The conclusions and views expressed in this paper are those of the author and do not necessarily reflect those of the World Bank Group. The paper is a draft for discussion; please do not cite without the author's permission.

DPH8116

Population and Human Resources Division
Discussion Paper 81-16

LABOR FORCE GROWTH, EMPLOYMENT AND EARNINGS
IN EGYPT: 1966-1986*

May 1981

Prepared by:

R.H. Sabot, World Bank
L. Taylor, M.I.T.
Y. Boutros-Ghali

* Research supported by the World Bank, the Cairo University/M.I.T. Technology Adaptation Program and the National Science Foundation. We are grateful to S. Cochrane, T. King and J. Knight for comments on an earlier draft of this paper and to J. Armitage for research assistance.

The World Bank
Washington, DC 20433
USA
Introduction

This paper reviews evidence regarding employment and earnings in Egypt, and presents conditional projections of future developments. The first section relies on historical data about labor demand and supply trends to suggest a potentially severe labor absorption or employment problem. However, labor markets tightened in the 1970s (as the second section argues) due to acceleration in aggregate demand and emigration. In the third section, a general equilibrium model based on 1975 data is used to illustrate possible paths of labor supply and demand under different hypotheses. The results suggest that even moderate declines in export and investment growth may reverse the favorable wage and employment trends of the 1970's.

I. EGYPT'S "EMPLOYMENT PROBLEM"

To avoid downward pressure on earnings, hence an erosion of the standard of living of employees and their dependents, and likely increases in inequality, the growth of labor demand must keep pace with supply.\(^1\) Rapid rates of labor force growth have strained the ability of many developing economies to accomplish this. Egypt has been characterized as an example, par excellence, of a developing country with a severe "employment problem."\(^2\) Table 1 summarizes the evidence.

\(^1\) The adverse consequences of an employment problem of this type are not felt equally by all groups in the society. Those who derive their income from returns to capital may benefit from a decline in real wages. Because of a rationing of opportunities for higher education or institutional barriers to mobility between occupations or sectors, adverse trends in the rates of growth of labor supply and demand may have a disproportional effect on the wages of those at the bottom of the occupational hierarchy.

\(^2\) The census revealed that in 1976 wage employees comprised more than 65% of the Egyptian labor force.
On the supply side of the Egyptian labor market the principal cause of concern is the acceleration of population growth over the past 30 years (see columns 1 and 2). Before World War II, population was growing at a rate of 1 percent per annum, taking approximately 90 years to double; it is estimated that during the 1970 to 1976 period it was growing at 2.1 percent per annum, taking less than 30 years to double. Even if indications that population growth has begun to decelerate prove correct there will be a long lag before this change influences the rate of growth of Egyptians of working age. It is projected that over the 1980s the population between the ages of 15 and 60 will increase by 7,000,000 at an average annual rate of 2.6 percent, higher than projected rates of growth of the population as a whole.1

The decline in labor force participation rates which characterized the period from 1937 to 1970 also appears to have been reversed, beginning in 1972 (see columns 3 and 4). The decline was to a large extent a reflection of the increase in the proportion of the youngest age groups, with relatively low participation rates, in the working age population, a corollary of accelerating population growth. It was also due, particularly in the 1950s and 1960s, to rapid increases in educational enrollment, particularly among females. With the slowing of increases in enrollment ratios, participation rates of males and females begin to increase in the 1970s and are likely to continue to do so.

On the demand side of the labor market the limited absorptive capacity of the agriculture sector is the principal source of concern. Over the past 30 years the sectoral structure of employment in Egypt has changed significantly (see columns 6-11). The share of agriculture in total employment declined from 58.4 percent in 1947 to 47.7 percent in 1976. Until the late 1960s or early 1970s, while agriculture's share of employment declined,

1/ World Bank (1980)
agricultural employment continued to grow slowly. There is now, however, some
evidence suggesting that agricultural employment actually peaked during the
intercensal period and that the 1970s have witnessed a decline in the absolute
number of agricultural workers.

Changes in the structure of output and employment are a virtually
universal feature of economic growth. As incomes increase, differences in
income elasticities of demand among consumer goods, and sectoral differences
in capital intensities and the ease of factor substitution, will generate
different sectoral growth rates. Thus the concern is not with structural
change of employment per se, but rather with its direction, pace and causes.
The concern is that in Egypt, the principal impetus for the rapid decline
of the agricultural sector's share of employment has not been the rapid rate
of growth of demand in nonagricultural, particularly industrial, employment,
but the scarcity of land. Given the limits to the extension of Egypt's
cultivable land area, technological innovation that is too slow or inno-
vation of the "wrong" sort (labor-saving) implies rapidly diminishing returns
to labor in agriculture.

The high population density in the 6 percent of Egypt's land area
that is currently arable lends credence to these concerns. Information
on agricultural land and on the population it now supports in 21 of the most
densely populated developing countries together with Japan and the Netherlands
indicate that in 1975 agricultural population per square kilometer of cropped
area was highest in Egypt; the level is historically unprecedented. Moreover,
the estimated per annum growth rate of agricultural area in Egypt over the
1970 to 1975 period was among the lowest. This explains why, since 1882, the
index of total Egyptian population and of total population per square kilometer
of arable land have increased at virtually the same pace (see columns 1 and 5).

1/ World Bank (1980)
Put another way, if indeed the agricultural sector has reached its absorptive capacity, then whether or not the growth of the domestic labor force will exert downward pressure on earnings depends on the growth of demand for labor in nonagricultural activities.

There are grounds for pessimism regarding the prospects for absorbing the increments to the Egyptian labor force in productive nonagricultural employment even at constant real wages. In particular, concern focuses on the relationship between output and employment growth as described by output elasticities of demand for labor in various nonagricultural sectors (see columns 12-17). As in many other developing countries, in most sectors in Egypt the elasticities are well below unity, implying relatively rapid increases in labor productivity. For example, in transport and communications in the period from 1971 to 1976 the elasticity was only .45 -- that is an increase of output of over 66 percent was associated with an increase of employment of only 30 percent. In general, recent rates of growth of modern sector output in Egypt have been historically unprecedented, and indeed are higher than the more developed countries achieved during their periods of industrialization. Though much smaller, modern sector employment growth has also been impressive when measured against prior experience in Egypt and in the industrialized countries at the turn of the century. It is only when measured against the growth of supply of non-agricultural labor that the growth of labor demand appears inadequate.

There are exceptions to the rule of low output elasticities of demand for labor in Egypt. For the period from 1961 to 1966 the elasticity for the manufacturing sector (including petroleum and mining) is .9; for

the periods 1961-1966 and 1971-1976 the elasticities for the "other services" sector are .99 and 1.17 respectively. These exceptions do not, however, allay concern about Egypt's employment problem. On the contrary, these abnormally high elasticities can be seen as symptoms of two potentially threatening complications of Egypt's employment problem. To counter the tendency for labor incomes to decline or for queues of job seekers to form when growth of labor supply outpaces demand, the government can artificially inflate labor demand, at least in the short run.

Mabro claims that the acceleration of industrial employment growth in the 1960s (it averaged only 1.9 percent per annum between 1947 and 1960) was not due "to a higher rate of investment (hence the high output elasticity of demand of labor) but was a result of employment policies; after nationalization in 1961 and 1962 the Government compelled public companies to engage more persons than they actually required." Management had little reason to resist because the prevailing price system did not penalize inefficiency: high tariffs together with the cost plus method of setting prices allowed firms to pass on the increased wage bill as higher prices. Even if they had the incentive, firms could not lower wages in response to the labor glut. They were prohibited from doing so by labor legislation which set out rigid wage schedules. Moreover the labor laws prevented employers from dismissing workers save in exceptional circumstances. Under such a policy regime there are, nevertheless, constraints on the accumulation of surplus labor in industrial enterprises. Their effect may be reflected in the lower

2/ Ibid, p. 137.

Whether a high elasticity of employment to output is a symptom of, or a solution to, Egypt's labor supply problems is quantitatively a more important issue in the "other services" category than in the industrial sector. The services sector is considerably larger than the industrial sector when measured in terms of employment. Between 1937 and 1976 roughly 57 percent of the total increment of 4.42 million to the Egyptian labor force was employed by tertiary activities, which increased their share of total employment from 24 to 38.6 percent. For each additional worker employed in industry, three were engaged in the tertiary sector. As only an additional 643,500 workers were employed in construction and transport, most of the expansion took place in commerce and other services. Since 1960 changes in the sectoral pattern of employment have followed the same general trend. Between 1960 and 1976 the services sector had the second largest absolute increase in employment, and in fact absorbed 23 percent of the increment to the Egyptian labor force during this period.

The services sector can be divided into government services and private services, with a significant proportion of the latter falling within what has come to be known as the "informal sector." Both segments of the service sector, it is claimed, harbor large numbers of low productivity "surplus" workers. The two segments may be distinguished, however, by the skill levels and incomes of participants and by the mechanisms hypothesized to give rise to the labor surplus.

The workers in the private segment, or at least that apparently large part of it that falls within the informal sector, are for the most part relatively low-skilled and earn low incomes. Mabro claims that in
Egypt "the transfer of labor from agriculture, where they would have become increasingly underemployed, to low-paid, low-productivity jobs in certain service activities is not akin to reallocation to industry. Labor in these activities ... does not generate an economic surplus; the growth of these activities is unlikely to contribute to economic development through external economies or technical progress. The reallocation that takes place ... is, to a large extent, a transfer to the locus of poverty, underemployment and low productivity from one economic sector to another." The underlying model appears to be that of an easy entry monopolistically competitive sector: the structure of the market permits more and more workers to get a share of the total income generated in the sector, even though they may not raise total output, or may raise it by an amount which is less than the income they earn.

When viewed from this perspective, rapid growth of the private service sector in Egypt is a symptom of the larger employment problem. It is important to note, however, that while hypotheses regarding the economic role of this sector abound the evidence on income trends and labor utilization necessary to assess them does not appear to exist. All that can be said is that in Egypt today, as in many other developing countries, a higher share of the labor force is to be found in tertiary activities than in the now developed countries at comparable stages of development.1

There is a similar lack of hard evidence regarding the magnitude of the surplus of white-collar, high-income labor in government employment. There is a basis, however, for deducing a serious problem from information about apparent causes. The rapid growth of employment in government services reflects in part the government's commitment to serve university and upper secondary school leavers as an employer of last resort. The presumption is

1/ A. Berry and R. Sabot (1978)
The increase in educational opportunities was one of the fruits of the Egyptian revolution enjoyed by the general populace. Enrollments at all levels, but particularly at the postprimary level, have been increasing for three decades at rates between 5 and 10 percent annually. During the intercensal period (1960-1976) the proportion of paid employees with intermediate or higher certificates, increased from 10.2 to 19.3%. Aggregate data are suggestive of the accumulation (from 1960 to 1974) of white-collar workers in government employment (see columns 18-23). The proportion of white-collar workers increased in all but the commerce sector. The largest increases were in services, transport, public utilities, and mining and quarrying, sectors in which the government presence is most prominent. The increase from 13 to 45 percent in the proportion of white-collar workers in public utilities is the most striking; it is difficult to reconcile this increase with efficiency in the allocation of labor.
II. SOME CONTRADICTORY EVIDENCE

The stylized facts considered above suggest that increases in the Egyptian labor force appear to be outstripping the capacity of the economy for generating productive employment opportunities. The revision of early estimates, some of which date back to the 1930s, of the magnitude of rural surplus labor that followed the accumulation of new data, distinctly better both with regard to accuracy and relevance, should, however, serve as a warning that with regard to labor utilization in Egypt appearances can be deceiving.

To the casual observers of 40 years ago it was striking how little the rural population devoted to activities normally considered work. This apparent leisure, the high proportion of the labor force working in peasant agriculture, and the abundance of labor relative to capital and land in Egyptian agriculture suggested that the rate of disguised unemployment might be quite high. Estimates of that rate made in the 1940s and 1950s were on the order of 20-30 percent or even more of the farm population, as high as the unemployment rate in the industrialized countries at the bottom of the Great Depression.

Assessments of the magnitude of rural surplus labor in Egypt have been revised. Rural dwellers do not, in fact, enjoy as much leisure as presumed. High labor inputs characterize much of peasant agriculture. Overall, Egyptians appear to work longer hours than people in industrialized countries, and there is no clear tendency in Egypt for persons in agriculture to work shorter hours than in nonagriculture. In part it was the marked seasonal variations in labor use in agriculture, with many hours being worked in some months, and few in others, that misled the early observers. According to one survey adult males in rural areas work an average of about 50 hours per week.
from March to October and less during the slack winter months. Even on very small farms of less than two acres labor is fully utilized for much of the year due to the availability of wage employment on large farms and outside agriculture. Self-employment in nonfarm economic activities, trade and crafts, also absorbs productively much labor. Indeed, it is claimed that currently in some segments of the agricultural sector there is a problem of labor scarcity.

The evidence of generally high labor inputs and localized labor scarcity could not, however, be taken to imply the complete absence of rural surplus labor. There are imperfections in the markets for labor and land that lead to pockets of surplus labor. The persistence of interregional factor price differentials provides support for this hypothesis. Nevertheless it is clear that any difficulties nonagricultural sectors may face in absorbing in productive employment the annual increments to the Egyptian labor force are not, as was once generally believed, significantly exacerbated by a large overhang of rural disguised unemployment.

Moreover, post-1974 wage trends appear to contradict the diagnosis that Egypt suffers from a serious employment problem. Table 2 reveals that between 1974 and 1977 average wages in agriculture and construction outpaced

3/ The 55 percent decline between 1974 and 1978 in the production of onions, the third largest agricultural export crop, is cited as an example. The decline occurred despite an increase in delivery price of 68 percent during this period. The decline is generally attributed to labor scarcity and the associated doubling of the wage cost per acre for this labor intensive crop. See Amr Mohie-Eldine (1979).
Table 2: TRENDS IN AVERAGE WAGES IN VARIOUS SECTORS, EGYPT, 1974-1977
(in Egyptian pounds)

<table>
<thead>
<tr>
<th>Year</th>
<th>Construction</th>
<th>Agriculture</th>
</tr>
</thead>
<tbody>
<tr>
<td>1974</td>
<td>233.2</td>
<td>70.8</td>
</tr>
<tr>
<td>1975</td>
<td>376.2</td>
<td>106.5</td>
</tr>
<tr>
<td>1976</td>
<td>378.7</td>
<td>107.0</td>
</tr>
<tr>
<td>1977</td>
<td>378.3</td>
<td>107.6</td>
</tr>
</tbody>
</table>

Total increase 1974-1977: 62.3% 50%

Increase in consumer prices, 1974-1977: 32%

Source: N. Choucri et al. (1978).
by a wide margin increases in consumer prices. If wages are rising for
unskilled workers in the sectors least influenced by government wage regulations this suggests that, despite forecasts to the contrary, the growth of labor demand is outstripping increases in supply. In construction this impression is confirmed by other evidence. The recent shift to more capital intensive construction techniques is readily apparent. There are, moreover claims of absolute scarcities of certain skills. That these persist despite rapid wage increases is explained by the cost and time involved in training skilled workers. It has even been suggested that given the crucial role of construction in capital formation, and the nontradeable nature of the sector's output, continued shortages of construction labor may place a binding constraint on the growth of aggregate output.

Unemployment data in Egypt, as in most developing countries, suffer from problems of definition and measurement. The concept of "open unemployment" makes most sense for educated urban workers, the very category protected from involuntary joblessness by public sector guarantees of wage employment. Changes in unemployment rates, which measure a quantity adjustment, are at best only a crude indicator of changes in the aggregate balance between labor supply and demand which may also induce price (wage) adjustments. For example while the rate of open unemployment as measured by labor force surveys declined

1/ Workers in the service, mining and industry sectors, on average did not fair so well. The data suggest marginal declines in average real wages. The explanation for this marked divergence between sectors is, in large part, likely to be found in two factors: the high proportion of workers in the sectors with declining real wages in white-collar occupations; the high proportion of such workers in government employment. Other evidence suggests that wages of white-collar workers and government employees have not increased as rapidly as blue-collar and private sector employees, another consequence perhaps of rapid educational expansion.

2/ See N. Choucri et. al.
steadily from 1968 (2.8%) to 1972 (1.4%), suggesting a tightening of the labor market, indices of real wages of unskilled workers also declined. Whether, in sum, the labor market had tightened or loosened is unclear. It is perhaps more significant that in the post-1974 period of rising wages there is evidence that open unemployment remains at a very low level. In 1976 the census classified as unemployed less than 25 percent of the number of workers so classified by the 1960 census.

Explanations for the post-1974 tightening of the market for manual labor in Egypt and the associated increase in real wages are to be found on both the supply and the demand side. On the supply side the most notable contributing factor has been the external migration of workers. This migration occurred at historically unprecedented rates in the 1970s. Between 1968 and 1971 the number of Egyptians leaving annually to work abroad nearly doubled; between 1971 and 1973 the number doubled again, to over 500,000, and since then has remained at a high level. The development programs of the newly rich Arab oil exporting countries have generated demands for labor at all skill levels that exceed by a wide margin domestic labor supplies. Rates of pay for Egyptians are five-to-ten times or more than what they can earn at home. The best, though still crude, estimate is that the stock of Egyptian workers abroad reached one million in 1979, nearly 10 percent of the entire Egyptian labor force.

1/ CAPMAS (various years).

2/ See Abedel-Fadil (1975) and Table 3 below.

3/ CAPMAS (1960 and 1976). It is not uncommon in developing countries for rates of open unemployment to be four to five times those prevailing in Egypt. The Egyptian rates are unusually low. See Berry and R. Sabot (1978),

4/ The principal migrant receiving countries have been Libya, Saudi Arabia, Algeria and Kuwait.

Out-migration has decreased the rate of growth of the domestic labor by some 30 percent, from more than 3 percent per annum to roughly 2 percent per annum. This obviously implies, for a given rate of growth of domestic labor demand, a tighter labor market than there would have been otherwise. The experience of the construction sector labor market between 1966 and 1974 suggests that the influence of emigration on wages was substantial. Average real wages in construction increased by 5-10 percent between 1972 and 1974; over the previous six years real wages had actually declined. Yet output of the construction sector, hence presumably the domestic demand for labor in construction, was actually lower in 1974 than it was in 1972. The association between the increase in wages and the increase in the external demand for labor thus appears unambiguous.

Simultaneous with the reduction of the rate of growth of the labor force there was an increase in the rate of growth of labor demand. Annual growth rates of gross domestic product (GDP) at constant factor cost accelerated from 2.7 percent in 1974 to an average of 9.3 percent over the following three years. During the latter period investment as a proportion of GNP was one third greater than in 1974. This surge in investment and output growth was accomplished with the help of increases in the volumes of aid flows from OECD countries and of dramatic rises in workers' remittances, the demand side dimension of the impact of emigration. There is no doubt that these trends contributed to the tightening of the domestic market for manual labor and to the marked rises in real wages in the 1970s. Whether the unusually low rates of growth of domestic labor supply and the unusually high rates of growth of labor demand can be sustained in the years

\[1/\ For the period 1974-1977 the annual average growth of GDP was 7.6% which compares with a 3.9% average for 1967-1973. See World Bank (1980)\]
ahead, and the labor market consequences of not doing so, are assessed in the next section.

III. WHAT LIES AHEAD?

Among Egyptian planners and policymakers some complacency about the employment problem would be understandable. The labor market in the 1970s did not convey the impression of suffering the effects of a chronic tendency for growth of labor supply to outstrip demand. Viewed from a different, long term, perspective, the extraordinary performance of the 1970s did not, however, appear to alter the underlying trends that give rise to a more pessimistic view. Nothing could be done to decrease the demographically predetermined high rate of growth of Egyptians of working age. Nothing was done to make the growth path of the economy more demanding of labor. The favorable wage trends were to a large extent a function of capital imports and labor exports. It is pertinent to ask what the labor market consequences in the medium term will be if the favorable supply and demand trends of the mid 1970s are not sustained. A historical perspective on wage trends increases the relevance of this query.

Table 3 indicates that the real wage for rural unskilled labor fluctuated regularly over the period 1938-74. However, by the end of the period it was only 25 percent higher than it was in 1938. Is the post-1974 upward trend in wages likely to persist, marking a true break from the tendency toward stagnation that has characterized mid-twentieth century Egyptian economic history? Or are the recent increases simply a phase in another of the wage cycles that have characterized Egyptian labor market history? Has the timely exploitation of opportunities in foreign capital and
labor markets simply postponed the day of reckoning with the Egyptian economy's underlying employment problem?

To assist in answering these questions we have used a computable general equilibrium model constructed around a 1976 social accounting matrix for Egypt. The matrix provides a twelve sector interindustry breakdown of the economy. The model was developed and previously used for other purposes.\(^1\)

We have changed the specification somewhat to focus more sharply on labor market issues. In particular, labor demand has been disaggregated into three skill categories.\(^2\) For most sectors there are separate two-level production functions for public and private enterprises. At the first level value-added depends on inputs of aggregate labor, capital and, in agricultural activities, land. At the second level aggregate labor is produced with inputs of three types of labor — white-collar, skilled and unskilled — along a constant elasticity of substitution (CES) production function. From this production structure incomes are generated through returns to labor, capital and land and distributed to their owners.

A typical solution sequence goes as follows: initial production levels and factor returns (wages, profits, and rents) are assumed. From

---


\(^2\) See the Appendix for a more detailed discussion of specification issues.
<table>
<thead>
<tr>
<th>Year</th>
<th>Money Wage Index</th>
<th>Cost-of-living Index</th>
<th>Real Wage Index</th>
</tr>
</thead>
<tbody>
<tr>
<td>1938</td>
<td>100</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>1939</td>
<td>117</td>
<td>101</td>
<td>116</td>
</tr>
<tr>
<td>1941</td>
<td>120</td>
<td>132</td>
<td>90</td>
</tr>
<tr>
<td>1942</td>
<td>167</td>
<td>198</td>
<td>83</td>
</tr>
<tr>
<td>1943</td>
<td>210</td>
<td>238</td>
<td>87</td>
</tr>
<tr>
<td>1944</td>
<td>310</td>
<td>262</td>
<td>117</td>
</tr>
<tr>
<td>1945</td>
<td>310</td>
<td>262</td>
<td>117</td>
</tr>
<tr>
<td>1946</td>
<td>317</td>
<td>297</td>
<td>107</td>
</tr>
<tr>
<td>1948</td>
<td>333</td>
<td>271</td>
<td>123</td>
</tr>
<tr>
<td>1949</td>
<td>333</td>
<td>259</td>
<td>130</td>
</tr>
<tr>
<td>1950</td>
<td>387</td>
<td>267</td>
<td>147</td>
</tr>
<tr>
<td>1951</td>
<td>420</td>
<td>263</td>
<td>160</td>
</tr>
<tr>
<td>1952</td>
<td>400</td>
<td>265</td>
<td>151</td>
</tr>
<tr>
<td>1953</td>
<td>400</td>
<td>269</td>
<td>150</td>
</tr>
<tr>
<td>1955</td>
<td>253</td>
<td>294</td>
<td>87</td>
</tr>
<tr>
<td>1956</td>
<td>333</td>
<td>342</td>
<td>97</td>
</tr>
<tr>
<td>1959</td>
<td>417</td>
<td>334</td>
<td>124</td>
</tr>
<tr>
<td>1960</td>
<td>417</td>
<td>337</td>
<td>123</td>
</tr>
<tr>
<td>1961</td>
<td>410</td>
<td>358</td>
<td>113</td>
</tr>
<tr>
<td>1962</td>
<td>450</td>
<td>367</td>
<td>122</td>
</tr>
<tr>
<td>1963</td>
<td>480</td>
<td>377</td>
<td>127</td>
</tr>
<tr>
<td>1964</td>
<td>609</td>
<td>438</td>
<td>138</td>
</tr>
<tr>
<td>1965</td>
<td>704</td>
<td>519</td>
<td>135</td>
</tr>
<tr>
<td>1966</td>
<td>801</td>
<td>468</td>
<td>170</td>
</tr>
<tr>
<td>1967</td>
<td>784</td>
<td>479</td>
<td>162</td>
</tr>
<tr>
<td>1968</td>
<td>784</td>
<td>499</td>
<td>156</td>
</tr>
<tr>
<td>1969</td>
<td>817</td>
<td>536</td>
<td>151</td>
</tr>
<tr>
<td>1970</td>
<td>801</td>
<td>576</td>
<td>138</td>
</tr>
<tr>
<td>1971</td>
<td>817</td>
<td>580</td>
<td>140</td>
</tr>
<tr>
<td>1972</td>
<td>880</td>
<td>613</td>
<td>143</td>
</tr>
<tr>
<td>1973</td>
<td>930</td>
<td>661</td>
<td>140</td>
</tr>
<tr>
<td>1974</td>
<td>1,001</td>
<td>702</td>
<td>125</td>
</tr>
</tbody>
</table>

Source: ABDEL - FADIL (1975)
these we compute value-added, incomes and sectoral levels of consumption demand. The latter, along with other exogenous components of final demand (investment, government, exports, stock changes and remittances) determine a new level of output. The procedure is repeated (this time keeping factor returns as they were) until equilibrium is reached between aggregate supply and demand or, in other words, until

\[ X = AX + C(X) + G + E + S + I \]

is satisfied.

Next, factor demands are computed (for the equilibrium output) and then matched with supplies of factors. Factor returns are adjusted to equilibrate the two. The equilibrium factor returns are then reintroduced in the first stage and the process again repeated until equilibrium is achieved in both the savings-investment equation and in the factor markets.

Precisely how the model is closed, by which we mean the specification of which factors will be constrained, is important for our purposes since it determines which factor returns will move to equate supply and demand. Not constraining a factor implies an infinite elasticity of supply and a fixed nominal rate of return. Our decision to constrain the supply of unskilled and blue-collar labor is based on revisionist views of rural surplus labor and on the implications of recent wage trends. Our decision not to constrain the supply of white collar labor is based on our knowledge of public sector employment policies and other evidence of overstaffing.  

---

1/ Capital is constrained in all sectors other than agriculture, where it is assumed for the most part to be traditional in nature and easily reproducible, and in services, which includes the Suez Canal and tourism, because of the difficulty of defining the concept there. Total land use in agriculture is constrained.
The Base Run

We use the model to elucidate the implications for labor market conditions of alternative assumptions regarding the growth of the domestic labor force, on the one hand, and of the various categories of final demand, which in the model are exogenous variables, on the other, with 1976 as the base year. Table 4 presents the values of the labor supply and demand variables included in the various runs of the model. There are two supply side alternatives. In the 1960s the domestic labor force grew at about the same rate as the total labor force which, because of the age structure of the population and the changes in participation rates increased more rapidly than Egypt’s population. Between 1970 and 1976, the rate of growth of the domestic labor force fell below that of the total labor force as a consequence of emigration. The difference between the high and low projections for 1976–1986 depend on alternative assumptions principally regarding the rate of emigration, but also on trends in participation rates and in the size of the military.

There are also two alternative sets of projections for various categories of exogenous demand. With the exception of government expenditure, which is explained below, the projected growth rates are all relatively high in one set and low in the other. The high set was taken from the Egyptian five-year plan; the other set was based on estimates made by the World Bank.

The base run of the model serves as our reference point for all subsequent runs. Given our focus on labor market balance and wage trends it is the most optimistic of alternatives as it combines the low set of projections of domestic labor force growth, assuming therefore continuation of high rates of emigration, with high rates of growth of the exogenous demand

1/ Since there is considerable uncertainty regarding the values of the exogenous supply and demand side variables, the outputs of the model are not forecasts. They should be viewed as illustrative of alternative output and labor market outcomes.
Table 4: VALUES OF THE LABOR SUPPLY AND DEMAND VARIABLES INCLUDED IN THE BASE RUN AND VARIANTS

<table>
<thead>
<tr>
<th>Exogenous Variables</th>
<th>Base Run</th>
<th>Var1*</th>
<th>Var1a*</th>
<th>Var2*</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Growth Rates (%)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Investment</td>
<td>8.9</td>
<td>-</td>
<td>-</td>
<td>3.5</td>
</tr>
<tr>
<td>Stocks and Inventories</td>
<td>3.0</td>
<td>-</td>
<td>-</td>
<td>2.0</td>
</tr>
<tr>
<td>Government Expenditures</td>
<td>4.0</td>
<td>-</td>
<td>-</td>
<td>6.5</td>
</tr>
<tr>
<td>Exports</td>
<td>5.9</td>
<td>-</td>
<td>-</td>
<td>3.0</td>
</tr>
<tr>
<td>Remittances</td>
<td>11.3</td>
<td>-</td>
<td>4.0</td>
<td>7.5</td>
</tr>
<tr>
<td>White Collar Labor</td>
<td>3.13</td>
<td>3.82</td>
<td>3.82</td>
<td>3.82</td>
</tr>
<tr>
<td>Blue Collar Labor</td>
<td>3.22</td>
<td>3.91</td>
<td>3.91</td>
<td>3.91</td>
</tr>
<tr>
<td>Unskilled Labor</td>
<td>0.98</td>
<td>1.67</td>
<td>1.67</td>
<td>1.67</td>
</tr>
<tr>
<td>Labor Productivity</td>
<td>2.0</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Crop Acreage</td>
<td>1.5</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

* - Indicates no change from base run.
Table 5: Changes in Commodity Prices & Output Manual Labour Demand & Wages

<table>
<thead>
<tr>
<th></th>
<th></th>
<th>Base Run</th>
<th></th>
<th></th>
<th>Variant 2</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>%Change in output 76-81</td>
<td>Prices 1976=1</td>
<td>%Changes in Labour Demand skilled</td>
<td>unskilled</td>
<td>%Changes in Wages skilled</td>
<td>unskilled</td>
</tr>
<tr>
<td>1</td>
<td>Staple food</td>
<td>26.95</td>
<td>1.41</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Nonstaple food</td>
<td>42.63</td>
<td>1.37</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Cotton</td>
<td>31.38</td>
<td>1.41</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Other Agriculture</td>
<td>41.04</td>
<td>1.49</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Food Processing Ind.</td>
<td>34.95</td>
<td>1.36</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Textile Industry</td>
<td>28.84</td>
<td>1.97</td>
<td>24</td>
<td>11</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Other Industries</td>
<td>36.71</td>
<td>1.74</td>
<td>12</td>
<td>.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Construction</td>
<td>52.53</td>
<td>1.88</td>
<td>25</td>
<td>206</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Crude Oil &amp; Products</td>
<td>33.92</td>
<td>2.08</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Transport &amp; Comm.</td>
<td>63.57</td>
<td>1.88</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Housing</td>
<td>30.52</td>
<td>2.35</td>
<td>1</td>
<td>147</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Other Services</td>
<td>35.82</td>
<td>1.56</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Construction & Housing: 144 81
Agriculture: 79 81
Industry (6,7,9): 115 123
Since it is assumed that the key exogenous variables continue the trends of the mid 1970s, the results of the base run should not come as a surprise. With slow labor force growth and rapid growth of aggregate demand, inability to absorb increments to the labor force is not Egypt's problem. On the contrary, even assuming two percent increases per annum in labor productivity, there is some doubt whether the supply of labor is adequate to satisfy the growing demand. Table 5 indicates the output price, manual labor demand, and wage changes given by the model for various sectors over a five-year period. Production levels, led by construction and transport and communications, rise rapidly as do prices. Increases in demand for manual labor are also large and substantial increases in real wages are forecast for all manual workers. The real wages of white collar labor do not rise because its supply is unconstrained, but the forecasts of increased demand relative to supply suggest a marked decline in overstaffing, assuming of course mobility of labor from positions where productivity is low to positions where better use can be made of their skills.

1/ We have assumed a one year lag in all sectors in the transformation of investment into operating capital. We thus assumed that capital stocks grow at the rate that will produce by the end of the five year period an increase equal to the accumulated investment for four years plus unused capacity. (Unused capacity, estimated at 18.1% in industry and 8% in the remaining nonagricultural sectors, is assumed to decline to zero over the period). The distribution of investment across sectors was based on the allocations indicated by the 1976-1982 plan.

2/ Results are also available for ten years. Since they do not add much to the discussion they are not presented here.
Variants 1 and 1a: Increased Labor Supply

In Variant 1 the impact of a decline in the rate of emigration is assessed. Reduced growth of demand for foreign workers is a likely consequence of the slowing of development expenditure by Egypt’s oil exporting neighbors. Only the labor supply assumptions are altered, as in Table 4. The growth rates of the exogenous categories of final demand are left as they were in the base run. Overall, the changes imply a 46 percent increase in the rate of growth of the domestic labor force. At the end of the five year period the projected labor force is roughly 3 percent greater than in the base run, a not inconsiderable difference, given the size of the Egyptian labor force in 1976.

The directions of the movements of output, prices and wages in response to this outward shift of the labor supply curve are predictable. Output is higher than in the base run, the labor constraint on production having been relaxed, and the rate of inflation is reduced, as are wage increases. What are notable are the magnitudes of these changes. They are much less than might be expected given such a difference in the rate of growth of the labor force. Substantial real wage increases are forecast, despite a substantial decline in emigration. This suggests that the Egyptian labor market may be less vulnerable than has been supposed to changes in the economic or political conditions of its neighbors.
Variant 1 took account only of the direct effect of a reduction of emigration. As we have noted, the flow of Egyptians has had a substantial impact, through remittances, on the demand side of the economy as well. The roughly one million Egyptians working abroad remitted approximately $2 billion in 1979. This compares with total exports of $4.6 billion and petroleum exports, the largest commodity group, of $1.4 billion. In the base run remittances are presumed to grow at 11.3 percent per annum. In Variant 1a they grow at 4 percent per annum. This reduction is the only demand-side change, indeed the only distinction between the base run and Variant 1a. While increasing the domestic supply of labor increased output, decreasing remittances reduced increases in output. The latter change outweighs the former. The effects of reduced growth of remittances and increased labor supply on prices and wages are, however, the same. The declines are again quite moderate, reinforcing the impression that a quite significant decline in rates of emigration and an associated slowing of the flow of remittances will not jeopardize the rising trend of real wages for manual workers in Egypt. Of course the consequences of a large scale repatriation of Egyptian workers would be quite another matter.

**Variant 2: Increased Labor Supply and Decreased Aggregate Demand**

In Variant 2, we substitute more pessimistic growth rates for the various exogenous categories of aggregate demand as in Table 4.
The biggest change is in investment growth. These rates are combined with the projections of more rapid growth of the labor force.

Table 5 presents the forecast output and price changes in various sectors. The decrease in aggregate demand has had a marked deflationary impact: output growth is significantly lower than in any of the other runs and prices actually decline. By comparison with the other runs, a markedly higher proportion of labor is absorbed in agriculture. Real wages decline. This run suggests that Egypt’s economic policymakers cannot afford to be complacent regarding the economy’s ability to absorb in productive employment the large increments to the labor force. Given the likelihood of slower rates of emigration, slower than planned rates of growth of aggregate demand, which historical and other country comparisons suggest are still quite high, would reverse the upward trend in real wages of the mid-1970s.

Variant 2 contains another warning. At first, the run was attempted with 4 percent increases in government spending, the same rate of increase as in the base run. But the resulting growth of aggregate demand was so slow that the model could not achieve equilibrium. It was necessary to increase government spending as a means of decreasing deflationary pressures. This outcome suggests that if investment, exports and remittances do not fulfill optimistic targets the government will be under pressure to take up the slack. The implication for the labor market is a further accumulation of surplus labor in the public sector and a reduced likelihood of discontinuing the employment guarantees for upper-level school leavers.
We have reviewed the evidence underlying assertions that Egypt suffers from a tendency for increases in labor supply to outstrip the growth of labor demand, and from the adverse impacts on earnings and the distribution of income that such a tendency implies. The Egyptian population is growing rapidly; the labor force is growing even faster. Land is scarce and, with regard to employment, the agricultural sector may have reached its absorptive capacity. Thus, nonagricultural sectors must bear most of the burden of absorbing the increments to the labor force. In manufacturing, construction, and transport, however, labor productivity has increased, i.e., employment has grown much slower than output. Despite rapid growth of output, these sectors have employed a relatively small proportion of labor force increment over the past three decades. Only in services has the growth of employment matched the growth of output; this sector has absorbed more than half of the increase of the labor force and has markedly increased its share of total employment. At least in the government segment of the service sector there is little doubt that rapid employment expansion has been associated with the accumulation of "surplus labor"; workers, in this instance white collar workers, earn wages well in excess of their productivity. Wage trends provide perhaps the most telling evidence in support of the contention that Egypt is faced with a serious employment problem. Real earnings of unskilled workers fluctuated between 1940 and the early 1970s but ended up at roughly the same level where they began. Secular stagnation of real incomes, or even a decline of wages, is just what is predicted when labor demand is unable to outpace the growth of labor supply.

Nevertheless, since the early 1970s, evidence contrary to the pessimistic assertions regarding Egypt's employment problem has been accumulating.
Open unemployment has been declining, wages of manual workers have been rising, in some manual occupations there are growing numbers of unskilled vacancies and attempts to substitute capital for labor are apparent in construction and elsewhere. Labor exports and capital imports provide an explanation for the marked tightening of the Egyptian labor market. Egyptians have been obtaining employment in the nearby oil producing countries in unprecedented numbers. As a consequence, the rate of growth of the domestic labor force has been sharply diminished. Simultaneously, increases in aid flows to Egypt have resulted in a surge in investment, output, and labor demand.

Has Egypt's employment problem been solved? Or will the underlying tendencies for growth of labor supply to outstrip demand reassert themselves? Our results caution against undue optimism in answering these questions. The labor market may be able to adjust to a substantial reduction in emigration if aggregate demand trends are sustained. Indeed, an increase in the domestic labor force may, in the short run, alleviate inflationary pressures, without adverse effects on wages. Taking account of moderate declines in the flow of remittances does not alter this assessment. It is, of course, difficult to determine just how sensitive the labor market is to changes in trends in aggregate demand. Our results, however, do suggest that even moderate declines in export and investment growth could rather quickly reverse the wage and unemployment trends of the 1970s. It is not for us to assess the likelihood of a slowing of growth of exogenous demand. What is clear is the as long as Egypt's population continues to grow rapidly, extraordinary growth of demand aggregates will be required to avoid yet another period of wage stagnation or decline.
APPENDIX: THE MODEL AND THE DATA

The model of this paper follows closely a computable general equilibrium model built by The Cairo University/M.I.T. Technology Adaptation Program. Since the details of the model are available in Eckaus, McCarthy and Mohie-Eldin (1979) (henceforth E.M.M.), we limit ourselves in this first section to outlining the general features of the model and its mechanism without going into the details of its structural equations. The structural equations that differentiate our model from the E.M.M. model are presented here.

Table Al presents the basic equations of the E.M.M. model in very stylized form. Its mechanisms are fairly straightforward. Output is determined in the material balance equations (e.g. [1]). This in turn determines the level of value added and factor demands. Value added, in turn, determines incomes, consumption, and government tax revenue (equations [2], [3], [4] and [5]). Output prices are cost-determined in e.g. [5] with consumption in turn determined by value added and all other terms in equation [1] determined exogenously. A new level of output is established. A savings investment balance will determine equilibrium output. Corresponding to this output are factor demands. These are matched with factor constraints to determined factor return. These in turn feed back into output prices via $P_i$ in equation [5]) leading to new incomes, consumptions, factor demands, etc. General equilibrium is obtained when the savings investment balance holds and factor markets clear simultaneously. Figure Al presents a flow-chart of the model.
Table A1: BASIC EQUATION OF THE E.C.M. MODEL

Material Balance

\[ X = AX + C + G + Z + I + \Delta s \]  \hspace{1cm} (1)

Value Added

\[ V = P(X, L, X) \]  \hspace{1cm} (2)

Incomes

\[ \tilde{\lambda}_j = \sum_{i=1}^{12} \lambda_{ij} P_i (1 - t_j) + S_j \]  \[ j = 1, \ldots, 12 \]

\[ \lambda_j = \sum_{i=1}^{6} \lambda_{ij} \]  \[ i = 1, \ldots, 12 \]  \hspace{1cm} (3)

Consumption

\[ C_1 = \sum_{j=1}^{6} C_{1j} \]  \[ i = 1, \ldots, 12 \]  \hspace{1cm} (4)

Price Determination

Price of Value Added

\[ P^V = g(u, r) \]

Price of output

\[ P_i = v^V \sum_{j=1}^{12} \lambda_{ij} P_j + \epsilon_{p_i} + \phi_{p_i} \]  \hspace{1cm} (5)

Government Expenditures & Revenue

\[ X = \sum_{i=1}^{12} \lambda_{i} \sum_{j=1}^{12} \lambda_{ij} P_j \]

\[ X = G + \sum_{j=1}^{12} S_j \]  \hspace{1cm} (6)

Foreign Trade

Exports

\[ \sum_{i=1}^{12} \sum_{j=1}^{12} \lambda_{ij} P_i \]

Imports

\[ \sum_{i=1}^{12} \sum_{j=1}^{12} \lambda_{ij} X_i + \sum_{i=1}^{12} \lambda_{ij} C_{mj} \]  \hspace{1cm} (7)

Factor Market Constraints

\[ \sum_{i=1}^{12} L_i (w/p) = L \]

\[ \sum_{i=1}^{12} X_i (r/p) = X \]  \hspace{1cm} (8)
Figure A1: FLOWCHART OF THE MODEL

Initial Output Guess $X_0$ → Output $X$

Initial Factor Returns
  Guess $W_0$, $r_0$ → Value Added $V$ → Prices $P$ → Incomes $Y$

Consumption $C$

Final Demand $C + G + E + I + ΔS = X_1$ → Factor Excess Demands

Factor Returns $W_1$, $r_1$
The model has 12 sectors built around an input-output matrix. Consumers are divided into six groups by size distribution of income and sector (three for the urban sector and three for the rural sector.) Factors are Capit昂, Land, and Labor. Production is for most sectors divided between private sector, production and public sector production.

A few basic features of the E.M.M. model are notable. The value added "production functions" are Cobb-Douglas functions with their implications of fixed factor shares and unit elasticities of substitution. This feature will be changed in the model presented in this chapter as explained below. Money does not enter the model explicitly. Government deficit (determined endogenously) is presumably financed by money creation. No money demand equations are specified. The inflation rate is endogenous, i.e. the price determination equations are not homogeneous of degree zero in nominal values.

As a consequence of this lack of homogeneity, the savings investment balance is attained in part through forced savings as prices shift against nominally fixed income flows. Foreign savings is determined endogenously; since real exports are fixed, it is implicitly assumed that the nominal exchange rate (for exports only) will move to keep them constant.

A. FACTOR SUBSTITUTION IN A GENERAL EQUILIBRIUM FRAMEWORK

To project labor demand for various skill levels a basic reformulation of the value added production function is necessary. In this section we present the production functions introduced and their implications for income determination and factor demands.
The Production Function

As in the E.M.M. model, our model is built around a twelve-sector input-output matrix and its production functions are assumed to have fixed coefficients for value added and intermediates:

\[ x_i = \nu_i + \sum_{j=1}^{12} \theta_{ij} x_j + \pi_i x_i \]  

(II-1)

i.e. value added is a fixed proportion of output along with domestic and imported intermediates.

Real value added is "produced" according to a two level C.E.S. production function (as opposed to a Cobb-Douglas in the E.M.M. model), i.e.-

\[ y_i = \left( \beta_1 L_i^{-\lambda_i} + \beta_2 K_i^{-\lambda_i} + \beta_3 T_i^{-\lambda_i} \right)^{-1/\lambda_i} \]  

(II-2)

where \( L_i \) = a labor aggregate (explained below) in \( i \)

\[ K_i \] = capital stock in \( i \)

\[ T_i \] = land in \( i \)

\[ \lambda_i = \frac{1-\sigma_i}{\sigma_i} \]  

where \( \sigma_i \) is the elasticity of factor substitution in value added \( i \)

\[ \beta_1, \beta_2, \beta_3 = \text{distribution parameters} \]

Corresponding to this production function is a cost function that will determine the "price" of value added.

\[ p_i = \left[ b_1 \mu_i (1-\sigma_i) + b_2 R_i (1-\sigma_i) + b_3 Z_i (1-\sigma_i) \right]^{1-\sigma_i} \]  

(II-3)

where

\[ \mu_i \] = is the unit cost of the labor aggregate input (defined below) in \( i \).

\[ R_i \] = the rental rate on capital in \( i \)

\[ Z_i \] = the rental rate on land in \( i \)

\[ b_1, b_2, b_3 = \text{cost parameters} \]
These two functions provide the first level of the C.E.S. production structure for value added. The second level refers to labor aggregate L. This aggregate is "produced" by combining — in a C.E.S. production function — three types of labor — skilled, blue collar, and unskilled.

Thus:

\[ L_i = \left[ \gamma_1^1 l_{i1}^{-\mu_1} + \gamma_1^2 l_{i2}^{-\mu_1} + \gamma_1^3 l_{i3}^{-\mu_1} \right]^{-1/\mu_1} \]  \tag{II-4}

with:

- \( l_{i1} \) = skilled labor in \( i \)
- \( l_{i2} \) = blue collar labor in \( i \)
- \( l_{i3} \) = unskilled labor in \( i \)

\[ \mu_i = \frac{1-\sigma_i^2}{\sigma_i^2} \] where \( \sigma_i \) is the elasticity of substitution between the various labor inputs

- \( \gamma_1^1, \gamma_1^2, \gamma_1^3 \) are distribution coefficients

Again corresponding to this "production function" a cost function will determine the cost of the labor aggregate \( W_i \) i.e.:

\[ W_i = \left[ g_i^1 w_{1i}^{1-\sigma_i^2} + g_i^2 w_{2i}^{1-\sigma_i^2} + g_i^3 w_{3i}^{1-\sigma_i^2} \right] \]  \tag{II-5}

The cost of this labor aggregate \( W_i \) will enter the cost function in (II-3) to determine the price of value added \( P_i^* \).
Factor Demands

Coupled with these cost equations, factor demand equations are derived along neoclassical lines:

\[ K_i = \beta_{ik} \left( \frac{R_i - \sigma_i^V}{p_i^V} \right) \cdot v_i X_i \]  
\[ T_i = \beta_{it} \left( \frac{Z_t - \sigma_t^V}{p_t^V} \right) \cdot v_i X_i \]  
\[ (II-6-A) \]

\[ X_j = \gamma_j \left[ \frac{W_j}{u_j} \right] \cdot \beta_{ij} \left[ \frac{W_i}{u_i} \right] \cdot \beta_{ij} \left( \frac{X_i}{p_i^V} \right) \cdot v_i X_i \]  
\[ (II-6-B) \]

\[ j = 1, 2, 3 \quad i = 1, \ldots, 12 \]

B. MODEL CLOSURE

As is clear from the nature of computable general equilibrium models of the E.C.M. type, the closure of the model will markedly affect the results of the comparative macro-statics performed. By closure we mean the specifications of which factors will be constrained in the model since this choice will determine which nominal factor returns will move to equate supply and demand. The homogeneity of the model rules out any unemployment in the constrained factors. On the other hand, not constraining a factor implies a fixed nominal return to it, and therefore, if prices go up, a decreased real return. In this model, after various experiments, we settled on the following constraints.
i) Unskilled Labor: In view of observed recent increases in real wages, we decided to constrain the supply of unskilled labor. Perfect labor mobility is assumed between the agricultural sectors and the nonindustrial sectors, (construction, housing, transportation, services). The industrial sectors (textiles, intermediate and capital goods industries and oil production) are constrained separately with perfect labor mobility among them. Wage differentials among sectors (which each of the two groups above) are kept fixed. This is to represent institutional barriers to wage equalization via labor mobility that the model cannot handle. Note that the differential between the two groups of unskilled workers (agricultural/nonindustrial and industrial) can vary.

ii) For blue collar workers, we chose to constrain their supply in the agricultural and the food processing sectors (with full mobility and fixed wage differentials). A separate constraint was imposed for the industrial sectors (defined above) and one for services and transportation. In view of the important role migration has played in the availability of labor for the construction and housing sectors, we chose to isolate their blue collar workers by assuming no mobility between the rest of the economy and these two sectors.

iii) White collar workers -- The 1961/62 nationalization and employment drive led to an overstaffing of firms with white collar workers. This—along with the education policy of Egypt led us not to constrain white collar employment in activities where the public sector predominates (all of the industrial sectors, transport, communication, and services). This lack of a supply constraint does pose a problem in terms of the political economy of Egypt. Most white collar workers will remain with a fixed nominal wage and thus (as the model results show) a decreasing real wage. However, given
that white collar workers constitute a sizable portion of the politically vocal strata, such a decrease in their real wage seems dubious. Regarding other sectors, we constrain white collar workers in agriculture (again with free mobility and fixed wage differentials). Finally, following the argument for blue collar workers, construction and housing have their labor supplies constrained separately.

iv) Capital — capital has proven to be the most difficult factor to pin down since data for capital stocks and capacity utilization are very poor in Egypt. We have therefore assumed that there is no constraint on capital in agriculture, it being of a rather traditional nature and easily reproducible.

In the rest of the economy evidence suggests that there was unutilized capacity until around 1973. We therefore proceeded as follows. Using educated guesses for capital-output ratios, we computed capital in use in the 12 sectors (along with base year profit rates), and assumed unused capacity to be 18.1% in industry and 8.0% in the remaining nonagricultural sectors (these somewhat low figures take into account the drive for increased production after 1973 and presumably the increase in capacity used). We then constrained the capital stock in the public sector portion of all non-agricultural sectors, with fixed profit differentials and full mobility (which in the context of the public sector seems plausible).

As for the service sector, we chose not to constrain its capital since the concept of capital in that sector (which includes the Suez Canal and tourism) is not well defined.

1/ See Mabro and Radwan, (1976).
v) Land — we have normalized the base year rent on land at unity and therefore land is measured in normalized units. It represents cropped acreage (as opposed to actual acreage) since crop rotation constraints have not been taken into consideration. We thus impose only a constraint on total land use in agriculture.

C. DATA BASE

1- Labor

Obviously the extension of the model to a more detailed picture of the Egyptian economy requires expanding its data base. These data collected from various sources (discussed below) did not match our twelve sector classification so it was necessary to map from the nine sectors of official publications into our twelve sectors. This mapping is based on labor value added weights (since it is going to be used to distribute employment among sectors). 1/

This first mapping provided us with employment by sector for our twelve sectors. Next a skill proportions matrix was used to break down total employment by sector into employment by skill level (skilled, blue collar and unskilled) by sector. Finally, the breakdown of employment by skill and by sector into private sector employment and government sector employment was done according to the respective shares in total labor value.

1/ The data on total employment by sector was taken from "AL TAWAZOFF WAL OJOUR for 1975" published by CAPMAS.
REFERENCES


CAPMAS, Arab Republic of Egypt, Central Agency for Public Mobilization and Statistics, Labour Force Sample Survey (Cairo, various years).


FAO. Production Yearbook (1976).


World Bank, "Population and Human Resources in Egypt" (Washington, D.C. 1
POTULATION & HUMAN RESOURCES DIVISION

DISCUSSION PAPERS

[A * by the number indicates the paper is
Bank-confidential or otherwise restricted.]

81-1 Oey A. Meesook, "Demographic Characteristics of Individuals and the Measurement of Lifetime Income". February 1981.


