.006 for NIf

(29) See Table 2 in the Appendix.