THE EFFECT OF EDUCATION & ECONOMIC ACTIVITY ON SEX DIFFERENTIALS IN EMPLOYMENT IN EGYPT

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1. INTRODUCTION

In Egypt, level of employment[1] varies considerably between sexes, with a noticeable clustering among the familiar divide of place of residence; urban or rural. Thus those who have the highest level of employment are males living in rural areas with average employment proportion of 0.905, while those with the lowest proportion are females living in urban areas with average proportion of 0.742, CAPMAS (1989).

This kind of variation reflects among other things, the interplay of two kinds of differentials; sex differentials in characteristics of the individuals in the labor force, most crucial among them is their level of education, and place, location or labor market differentials in terms of characteristics of jobs available. Males are universally more educated than females and type of economic activities prevailing in the labor market and the level of technology used in them differ between modern (urban) labor markets and traditional (rural) labor markets. The sex differentials in education and place differentials in type of economic activities has been historically linked through the process of modernization; see Bruton (1973) and De Miranda (1979) for a detailed discussion of this and related issues. This process has been characterized by an ever-growing need for labor with a variety of skills and knowledge in the society. On the personal level this implies, that one has to have some form of formal education to participate in the formal job market and to get one's share of the increase in the production of modern goods. Here males and females differ in two aspects. First, education is more evenly spread among males (due to their overall higher level of education) than among females, and thus males has a higher degree of participation in the modern sector than females. Second, within the modern sector, some economic activities demand non-skilled manual workers such as jobs in the construction, manufacturing and transport. These jobs

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[1] Level of employment is defined as proportion employed among those who in the labor force.

are usually filled by men who are illiterate and/or with low level of education. For females no comparable jobs are available and hence their participation in the modern sector is much more dependent on a formal education.

Table (1) and (2) show the distribution of Egyptian population 6 years or more by level of education and type of economic activity respectively. In each table the population is divided according to sex, place of residence or both. Comparing the averages for males and females, the discrepancies between the educational levels for the two sexes are noteworthy. The percentages without any formal education are 64% and 78% for males and females respectively, but the percentage illiterate is about 165% higher for females than for male; 62% to 38%. Two things are clear from this table, viz., those who live in urban areas (be males or females) has more education than those living in rural areas and distribution of education levels among females is much more skewed to the right than that for males. Table (2) shows clearly, as discussed earlier, that important sex differentials exist with regard to economic activities. In general the table suggests that males are more comparatively more engaged in economic activities where a higher share of "blue collar" workers is to be expected such as agriculture and mining, manufacturing and construction.

Table (1)

DISTRIBUTION OF POPULATION (10 YRS AND ABOVE) BY LEVEL OF EDUCATION ACCORDING TO SEX AND PLACE OF RESIDENCE, EGYPT 1986

Educational Level	Males			Females			Total Rural	Total	Total
	Urban	Rural	Total	Urban	Rural	Total Urban			
Illiterate	.266	.473	.379	.448	.761	.619	.354	.614	.497
Read and Write	.255	.265	.260	.209	.136	.169	.232	.201	.215
Less than Secondary School	.179	.126	.150	.157	.063	.105	.168	.095	.128
Secondary School and below University	.212	.114	.158	.158	.038	.092	.186	.077	.126
University and above	.088	.022	.052	.029	.002	.014	.059	.013	.034
Total	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000

Note: Figures may not add to one because of roundings.
Source: Computed using Table (7), CAPMAS (1989).

Table (2)

DISTRIBUTION OF ECONOMICALLY ACTIVE POPULATION (6 YRS+) BY TYPE OF ECONOMIC ACTIVITY ACCORDING TO SEX AND PLACE OF RESIDENCE, EGYPT 1986

Economic Activity	Males			Females			Total Urban	Total Rural	Total
	Urban	Rural	Total	Urban	Rural	Total			
Agriculture and Mining	.143	.665	.437	.027	.399	.121	.126	.653	.407
Manufacturing and Electricity	.227	.074	.141	.129	.065	.113	.212	.074	.138
Construction	.117	.048	.078	.015	.012	.015	.101	.047	.072
Commerce	.130	.035	.077	.067	.042	.060	.120	.036	.075
Transportation	.091	.034	.059	.039	.011	.032	.083	.034	.056
Financial Services	.033	.006	.018	.044	.012	.036	.035	.006	.020
Social Services	.259	.137	.190	.679	.459	.623	.322	.151	.231
Total	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Activities not clearly stated	.063	.062	.063	.057	.221	.105	.062	.070	.067

Note: Figures may not add to one because of roundings.
Source: Computed using Table (6), CAPMAS (1989).

Female economic activities, on the other hand, are predominantly in sectors with relatively more "white collar" occupations such as financing and social services. If we add to this the fact, which will be shown next, that employment rates of females are lower than those of men, then the data in Table (2) seems to confirm that there is little work for females in the low status production sphere. Finally, the table shows that about 10% of all females, 6 years and above, who are economically active work in activities not clearly stated or in the "residual" category. In the rural areas the corresponding percentage reaches 22%, i.e., almost one-quarter of all active females. This can be explained by a double process—the increase of the available labor force and the incapacity of the productive forces in the traditional sector to absorb excess labor.

To sum up, the interplay of sex differentials in education and sector (modern vs. traditional) or place (urban vs. rural) differentials in economic activities has created two kinds of disparities in most developing countries and Egypt is no exception. The first disparity is between those who have some form of education and those who have not, where the former group should have higher employment rates in the job market of the modern sector. The second disparity has to do with the difference in relative shares of economic activities, and their implied occupational status, for those who are employed according to their sex. Systematic studies of the spatial expressions of these two disparities and their relation to employment differentials are lacking despite their useful implications for planning purposes.

This study attempts to fill a gap in the Egyptian literature and to analyze the spatial distribution of sex differentials in employment with particular emphasis on the quantification of the importance of the effect of spatial differentials in education and in type of economic activities on sex-location specific employment levels. Specifically, we pose the following questions:

1) Is the employment differentials due to the different levels of factors known to affect employment such as education and job characteristics?

2) If so, which factors are more responsible for the extent of the differentials?

3) Do variations in these factors entirely explain the sex-location specific differentials or does the nature of the relationships between employment and its covariates differ as well between high employment and low employment areas?

Answering these questions has been preceded by a detailed comparative analysis of the extent of employment differentials. First, a statistical profile for employment has been constructed for each sex-location; male/female and urban/rural. Second, differences in the level of employment has been examined in terms of its statistical significance and the relative contribution of both sex differences and location differences to the overall significance has been assessed.

2. DATA

The data for this paper are taken from 1986 Egyptian Census (November 1986) and represent the socio-economic characteristics of a 20% systematic sample from all Egyptian households, and published by Central Agency for Public Mobilization And Statistics; CAPMAS (1989). All the data used in this paper comes from Tables (5), (6), and (7) which give the distribution of total population according to sex and employment status, type of economic activity and educational status respectively; CAPMAS (1989)[2] . The data are published according to the place of residence (urban/rural) for the 26 governorates in Egypt. Four of these are totally urban giving a total of 48 spatial units. However, due to their relatively very small

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[2] Data in these tables represent the inflated estimates for the 20% sample. For a discussion of the estimation procedure used see CAPMAS (1986).

size of population, the 5 frontier governorates are excluded from the analysis. This gives us a total of 38 spatial units and 76 sex-location groups.

3. DESCRIPTION OF THE PATTERNS

Table (3.a) gives the summary statistics for proportion employed of the labor force by sex and location. The figures in the table shows clearly that not only males are more employed than females, overall and regardless of location, but they are also much more spatially consistent. This can be seen from comparing their coefficient of variations (2.2% compared to 8.5% for females) and in particular the range of their proportions (.075 for males and .272 for females). Males living in rural areas have the highest employment proportions while females in urban areas are at the other extreme. This tentatively supports our earlier discussion namely that job opportunities for females in the modern sector are more dependent (unlike males) on their having some kind of formal education, while males are spread over all types of jobs and occupations. The contrast between sex differentials in employment and location differentials is very clearly shown in Table (3.b) which gives the correlation coefficients between employment proportion and illiteracy for different sex/location groups. Spatially there is a negative and strong relation between employment and illiteracy whereas there is a positive and strong relation (especially in the rural areas) for each sex.

Table (3)

a) SUMMARY STATISTICS FOR PROPORTION EMPLOYED BY SEX AND LOCATION, EGYPT 1986

Sex/Location	Summary Statistics					N
	Min.	Max.	Mean	Coeff. of Variation (%)	Median	
T. Males (M)	.862	.937	.891	2.2	.886	38
T. Females (F)	.621	.893	.743	8.5	.735	38
Urban (U)	.677	.899	.811	9.4	.856	42
Rural (R)	.621	.937	.824	12.3	.871	34
Males—Urban (MU)	.862	.899	.880	1.3	.879	21
Females—Urban (FU)	.676	.850	.742	5.5	.728	21
Males—Rural (MR)	.862	.937	.905	2.3	.910	17
Females—Rural (FR)	.621	.893	.744	11.4	.748	17
All observations	.621	.893	.817	10.8	.862	76

b) CORRELATION BETWEEN PROPORTION EMPLOYED AND PROPORTION ILLITERATE BY GROUP

Group	M	F	U	R	MU	FU	MR	FR	T
Corr. Coeff.	.80	.19*	-.83	-.50	.22*	-.27*	.82	.63	-.44

* Not Significant

Source: Computed using Table (7), and Table (5); CAPMAS (1989).

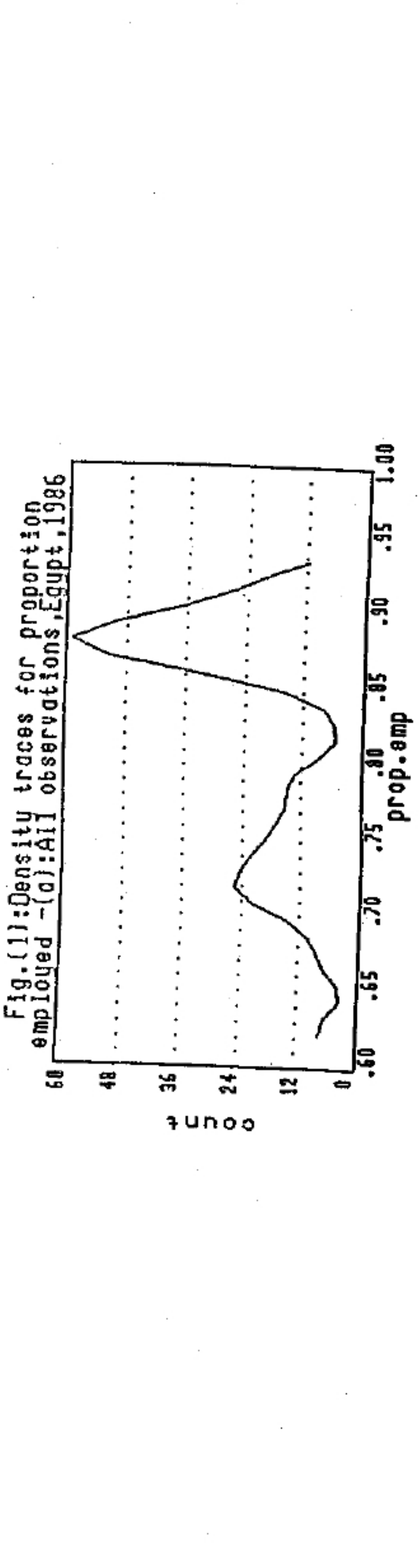
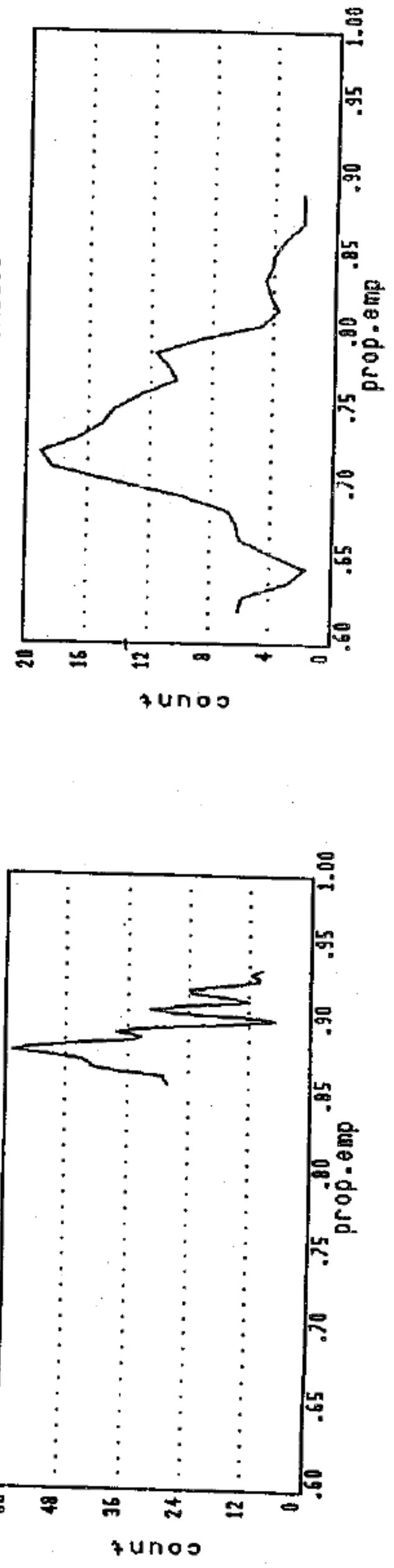
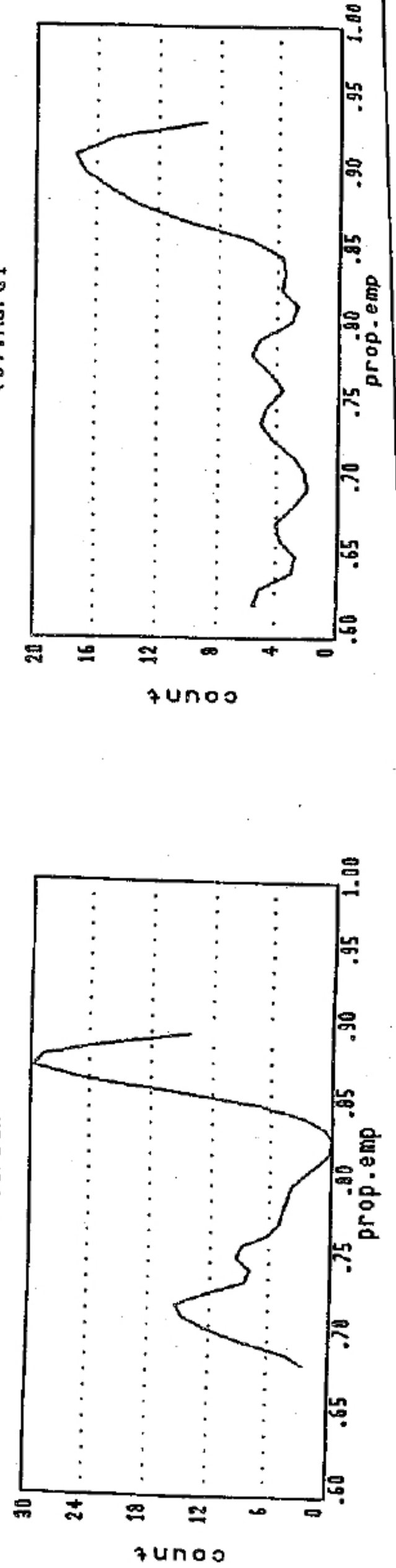


Fig.(1):Density traces for proportion employed -(a):All observations,Egypt,1986
count
prop.emp
.60
.65
.70
.75
.80
.85
.90
.95
1.00
0
12
24
36
48
60


(b):Males
count
prop.emp
.60
.65
.70
.75
.80
.85
.90
.95
1.00
0
12
24
36
48
60

(c):Females
count
prop.emp
.60
.65
.70
.75
.80
.85
.90
.95
1.00
0
4
8
12
16
20


(D):Urban
count
prop.emp
.60
.65
.70
.75
.80
.85
.90
.95
1.00
0
6
12
18
24
30

(e):Rural
count
prop.emp
.60
.65
.70
.75
.80
.85
.90
.95
1.00
0
4
8
12
16
20

The exception is the case of females in urban areas where the relation is negative although it is not significant. This contrast is the result of what we have called earlier the interplay between sex differential in education and location differentials in job characteristics.

In rural areas, where labor market is more traditionally oriented and formal education is not a barrier for entering the job market, the relation between employment and illiteracy is positive and strong. The reverse is true with regard to urban areas. In either case, the relation is stronger in the case of males. The important observation is that in rural areas sex plays the role of the so called "suppresser factor" in the relation between illiteracy and employment, whereas in urban areas it plays the role of "intermediate variable". In the first case, the two sub-correlations are larger, in absolute value, than the original correlation (.82, .63 as compared to .50), whereas in the second case the reverse is true. That is, while controlling the effect of sex has resulted in stronger relation between employment and illiteracy, in rural areas, it has weakened the relation to a large extent in urban areas. An interpretation of this observation necessarily demands an examination of the relation between employment and its covariates at a more dis-aggregated level of analysis. This will be done later in the paper.

Figure (1) shows the distribution of employment proportions in the form of a density trace curve for each sex and location group[3] , drawn on the same scale. The figure illustrates the striking difference between the spatial distribution of employment proportions for males as compared to that for females. First, Figures (1.a), (1.d) and (1.e) reveals quite clearly the biomodality of the spatial distribution of employment which takes a much sharper form in the case of urban areas. In each case, the distribution of employment proportions comprises of two sub-

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3 Density trace is now one of the most popular techniques for displaying the distribution of the data. Mathematically, density at any point x is defined as the fraction of data values per unit of measurement that lies in an interval centered at x. The smoothness of the density curve depends on the width of the interval. For a detailed discussion of density curves, see Chambers, et al. (1983).

distribution. The first is much more peaked than the other with data points highly concentrated around its average. The second is much flatter with data scattered over long range. This spatial biomodality is caused by the sex differentials in employment as can be seen in Figures (1.b), and (1.c). As a matter of fact, the actual inspection of data points support this sex-decomposition of employment density curve with one exception in the case of urban areas and four in the case of rural areas.

From Figure (1) it is clear that differences between the two sexes in the same location (urban or rural) are much more pronounced than the differences within the same sex in different locations. But how significant are these differences and which type of differences (sex differences or location differences) contributes significantly more to the overall or total difference? We will now turn our attention to these questions.

4. Significance of Employment Differentials and Its Decomposition

To determine the significance of differences among employment proportions by sex and location on the one hand and the relative contribution of each sub-group to the overall significance on the other, we have utilized a Chi-square test commonly used in the analysis of epidemiological data; Fleiss (1981). The test statistic is used to test the significance of the differences among m proportions, each coming from an independent sample and measures the presence of some characteristics among the subjects in the sample. The formula for the test statistics is given as follows:

$$\chi^2 = \frac{1}{\bar{p}\bar{q}} \sum_{1=1}^{m} n_i(p_i - \bar{p})^2 \qquad \ldots (1)$$

where p_i = proportion of those with the characteristic under consideration in the (i^{th}) sample,

$\bar{p}$ = overall proportion in all samples (number with characteristics in all samples divided by total number of observations).

n_i = size of the (i^{th}) sample,

$\bar{q}$ = $1-\bar{p}$

The test statistic (1) has a Chi-square distribution with (m-1) degrees of freedom.

A very useful property of this test statistic is that it is decomposable. Specifically, if the m samples can be partitioned into two groups, according to a given criteria, the first containing m_1 samples and the second m_2, where $m = m_1+m_2$, then the test statistic given in (1) can be written as follows:

$$\chi^2 = \chi_1^2 + \chi_2^2 + \chi^2_{diff} \quad \ldots (2)$$

where χ_1^2 and χ_2^2 have similar forms to (1), with degrees of freedom (m_1-1), (m_2-1) respectively, and can be used to test the significance of the differences among the m_1 proportions in the first group and among the m_2 proportions in the second group respectively. The third term χ^2_{diff} has the following form:

$$\chi^2_{diff} = \frac{1}{\bar{p}\bar{q}} \times \frac{n_{(1)}\, n_{(2)}}{N} (\bar{p}_1 - \bar{p}_2)^2 \quad \ldots (3)$$

where $n_{(1)}$ and $n_{(2)}$ are the total size of observations while $\bar{p}_1$ and $\bar{p}_2$ are the proportion of those having the given characteristic in the first and second group respectively. χ^2_{diff} has one degree of freedom and can be used to test the significance of the difference between $\bar{p}_1$ and $\bar{p}_2$.

The above approach can be adapted to our case here in a very straightforward manner by letting the (i^{th}) spatial unit (totaling 76) corresponds to the (i^{th}) sample above, the sex/location groups corresponding to the two partitioned groups of samples as appropriate and being employed be the characteristic under consideration. However, since number of observations in each spatial unit (n_i) is very large (it is a population count) all values of χ^2 shown in (2) would be highly significant. Nevertheless, we still could use the decomposable

property of the test statistic to evaluate the relative contribution of differences in each sex/location group to the overall significant differences which is our main concern here. The results of applying this approach to the data in question are reported in Table (4) where Parts (A) and (B) examine the significance for the complete observations, and the rest of the table considers the significance in each sex location group. The following are immediately clear:

a) Sex differentials in employment are much more important in terms of causing the significant differences among employment proportions in Egypt than location differentials. The former accounts for 71% of the total value of Chi-square, while the latter accounts only for 9%. On the other hand, the variations within each specific location (urban/rural) is very high which testifies to the heterogeneity of employment proportions. For example, differences among rural proportion contributed about 55% of overall significance differences.

b) Controlling for location (parts c and d in the table), sex differentials contributes about 85% of the significance differences within urban and rural areas (c.3 and d.3). However, there is an interesting difference; in urban areas male employment proportions are relatively more homogenous than female proportions, the reverse is true with regard to rural areas. Note that controlling for location, that is, by examining the significance of differences within each location separately, means that differences in proportions results mainly from differences in personal qualifications between the two sexes, especially with regard to their level of education, and the extent of the match between these qualifications and type of economic activities prevailing in the areas.

Table (4)

ANALYSIS OF SIGNIFICANCE OF DIFFERENCES AMONG PROPORTIONS EMPLOYED BY SEX AND LOCATION, EGYPT 1986

Source of Significance	Notation / Value	No. of Spatial Units	Contribution to Overall Significance (%)
A. Differences Among all Proportions:	χ^2_{All} =346.000	76	100
*A.1) Differences among Urban Proportions	χ^2_U =125,457	42	36.2
*A.2) Differences among Rural Proportions	χ^2_R =189,541	34	54.8
*A.3) Differences between Average Proportion in Urban and Rural Areas	χ^2_{U-R} = 31,002		9.0
B. Differences Among all Proportions:	χ^2_{All} = 346.000	76	100
B.1) Differences among Male Proportions	χ^2_M = 41,306	38	11.9
B.2) Differences among Female Proportions	χ^2_F = 60,013	38	17.3
B.3) Differences between Average Male and Female Proportion	χ^2_{M-F} =244,681		70.8
C. Differences Among Urban Proportions:	χ^2_U =151.516	42	100
C.1) Differences among Urban Male Proportions	χ^2_{MU} = 3,227	21	2.1
C.2) Differences among Urban Female Proportions	χ^2_{FU} = 18,297	21	12.1
C.3) Differences between Average Urban Male and Female Proportions	χ^2_{MU-FU} =129,992		85.8
D. Differences Among Rural Proportions:	χ^2_R =182.840	34	100
D.1) Differences among Rural Male Proportions	χ^2_{MR} = 23,857	17	13.0
D.2) Differences among Rural Female Proportions	χ^2_{FR} = 6,622	17	3.6
D.3) Differences between Average Rural Male and Female Proportions	χ^2_{MR-FR} =152,361		83.4

Table (4) Contd...

ANALYSIS OF SIGNIFICANCE OF DIFFERENCES AMONG PROPORTIONS EMPLOYED BY SEX AND LOCATION, EGYPT 1986

Source of Significance	Notation / Value	No. of Spatial Units	Contribution to Overall Significance (%)
E. Differences Among Male Proportions:	$\chi^2_{\underline{M}} = \underline{4,557}$	<u>38</u>	<u>100</u>
*E.1) Differences among Urban Male Proportions	$\chi^2_{MU} = 3,231$	21	7.0
*E.2) Differences among Rural Male Proportions	$\chi^2_{MR} = 24,116$	17	52.5
*E.3) Differences between Average Urban and Rural Male Proportions	$\chi^2_{MU-MR} = 18,610$		40.5
F. Differences Among Female Proportions:	$\chi^2_{E} = \underline{34,682}$	<u>38</u>	<u>100</u>
F.1) Differences among Urban Female Proportions	$\chi^2_{FU} = 11,801$	21	34.0
F.2) Differences among Rural Female Proportions	$\chi^2_{FR} = 18,888$	17	54.5
F.3) Differences between Average Urban and Rural Female Proportions	$\chi^2_{FU-FR} = 3,993$		11.5

* Note that the value of χ^2 statistics in (A.1) differ from that of (C) although they both measure the extent of differences among urban proportions. The reason is that the value of product term (pq) which appears in the denominator of each of them is a group specific and it differs according to whether the group is the whole group like in the case of (C) or a sub-group like in the case of (A.1).

For each sex more than half of the significance of the difference is due to the difference among proportions in rural areas; (e.2) and (f.2). However, there is an important difference. In contrast to males, difference in proportions for females in urban areas are relatively much more significant. Thus, while differences among male proportions combined contributed about 60% of the total significance, the corresponding contribution is about 90% for females. Thus, another aspect of the sex differential in employment and it testifies to the fact that female employment (unlike male employment) is sensitive to the size of the so called residual or not clearly stated type of activities which in turn differs greatly between one spatial unit and another.

5. The Effect of Differences in Levels of Education and Type of Economic Activities on Employment Differentials

The results of significance analysis in the preceding section together with the shape of density curves in figures (1.d) and (1.e) show clearly the contrast in the variation of employment proportion both, between, and within the sex-location specific groups. To understand how those variations are related to employment covariates; namely levels of education and types of economic activities, and the relative importance of each of them, we have performed a series of regression analysis with proportions employed as the dependent variable and the covariates as the independent variables. The results are shown in Table (5). The focus in the analysis was on the extent of employment differentials and how they were affected by the covariates and not (as is normally the case) on the employment proportions *per se*. The effect on employment differentials was assessed by including a dummy variable as an additional independent variable which was used as an indicator for each sex-location specific group. By examining the changes in the size and sign of the indicator's coefficient we were able to assess the effect on employment differentials. For emphasis, the coefficients of the four indicator variables and the corresponding t-values were enclosed within a rectangle. In Panel A the four indicators for the different sex-location specific groups are the only explanatory variables. All the coefficients are highly significant indicating the existence of significant difference in the extent of employment between each group and the rest of Egypt with males having above average and females having below average employment. This is in accordance with the previous discussion. However, the size and significance of these differences change as alternative groups of employment covariates are added in Panels B to D.[4]

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4 Due to the high correlations within each group of covariates a separate forward stepwise regression was done for each group with employment proportions as the dependent variable and the covariates as the independent variables. The variables included in the analysis reported in Table (5) are the ones that has been retained by the stepwise regression.

Table (5)

REGRESSION ANALYSIS FOR EMPLOYMENT SHOWING THE EFFECTS OF CONTROLLING OTHER COVARIATES ON COEFFICIENT OF THE SEX-LOCATION SPECIFIC INDICATOR

Explanatory Variables	SEX-LOCATION SPECIFIC GROUP*			
	F-U (1)	M-U (2)	F-R (3)	M-R (4)
A. Indicator (D) Only**	-.104 (-5.38)	.087 (4.27)	-.094 (-4.3)	.113 (5.51)
r^2	.281	.197	.199	.291
B. Indicator plus Education Variables				
Indicator (D)	-.076 (-3.81)	.069 (2.76)	-.086 (-2.78)	.092 (3.94)
Read and write	-.682 (-3.68)	1.019 (5.81)	.793 (4.23)	.366 (1.60)
< Secondary School	-.170 (-.60)	-.966 (-3.86)	-1.254 (-4.27)	-.298 (-1.14)
Univ. and higher	-.516 (1.75)	.428 (1.25)	.963 (3.42)	1.142 (4.20)
r^2	.524	.483	.483	.530

* F = Females, M = Males, U = Urban, R = Rural.

** D = Dummy Variable with D = 1 for the group under consideration and D = 0 for the rest of the observations.

Table (5) Contd...

Explanatory Variables	F-U (1)	M-U (2)	F-R (3)	M-R (4)
C. Indicator (D) Plus Activity Variables				
Indicator (D)	.089 (3.93)	.002 (.16)	-.128 (-7.46)	.031 (1.72)
Not clearly stated	-.180 (-2.76)	-.255 (-3.67)	.268 (3.08)	-.182 (-2.26)
Fin. & business	1.264 (2.62)	1.599 (2.68)	.762 (1.87)	2.19 (3.64)
Social services	-.488 (-11.92)	-.353 (-11.28)	-.308 (-15.24)	-.337 (-12.24)
r^2	.808	.766	.869	.775
D. All Variables				
Indicator (D)	.100 (4.30)	-.009 (-.45)	-.137 (-7.25)	.043 (2.07)
Read and write	.063 (.44)	.098 (.59)	-.032 (-.26)	.003 (.02)
< Secondary School	.245 (1.18)	.222 (.84)	-.147 (-.81)	.309 (1.30)
Univ. and higher	.194 (.97)	.040 (.17)	-.059 (-.36)	.117 (.53)
Not clearly stated	-.028 (-.29)	-.132 (-1.21)	.230 (2.41)	-.028 (-.24)
Fin. & business	.529 (.88)	1.387 (2.15)	1.023 (2.1)	1.742 (2.67)
Social services	-.471 (-10.61)	-.343 (-8.92)	-.320 (-12.01)	-.307 (-8.29)
r^2	.821	.733	.872	.786

Controlling for education variables; Panel (B), has resulted in a decrease in the absolute size of all indicator's coefficients which implies a narrowing of the size of the differentials. However, the size of the decrease is small ranging from 9%

from its original value in the case of females in rural areas (group (3)) to 27% in the case of females in urban areas (group (1)).

Thus, only a small part of employment differentials between each specific group and the rest of Egypt can be explained by differences in levels of education. Specifically lower (higher) employment for females (males) can be partly explained by their relatively lower (higher) proportions in "read and write" category, and in "university or higher degree" and their relatively higher (lower) proportions in "less than secondary school" category. Overall differences in levels of education plus the differential indicator explain about 50% of the variation in employment in each case.

Panel (C) reveals interesting aspects regarding the association between the type of economic activities and differentials in employment. First, spatial distribution of economic activities is much more strongly related to spatial distribution of employment levels than is the case with regard to education. This can be seen both from the high values of (r^2), which reached 87% in the case of rural females, and the profound effect they had on employment differentials once they have been controlled. For males, controlling for the effect of economic activities has resulted in a decrease in the size of the differentials, i.e., the size of the regression coefficient, by about 98% in urban areas and 75% in rural areas. Thus, almost all of employment differentials (the remaining differentials has become non-significant) between each male-specific group and the rest of the population can be explained by the different types of activity they engaged in. Thus, areas with relatively high male employment are characterized by smaller size of "residual" activities and of social services and a larger size of financial and business activities.

In contrast, female employment differentials has shown a completely reversed pattern and especially so for females working in urban areas (group (1)). Unlike males, employment differential has increased, in absolute terms, for rural females.

This means that employment differential would have been even greater (with even lower female employment) had it not been for the more job opportunities in both the not stated and financial and business service categories. Controlling for economic activities, has reversed the sign of the employment differential indicating a higher employment level for urban females than for the rest of the population (.089 higher instead of .104 lower). This implies that female employment in urban areas would have been much higher had it not been for their higher proportions in both not stated and social service activities and their lower proportion in financial and business activities which are the characteristics of areas with low employment level.

Finally, we have combined the two covariate groups in Panel (D) to see which effects dominate. The results are very similar to that of Panel (C), i.e., when only the economic activity group was entered in the equations, which testifies to the dominance of effect of economic activities.

6. Estimating the Amount of Sex Employment Differentials due to Variation in Independent Variables

The above analysis assumes that in each case both the specific sex-location group and the rest of observations have the same type of relationships explaining employment variations. However, given the differences in labor market environment between the two sets of observations, the nature of the relationships could differ as well. To assess the relative role of differences in levels of independent variables versus the role of differences in relationship we have to allow for different relationships. Ideally a separate regression equation should be fitted for each sex-location group. But since this procedure will result in large reduction in the number of observations in each case, we have decided to investigate only the two sex-groups (total males and total females) regardless of location. A separate regression equation was fitted (without the dummy indicator)

for each sex using the six independent variables reported in Table (5) above, and the results used to decompose the size of the sex differentials as follows:

Let $\bar{E}_{m,m}$ = the estimated mean employment proportion for males using both the estimated regression coefficients and the mean values of the independent variables observed for males.

$\bar{E}_{m,f}$ = the estimated mean employment proportion for females using the estimated regression coefficients for males and the mean values of the independent variables observed for females.

$\bar{E}_{f,m}$ = estimated mean employment proportion for males using the estimated coefficients for females and the mean values of the independent variables observed for males.

$\bar{E}_{f,f}$ = the estimated mean employment for females using both the estimated coefficients and the mean values of the independent variables for females.

Then we have,

$$\text{Total differential} = \bar{E}_{m,m} - \bar{E}_{f,f}$$

$$= (\bar{E}_{m,m} - \bar{E}_{m,f}) + (\bar{E}_{m,f} - \bar{E}_{f,f}) \quad \ldots (4)$$

$$= (\bar{E}_{f,m} - \bar{E}_{f,f}) + (\bar{E}_{m,m} - \bar{E}_{f,m}) \quad \ldots (5)$$

Thus,

$$\text{Total differential} = \left[\begin{array}{l}\text{differential due to differences in employment covariates.}\end{array}\right] + \left[\begin{array}{l}\text{unexplained residual due to differences inestimated coefficients.}\end{array}\right]$$

In equation (4), mean values of independent variables for females are used as weights while in equation (5), the weights are those of males.[5] The unexplained residual reflects the influence of factors not incorporated explicitly into the regression equations and is assumed to be due at least in part to socio-cultural factors that influence the choice of one sex over the other for a given job. The results are reported in Table (6), where Panel (A) of the table gives the estimated

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5 This decomposition is subject to the familiar index number problem since the same differential can be decomposed under the alternative assumption that the estimated male structure applied to both sexes. The true structure that exists for both sexes is unknown. Nevertheless, it is assumed that the range of estimates obtained under these alternative assumptions includes values based on the unknown true employment relationships.

coefficients for males and females, and Panel (B) show the results of the decomposition. Only about 40% of total mean differences in employment (regardless of the weights used) can be attributed to variation in employment covariates. The other 60% presumably reflect non-labor market factors as we mentioned above. However, a detailed analysis using micro-level data is needed to investigate this issue, more fully.

Table (6)

ESTIMATED MEAN EMPLOYMENT LEVEL USING ONE SEX'S REGRESSION CO EFFICIENTS AND THE MEAN VALUES OF THE OTHER SEX'S VARIABLES

A. Estimated Regression Coefficients for Males and Females
(Dependent Variable: proportion employed)

Independent Variables	Males	Females
	Coefficient (t-value)	Coefficient (t-value)
Read and write	-.1308 (-2.35)	-.1147 (-.36)
Less than Secondary School	-.1872 (-2.35)	-.1386 (-.22)
University and higher	-.1081 (-1.76)	2.089 (1.48)
Not clearly stated activities	-.1642 (-1.88)	.3593 (1.87)
Financial & business activities	.5770 (2.13)	2.464 (2.30)
Social services activities	-.2038 (-5.65)	-.1123 (-1.14)
Intercept	1.001 (57.32)	.7144 (8.96)

B. Decomposition Results

Regression Coefficients Estimates for	Mean Values of Independent Variables for Males	Mean Values of Independent Variables for Females
Males	$\bar{E}_{m,m} = .8971$	$\bar{E}_{m,f} = .8459$
Females	$\bar{E}_{f,m} = .8170$	$\bar{E}_{f,f} = .7642$
Total Differential	$\bar{E}_{m,m}-\bar{E}_{f,f} = .1329$ (100%)	
	Using Male Coefficients	Using Female Coefficients
Differential due to differences in independent variables (%)	$\bar{E}_{m,m}-\bar{E}_{f,f} = .0512$ (38.5%)	$\bar{E}_{f,m}-\bar{E}_{f,f} = .0528$ (39.7%)
Differential due to differences in estimated coefficients (%)	$\bar{E}_{m,f}-\bar{E}_{f,f} = .0817$ (61.5%)	$\bar{E}_{m,m}-\bar{E}_{f,m} = .0801$ (60.3%)

7. Summary and Conclusions

This study has attempted to describe and analyze the spatial distribution of employment differentials by sex and location with particular emphasis on the quantification of the importance of the effect of spatial differentials in education and in economic activities on the sex-location specific employment level. Utilizing the decomposable property of a Chi-square test statistics we have been able to assess the relative contribution of differences in employment proportions between and within the different sex-location specific groups to the significance of differences among the complete set of the proportions.

Next, we have examined how the relationship between sex-location and employment changes when other factors are controlled, by estimating several regressions, one for each sex-location group. We first estimated a regression that include only an indicator for whether the observation belong to the specific group in question. We then added two set of employment covariates to assess their effect on employment differentials between the given sex-location group and the rest of Egypt. The two sets represent a pre-selected variables that describe levels of

education and type of economic activities prevailing in different spatial areas in Egypt. A final regression combined these two sets of factors to examine the full impact of controlling them on the size and significance of the employment differentials between the sex-location specific group and the rest of Egypt.

There is a considerable spatial variability in employment in Egypt and the observed pattern suggests clear links between this variation and levels of education and types of economic activities. This link between employment and its covariates was shown to be sex-specific with larger differentials within urban areas. The results in this Paper has produced evidence that regional differences in the level of employment exists beyond those which can be attributed to differences in levels of determinants. A fuller examination of this finding demands a micro-level analysis with an explicit consideration of non-labor market factors. This is a subject for future research.

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