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TAKING TECHNICAL EDUCATION SERIOUSLY IN MENA: ETERMINANTS, LABOR MARKET IMPLICATIONS AND POLICY LESSONS

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Abstract

Our study focuses on the labor market implications of vocational and technical education in the MENA region, analyzing the case of Egypt and Morocco. We try to assess the validity of those vocational systems by looking at the determinants of schooling choice and the effect of segregation between vocational and general education in rate of returns to education, wage differentials and wage inequality. Drawing conclusions from our analysis, we outline the main challenges faced by policy makers, namely the streamlining of inefficient education systems and the redressing of social stratification furthered by schooling choice based on the successful experiences of South-East Asian economies.

ملخص

تركز هذه الدراسة على تأثيرات سوق العمل بالنسبة للتعليم المهني والفني في منطقة الشرق الأوسط وشمال إفريقيا وذلك بتحليل حالتي مصر والمغرب. نحاول تقييم صلاحية هذه الأنظمة المهنية من خلال النظر إلي محددات خيار التعليم المدرسي وتأثير التمييز بين التعليم المهني والتعليم العام من حيث عائدات التعليم وعدم المساواة والفروق بين الأجور. وبالاعتماد علي نتائج هذا التحليل, فإننا نجمل التحديات الرئيسية التي تواجه صانعي السياسات كما يلي: جعل الأنظمة التعليمية التي تفتقر إلى الكفاءة أكثر فعالية ومعالجة الطبقية الإجتماعية التي أكدها خيار التعليم المدرسي وذلك بالاستعانة بالتجارب الناجعة التي طبقت في دول جنوب شرق أسيا.

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

The experience of the East-Asian economies, such as Japan, Taiwan, Singapore and South Korea, demonstrate that investments in vocational skills at the secondary school level are beneficial for both the individual and society (Tzannatos and Jones, 1997; Green et al., 1999; Gill et al., 2000; Lynch, 1994). In contrast to these successes, one Arab Human Development Report (UNDP, 2003) has highlighted the deep seated institutional, political and economic problems facing education in the region. Even in countries like Egypt, where reform of vocational secondary and higher institute technical education systems is now quite high on the policy agenda, recent analysis shows that the pattern of growth of technical education had little to do with a rational planning exercise or that it is even focused on how to provide young people with workplace relevant skills. Instead it was related to haphazard efforts to divert students aspiring for higher education. Today, technical education graduates are the group of the population most hit by the inadequacies of the education system, as attested by their high unemployment rates (Antoninis, 2002).

The inadequacy of the educational system is amplified by key structural issues in both Morocco and Egypt, where the traditionally large role of the state as an employer has given rise to labor market segmentation. There is evidence indicating that for a selected group of MENA countries (Egypt, Morocco, Jordan and Yemen) returns to education are generally higher in the public sector than in the private sector (World Bank, 2004), especially for specific social groups, for instance women (Said, 2002).

Our research will investigate the impact of vocational secondary and technical higher education on labor market outcomes in MENA. Using recent household survey data for Egypt and Morocco, we will focus on the determinants of vocational versus general education. After analyzing the differences in returns to education over time and across different levels of education, we will investigate the interplay between different levels of education and characteristics such as gender, sector, and occupation and how those result in enduring wage differential and wage inequality. In particular, we will assess whether these differentials can be interpreted as a result of labor market segmentation according to education attainments. Finally, we will look at contexts in which vocational education has fared better and at the policy lessons to be learnt for MENA.

II. Vocational Education and Labor Outcomes: A Literature Review

Numerous recent studies shed a light on the pivotal role vocational and technical education plays in the process of development, both at an individual and societal level (for example Tunali, 2003; Bennell, 1996; Bennell and Segerstrom, 1998; Neuman and Ziderman, 1991). However, there has been an ongoing debate in academic circles on the effectiveness of vocational education, especially if compared to general secondary education. The prevailing consensus is that vocational education generally exhibits lower rate of returns than general education. However, many studies have challenged the orthodoxy by arguing that the impact of such programs is highly influenced by the context that surrounds their implementation (Kurovilla, 1996 and Arum, 1998). Because 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 Japan and South East Asian Tigers), from the Singaporean case where women who undergo skill-specific training are better off than graduates from general education (Sakellariou, 2003) to the experience of OECD countries where, in general, the opposite tends to be true (Hollenbeck, 1993; Cohn and Addison, 2003). When looking at the experiences of different developing countries, researchers are faced on one hand with success stories mainly from South-East Asian countries (Moenjack and Worswick, 2003; Sakellariou, 2003; Abdelkarim, 1997) and on the other hand with cases where vocational education exhibits inadequate rates of return, like Peru (Bellew and Moock, 1990), Mozambique (Ziederman, 2001) or Papua New Guinea (Preston, 1993) to name just a few.

Moreover, vocational education and its effect have traditionally received less attention on part of both policy makers and academics and are, therefore, subject to some misconceptions that underscore the complexity underlying the assessment of vocational education programs. For instance, some authors look at how vocational and general education ought to be perceived as complements rather than substitutes, while other look at the role of information and the matching of supply and demand as keys to success. Finally, another stream of research focuses on the issue of the higher costs of vocational training.

Traditionally, vocational education and general education are seen as two mutually exclusive alternatives. One of the arguments that is usually put forward states that because of the specificity of vocational training, students are locked in occupations in a given industry and have no possibility to switch career path; evidence from Brazil (De Moura, 1987) indicates that highly specialized graduates of technical schools change jobs more frequently than ones with general education, implying that thorough, theoretically sound vocational education has a built-in logic of its own and is capable of producing a type of learning that is as transferable as general education. Looking at the political economy of education, many scholars suggest that the vocational-general education divide is the product of a post-industrialization class struggle that caused an expansion of vocational training where the "elite" relegates members of the "lower class" to technical schools (Bertocchi and Spagat, 2004; Herman, 1995; Oakes, 1983). Riele and Crump (2002) look at the Australian experience to show how the increase of retention rate of secondary education was accompanied by a necessity to accommodate those entering tertiary education as well as those entering the job market directly. In countries where vocational and general curricula are two distinct options, scholars have endeavored to measure the relative advantages of one over the other. However, some studies focus on instances where students are able to enroll in hybrid programs. Kang and Bishop (1989) analyze twelve years of longitudinal data and find that those who devoted about one-sixth of their time in high school to occupation-specific vocational courses earned at least 12 percent extra one year after graduating and about 8 percent more seven years later (holding attitudes and ability in eighth grade, family background and college attendance constant). McMahon and Jung (1992) elaborate on the concept of optimum "mix" that allows curricula to be technologically progressive and adaptive. Specifically, they argue that occupation specific skills provided by vocational education are readily applicable on the job place and are therefore associated with higher starting wages and lower initial unemployment, but vocational skills have large effects on productivity only when there is a correspondence between one's vocational skill and one's job (Bishop, 1989; Neuman and Ziederman, 2001) and if hybrid educational tracks are based on the demands of the labor market (Paleocrassas, Rousseas and Vretakou, 2002). This implies that market-tailored educational curriculum providing both technical and general education may result in larger benefits from educational investment.

Information plays a crucial role in improving the effect of vocational education in two distinct ways: firstly it allows prospective students to make informed choices on the vocational path they undertake and, secondly, information channels that match trainees and adequate job opportunities decrease the risk of unemployment of young graduates. In their study based on the Dutch labor market, Borghans, De Grip and Heijke (1996) investigate the mechanisms that allow vocational

education students to make informed choices that result in improved career prospects. It is argued that students assess the attractiveness of jobs based on the expected wage and that they form these expectations by looking at current wages. Labor market imperfections result in current wages not reflecting all relevant information, thus leading to a misallocation of vocational education graduates. One of the most prominent problems faced by students is the mismatch between the skills transferred through vocational education and those required by the labor market.

In Peru, vocational education is nothing short of a spin-off of general education (Bellew and Moock, 1990) where students do not receive "hands-on" technical experience and therefore are unsuitable for the jobs they are ideally prepared for. It has been shown how vocational school completers achieve higher earnings than their counterparts who attended academic secondary schools only if they worked in occupations related to the vocational course of study pursued (Neuman and Ziederman, 1999; Sakellariou 2003). The necessity for vocational curricula that are attentive and responsive to the needs of the market is acknowledged even by those like Godfrey (1997) who argues for a "minimalist" approach to vocational education planning.

One of the main problems associated with vocational education is that it requires more funding than general education. Tsang's analysis (1997) illustrates how, in general, vocational/technical education is more costly than academic programs, while pre-employment vocational training is more expensive than in-service training. The recurrent cost per student in vocational and technical schools exceeds that for academic schools from a modest margin of 14 percent for Tanzania to a substantial margin of 620 percent for Honduras, with an average of 153 percent. Relative costs hinge on the length of schooling and the variety of subjects, both requiring specific equipment and trained teachers which are often in scarce supply. The problem of higher fixed and recurrent costs of vocational education is critically influenced by the scale of the program. Many studies have drawn attention to scale as a determinant for the success of technical education programs (Tsang, 1997; De Moura 1987). Both studies argue that the total costs of implementing a vocational education scheme result in substantial unit costs if the scale of the program is not adequate or if the wastage and drop-out rates are significant. These findings seem to be supported by the examples of many South-East Asian countries like Thailand, where high demand for vocational education graduates coupled with a historic propensity to invest in technical education have produced streamlined programs operating at the right capacity, leading to rate of returns for vocational education that are superior to those of general education (Moenjak and Worsowick, 2003). The issue of costs can also bring useful elements to the design of policies, once private returns and social returns are analyzed separately. A study of returns to formal and informal vocational education in Côte d'Ivoire (Grootaert, 1990) illustrates the returns of these two forms of vocational training both for society and the individual. In terms of social costs, vocational training based on informal apprenticeships is less costly (because the costs are internalized by the employer rather than the education system); nonetheless, both informal and formal schemes of vocational education yield rates of return below the social opportunity cost of capital and therefore, in order to justify the investments in vocational education, society is required to advocate for non-quantifiable benefits. Individual returns to formal vocational education are higher than those to informal training, where "credentialism" leads both employers and students to value and reward the presence of a diploma. In fact, the Ivorian informal education system tends to absorb vocational education drop-outs or students that never gained access to formal education. The two systems, therefore, cater for two distinct groups and the different ways costs are absorbed across individuals, companies and society lead the author to argue for the validity of both systems: the promotion of informal education could increase society's returns to educational expenditures and contribute to realizing the employment creation potential of the informal sector together with the absorption of those students left behind by formal vocational education.

Arguably, the best approach to the evaluation of vocational education is one that avoids making generalizations, but rather looks at the elements that positively or negatively influence the returns

to vocational training. One explanation worth considering is whether policy making can result in creating a sub-market of vocational education graduates that will eventually evolve in the secondary labor market.

In the context of MENA, we decided to focus our attention on Egypt and Morocco, as these two countries epitomise some of the major trends of education policy within the region. Egypt is praised for now approaching universal primary school enrolment and closing the gender gap on that count, but criticized for over-investing in low quality secondary and tertiary education, whereas Morocco is seen to be one of only three countries in the region (the other two being Saudi Arabia and Yemen) where access to primary schools remains problematic; especially for girls (Van Eeghen, 2003; Megahid, 2004). Additionally, the 1990s have been a period of considerable socioeconomic changes in both countries as the structural adjustment programs undertaken were characterized by the adoption of economic liberalization policies predicated upon the retrenchment of the public sector, whose employment guarantee had historically created a group of technical education graduates trained in areas that predominantly catered for the needs of growing bureaucracies. For these reasons, and for the presence of a wealth of data, an analysis of the dynamics of education and labor market outcomes in Egypt and Morocco can be quite informative on both conceptual and policy grounds.

III. Estimation Methodology

Research on returns to education is based on the work by Mincer (1974). In the traditional specification, returns to education are estimated as follows:

$$\mathrm{Ln}W = \beta_0 + \beta_1 \mathrm{EDU} + \beta_2 \mathrm{EXP} + \beta_3 \mathrm{EXP}^2 + u \qquad (1)$$

Where EDU is the number of years of schooling, EXP is experience in years, EXP^2 is experience squared, and u is a random disturbance term. The specification is shown logarithmically in order for the regressors to be interpreted in terms of marginal effects. In this way index β is interpreted as the rate of returns to schooling. This function that has been introduced by Mincer (1974) is known as the? human capital earnings function to education, which has been the basis of practically all research on returns

Griliches (1977), however, pointed out that the coefficient estimates of the OLS estimation of the classical model could suffer from what is now known as 'self-selection bias'. When individual's family background and ability influence his/her educational attainment, the individual is said to be self-selected into that educational attainment. If educational attainment of an individual is partially determined by his/her abilities and family backgrounds, estimating the previous classical earnings function without taking into account the possibility that family background and ability might influence educational attainment, could give biased results.

One approach to reduce the bias is to include control variables that might capture part of the unobserved components in the error term such as family background characteristics, specifically the father's and mother's level of education and the father's occupation. An interaction term between education and family background can capture the effect of family background on returns to education.

These results, however, are still subject to another type of selection bias. Basically, the equation has been estimated from data on workers, resulting in a censored sample of the entire population. When estimating the wage equation, only those who reported wages at the time of the survey are entered into the analysis, while the ones who were not working were not. In order to solve the problem of sample selection bias, Heckman (1979) suggests estimating two equations. First the participation equation is estimated, consisting in estimating through a logit, for the purpose of this study, the probability of having worked at the time of the survey, and out of school (using the entire sample: workers and non-workers). From the logit results, a selection variable (the inverse

Mills ratio term) is created. This estimate is used in the second step, as an additional regressor in the wage equation, yielding consistent estimates of the coefficients free of censoring bias.

A recent extension to this model is to capture the so-called "certification effect" or "sheep skin effect". The idea is that an employer might value a worker with a certificate more than a worker without one. For this reason, and to allow for estimated rate of return to vary by level of schooling, dummies for levels of education are used instead of years of schooling. The modified Mincerian earnings function is:

$$\text{Ln}W = \beta_0 + \sum\beta_k \text{E.Dum}_{ik} + \beta_2 \text{EXP} + \beta_3 \text{EXP}^2 + u \qquad (2)$$

Where E.Dum consists of dummies for levels of education. Years of experience are calculated by the following formula: (age – years of schooling-6)

1- First Stage: Multinomial Logit Model

Ignoring the fact that the distribution of individuals between general and vocational education is not random offers potential bias in wage estimation (Heckman, 1974). Therefore, we assume that individuals determine their schooling choice before determining a sector of employment, and hence they face three mutually exclusive alternatives when it comes to pursuing post intermediate schooling: not joining high school (j=0), joining general education and presumably continue to a university education (j=1), or joining a vocational or technical[1] schooling (j=2). Therefore, the model takes the form:

$$Pj = \exp(Z\alpha j) \,/\, (1 + \Sigma_{j=1} \exp(Z\alpha j)) \qquad (3)$$

Where Z is a vector of explanatory variables that enter into the decision of choosing the type of education, j is a vector of unknown parameters of the alternative j. Following Lee, 1983; Trost and Lee, 1984, we employ a two stage method in order to estimate wage equations. The first is estimating the probabilities of schooling choice by maximum likelihood logit estimation. Followed by constructing the selection term as follows:

$$\lambda j = \phi(Hj) \,/\, \Phi(Hj) \qquad (4)$$

Where $Hj = \Phi^{-1}(Pj)$; ϕ and Φ are the standard normal density and distribution functions respectively.

Explanatory variables that enter into the logit model include: educational dummies for the father and the mother as proxies for household socioeconomic status. It is assumed that higher parental educational attainment to imply higher socioeconomic status. Since the mother is often the provider of the learning environment for her children, the mother's education (rather than the father's) might have more significant impact on the individual's education decision, as discussed in Behrman and Wolfe (1984), Chiswick (1986) and Heckman and Hotz (1986). Regional differences in choosing a certain level of education are captured by regional dummies. Other explanatory variables[2] include the number of siblings in the household. It is expected to find lower levels of educated parents and the presence of young siblings in the household to be associated with choosing a less risky type of investment in education, namely choosing a vocational schooling, since the graduate secures employment right after getting the certificate.

[1] Vocational education certification is considered a dead end track in Egypt and Morocco. Although graduates of vocational schools are allowed to take part in university education after taking a special examination, few succeed in doing so.

[2] Following Tunali (2003)

2- Second Stage: Earnings Function

Estimating the parameters in the first stage allows calculating the selection term, to correct for selectivity bias, which is then entered linearly into the wage equation. The dependent variable in the wage equation is the log hourly earnings for Egypt and log weekly earnings for Morocco. Log hourly and log weekly earnings are used (instead of hourly or weekly earnings) because they reduces the effects of earnings outliers. The model therefore is:

$$\text{Ln}W = \beta_0 + \sum\beta_k \text{E.Dum}_{ik} + \beta_2 \text{EXP} + \beta_3 \text{EXP}^2 + \sum\beta_j \text{ Reg. Dum}_{ij} + \beta_4 \lambda + u \quad (5)$$

Where E.Dum are dummies for levels of education, experience, experience squared, regional dummies and the selection term.

Experience variables are included in the model since workers with more years of job experience are likely to earn more. (Higher experience is often associated with higher skills and higher productivity). A firm is likely to use higher wages to induce experienced workers to stay on in their jobs, as the cost of training new workers could be very expensive. The experience squared variable is included to capture the possibility of a non-linear relationship between experience and earnings. We expect a positive sign of the experience variable for the reason that working experience is likely to contribute to enhancement of individual's human capital, and negative coefficient of experience square as marginal returns from experience tend to decline over the lifetime.

Interaction of the effects of schooling and experience on earnings should not be neglected. A common reason is the fact that the first few years in the labor market are time for experimenting and frequent job change. As a consequence, earnings of many individuals rise in their first years in the labor force, then level off and increases by a decreasing rate. Another rationale is that the life-time patterns of low levels of education and highly educated workers' earnings differ by nature: for example, the marginal effects of experience on education for a worker with a lower level of education are likely to increase during the first years of work and diminish afterwards. A university educated worker, on the contrary, faces increasing marginal returns to experience. Omission of the interaction variable, therefore, leads to the omitted variable bias in the coefficients estimates.

IV. Data Sets

Our study makes use of 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, ownership of assets, migration histories and activity status.

For the case of Egypt, the empirical analysis is based on the 1988 Egypt Labor Force Sample Surveys (LFSS), the 1998 Egypt Labor Market Survey (ELMS) and the Egypt Labor Market Panel Survey (ELMPS) for 2006. All three surveys are nationally representative household surveys covering 10,000 households in 1988, 5000 households in 1998 and 8500 households in 2006. All surveys were carried out jointly by the Economic Research Forum (ERF) and the Egyptian Central Agency for Public Mobilization and Statistics (CAPMAS) and were conceived as a periodical longitudinal survey, because they contain comparable data. In fact, the ELMPS 2006 covers households included in the ELMS 1998, as well as those units that resulted from splits of the original households and a sample of new households. For Morocco, we used the Morocco Living Standard Measurement Studies (MLSMS) of 1990/1991 and 1998/1999, covering 3349 households and 5129 households respectively. Similarly in the case of Morocco, the data sets contain comparable data allowing for a periodical longitudinal analysis.

For the purpose of this study, we extracted some variables such as: employment status, levels of education, age, experience, experience squared, regional dummies, parental education,

hourly/weekly wages (in logs), and 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). Five regional dummies were used in Egypt in 1988, 1998 and 2006; eight regional dummies in Morocco for 1991 data, and 16 regional dummies in Morocco for 1999 data. The Moroccan data of 1991 did not have distribution by all 16 regions as was the case in 1999. There were cases with few observations on the mother's level of education in Morocco in 1991, therefore, and for the purpose of this comparative study, we opted to use one dummy that takes the value zero for illiterate mothers and 1 for literate mothers. We used weekly wages in Morocco for lack of number for daily working hours in 1999, and because both surveys provided weekly wages. Moreover, because of high rates of seasonal employment within the agricultural sector, we restricted our analysis to non-agriculture workers, who are sons or daughters of the household heads between the ages of 15 and 64, and not currently enrolled in school.

V. Empirical Results

In this section of our study we focus on a comparison between the 1988 LFSS and 1998 ELMS data for Egypt with 1990 and 1998 MLSMS data from Morocco. The comparison allows us to draw important conclusions on the determinants of choice of general versus vocational education, which will be analyzed in detail in section A below. Moreover, we were able to estimate the rate of returns to education and, given the availability of new data for Egypt, we broke down our analysis for different percentiles of income distribution and then we extended it across the period from 1988 to 2006, as outlined in section B. Section C and D are devoted for a detailed study of the Egyptian case, namely, the issue of wage differentials across sectors and the issue of wage inequality.

A. Determinants of Choice

In line with most previous research, we treat schooling choice as a multinomial logit problem, where 4 levels of education are modeled: general secondary; 3 years vocational secondary; 5 years vocational secondary; and university and above[3]. In this sample, private sector workers are one of the following: middle school graduates; secondary general graduates; a 3 year vocational education graduates; a 5 year vocational school graduates, or university graduates. Given that the explanatory variables used in the analysis are dummies, the marginal effects show the effect of a discrete change from zero to one. The reference individual lives in rural regions, with illiterate parents, and no siblings

Our analysis suggests that family background plays a substantial role in the child's choice of an educational path. We note that both in 1988 and 1998 Egyptian mothers with low levels of education (illiterate and primary) increase the chances that their kids will join vocational education. On the other hand, mothers with higher education are more likely to influence their children's decision to join general and, subsequently, university education. The father's education is significant and increases in magnitude with levels of education, but the pattern basically mirrors that of the mother's education. In both instances, the magnitude of the effect weakens in 1998. The effect of both parents on their kids decision to enroll at a university education is comparable when both parents are well educated (having obtained a secondary degree or and above). For example, a mother with secondary or post secondary degree increases the chance that her kids choose a university education by 5 and 3 percent compared with 6 and 4 percent with comparable fathers respectively.[4] Moreover, siblings younger than 6 in the household increase the chances of the individual pursuing secondary general education before reform policies, but increases the chances of joining vocational education in 1998 after the reform. A possible interpretation is that

[3] Small cell sizes did not allow distinguishing between commercial, industrial or agriculture nor within gender.

[4] These findings are consistent with Tunali's in Turkey (Tunali, 2003). The higher the father's education the less likely his son is to choose vocational education.

since the vocational education is considered a terminal degree, individuals with young siblings are expected to get a job right after graduating to help their families financially. Parents, who send their kids to vocational education, expect quick returns and less risky investment. Having siblings 6 years of age or older had a positive effect on joining general education (secondary and university) before the reforms, but a negative effect afterwards, where they preferred to pursue the vocational track.[5]

Moroccan data sets offer a slightly different picture. Regions of residence had no effect on the choice of the type of education in 1991, while in 1999 students residing in regions such as Oriental, G.Casablanca and Rabat-Salé-Zemmour-Zaer prefered to join the vocational schools rather than general schools. The mother's education does not affect choice in 1991, but it does in 1999, when we found that a mother with an upper secondary education influences her children's choice of keeping away from vocational education. Another pattern emerges when we look at the effect of the father's education. In 1991, the father's literacy appeared to have a negative effect on their children's decision to join general secondary education, and a positive one to choose a vocational education instead. The table also shows that the lower the level of the father's education, the greater the effect he exerts on not choosing a general education. This pattern did not continue into 1999, when we see no effect of the father's level of education on the education choices of the children. The existence of siblings in the household in Morocco did have a significant, though subtle, negative effect one on choosing a general education in 1991, while no significant effect was found in 1999. We can thus conclude that family background has the greatest influence on the schooling choice, as children tend to replicate the educational path of their parents (especially mothers) in both Egypt and Morocco.

B. Returns to Education

In this section we examine the labor market outcomes of secondary school graduates. Namely, how acquisition of general vs. vocational (or technical institute vs. university) education impacts the returns individuals obtain, once they enter the labor market. We will first look at a comparison of returns to education in Egypt and Morocco in the 1990s. In the second part of this section, we will disaggregate Egyptian data across percentiles and we will extend our comparison from 1988 to 2006.

Charts 4 and 5 show proportionate returns to vocational secondary, higher institute and university levels of education calculated across years, gender and sectors. The results show that by 2006 (and like returns to experience) they were higher for females than males in the government sector. Except for vocational secondary school certificates, returns to higher educated groups are now higher in the private sector than in public sector. Thus the very notable decline in returns to vocational schools (entry level for those eligible for the public sector employment guarantee) witnessed between 1988 and 1998 has been reversed lately only in the government, but not elsewhere. For Moroccan males with university education (versus secondary) in public sector, returns dropped from 26 percent to 5 percent in a decade (Table 10). Males in the private sector also experienced a drop in returns at all levels of education. Despite a 1 percent drop in their returns, female university graduates in the public sector did fare better in 1999 than in 1990. We can conclude that, as both countries went through a period of structural adjustment, they experienced substantial wage compression in most, if not all, sectors. As a consequence, rate of returns decreased for virtually every sector.

When focusing on Egypt specifically, we need to be aware that the labor force is not well described by constant returns to education for all workers. The average may provide a misleading

[5] Please refer to Tables for data. Tables 1-3 show descriptive statistics of variables used in the analysis, while Tables 4-7 show empirical results on the marginal effects of maximum likelihood multinomial logit estimation of schooling choice.

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. Therefore, we attempted to account for this by resorting to a quantile regression. Our results show that experience has the expected profile, since a positive sign of the experience variable indicating working experience is likely to contribute to growth of individual's human capital and a negative coefficient of experience square as marginal returns from experience tends to decline over the lifetime. Moreover, the coefficients of the education dummies all have the expected positive sign, and all are significantly different from zero at the 1% level or higher. These results may suggest that employers are affected by "credentialism" in their wage setting. The education coefficients in this case, may be regarded as evidence of "credentialism" or screening for ability.[6] Our findings do not match those obtained by Assaad (1997) – using 1988 data – and Antoninis (2001) – using 1997 data – on Egypt. Both Assaad and Antoninis found that rates of return to vocational secondary schooling and higher institutes in the private sector were either negative or very low.

Returns to schooling drop over the wage distribution. Or, to put it differently, the earnings increment associated with schooling is lower for those individuals whose unobservable characteristics place them at the top of the conditional wage distribution. These findings imply that schooling may have a negative impact upon within-group wage inequality, as the spread of returns drops for higher educational levels. One explanation is 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. In 1988, results show that returns to schooling at the lowest decile are almost equal for general secondary and vocational secondary graduates, but are higher for two-year higher technical education followed by university. These returns drop as we move up the wage distribution at all levels but goes up at the highest decile only for university graduates. We also notice an increase in earnings for those with general secondary at the mid distribution and beyond. In 1998, vocational graduates earned the lowest at all levels of wage distribution. University and secondary general graduates earned almost the same at the lowest and highest distribution. Additionally, graduates of two-year higher technical schools experienced a decline in their rewards. Between 1988 and 1998, university and vocational graduates experienced a decline in returns at the tail of the distribution, especially below the 25th percentile. On the other hand, general high school graduates experience abnormal returns at the tail of the distribution, and no change for the median individual. It can be argued that the decade 1988-1998 was a period of 'polarization' of the labor market, where the upper quartiles of each cohort experienced the greatest degree of change, with a staggering 30-40 percent improvement for general high school graduates and declining rates for university and vocational education graduates. These findings, summarized in Chart 3, are consistent with the phenomenon of wage compression caused by the adjustment period.

To sum up, the results on changes in returns to experience and education over the period under study confirm that the legacy of the predominance of the public sector as an employer and the impact of the public sector employment guarantee continues in the labor market in Egypt up to 1998. The public sector in general, and the government in particular, offered the highest rewards for experience and education, and particularly so for females. Since 1998, however, there is evidence that the impact of the public sector employment guarantee started petering off, especially at the post-secondary institute and university levels where labor market returns are now highest in the private sector.

[6] For a more detailed explanation of the methodology of Selectivity Corrected Quantile Regression please refer to the Appendix A.1. Data sets are summarised in Table (12).

C. Wage Differentials by Sector

The 1990s have been a period of considerable socio-economic change. Both Morocco and Egypt opted for a downsizing of the government sector and for the implementation of liberalization measures, albeit with different intensity. The faster pace of the structural adjustment in Morocco had a more noticeable effect on wages over the span of one decade, while Egyptian wages seemed to follow the same trend, but over two decades.

In Egypt we started from a situation where, throughout the decade (1988-1998), individuals with vocational education and university were more likely to reside in urban regions, which might have explained the over presence of vocational schools in urban than in rural regions. Tables 12 and 13 display selectivity corrected estimates of the returns to education equations for public vs. private sectors in Egypt and Morocco respectively[7]. Table 12 presents returns to general and university education for public and private sector workers for 1988 and 1998 in Egypt. Selection terms are not significant in both years, except for public sector workers in 1988 with a small magnitude, which indicates that education selection does not pose a bias problem to estimates. Experience has the expected profile and all coefficients are significantly different from zero at the 1 percent level or more.[8] Region of residence does not matter as a determinant of private sector earnings, but it does matter for public sector workers, where they earn their premium in Cairo, followed by the two urban regions, and the magnitude of these differences has widened in 1998. This is consistent with the fact that larger, and presumably higher paying units of the government tend to be concentrated in urban Egypt.

Table 12 also reveals that differences between wages of all three types of education did not change significantly in the public sector between 1988 and 1998. On the contrary, private sector workers witnessed a spread in their wages. For example, university workers of the private sector earned 47% more than lower secondary graduates in 1988, as opposed to 54% in 1998— an increase of 13%. Furthermore, private sector vocational workers have witnessed a comparative increase in their wages reaching 17% over the 10 year period. Variations between general and vocational workers' wages particularly increased in the private sector in 1998 compared to their level in 1988. These results may suggest that employers are affected by credentialism ('sheep-skin effects') in their wage-setting. The education coefficients in this case, may be regarded as evidence of credentialism, or screening for ability.

For Morocco, the data in Table 13 reveals several interesting facts leading to one conclusion. That is, wages in Morocco have witnessed a compression and a more equal distribution in 1999 than in 1991. For example, graduates of general and university education working in the public sector are earning 96% higher than those who did not continue through secondary education, while vocational graduates earned only 38% more. We notice a drop in returns in 1999 to 68% for the first group and an increase to 74% for vocational workers in the public sector. The same result is observed in the private sector. Between 1991 and 1999 general and university graduates working in the private sector witnessed a drop in their comparative wages to their lower education by 59%, whereas comparative differences rose in favor of vocational graduates by more than 13%. The 'sheep skin effect' does not show up in Morocco. Private sector workers do not appear to have significant differences in earnings for both types of education. Contrary to Egypt, public sector workers in Morocco have witnessed compression in their wages between all types of graduates, in

[7] In a previous version of this paper, we tested the interaction terms with levels of education and the rest of explanatory variables and did not see much of a difference in both countries. Therefore, we only report this version without interaction variables in the analysis. For a lengthier description of the Oaxaca-Blinder method, please refer to Appendix A.2.

[8] A positive sign of the experience variable indicates that working experience is likely to contribute to enhancement of individual's human capital, and a negative coefficient of experience square points to the fact that marginal returns from experience tend to decline over the lifetime.

just eight years. Regional differences did not have any significant effect on wage determination in Morocco in 1991. It had some significance on public sector wages in 1999, with Oriental and Tangier workers having the lowest public sector wages in Morocco.

Extending our analysis of the Egyptian case to the second decade of structural adjustment (Chart 4), we will notice a similar trend — wage compression that resulted in declining returns in the government sector for all groups between 1988 and 1998. It is important to point out that it is women from all educational backgrounds and male graduates from post-secondary education who experience the biggest reductions. On the contrary, rewards in the government sector increased dramatically for all females by 2006, while they kept declining for all males except graduates from vocational education. We can conclude that the government has reverted to its role of 'model' employer where disadvantaged groups find the higher level of returns.

Given the absence of significant data for women in the private sector, it was only possible to include women with university level education in our analysis, whose results are rendered in Chart (5). After the decline between 1988 and 1998, all university graduates experienced an increase in their rate of return, especially women. Men with vocational education experienced a decline across the two decades, while the opposite is true of men with post-secondary education. We can conclude that private enterprises rewarded more those categories that did not find an adequate level of returns in the government sector. Notably, those categories hold the highest educational attainments.

As for the sector wage gaps, Table 14's crude differentials figures indicate that the relative position of both government and public enterprise workers has improved between 1988 and 2006; particularly for females where they reached 77-83% in 2006. After correcting for differences in worker characteristics, this conclusion of improvement in relative position of public sector employees is maintained , but at a lower level than indicated by the crude estimates. In 2006, males are no longer disadvantaged in the government sector as wages are nearly equal to what they would get in the private sector; they now earn a premium in the public enterprise equal to 27%. The corrected female government and public enterprise premiums are about only 33% (not as high as the77-83% crude rate). These figures still indicate the attractiveness of the government sector for females, but the size of their premium compared to the private sector has now declined from its 50-60% level of 1988.

D. Wage Inequality

Finally, in this section we turn to an analysis of the implication of the above changes in wage differentials to the overall observed inequality (or dispersion) of hourly wages in Egypt. Table 15 presents several standard statistical measures of inequality of both wages and earnings, calculated separately for males and females. In each case, an attempt was made to decompose measured inequality into a component attributable to changes 'within' and another one to changes 'between' important socio-economic groups (such as occupation, industry and education). In this paper, the measures of inequality estimated include the coefficient of variation, the decile ratio and the Gini coefficient.[9] Another measure calculated is 'half the square of the coefficient of variation'. This is a member of the general entropy (GE) indices which have the desirable property of being additively decomposable into components within and between groups. The groups considered are level of education (8 groups), occupation (9 groups) and industry (14 groups).[10]

[9] For an extended discussion of the different measures used to compute wage inequality please refer to Appendix A.3.

[10] The 8 education groups are the same as those in Tables A1-A2. The occupation and industry groups are standard one-digit classifications of occupations and sectors of economic activities used in recent CAPMAS publications.

Using all measures of inequality, hourly wages dispersion has in the sample over the initial observation period (1988-1998), but rebounded by 2006 again to the 1988 level or even higher in some measures. These results are mainly driven by what happened to males over the two periods which followed the same pattern as the whole sample (males are 80% of wage workers in the sample). For females, inequality either increased or, if we take our favored measure of decile ratio, stayed the same until 1998. All measures, however, indicate quite a dramatic increase in female hourly wage inequality between 1998 and 2006.

Further decomposition of the GE index show that most of the observed inequality for males and females in the three years is 'within' (as opposed to 'between') groups. Over the period, however, for both males and females, there were some decline in inequality 'between' educational groups and occupations between 1988 and 1998 (consistent with the declining educational reported in the above wage regression results). The most important change that occurred between 1998 and 2006 is the dramatic increase in within group inequality for both males and females. This is consistent with falling R^2 in 2006 reported in the wage regression above which signifies that the standard human capital variables (controls for experience, education and region) are no longer sufficient on their own to explain major variation and dispersion of wages in Egypt.

Table 15 shows Gini coefficients for different socio-economic groups over the period under study. It is noteworthy that the groups that witnessed the largest real wage increases between 1998 and 2006 are also the ones that had the largest increases in inequality (females, higher age groups, rural-lower and urban-upper Egypt, services and higher educational groups). Looking at differences across institutional sectors, it is also interesting to note that whereas in 1988, hourly wages were most compressed (equalized) in the government sector and most dispersed the private sector, by 2006, the highest degree of dispersion is now observed in the government sector. This pattern is even more dramatic if we look at the decile ratios (see Chart 10). This can be taken as further evidence of the declining impact of the public sector employment guarantee and centralized wage bargaining in the government sector in Egypt in the new millennium. Chart (6) looks at the changes in wage inequality as measured by the Gini Coefficient, and permits us to conclude that, while wages dropped remarkably between 1988 and 1999, the level of inequality was almost unchanged. On the other hand, the increase in wages in 1999-2006 was matched by an increase in inequality for all categories of workers; in particular, graduates of vocational education experienced a doubling in wage inequality.

Looking at the changes in wage premia permits to reach interesting conclusions (Chart 7). The effect of 'credentialism' has increased, as the wage premium for literate people with an elementary school diploma has increased, albeit by a limited amount. The premium for general education graduates that pursue their education (both in University and in a Post-Secondary school) has increased, as a sign that the market values a better educated class of white-collars. At the same time the premium of general high school graduates has reduced substantially in favor of vocational graduates. We can conclude that the labor market seems to signal a strong preference for people with job-specific skills, from both vocational and above-high school education tiers.

Finally, Chart (8) looks at the representation of the groups of graduates among low-earners will reveal that, quite remarkably, workers with vocational training have a higher probability (almost double) of being low earners than illiterate workers, in all three years, reaching almost 40 percent in 2006. At the same time, high school graduates represent 1 percent of all low-earners. This result may lead us to suspect that there may be an overhang of workers with vocational education or that their productivity level may be low, either because of lack of adequate skills, or because they are employed in sectors with low productivity.

VI. Policy Recommendations

There are currently several initiatives to reform systems of vocational secondary and higher technical education in MENA, under the initiative of the World Bank and other lending institutions (see USAID, 2004 for a summary). As financial resources in developing countries are chronically scarce, not every educational sector can receive an equitable amount of funding and attention for planning. The issue of particular contention, among many others, is about the *kind (or level /stream)* of education that the state should promote and prioritize. The current World Bank strategy (1995a) for educational development is to advise its client governments to allocate most of their resources and planning to basic and primary education sector as social rates of return to education (RORE), while generally high, are *highest* for basic and primary education (World Bank, 1980) and because the spillover effects for poverty reduction programs are particularly high for investment in basic and primary education (World Bank, 1995a).

Despite the attempts to reform the vocational education system in Morocco and Egypt, the logic underlying the mechanisms of today's education systems does not differ dramatically from the initial motivations that brought about the establishment of such systems during the colonial period (Lindgren, 2005). The primary objective at the time was to 'produce' diploma-holders that would eventually be absorbed in the public sector while, for instance, the policies led by concerns of universal coverage have been formulated in Egypt only in the 1990s (World Bank, 1995a). The white-collar focus of the Egyptian educational system has been reinforced in 1962 with the introduction of the graduate employment guarantee, which, together with the demographic explosion witnessed in the 20th century, increased the number of students that enrolled in general secondary education with the intent to pursue university level education. As a consequence, the labor market was not able to absorb the overhang of new graduates, and since the bulk of those graduates preferred to be employed in the government sector because of the higher wages first and then non-wage benefits at a later stage, many young entrants preferred to queue for a government job rather than seek private employment (Said, 2004). To counteract this phenomenon, the school system became very selective; only the top 50 percent of preparatory students were admitted into secondary education, and of those, only the top 30 percent could enroll in the general track, with the remaining two thirds channeled into the vocational track (Lindgren, 2005).[12] Tracking students at such an early stage has had repercussions beyond the students' ability to enter university (only the top 5 percent of vocational students enrolls in university). As suggested by Lindgren (2005), the schooling system over-focuses on the acquisition of a diploma, so that memorization and exam-related skills take precedence over those skills that are of direct relevance to a future potential job. At the same time, while university enrolment stands at 0,7 million (compared to 12,5 million in primary schools), university absorbs 45 percent of the education budget (World Bank, 2005), thus expenditure for one university student is 17 times higher than for a primary school pupil (Lindgren, 2005).

Morocco differs from the Egyptian case in that only 5.5 percent of students are enrolled in technical education (Diyen, (2004) refers to year 1999/2000). The scarce appeal of the Moroccan vocational system is dictated by the scarcity of vocational schools (for instance in the eastern part of Morocco, there is only one technical school) and by the fact that vocational education is instrumental to direct entry in the labor market only, given the inexistence of higher technical institutes, and considering that entrance to university is barred to vocational graduates since no degree is issued on completion of technical secondary education.

The evident bias for general and university education has two major outcomes 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

[12] Please refer to Appendix B: The Egyptian School System for recent data.

pressure off more academic paths, with subsequent neglect on the part of the authorities. The annual cost of a student in a technical secondary school is LE 500, a level extremely low if compared to LE 2500, the amount deemed necessary to provide moderate quality technical education in a private technical school (World Bank, 2005). In addition to their lower status within the educational hierarchy, vocational and technical schools suffer from other built-in inefficiencies. Students are channeled into 114 tracks that specialize in specific and often times obsolete skills and, especially because of the importance placed on the mere acquisition of credentials, young graduates enter the labor market poorly trained in skills that are outdated and too specific to adapt to newer opportunities. The results of our precedent analysis confirm this intuition: vocational graduates in the private sector have witnessed a low and declining rate of returns to education over the past two decades. At the same time vocational graduates have been hit the hardest by the shift towards less government involvement as their share among low earners increased from a high 33 percent in 1988 to a staggering 37 percent, when illiterate workers represent only 22 percent of low earners.

The issue of quality and failure to teach appropriate skills is also present in Morocco where, for instance, there is not a single school where basic information technology skills are taught in the whole country (Diyen, 2004). The decline of national industries has also meant that skills that used to be relevant in the past have now to become updated, a phenomenon neglected in technical schools. A report by the Commission Spéciale de l'Education et la Formation states that 77 percent of all students and 80 percent of teachers are dissatisfied with the schooling system. Faced with this abysmal situation the report calls for a reform of the secondary education system with a common first year and a two-year cycle leading to a diploma, allowing students to choose between a general and vocational track. The diploma will thus enable vocational students, at least theoretically, to enroll in university. For the vocational track, students will be taking modules relevant to their specialization in the second semester of their first year and, in order to give them the possibility to deepen their training, the reform envisages the establishment of higher technical schools. From the formulation of the reform plan in 1999 till 2002 very little has been achieved , therefore it remains to be seen how this reform will score in the coming year, as primary school coverage is far from universal in many regions, while disputes over whether Arabic, French or Berber should be the language of instruction are still present.

The Egyptian authorities have already undertaken a series of projects to redress the inefficiencies of the vocational and technical education system. The complex governance mechanism that saw a sharing of responsibilities for all the different components of vocational education spread across the two ministries of education (Ministry of Education, Ministry of Higher Education) and six other ministries has been brought under the umbrella of the Supreme Council for Human Resource Development (SCHRD). While the attempt at improving coordination should be praised, the SCHRD has been, according to the World Bank (2005), largely ineffective since, for instance, the Ministry of Education has not been actively involved since 2002. Another attempt at reducing the rigid top-down approach 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. This initiative is flanked by a Technical Vocational Education and Training (TVET) Reform, financed by the European Union, which, starting from 2004, attempts to create partnerships between vocational schools, training institutions and businesses (World Bank, 2005). Changes have also been taking place with respect to the funding of vocational and technical education. The Skills Development Project (SDP), recently set up with the assistance of the World Bank, provides funding for vocational training directly to those businesses that invest in the development of their workforce, as opposed to funding the training institutions. A final initiative, modeled on the Singaporean and Malaysian experience (Kuruvilla, 1996), led to the establishment of a Training Finance Fund (TFF) that applies a 1 percent levy on profits of businesses with more than 10 employees. Those funds (estimated at LE 350 million a year)

should go towards vocational and technical training but, while this scheme has proved fundamental in the shift towards an improvements of vocational education in Singapore and Malaysia, Johanson and Kanawaty (2001) identify possible problems arising with weak and still partially undefined governance and control mechanisms of the TFF. While all these initiatives deserve an appraisal for the establishment of mechanisms aimed at improving the performance of the vocational and technical education, one might argue that these measures will only address superficial aspects of the problem, without challenging the inherent contradictions of the system. 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. An overhaul of vocational and technical education should concentrate on the two main objectives of any school system: promote social mobility and equity while being the cornerstone of economic and social development of society. Because the Egyptian VTET scores badly on these two fundamental aspects, we argue that the government should prioritize those elements in its policy making.

Several studies carried out in countries with high levels of ethnic heterogeneity have focused on the relationship between the inclusion of minorities and vocational education. Despite the fact that Egypt and, to a lesser extent Morocco, are homogenous societies with respect to ethnicity, the education system furthers the social stratification of youth according to their economic background. Thus, the labor market segmentations on racial ground in countries like South Africa (Herman, 1995), the United States (Arum, 1998 and Oakes 1983) and Israel (Neuman and Ziederman, 2001) is perpetuated in Egypt and Morocco by the role of credentials as a signal of family background and education achievements. Our analysis underlined how low education achievements of fathers and mothers are correlated with their children's choice of vocational education, thus low levels of parents' education (usually associated with lower income) are passed on the next generations. Holders of a diploma from a vocational institute may signal two characteristics to potential employers: their (probably low) socio-economic background as well as low achievements in preparatory schools that tracked them in inefficient vocational paths, resulting in low levels of capital accumulation and low productivity. As a consequence, it may not be inappropriate to draw parallels with the analysis of segregation in ethnically heterogeneous societies. In her study of 25 schools, Oakes (1983) found that, non-white students were more likely to be enrolled in a set of vocational courses with lower potential earnings than their white counterpart. Neuman and Ziederman (2001) look at how the vocational and technical education has been used as a means to integrate new immigrants and disadvantaged minorities (like Israeli Arabs or Women) into Israeli society. The general finding of their previous study was that vocational education improves earnings only if the graduate is matched to a job related to her or his training. While women in vocational education (with the exception of those few women enrolled in technical programs as opposed to clerical ones) do not reap any benefit, Eastern Jews that graduated from a vocational school and were employed in matched occupations earn a higher wage premium than better off Western Jews, despite the fact that Eastern Jews are over represented in vocational education programs. These findings reinforce previous ones by Neuman and Ziederman (1999), that those vocational education programs that are tailored to the needs of the labor market do improve the prospects of vocational students.

The argument put forward by Herman (1995) that, in order to keep academic secondary education as the exclusive domain of middle class children, societies opt for the segregation of less advantaged children in vocational education, does not differ excessively from the rationale at the basis of selectivity in the Egyptian school system. Arum (1998) finds that in the US students in states were vocational education receives relatively more funds are more likely to finish their degrees and earn higher wages than the students in poorly funded state schools. These studies illustrate that social equality is not the only reason why Egypt and Morocco should rethink part of the structure of its education system; if we define schooling as culturally organized formulae for preparing children to participate in the status mobility system of their society (Ogbu, 1982 in

Herman, 1995) a more egalitarian access to education would result in a better allocation of resources to more apt students, rather than to those with higher exam scores which may have been dramatically raised recurring to expensive private tutoring (Lindgren, 2005). The example of Jews of Eastern origin and the findings in Arum (1998) indicates that when vocational education receives adequate attention in the form of funds and focus on relevant skills, it can be used by society to promote the advancement of individuals, with benefits being reaped by society as a whole.

The spectacular growth of the Asian Tigers (Japan, South Korea, and Taiwan) is attributed to many reasons, one of them being the massive investment these states undertook in education and human capital during their period of catching-up. While the exact relationship between human capital (education) and economic growth is still open to debate, it is generally agreed that investment in education is a necessary condition for economic growth (Psacharopoulos, 1988; Schultz, 1988, see also Pritchett, 1999 for diverging evidence). Several analysis of the success stories of Asian economies advocate in favor of such a drastic overhaul of the system led by efficiency concerns (McKormick, 1988; Kuruvilla, 1996; Tzannatos and Johnes, 1997; Green et al., 1999; Gill et al., 2000; Lynch, 1994). In a study on the relationship between the correlation between industrialization strategies and industrial relations and human resources policy goals, Kuruvilla (1996) illustrate how the shift between an import substitution development policy to a cost-driven export promotion first and a high-tech export oriented policy later was matched with drastic changes in education policy and industrial relations in Singapore and Malaysia. Faced with the rise of low cost competitors, Singapore and Malaysia invested heavily in the development of a strong, competent workforce, outlining a strategy that was consistent with the development goals envisaged. Seen as the cornerstone of the country's development strategy and adequately funded by the state, vocational schools started attracting a higher number of students, which were then absorbed in new, export-oriented technology sectors. The increase in demand of the part of students and employers led to a mushrooming of private centers, thus decreasing the financial burden on the public system (AbdelKarim, 1997; Kurovilla, 1996). This marked a watershed in the perception of vocational education from a strait-jacket for low-achievers to a powerful vehicle to employment and empowerment. All these factors triggered self-reinforcing mechanisms that resulted in high returns to vocational education that, still today, are more of an exception than a norm elsewhere in the world.

Taking our analysis of the current challenges facing Morocco and Egypt as a starting point, and the experiences of many South-East Asian economies as a reference point, we can conclude that current and future reforms should be built around three key aspects:

- **Quality:** increasing quality does not only focus on increasing spending. Governance systems ought to be simplified and made more transparent, flexible and participative. Increasing spending might prove difficult in Egypt, where the system enrolls more than 500 thousand students already; while in Morocco the limited size poses problems because investment in equipment are spread across too small a number of students. A key strategy could be to begin investment on a smaller pool of school, thus improving the perception of quality that could have knock-down effects on perspective students and employers.
- **Equality:** as long as vocational and technical education remains a second-best alternative, the best students will be channeled into general education, even if the current selective system based on exam results were to be dismantled. At the same time, very slight possibilities to pursue higher education (whether at university or in higher technical schools) will mean that few bright students will opt for vocational education, since it would limit their future alternatives.
- **Public-private partnerships:** such partnerships will be beneficial because they decrease the burden on public funding, while ensuring that training is matched with the need of the labor markets.

Of course in a situation of dire infrastructure and very limited resources like in the case of Egypt, one cannot expect the system to pull itself up by its bootstraps. Nonetheless, attention should be paid to the self-reinforcing mechanism built-in our logic. More quality will convince families and employers to invest in vocational education, while private investment can definitely boost quality. Perhaps the hardest task of all will be to push reform of vocational education higher in the development agenda of both Egypt and Morocco.

VII. Conclusions and Future Expansions

The socioeconomic changes witnessed by Egypt and Morocco have had an adverse impact on the achievements of vocational graduates. Family background remained one of the crucial determinants of educational choice, especially in Egypt, meaning that children are still likely to replicate the educational choice of their parents. As labor markets became more polarized, vocational graduates seem to have been the least favored group both in the public and private sector, mainly because of the declining role of the public sector and because of the private sector's preference for males with post-secondary education. As a result in Egypt, low-earners are twice more likely to be vocational graduates than illiterate.

A possible explanation of these trends could be that a mechanism of path-dependency locks a specific category of workers in a secondary job market. Questions of opportunity cost and an underestimation of the value of education, coupled with dismal wage prospects and structural barriers, reduce significantly the return to vocational education, setting a vicious circle that inevitably co-opts younger generations. These dynamics deserve closer examination as ELMPS 2006 data suggest that graduates of vocational school constitute the biggest and fastest growing group among new entrants in the labor market.

Future expansions of our research should look closely at the internal dynamics of the sub-market for vocational education graduates, by further expanding previous observations to the new 2006 data set. In addition to that, our findings should pave the way to future reforms of vocational education aimed at addressing structural as well as operational imbalances, so that vocational education programs become increasingly more tailored at the needs of MENA labor markets, and society at large. In supporting our arguments, we will draw on empirical evidence from aggregate indicators and cross-sectional data on vocational education and labor market outcomes in MENA and East Asian countries (compiled from a variety of country specific, regional and international sources (namely ILO, UNIDO, UNDP, World Bank and IMF databases).

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Chart (2) Crude and Corrected Public-Private Wage Differentials (1998-1988)

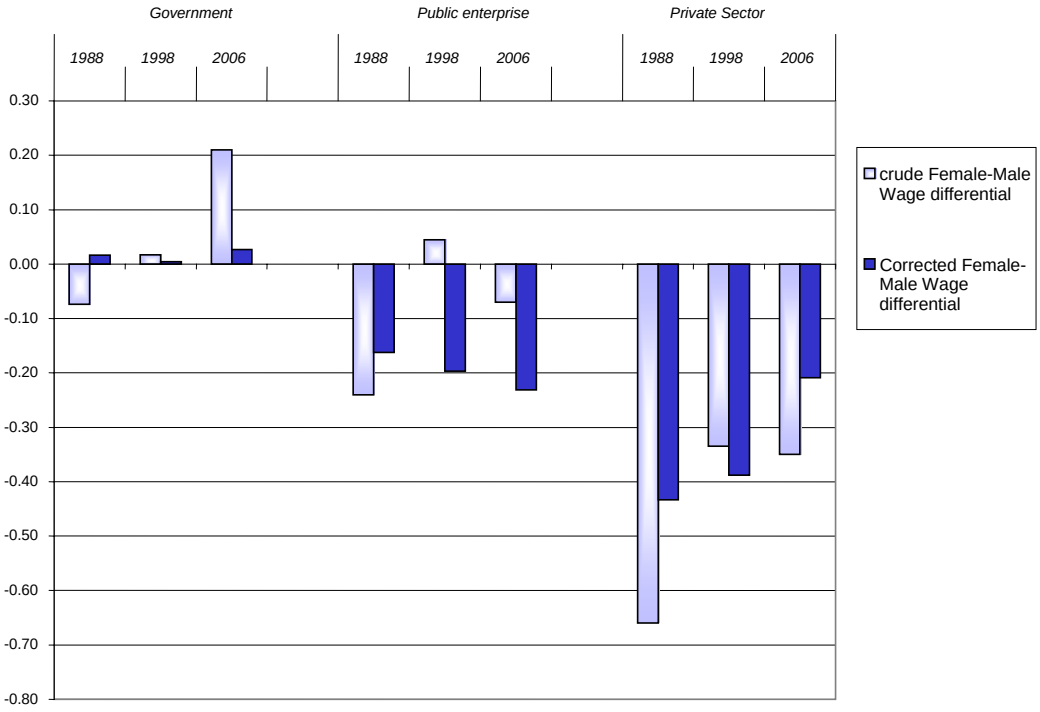
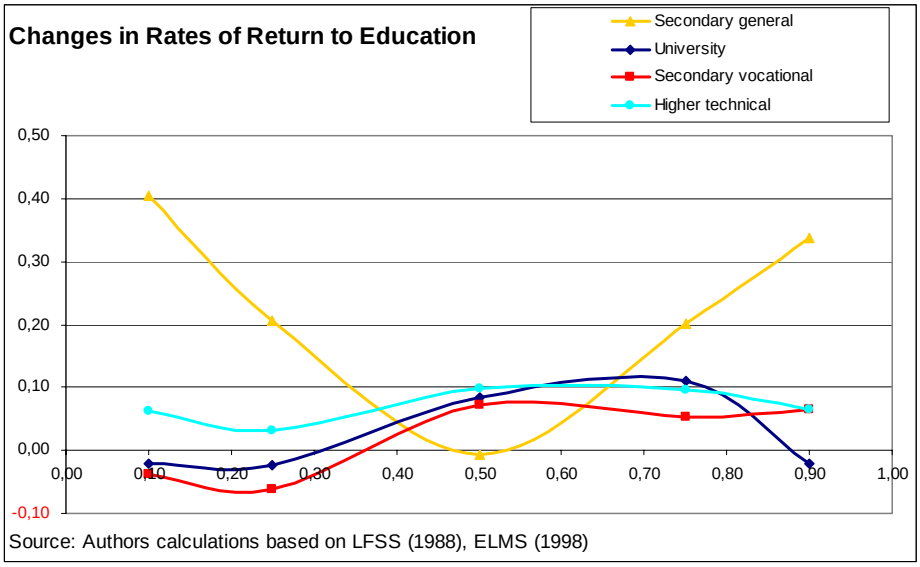
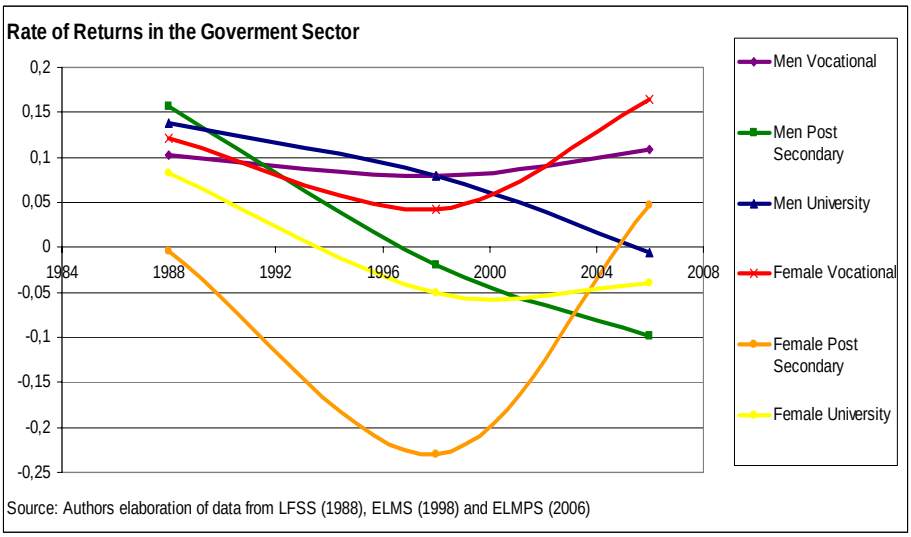


Chart (3) Changes in the Rate of Returns to Education, Egypt, 1988-1998



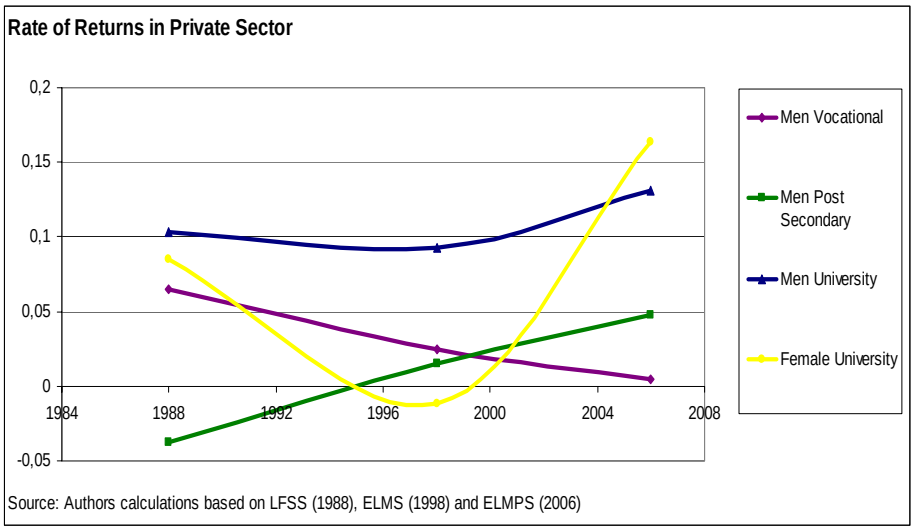
Source: Authors calculations based on LFSS (1988), ELMS (1998)

Chart (4) Rate of Returns to Education in the Government Sector, Egypt, 1988-1998-2006.



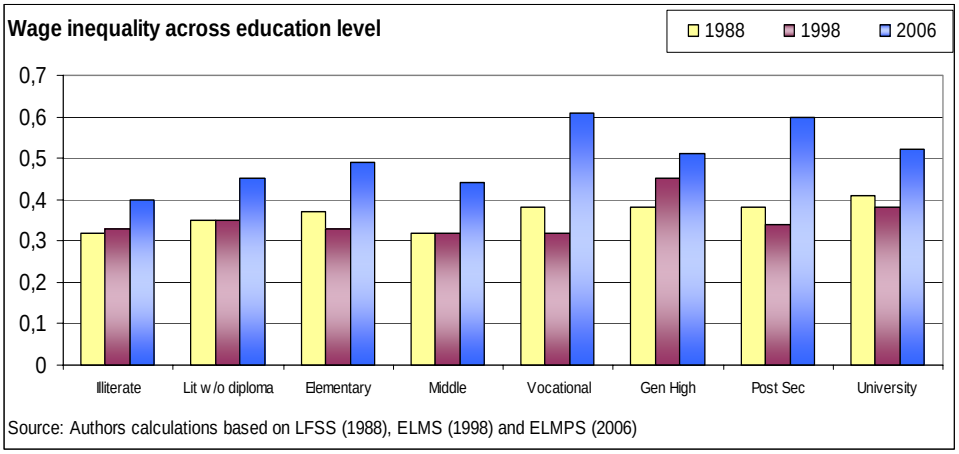
Source: Authors elaboration of data from LFSS (1988), ELMS (1998) and ELMPS (2006)

Chart (5) Rate of Returns to Education in the Private Sector, Egypt, 1988-1998-2006



Source: Authors calculations based on LFSS (1988), ELMS (1998) and ELMPS (2006)

Chart (6) Wage Inequality as Measured by the Gini Coefficient, Egypt, 1988-1998-2006



Source: Authors calculations based on LFSS (1988), ELMS (1998) and ELMPS (2006)

Chart (7) Evolution of the Wage Premium of Median Workers According to Level of Education, Egypt, 1988-1998-2006

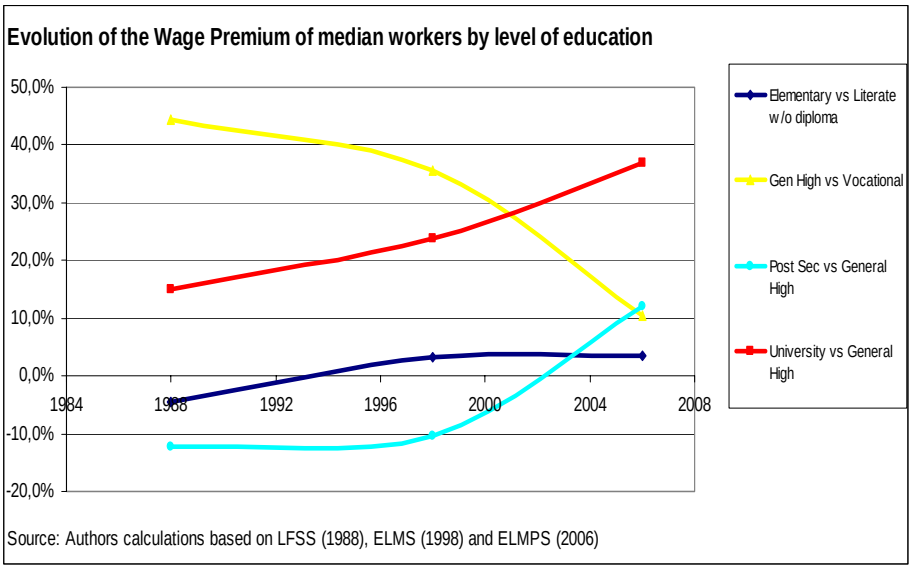
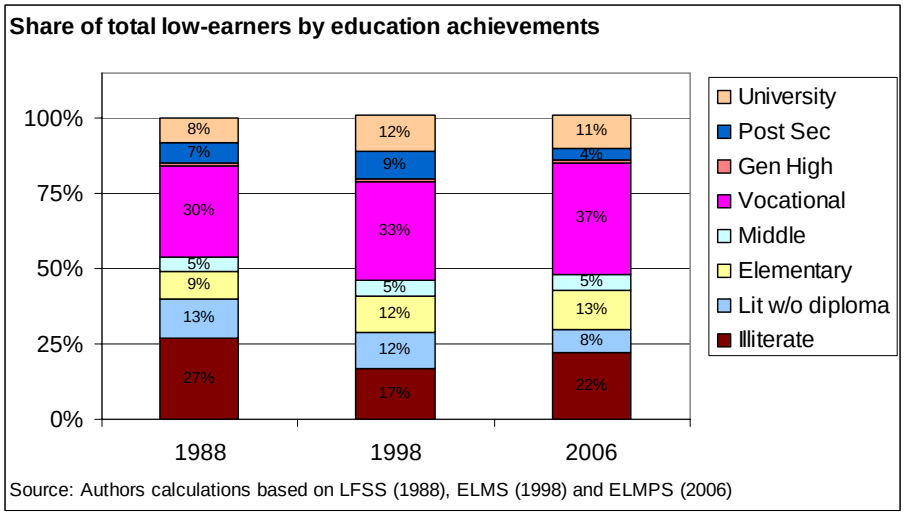


Chart (8) Share of Total Low-earners According to Education Achievements, Egypt, 1988-1998-2006



Source: Authors calculations based on LFSS (1988), ELMS (1998) and ELMPS (2006)

Table (1): Marginal Effects of Maximum Likelihood Estimation of Multinomial Logit of School Choice for Private Sector Workers; Egypt 1988

	All Sample		Public Sec.		Private Sec.	
	1988		1988		1988	
Variables	Mean	Std. Dev	Mean	Std. Dev	Mean	Std. Dev
Alexandria &Suez Can.	0.093	0.291	0.134	0.341	0.105	0.306
Urban Lower Egypt	0.140	0.347	0.158	0.365	0.125	0.330
Urban Upper Egypt	0.099	0.299	0.132	0.339	0.079	0.270
Rural Lower Egypt	0.263	0.440	0.179	0.384	0.235	0.424
Rural Upper Egypt	0.175	0.380	0.100	0.300	0.169	0.374
Mother_Read & Wrt	0.080	0.272	0.146	0.353	0.084	0.277
Mother_Primary	0.021	0.143	0.030	0.172	0.024	0.154
Mother_Second.	0.002	0.044	0.004	0.062	0.001	0.033
Mother_Univ.	0.003	0.054	0.005	0.072	0.006	0.077
Father_Read & Wrt	0.260	0.439	0.371	0.483	0.255	0.436
Father_Primary	0.051	0.219	0.076	0.266	0.059	0.236
Father_Second.	0.007	0.081	0.013	0.113	0.006	0.077
Father_Univ	0.023	0.150	0.050	0.219	0.026	0.158
No.Siblings 0-6 Yrs	1.188	1.444	1.032	1.266	1.101	1.380
NoSiblings >6 Yrs	4.706	2.893	3.830	2.535	4.459	2.726
Log Real Hourly Wage	.449	.761	.605	.659	.420	.730
Observations	9406		2278		1853	

Source: Authors' own calculations from 1988 and 1998 Egypt LFSS and ELMS

Table (2): Marginal Effects of Maximum Likelihood Estimation of Multinomial Logit of School Choice for Private Sector Workers; Egypt 1998

Descriptive Statistics of Variables Used in the Analysis, 15-64 Years, Egypt, 1988

	All Sample		Public Sector		Private Sec.	
	1998		1998		1998	
Variables	Mean	Std. Dev	Mean	Std. Dev	Mean	Std. Dev
Alexandria&SuezCan	0.126	0.331	0.139	0.346	0.121	0.326
Urban Lower Egypt	0.162	0.368	0.177	0.381	0.144	0.351
Urban Upper Egypt	0.172	0.378	0.227	0.419	0.139	0.346
Rural Lower Egypt	0.199	0.399	0.165	0.372	0.210	0.407
Rural Upper Egypt	0.145	0.352	0.086	0.280	0.144	0.351
Mother_Read&Wrt	0.132	0.339	0.197	0.398	0.128	0.335
Mother_Primary	0.009	0.092	0.014	0.117	0.009	0.094
Mother_Second.	0.005	0.069	0.009	0.094	0.006	0.074
Mother_Univ.	0.005	0.069	0.005	0.070	0.004	0.067
Father_Read&Wrt	0.325	0.468	0.394	0.489	0.300	0.458
Father_Primary	0.033	0.179	0.045	0.207	0.023	0.151
Father_Second.	0.012	0.108	0.022	0.147	0.008	0.086
Father_Univ	0.042	0.200	0.061	0.239	0.028	0.166
No. Siblings 0-6 Yrs	0.749	1.070	0.748	0.985	0.802	1.063
No. Siblings >6 Yrs	4.297	2.471	3.627	2.188	4.308	2.469
Log Real Hourly Wage	.277	.678	.365	.649	.196	.680
Observations	8192		1943		823	

Source: Authors' own calculations from1988 and 1998 Egypt LFSS and ELMS

Table (3): Marginal Effects of Maximum Likelihood Estimation of Multinomial Logit of School Choice for Private Sector Workers; Morocco 1991 and 1999

Descriptive Statistics of Variables Used in the Analysis, 15-64 Years, Morocco, 1991

	All Sample		Public Sec.		Private Sec.	
	1991		1991		1991	
Variables	Mean	Std. Dev	Mean	Std. Dev	Mean	Std. Dev
Laayoune-Boujdour-Sakia El Hamra	0.146	0.353	0.172	0.378	0.144	0.352
Guelmime Es-Semara	0.136	0.342	0.111	0.315	0.137	0.344
Souss-Massa-Daraa	0.146	0.353	0.195	0.397	0.143	0.350
Gharb-Chrarda-Beni Hssen	0.148	0.355	0.133	0.340	0.149	0.356
Chaouia-Ouardigha	0.153	0.360	0.139	0.346	0.154	0.361
Tensift Al Haouz	0.139	0.346	0.108	0.311	0.142	0.349
Mother_Read&Write	0.007	0.086	0.010	0.099	0.007	0.085
Father_Read&Wrt	0.811	0.391	0.661	0.474	0.824	0.381
Father_Primary	0.143	0.350	0.244	0.430	0.134	0.341
Father_Prep	0.028	0.166	0.050	0.219	0.027	0.161
Father_Second	0.009	0.096	0.022	0.145	0.008	0.091
Father_Univ.	0.003	0.055	0.005	0.073	0.003	0.053
No.Siblings 0-6 Yrs	1.093	1.298	0.866	1.034	1.108	1.312
No.Siblings >6 Yrs	6.304	3.011	5.035	2.630	6.388	3.016
Log Average Weekly Wages	5.535	.895	6.072	.781	5.184	.767
Observations	5773		184		163	

Source: Authors' own calculations from1991 and 1999 MLSMS, Morocco

Descriptive Statistics of Variables Used in the Analysis, 15-64 Years, Morocco, 1999

	All Sample		Public Sec.		Private Sec.	
	1999		1999		1999	
Variables	Mean	Std. Dev	Mean	Std. Dev	Mean	Std. Dev
Laayoune-Boujdour-Sakia El Hamra	0.013	0.111	0.067	0.251	0.009	0.096
Guelmime Es-Semara	0.023	0.151	0.044	0.204	0.022	0.148
Souss-Massa-Daraa	0.092	0.289	0.066	0.249	0.093	0.291
Gharb-Chrarda-Beni Hssen	0.061	0.239	0.047	0.211	0.062	0.240
Chaouia-Ouardigha	0.051	0.219	0.057	0.233	0.050	0.218
Tensift Al Haouz	0.095	0.293	0.062	0.242	0.097	0.296
Oriental	0.071	0.257	0.050	0.219	0.072	0.259
G.Casablanca	0.129	0.335	0.150	0.358	0.127	0.333
Rabat-Salé-Zemmour-Zaer	0.087	0.282	0.151	0.359	0.083	0.277
Doukala Abda	0.064	0.245	0.051	0.221	0.065	0.246
Tadla Azilal	0.052	0.221	0.028	0.164	0.053	0.224
Meknes Tafil	0.074	0.261	0.058	0.235	0.074	0.262
Fes-Boulemane	0.050	0.217	0.044	0.204	0.050	0.218
Taza-Al Hoceima-Taounate	0.055	0.228	0.041	0.197	0.056	0.230
Tanger-Tetouan	0.075	0.263	0.037	0.188	0.077	0.266
Mother_Read&Write	0.005	0.073	0.010	0.098	0.005	0.071
Mother_Primary	0.014	0.117	0.029	0.168	0.013	0.112
Mother_LwrSecnd.	0.003	0.059	0.006	0.074	0.003	0.057
Father_Read&Wrt	0.762	0.426	0.634	0.482	0.771	0.420
Father_Primary	0.139	0.346	0.215	0.411	0.133	0.340
Father_Prep	0.051	0.220	0.086	0.281	0.048	0.215
Father_Second	0.016	0.127	0.031	0.173	0.015	0.123
Father_Univ.	0.010	0.098	0.020	0.139	0.009	0.095
No.Siblings 0-6 Yrs	0.915	1.146	0.822	0.986	0.920	1.154
No.Siblings >6 Yrs	6.309	2.769	5.223	2.463	6.372	2.773
Log Average Weekly Wages	5.211	1.176	6.306	.695	4.972	1.092
Observations	9502		441		1033	

Source: Authors' own calculations from1991 and 1999 MLSMS, Morocco.

Table (4): Marginal Effects of Maximum Likelihood Multinomial Logit Estimation of Schooling Choice, Egypt, 1988 and 1998

	1988, Gen+Univ	1988,Voc.	1998, Gen+Univ	1998, Voc.
Region (Cairo=Ref.)				
Alexandria&Suez Can.	-0.002	-0.016	-0.019	0.028
	(0.15)	(1.18)	(1.51)	(1.85)
Urban Lower Egypt	-0.011	-0.004	-0.063	0.084
	(1.13)	(0.32)	(5.08)**	(6.06)**
Urban Upper Egypt	0.009	0.008	-0.006	0.033
	(0.87)	(0.65)	(0.50)	(2.29)*
Rural Lower Egypt	-0.058	-0.005	-0.101	0.081
	(5.50)**	(0.38)	(7.13)**	(5.34)**
Rural Upper Egypt	-0.100	0.025	-0.111	0.022
	(6.85)**	(1.64)	(5.78)**	(1.07)
Mother_Read&Wrt	0.115	-0.013	0.116	-0.019
	(12.83)**	(1.20)	(11.73)**	(1.66)
Mother_Primary	0.133	-0.015	0.151	0.012
	(8.13)**	(0.71)	(4.55)**	(0.33)
Mother_Second.	1.183	0.508	0.237	-0.046
	(10.16)**	(5.00)**	(4.01)**	(0.67)
Mother_Univ.	0.012	0.041	0.195	-0.155
	(0.25)	(0.61)	(2.78)**	(1.54)
Father_Read&Wrt	0.043	0.034	0.034	0.028
	(5.89)**	(4.09)**	(3.92)**	(2.95)**
Father_Primary	0.064	0.038	0.042	0.034
	(5.53)**	(2.83)**	(2.19)*	(1.60)
Father_Second.	0.228	-0.096	0.251	-0.070
	(6.94)**	(2.06)*	(7.66)**	(1.65)
Father_Univ	0.261	-0.120	0.263	-0.041
	(12.05)**	(4.05)**	(13.61)**	(1.71)
Siblings 0-6 Yrs	-0.009	-0.003	-0.012	0.031
	(2.65)**	(0.80)	(2.76)**	(6.98)**
Siblings >6 Yrs	-0.010	0.004	-0.017	0.016
	(6.41)**	(2.34)*	(7.59)**	(2.61)**
Observations	9406	9406	8192	8192

Absolute value of z-statistics in parentheses * significant at 5% level; ** significant at 1% level
Source: Authors' own calculations from1988 and 1998 Egypt LFSS and ELMS

Table (5): Marginal Effects of Maximum Likelihood Multinomial Logit Estimation of Schooling Choice, Morocco, 1991 and 1999

	1991, Gen+Univ	1991,Voc.	1999, Gen+Univ	1999, Voc.
Regions(Oued Ed-Dahab-Lagouira=Ref)				
Laayoune-Boujdour-Sakia	-0.001	-0.005	0.142	-0.070
	(0.07)	(0.64)	(0.00)	(0.00)
Guelmime Es-Semara	0.001	0.005	0.104	-0.065
	(0.14)	(0.71)	(0.00)	(0.00)
Souss-Massa-Daraa	0.008	-0.004	-0.140	0.084
	(1.03)	(0.55)	(0.00)	(5.38)**
Gharb-Chrarda-Beni Hssen	0.017	-0.006	0.093	-0.065
	(2.36)*	(0.82)	(0.00)	(0.00)
Chaouia-Ouardigha	-0.006	-0.003	-0.127	0.090
	(0.66)	(0.32)	(0.00)	(5.42)**
Tensift Al Haouz	-0.006	0.003	-0.146	0.085
	(0.69)	(0.32)	(0.00)	(5.42)**
Oriental			-0.154	0.094
			(0.00)	(5.51)**
G.Casablanca			-0.134	0.090
			(0.00)	(5.47)**
Rabat-Salé-Zemmour-Zaer			-0.122	0.088
			(0.00)	(5.40)**
Doukala Abda			0.098	-0.065
			(0.00)	(0.00)
Tadla Azilal			-0.196	0.096
			(0.00)	(5.62)**
Meknes Tafil			-0.130	0.084
			(0.00)	(5.33)**
Fes-Boulemane			-0.149	0.089
			(0.00)	(5.48)**
Taza-Al Hoceima-Taounate			0.094	-0.064
			(0.00)	(0.00)
Tanger-Tetouan			-0.160	0.086
			(0.00)	(5.79)**
Mother_Read&Write	0.021	-0.011	0.234	-0.156
	(1.74)	(0.69)	(0.00)	(0.00)
Mother_Primary			0.023	0.000
			(0.00)	(0.01)
Mother_LwrSecnd.			0.294	-0.162
			(0.00)	(6.12)**
Father_Read&Wrt	-0.126	0.352	0.002	-0.005
	(5.78)**	(7.79)**	(0.00)	(1.11)
Father_Primary	-0.100	0.351	0.028	-0.002
	(4.67)**	(7.55)**	(0.00)	(0.41)
Father_Prep	-0.068	0.340	0.049	-0.004
	(3.20)**	(7.20)**	(0.00)	(0.79)
Father_Second	-0.054	0.329	0.071	-0.007
	(2.43)*	(6.89)**	(0.00)	(1.23)
Father_Univ.	-0.075	0.349	0.079	-0.005
	(3.00)**	(7.57)**	(0.00)	(0.81)
Siblings 0-6 Yrs	-0.007	0.002	-0.004	-0.000
	(3.00)**	(0.78)	(0.00)	(0.51)
Siblings >6 Yrs	-0.006	-0.001	-0.004	-0.001
	(4.98)**	(0.48)	(0.00)	(1.52)
Observations	5773	5773	9502	9502

Absolute value of z-statistics in parentheses * significant at 5% level; ** significant at 1% level
Source: Authors' own calculations from1991 and 1999 MLSMS, Morocco.

Table (6): Selectivity Corrected Wage Equations by Sector of Employment, Egypt, 1988 and 1998

Log Hourly Wages	Public, 88	Private, 88	Public, 98	Private, 98
General+University	0.895	0.467	0.880	0.544
	(0.033)**	(0.060)**	(0.035)**	(0.076)**
Vocational	0.579	0.154	0.503	0.182
	(0.033)**	(0.051)**	(0.037)**	(0.076)*
Experience	0.067	0.063	0.052	0.026
	(0.004)**	(0.004)**	(0.005)**	(0.010)**
Experience Sq.	-0.076	-0.110	-0.045	-0.092
	(0.007)**	(0.009)**	(0.010)**	(0.017)**
Regions: (Cairo=Ref)				
Alexandria	-0.101	-0.008	-0.036	0.078
	(0.036)**	(0.058)	(0.039)	(0.075)
Urban Lower Egypt	-0.150	-0.105	-0.243	-0.002
	(0.034)**	(0.055)	(0.037)**	(0.076)
Urban Upper Egypt	-0.224	-0.177	-0.192	-0.169
	(0.036)**	(0.066)**	(0.036)**	(0.081)*
Rural Lower Egypt	-0.265	-0.059	-0.302	0.011
	(0.034)**	(0.049)	(0.039)**	(0.079)
Urban Upper Egypt.	-0.258	-0.032	-0.290	-0.221
	(0.042)**	(0.053)	(0.051)**	(0.085)**
Lambda	-0.055	-0.021	0.000	-0.062
	(0.019)**	(0.013)	(0.000)	(0.049)
Constant	-0.627	-0.040	-0.886	0.069
	(0.055)**	(0.067)	(0.079)**	(0.145)
Observations	2278	1853	1943	823
R-squared	0.40	0.25	0.37	0.23

* significant at 5% level; ** significant at 1% level Standard errors in parentheses
Source: Authors' own calculations from1988 LFSS and 1998 ELMS.

Table (7): Selectivity Corrected Wage Equations by Sector of Employment, Morocco, 1991 and 1999

Log Hourly Wages	Public, 88	Private, 88	Public, 98	Private, 98
General+University	0.956	1.477	0.678	0.927
	(0.203)**	(0.657)*	(0.070)**	(0.154)**
Vocational	0.379	1.456	0.740	1.448
	(0.180)*	(0.398)**	(0.173)**	(0.344)**
Experience	0.074	0.098	0.111	0.092
	(0.027)**	(0.030)**	(0.021)**	(0.012)**
Experience Sq.	-0.120	-0.130	-0.163	-0.140
	(0.046)*	(0.020)**	(0.032)**	(0.020)**
Regions (Oued Ed-Dahab-lagouira=Ref)				
Laayoune-Boujdour-Sakia El Hamra	-0.055	-0.508	-0.268	0.777
	(0.317)	(0.269)	(0.195)	(0.446)
Guelmim Es-Semara	0.087	-0.476	-0.392	0.000
	(0.321)	(0.251)	(0.199)*	(0.000)
Souss-Massa-Daraa	0.180	-0.641	-0.413	-0.056
	(0.287)	(0.207)**	(0.176)*	(0.306)
Gharb-Chrarda-Beni Hssen	0.043	-0.360	-0.413	-0.024
	(0.346)	(0.277)	(0.186)*	(0.315)
Chaouia-Ouardigha	0.040	0.445	-0.399	-0.042
	(0.293)	(0.314)	(0.181)*	(0.319)
Tensift Al Haouz	0.260	-0.500	-0.310	0.136
	(0.333)	(0.254)	(0.184)	(0.311)
Oriental			-0.605	0.282
			(0.181)**	(0.310)
G.Casablanca			-0.211	0.720
			(0.157)	(0.294)*
Rabat-Salé-Zemmour-Zaer			-0.444	0.269
			(0.151)**	(0.300)
Doukala Abda			-0.334	-0.184
			(0.199)	(0.311)
Tadla Azilal			-0.404	0.000
			(0.209)	(0.000)
Meknes Tafil			-0.317	-0.416
			(0.169)	(0.303)
Fes-Boulemane			-0.523	-0.259
			(0.194)**	(0.318)
Taza-Al Hoceima-Taounate			-0.576	-0.546
			(0.196)**	(0.317)
Tanger-Tetouan			-0.615	0.379
			(0.192)**	(0.300)
Lambda	-0.087	-0.066	-0.108	-0.172
	(0.100)	(0.087)	(0.066)	(0.052)**
Constant	5.113	5.648	4.968	4.414
	(0.465)**	(0.498)**	(0.370)**	(0.345)**
Observations	184	163	441	1033
R-Squared	0.39	0.42	0.31	0.30

* Significant at 5% level; ** significant at 1% level Standard errors in parentheses
Source: Authors' own calculations from 1991 and 1999 MLSMS, Morocco.

Table (8): Wage Decomposition for Egypt and Morocco: Public vs. Private

	Raw Differential.	**Percent Explained** (Endowments)	**Percent Unexplained** (Pure Premium)	**Adjusted (Unexplained) Differential** (in percent)
Egypt				
1998, Public vs. Private Sector	6.7	34	67	4.4
1988, Public vs. Private Sector	18.9	39	61	11.5
Morocco				
1999, Public vs. Private Sector	111.3	48.8	51.2	57.0
1991, Public vs. Private Sector	80.6	51.2	48.8	39.3

Source: Authors' own calculations from from1988 LFSS and 1998 ELMS, Egypt and 1991 and 1999 MLSMS, Morocco.

Table (9): Changes in Private Rates of Return between 1998 and 1988 by Sector, Egypt

Males

Education Level	**Public 98-88**	**Private 98-88**
Primary to Read & Write	6,7%	-3,0%*
Preparatory to Primary	-9,9%	-11,1%*
Secondary to Preparatory	3,1%	14,8%*
University to Secondary	-7,2%	-18,8%*

Females

Education Level	**Public 98-88**	**Private 98-88**
Primary to Read & Write	40,1%*	28,5%*
Preparatory to Primary	-24,1%	5,1%*
Secondary to Preparatory	14,1%	-2,8%*
University to Secondary	-4,0%	106,4%*

* Corresponds to insignificant coefficients. Source: Authors' own calculations from LFSS 1988 and ELMS 1998.

Table (10) Percentage Differences in Private Rates of Return By Sector, Morocco, 1991 and 1999

Males				
Education Level	**Public, 91**	**Public, 99**	**Private, 91***	**Private, 99**
Primary to R&W	14.60	4.87	6.60	0.83
Prep. To Primary	10.97	10.00	8.50	11.80
Sec. to Prep.	9.37	8.97	22.43	19.20
Univ. to Sec.	25.85	4.93	25.08	8.58
Females				
Education Level	**Public, 91**	**Public, 99**	**Private, 91***	**Private, 99***
Primary to R&W	12.70	18.13	8.80	10.10
Prep. To Primary	12.17	13.53	23.20	19.90
Sec. to Prep.	1.87	4.77	1.57	13.13
Univ. to Sec.	14.18	13.13	25.75	0.58

* Corresponds to insignificant coefficients. Shaded areas correspond to insignificant coefficients.
Source: Authors' own calculations from1991 and 1999 MLSMS, Morocco.

Table (11): Selectivity Corrected Quantile Regression Results, 1988 and 1998

Selectivity Corrected Quantile Regression Results, 1988 and 1998

	1988					1998				
COEFFICIENT	**0.10**	**0.25**	**0.50**	**0.75**	**0.90**	**0.10**	**0.25**	**0.50**	**0.75**	**0.90**
Experience	0.088***	0.070***	0.052***	0.039***	0.034***	0.055***	0.053***	0.051***	0.050***	0.035***
	(0.004)	(0.002)	(0.002)	(0.004)	(0.005)	(0.006)	(0.004)	(0.005)	(0.005)	(0.008)
Experience Sq.	-0.133***	-0.101***	-0.075***	-0.053***	-0.048***	-0.064***	-0.061***	-0.057***	-0.053***	-0.031**
	(0.007)	(0.005)	(0.004)	(0.008)	(0.010)	(0.012)	(0.008)	(0.008)	(0.009)	(0.013)
Region (Cairo=base)										
Alex and Suez Cnl	0.054	-0.036	-0.043	-0.106**	-0.192***	0.076	-0.006	-0.054	-0.023	-0.072
	(0.051)	(0.034)	(0.028)	(0.048)	(0.055)	(0.060)	(0.037)	(0.041)	(0.043)	(0.059)
Urban Lower Egypt	0.051	-0.114***	-0.124***	-0.167***	-0.222***	0.044	-0.085**	-0.222***	-0.236***	-0.350***
	(0.048)	(0.032)	(0.026)	(0.045)	(0.051)	(0.058)	(0.036)	(0.039)	(0.041)	(0.056)
Urban Upper Egypt	-0.055	-0.127***	-0.159***	-0.221***	-0.270***	-0.028	-0.075**	-0.224***	-0.243***	-0.340***
	(0.053)	(0.036)	(0.029)	(0.051)	(0.058)	(0.057)	(0.035)	(0.038)	(0.040)	(0.054)
Rural Lower Egypt	0.026	-0.111***	-0.152***	-0.172***	-0.196***	-0.114*	-0.111***	-0.248***	-0.309***	-0.372***
	(0.053)	(0.035)	(0.028)	(0.048)	(0.054)	(0.065)	(0.040)	(0.043)	(0.045)	(0.060)
Rural Upper Egypt	0.145**	-0.029	-0.125***	-0.223***	-0.328***	-0.122	-0.201***	-0.346***	-0.258***	-0.412***
	(0.058)	(0.038)	(0.031)	(0.054)	(0.060)	(0.077)	(0.047)	(0.051)	(0.054)	(0.071)
Levels of Education (LT Secondary=base)										
Secondary General	0.444***	0.453***	0.508***	0.328***	0.249**	0.849***	0.658***	0.501***	0.529***	0.586***
	(0.100)	(0.066)	(0.054)	(0.093)	(0.102)	(0.149)	(0.097)	(0.106)	(0.112)	(0.144)
Secondary Vocational-3 yrs	0.475***	0.405***	0.204***	0.145***	0.115**	0.437***	0.343***	0.275***	0.199***	0.179***
	(0.041)	(0.027)	(0.022)	(0.040)	(0.046)	(0.047)	(0.030)	(0.034)	(0.038)	(0.052)
Secondary Vocational-5 yrs	0.595***	0.570***	0.385***	0.245***	0.180**	0.657***	0.602***	0.483***	0.342***	0.246***
	(0.073)	(0.049)	(0.041)	(0.071)	(0.081)	(0.067)	(0.042)	(0.047)	(0.051)	(0.072)
Univeristy+	0.923***	0.767***	0.588***	0.513***	0.604***	0.903***	0.743***	0.673***	0.623***	0.582***
	(0.050)	(0.034)	(0.027)	(0.047)	(0.054)	(0.053)	(0.033)	(0.038)	(0.041)	(0.057)
Selection Term	-3.781*	-2.870**	-1.754**	-3.391**	-2.640*	-0.926**	-1.291***	-0.607***	-9.674***	-3.518***
	(1.932)	(1.318)	(-0.737)	(-1.467)	(-1.792)	(0.045)	(0.027)	(0.281)	(2.901)	(0.285)
Constant	-2.817	-2.441	-0.686	-2.611	-2.334	-7.293**	-4.219**	-5.330***	-5.501**	-5.425*
	(2.889)	(1.797)	(1.463)	(2.383)	(2.631)	(3.326)	(1.849)	(2.036)	(2.153)	(2.797)
Observations	4315	4315	4315	4315	4315	2776	2776	2776	2776	2776

Standard errors in parenthe

*** p<0.01, ** p<0.05, * p<0.

Table (12): Selectivity Corrected Wage Equations by Sector of Employment, Egypt, 1988 and 1998

Log Hourly Wages	Public, 88	Private, 88	Public, 98	Private, 98
General+University	0.895	0.467	0.880	0.544
	(0.033)**	(0.060)**	(0.035)**	(0.076)**
Vocational	0.579	0.154	0.503	0.182
	(0.033)**	(0.051)**	(0.037)**	(0.076)*
Experience	0.067	0.063	0.052	0.026
	(0.004)**	(0.004)**	(0.005)**	(0.010)**
Experience Sq.	-0.076	-0.110	-0.045	-0.092
	(0.007)**	(0.009)**	(0.010)**	(0.017)**
Regions: (Cairo=Ref)				
Alexandria	-0.101	-0.008	-0.036	0.078
	(0.036)**	(0.058)	(0.039)	(0.075)
Urban Lower Egypt	-0.150	-0.105	-0.243	-0.002
	(0.034)**	(0.055)	(0.037)**	(0.076)
Urban Upper Egypt	-0.224	-0.177	-0.192	-0.169
	(0.036)**	(0.066)**	(0.036)**	(0.081)*
Rural Lower Egypt	-0.265	-0.059	-0.302	0.011
	(0.034)**	(0.049)	(0.039)**	(0.079)
Urban Upper Egypt.	-0.258	-0.032	-0.290	-0.221
	(0.042)**	(0.053)	(0.051)**	(0.085)**
Lambda	-0.055	-0.021	0.000	-0.062
	(0.019)**	(0.013)	(0.000)	(0.049)
Constant	-0.627	-0.040	-0.886	0.069
	(0.055)**	(0.067)	(0.079)**	(0.145)
Observations	2278	1853	1943	823
R-squared	0.40	0.25	0.37	0.23

* significant at 5% level; ** significant at 1% level Standard errors in parentheses
Source: Authors' own calculations from1988 LFSS and 1998 ELMS.

Table (13): Selectivity Corrected Wage Equations by Sector of Employment, Morocco, 1991 and 1999

Log Weekly Wages	Public, 91	Private, 91	Public, 99	Private,99
General+University	0.956	1.477	0.678	0.927
	(0.203)**	(0.657)*	(0.070)**	(0.154)**
Vocational	0.379	1.456	0.740	1.448
	(0.180)*	(0.398)**	(0.173)**	(0.344)**
Experience	0.074	0.098	0.111	0.092
	(0.027)**	(0.030)**	(0.021)**	(0.012)**
Experience Sq.	-0.120	-0.130	-0.163	-0.140
	(0.046)*	(0.020)**	(0.032)**	(0.020)**
Regions (Oued Ed-Dahab-Lagouira=Ref)				
Laayoune-Boujdour-Sakia El Hamra	-0.055	-0.508	-0.268	0.777
	(0.317)	(0.269)	(0.195)	(0.446)
Guelmime Es-Semara	0.087	-0.476	-0.392	0.000
	(0.321)	(0.251)	(0.199)*	(0.000)
Souss-Massa-Daraa	0.180	-0.641	-0.413	-0.056
	(0.287)	(0.207)**	(0.176)*	(0.306)
Gharb-Chrarda-Beni Hssen	0.043	-0.360	-0.413	-0.024
	(0.346)	(0.277)	(0.186)*	(0.315)
Chaouia-Ouardigha	0.040	0.445	-0.399	-0.042
	(0.293)	(0.314)	(0.181)*	(0.319)
Tensift Al Haouz	0.260	-0.500	-0.310	0.136
	(0.333)	(0.254)	(0.184)	(0.311)
Oriental			-0.605	0.282
			(0.181)**	(0.310)
G.Casablanca			-0.211	0.720
			(0.157)	(0.294)*
Rabat-Salé-Zemmour-Zaer			-0.444	0.269
			(0.151)**	(0.300)
Doukala Abda			-0.334	-0.184
			(0.199)	(0.311)
Tadla Azilal			-0.404	0.000
			(0.209)	(0.000)
Meknes Tafil			-0.317	-0.416
			(0.169)	(0.303)
Fes-Boulemane			-0.523	-0.259
			(0.194)**	(0.318)
Taza-Al Hoceima-Taounate			-0.576	-0.546
			(0.196)**	(0.317)
Tanger-Tetouan			-0.615	0.379
			(0.192)**	(0.300)
Lambda	-0.087	-0.066	-0.108	-0.172
	(0.100)	(0.087)	(0.066)	(0.052)**
Constant	5.113	5.648	4.968	4.414
	(0.465)**	(0.498)**	(0.370)**	(0.345)**
Observations	184	163	441	1033
R-Squared	0.39	0.42	0.31	0.30

* Significant at 5% level; ** significant at 1% level
Standard errors in parentheses
Source: Authors' own calculations from1991 and 1999 MLSMS, Morocco.

Table (14) Gender and Sector Wage Differentials, Egypt, 1988-2006

	1988		1998		2006	
	crude	*corrected*	*crude*	*corrected*	*crude*	*corrected*
Sector Wage Differentials						
Males						
Government-private	0.20	-0.19	0.11	-0.22	0.27	-0.01
Public enterprise-private	0.40	0.03	0.37	0.06	0.49	0.27
Females						
Government-private	-0.56	0.59	0.50	0.10	0.83	0.33
Public enterprise-private	-0.46	0.48	0.79	0.13	0.77	0.33
Gender Wage Differentials (Female-Male)						
Government	-0.07	0.02	0.02	0.00	0.21	0.03
Public enterprise	-0.24	-0.16	0.05	-0.20	-0.07	-0.23
Private Sector	-0.66	-0.43	-0.34	-0.39	-0.35	-0.21

Source: Calculated from log hourly wage regressions based on the 1988 Labour Force Sample Survey, 1998 Egyptian Labour Sample Survey and 2006 Egypt Panel Labor Market Survey (see appendix).

Note: Crude sector and gender wage differentials are simply differences in the means of log hourly wages. Corrected sector wage differentials are calculated as the difference between predicted log hourly wages for public sector sector employees using the public sector wage equation and their predicted log hourly wages using the private sector equation (expressed as a proportion of the former). Similarly, corrected Gender wage differentials are the difference between predicted female wages using the female equation and their predicted wages using the male equation.

Source: Calculated from log hourly wage regressions based on the 1988 Labor Force Sample Survey, 1998 Egyptian Labor Sample Survey and 2006 Egypt Panel Labor Market Survey (see appendix).

Table (15): Measures of Wage Inequality for Egypt, 1988, 1998 and 2006

Table 5: Measures of Inequality of Hourly Wages: Within and Between Groups

Variable		coeficient of Variation	Decile Ratio	Gini Coeficient	General Entropy Index						
					Total	Education		Occupation		Industry	
						within	*between*	*within*	*between*	*within*	*between*
Males	1988	1.13	6.40	0.30	0.64	0.58	0.06	0.53	0.11	0.60	0.03
	1998	0.92	4.02	0.36	0.33	0.30	0.04	0.29	0.04	0.32	0.01
	2006	2.05	5.00	0.48	2.59	2.54	0.05	2.50	0.09	2.53	0.05
Females	1988	0.83	6.54	0.39	0.35	0.28	0.07	0.27	0.08	0.30	0.05
	1998	1.74	6.53	0.43	1.51	1.43	0.07	1.46	0.05	1.08	0.44
	2006	4.54	13.47	0.71	10.75	10.18	0.07	10.18	0.09	10.17	0.10
Total	1988	1.09	5.75	0.39	0.60	0.54	0.05	0.51	0.09	0.57	0.03
	1998	1.08	4.89	0.37	0.58	0.53	0.04	0.53	0.04	0.51	0.07
	2006	3.59	6.79	0.66	6.75	6.70	0.04	6.67	0.10	6.70	0.07

Source: 1988 Labour Force Sample Survey, 1998 Egyptian Labour Sample Survey and 2006 Egypt Labor market Panel Survey; own calculation
Note: Coeficient of Variation=Standard of Deviation/ mean; Decile Ratio=90th percentile/10th percentile; Due to rounding off error, the within and between components of the Generalised Entropy Index might not add up exactly to the total.

APPENDIX A: Quantile Regressions, Wage Decomposition and Measures of Inequality

A.1 Selectivity Corrected Quantile Regression

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 qth quantile of the conditional log distribution of wages as a linear function of the regression variable, X:

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

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

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

Where r is the residual, $r_i = \ln w - x'\beta_q$ the gender pay gap is calculated as follows,

$$G_q = \ln w_{fq} - \ln w^*_{fq}$$

where $\ln w_{fq}$ is average log hourly wage females and $\ln w_{fq}$* is the log hourly wage computed by multiplying the coefficients for the male equation times the average characteristics of the female workers.

Quantile regressions therefore, provide snapshots of different points of a conditional distribution. They therefore constitute a parsimonious way of describing the whole distribution. 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 (like for example the 10th, the 25th, the 75th or the 90th).

A2: Oaxaca-Blinder Method

Our earning estimates above reveal differences in wage setting and returns to education by sector of ownership in both Egypt and Morocco. Besides estimating "sheep skin effects", we formally study hypotheses relating to the incidence of pay differentiation by sector. In order to ascertain whether changes in returns to education translated into altering overall wage inequality in the Egyptian and Moroccan labor markets, we further decompose the sector wage gap into components attributable to pure pay premium between sectors as opposed to differences in characteristics.

The overall sample selection adjusted wage differential between public and private workers can be decomposed into different components: (1) a portion due to differences in average characteristics, such as experience, region and education. (2) a portion due to differences in the parameters of the wage function, caused by labor market discrimination and other omitted factors, and (3) a portion due to differences in selectivity bias. Adopting the methodology, which was first utilized by Oaxaca (1973) and Blinder (1973), the differences in the logarithmic wages between public and private, is written as:

$$\Delta \ln W = \ln \overline{W}_p - \ln \overline{W}_v \qquad (6)$$

Where *P* refers to public sector and *v* to private sector the operator Δ represents the mean difference between public and private wages. First, separate wage equations are estimated for public and private workers. The estimated wage equations are then used to decompose the observed wage differential between public and private workers into components due to personal

characteristics, to parameters and to sample selectivity bias. If the average observed log wage for type j worker is $\overline{lnW}_{ij} = \sum_i lnW_{ij}/n_j$. The average observed characteristics, $\overline{X} = \sum_i X_{ij}/n_j$ and the average sample selectivity bias term, $\bar{\lambda} = \sum_i X_{ij}/n_j$ where n_j is the number of individuals in a j group. In this case, j=public (p), private (v). Suppose that $\hat{\beta}_p$ is the competitive wage and that private sector workers are compensated at the same wage as public sector workers. Then, the predicted mean wage for private workers using competitive wages is given by $\hat{\beta}_p \overline{X}_v$. In other terms, the previous equation can be written, including the selection term, as:

$$\ln\overline{W}_p - \ln\overline{W}_v = \sum\hat{\beta}_p\overline{X}_p - \sum\hat{\beta}_p\overline{X}_v + \sum\hat{\beta}_p\overline{X}_v + \sum\hat{\beta}_v\overline{X}_v + \sum\left(\hat{\delta}_p\overline{\lambda}_p - \hat{\delta}_v\overline{\lambda}_v\right)$$
$$= \sum\hat{\beta}_p\left(\overline{X}_p - \overline{X}_v\right) + \sum\left(\hat{\beta}_p - \hat{\beta}_v\right)\overline{X}_v + \sum\left(\hat{\delta}_p\overline{\lambda}_p - \hat{\delta}_v\overline{\lambda}_v\right) \quad (7)$$

The first term on the right-hand side of equation is the differences in the endowments of wage-determining characteristics (X's) between the public and private sector workers, evaluated according to the public sector pay structure ($\hat{\beta}_p$). This portion can also be interpreted as the wage gain private sector workers would experience if they had the same characteristics on the average as public sector workers. The second term on the right-hand side is the portion due to differences in pay structure (coefficients, $\hat{\beta}'s$) between public and private sector workers. It is the wage gain private sector workers would experience, given their mean characteristics, if they were compensated as public sector workers. The last term represents the wage differential attributed to sample selection bias. Accordingly, we run into an index number problem (Oaxaca, 1973; Jones, 1983). The problem arises when heterogeneous group of characteristics (X variables) are summed with two sets of wages (public and private). Following the approach employed by Reimers (1983), which uses an unweighted average of each type of worker's coefficients, the wage differential can be decomposed as:

$$\ln\overline{W}_p - \ln\overline{W}_v = 0.5\left(\overline{X}_p - \overline{X}_v\right)\left(\hat{\beta}_p + \hat{\beta}_v\right)\overline{X}_v + 0.5\left(\overline{X}_p + \overline{X}_v\right)\left(\hat{\beta}_p - \hat{\beta}_v\right) + \left(\hat{\delta}_p\overline{\lambda}_p - \hat{\delta}_v\overline{\lambda}_v\right) \quad (8)$$

In our discussion in Section V.C we followed the literature and use the previous methodology to sort out the differences in wages between public and private sectors that are due to endowments and those that are due to discrimination, i.e. the explained from the unexplained. We grouped differences due to discrimination and differences due to selection bias in one "unexplained" factor.

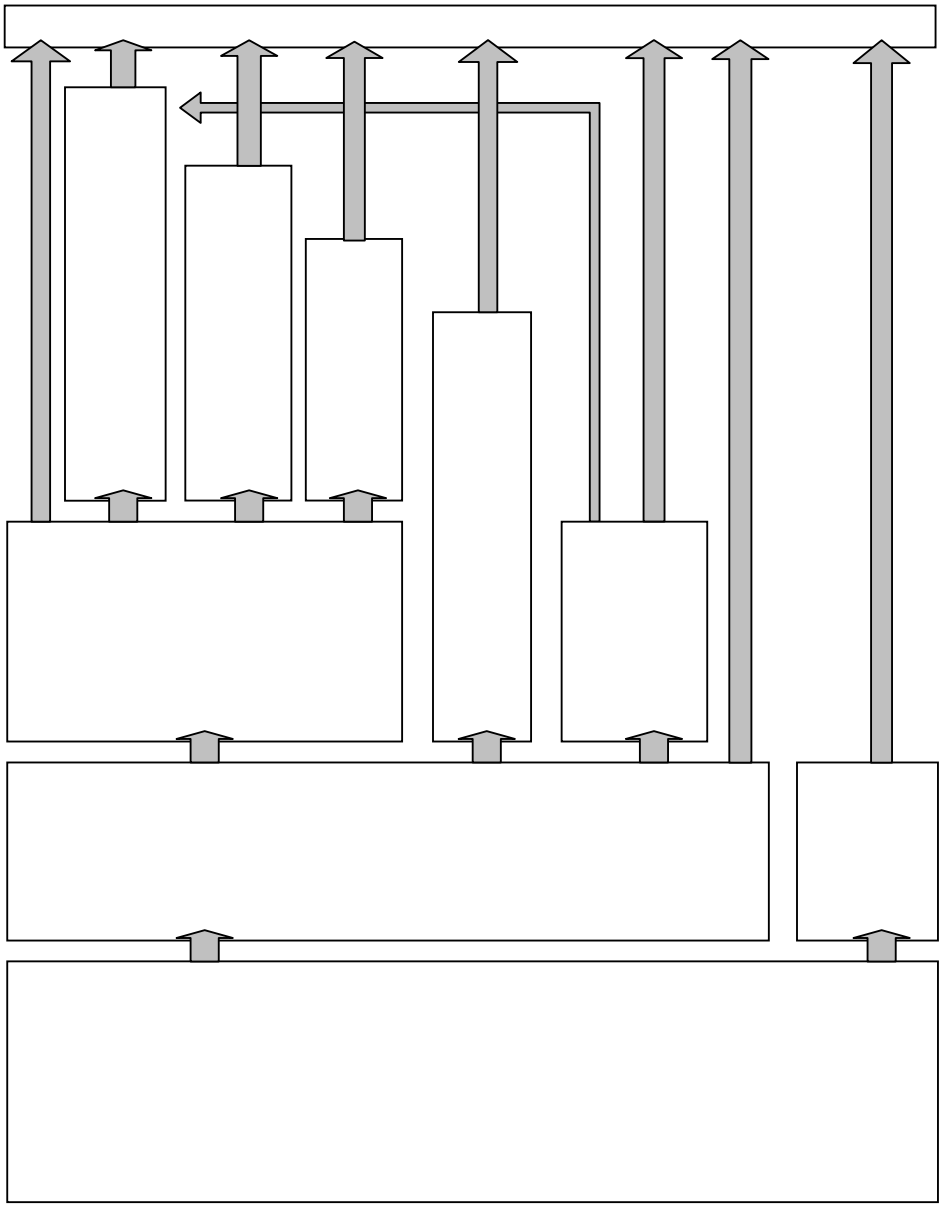
A3. Standard Measures of Inequality

It is important to clarify the differences between the different measures of inequality presented.[13] The most commonly reported statistical measure of inequality is usually 'the standard deviation', which is a measure of how far each observation is from the mean. It is not, however, a good measure of inequality because if everyone's income doubles, (or there is inflation), the standard deviation will also double. If the standard deviation is however standardized by dividing it by the mean of the distribution, we obtain the second measure, namely 'the coefficient of variation', which does not suffer from this problem. A third measure is 'the Gini coefficient' which graphically is defined as the area between the Lorenz Curve (which graphs the cumulative fraction of income versus the cumulative fraction of the population arranged in ascending order)

[13] For more formal definitions of the different measures of inequality, see Cowell (1995), Jenkins (1995) and STATA Technical Bulletin no.48, March 1999, section on "Analysis of Income Distributions".

and the line of perfect equality. Intuitively, the Gini coefficient can be given the interpretation that if one randomly draws two people from the population, then the expected wage difference between these two people as a proportion of the average wage is twice the Gini coefficient. A problem of all those three measures, however, is that as they take into account all observations, they are sensitive to errors or real changes at the tails of the distribution. It is also, therefore, useful to report 'the decile ratio' (ratio of the 90th percentile of the wage distribution to the 10the percentile) which is not sensitive to outliers.

APPENDIX B: The Egyptian School System



Source Statistical Year Lindgren (2005) of the Arab Republic of Egypt, 1995-2002 (Cairo, June 2003). *In Technical Secondary Education, 9,8% of students are enrolled in the Agricultural track, 43,1% in the Commercial track and 47,1% in the Industrial Track. Data refer to the year 2000/2001. In Morocco, 92.5 percent of secondary students are enrolled in the general track, 5.5 percent in technical school and 2 percent in the 'original' track (Diyen, 2004).