



FEM42-10

FEMISE RESEARCH PAPERS

"Inequality and inclusive growth in the South Mediterranean region: Are education and innovation activities favoring firm performance and citizens' wellbeing?"

A. Returns to Vocational and University Education in Egypt

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Returns to Vocational and University Education in Egypt

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Abstract

While tertiary skills are important for growth in developed countries, it is primary and secondary education that are related to development in developing countries. Despite the substantial expansion in technical and vocational education in Egypt, the labor market lacks technical skilled workers not only in numbers but also in competences. This paper examines the impact of education on labor market outcomes in Egypt, with a focus on returns to vocational secondary and technical higher education in 1998, 2006 and 2012. We provide estimates of incremental rates of return to education based on selectivity corrected earnings equations and quantile regressions that give credence to the view that technical education has generally been inequality reducing in Egypt. The main policy implication of this paper’s analysis is that quality and labor market relevance of vocational education remains the key to an effective reform. Encouraging private businesses to invest in vocational education will be of little use if the trainees are still faced with social stigma that relegates them to low-paid jobs. Therefore, a policy recommendation is to design governmental measures to improve the ‘image’ of vocational education in Egypt.

Key Words: returns to education, technical education, quantile regression, labor market; Egypt.

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1. INTRODUCTION

Conventional wisdom in education policy literature has been that, while technical and tertiary skills are important for growth in developed countries, it is primary and secondary education that are related to development in poorest and intermediate developing countries. Accordingly, donor and lending agencies, including the World Bank, have been promoting investment in basic and

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general education in MENA and other developing regions (World Bank, 1995a; Psacharopoulos, 1987, 1994). Amongst the reasons cited for such policy advice are low returns to vocational and technical education, high cost of those types of education, and a weak relationship between vocational school graduates and the needs of the labor market.

Egypt’s recent experience appears to follow closely the above pattern. The Egyptian education system is comprised of two tracks: the general (academic) education and the technical. The former leads to the university while the latter leads to technical secondary level, except for those that manage to score above 70% that qualify for higher education. The technical route is challenged by social stigma that has long been associated with non-academic education and its label as a poor second chance option. Despite the substantial expansion in technical and vocational education in Egypt, the labor market lacks technical skilled workers not only in numbers but also in competencies. Recent Arab and Egyptian Human Development Reports (UNDP, 2003; UNDP, 2010) highlighted the deep-seated institutional, political and economic problems faced by education in the Middle East and North Africa region. Other surveys cite evidence of a puzzle of low productivity of education combined with high demand by families and youths who view it as a main avenue for social mobility (Makdisi et al, 2006 and Salehi, 2009).

Globally, as national education policies are the result of a complex interplay of different developmental and historic circumstances, the results of vocational education are scattered across a wide spectrum: it is possible to find cases where vocational education outperforms general education (notably South East Asian Tigers). For instance, there are countries, such as Singapore, where women that undergo skill-specific training are better off than graduates from general education (Patrinos et al, 2006) and countries where the opposite is true (Hollenbeck,

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1993). The experience of the East-Asian economies, such as Japan, Taiwan, Singapore and South Korea, demonstrates that investments in vocational skills at the secondary school level are beneficial for both the individual and society (Tzannatos and Johnes, 1997; Green et al, 1999; Gill et al., 2000).

A changing pattern has been recently documented, whereby returns to higher schooling in several developing economies sharply increased, while returns to primary education dropped across a large number of Latin American and South Asian countries (Reilly and Bellony, 2009; Patrinos et al, 2006 and Aslam 2009). This has been attributed to the impact of trade openness and foreign investment in increasing the demand for skilled workers and wage inequality (Colclough et al., 2010). When looking at the experiences of different countries, researchers are faced with success stories such as those of many South-East Asian countries (Moenjack and Worswick, 2003; Sakellariou, 2003) and many cases where vocational education exhibits inadequate rates of return (Bellew and Moock, 1990; Cohn and Addison, 2003). This paper adds to the above literature by examining the impact of education on labor market outcomes in Egypt, with a focus on returns to vocational secondary and technical higher education in 1998, 2006 and 2012. As previous studies identified gender and institutional sector as the most important axes of segmentation of the Egyptian labor market (Assaad, 1997, Said 2004 and 2009), selectivity corrected earnings equations are estimated separately for government, non-government wage workers and non-wage workers by gender, employing a multinomial-logit model to undertake the selection correction. In addition to evaluating the returns to education at the mean of the earnings distribution, this paper will also evaluate returns to education along the entire earnings distribution using quantile regression methods.

We provide estimates of incremental rates of return to education based on selectivity

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corrected earnings equations and quantile regressions that give credence to the view that education has generally been inequality reducing in Egypt. The main policy implication of this paper’s analysis is that quality and labor market relevance of vocational education remains the key to an effective reform. Encouraging private businesses to invest in vocational education will be of little use if the trainees are still faced with social stigma that relegates them to low-paid jobs.

The rest of the paper is organized as follows. After a brief review of general trends in enrollment at the various levels of schooling in Egypt in Section 2, Section 3 presents the models underlying the estimation and rate of return to schooling calculations and then introduces the data and empirical results of estimation of selectivity corrected and quantile regression wage equations in Section 4. This section presents the incremental and cumulative returns to different levels of education and discusses whether they confirm to expectations based on enrollment trends. The conclusion, in Section 5, summarizes the results and discusses some of their policy implications.

2. EDUCATION STRUCTURE, ENROLLMENT POLICY, AND WAGE DISPARITIES BY EDUCATION IN EGYPT SINCE THE 1990s

The current structure of the education system in Egypt is as follows: basic education is compulsory and consists of a six-year primary school followed by a three-year lower secondary school. Afterwards, students are tracked into a general (academic) secondary school or a technical secondary school, each of three years. Agricultural, industrial, and commercial tracks are the three main channels that technical secondary education offers. Both general secondary and technical secondary education are designated as intermediate level of education. There is

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another system of technical secondary schools offering diploma in five years. General secondary graduates usually join the university track, while technical secondary graduates may either enter the labor force directly or join a two-year higher technical institute leading to diplomas in many applied fields: secretarial work, accountancy, health science, electronics, computer, insurance, etc. University education offers formal academic training in disciplines such as: engineering, science, medicine, business, law, etc. Both technical five-year secondary and higher technical institute education are designated as above intermediate level of education (Zhang, 2003 and Lindgren, 2005).

Table 1 and Figures 1 and 2 below present some stylized facts on the evolution of new labor market entrants by educational attainment in Egypt since the 1970s. The main trend documented is one of a dramatic rise for the upper secondary (mostly vocational) and above secondary levels. Alarmed by the rapid growth in the number of secondary and university graduates in the 1980s and early 1990s, the Egyptian government attempted to slow down educational expansion especially for university enrollment. It enacted the 1981 reform aimed at controlling the intake into general secondary schools and directing the growing number of degree seekers to technical secondary education. As a result of this policy, the share of enrollment in general secondary schools immediately declined, and were followed by an eventual decline in university graduates in the late 1990s, early 2000s and continue till 2012.

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**TABLE 1. NUMBER OF GRADUATES FROM THE FORMAL SCHOOLING SYSTEM
IN EGYPT, 1990/91-2011/12**

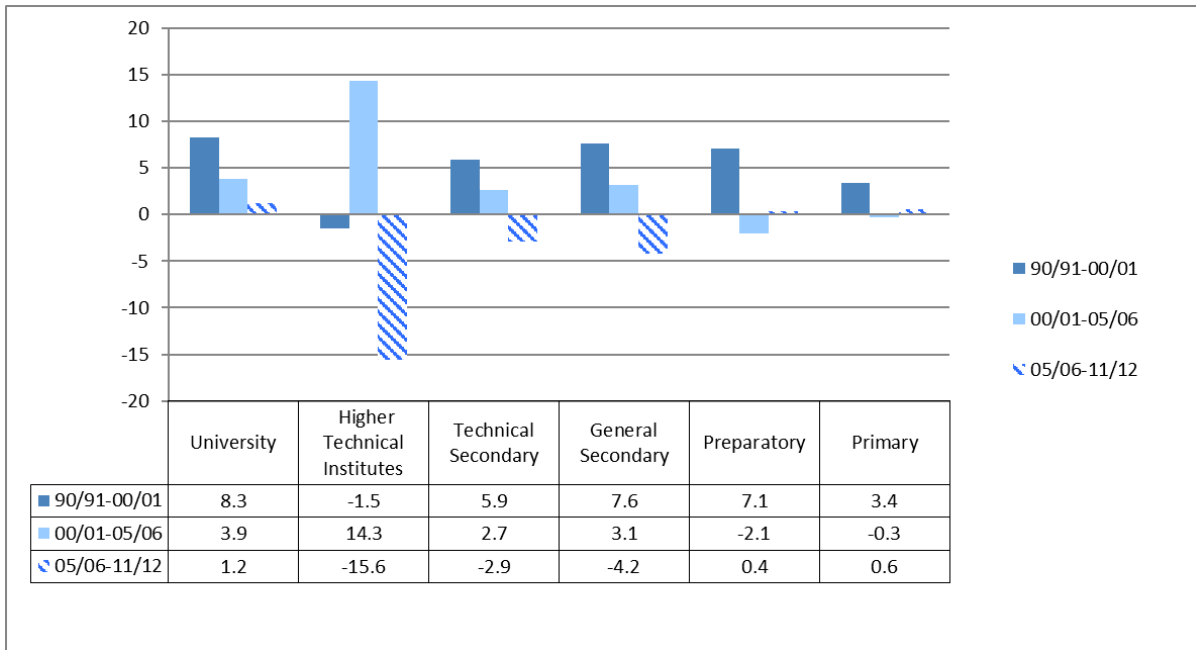
Specialization	90/91	00/01	05/06	11/12	90/91- 00/01	00/01- 05/06	05/06- 11/12
All University	108,276	248,451	311,701	334,203	8.3	3.9	1.2
All Higher Technical Institutes	35,112	30,154	67,296	24,249	-1.5	14.3	-15.6
All Technical Secondary	281,912	509,750	597,344	500,954	5.9	2.7	-2.9
Agricultural	35,339	50,084	75,316	270,552	3.5	7.0	23.8
Commercial	114,234	219,469	222,345	53,352	6.5	0.2	-21.2
Industrial	132,339	240,197	299,683	177,050	6	3.8	-8.4
General Secondary	176,946	377,622	454,447	351,093	7.6	3.1	-4.2
Preparatory	631,811	1,288,994	1,137,307	1,164,972	7.1	-2.1	0.4
Primary	984,181	1,377,455	1,352,848	1,406,349	3.4	-0.3	0.6

Source: CAPMAS, *Egyptian Statistical Yearbook* (various years).

As can be seen in the above table and Figures 1 and 2, there was a rapid acceleration for the industrial and commercial branches of technical secondary education which are the specializations in demand in government employment. In fact, the higher growth of technical secondary education throughout the 1990s was largely driven by the promise of government employment and the higher returns of such employment on these educational investments. In 2000-2005, there was a marked increase especially in the two-year post secondary institutions, whose graduates are also covered by the public employment guarantee, so that their returns are likely to slow down in 2006. The decline in all levels of technical education in the following period reflected the fact that the slowdown in government hiring started kicking in. Only the agriculture track continued to increase rapidly in the following period. Finally, university enrollment continued to decrease during the same period and up to 2012, however it is unlikely that this could have eroded the oversupply of university graduates accumulated over the previous decade.

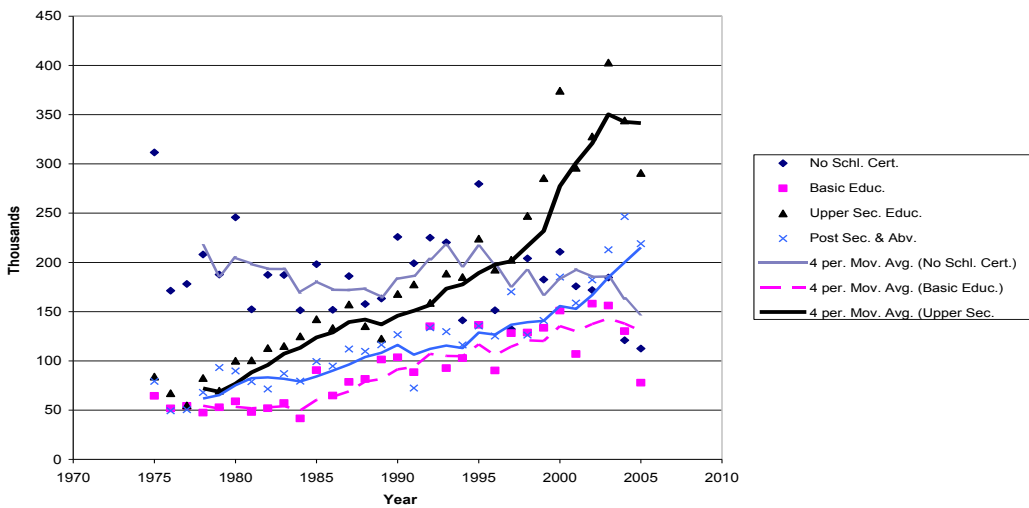
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FIGURE 1. ANNUAL AVERAGE GROWTH RATES OF EDUCATIONAL ATTAINMENT



Source: CAPMAS, *Egyptian Statistical Yearbook* (various years).

FIGURE 2. EVOLUTION OF NEW ENTRANTS BY EDUCATIONAL ATTAINMENT, 1975-2005



Source: CAPMAS, *Egyptian Statistical Yearbook* (various years)

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Table 2 below examines the impact of the above changes in enrollments and the supply of graduates at different levels of education to their respective wages. Reflecting earlier increases in the number of technical and university graduates, the period of the world financial crisis and revolution (2006-2012) witnessed a moderation of wage growth for all above elementary educational groups, but was especially pronounced for university and post-secondary technical institutes. All the above averages can be misleading however, as they do not correct for productivity differences amongst workers, a task that the rest of this paper will be devoted to

Table 2: Median Real hourly wage by level of Educational Attainment (in 2012 Prices)

level of Educational attainment	1998	2006	2012	Annual	Annual
				Growth	Growth
				1998-2006	2006-2012
illiterate	2.81	3.30	3.77	2.0	2.3
Literate without Diploma	3.03	3.30	3.77	1.0	2.3
elementary school	3.14	3.33	3.85	0.8	2.4
Middle School	3.51	3.82	4.00	1.0	0.8
General High school	4.22	4.10	4.33	-0.4	0.9
Vocational high school	3.12	3.93	4.47	2.9	2.2
post-secondary institute	3.78	4.75	5.00	2.9	0.8
University&above	5.23	6.03	6.25	1.8	0.6
Total	3.42	4.10	4.58	2.3	1.9

Source: Author’s calculation based on the Egypt Labor Market Surveys 1998, 2006 and 2012.

3. ESTIMATION METHODOLOGY

3.1 Estimating impact of education on wage premium

Mincer’s (1974) earnings equation postulates log of average wages as a function of years of schooling. In extended versions, dummies for levels of education are used to allow for effects on

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wages by level of schooling. The modified earnings function is then:

$$\ln W = \beta_0 + \sum \beta_k EDum_{ik} + \beta_2 EXP + \beta_3 EXP^2 + u \quad (1)$$

Here EDum consists of dummies for levels of education EXP is experience in years, EXP^2 is experience squared, and u is a random disturbance term. The wage premiums to different levels of education can be derived from the following formula, $r_k = (\beta_k - \beta_{k-1}) / \Delta n_k$. This calculates the incremental impact of the k th level of education where β_k represents the coefficient of a specific level of education, β_{k-1} is the coefficient of the previous level of education, and Δn is the difference in years of schooling between k and $k-1$ (Hamidi, 2006).

Two problems exist in the above estimation equation. One is the potential endogeneity of the level of educational attainment and the other is sample selection bias, as the equation is estimated only for wageworkers. The potential endogeneity emanate from the fact that it is difficult to separate whether higher income of individuals is due to their higher education, or vice versa. An attempt to control the causality issue usually uses the instrumental variables approach as reviewed in Card (1999), whereby instruments are sought on the supply side of the education system. This usually results in the same size or bigger estimates for returns of schooling (e.g. Angrist and Kreuger, 1991 and Ashenfelter and Krueger, 1994). Other studies attempted to use data on twins as instruments which also serves to control for the ability bias (Arias et al., 2001). As such instruments are not available in the present data set, the approach in this paper is to follow the literature reviewed in Caamal-Olvera (2007) that does not claim to address causality issues, but rather limits the analysis to measuring the trend of the wage effects of schooling at both the mean and across the conditional wage distribution. The paper however follows the literature that concentrates on correcting for sector selection which is by far the most significant segmenting factor in the Egyptian labor market (see Assaad, 1997, Zhang, 2003 and Said, 2003)

3.2 Sector Selection Decision

Correct estimation of the above wage effects hinges on the ability to identify determinants of wages for randomly selected individuals from the sample under study. However, the above wage equation can only be estimated for non-random groups of individuals (i.e. those who report a wage). This leads to sample selection bias especially when the unobservable characteristics of the work-status decision are correlated with the unobservable characteristics affecting wages.

The standard treatment for the sample selection problem is Heckman’s (1979) two-step estimate. Lee (1982) proposed a generalization of the two-step selection bias correction method where selectivity is modeled as a multinomial logit decision (Bourguignon et al., 2007). Using Lee’s extension, we assume that individuals face five mutually exclusive alternatives when it comes to joining the labor market: non-participation (j=0), working as a non-wage worker (j=1), working as a wage workers in the non-government sector (j=2), as wage worker in the government sector (j=3) or remaining unemployed (j=4).

The functional form of the multinomial logit model (Maddala 1983) is employed as follows:

$$\Pr(Y_{it} = j | Y_{it-1} = k) = \frac{\exp(B'_j Z_i)}{\sum_k \exp(B'_k Z_i)}, \dots, j, k = 0,1,2,3 \quad (2)$$

The probability that the ith individual selects the jth work-status is:

$$P_{ji} = \exp(\beta'_j X_i) / [1 + \sum_{j=0}^3 \exp(\beta'_j X_i)] \quad (3)$$

where the subscript j=0, 1, 2, 3 is for type of sector/work status, X_i is a vector of independent variables and β_j is the parameter vector for work status choice (j).

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To obtain the marginal effects of a covariate, x_i , on the choice probability to state j , P_j , is given by:

$$\frac{dP_j}{dx_i} = P_j[\beta_j - \sum_k P_k \beta_k], \quad (4)$$

Where β_j and β_k are the relevant elements of the parameter vector β . Thus, the marginal effects are to be interpreted as the change in the probability of ending in a particular state j given a change in an explanatory variable x_{it} .

This step is followed by constructing the selection term as follows:

$$\lambda_j = \phi(H_j) / \Phi(H_j) \quad (5)$$

where $H_j = \Phi^{-1}(P_j)$; $\phi(\cdot)$ and $\Phi(\cdot)$ are the standard normal density and distribution functions, respectively.

3.3 Selectivity Corrected Earnings Function and Quantile Regressions

The above selection terms are then entered linearly into the wage equation extended with regional dummies where the dependent variable in the wage equation is the log hourly earnings such that:

$$\ln W_j = \beta_0 + \sum \beta_k EDum_{ik} + \beta_2 EXP + \beta_3 EXP^2 + \sum \beta_j RegDum_{ij} + \beta_4 \lambda_j + u \quad (6)$$

Finally, the above model is estimated across different quantiles of the wage distribution using quantile regression methods. Quantile methods are also preferred over, or along side, least square estimation due to the higher degree of robustness in estimation, reduced sensitivity to outlying observations (Koenker and Bassett, 1978; Deaton, 1997). The Quantile regression method can be written in equation form as the q th quantile of the conditional log distribution of wages as a

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linear function of the regression variable, X:

$$\text{Quantile}_q(\ln w|x) = X \beta_q \quad (7)$$

The model can be estimated by finding the vector (β_q) that minimizes the following expression,

$$\sum_{r < 0} q | \ln w - x' \beta_q | + \sum_{r > 0} (1 - q) | \ln w - x' \beta_q | \quad (8)$$

We test the hypothesis that wage dispersions do indeed vary across educational levels, thus resulting in an impact of schooling upon the wage distribution, through its within-levels channel schooling-related earnings increment. The log wage equation may be estimated conditional on a given specification and then calculated at various percentiles (e.g., the 10th, the 25th, the 75th or the 90th). The above quantile regressions do not correct for selectivity as the OLS method above. Instead they provide estimated coefficients that correspond to particular parts of the distribution, thus it offers a more comprehensive view of the relationship between the wage and schooling variables under study. Furthermore, another advantage of quantile regression is the robustness of the quantile estimations to outlying observations, especially in the presence of large errors, it is expected that the median can perform better than the mean (Caamal-Olvera, 2007).

4. DATA AND RESULTS

4.1 Data and Sample of Study

This study makes use of three recently available Egyptian household survey data sets that contain a wealth of information on household composition and socioeconomic characteristics such as income, parental background, measures of access to the labor market, detailed education history and activity status. These are the 1998 Egypt Labor Market Survey (ELMS) and the Egypt Labor

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Market Panel Survey (ELMPS) for 2006 and 2012. All three surveys are nationally representative and were carried out jointly by the Economic Research Forum (ERF) and the Egyptian Central Agency for Public Mobilization and Statistics (CAPMAS).

The sample of the present study is confined for individuals who are not currently enrolled in school and belong to the working age group between the ages of 15 and 64. The sample on which the analysis is based consists of 6,300 non-wage, non-government, and government workers for both men and women in 1998. The corresponding sample consists of approximately 11,390 in 2006 and 10054 in 2012.

4.2 Variable Specification

For the purpose of this study, several variables are extracted that affect the choice of employment status, levels of education, age, age squared, experience, experience squared, regional dummies, parental education, and hourly wages (in logs). Earnings for non-wage workers (household enterprise workers and the self-employed) are estimated from available data using a methodology suggested by Roushdy and Assaad (2007).

Five regional dummies were used in Egypt in 1998, 2006 and 2012. Other household-related variables are included such as number of siblings in the household (a dummy for presence of siblings less than 6 years of age; and a dummy for presence of siblings older than six years of age), mother’s level of education, father’s level of education (a dummy for holding an intermediate or above degree; and a dummy for holding less than an intermediate degree), and father’s employment status (whether he is a self-employed or an employer at the time the individual entered the labor force). Parental background variables can also be interpreted as proxies for household socioeconomic status (see tables A1-A2).

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4.3 Determinants of choice (multinomial logit model) for Egypt

Four multinomial logit regressions are estimated to study selection into non-participation, unemployment, non-wage work, non-government work, and government wage work by gender and round (1998, 2006 and 2012). In each equation, the dependent variable is a categorical variable represented by the five different work status states mentioned above.

Tables A3 to A5 show the parameter estimates of the sector-gender-round specific selection equations. The reference category is an illiterate and non-participant person living in Greater Cairo. The results show that the government sector remains the favored employer for men because of its job security and compensating retirement schemes in addition to short working hours and lower effort. For females, education increases the probability of being a waged worker, especially in the government sector. As expected, higher educational attainment also reduces the probability of a female being a non- wage earner in all years. One interpretation is that women (like men) prefer to work in the government for its more convenient working conditions and short working hours.

Other patterns are found by examining the coefficients reflecting household variables. Both parental education and fathers’ self-employed/employer status appear to negatively influence the probability of females joining wage employment (relative to non-participation) in 1998. To the extent that these variables are reflective of higher income or socio-economic status, this may also be indicative of the predominance of the income-effect due to higher household income acting as a disincentive for female wage work in 1990s Egypt. By 2006, however, mother's education exerted the expected positive influence upon the choice to be a waged worker for males and for females to join non-government wage employment.

Another result worthy of highlighting is that all vocational secondary and university

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graduates with industrial vocational secondary level faced a higher probability of unemployment in 1998. This is attributed to the vocational industrial enrolment expansion adopted by the government and was based on a belief that such skills were the most in demand by the labor market. By 2012, the situation had worsened for both sexes (particularly for males) such that the probability of being unemployed jumped for all vocational and university graduates and not just those with industrial track education. This continued to be the case in 2012, especially for females. Moreover, university graduates currently face the highest probability of being unemployed among all the educational groups as a result of the massive expansion of university enrolment over time. Relative to their male counterparts, female university and vocational secondary graduates face double the probability of unemployment. This result can be interpreted as giving credence to the view that educated women in the Egyptian labor market still suffer discriminatory treatment in employment relative to their male counterparts.

4.4 Incremental returns to different levels of education for Egypt

Selectivity corrected wage equations for men and women (across economic sectors) are then estimated based on the selectivity corrected wage determination model and parameter estimates are used to calculate incremental rates of return to education. Equality of coefficients tests are further conducted to test significant differences in coefficients across years and levels of education. Tables A6-A7, show these results and compares them to OLS estimates for 2006 and 2012. In both tables an extensive list of control variables, including regional and educational level dummy variables as well as a gender dummy are included to avoid biased results. Table 2 presents the incremental private rates of return to education for men and women in 1998 and 2012 based on the selectivity corrected wage parameter estimates.

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The main results may be summarized as follows: Relative to the preparatory certificate holders, there are small (5-12%) but mostly positive and significant returns for males in 1998, 2006 and 2012. These returns, however, have been declining especially for technical education graduates. The returns are highest in the government sector, which remains the favored employer especially for male technical secondary graduates. These graduates obviously face much poorer prospects in the private labor market, which creams the best technical secondary graduates and generally considers them as belonging to lower social classes.

Vocational education yielded lower rate of returns if compared with general education for all categories in the private sector. Returns to male university witnessed further improvement over time in the private sector. In comparison to other levels and to the private sector, the public sector remains the best destination for men in terms of wage and non-wage benefits, job opportunities are less there.

Finally, changes in returns to education throughout the period 1998-2012 indicate a decline for higher levels of education in the male general secondary and university graduate populations working in the private sector. This is the result of cumulative effect of previous episodes of rapid acceleration in university graduates from 1995 onwards. For women, the returns to university graduates working in the government sector also declined. Thus highly educated women are now facing a doubly difficult treatment in the labor market, as they are not able to join the private sector at the same rate as men and face worsening prospects in the government.

In sum, two main important observations can be made. First, returns to schooling have dropped quite substantially in Egypt over this period at all levels (except the university level where they increased in the government for men). Second, in relation to gender differences, after

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the crisis, returns to schooling for women are much lower than men in the public sector. In the private sector, they declined for women at vocational and university levels, but are higher than men for university graduates in the private sector.

This confirms the finding that highly educated women can still reap significant benefits from their education in the private sector. This does not mean that educated women fare better than men in Egypt, but only that the gender gap in wages declines with education in the private sector, especially when one reaches the university level.

Table 2 Selectivity corrected Incremental Returns to Education in Egypt (1998-2012)

		1998	2012
Male Public			
	General Secondary	8.8	8.4
	Vocational Secondary	7.2	9.8
	University	8.8	12.4
Male Private			
	General Secondary	7.3	5.3
	Vocational Secondary	5.0	3.5
	University	7.3	6.8
Female Public			
	General Secondary	9.7	6.3
	Vocational Secondary	9.6	7.5
	University	10.7	10.1
Female Private			
	General Secondary	-1.5	12.8
	Vocational Secondary	4.9	4.4
	University	10.9	9.0

Source: Author Calculation from the 1998 Egyptian Labour Sample Survey and 2006-2012.

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4.5 Quantile Regression Results for Egypt

As Figures 3 and 4 show, there is a large degree of dispersion or inequality in wages amongst individuals in the same educational group. More generally, the labor force in Egypt is not well described by constant returns to education for all workers. The average may provide a misleading impression as to the variation in the magnitude of the pay gap across the wage distribution as it implicitly assumes that the schooling-related earnings increment is constant across the wage distribution.

Using quantile regressions, the two figures show incremental returns for the non-government and government sectors respectively, calculated across years, gender and five quantiles of the earning distribution (10th, 25th, 50th, 75th and 90th). The results show that in all three years: 1998, 2006 and 2012, returns to vocational secondary school certificates versus preparatory certificates are very low (not exceeding 12%). This was particularly the case for female non-government workers for whom they were uniformly negative across quantiles in 2006 and increased slightly in 2012. Returns to vocational secondary and two-year technical institutes were actually falling in 1998 and 2006 and are now stagnant across quantiles indicating that such education adds very little in terms of incremental earnings for higher earning groups. Conversely, returns to university education are clearly increasing across quantiles and are much higher in the non- government compared to the government sector.

Overall, returns to technical schooling drop or are stagnant over the wage distribution, as the earnings increment associated with schooling is lower for those individuals whose unobservable characteristics (wealth, ability etc.) place them at the top of the conditional wage distribution. These findings imply that technical schooling may have a negative impact upon wage inequality, as the spread of returns drops for higher educational levels. One explanation is

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that there is an interaction between schooling and ability, in which the least able can benefit more from their schooling and the pay gap between the more and less able shrinks for higher educational levels. Returns to university schooling are constant in the government except for the 90th percentile, but are increasing only for men in the private sector, where they would have an increasing impact on inequality.

FIGURE 3. Incremental Rates of Return to Education in the Non-Government Sector



Source: Author Calculation from the 1998 Egyptian Labour Sample Survey and 2006-2012

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FIGURE 4. Incremental Rates of Return to Education in the Government Sector



Source: Author Calculation from the 1998 Egyptian Labour Sample Survey and 2006-2012

5. CONCLUSION AND POLICY IMPLICATIONS

Using rich labor survey data for 1996-2012, this paper presents estimates of incremental rates of return to education based on selectivity corrected earnings equations and quantile regressions that give credence to the view that technical education has generally been inequality reducing in Egypt. On the other hand, university education can have a boosting impact on wage inequality only at higher levels in government and for females in the private sector. Technical school graduates in general have witnessed low and declining rate of returns to education over the past two decades, particularly in the private sector, and appear to have been hit the hardest by the shift towards less government involvement as their share among low earners increased to higher than that of illiterate workers. This finding is consistent of Bertocchi and Spagat’s (2004) suggestion that the vocational-general education divide is the product of a post-industrialisation class struggle that caused an expansion of vocational training where the “elite” relegates members of the “lower class” to technical schools.

The evident bias for general and university education has two major effects on vocational and technical education in Egypt. First, vocational education represents in the eyes of families and future employers a ‘second best option’, since the highest achievers among preparatory school students usually enter the general track. Secondly, vocational programs act as a vent to ease off pressure from more academic paths, with deteriorating quality that constitutes a drain on the national economy. In the industrial sector, skill shortages result in employers refraining from expanding the business scale, while potential manpower remains “dormant, untrained and untapped” (UNDP 2010).

The experience of other Middle Eastern countries such as Turkey and Iran, where

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selection into the vocational track is not compulsory and extensive and selection into university is highly competitive, returns to secondary technical and university education are high, and the quality of skills is superior (Salehi, 2009). In a study on the costs of higher education in Egypt, Assaad (2010) showed that the policy of universal subsidies that aimed at achieving equality in access to higher education has yielded high benefits to those who already qualify for it, as households with limited means send their children to work or are incapable of preparing them to qualify for university acceptance. This lead to calls for a new policy framework that targets public funds only to groups that are in need of assistance and to allow others to pay their own way. The findings of the current paper suggest that this inequity starts at the sorting of entrance at the general versus vocational tracks of secondary education, and targeted assistance to needy students who are likely to proceed to general tertiary education should start at that point.

Reducing the number of students that would seek vocational education, by providing targeted subsidies to general education is only a partial solution. The Egyptian authorities have already undertaken a series of projects to redress the inefficiencies of the vocational and technical education system itself. The complex governance mechanism that saw a sharing of responsibilities for all the different components of vocational education spread across eight ministries has been brought under the umbrella of the Supreme Council for Human Resource Development. Changes have also been taking place in the funding of technical education. The Skills Development Project (SDP), recently set up with the assistance of the World Bank, provides funding for vocational training directly to businesses, as opposed to funding the training institutions. Finally, an important attempt to rectify the system is represented by the Mubarak-Kohl Initiative that, based on the German model, seeks to promote a greater role for partnerships between training institutions and businesses and is financed by the European Union (World

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Bank, 2005). These are all necessary co-ordination and streamlining first steps that need to be supplemented by curriculum content and implementation overhaul.

The main policy implication of this paper’s analysis is that quality and labor market relevance of vocational education remains the key to an effective reform. Encouraging private businesses to invest in vocational education will be of little use if the trainees are still faced with social stigma that relegates them to low-paid jobs. Therefore, a policy recommendation is to design governmental measures to improve the ‘image’ of vocational education in Egypt. An overhaul of technical education should concentrate on the two main objectives (that the Egyptian system particularly scores badly on): promote social mobility and equity while enhancing economic and social development.

Other policy recommendations are to improve school-to-work transition of youth, define employers’ perspectives on the demand-side of the labor market, and the certification and provision of career path development potential. The issues here are: mismatch in the labor market, weak interrelation between education and training systems and industry needs, negative perception of vocational trades in society, limited availability of employment services for youth have led to one of the slowest and least efficient school-to-work transition rates worldwide in Egypt. Active Labor Market Policies that contribute to facilitating the school-to-work transition, especially through: provision of career guidance services and encouraging entrepreneurship are a key to addressing this issue. They would provide integrated employment services (e.g. demand-driven training and employment services), raising awareness of jobseekers in terms of their skills and capabilities, available employment opportunities, collaboration between government, private sector and educational institutions to provide career education for students to enable them to make well-informed education and career decisions. Finally, to simplify start-up and exit

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procedures for those who wish to be self-employed, can help improve the employability and bargaining power of graduates with technical skills, which in turn can help achieve higher wages.

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Table A 1: Means and Standard Deviations of Variables by Sector and Gender, Egypt, 2006

Variable	Male						Female						Total	
	Government		Public Enterprise		Private		Government		Public Enterprise		Private		mean	S.D.
	<i>mean</i>	<i>S.D.</i>	<i>mean</i>	<i>S.D.</i>	<i>mean</i>	<i>S.D.</i>	<i>mean</i>	<i>S.D.</i>	<i>mean</i>	<i>S.D.</i>	<i>mean</i>	<i>S.D.</i>	<i>mean</i>	<i>S.D.</i>
Real Hourly Wage	8.52	25.82	10.37	21.22	5.28	9.46	12.51	50.85	9.18	12.37	5.94	22.38	7.55	25.39
Real Monthly Earnings	1598.20	5033.34	2106.65	4686.13	1156.05	1929.47	1235.36	3742.10	1469.91	1601.77	742.44	1264.52	1324.27	3466.41
Log Real Hourly Wage	1.63	0.80	1.84	0.85	1.35	0.68	1.77	0.94	1.77	0.89	0.95	0.97	1.49	0.81
Experience	22.07	11.82	22.22	12.46	23.10	37.95	16.58	9.92	16.99	12.07	19.44	16.19	17.44	36.29
illiterate	0.07	0.26	0.09	0.28	0.20	0.40	0.02	0.13	0.04	0.21	0.37	0.48	0.78	1.76
Literate without Diploma	0.05	0.22	0.08	0.27	0.14	0.34	0.01	0.09	0.00	0.00	0.10	0.30	0.37	1.22
elementary school	0.07	0.26	0.11	0.31	0.16	0.37	0.00	0.06	0.03	0.17	0.12	0.32	0.49	1.49
Middle School	0.04	0.20	0.08	0.26	0.10	0.31	0.01	0.09	0.00	0.00	0.09	0.29	0.32	1.14
General High school	0.01	0.09	0.01	0.09	0.05	0.22	0.00	0.06	0.01	0.12	0.05	0.21	0.13	0.79
Vocational high school	0.32	0.47	0.35	0.48	0.24	0.43	0.40	0.49	0.57	0.50	0.19	0.40	2.09	2.76
post-secondary institute	0.09	0.28	0.09	0.28	0.03	0.16	0.12	0.33	0.06	0.24	0.02	0.15	0.41	1.44
University	0.35	0.48	0.20	0.40	0.08	0.28	0.43	0.50	0.28	0.45	0.06	0.24	1.40	2.34
Alexandria and Canal Cities	0.08	0.27	0.25	0.43	0.10	0.30	0.14	0.34	0.33	0.47	0.10	0.30	0.99	2.11
Urban Lower Egypt	0.13	0.33	0.13	0.34	0.12	0.33	0.19	0.39	0.11	0.32	0.13	0.33	0.81	2.04
Rural Lower Egypt	0.27	0.44	0.18	0.38	0.26	0.44	0.18	0.39	0.11	0.32	0.25	0.44	1.25	2.41
Urban Upper Egypt	0.23	0.42	0.16	0.36	0.17	0.38	0.28	0.45	0.14	0.35	0.17	0.37	1.14	2.33
Rural Upper Egypt	0.16	0.37	0.07	0.26	0.23	0.42	0.06	0.23	0.01	0.12	0.23	0.42	0.77	1.82
Greater Cairo	0.13	0.34	0.21	0.41	0.12	0.33	0.16	0.37	0.29	0.46	0.13	0.33	1.04	2.23
Sample Size	1950		491		3427		1023		68		416		7558	

Note: With the exception of real hourly wages, log real hourly wages, monthly earnings and the experience variables, all variables in the above table are dummies, therefore the mean refers to the percentage of the relevant variable in the sample.

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Table A2: Means and Standard Deviations of Variables by Sector and Gender, Egypt, 2012

Variable	Male						Female						Total	
	Government		Public Enterprise		Private		Government		Public Enterprise		Private		mean	S.D.
	Mean	S.D.	mean	S.D.	mean	S.D.	mean	S.D.	mean	S.D.	mean	S.D.		
Real Hourly Wage	7.50	10.89	8.32	7.90	5.68	13.25	6.92	7.76	12.23	31.76	4.53	6.50	6.35	11.90
Real Monthly Earnings	1283.60	1573.70	1626.91	1380.23	1068.17	1174.54	1059.60	1066.39	1429.75	1098.20	781.72	883.59	1128.81	1269.81
Log Real Hourly Wage	1.68	0.76	1.83	0.75	1.44	0.66	1.66	0.71	1.88	0.88	1.12	0.82	1.53	0.72
Experience	23.65	11.38	20.81	11.54	19.72	13.89	18.74	11.19	16.67	13.08	19.42	14.23	22.87	15.82
Experience2	688.88	571.90	565.89	566.58	582.00	771.94	476.28	458.21	445.41	554.64	579.51	735.90	773.62	968.36
illiterate	0.07	0.25	0.06	0.24	0.24	0.43	0.01	0.12	0.04	0.20	0.50	0.50	0.24	0.43
Literate without Diploma	0.03	0.18	0.04	0.19	0.06	0.23	0.01	0.07	0.04	0.20	0.03	0.18	0.10	0.30
elementary school	0.06	0.24	0.08	0.27	0.14	0.35	0.00	0.06	0.00	0.00	0.08	0.27	0.14	0.35
Middle School	0.04	0.20	0.06	0.25	0.07	0.26	0.01	0.12	0.04	0.20	0.04	0.19	0.09	0.29
General High school	0.03	0.16	0.02	0.15	0.03	0.16	0.02	0.14	0.02	0.14	0.01	0.12	0.05	0.22
Vocational high school	0.35	0.48	0.40	0.49	0.32	0.47	0.34	0.47	0.29	0.46	0.19	0.39	0.23	0.42
post-secondary institute	0.06	0.24	0.08	0.28	0.03	0.16	0.07	0.25	0.12	0.33	0.02	0.14	0.03	0.16
University	0.36	0.48	0.26	0.44	0.12	0.32	0.53	0.50	0.45	0.50	0.12	0.33	0.12	0.33
Greater Cairo	0.10	0.30	0.18	0.39	0.10	0.30	0.14	0.35	0.39	0.49	0.12	0.32	0.11	0.31
Alexandria and Canal Cities	0.07	0.26	0.29	0.46	0.07	0.26	0.12	0.32	0.35	0.48	0.07	0.25	0.08	0.27
Urban Lower Egypt	0.12	0.33	0.09	0.29	0.11	0.31	0.17	0.38	0.08	0.27	0.08	0.28	0.11	0.31
Rural Lower Egypt	0.19	0.39	0.08	0.27	0.13	0.33	0.22	0.42	0.08	0.27	0.10	0.30	0.14	0.35
Urban Upper Egypt	0.31	0.46	0.23	0.42	0.29	0.46	0.24	0.43	0.04	0.20	0.30	0.46	0.28	0.45
Rural Upper Egypt	0.21	0.41	0.12	0.33	0.29	0.45	0.10	0.30	0.06	0.24	0.33	0.47	0.28	0.45
Sample Size	2306		435		5579		1321		51		416		10160	

Note: With the exception of real hourly wages, log real hourly wages, monthly earnings and the experience variables, all variables in the above table are dummies, therefore the mean refers to the percentage of the relevant variable in the sample.

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TABLE A3. MULTINOMIAL LOGIT ESTIMATES OF WORK STATUS SELECTION EQUATION (1998)

Variable	Males				Females			
	Non-Wage	Non-Government	Government	Unemployed	Non-Wage	Non-Government	Government	Unemployed
Constant	-7.44 ***	-5.42 ***	-16.04 ***	-3.61 ***	-4.97 ***	-0.47 ***	-15.74 ***	-5.3 ***
Age	0.47 ***	0.45 ***	0.8 ***	0.21 ***	0.1 ***	-0.1 ***	0.48 ***	0.15 **
Age ²	-5.86 ***	-6.06 ***	-9.38 ***	-3.42 ***	-1.35 ***	1.2 ***	-5.34 ***	-4.11 ***
Educational attainment:								
Read & Write	-0.5 ***	-0.33 **	0.41 *	-0.04	-0.77 ***	-0.3	0.84 *	0.73
Primary	-0.51 ***	-0.33 **	0.78 ***	-0.12	-0.46 *	0.08	1.04 **	0.57
Preperatory	-0.43 *	-0.51 **	0.83 ***	0.1	-0.98 **	-0.15	2.56 ***	0.39
General Secondary	-0.9 **	-1.31 ***	0.6	0.14	-1.14	0.18	2.97 ***	1.65
Voc.Sec.Agricultue	-0.95 ***	-1.08 ***	1.46 ***	0.11	-29.79	0.86	5.08 ***	4.12 ***
Voc.Sec.Industrial	-0.99 ***	-0.74 ***	1.07 ***	0.67 ***	-0.83	1.15 ***	4.63 ***	3.73 ***
Voc.Sec.Commercial & Other	-1.19 ***	-1.13 ***	1.62 ***	0.38	-0.53 *	1.18 ***	5.28 ***	3.39 ***
Higher Technical Institute	-1.35 ***	-2.3 ***	2.2 ***	0.11	-29.35	1.15 **	7.24 ***	3.09 ***
University and Above	-1.18 ***	-1.11 ***	1.86 ***	0.38	-0.16	2.32 ***	6.62 ***	3.96 ***
Household-related variables:								
Father's education level intermediate or above	0.12	0.22	-0.06	-0.32	-0.04	-0.57 **	-0.34 **	-0.55 ***
Mother's education level intermediate or above	0.38	0.18	-0.22	1.04 *	0.18	-0.78 *	-0.7 ***	-0.71 *
Father's occupation self-employed or an employer	1.7 ***	0.26 **	0.67 ***	-1.2 ***	0.16	-0.95 ***	-0.58 ***	-0.31 *
Regions:								
Alex	-0.11	-0.06	-0.21	0.34	-0.29	-0.55 ***	0.18	0.07
Rural Upper Egypt	0.43 **	-0.09	0.77 ***	-0.02	0.64 **	-1.23 ***	0.3	-0.16
Urban Upper Egypt	0.49 ***	-0.12	1.09 ***	0.3	0.53 **	-1.07 ***	1.29 ***	0.01
Rural Lower Egypt	0.54 ***	-0.02	1.03 ***	0.64 ***	0.87 ***	-1.03 ***	0.78 ***	0.36 *
Urban Lower Egypt	0.37 **	-0.18	0.55 ***	0.3	0.51 *	-0.57 ***	0.94 ***	0.69 ***
Log Likelihood	-7318.4099				-4030.942			
Goodness of fit- c2	3243.95				3859.11			
Sample Size	6099				6298			

Note: * denotes significance at the 10, ** and *** at the 1 percent level.

Source: Author's calculations based on ELMs 1998.

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TABLE A4. MULTINOMIAL LOGIT ESTIMATES OF WORK STATUS SELECTION EQUATION (2006)

Variable	Males								Females							
	Non-Wage		Non-Government		Government		Unemployed		Non-Wage		Non-Government		Government		Unemployed	
Constant	-7.28	***	-6.41	***	-17.68	***	-4.11	***	-5.39	***	-1.92	***	-16	***	-8.88	***
Age	0.49	***	0.53	***	0.89	***	0.23	***	0.14	***	-0.01		0.49	***	0.27	***
Age ²	-6.34	***	-7.22	***	-10.51	***	-4.19	***	-1.68	***	-0.02		-5.24	***	-5.62	***
Educational attainment:																
Read & Write	0.01		0.15		0.5	**	0.58		-0.8	***	0.01		0.75	**	-28.48	
Primary	-0.26	*	-0.04		0.66	***	0.05		-0.39	***	-0.03		-0.32		1.07	*
Preperatory	-0.6	***	-0.48	***	0.49	**	0.08		-1.03	***	-0.23		1.11	***	1.17	*
General Secondary	-1.06	***	-1.26	***	-0.14		0.38		-1.34	***	0.22		1.8	***	1.87	**
Voc.Sec.Agricultue	-0.36		-0.39	**	1.48	***	1.15	***	-1.04	**	0.28		3.99	***	3.8	***
Voc.Sec.Industrial	-0.38	***	-0.15		1.25	***	1.5	***	-0.79	***	0.34	*	3.31	***	3.95	***
Voc.Sec.Commercial & Other	-0.61	***	-0.37	**	1.64	***	0.98	***	-0.78	***	0.9	***	4.04	***	3.95	***
Higher Technical Institute	-0.69	**	-0.31		1.77	***	1.67	***	-1.14	***	0.78	***	4.48	***	4.31	***
University and Above	-1.02	***	-0.75	***	1.9	***	2.04	***	-1.44	***	1.56	***	5.37	***	4.76	***
Household-related variables:																
Father's education level intermediate or above	-0.11		-0.13		-0.1		0		-0.25		-0.78	***	-0.43	***	-0.44	***
Mother's education level intermediate or above	0.77	*	0.89	**	0.65	*	-0.72		0.1		0.42	*	0.15		-0.46	**
Father's occupation self-employed or an employer	0.94	***	0.02		0.26	**	-0.49	*	0.49	***	-0.7	***	-0.29	***	-0.71	***
Regions:																
Alex	-0.01		0.04		-0.33	*	0.11		-0.02		-0.1		0.5	***	0.24	
Rural Upper Egypt	0.8	***	-0.14		0.86	***	-0.84	***	2.1	***	-1.22	***	0.63	***	0.19	
Urban Upper Egypt	0.37	**	-0.29	**	0.61	***	-0.19		1.3	***	-0.85	***	1.08	***	0.34	*
Rural Lower Egypt	0.69	***	-0.11		0.89	***	-0.22		0.73	***	-0.62	***	0.82	***	0.71	***
Urban Lower Egypt	0.49	***	-0.26	*	0.26		-0.08		0.26		-0.43	***	0.86	***	0.97	***
Log Likelihood	-11753.992								-8447.5102							
Goodness of fit- c2	4904.67								4861.61							
Sample Size	10132								10501							

Note: * denotes significance at the 10, ** and *** at the 1 percent level. Source: Author's calculations based on ELMPS 2006-2012.

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TABLE A5. MULTINOMIAL LOGIT ESTIMATES OF WORK STATUS SELECTION EQUATION (2012)

	Male				Female			
	Non-wage	Private	Public	Unemployed	Non-wage	Private	Public	Unemployed
Constant	-11.787***	-10.484***	-22.657***	-10.176***	-6.702***	-4.878***	-17.491***	-11.935***
age	0.730***	0.786***	1.126***	0.630***	0.179***	0.190***	0.496***	0.456***
agesq	-0.009***	-0.010***	-0.013***	-0.009***	-0.002***	-0.003***	-0.005***	-0.008***
Educational attainment								
Literate without								
Diploma	-0.350*	-0.414**	0.554**	-0.040	-0.339*	-0.040	1.732***	1.392**
elementary school	-0.614***	-0.670***	0.308*	-0.700***	-0.369***	-0.229	0.297	0.797*
Middle School	-1.601***	-1.626***	-0.164	-1.928***	-1.086***	-1.042***	2.490***	0.921**
General High school	-2.660***	-3.112***	-0.499**	-2.512***	-1.786***	-1.217***	3.984***	1.651***
Vocational high school	-0.841***	-0.750***	1.283***	-0.010	-0.449***	-0.188	4.628***	3.441***
post-secondary								
institute	-0.880***	-0.976***	1.676***	0.184	-0.812**	0.368	5.336***	3.736***
University&above	-1.208***	-1.275***	1.828***	0.248	-0.679***	0.951***	6.536***	4.135***
Regions								
Alex	-0.136	-0.095	0.041	0.15	-0.020	-0.084	0.566***	0.239
Rural upper Egypt	0.677***	-0.099	0.776***	4	0.466**	-0.478***	1.210***	1.046***
Urban Upper Egypt	0.550***	-0.176	1.057***	0.017	0.810***	-0.883***	1.404***	0.659***
Rural lower Egypt	0.801***	0.059	1.211***	-0.376**	1.098***	-0.554***	1.345***	1.200***
Urban lower Egypt	0.767***	0.012	1.145***	-0.373*	1.232***	-1.571***	1.156***	0.122
Observations	14839	14839	14839	14839	15192	15192	15192	15192

Note: * denotes significance at the 10, ** and *** at the 1 percent level.

Source: Author's calculations based on ELMPS 2006-2012.

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Table A6: Ordinary least Squares and Selectivity Corrected Wage Equation Estimates, Egypt 2006

	Ordinary Least Square Estimates					Selectivity Corrected Estimates			
	Total	Male		Female		Male		Female	
		Private	Public	Private	Public	Private	Public	Private	Public
exper	0.058*** (0.002)	0.049*** (0.003)	0.040*** (0.005)	0.065*** (0.013)	0.073*** (0.009)	0.232** (0.111)	0.175 (0.322)	0.343 (1.057)	0.659 (1.047)
expsq	-0.001*** (0.000)	-0.001*** (0.000)	-0.000*** (0.000)	-0.001** (0.000)	-0.001*** (0.000)	-0.003* (0.002)	-0.001 (0.006)	-0.004 (0.026)	-0.002 (0.024)
nlevel2	0.032 (0.041)	0.074* (0.043)	0.095 (0.092)	-0.427** (0.216)	-0.193 (0.341)	0.533 (1.100)	-0.880 (3.889)	-3.957 (13.081)	3.044 (25.072)
nlevel3	0.132*** (0.036)	0.087** (0.037)	0.312*** (0.085)	0.042 (0.185)	0.533 (0.461)	0.440 (0.995)	0.937 (3.796)	3.296 (13.044)	11.816 (34.399)
nlevel4	0.234*** (0.046)	0.199*** (0.049)	0.359*** (0.100)	0.248 (0.247)	0.429 (0.341)	0.541 (1.301)	-0.655 (4.480)	-3.234 (18.518)	2.293 (24.280)
nlevel5	0.468*** (0.098)	0.219* (0.118)	1.106*** (0.193)	0.366 (0.328)	0.797* (0.461)	0.365 (3.417)	12.780 (9.061)	0.315 (35.367)	6.512 (31.833)
nlevel6	0.396*** (0.030)	0.262*** (0.032)	0.697*** (0.074)	0.100 (0.126)	0.897*** (0.201)	1.946* (1.024)	3.589 (4.880)	6.603 (8.138)	12.764 (21.133)
nlevel7	0.602*** (0.043)	0.404*** (0.057)	0.945*** (0.087)	0.112 (0.207)	1.002*** (0.210)	2.558 (1.688)	3.753 (6.016)	-16.794 (13.681)	12.306 (23.839)
nlevel8	0.814*** (0.034)	0.823*** (0.041)	1.125*** (0.075)	0.662*** (0.141)	1.065*** (0.202)	10.138*** (1.455)	4.892 (5.927)	-3.089 (8.663)	9.160 (23.612)
region_2	-0.034 (0.031)	0.036 (0.036)	-0.028 (0.069)	-0.138 (0.114)	-0.157* (0.092)	0.087 (0.947)	-0.158 (2.771)	-6.165 (9.564)	-1.701 (6.752)
region_3	-0.138*** (0.030)	-0.084** (0.038)	-0.220*** (0.060)	-0.495*** (0.128)	-0.095 (0.085)	-0.722 (1.100)	-3.358 (2.437)	1.196 (11.694)	-0.904 (6.768)
region_4	-0.099*** (0.029)	-0.136*** (0.038)	-0.134** (0.053)	-0.090 (0.157)	0.001 (0.079)	-1.607 (1.152)	-2.545 (2.686)	27.807* (15.698)	2.634 (6.745)
region_5	-0.116*** (0.027)	-0.102*** (0.033)	-0.310*** (0.051)	-0.253** (0.119)	0.344*** (0.088)	-0.510 (1.017)	-1.293 (2.500)	-8.289 (9.787)	21.227*** (6.635)
region_6	-0.139*** (0.030)	-0.114*** (0.035)	-0.245*** (0.056)	-0.070 (0.176)	0.017 (0.128)	-1.641 (1.049)	-1.193 (2.647)	-7.919 (16.587)	17.234* (9.581)
female	-0.035 (0.022)								

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crgovwg	-0.050**								
	(0.021)								
sel2						-1.920			
						(1.428)			
sel3							-2.549		
							(4.351)		
sel5								9.189	
								(15.323)	
sel6									-1.238
									(9.281)
Constant	0.574***	-0.654***	-0.964***	-0.805**	-2.458***	3.620**	5.573	-8.567	-12.137
	(0.039)	(0.092)	(0.254)	(0.339)	(0.425)	(1.532)	(12.177)	(21.142)	(37.723)
Observations	7505	3956	1993	505	1050	1638	1535	156	878
R-squared	0.207	0.175	0.222	0.272	0.222	0.068	0.012	0.103	0.035

Note: nlevel2-nlevel8 denote levels of education as described in Table A4. Sel2-sel6 denote selection variables. Standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1.

Table A7: Ordinary least Squares and Selectivity Corrected Wage Equation Estimates, Egypt 2012

	Ordinary Least Square Estimates					Selectivity Corrected Estimates				
	Total	Male		Female		Male		Female		
		Private	Public	Private	Public	Private	Public	Private	Public	
exper	0.034***	0.025***	0.039***	0.035***	0.029***	0.026***	0.009	0.034***	0.033***	
	(0.002)	(0.002)	(0.005)	(0.011)	(0.006)	(0.003)	(0.010)	(0.011)	(0.010)	
expsq	-0.000***	-0.000***	-0.000***	-0.001*	-0.000	-0.000***	0.000	-0.000	-0.000	
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	
nlevel2	0.026	0.018	0.230**	-0.049	0.314	0.013	0.106	-0.017	0.331	
	(0.039)	(0.044)	(0.092)	(0.246)	(0.284)	(0.044)	(0.099)	(0.234)	(0.293)	
nlevel3	0.073**	0.004	0.178**	0.251	2.325***	0.018	0.098	0.259	2.335***	
	(0.029)	(0.031)	(0.079)	(0.159)	(0.398)	(0.032)	(0.085)	(0.162)	(0.399)	
nlevel4	0.110***	0.012	0.459***	-0.110	0.780***	0.032	0.283***	-0.115	0.790***	
	(0.034)	(0.038)	(0.088)	(0.218)	(0.213)	(0.040)	(0.103)	(0.228)	(0.234)	
nlevel5	0.302***	0.170***	0.712***	0.274	0.969***	0.213***	0.415***	0.203	0.958***	
	(0.046)	(0.058)	(0.104)	(0.242)	(0.193)	(0.063)	(0.137)	(0.256)	(0.241)	
nlevel6	0.278***	0.116***	0.753***	0.022	1.006***	0.141***	0.475***	0.110	0.994***	
	(0.023)	(0.027)	(0.063)	(0.122)	(0.153)	(0.027)	(0.104)	(0.122)	(0.228)	
nlevel7	0.403***	0.235***	0.888***	0.060	1.137***	0.308***	0.522***	0.182	1.114***	

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	(0.038)	(0.057)	(0.082)	(0.206)	(0.166)	(0.055)	(0.136)	(0.187)	(0.256)
nlevel8	0.671***	0.442***	1.209***	0.634***	1.373***	0.496***	0.757***	0.773***	1.329***
	(0.027)	(0.035)	(0.065)	(0.124)	(0.154)	(0.037)	(0.148)	(0.126)	(0.289)
region_2	-0.014	-0.083**	0.031	-0.202*	0.025	-0.009	0.020	-0.188*	0.015
	(0.028)	(0.038)	(0.068)	(0.118)	(0.069)	(0.036)	(0.068)	(0.111)	(0.073)
region_3	-0.172***	-0.179***	-0.128**	-0.273**	-0.228***	-0.179***	-0.216***	-0.375**	-0.229***
	(0.027)	(0.036)	(0.060)	(0.131)	(0.063)	(0.036)	(0.066)	(0.146)	(0.076)
region_4	-0.148***	-0.119***	-0.177***	-0.268*	-0.190***	-0.121***	-0.305***	-0.405**	-0.196**
	(0.026)	(0.035)	(0.055)	(0.146)	(0.060)	(0.036)	(0.068)	(0.186)	(0.080)
region_5	-0.217***	-0.193***	-0.245***	-0.393***	-0.166***	-0.196***	-0.367***	-0.509***	-0.172**
	(0.023)	(0.030)	(0.051)	(0.107)	(0.060)	(0.030)	(0.064)	(0.133)	(0.074)
region_6	-0.074***	-0.019	-0.208***	-0.223	-0.157**	-0.027	-0.329***	-0.378*	-0.164*
	(0.024)	(0.031)	(0.054)	(0.169)	(0.076)	(0.031)	(0.066)	(0.225)	(0.088)
female	-0.145***								
	(0.019)								
crgovwg	-0.001								
	(0.017)								
sel2						-0.024			
						(0.041)			
sel3							-0.327***		
							(0.095)		
sel5								0.149	
								(0.197)	
sel6									-0.022
									(0.096)
Constant	0.940***	1.162***	0.361***	0.796***	0.074	1.152***	1.552***	0.536	0.129
	(0.035)	(0.044)	(0.094)	(0.147)	(0.172)	(0.048)	(0.358)	(0.353)	(0.478)
Observations	10054	5538	2305	409	1317	5929	2295	460	1314
R-squared	0.146	0.068	0.241	0.184	0.218	0.084	0.242	0.216	0.210

Note: nlevel2-nlevel8 denote levels of education as described in Table A5. Sel2-sel6 denote selection variables. Standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1.

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