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The American University in Cairo

The School of Business, Economics, and Communication

**Technical Education and Returns to Schooling in Egypt
(1998-2006)**

A Thesis Submitted to

The Department of Economics

In partial fulfillment of the requirements for the degree of

Master of Arts in Economics

By

Hesham Salah El Din Tawfik

Under the Supervision of

Dr. Mona Said

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Abstract

It has been recognized that technical and tertiary skills play a key role in the economic growth of the developed world. Yet, amongst developing countries, and Arab countries in particular, little progress has been made in this regard. Only a few East Asian countries have managed to make significant progress in catching-up with the developed world in terms of providing job-related skills and achieving higher quality education. This thesis uses newly available micro data on the Egyptian labor market to shed light on technical secondary education and its impact on returns to schooling. Technical education was criticized for its deteriorating quality and its inability to satisfy the skills needed for the labor market. As a result, this type of education is seen to lead to high unemployment rates and low wages among its graduates.

This research analyzes the performance of technical education graduates in the labor market, by estimating the differences in returns (incremental wages) to general versus technical graduates across sectors and to what extent does it relate to labor market outcomes. The basic empirical framework in estimating the returns to education is the 'Mincerian Human Capital' wage determination model using Lee's method to correct for sample selection bias. The data used in this research is drawn from the 1998 Egypt Labor Market Survey (ELMS) and a newly dataset of Egypt Labor Market Panel Survey (ELMPS). This is used to estimate differences in returns across sectors by gender over the period 1998-2006.

The results show that the massive expansion in vocational secondary and higher-technical institute enrolment had a continuing negative effect on their returns, because of the oversupply of graduates since the mid 1980s in Egypt. The results reach a dismal conclusion concerning vocational secondary education that does not provide its graduates with any value that would justify the private sector to be interested in hiring them. In particular, returns for female vocational secondary education are declining if not approaching zero over the period 1998-2006. Educational policy's greatest distortionary effect is observed for university graduates where they experience the highest unemployment rates and have the lowest rates of return to education in the government sector. There exists a decrease in returns to university graduates and a dramatic decrease for vocational secondary and higher-technical institute graduates over the period under study. The employment guarantee resulted in a bloated bureaucracy and overstaffing along with declining returns.

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Thus, vocational graduates face mediocre prospects in the private sector whereas compensation policies offered by the government encouraged queuing to obtain a job. The government sector remains the favored employer for both male and female technical secondary graduates because they face barriers to private sector employment, particularly for women. Moreover, the private entrepreneur either creams the best technical secondary graduates or refuses to hire them as they are considered to belong to lower social economic class and there is a mismatch between their obsolete skills acquired at school and labor market needs.

These results indicate that any recent reform of vocational secondary education in Egypt has so far failed to produce the desired labor market outcomes. The institutional setting in the labor market (public sector) has encouraged investment in obsolete human capital and entrapped it in unproductive employment in the government. As shown in empirical results, there is a significant misallocation of resources that spring from declining returns to education among middle to the upper-end of the educational distribution. The waste of human capital through the high unemployment rates particularly among university graduates in 2006 weakens the overall contribution of human capital to growth in Egypt. The results in this thesis can best be interpreted as giving credence to the view that technical education needs to be rationalized and improved, not simply thrust aside, in order for the country to capitalize on the benefits from its vast past investment in that area.

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Introduction

The role of education is growing around the globe as a major determinant of the economic well being of individuals and progress of nations. With increasing globalization, knowledge driven economies, and concern for human rights, investment in education is increasingly seen as essential to economic welfare and more cohesive and participatory communities in the development process. In developing countries, the key issue in educational policy has long been to simply increase enrollment in education. More recently, the increasing challenges of the twenty-first century, represented by fierce global markets' competitiveness, called for improving the quality of education and providing a skilled workforce to match the demands of the labor market.

Despite the growing recognition of the importance of technical education in promoting skills, one of the most recent Arab Human Development Reports (UNDP, 2003) emphasized the lack of skill acquisition in the Arab World. This is rendered to insufficient allocation of resources to technical education and its deteriorating quality. The report also criticized educational policy on the grounds that there is no vision adopted by policy makers with regards to the role that technical education plays in the labor market and national economy.

Egypt stands out in the Middle East and North Africa region, as the country with the longest record of promoting technical education at both the secondary and post-secondary levels. The expansion of technical education is closely related to the history of the public sector employment guarantee. In 1962, following the wave of nationalization in the economy, the Egyptian government pledged to employ technical secondary graduates along

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with general secondary graduates in the public enterprise and government sectors, with the objective of alleviating the pressure on university education.

Initially, technical education was promoted by the Egyptian government, aspiring to upgrade industry, to be more competitive globally. However, it represented a burden on the government budget and was criticized for failing to satisfy the requirements of economic growth. Especially, since the 1980s, this type of education has come under strong attack and criticism, due to the fact that it provides skills that are completely irrelevant for the needs of the private sector, resulting in high unemployment rates and low wages for its graduates. Thus, after showing initial success, by the 1980s a problem with this type of education emerged; the skills it provided did not match the demands of the labor market. To date, the highest unemployment rates prevailed among the youth technical graduates in Egypt (Antoninis, 2002). In order to assess the validity and policy implications of this critique, one needs to study the determinants of the process of the school to work transition (time gap between graduating from school and labor market entry) and to what extent it relates to labor market outcomes.

This research analyzes the performance of technical education graduates in the labor market, by estimating the differences in returns (incremental wages) to both types of education. Comparison over the period 1998-2006 will be undertaken for general versus technical track at the secondary level and higher-technical institute versus university track at the above secondary level, by gender and across employment states (non-wage, non-government that includes public enterprise and private sector, and government).

In analyzing the detailed labor market outcomes of secondary school graduates, insights will be drawn on how acquisition of general versus technical education impacts the participation decisions of individuals, and the incidence of unemployment. A distinction is

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made between technical graduates aspiring to join the commercial track which tends to be feminized (seeking a public sector clerical job), and those pursuing the male-dominated industrial track (seeking blue-collar occupations) as well as the agricultural track. In the analysis, a focus is made on the mechanisms by which graduates are allocated to different sectors (government/ non-government/ non-wage) and how that affects wage differentials by level of education attainment in the Egyptian labor market. Finally, the analysis uses the estimation of selectivity corrected returns to different levels of education across sectors and gender to draw implications for the stratification of the Egyptian labor market in the new millennium. The thesis concludes by drawing implications for the reform of vocational education system in Egypt based on the experiences of the East-Asian countries.

The overriding question of this thesis is thus to evaluate how useful schooling is for the individual. One of the main contributions of this analysis that, unlike previous studies on Egypt, estimation is not only confined to returns to education in the salaried sectors (the government and non-government sectors), but an attempt is also made to estimate the returns in the non-salaried sector including those participating in the agricultural production (cultivation, irrigation, poultry and cattle, cotton picking and weeding), self-employed, employers, and family businesses.

The rationale for comparing non-wage workers with other wage workers in the salaried sectors stems from the fact that a significant part of the labor force in Egypt derives its income from other sources i.e, farming or family businesses. Non-wage workers who are not currently enrolled at school and lie between the ages of 15 to 64 constitute around 25 percent of the sample size for both men and women in 1998. In 2006, the percentage increased to 33 percent of the sample size (ELMS 1998 and ELMPS 2006). Moreover, the government and non-government sectors in the developing countries are highly regulated and

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the wage premium to education might reflect institutional factors. However, returns to non-wage workers are more likely to reflect productivity differences. As a result, estimating only the returns to education for the wage sample only might give an inaccurate picture of the total return to education from the individual's perspective. Egypt has long been dominated by the public sector and diminishing, less regulated agricultural sector. Hence, the returns to education might look very different between wage and non-wage workers. Knowledge of how beneficial education is for the individual can be useful in many debates, most importantly concerning its impact on returns in the labor market. Other debates can be related to investigating the reasons behind dropping out of school that may be attributed to poverty or low benefits of schooling.

This thesis will make use of a newly available dataset, the Egypt Labor Market Panel Survey of 2006 (ELMPS), in order to estimate rates of return to sector-selection between technical and general secondary education in Egypt by gender and across economic sectors (non-wage, non-government, and government work) for comparing to other estimates based on 1998 Egypt Labor Market Survey. The availability of household level labor market surveys for more than one point in time helps in drawing conclusions into the determinants and returns to these types of education in Egypt.

The key questions that this research attempts to address are: How are workers allocated to non-wage work, non-government wage work, and government wage work? Are there significant differences by gender, sector, and level of educational attainment? Finally, what are the lessons to be learnt for Egypt in reforming Vocational Education and Training (VET)? The results obtained help to add new evidence to debate on the relative benefits of technical versus general secondary education (leading to university) in Egypt and to draw

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some concrete policy recommendations and lessons to be learnt from the East Asian experiences for the reform of technical education in Egypt.

The thesis will be organized as follows. Chapter one presents a selected review of the theoretical literature on the relative benefits of technical education in OECD, East Asian, and Egyptian contexts. Chapter two then provides an overview of the Egyptian system and its labor market implications. Chapters three and four explain the methodology of estimation of returns to education and present the empirical results, derived from labor market survey data on Egypt, based on ordinary least squares and selectivity corrected methods. Finally, chapter five suggests some policy implications for the reform of technical education in Egypt and chapter six concludes.

Chapter 1: Review of Theoretical and Empirical Literature

1.1 Conceptual Frameworks in Assessing Technical Education

1.1.1 Debates on General versus Technical Education

The two prominent forms of secondary education in the world are technical and general education. There is a strong debate on the relative benefits of technical education and general education at the secondary and upper-secondary level. Studies on industrialized countries are quite abundant, whereas empirical work in the Middle-East countries, including Egypt, is still relatively lacking (Hamidi, 2006).

Goldin (2001) recently reviewed studies on differences between the American system highly focusing on general education, and the European one, focusing on technical education. This review emphasized that technical education is seen to provide better occupation-specific training. Accordingly, this limits the ability for inter-occupational mobility of its participants. On the contrary, general education is lacking occupation-specific skills but facilitates mobility during times of structural change.

In the context of developing countries, empirical evidence showed the importance of both technical and general education to foster growth, manifested in the experiences of the East Asian economies such as Japan, South Korea, Singapore, and Taiwan. According to Cantor (1985), the Japanese system of technical education and training is considered to be the ideal model to imitate around the globe. Japan is the only country in East Asia where technical education is demand rather than supply driven. This is due to strong incentives by enterprises to provide continuous training that stem from social responsibility. Additionally, the success of technical education and training in Japan could not happen without state intervention. In South Korea and Taiwan, reliance on state intervention to provide technical

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education is significant. The education system in the three countries is targeted to supply the market needs with technical professionals. Thus, neither did they suffer a large proportion of unemployed university graduates nor unproductive class of professionals as in the Middle East and North Africa region. This raises the need to compare the educational experience in Egypt to those of East Asian countries in order to assess in what ways does Egypt lag behind in terms of provision of skills needed to cope with the market demands.

According to Bennell and Segerstrom (1998), development agencies, such as the World Bank, strongly promote investment in basic and general education in the developing countries while public expenditure on technical education should be reduced drastically. This policy advice is usually based on evidence of low rates of returns to technical education, the high cost of that type of education, and the inability of technical graduates to satisfy labor market needs. Psacharopoulos (1987) advocated strongly what is stated by the (1995a) World Bank Education Sector Review that “comparative evaluations of earlier, more differentiated, general and technical secondary curricula indicated clearly that the rate of return was much higher to investments in general than in technical secondary education.” Thus, the World Bank argues that technical education and training in developing countries should be left to the private sector (market forces) with the least amount of government intervention while basic education, should be set as a top priority on the policy agenda.

The counter argument for the above view is that technical education needs to be rationalized and improved, not thrust aside, as there is no need to assume that the skills it provide can be replaced by general education. Besides, there is no clear evidence that the social rate of returns for technical education is generally lower than those for general secondary education as opposed to World Bank economists’ view (Bennell, 1996a). Bennell and Segerstrom (1998) showed results that refute the World Bank’s claim that basic and

primary rates of return outperform technical education and training returns. Thus, both types of education are needed to promote economic growth. This is consistent with the current dominant view in the development literature that technical training can no longer be viewed as a specific area reserved for specialists but, nowadays, plays an indispensable role in technology transfer, innovation, and development (Hamidi, 2006).

1.1.2 World Bank Orthodoxy and its Critique

The current World Bank strategy (1995a) for educational development is to advise its client governments to allocate most of their resources to basic and primary education. This is due to the following three reasons: first, the social rates of return to education (RORE) for basic and primary education are higher relative to RORE for vocational education and training (VET). Second, the investment in basic and primary education reduces significantly the spillover effects of poverty. Third, the Bank argues that the Asian Tiger's main policy was to massively invest in basic and primary education. Thus, the Bank's policy recommendations match the actual policies of these states. However, the Bank was cautious not to give the impression that VET is unimportant because it can be socially more profitable than general education in certain conditions such as VET experiences of South East Asian countries.

Middleton et al (1993) advocated the World Bank's policy, "strengthening general education at primary and secondary levels is the first priority for public policies to improve the productivity and flexibility of the workforce". For Bennell and Segerstrom (1998), the Bank advises its client governments to shift resources to basic and primary education while VET should receive less attention and funding. VET is best left to be provided by the private sector training institutions and enterprises to supply, and individuals to demand without state intervention. It should be driven by private demand not by public supply as the case in

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MENA region. It is argued that “giving priority to expanding the primary and secondary bases of the education pyramid. The East Asian governments have stimulated the demand for high education while relying to a large extent on the private sector to satisfy that demand” (World Bank, 1993).

The World Bank’s position reached by RORE studies pioneered by G. Psacharopoulos (the Bank’s leading education economist in the 80s and 90s) aims to reveal that the social RORE for primary cycle exceed social opportunity costs for capital and are thus very high. However, RORE studies are challenged with too much methodological and theoretical deficiency.

The World Bank’s view was criticized for not having understood the “Asian Miracle” correctly and wanting to spin facts so that the miracle does not contradict general World Bank position. According to Green et al (1999), the exact role of education in explaining the “miracle” is currently under-researched. VET played a significant role in igniting growth.

According to the Bank’s argument about the low rate of return to VET, it is doubtful whether basic and primary education actually surpasses VET in terms of rates of return (Bennell, 1996b). These doubts have concealed evidence of the success stories of the “East Asian” miracle countries. The Bank’s explanation for this miracle was biased in order to give credibility to its education strategy.

The Bank's message stresses that in order to succeed in international markets and to attain international competitiveness; a national economy must have a broad base of highly-skilled labor. However, this type of labor is developed through technical education, and can not be created based on a laissez-faire provision of technical education or voluntarily. Therefore, it is unlikely that international competitiveness can be achieved based on the Bank’s policy recommendations (Bennell and Segerstrom, 1998). A further problem of the

Bank's conventional approach is represented in its lack of any historical perspective regarding the evolution of each national educational system. Moreover, it lacks the country-specific conditions that make the adoption of any educational strategy easier or more difficult.

Fine and Rose (1999) suggest that education should be seen as a "system of provision." where education is provided through, interacts with and is partly influenced by a mix of social, economic, political, and cultural factors. A historical understanding of the evolution of these factors is necessary to understand the ways which relate education to these factors. Education should not be conceptualized from a human capital perspective as suggested by the Bank (economic reductionism). The latter denies the existence or relevance of national differentiation in education as investment in education is reduced to the decisions taken by individuals when and how much to invest in human capital.

Finally, the Bank did not mention the decisive importance of the nature of state policies and intervention in education and its relationship to intervention in other sectors. In order to apply lessons from East Asian education policies to other regions (MENA), these policies have to be understood in their political context. This raises the need to include the factors that were involved in formulating development policies into study. It is not possible to look at East Asian education policy in isolation of these factors.

1.1.3 Role of International Organizations and Foreign Donors in Egypt

International agencies and foreign donors have undertaken evaluation studies of the Egyptian education system. Yet, they are limited to the level of mission observations and experts' remarks. These studies concluded that the signs of inefficiency in the Egyptian

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education system could be attributed to the public sector employment guarantee, the compression of the government pay scale, the expansion of the university system, the restrictive labor legislations, the fragmentation of authority in training provision, and the low salary of teachers (Middleton et al, 1993). Moreover, the scarcity of adequately trained teachers along with the absence of exercising practical skills by workshop instructors in an industrial environment as production or maintenance workers are regarded as the most serious problems (World Bank,1986).

In the late 1970s, Sadat abandoned Soviet support and called for economic liberalization and paved the way for the peace process. This accordingly encouraged the western donors to provide a series of development assistance programs for Egypt. For instance, three World Bank projects were set to concentrate on curriculum diversification, technical teacher training and skilled and semiskilled worker education upgrading. The state of educational planning in Egypt preoccupied the international donors where an “urgent attention” was voiced. This attention was attributed to the severe scarcity of technicians based on manpower demands. The annual supply of industrial skilled workers covered only up to 30% of expected demand according to Bank estimates (World Bank, 1978).

The above suggests that the leading international development lending organizations encouraged investments in technical education. Until the 1980s, the World Bank was the largest funding source for such projects (Psacharopoulos and Loxely, 1985). However, during the second half of the 1980s, there was a mounting opposition to the large-scale technical education systems among the educational researchers. Since then, it represented a policy shift against expanding technical education established at a quick pace (Lauglo and lillis, 1988). The defense of the Egyptian policy makers in favor of expanding technical education stems from the prescriptions suggested by the international organizations.

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For instance, the 1980 International Labor Organization (ILO) mission declared its “approval “ for the plans for further expansion of the technical system incorporated in the 1981 reform. It entailed that one -third of students who passed the exams of the preparatory cycle to join the general secondary leading to university track whereas the remaining two-thirds to join technical secondary schools. In other words, high achievers at the end of preparatory cycle are channeled to general secondary where it includes the best students while low achievers join technical track (Hansen and Radwan, 1982). Furthermore, the foreign experts' reports and the United Nations for Educational, Scientific, and Cultural Organization (UNESCO) reports represent other examples of justifying such educational policies.

Although the philosophy concerning expanding the technical system has changed, the United States Agency’s for international Development (USAID) advocated such expansion in the late 1970s. In 1979, a joint Egyptian-American committee submitted a report on the reform of basic education. This report, in common with the suggestion of the manpower report, justified an expansion of technical secondary education. This means there was a striking absence of interface between researchers and administrators within institutions. While the USAID philosophy on technical education in 1982 was stressing the need to decentralize and rely on employers, at the same time the agency’s representatives in Egypt were consenting to the expansion of a system that was organized along diametrically opposite lines. Moreover, the report argued that despite the weaknesses of the technical system, it was preferable to seek solutions through it because individuals would only be able to adapt to changing economic circumstances with delay and had to be protected (Antoninis, 2002). Baha ‘el Din (1995), the former Minister of Education, exposed his policy concerning technical education at a conference of the Society of Engineers: “I have always been saying

that in Egypt we suffer in the field of technical education and this issue is indisputable. Let's have a look around together, anywhere you like, for example let us have a look at the surrounding buildings where we can see the Egyptian trademark of which we are all aware, a leaking sewage on the façade, clear evidence of the real crisis of technical education. I have not seen this thing in any developed country; however it is ever present in Egypt. Is it only related to technical education? Or is it in our deep rooted nature, our fatalism, lack of effort, and neglect? Or is it all these together affecting in various ways our education, including technical education?"

There is an exception to the dominant international trend of withdrawing funding from explicit technical education projects represented in the Mubarak-Kohl project. It is an initiative of the Egyptian government, undertaken in collaboration with the German Organization for Technical Co-operation (GTZ). This agreement was signed in 1991 to establish a unit within the Egyptian Ministry of Education. The project aims to provide the opportunity for students to work in workshops of firms. Furthermore, the advantage of the project is that the participating companies are private, which leads to a higher quality of technical schools. Most of these schools are located in the new industrial cities surrounding Cairo and have been accompanied with special agreements with the local investors associations. However, the entrepreneurs participate for reasons associated with the prestige they receive through it rather than any special commitment to personnel upgrading. The first students graduated in 1998. The target of the project is to transform up to 25 existing schools and provide a total of 40,000 graduates every year (Antoninis, 2002).

1.1.4 Evaluating the Quality of Technical Education

In assessing the quality of education, the actual causal effect of schooling on productivity is examined. However, this is not empirically analyzed but theoretically

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discussed in this research. A higher quality of school means that fewer complementary inputs are required from the household, implying a lower direct cost. In Egypt, the increase in rural school enrolment in the late 1990s was attributed partly to the public educational policy adopted by the Egyptian government which was designated as the rural school building campaign (Assaad et al, 2001).

There are some key factors in the economy that are complementary to education. Capital, for instance, has been found to be complementary to schooling. A more capital-intensive economy is more likely to generate higher returns to education. Another key variable affecting the quality of schooling is the laws which make schooling compulsory because it could be thought of as an extra cost of not being in school. In the west, the compulsory schooling played a significant role for the decline of child labor.

The demand for education is primarily determined by the regulation of the labor market. This institutional factor, very common in the developing world, disturbs the household choice between either putting their children in school or in work because most labor markets are unregulated. The wages are set according to some other criteria than productivity and are found particularly common in the public enterprise sector but uncommon in the informal self-employed sector. As a consequence, the wage structure is compressed in the public sector, thereby lowering the wage premium. When considering cultural barriers, there is a non-economic cost of schooling represented by cultural constraints against girls being in school which affect adversely the returns to education for women (Lindgren, 2005).

There is a wide controversy whether technical education system is prepared to absorb the large increases in enrollments during the 1980s. Its effectiveness is dependent on many variables such as expenditure per pupil, teacher-student ratios and current spending (teacher

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salaries versus maintenance or materials cost). However, information on the cost of technical education is not enumerated in the ministry of education budget. But even then if it has appeared, it has been for the sake of producing reports for international organizations. Returns have been found to be lower the higher the supply of schooling. In the late 1980s, there was a fall in the average cost differentials between general and technical secondary types of education. This may imply falling standards in technical education, as industrial schools are by default more expensive to run (UNESCO, 1984).

Furthermore, although there is no specialized information on the current spending level on technical education, the World Bank (1991) reported the rapid decline of non-salary related current expenditures at both the primary and secondary level. Between 1980 and 1989 such spending decreased by 75% to less than \$2 per student. In the mid 1980s, there was a rapid increase in the student-to-teacher ratio in each of the three types of schools- industrial, commercial, and agricultural- due to the government's adoption of its educational reform programme. Yet, this ratio, even if it is improved, conceals the fact that the level of commitment of technical education teachers is low due to salary erosion under increasing public debt. Also, teachers have never been exposed to any practical workshop experience where they learn hand-on training.

1.2 Empirical Studies on Technical Education

1.2.1 Studies on Developed Countries

Bennell (1996a) examines critically the prevailing orthodoxy concerning the social rates of return to general and vocational secondary education in developing countries. His analysis is based on evidences from George Psacharopoulos, Manuel Zymelman and Jandhyala Tilak. Zymelman estimated a comparative rate of return (ROR_S) study between Malaysia and Jordan. The Jordanian study (Al-Bukhari) has sample selection bias and thus, benefit-cost ratios favoring general education lend them to be unjustifiable. For the same reason, based on Malaysian study, supporting the proposition that vocational education is less socially profitable than general secondary education is unacceptable. Psacharopoulos (1994), in the "global update", derived aggregate social ROR_S for 24 countries by summing every available estimate and calculating the means. This is a methodological flaw because social ROR_S are only available for 7 countries, so there is a risk of biasing the means. Moreover, he used three separate methodologies to derive ROR estimates where they lend them to be not comparable. Tilak estimated ROR for 11 developing countries where only 3 of them showed that ROR to general secondary education is significantly higher. However, other standard methodology studies favor vocational to general secondary education. Bennell (1996a) examined all the rates of return studies that have been used to establish the orthodoxy and the overall conclusion drawn is that for the large majority of them, social ROR_S to general education are not significantly higher than for specialist secondary vocational education.

Concerning the studies conducted to estimate ROR_S of European experience, the limited information on the returns to vocational training is the main drawback. Chon and Addison (2003) concluded, based on the recent literature on the returns to schooling and

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vocational and occupational training in the organization of European Co-operation and Development (OECD) countries, that vocational training except the highest level does not yield any incremental effect on earnings over and above basic low-level academic qualifications. Similarly, most recent government training schemes have small or negative effects on earnings. However, the US evidence points to mixed results for vocational training. The empirical results found out that vocational training is more effective when it is acquired at the two-year post secondary institutions rather than acquired at the secondary level.

Neuman and Ziderman (1999), based on the Israeli census of population and housing data of 1983, showed that vocational school completers achieved higher earnings than their counterparts who attended academic secondary schools, but only if they worked in occupations related to the vocational course of study pursued. These initial findings were based on an earlier study by the same authors. However, these findings were challenged by Lawrence Hotchkiss; who conducted US follow-up data from the High School and Beyond Survey. He claims that their estimation model was misspecified in failing to include a separate explanatory variable for training-related occupations and argues that the wage advantage of vocational completers stems not from training received but from employment in training-related occupations that are well paid. As a result, Hotchkiss asserts that vocational education is not a necessary condition for entry into training-related occupations.

In refuting Hotchkiss' criticism, Neuman and Ziderman replicate the US study using Israeli database. Its aim is to account for the contrasting findings of their and Hotchkiss' work through re-estimating the regression model of their earlier study with addition of a variable representing training-related occupations. Nevertheless, the new results strongly confirm those from the earlier study and the earnings of vocational education completers working in

course-related occupations are augmented by 8% majorly explained by the new added term. The main difference in both studies lies in the independent variable representing the working age group. Hotchkiss focused on young workers' wage in their first job within two years after secondary graduation which justifies his pessimistic results with regard to the labor market outcomes of vocational schooling. On the other hand, the Israeli authors related their study to workers at different points in the life-cycle up to age of 50. Another discrepancy lies in the distinctive initial conditions in the educational and labor market environments in the US and Israel which affect differentially the efficacy of vocational education in the two countries.

1.2.2 Experiences of East Asian Countries

The VET system in Japan dates back to late 19th century (Meiji government). In 1893/4, regulations were enacted for vocational continuation schools. Also, low-level technicians had the opportunity to join training workshops set by the government. Since then, the Japanese education system has been characterized by secularism and egalitarianism. The state, through the ministry of labor, facilitated VET to comply with national economic goals such as how many workers are required for each industry. Beside facilitation, overseeing VET was an essential task for the state represented in many aspects. First, it provided the training of trainers for private and public VET. Second, it provided subsidies for smaller firms to run their VET courses. Finally, it set up a national system of trade testing. Enterprises had a vigorous incentive to provide continuous training and education because employment is regarded as a life-time contract between employee and firm (Sato, 1987).

For Cantor (1985), it is neither feasible nor desirable to attempt to “transplant the Japanese VET system elsewhere given that its education system evolved over more than 100 years due to country-specific political, educational, and historical factors. VET success can not be explained without also addressing these factors. Hence, in any attempt to transplant

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the Japanese VET in MENA region, outcomes would become sub-optimal for the following reasons. First, VET is the institutionalization of continuous, life-long training and education not a start or an end of education. Since education is compulsory in Japan until the age of 18, VET students are already equipped with necessary skills and knowledge required to succeed in VET programs. Second, VET received the necessary attention and funding and became instrumental due to the state's long-term commitment to long-term economic planning. Third, but certainly not any less important, the industrial sector in Japan was able to provide funds to improve VET. It took over the burden of funding trainers, bureaucracy to monitor VET institutions and state-funded regulatory framework. So, the success of VET in Japan could not happen without the state intervention or investment in basic and primary education. This could be thought of as a first stage among many other contributing factors representing the necessary conditions for the success of VET in Japan. Technological VET can not make up for industrial development. Technological education must be translated into technological innovation (the introduction and adaptability of new technologies). Innovation comes from the transfer of technology from already developed countries. In Japan, technology transfers were made possible through the acquisition of technology from Europe and the United States of America (USA). Therefore, VET education as well as technology transfers represent the basis of innovation.

A study of choice and returns on vocational education is conducted in order to identify factors that influence an individual's choice between vocational and general education at the secondary level in Thailand. The study also evaluates the relative benefits and returns between these two types of education at the upper secondary level. The data set was extracted from Thailand's Labor Force Survey for the years 1989 to 1995 inclusive. Moenjak et al (2003) adopted a probit model. The earnings determinants are estimated using

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Mincerian human capital model. Estimates on returns to vocational education are corrected for self-selection bias by using standard Heckman's two-stage procedure with inverse Mill's ratio. The empirical results exhibit that returns to vocational education are higher than those to general education after correcting for self-selection bias. This adds new evidence to the debate on the relative benefits of the two types of education contrary to the dominant World Bank's perspective. Furthermore, the study finds that upper secondary technical education gives higher earnings returns than general education, and an individual from a high-income family is more likely to enroll at vocational education. The father's occupation besides being raised in a prosperous region play a significant role in affecting an individual's choice of upper secondary education. Finally, the study suggests that an investment to improve the access to vocational education might prove more beneficial. However, it raises into question the belief that vocational education has been overvalued and that providing general education to the work force followed by on-the job training would provide more benefits. The main drawback of this study is that the estimates might have neglected the fact that increased access to higher education could have led more technical school graduates to pursue tertiary or post secondary education in assessing the choice between the two education tracks at the upper-secondary level.

Another study is conducted by Sakellarou (2003) on private rates of return to investments in formal and technical education in Singapore. It relied on the Mincerian and detailed specification to allow for computation of the social return beside the private return. The mid-1998 Labor Force Survey is the data set used to estimate the ROR_S to both formal and vocational education. The main findings, in general, confirm that returns to technical education are slightly higher than formal education but there are sharp differences in returns within male and female workers. The returns to male formal education are consistently

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higher than male returns to vocational education. However, returns to female vocational are consistently higher than returns to formal schooling. The study suggests that in the case of a better match of technical skills acquired in school; and industry, labor market would reward technical skills more than formal education.

In South Korea and Taiwan, VET was led by the state and the private sector was far less willing to provide it. In Taiwan, after the Japanese troops left in 1949, a strong Japanese-style educational infrastructure remained. The Japanese had left them a great asset epitomized by nurturing the positive social recognition towards education and learning. Taiwan massively supported the VET sector. Manpower Development Plans (MDP) was designed to link growth, design, and purpose of educational institutions and training programs with economic goals. The rationale behind MDP was to match economic needs with educational output. Hence, the Taiwanese economy began to grow rapidly and demanded more highly-skilled labor (Hay-Woo, 1991). Similarly, South Korea massively supported the VET sector. The state offered subsidies in the form of tax exemptions for the private sector in return for its participation in state-sponsored training schemes (Johnes and Tzannatos, 1997).

To sum up, state intervention in the VET sector was significant in Japan, Taiwan, and South Korea. Its role through regulation, monitoring, and close state-business sector interaction, was able to match the development and output of the educational systems in these countries with the needs of their rapidly growing economies.

In contrast to the above large number of studies that focus on the rates of return to technical versus general education, studies in the case of Egypt have been limited.

1.2.3 Empirical Studies on Egypt

Starting 1973, Psacharopoulos (1986) has estimated returns to education in the salaried labor market from around the globe. He reached the conclusion that returns to schooling outperform returns to capital. There is a tendency for countries with lower schooling attainment to have higher returns, especially for primary education graduates in the developing world. However, estimates for Egypt and Sudan conducted by Psacharopoulos indicate low returns given the low overall level of education for both countries. Many studies have generally found low returns to education in Egypt, particularly for basic education. However, hardly any have attempted to integrate a discussion on how the returns in other non-salaried sectors might affect the total picture. In this research, the non-wage sector is incorporated in the analysis of returns to education. Returns were found to be lower in the agricultural sector than in the industrial sector because the latter tends to be more capital-intensive. If the agricultural sector is modernized and wages are not compressed by institutional barriers, the returns to this sector will be higher. In the developed world, a few number of studies attempt to compare the returns between the self-employed and the wage workers in the salaried sector (government, public enterprise, and private sectors). However, if they control for ability bias, the return for self-employed is significantly higher. Although, it seems to be more common to simply use a single variable, most commonly the years of schooling in estimating the returns to education, most recent studies utilize dummies for various schooling degrees in order to assess if there are significant differences between the various degrees. Generally, low returns to education in the developing countries can be explained by institutional factors or low schooling quality.

Only in the past few years, Assaad (1997), Said (2002), and Zhang (2003) had conducted their research on the returns to different levels of education in Egypt. Hamidi

(2006) extended this work by incorporating the determinants of choice between technical and general education. She reached the conclusion that technical education in Egypt is neither associated with higher unemployment nor lower rewards in the labor market.

A main contribution by Hamidi (2006) is her conduct of the first empirical study on Egypt that uses micro level data in order to study the determinants of technical versus general levels of education. However, in her study, she made no distinction across sectors in estimating the differences in returns for both types of education. Moreover, no distinction was made for technical graduates aspiring for the commercial track and those pursuing the industrial track.

1.2.4 Other Insights from Evaluation Studies on Egypt

With the exception of the studies discussed above, other studies in this issue are carried out by Egyptian researchers and characterized by their lack of awareness of the economic relationship between skill acquisition and the wage determination process. However, they share a common belief that technical education is in urgent need of reform. Al-Bahwash (1993) argues that the majority of graduates of industrial and agricultural schools can not participate in the production process. Furthermore, he describes technical education as being not able to “become a tool for development and progress ... (and is) nothing more than a waste of time and effort for those who expend it.”

Berger (1957) and Kerr (1965) first pointed to the crucial gaps between aspirations and realities in the Egyptian society. For Antoninis (2002), technical secondary education stands out as a major victim of the sustained growth in university enrollments. Industrial, agricultural, and commercial schools were actually, and continue to be, used as the dam or dump place to regulate the stream of university aspiring secondary education students instead of embracing technological progress. Meanwhile, students who do not reach a particular limit

in general education ought to go to technical education. It is based on ability to successfully pass the final exams held at the end of the preparatory stage.

The Egyptian education system suffers a dualism represented by its aspirations for sustainable industrial development while not entrusting it to the best students (Morsi and el-Nouri, 1977). Metwali (1989) stresses that the main drawback lies in the absence of interface between firms and schools. He wonders how employers have no say in the curriculum content while they are the main channel for training students to become employed. According to Al Qusi (1986), several specializations were being overly expanded while others suffered shortages. Moreover, graduates in the overly expanded specializations were routinely appointed to irrelevant posts. This exacerbates the weak relationship between education and employment in the absence of feedback.

According to Antoninis (2002), technical education policy makers overlooked the fact that a large proportion of technical graduates were self-employed in family businesses (informal sector). Thus, instead of matching technical education courses and specializations with the needs of public sector industrialization, they should match the training needs of the informal sector. In addition, workshop experience had been very low due to the hastiness in preparing instructors, instructors' inability to meet quality standards, and because of increasing class sizes. These factors led to discredit in the technical school system. Recruitment criteria at intermediate skill levels were, and continue to be, no longer based on educational attainment. Instead, they are based on skill mastery after long probation periods. A technical graduate can find a job if he has workshop experience mainly acquired during adolescent part-time employment rather than in school itself. Dessouqi (1992) designated this phenomenon of substituting less education but more experienced workers for technical school graduates as the opposite form of the traditional model of the labor market, where

employers prefer to hire more educated workers. Langeoire (1984) suggests that university graduates, whose employment opportunities are exhausted, filter down to a lower step in the job hierarchy.

Since the middle of the 1980s, the government ceased serving as the employer of last resort. The adverse economic conditions (the reverse oil shock and the repatriation of a large part of immigrants) exacerbated this situation. This led to the collapse of the public budget and meant lower spending for technical education, lower level of investment in public enterprises, and, along with these, lower intensity of training.

The screening process for tertiary education resulted in the expansion of technical secondary system. The early sorting of lower secondary education into general and technical schools alleviated the pressure on the exams at the end of the general secondary cycle. These exams represented a social burden because of the high cost incurred on cram lessons which had deteriorated educational quality. The educational planning decided by the government neglected the essence of the educational target - the transmission of development-related skills (Antoninis, 2002). Ali (1996) stated that “the specialists in the field of education... overflow the market of intellect with laudatory speeches and panegyrics in exaltation of the issue of technical education... More students now join the public institutions of technical education than those of general education... Can these indicators fill us with confidence with respect to this education?”

Korayem et al (1985) argue that educational policy can only be understood in light of history and ideology. They state that “in Egypt, as elsewhere, reversing the forces of history and ideology requires an equally formidable force because the overriding conditions of underdevelopment reduce the range of options and leave little room for manoeuver.” It is hard for policy makers to decide which segments of the population will be excluded from the

educational process. Yet, in Egypt the form of exclusion resulted not only in diverting resources from improving access and educational standards in compulsory education, but it also created a large cohort of educated people with high expectations but inadequate means to fulfill them. One argument for the poverty explanation is the fact that the educational returns, particularly for primary education, supposedly have been found to be high in the developing countries in general and Egypt in specific.

Chapter 2: Overview of the Egyptian Education System and its Economy-wide and Labor Market Repercussions

Among Middle-Eastern countries, Egypt is considered to be one of the most extreme examples of a very high share of university graduates given its low level of literacy. In this chapter, a general background of the Egyptian education system is presented. This historical background helps provide expected results for the variables used in the estimation and to assess the importance of the school quality problems for the observed returns. It also helps provide the overall economic and social contexts during the period of research.

2.1 Historical Background on the Egyptian Educational System

During the British conquest of Egypt between 1881 and 1922, the Egyptian government maintained public expenditures on education at a low level. The aim of the education system is to educate a few Egyptians to work for the colonial civil service and some to work in the international business community. Holding a school certificate was a prerequisite for employment in the bureaucracy as made by the British Consul. The British, wanted the schooling system to produce obedient civil servants with no analytical skills. The nationalists however, asked for the right of education for all and to imitate the western

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education system which is based on critical thinking and problem solving. The British eventually approved to expand elementary education which helped in rooting the idea that education was a means to white-collar (public) employment rather than something everybody just does while a child.

Following the partial independence of Egypt in 1922, the new government made free and universal education a principle. It resulted into an expansion of schooling enrolments with overcrowding and deteriorating quality of education regardless of what regime had been in power. The main goal for the student was to work in the civil service. There was a demand for the highly-educated for such an employment since the supply of qualified labor over exceeds the demand for them.

Until 1951, there were two types of schools. The first type was the elementary school aimed at giving literacy skills to farmers. These schools did not qualify its graduates for any secondary education and they were few in numbers relative to the national goal of spreading literacy among the masses. Primary schools, the second type, qualified its graduates for higher levels of education but they were expensive and dominated by foreign and private schools. It was so common among the farmers not to send their children to the village school which belongs to the first type, elementary school. This type of schools did not qualify for higher education. On the hand, farmers perceived the only benefit of schooling was to complete higher education studies which pave the way to employment in a respectable government job. As a consequence, farmers favored to let their children learn farming skills and work in the arable fields rather than learning inadequate skills at elementary schools which block-up any employment opportunities in the government sector.

Egypt was similar to the Latin American experience in many aspects until the 1950s. For example, both had an unequal distribution of land, capital, and income. Following the

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Egyptian revolution in 1952, that brought Nasser to power, several egalitarian reform policies were carried-out such as: Land reforms, confiscation of the property of the upper-classes, and nationalizations of the industry. As a result, both the asset and income distribution are relatively equal. Yet, no improvement was implemented concerning human capital distribution. Education expanded disproportionately especially for the high levels of education while literacy rate continued to be weak.

In 1962, university studies became tuition free and admission to any post secondary education became a right for every successful graduate from the secondary level. After two years, the government extended the employment guarantee in the civil service or public sector for technical secondary graduates as well as higher technical institute graduates. As a result, the employment guarantee became the dominant employer for technical graduates especially after several nationalizations in the early 1960s.

Public sector employment guarantee was introduced in the 1960s for secondary and post-secondary graduates. It was very common in the socialist states in general (including Egypt) throughout the 1960s that the wages were compressed in the salaried sectors reflecting institutional barriers in setting wages irrelevant to productivity differences. However, such employment was connected with significant status and non-wage benefits. Hence, this guarantee represented the main aspiration for a socially mobile lower middle-class. The public sector expansion became tailored to the supply of education system rather than the educational system being tailored to the need of the economy. Moreover, such employment deteriorated the quality of education. It sought formal schooling credentials rather than real skills. The fastest expansion took place in the higher educational levels. Primary enrolment did not show the fastest growth of enrolment during the period of 1952-1977. The distribution of schooling became highly unequal and a high share of public

educational budget was devoted to higher education. As a result, general secondary and university graduates have been most in demand unlike technical secondary and higher-technical institute graduates, a main feature of a discriminatory educational policy that exacerbates the stratification of the Egyptian population strata. Technical graduates are perceived as belonging to lower-social income segments.

The scarce capital was concentrated to a few capital intensive state industries and expensive desert reclamation projects. The central planning policies in the 1960s deprived a large segment of the economy from its fair share of capital. As a result, the demand for skilled labor, outside the public sector, was lower. The urban bias led other sectors, such as the agricultural one, to be deprived from capital. The rural sector did not only suffer lagging public investments in rural infrastructure (e.g electricity), but also a high implicit net taxation of agriculture.

However, in the second half of the 1970s, urban bias diminished in terms of the taxation of agriculture and investments in infrastructure. The liberalization policies adopted in 1974 by Sadat decreased the bias against the large-scale but not the small-scale private sector. The oil shock created a boom and led to an increase in the demand for unskilled labor locally (an increased rural to urban migration) as well as an enormous migration to the Gulf region.

Even though the economy boomed in the 1970s, the demand for labor, in general, increased. However, this did not entail a general demand for the highly educated labor. As a result, unemployment started to prevail among university graduates along with shortages of certain types of skilled blue-collar workers such as electricians (Lindgren, 2005). The phenomenon of private tutoring started before the late 1970s because of deteriorating schooling quality and severe competition especially at the general secondary level. This

phenomenon became widespread now, even among lower income households. Education became privately fee-based where tuition-free alternative nowhere exists (Assaad et al, 2001).

The 1981 reform was enacted to channel one-third of preparatory graduates, based on high achievements, to general secondary track while the remaining two-thirds are sorted to technical secondary education as an attempt to expand technical education enrolment. By the 1980s, the oil-boom ended and the employment guarantee though had been terminated, remained in theory. In the 1990s, the Egyptian government adopted a more liberalized policies initiated by the Egyptian Reform and Structural Adjustment Program (ERSAP) mainly focusing on privatization, deregulation, and macroeconomic stability (Lindgren, 2005). Moreover, a large campaign of building primary schools in rural areas was initiated. The government attributes high schooling enrolment to the school building program. In 1997, private universities, financed by fees, emerged to absorb excess demand for higher education. However, only middle and higher income classes can afford to pay the expensive tuition fees (Assaad et al, 2001).

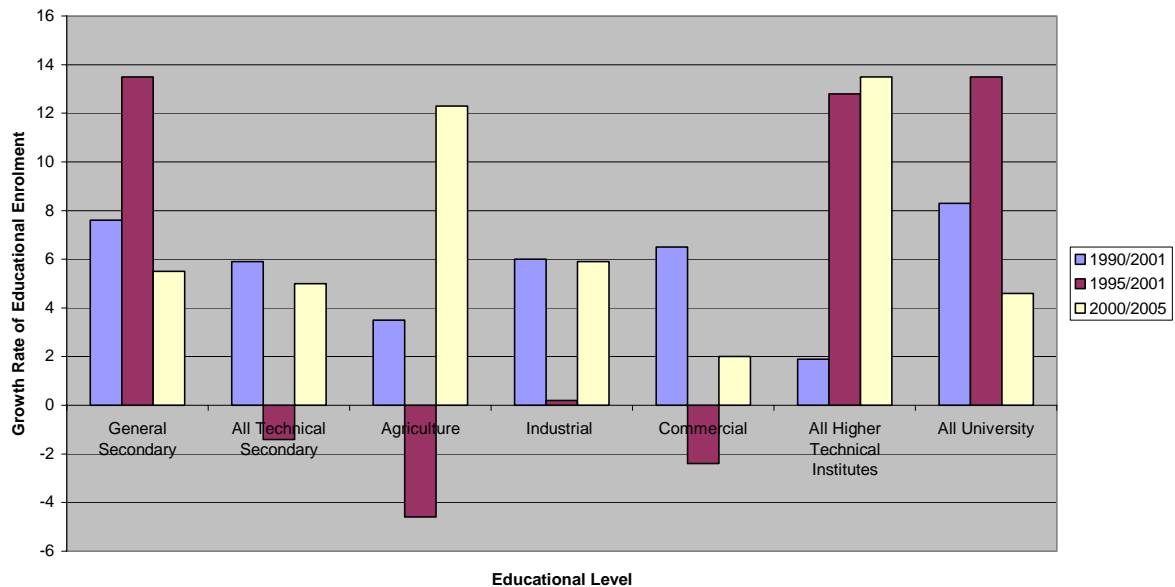
Today, the structure of the education system in Egypt is as follows: Basic education is compulsory and consists of six-year primary school followed by a three-year lower secondary school. Afterwards, students are tracked into a general (academic) secondary school or a technical secondary school, each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

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

2.2 Educational Enrolment throughout the 1990s

Chart (1): Annual Average Growth Rate of Educational Enrolment



Sources: Statistical Year Book of the Arab Republic of Egypt, 1995-2002, 1990-1995 (Cairo, June 2003) for 98/99 and 00/01 and 90/91 figures

Before embarking on specifying the equations that will be estimated, it is useful to revive overall trends in supply of educated workers during the period under study. Alarmed by the rapid growth in the number of secondary and university graduates in the 1980s and early 1990s, the Egyptian government attempted to slow down educational expansion especially for university enrolment. It enacted the 1981 reform aimed at controlling the

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intake into general secondary schools and directing the growing number of degree seekers to technical secondary education. As a result of this policy, the share of enrolment in general secondary schools declined. The decline in general secondary enrolment resulted in an eventual decline in university graduates in the late 1980s and early 1990s. Moreover, it led to the decline of instruction standards and the deterioration of technical school system output represented in the high unemployment among technical graduates (Antoninis, 2002).

However, as depicted in Chart (1), this was followed by increase in enrolments at the secondary and university levels in the 1990s. There was a rapid acceleration for the industrial branch of technical secondary education which is rendered to a belief on the part of education officials that industrial skills would be in more demand in the private sector. The higher growth of technical secondary education throughout the 1990s was largely driven by the promise of government employment and the higher returns of such employment on these educational investments. This pattern was entirely reversed from 1995-2001 as the number of technical secondary graduates shrunk in absolute terms. In 2000-2005, the growth of overall technical secondary enrolment increased especially for the agricultural track. It is likely that their returns will tend to decrease because of the oversupply of agricultural graduates which reduces wages. The main overriding question is why technical secondary enrolment increases despite the low returns to this type of education.

The two-year post secondary institutions, whose graduates are also covered by public employment guarantee, grew rapidly from 2000-2005 so that their returns are likely to slow down in 2006. Finally, university enrolment decreased during the same period which should result in time, in a witnessed increase in returns to this type of education. However, the cumulative effect of large number of university graduates from 1995-2001 were added to

new graduates from 2001-2005 which led to oversupply of university graduates and consequently lower wages.

2.3 Overview of Developments in the Egyptian Economy (1998-2006)

By early 1990s, the Egyptian economy initiated its ERSAP structural adjustment program under the terms of international lending institutions (World Bank, International Monetary Fund). The policies aimed to provide a permissive environment for transition towards a private sector-led market economy. Between 1998 and 2006, the industrial sector contributed to real GDP growth between 25%- 30% and became less dominated by the public sector especially in the heavy industries. However, private-sector production has increased sharply because of privatisation and liberalization initiatives and accounted for 86% of manufacturing output in 2004/05. The services sector conquered 50%-60% of real GDP growth. Agriculture's share of GDP was around 15% in 2005/06 and this share remained the same since 1999/2000. This could partly explain the deteriorating returns to vocational agricultural graduates as this sector lacks modernization. The budget deficit increased dramatically from 2002-2007 as a result of strong expansion of public sector wage bill driven by the government employment pledges which amounts to 60 billion Egyptian pounds in the fiscal year 2007.

The main export revenues increased dramatically from oil and natural gas particularly after the higher world oil prices and increased natural gas production. Industry accounted for 18.2% of GDP in 2005/06, led by agro-food (sugar and beverages), textiles/clothing (cotton and wool yarn) and construction materials revenues from the Suez Canal increased due to increased world trade. In 2004, the Egyptian economy was driven by export revenues. The Egyptian pound depreciated against the dollar which increased exports and GDP but imposed a burden on the average worker because of inflation.

Although population growth rate slowly dropped from 2.1% in 2000 to 1.9% in 2004,

and after years of positive GDP growth from 1993 to 2000, Egypt experienced repeated declining growth of GDP from 2001 to 2004. By 2005 however, there was a turning point to a positive growth of 19% and by another 12% in 2006, thanks to the exchange rate policy.

The private sector has been the new engine of growth in the economy. The private sector contributed for 70% of the increased investment from 2004 to 2006. However, the government remained the favored employer especially for women due to restrictions to labor market entry to the private sector.

By 2006, the labor force was estimated at 22.34 million. It is dominated by men who represent 78% and women making-up the remaining 22%. The labor market is highly segmented, with the government remaining a major source of non-agricultural employment and the informal sector, which represent 82% of employment, contributes more to low-productivity and low-skilled labor, especially women. The Egyptian labor market is characterized by the mismatch between the skills needed by the labor market and what the educational system produces (Hamidi, 2007).

2.4 Trends in Unemployment by Gender and Education

Labor market statistics in Egypt suffer serious problems. These problems come from the inability of the Central Agency for Public Mobilization and Statistics (CAPMAS) to deal with the emerging private sector (Weiss and Wurzel, 1998). However, all available evidence on unemployment, despite divergence across surveys on precise figures, agree that unemployment has two structural aspects: it is concentrated upon those with no labor market experience and those with secondary education certificates.

According to the 1995 labor force sample survey regarding the educational composition of the unemployment, male secondary graduates make up about one fourth of the labor force while the female secondary graduates constitute up to a third. Furthermore, male

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secondary graduates compose three quarters of the unemployment whereas female secondary graduates conquer four fifths. Unfortunately, wage statistics cover only public sector and formal private sector enterprises. So, it provides no breakdown of employees according to their education qualifications and no information for the changes in demand for graduates of different educational levels (Antoninis, 2002).

The main challenge for the Egyptian economy is to create sufficient jobs to match the population and labor force expansion, of 2.7% per year. About 11% of the labor force was unemployed in 2006. Women are the worst suffering group because of public sector downsizing, privatization, where their unemployment rate in 2006 estimated at 25% compared to 6.9% for men. This high rate of unemployment among women is the result of getting disappointed from long queues for government job and lack of trust toward government employment and regulations which help in reaching the decision not to participate in work and thus, being out of labor force explaining the decline of unemployment from 1998-2006 (Hamidi, 2007). Egypt's telecommunication sector is one of the largest in the Middle-East and Africa. It moves toward more competitive market. The prospective investment in this sector is more likely to boost demand for high quality skilled graduates. The reform policies, though support the private sector, has so far failed to alleviate the pressure on government employment which remains the favored sector of employment for the large bulk of graduates especially at the vocational secondary level.

Since 1998, the employment outlook improved. It declined from 11.7% in 1998 to 8.3% in 2006. Also, the absolute number of unemployed decreased. The reason lies in the prolonged queues for government job which discouraged the unemployed women from job seeking. Women face discriminatory practices compared to men. For instance, they face cultural barriers to labor market entry because of the social norms that define what is appropriate for female employment. Women do not prefer the private sector because its jobs often necessitate staying late outside home. Women's

safety from male harassment restricts on how far they can travel to go to work or stay late outside home. Other kinds of bias against hiring women by entrepreneurs who do expect a general tendency for women to stop working at marriage to devote themselves completely to domestic responsibilities. As a result, married women discourage employers from investing in their training. Despite high female educational enrolment, fertility decline, and greater participation in paid work, social norms are much slower to change the concept of female employment. Women prefer to queue for public sector jobs as they get paid higher wages relative to private sector in addition to appropriate working conditions of short working hours, low effort, retirement benefits, and sexual safety due to presence of large number of other women in the government workplace. Unemployment among rural areas declined indicating that labor markets have seen bigger improvements by the government. There is an interesting shift from 1998 to 2006 for unemployment among university graduates where they became the only educational group to have experienced an increase in unemployment. This indicates that the Egyptian labor market can not satisfy the human capital aspirations and achievements of the highly educated. The informal sector bloated to 82% of new labor market entrants signaling the failure of government regulations and employment to any longer absorb new labor in the formal sector (Assaad, 2006).

2.5 Recent Trade Reforms in Egypt

Liberalization or protection policies can affect sectoral wage structure in different ways. Reducing industry protection adversely affects the demand for labor which leads to a decline in relative wage level. Moreover, the market structure tends to be more competitive which diminishes the price distortions and the relatively higher rents enjoyed by the imperfect competition and boosts labor productivity.

Since mid 1990s, Egypt has signed several multi and unilateral trade agreements: Egypt belongs to the Common Market for Eastern and Southern Africa (COMESA) and the

Greater Arab Free Trade Area (GAFTA). It has also signed the Agadir Accord with Tunisia, Morocco and Jordan which liberalized trade among the four countries on January 2005 and another with the EU on January 2004. The United States is a strategic trade partner to Egypt under the Trade and Investment Framework Agreement (TIFA).

In 1995, Egypt became one of the member states of the World Trade Organization (WTO). Egypt scored progress in liberalizing its tariff structure. Egypt managed to reduce the maximum tariff rate for most imports from 50 percent to 40 percent as to satisfy its commitments and become more globalized. Nevertheless, Egypt's tariffs remain relatively high, especially when compared with those of other developing countries. Following the Multifibre Arrangement quota system which threatened the textile industry, which is a labor-intensive industry mostly dominated by women, the government signed qualified industrial zones (QIZs) agreement in 2005 which allows the products produced in free trade industrial zones to be exported duty- and quota-free to the United States as long as they contain at least 11.7% of raw material from Israel. The textile industry benefited from QIZ's agreement which opened more markets and led to positive repercussions on returns for women.

In Egypt, there exists a high share of women in export oriented, labor intensive industries such as textile and clothing. Labor-intensive firms prefer to hire women because they can handle women's absences related to maternity and child care better than capital intensive ones as well as being more flexible, cheaper and compliant. However, women working in the non-government are relatively disadvantaged because crowding of women in certain occupations is responsible for depressed wages for them (Hamidi, 2007).

2.6 Female Labor Force participation in Egypt

Until late 1990s, Egypt did not experience feminization of some occupations unlike other MENA countries such as Morocco, Tunisia, and Turkey. From 1998-2006, the overall labor force

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participation increased particularly in rural areas but the increase was confined to males only. The participation rate for females is relatively lower compared to their males' counterparts. This is driven by getting disappointed from prolonged queues for government jobs. As a result, unemployment declined from 1998-2006 because large bulk of females are then out of labor force. The main reason behind lower returns for women is their disproportionate representation in the non-wage sector, which includes informal and self-employed laborers, in addition to facing barriers to labor market entry. As a result, the labor market for women in Egypt is still discriminatory. Both increased labor market participation along with low unemployment contributed to expanding employment especially in rural regions which witnessed the highest decline of unemployment because of the government outlook and perception of the importance of rural development in the recent years. Female non-wage earners have grown substantially in the agricultural sector. More than half of out of the labor force are either illiterates or vocational secondary graduates. Most of the illiterate are rural women whereas they constitute 70% of vocational graduates. The continued prolonged queues for government jobs are becoming worthless as the labor market is unable to absorb human capital aspirations and achievements especially for female university graduates. This resulted into delayed entry for urban women in the government sector. Increased feminization in some job types has had positive effect for women. It meant greater recognition of women's work and improved the relative position and bargaining power within the household, in a culture that recognizes men as the sole breadwinner of the family (Assaad, 2007).

Having described the Egyptian educational and economic systems, chapter three presents the methodology of estimating returns to education and chapter four assesses what the data can say about how schooling affects the chances of being selected into non-wage, non-government, and government sectors, which is followed by the effects of schooling at different levels on returns in each of these categories.

Chapter 3: Methodology and Estimation of Returns to Education in Egypt

The most dominant approach in researching education is the Mincerian Human Capital Earnings Model developed by Becker (1964) and Mincer (1974). In fact, Mincerian earnings function represents the basis of all research on returns to education. It is a simple regression model with a linear schooling term used to show the role of education in the labor market. It is based on discounting future earnings to calculate the private rate of return. This methodology has been criticized, however, on the grounds that it solely takes into account the individual as a decision maker choosing his/her level of schooling and neglects family background as a determining factor for returns to education (Card, 1998).

As mentioned above in section (1.2.3), recent attempts to estimate returns to education in Egypt includes Zhang (2003) and Hamidi (2006). Zhang conducted the sector-selection equation in the first stage to determine how education affects the chance of ending-up in different sectors. The selection equation, for Hamidi, determines the schooling choice and the factors that influence achieving or ending up at a specific level of schooling using the ordered logit model. Zhang (2003) and Hamidi (2006) adopted Mincerian equation in the second stage that relates the log of hourly earnings to years of schooling, years of experience, and other variables that can be added to this basic equation such as gender, region, and occupation. The estimated parameters in the first stage of the equation are then used to calculate the private rate of return to different levels of education in the second stage. Like Hamidi, Haveman (1991) and Wilson (2001) adopted the “reduced form estimation model” which relates educational attainment as a dependent variable and a number of family characteristics as regressors. It incorporates the effect of family background on returns to

education and evaluates different factors that affect an individual's choice to conclude his/her education at a specific level.

In this research, an extended Mincerian human capital earnings function is used along the lines suggested by Zhang (2003). It is based on estimating selectivity corrected returns to different levels of education from which a crude estimate of private rate of return is derived. A recent extension to this model is to capture the so-called certification effect or "sheep skin effect" which refers to how the possession of a degree affects wages.

The standard Mincerian equation relates the log of hourly earnings to years of schooling, years of work experience and years of work experience squared.

$$\ln W_i = \alpha + \beta_1 S_i + \beta_2 X_i + \beta_3 X_i^2 + u_i \quad (1)$$

$i = 1, 2, \dots, n$

Where $\ln W_i$ represents the natural logarithm of real wages, S_i is the number of years of schooling, X_i is potential experience (measured as age minus years of schooling, minus six), X_i^2 is experience squared, and u_i is a random disturbance term. Other variables can be added to the basic equation such as: race, gender, region, economic sector, and occupation.

The main advantage of the Mincerian equation is the fact that the coefficient on the years of schooling equals the marginal internal rate of return to additional schooling. The specification is shown logarithmically in order for the regressors to be interpreted in terms of marginal effects. Thus, index β_1 is interpreted as the rate of returns to schooling¹ (Zhang, 2003).

¹ Strictly speaking, the coefficients on the education variables are simply the marginal benefit and not the returns to schooling since it does not take into account the direct cost of education.

3.1 Returns to Education based on the Extended Mincerian

Earnings Function

To estimate returns to schooling at different levels, the ‘extended’ earnings function is used. The extension to the above model is manifested in the inclusion of the so-called “certification effect” or “sheep skin effect”. It is based on the idea that an employer might value a worker with a certificate more than a worker without one. Accordingly, in order 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 ‘extended’ earnings function depends on replacing the continuous years of schooling variable (S_i) with a series of dummy variables representing the completion of the main schooling cycles. The modified Mincerian earnings function is:

$$\ln W_i = \beta_0 + \sum \beta_k S.Dum_{ik} + \beta_2 X_i + \beta_3 X_i^2 + u_i \quad (2)$$

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

Or, the model with detailed educational dummies:

$$\begin{aligned} \ln W_i = & \alpha_i + \beta_1 rd\ write_i + \beta_2 primary_i + \beta_3 preparatory_i + \beta_4 gen\ sec_i + \beta_5 voc\ 3yr\ agr \\ & sec_i + \beta_6 voc\ 3yr\ ind\ sec_i + \beta_7 voc\ 3yr\ com\ sec_i + \beta_8 voc\ 5yr\ sec_i + \beta_9 postsec_i + \beta_{10} university \\ & 4yrs_i + \beta_{11} university\ 6yrs_i + \beta_{12} postgrad_i + \beta_{13} X_i + \beta_{14} X_i^2 + u_i \end{aligned} \quad (3)$$

$i = 1, 2, 3, \dots, n$

Where the private rate of return (ROR) to different levels of education can be derived from the following formula, $r_k = (\beta_k - \beta_{k-1}) / \Delta n_k$ where it calculates the incremental private rate of return to the k^{th} level of education where β_k represents the coefficient of a specific level of education, β_{k-1} is the coefficient of the previous level of education, and Δn is the

difference in years of schooling between k and $k-1$. S_{primary} and $S_{\text{preparatory}}$ stand for the total number of years of schooling for each successive level of education. For example, the difference in returns for the students holding completed primary education relative to the illiterate is: $r_{\text{primary}} = \beta_2 / (S_{\text{primary}} - 5)$. The same applies to the completed preparatory education relative to the completed primary education, $r_{\text{preparatory}} = (\beta_3 - \beta_2) / (S_{\text{preparatory}} - S_{\text{primary}} - 8 - 5 = 3)$ and so forth (Hamidi, 2006).

3.2 Approaches to correct for Selection Bias

Griliches (1977) pointed out that the coefficient estimates of the OLS estimation of the classical model could suffer from what is known as 'self-selection bias'. The individual is self-selected into educational attainment if his/her family background and his/her ability affect that educational attainment. Accordingly, estimating the above classical earnings function without incorporating the family background and ability that might affect educational attainment could yield 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. Control variables such as family background characteristics: Father's and mother's level of education and father's occupation. An interaction term between education and family background can obtain the effect of family background on returns to education.

However, these results 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 did not report any wage. In order to solve the problem of sample selection bias, Heckman (1979) suggests estimating two equations. First, the participation equation is run, as a multinomial

logit, for the purpose of this study, to estimate the probability of having worked at the time of the survey, and not currently enrolled as a student (using the entire sample: workers and non-workers). From the logit results, a selection variable (the inverse Mill's ratio term) is created. This estimate is used in the second step, as an additional regressor in the wage equation, giving consistent estimates of the Ordinary Least Squares (OLS) coefficients free of censoring bias.

3.3 The Sample Selection Models

This study investigates the wage determination in the Egyptian labor market by controlling for selection bias. The wage function is comprised of individuals who report a wage and salary employment. However, the econometric work aims to identify the determinants of wages for randomly selected individuals. This leads to sample selection bias especially when the unobservable characteristics of the work decision (v_i) are correlated with the unobservable characteristics affecting wages (ε_i).

The form of the sample selection model:

$$y_i^* = x_i' \beta + \varepsilon_i \quad i=1, 2, \dots, n \quad (4a)$$

$$d_i^* = z_i' \gamma + v_i \quad i=1, 2, \dots, n \quad (4b)$$

$$d_i = 1 \text{ if } d_i^* > 0; d_i = 0 \text{ otherwise} \quad (4c)$$

$$y_i = y_i^* \cdot d_i \quad (4d)$$

Furthermore, y_i is observed only when d_i^* is greater than zero.

$$\begin{aligned} E(y_i \mid d_i^* > 0) &= E[y_i \mid v_i > -z_i \gamma] \\ &= x_i' \beta + E[u_i \mid v_i > -z_i \gamma] \end{aligned} \quad (5)$$

When $E[u_i \mid v_i > -z_i \gamma] \neq 0$, least squares regression yields inconsistent estimates of β .

Hence, Heckman's two step estimate is used to treat for the sample selection problem.

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The standard treatment for the sample selection problem is Heckman's two-step estimate. It initially applies OLS in the first stage and then uses the entire sample to model the choice to work by a multinomial logit model. The results of the multinomial logit estimation in the second stage are then used in the third stage of wage determination to construct estimates of the selection variables (the inverse Mill's ratio λ_i^{\wedge}):

$$\lambda_i^{\wedge} = \frac{\varphi(z_i \cdot \gamma)}{\Phi(z_i \cdot \gamma)} \quad (6)$$

Where φ and Φ denote the probability density function (pdf) and cumulative distribution function (cdf) of the standard univariate normal distribution respectively. When adding the inverse Mill's ratio λ_i^{\wedge} into OLS estimation, Formula (5) can be expanded as:

$$\begin{aligned} E[y_i \mid d_i^* > 0] &= x_i' \beta + E[u_i \mid v_i > -z_i \gamma] \\ &= x_i' \beta + \rho \delta_v \lambda_i + \varepsilon_i \end{aligned} \quad (7)$$

Where ρ is the correlation coefficient of u and v , δ_v is the variance of the error term v_i (δ_u is assumed to be 1 or standard normally distributed), and the error term ε_i has a zero mean (normally distributed) and is uncorrelated with v_i . Thus, a simple application of OLS in the third stage will yield consistent estimates of β (Zhang, 2003). Lee proposed a generalization of the two-step selection bias correction method introduced by Heckman (1979) that allows for any parameterized error distribution. His method extends to the case where selectivity is modeled as a multinomial logit (Bourguignon et al, 2004). His extension to Heckman's correction method will be used in this thesis as a multinomial logistic

regression which will allow us to examine selection into different sectors of participation as will be discussed below.

Chapter 4: Empirical Results (1998-2006)

4.1 Data and Descriptive Statistics

4.1.1 The 1998 and 2006 Egypt Labor Market Surveys

The empirical analysis for the case of Egypt is based on the two nationally representative surveys, the Egypt Labor Market Survey of 1998 (ELMS 98), and a new data set which is the Egypt Labor Market Panel Survey (ELMPS) for 2006. The surveys include data concerning household composition and socioeconomic characteristics such as: measures of access to the labor market, employment status, educational attainment, detailed educational history, migration, earnings, parental background, activity status, and occupational history.

The ELMPS98 was applied to a sample of 5000 households in 1998. The ELMPS2006 covered 8500 households in 2006. Both surveys were implemented by the Economic Research Forum (ERF) in collaboration with the Egyptian Central Agency for Public Mobilization and Statistics (CAPMAS). The surveys are envisaged as a periodical longitudinal survey because they contain comparable data. In fact, the ELMPS 2006 includes a panel part which tracks 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 (Assaad, 2006).

The data of ELMS1998 and ELMPS2006 were mostly supplied in raw form meaning that there were lots of problems with missing observations and inconsistencies that had to be

dealt with. The data required cleaning-up, merging categories inside the variable of interest to avoid loss of observations, and creating variables relevant to the estimation model.

4.1.2 Sample of the Study

Some variables are extracted for the purpose of this study that affect the choice to work for wages and choice of sector of employment such as: employment status, levels of education, age, age squared, experience, experience squared, regional dummies, parental education, and hourly wages (in logs). Five regional dummies were used in Egypt in 1998 and 2006. Other household-related variables are used as identification variables affecting sectoral choice such as mother's level of education, father's level of education and father's employment status (whether he is a self-employed or an employer at the time the individual entered the labor force). For females, household male earnings variable is included because it is more likely to affect female's participation in the wage work. However, it proved to be insignificant.

Detailed education dummy variables are used in estimating the selection and wage equations. The education variable is divided into thirteen categories. The illiterate denotes the reference category. The ability to read and write denotes literate individuals who have not completed primary school. Primary denotes individuals who earned a diploma after five years of primary school. Preparatory denotes individuals who earned a diploma after three years of preparatory school. General secondary denotes individuals who earned a diploma from a three-year secondary school that leads to the higher education system (university education). Vocational secondary denotes individuals who completed a three-year vocational agricultural, industrial, or commercial track. General secondary and vocational secondary are considered intermediate degrees. Technical institute denotes individuals who earned a diploma from a two-year postsecondary technical institute. Vocational five-year secondary

denotes individuals who earned a diploma after five years of vocational school. Both vocational five-year secondary and higher technical institutes are designated as above intermediate level of education. University denotes individuals who earned a higher degree after four years or six years of education, as disaggregated in the model. Eventually, post graduate denotes individuals who pursued further studies after the university such as master's and PhD degrees (Assaad, 1997). The reference category is restricted to non-participants in the labor force who are illiterate and live in Greater Cairo.

The analysis is restricted to the individual's employment status whether he/she is a non-wage worker, non-government wage worker, or government wage worker. Furthermore, it is also confined for individuals who are not currently enrolled in school and belong to the working age group between the ages of 15 and 64 for both years of 1998 and 2006. Appendix (A1) and (A2) display means and standard deviations for variables used in analysis. The sample on which the analysis is based consists of 6,300 non-wage, non-government, and government workers for both men and women in 1998. For 2006, the sample consists of approximately 11,390 non-wage, non-government, and government workers for both men and women.

As displayed in Appendix (A1) and (A2), nearly 45 percent of males are non-government wage workers in both rounds of 1998 and 2006. However, around 60 percent of females work in the government sector in 1998 but it decreased to around 40 percent in 2006 because women got disappointed from prolonged queues to obtain a government job and decided not to participate in the labor force and because of declining wages especially for highly-educated women indicating that the labor market is unable to absorb human capital aspirations.

Both males and females who work in the government sector are generally better educated, within those; females are better educated than their male counterparts in both years of 1998 and 2006. In 1998, 73 percent of male government workers hold a secondary diploma or above, compared with 94 percent of their female counterparts. In 2006, 75 percent of male government workers hold a secondary diploma or above, compared with 94 percent of their female counterparts. As a result, the government sector employs the better educated workers relative to the other sectors in both rounds of 1998 and 2006. On the other hand, female non-wage workers are the least educated where only 11 percent acquires a secondary diploma or above in 1998, and that percentage rises to only 14% in 2006. Female wage workers tend to be more concentrated in the large metropolitan areas of Cairo and Alexandria, where social norms are more permissive of women's work outside the home except for non-wage workers where they are concentrated in the rural areas to carry out rural-related activities (cultivation, poultry,..etc) in both rounds of 1998 and 2006.

4.1.3 Empirical Specification of the Estimated Model

Many empirical studies focused on the examination of factors that influence an individual's choice between technical and general secondary education at the secondary level in Egypt, and his/her decision to graduate with a specific level of education. The rationale entails that this decision is a key factor in the school to work transition (time gap between graduating from school and entry to the labor market), because in Egypt, technical secondary degrees are terminal ones leading to labor market entry while general secondary education is a route to a university degree. The educational policy variables are used as identification variables for schooling choice but household-related variables are used for sector selection. However, the main dilemma lies in the unavailability of identification variables that affect schooling choice but not the wage level in the datasets of 1998 and 2006. For instance, there

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exists a correlation between father and his son in terms of ability as usually children pursue their fathers' education and occupation track. Father's and mother's education level can be used as determinants for other human capital models of wage determination other than the schooling choice. This leads to sample selection bias especially when the unobservable characteristics of the work decision are correlated with the unobservable characteristics affecting wages. As a result, determinants of schooling choice (general versus technical secondary) need further investigation in the future research.

The two surveys used very detailed set of earnings structure. As a consequence, data on monetary earnings are fairly reliable. However, the quality of non-pecuniary benefits data is likely to be poor in quality. Therefore, only monetary earnings are included in the wage equation (Zhang, 2003). Log real hourly wage is used as a dependent variable which is computed by dividing the monetary net earnings by the number of hours worked per year and all wages are expressed in 2006 prices. Log hourly wage is used (instead of hourly wage) to reduce the effects of wages outliers. It is expected as the government though provides much better non-pecuniary compensation (i.e. retirement and death benefits for workers who are covered by social insurance and medical coverage, job security for those who possess legal employment contracts, and probably lower of effort); it provides less monetary compensation relative to the non-government sector. However, Egyptians are still more willing to work in the government sector. The non-government sector includes the public enterprise sector and the private sector. The analysis divides wage worker sample by gender and employment sector (non-wage, non-government, and government) to estimate sector- gender specific wage equations.

The study assumes that the non-monetary benefit for a job is a constant portion of the monetary wage regardless of the education level, though the constants can vary between

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different sectors. Therefore, disaggregating sectors into government, and non-government overcomes the limitation of the non-comparability of packages in the two sectors. As a result, returns to education estimated by the monetary wage represent well the rates of return to education from the overall compensation package.

The wage equations for male and female, across economic sectors, are based on standard Mincerian wage determination model. Log real hourly wage is assumed to depend on many explanatory variables such as: educational attainment, potential experience, potential experience squared, and a set of controlling dummy variables for location (Alexandria, Rural Upper Egypt, Urban Upper Egypt, Rural Lower Egypt, and Urban Lower Egypt). Other explanatory variable include educational dummies for the father and the mother as proxies for household socioeconomic status, where those who hold less than intermediate degree take the value of zero and those holding intermediate or above degree take the value of one. Father's occupation as self-employed or an employer is an identifying regressor reflecting the status of the household. The goal is to calculate the Mincerian returns to education by using the coefficients on education variables in the wage equation.

As mentioned above, the extended Mincerian equations are adopted to estimate the returns to different levels of education. The analysis starts with simple OLS estimates of the wage equations without controlling for sample selection bias. In the second stage the empirical work estimates selection equation models for the selection into non-wage, non-government, and government wage worker for both men and women in both rounds of 1998 and 2006. The models depend on using a multinomial logit model (the dependent variable is a categorical variable represented by the male work status and female work status) where identification variables (affect participation but not wages) represented by household-related variables determine participation in the labor force which consequently

affects the choice of the employment status. Parameter estimates are then used to compute the six selection variables or inverse (λ) Mill's ratios to correct for selectivity bias, which are subsequently, included as regressors in the third-stage wage equations. The standard errors of the third stage are adjusted to account for the presence of estimated regressors. The empirical work estimates six wage equations for both men and women across the three employment states (non-wage, non-government, and government) in both rounds of 1998 and 2006. From these incremental and cumulative rates of return to education, a single dummy equation is used to test for the equality of the same educational levels between different years to find out if there exists significant change in returns from 1998 to 2006, as shown in tables (3), (4), (5), and (6).

4.2 Estimation of the Determinants of Sector-Selection by Gender

(Multinomial Logit Model)

Appendix (A3) and (A4) show the parameter estimates of the sector-gender-round specific selection equations. The study uses a multinomial logit model in the estimation of the sector selection equations. The reference category is an illiterate and non-participant person living in Greater Cairo.

In estimating the selection equations, detailed education dummy variables are used. Furthermore, the household-related variables (father's and mother's education level, father's occupation) are used as identification variables that affect the choice to work for wages and choice of sector but not affect the wage level. The selection estimates show that education increases a male's probability to be wage workers in the government sector but it decreases a male's chance of being a wage worker in the non-government sector or as being a non-wage earner in most cases in both 1998 and 2006. The coefficients of the education dummies for

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male non-wage earners and non-government workers have negative sign in both years but the coefficients have the expected positive sign only for male government workers, and the majority are significantly different from zero at the 1% level. As a consequence, the government remains the favored employer for men because of its job security and compensating retirement schemes in addition to short working hours and lower effort.

For females, the selection estimates show that education increases a female's probability to be wage worker, especially in the government sector and in most cases in the non-government sector. The coefficients of education dummies for female non-wage earners have negative sign. Moreover, the coefficients for females holding less than intermediate degree have negative sign in 2006. But, the coefficients have positive sign for female government workers in 1998 and 2006, and the majority are significantly different from zero at the 1% level. Almost all the coefficients are positive for female non-government workers but with lower probability of participation compared to the government sector. As a result, the government sector remains the favored employer for women. Higher educational attainment increases a female's probability of working in the government sector as a first choice and non-government sector as a second choice, but it reduces her probability of being a non-wage earner in both 1998 and 2006. Women prefer to work in the government, like men, for its appropriate working conditions and short working hours.

Other patterns are found by examining the coefficients on the identification variables. A male is more likely to be non-wage earner in the first place (work for family business), followed by working for wage in the government sector as a second preference if his father was self-employed or an employer at the time he entered the labor market. However, the probability for a male to work in the government, as influenced by his father's employment status, declined from 67% in 1998 to 26% in 2006. This springs from father's ability

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influence over their children to pursue his same career-path through undertaking more risky type of work as self-employed rather than passing through the lagging conventional formal government employment. Furthermore, the male's probability to work in the non-government sector declined as well. Hence, father's employment status as self-employed has a great effect on males to work as non-wage earners. For females, father's work status as self-employed or an employer increases his daughter's probability to be non-wage earner just like men, but decreases the chance of being wage worker at either the government or non-government sectors.

In 1998, a father holding an intermediate or above degree increases male's chance to work as non-wage earner or wage worker in the non-government sector, and it decreases the probability to work in the government sector. However, it decreases a female's probability to work at any of the three sectors or it affects inversely on female's participation in the workforce. In 2006, father's education level has an adverse effect on both males and females to participate on any of the sectors.

On the other side, a mother holding an intermediate or above degree increases only a male's probability to work as non-wage earner or wage worker in the non-government sector and increases a female's chance of being a non-wage earner in 1998. Otherwise, it has a negative effect on participation. However, in 2006, mother's education has a positive effect on both males and females to participate in different sectors.

Male vocational industrial and higher technical institute graduates face a higher probability to be unemployed. This is attributed to the vocational industrial enrolment expansion adopted by the government based on a belief that their skills are most in demand in the labor market. Moreover, university graduates face the highest probability among all the educational groups as a result of massive expansion of university enrolment. This is in line

with enrolment statistics illustrated in chart (1). The government has failed to alleviate the high demand for university education and caused even worse labor market outcomes for both technical secondary and university graduates. On the other hand, female university and vocational secondary graduates face even double the probability relative to their male counterparts to be unemployed. Women in Egyptian labor market still suffer discriminatory treatment relative to their male counterparts especially in the private sector where employers are reluctant to hire women because of maternity leave and higher propensity to stop working after marriage.

4.3 Estimation of gender-sector specific wage equations

4.3.1 Ordinary Least Squares versus Selectivity Corrected

Wage Equation Estimates Using Lee's Method

Appendix (A5) and (A6) display the ordinary least squares and selectivity corrected estimates of the wage equations for men in 1998 and 2006 respectively. The following analysis applies to both men and women by work status (non-wage, non-government, and government) in years of 1998 and 2006. The reference category is an illiterate person, and non-participant living in Greater Cairo.

Experience has the expected concaved shaped profile. A positive sign of the experience variable indicates working experience is likely to contribute to growth of individual's human capital. A negative coefficient of experience square signifies that marginal returns from experience tend to decline over the lifetime. This is true for both men and women, across all work states, in years of 1998 and 2006 except for female non-wage workers in 1998. Standard errors are bootstrapped by resampling observations multiple times which yield higher standard errors relative to without bootstrapping.

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Within the male group, as displayed in Appendix (A5) and (A6), almost all the OLS and selectivity corrected returns to education and regions report no significant differences across all sectors in both 1998 and 2006 except for government workers in 2006 where selectivity returns further declined compared to OLS coefficients indicating that the sector-selection bias was evident and had to be accounted for. Concerning the regional differences, Alexandria is the only exception where it has higher earnings across all work states compared to Greater Cairo whereas returns to other regions are inferior. This indicates that all businesses and remunerating jobs are located and centralized in the metropolitan urban cities; Greater Cairo and Alexandria which jointly conquer around 80% of public expenditures devoted to urban development. As a consequence, the government should realize that other governorates in Egypt still lack adequate physical and social infrastructure (education and health) which ignite the demand for investment and accordingly better returns to education. Almost all the selection terms are insignificant for males across all sectors in both 1998 and 2006, indicating that sample selection is not a problem. However, the selection term for government workers in 2006 is significant at the 5% level indicating that there was an upward bias in the OLS estimates.

Within the female group, as displayed in Appendix (A7) and (A8), the selectivity corrected returns to education compared to OLS improved for non-wage earners in 1998 and 2006. For non-government workers, the selectivity corrected returns were worse-off relative to OLS for those holding less than intermediate degree and better-off for the above intermediate degree holders in 1998. This is attributed to the restriction to hold a secondary diploma in order to be eligible for government employment. In 2006, the selectivity corrected returns are generally better-off, though some are inferior, relative to OLS with the possible exception of vocational agricultural secondary graduates. If the agricultural sector had

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modernized, the returns would have been higher. The Egyptian agricultural sector still lags behind relative to the outside world in terms of introducing new sophisticated technological machines and tractors which enhance total factor productivity and returns. Moreover, the vocational agricultural graduates learn obsolete skills and curricula which do not match the labor market needs and the most recent technological changes. For government workers, the selectivity corrected returns are all positive and higher relative to OLS in 1998 whereas they are all negative and inferior in 2006. The selectivity corrected returns across regions are inferior relative to OLS in both 1998 and 2006. Concerning the regional difference, returns to women across all work states are inferior and negative especially for non-government workers because of facing institutional and cultural barriers to private sector employment imposed by entrepreneurs. This implies that females are relatively better paid in the waged sectors located in Greater Cairo. The selection terms are only insignificant for government sector in 1998 and 2006 and for non-wage earners in 1998.

Almost all the coefficients of education dummies for both men and women have the expected positive sign relative to the reference category in both years of 1998 and 2006 with the possible exception for females working in the government sector in 2006. Returns to female government workers relative to the illiterate are inferior because of few numbers of observations for the illiterate females. The majority of coefficients are significantly different from zero at the 1% level for males and insignificant for females. The empirical results, in general, may reveal that employers are influenced by credentialism in their wage setting especially for above intermediate degree holders. The education coefficients may be deemed as evidence of credentialism, or screening for ability.

4.3.2 Ordinary Least Squares versus Selectivity Corrected

Estimation of Incremental Private Rates of Return to Education for Men

Tables (1) and (2) present the Ordinary least squares (OLS) and the selectivity corrected incremental private rates of return to education for men and women respectively. The selection-bias correction is based on Lee's method. The equation used for computing the incremental rate of return is: $r_k = (\beta_k - \beta_{k-1}) / \Delta n_k$. It calculates the private rate of return to the k^{th} level of education where β_k represents the coefficient of a specific level of education, β_{k-1} is the coefficient of the previous level of education, and Δn is the difference in years of schooling between k and $k-1$. To ensure that these rates of return are significant, tests of restrictions that the coefficients of k^{th} variables are equal to those of $(k-1)^{\text{th}}$ are conducted. It is expected according to all Human Capital models that the rate of return to educational levels will fall as the educational level gets higher, since the opportunity cost of education increases with educational level. The analysis primarily focuses on non-government sector as it reflects market forces in wage determination. The wage determination in the government sector however, is rigid and institutionalized where non-monetary earnings, which are not accounted for in the returns, are highly pronounced. Non-wage earnings tend to reflect more relatively the productivity differences.

Within the male group, and compared to the preparatory level, the coefficients are higher for the vocational three-year secondary graduates across all work states in both years of 1998 and 2006 with the relatively highest returns for government workers due to compensating and rewarding packages offered by the government. The government sector remains the favored employer for male technical secondary graduates because they face

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much poorer prospects in the private labor market which either creams the best technical

secondary graduates or refuses to hire them as they are considered to belong to lower social

Table (1): Ordinary Least Squares and Selectivity Corrected Estimates of Incremental Private Rate of Return for Men by Work Status, Egypt 1998, 2006

Education Level	Incremental Rate of Return											
	Ordinary Least Squares						Selectivity Corrected					
	Non-Wage		Non-Government		Government		Non-Wage		Non-Government		Government	
	1998	2006	1998	2006	1998	2006	1998	2006	1998	2006	1998	2006
Vocational Secondary versus Preparatory	0.07	0.04	0.05	0.01	0.11	0.11	0.07	0.04	0.05	0.01	0.10	0.08
Agricultural Secondary	0.06	0.04	0.00	0.02	0.09	0.16	0.05	0.04	0.00	0.03	0.08	0.14
Industrial Secondary	0.07	0.05	0.06	0.02	0.11	0.08	0.07	0.05	0.06	0.02	0.11	0.07
Commercial and Other Secondary	0.08	0.02	0.04	0.00	0.11	0.11	0.08	0.02	0.04	0.00	0.10	0.08
Vocational Secondary versus General Secondary	-0.11	0.00	-0.45	0.11	-0.22	-0.14	-0.12	0.01	-0.45	0.10	-0.23	-0.20
Agricultural Secondary	-0.17	0.01	-0.60	0.14	-0.29	0.03	-0.17	0.01	-0.60	0.14	-0.30	-0.04
Industrial Secondary	-0.11	0.02	-0.41	0.12	-0.20	-0.20	-0.12	0.04	-0.41	0.11	-0.20	-0.24
Commercial and Other Secondary	-0.09	-0.05	-0.48	0.06	-0.22	-0.13	-0.10	-0.03	-0.48	0.06	-0.23	-0.22
Higher Technical Institute versus Vocational Secondary University	0.03	0.07	0.16	0.06	0.13	0.12	0.03	0.07	0.17	0.06	0.13	0.10
Vocational Secondary University versus Higher Technical Institute	0.09	0.08	0.11	0.13	0.12	0.10	0.09	0.09	0.11	0.14	0.12	0.08
	0.14	0.10	0.06	0.21	0.10	0.09	0.14	0.10	0.05	0.21	0.11	0.06

Source: Author's calculations based on ELMS 1998 and ELMPS 2006

classes. Only the returns for vocational agricultural secondary graduates working in the non-government and government sectors improved from 1998 to 2006.

Table (1) reports generally negative incremental OLS returns to the three-year vocational agricultural, industrial, and commercial secondary education compared to the general secondary for men in all sectors in 1998. In 2006, the returns for vocational secondary graduates are reported positive for non-wage earners and non-government workers. However, the returns to government workers are inferior but still positive. In general, there is an improvement in the incremental rates of return for vocational secondary graduates compared to general secondary from 1998 to 2006, especially for male non-government workers. However, these estimates, when only compared to general secondary, are not reliable enough because most of general secondary graduates (around 90%) usually join the university track whereas only a few (the remaining 10%) join the labor force.

By default, and compared to vocational secondary level, both higher technical institute and university graduates earn higher returns. Only the returns for higher technical institute graduates compared to vocational secondary declined for non-government workers in 2006. This is rendered to high annual growth of higher-technical secondary enrolment (13.5%) compared to vocational secondary (5%) from 2000-2005, as displayed in chart (1). Returns to university graduates compared to vocational secondary had a slight improvement in the non-government sector, especially in the private sector, which is highly affected by credentialism and better reward the university graduates. Returns to university graduates increased dramatically to 3.5 times relative to higher technical institute graduates for non-government workers in 2006 because the higher-technical institute enrolment is about 3 times higher than the university enrolment from 2000-2005, as shown in chart (1).

Compared to OLS, almost all the selectivity corrected incremental returns to education have the same coefficients for men across all work states in 1998 and 2006 with the only exception for the selectivity corrected returns to vocational secondary compared to general secondary in all sectors which remained inferior because of queuing for government jobs based on the possibility of employment guarantee and compensation policies (non-wage benefits) which drive the labor market expectations of technical graduates and the poor prospects against technical graduates in the private sector.

4.3.3 Ordinary Least Squares versus Selectivity Corrected

Estimation of Incremental Private Rates of Return to Education for Women

Within the female group, and compared to the preparatory level, only the returns to vocational secondary graduates became inferior for non-government workers in 2006, as shown in table (2), as a result of private employment entry barriers. Entrepreneurs cite lack of adequate skills as an important constraint to hiring. Female vocational school graduates face much poorer prospects in the private sector than their male counterparts and thus, have an even greater incentive to queue for government jobs. Generally, table (2) displays negative returns to the three-year vocational agricultural, industrial, and commercial secondary education compared to the general secondary in all sectors in 1998 because only a few of female general secondary graduates enter the labor market which render their wages higher relative to vocational secondary counterparts. In 2006, returns continued to be inferior with the possible exception for female vocational industrial and commercial graduates in the government sector.

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Table (2): Ordinary Least Squares and Selectivity Corrected Estimates of Incremental Private Rate of Return for Women by Work Status, Egypt 1998, 2006

Education Level	Incremental Rate of Return											
	Ordinary Least Squares						Selectivity Corrected					
	Non-Wage		Non-Government		Government		Non-Wage		Non-Government		Government	
	1998	2006	1998	2006	1998	2006	1998	2006	1998	2006	1998	2006
Vocational Secondary versus Preparatory	-0.34	0.06	0.05	-0.09	0.05	0.16	-0.26	0.06	0.10	-0.01	0.07	0.07
Agricultural Secondary		0.04	0.10	-0.20	0.10	0.03		0.04	0.13	-0.18	0.11	-0.05
Industrial Secondary	-0.14	0.00	0.06	-0.08	0.08	0.17	-0.02	0.00	0.12	-0.04	0.09	0.11
Commercial and Other Secondary	-0.39	0.09	0.04	-0.09	0.05	0.16	-0.33	0.08	0.10	0.02	0.07	0.07
Vocational Secondary versus General Secondary	-1.92	-1.16	-0.29	-0.15	-0.31	0.13	-1.69	-1.20	-0.16	-0.04	-0.26	-0.06
Agricultural Secondary		-1.21	-0.11	-0.50	-0.17	-0.24		-1.24	-0.07	-0.55	-0.13	-0.43
Industrial Secondary	-1.27	-1.33	-0.23	-0.14	-0.23	0.17	-0.93	-1.37	-0.11	-0.16	-0.19	0.05
Commercial and Other Secondary	-2.01	-1.08	-0.29	-0.14	-0.32	0.14	-1.88	-1.11	-0.15	0.03	-0.27	-0.06
Higher Technical Institute versus Vocational Secondary University		-0.20	0.06	0.02	0.11	0.06		-0.16	-0.01	-0.01	0.13	0.03
Vocational Secondary University versus Higher Technical Institute	0.23	0.03	0.19	0.14	0.10	0.03	0.17	0.07	0.20	0.17	0.11	0.01
		0.26	0.31	0.27	0.09	0.01		0.30	0.41	0.36	0.09	-0.02

Source: Author's calculations based on ELMS 1998 and ELMPS 2006

For non-government workers, returns to higher technical institute graduates compared to vocational secondary declined 3 times less whereas for government workers, they

decreased to one-half less in 2006. This is attributed to the huge enrolment from 1998 to 2006 in higher technical institutes relative to vocational secondary diploma, as displayed in chart (1), because graduates attempt to get a job through pursuing post secondary education rather than ending-up at the vocational secondary diploma which proved to have negative returns in 1998. Furthermore, the wage difference between returns to university graduates working in the government sector compared to both vocational secondary and higher technical institute graduates slowed down from 1998 to 2006 because of the large bulk of cumulative university graduates by the new millennium.

As displayed in Table (2), the selectivity corrected returns are similar to OLS except for the selectivity corrected returns in the government sector for commercial secondary graduates compared to preparatory cycle which remained the same and compared to general secondary where they remained inferior. Moreover, returns to higher technical institute graduates compared to vocational secondary working in the non-government sector became negative and inferior unlike the OLS results particularly because of the oversupply of higher technical institute graduates in 2006 which accordingly boosts their labor supply and reduces their wages.

4.3.4 Cumulative Rates of Return to Education for Men and Women

Tables (3) and (4) present cumulative/annual percentage growth of rates of return for different aggregate levels of education for men and women in relation to total vocational secondary level with all its specializations. A Wald test is used to test the difference in returns for each educational level at different years (1998 versus 2006). As for males, results indicate that returns have declined from 1998 to 2006 where almost all coefficients are

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statistically insignificant. However, the only exception applies to general secondary and university graduates in the non-government sector where their corresponding coefficients are statistically significant. Returns declined severely for general secondary and slightly for

Table (3): Cumulative/Annual Growth of Returns for Ordinary Least Squares Estimates for Men 1998, 2006 (Aggregated by Educational Level)

Variable	Ordinary Least Squares						Change 2006 vs 1998		
	Non-Wage		Non-Government		Government		Non-Wage	Non-Government	Government
	1998	2006	1998	2006	1998	2006			
Educational attainment:									
Preparatory	-0.07	-0.04	-0.05	-0.01	-0.11	-0.11			
General Secondary	0.11	0.00	0.45	-0.12	0.22	0.14	***		
Higher Technical Institute	0.03	0.07	0.16	0.07	0.13	0.12			
University	0.09	0.08	0.11	0.14	0.12	0.10	**		

Table (4): Cumulative/Annual Growth of Returns for Ordinary Least Squares Estimates for Women 1998, 2006 (Aggregated by Educational Level)

Variable	Ordinary Least Squares						Change 2006 vs 1998		
	Non-Wage		Non-Government		Government		Non-Wage	Non-Government	Government
	1998	2006	1998	2006	1998	2006			
Educational attainment:									
Preparatory	0.35	-0.06	-0.04	0.06	-0.05	-0.16			
General Secondary	1.93	1.16	0.34	0.10	0.31	-0.13			
Higher Technical Institute		-0.20	0.04	-0.01	0.11	0.06			
University	0.23	0.03	0.18	0.14	0.10	0.03			***

Note: Standard errors are in parenthesis * denotes significance at the 10 percent level, ** denotes significance at the 5 percent level and *** denotes significance at the 1 percent level, (Total Vocational Secondary is the reference category).

Source: Author's calculations based on ELMS 1998 and ELMPS 2006

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university graduates from 1998 to 2006. As for females, the coefficients are statistically insignificant between 1998 and 2006 with the exception of female university graduates working in the government sector.

In sum, changes in returns to education throughout the period 1998-2006 indicate a decline for higher levels of education for male general secondary and university graduates in the non-government sector. This is the result of cumulative effect of previous episodes of rapid acceleration in university graduates especially from 1995 to 2001 who joined the labor market at this level of education. As for females, returns to university graduates working in the government sector declined. Thus, it is worth noting that highly educated women are now facing a doubly unfair treatment in the labor market as they are not able to join the private sector at the same rate like men (institutional and cultural barriers to private sector employment) nor are their skills as highly valued in the government sector as in the past. The worst prospects facing women are consistent with results of other studies such as Hamidi and Assaad (2006) and Hamidi (2007) that females are suffering higher discrimination in the labor market in 2006.

Disaggregating shows the cumulative/annual percentage growth of rates of return for different levels education, including vocational education with its agricultural and industrial specializations, for men and women in relation to commercial vocational secondary level, as shown in tables (5) and (6). The results show a statistically significant increase in returns to agricultural vocational secondary for both men and women between 1998 and 2006 whereas returns to industrial vocational secondary have declined over this period for females. In other words, agricultural vocational graduates seem to be the only one to face better prospects in the labor market during this period.

Table (5): Cumulative/Annual Growth of Returns for Ordinary Least Squares Estimates for Men 1998, 2006 (Disaggregated by Educational Levels)

Variable	Ordinary Least Squares						Change 2006 vs 1998		
	Non-Wage		Non-Government		Government		Non-Wage	Non-Government	Government
	1998	2006	1998	2006	1998	2006			
Educational attainment:									
Preparatory	-0.10	-0.02	-0.05	0.00	-0.12	-0.11			
General Secondary	0.05	0.05	0.45	-0.07	0.20	0.12		***	
Voc. Sec. Agriculture	-0.12	0.06	-0.16	0.07	-0.09	0.15			**
Voc. Sec. Industrial	-0.07	0.07	0.04	0.06	0.00	-0.09			
Higher Technical Institute	-0.01	0.09	0.16	0.09	0.12	0.11			
University	0.07	0.09	0.11	0.15	0.11	0.10			

Table (6): Cumulative/Annual Growth of Returns for Ordinary Least Squares Estimates for Women 1998, 2006 (Disaggregated by Educational Levels)

Variable	Ordinary Least Squares						Change 2006 vs 1998		
	Non-Wage		Non-Government		Government		Non-Wage	Non-Government	Government
	1998	2006	1998	2006	1998	2006			
Educational attainment:									
Preparatory	0.35	-0.09	-0.06	0.05	-0.05	-0.16	***		
General Secondary	1.84	1.08	0.31	0.09	0.31	-0.14			
Voc. Sec. Agriculture		-0.14	0.10	-0.44	0.13	-0.38			*
Voc. Sec. Industrial	0.65	-0.25	0.00	-0.04	0.07	0.04	*		
Higher Technical Institute		-0.24	0.02	-0.01	0.11	0.05			
University	0.23	0.01	0.17	0.13	0.10	0.03	*		***

Note: Standard errors are in parenthesis * denotes significance at the 10 percent level, ** denotes significance at the 5 percent level and *** denotes significance at the 1 percent level, (Vocational Commercial Secondary is the reference category).

Source: Author's calculations based on ELMS 1998 and ELMPS 2006

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Overall, it is striking that presenting data in that way clearly show that returns to all levels of education for men have declined between 1998 and 2006, most dramatically for commercial vocational secondary diplomas. The same pattern is observed also for women, whose returns declined even further than men, especially in the government, and only there do we find statistically significant differences of returns for females between the two years.

The above seems to reflect the fact that the reduction in enrolment for agricultural vocational secondary from 1995-2001 as shown in chart (1) appears to have stayed off in the form of higher returns among the worst performers in terms to their rate of returns in education now in Egypt. Female university graduates whose skills are not even well valued in the government sector which were trade favored destination in Egypt are perhaps this group of educated women that our results show to be among the most excluded from the benefits of the trade liberalization in the new millennium. Next section will discuss the policy implications of the above results.

In comparing our results to other studies in the empirical literature, as noted above, many such studies concluded that private rates of return for technical education in South-East Asian countries outperform the basic and general secondary levels (Japan, Singapore, Taiwan, and South Korea). On the other hand, the World Bank, based primarily on Psacharopoulos' studies, found the opposite. The World Bank's estimates are biased to give credibility to its strategy. Egypt shares in common with many other MENA countries the low returns for vocational secondary education. Returns in Morocco are even worse compared to Egypt (Said, 2004). However, this does not support the World Bank's claim as skills acquired through technical education are not substitutable for by academic/exam-related skills. Returns for vocational graduates in all tracks are inferior because the private rate of return to education does not reflect the need for skills but reflects credentialism.

The declining returns are not attributed to inferiority of technical education per se in Egypt but to the social norms that consider technical education a dump place to regulate the stream of university enrolment. Its low quality, acquired obsolete skills, distorted labor market institutions and entrepreneurs' perception of technical graduates as belonging to lower social classes all contribute to lower returns. Technical education, at present, is the qualification of the bulk of the poor and unemployed.

Chapter 5: Policy Implications for Reform of Technical

Education in Egypt

In Egypt, like most other developing countries, financial resources are limited where every educational sector cannot receive an equitable amount of funding and attention for planning. As noted earlier, the World Bank strategy (1995a) has been to promote investment in basic and primary education for its high social rates of return to education (RORE) generally. There continues to be a debate on whether the social returns for technical education are lower or higher than those of general secondary education (Bennell, 1996a). The results in this thesis can best be interpreted as giving credence to the view that technical education needs to be rationalized and improved, not simply thrust aside.

John Waterbury (1983) voiced one of the earliest criticisms of educational policy in Egypt concerning technical secondary schools. His essential insights remain relevant today as he suggests that “there is a tendency to let the crisis worsen because, it is felt, whatever its dimensions it is no longer susceptible to reform. The standard tactic is then to seek a solution outside the afflicted institutions.”

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Although some of the largest firms and organizations established industrial secondary schools, the links between public enterprises and schools were never close. There are three policy options that would help to restore this link. One policy option is to reestablish feedback mechanisms between the public enterprises and the industrial secondary schools. However, this was unrealistic due to the diminishing role of the state as an economic agent. The public sector's share in total investment declined from 44% in 1988 to 27% in 1997. Additionally, the privatization process led to the declining role of public manufacturing enterprises which annulled the role of a centralized education system. During the 1970s, the benefit of being employed upon graduation as a technician in public sector firms, no longer exists for industrial school graduates. A second policy option is to consult the investors' associations in updating the curriculum so that the graduates acquire skills adjusted to the needs of the private sector. Yet, this institutional capacity does not exist. The third policy option is to reduce the number of enrollments because the link between production and education is not there. This poses questions concerning the massive expansion of enrolments in industrial secondary schools since the 1980s (Antoninis, 2002).

For Egypt, public sector employment guarantee- introduced in 1962- reinforced preference for white-collar prospective. In addition, the demographic expansion witnessed in the second half of the 20th century increased the number of students enrolled in general secondary education who joined the university track afterwards. This led to the inability of the labor market to absorb the bulk of those graduates' human capital aspirations especially in the government sector. The young entrants preferred to queue for a government job rather than seek private employment (Said, 2004). However, only the top 50 percent of preparatory students were admitted into secondary education, and of those, only the top 30 percent could enroll in general track where the remaining two-thirds channeled into the technical track

(Lindgren, 2005). Two-thirds of those engaged in technical track pursue the commercial track, mainly dominated by women. Hence, the schooling system focuses on the acquisition of a diploma where memorization and exam-related skills take precedence over technical skills that are of direct relevance to a future potential job.

There are further inequities in the distribution of public expenditure on education in Egypt. For example, university education absorbs 45 percent of the education budget. The cost per university student is 17 times higher than primary school pupil (Lindgren, 2005). Improving the quality of technical education can prove to be very costly. The annual cost per student in a public technical secondary school is LE500 where the cost in a private technical school is LE2500 so that it is 5 times the cost needed in order to provide a moderate quality technical education (World Bank, 2005).

There were many attempts towards reforming technical education. One of these attempts was the initiative of Mubarak-Kohl. This initiative was based on the German model and financed by the European Union. It sought to promote partnerships between technical schools, training institutions, and businesses starting 2004 (World Bank, 2005). Another attempt was the Skills Development Project (SDP), set up with the assistance of the World Bank, to provide funding for technical training undertaken by businesses that invest in the development of their workforce (Kuruvilla, 1996).

However, there are inherent contradictions in the technical systems that are yet to be challenged. For instance, the Egyptian technical system scores badly on the two fundamental aspects of any schooling system: social mobility and equity. Families and future employers consider technical education as a 'second best alternative' that is ranked at lower status within the educational hierarchy. Thus, encouraging the private sector to invest in technical education will be of little use if the trainees are still faced with social stigma that channels

them into low-paying jobs. For employers, technical diploma holders are characterized by low socio-economic background as well as low achievements in preparatory schools. These circumstances have channeled them into inefficient technical paths resulting into low levels of productivity. Hence, the reforms will be useless with the co-existence of lower wages and social inequality with respect to technical graduates.

In contrast, one of the main reasons behind the spectacular growth of the Asian Tigers (Japan, South Korea, and Taiwan) is attributed to the massive investment in general and technical education during their period of catching-up. Technical schools attracted a large number of students who were then absorbed into the export-oriented technology sectors. This demand-driven technical education led by employers decreased the financial burden on the public system (Abdel Karim, 1997; Kuruvilla, 1996).

The South-East Asian reforms in technical education have a different approach from the Egyptian ones. The Singaporean and Malaysian experiences 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 technical training (Kuruvilla, 1996). Johanson and Kanawaty (2001) identify possible problems arising with weak and still partially undefined governance and control mechanisms of the TFF.

Taking the experiences of many South-East Asian economies and the challenges facing Egypt in reforming technical education, reforms should be based on three key aspects. Firstly, increasing expenditures on Technical Education and Training (TET) is a necessary but not sufficient condition for achieving higher quality. It is the system of governance that should be transparent, and flexible. Higher quality education will convince families and employers to invest in technical education. Secondly, as technical education remains a

second-best alternative, the best students will be channeled into general education, the first-best alternative. Thus, the state has to promote a more egalitarian access to education. If so, this would result in a better allocation of resources to more apt students, rather than to those with higher exam scores due to expensive private tutoring. Finally, equally important, public-private partnership alleviates the burden on public funding provided that TET skills match the needs of the labor market. Private investment in TET has been shown in other contexts to positively boost quality.

Chapter 6: Conclusion

This thesis uses a newly available dataset, the Egypt Labor Market Panel Survey of 2006 (ELMPS), in order to estimate rates of return to sector-selection between technical and general secondary education in Egypt by gender and across economic sectors (non-wage, non-government, and government work) and compare results to other estimates based on 1998 Egypt Labor Market Survey. The availability of household level labor market surveys for more than one point in time helps in drawing conclusions into the determinants and returns to these types of education in Egypt.

The results show that the massive expansion in vocational secondary enrolment had a continuing negative effect on their returns, because of the oversupply of graduates. A similarly and erratic pattern can be seen in the evolution in the number of graduates from higher technical institutes which reduce their wages. There is, however a slow down in university enrolment in 2000-2005 and their returns should have increased as a result. This has not yet, been reflected in the returns at the cumulative level. Instead, their returns declined because of the cumulative effect of very high university enrolment reaching 13.2%

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per year proceeding the year of 2000 which led to an oversupply that depressed their cumulative returns. In the non-government sector, university graduates earn higher earnings compared to higher-technical institute graduates which are consistent with the statistics above. There exists a decrease in returns to university graduates and a dramatic decrease for vocational secondary and higher-technical institute graduates.

Compared to OLS, almost all the selectivity corrected incremental returns to education have the same results for men across all work states in 1998 and 2006 with the only exception for the selectivity corrected returns to vocational secondary compared to general secondary in the government sector which remained inferior because of queuing for government jobs based on the possibility of employment guarantee.

The returns for female vocational secondary education are declining if not approaching zero. The main question is why women get these qualifications although the returns are inferior. Female vocational graduates face mediocre prospects in the private sector whereas compensation policies offered by the government encouraged queuing to obtain a job. The employment guarantee resulted in a bloated bureaucracy and overstaffing along with declining returns. The reason for getting such qualifications could be either the benefit of government job which enables them to work less hours and thus allowing them to get married and start a family, or to avoid the high cost of private tutoring in order to get prepared for the general secondary exams. It can be argued that typically conservative families, especially in rural upper and lower Egypt, deter their daughters from joining the general secondary track to save the expensive cram lessons as they end-up into marriage.

For both men and women, eligibility for the employment guarantee is achieved by reaching the secondary level of education and is most easily crossed by getting a vocational secondary degree. As a result, the policy's greatest distortionary effect is observed for

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graduates at this level where they experience the highest unemployment rates and have the lowest rates of return to education in the private sector, particularly for females. Similarly, the government sector remains the prospective employer for male technical secondary graduates because they face poor prospects in the private labor market which creams the best technical secondary graduates. These results are sustained by the selectivity corrected methods indicating that any recent reform of vocational secondary education in Egypt has so far failed to produce the desired labor market outcomes.

In sum, the results in this thesis reach a dismal conclusion concerning vocational secondary education that does not provide any value for the private sector to invest. The employer considers them as belonging to lower social economic class and there is a mismatch between their obsolete skills acquired at school and labor market needs. Even in projects aimed at providing workshop experience for technical graduates such as Mubarak-Kohl and ORASCOM projects, the employers are likely to cream and select only the best technical secondary graduates. Egypt does not capitalize on benefits of technical education because of social norms which consider its graduates as less able and belong to low-income families. Recent calls by the Egyptian government reflect the realization that technical secondary schools' curricula are obsolete and provide no valuable skills to students and lead to high unemployment among technical graduates, a high social cost for the whole economy. As suggested by the Minister of Education in a recent statement, the Egyptian government will launch, starting 2010, a new initiative based on adding some courses of technical secondary to the general secondary curriculum and vice-versa. However, one main insight obtained from this thesis is worthy of further investigation in this initiative, as it has important policy implications. The general education (including university) graduates will

crowd-out their technical secondary counterparts for getting a job resulting into more deteriorating labor market outcomes for technical graduates.

Egypt has large university and higher technical institute enrolments given its low level of literacy. Educational enrolment increased whereas the growth of educational spending slowed down due to demographic pressures which deteriorated quality of education. Moreover, the institutional setting in the labor market (public sector) has encouraged investment in obsolete human capital and entrapped it in unproductive employment in the government. As a result, the public sector is not competing with other sectors for qualified labor. As shown in empirical results, there is a significant misallocation of resources that spring from vast unemployment among middle to the upper-end of the educational distribution especially in the government sector. The waste of human capital through the high unemployment rates particularly among university graduates in 2006 weakens the overall contribution of human capital to growth in Egypt.

Moreover, the government must devote more effort to better-match the technical secondary curricula to the market needs through bringing employers to set up the curricula. Moreover, there exists a controversial trade-off between schooling quality versus quantity in Egypt. The Egyptian government is concerned with the schooling coverage through expanding the number of schools irrespective of overcrowded students in classes along with the absence of workshop experience for technical teachers. The government instead, should not overlook the quality of schooling as it has substantial effect on labor market outcomes.

References

- Abdelkarim, A. (1997). Technical and technical education and training in the *Philippines: experience and views of trainees*, The International Journal of Manpower, Vol. 18, No. 8 (1997), Emerald Group Publishing, pp. 675-701.
- Ali, S. I. (1996). *Educational policy in Egypt* (Siyasa al-ta'alim fi misr), Cairo: 'Alam al-Kutub.
- Al-Bahwash, S. A. (1993). *Toward a new philosophy of technical education in Egypt in the face of the challenges of the 21st century* (Nahu falsafah jadida li al-ta'alim al-fanni fi misr li muwajahat tahdiat al-qarn al-hadi wa al-'ashrin), Proceedings of the 13th conference of the Association of Modern Education with the participation of the Faculty of Education of Ain Shams University, Cairo 13-15/7/1993 (on technical education).
- Al-Qusi, A. F. (1986). *Technical education and the needs of development* (Al-ta'alim al-fanni wa ihtiajat al-tanmiyah), Conference on technical education organised by the Egyptian Society of Engineers, October 1986, Cairo.
- Antoninis, M. (2002). *The Vocational School Fallacy Revisited, Technical Secondary Schools in Egypt*. St Antony's College and Centre for the Study of African Economies, University of Oxford, UK.
- Assaad, R. (2007). *Assessing Female Labor Force in Egypt Then (1998), and Now (2006)*. Population council, Cairo, Egypt.
- Assaad, R. (2006). *The Egypt Labor Market Panel Survey, 2006 (ELMPS): Survey Description by Ragui Assaad Newsletter of the Economic Research Forum*. vol. 13 no. 2 Winter 2006 ERF Annual Conference.
- Assaad, R. and F. El Hamidi (2001). *Is All Work the Same? A Comparison of The Determinants of Female Participation and Hours of Work in Various Employment States in Egypt. In The Economics of Women and Work in the Middle East and North Africa*. E. Mine Cinar (Ed.). Amsterdam: JAI – Elsevier Science, pp. 117-150.
- Assaad, R. (1997). "The Effects of Public Sector Hiring and Compensation Policies on the Egyptian Labour Market". *The World Bank Economic Review*, vol. 11, no.1.
- Baha' el-Din, H. K. (1995). *The general strategy on technical education in Egypt* (Al-istratijiah al-'amah li al-ta'alim al-fanni fi misr), National Strategy for Development on the Occasion of the 75 Years Jubilee of the Society : Volume Three, Cairo : Egyptian Society of Engineers.
- Bennell, P. and Segerstrom, J. (1998). *Technical Education and Training in Developing*

- Countries: Has the World Bank Got It Right? International Journal of Educational Development*, Vol. 18, No. 4, 271-287.
- Bennell, P. (1996a, December). *General versus Technical Secondary Education in Developing Countries: A Review of the Rates of Return Evidence. The Journal of Development Studies*, Vol. 33, No. 2, 230-247, published by Frank Cass, London.
- Bennell, P. (1996b). "Using and Abusing Rates of Return: A Critique of the World Bank's 1995 Education Sector Review", *International Journal of Educational Development*, Vol. 16, No. 3, 235-248.
- Berger, M. (1957). *Bureaucracy and Society in Modern Egypt: A Study of the Higher Civil Service*. Princeton University Press.
- Blaug, M. (1973). *Education and the employment problem in developing countries*, International Labor Organization (ILO).
- Bourguignon et al (2004, September). *Selection Bias Corrections. Based on the Multinomial Logit Model: Monte Carlo Comparisons*.
- Cantor, L. (1985). "Technical Education and Training: The Japanese Approach", *Comparative Education*, Vol. 21, No. 1, 67-75, reprinted in: Björk, C. and Rohlen, T. (1998) "Education and Training in Japan", Vol. 3, London: Routledge Library of Modern Japan.
- Card, D. (1998). *The Casual Effect of Education on Earnings*. The Center for Labor Economics Working Paper 2.
- Cohn, Elchanan, and Addison, J. T. (2003). *The Economic Returns of lifelong learning in OECD Countries*. The Economics of higher education, pp.3-57. International library of Critical Writings in Economics, vol.165.
- Dessouqi, S. (1992). *The role of education in development (Dawr al-ta'alim fi al-tanmiyah)*, Proceedings of conference on pre-university education, April 1992, Club of members of the Institute of Education, University of Cairo.
- Fine, B. and Rose (1999). "Education and the Post-Washington Consensus-Plus Ca Change". Draft Paper.
- Goldin, C. (2001). *The Human-Capital Century and American Leadership: Virtues of the Past. Journal of Economic History*, 263-292.
- Green, F. et al. (1999). "The Role of the State in Skill Formation: Evidence from the Republic of Korea, Singapore, and Taiwan", *Oxford Review of Economic Policy*, Vol. 15, No. 1, 82-96.

- Griliches, Z. (1977) *Estimating the returns to schooling: some econometric problems*. *Econometrica*, 45, 1–22.
- Hamidi, F. (2007, December). *The Effect of Trade Liberalization on Industrial Segregation and Wage Determination: Evidence from Egypt*. 14th Annual Conference of the Economic Research Forum (ERF). Cairo-Egypt
- Hamidi, F. (2006, June). *General or Technical Schooling? Evidence on School Choice, Returns, and Sheepskin Effects from Egypt 1998*. *The Journal of Policy Reform*, 157–176.
- Hansen, B. and Radwan, S. (1982). *Employment opportunities and equity in a changing economy, Egypt in the 1980s : a labour market approach*, International Labour Office.
- Haveman, R. (1991). *Childhood Events and Circumstances Influencing High School Completion*. *Demography*, 28(1), 133–157.
- Hay-Woo, J. (1991). “*Education and Economic Growth in Taiwan: A Case of Successful Planning*”. *World Development*, Vol. 19, No. 8., 1029-1044.
- Heckman, J. (1979). *Sample Selection as Specification Error* *Econometrica* 47:153-161.
- Johnes, G. and Tzannatos, Z. (1997). “*Training and Skills Development in the East Asian Newly Industrialized Countries: A Comparison and Lessons for Developing Countries*”. *Journal of Vocational Education and Training*, Vol. 49, No. 3, 431-453.
- Johanson, R. K., and Kanaway, G. (2001). *Investing in the Future: The National Training Fund in Egypt*, ILO-UNDP, Geneva.
- Kerr, M. (1965). *Education and Political Development*. James S Coleman (ed.). Princeton University Press.
- Korayem, Karima, El-Koussy, A. , Harby, M. K. and Leonor, M. (1985). Egypt, in: MD Leonor (ed.) *Unemployment, schooling and training in developing countries: Tanzania, Egypt, The Philippines and Indonesia*, International Labour Office/World Employment Programme, Croom Helm.
- Kuruvilla, S. (1996). *Linkages between industrialization strategies and industrial relations/ human resource policies: Singapore, Malaysia, the Philippines and India*, *Industrial and Labor Relations Review*, Vol. 49, No. 4 (Jul., 1996), pp. 635-657.
- Langeoire, JF (1984). *A study of industrial training in Egypt: a report on agricultural machinery repair and maintenance*, International Labour Office and Ministry of

- Industry, Productivity and Vocational Training Department.
- Lauglo, J. and Lillis, K. (eds.) (1988). *Vocationalising education*, Pergamon Press : Comparative and International Education Series, 6.
- Lindgren, M. (2005). “*Does schooling make sense? A household perspective on the returns to schooling in Egypt*”, Lund studies in economic history, Lund University, Sweden.
- Morsi, M. M. and El-Nouri, A. E (1977). *Educational planning and economics* (Takhtit al-ta’alim wa iqtisadiatuhu), Cairo : Dar al-Nahdah al-‘Arabiyah.
- Metwalli, F. B. (1989). *Technical education : its history, legislation, reforms and future, Analytic study on the history of technical education from the beginning of the 19th century to the end of the twentieth century* (Al-ta’alim al-fanni, tarikhuhu, tashri’at, islahat, mustaqbaluhu), Alexandria : Dar al-Ma’arifa al-Gama’ia.
- Middleton, J. Ziderman, A. and Van Adams, A. (1993). “*Skills for Productivity: Vocational Education and Training in Developing countries*”, New York: Oxford University Press.
- Moenjak, T.; Worswick, and Christopher (2003, February). *Technical Education in Thailand: A Study of Choice and Returns. Economics of Education Review*, v. 22, iss. 1, 99-107.
- Neuman, Shoshana, Ziderman, Adrian (1999). *Vocational Education in Israel: Wage Effects of the VocEd-Occupation Match*. *Jornal of human Resources*, v.34, iss.2, pp.407-420.
- Psacharopoulos, G. (1994). “*Returns to Investment in Education: A Global Update.*” *World Development*, Vol. 22, No. 9: 1325–1343.
- Psacharopoulos, G. (1987). “*To Technicalize Or not to Vacationalize? That is the Curriculum Question*”. *International Review of Education*, Vol.33, No.2, 187-211.
- Psacharopoulos, G. and Loxley, W. (1985). *Curriculum diversification in Colombia and Tanzania : an evaluation*, Johns Hopkins University Press.
- Said, M. (2004). *Compensating Differentials and Non-Pecuniary Aspects of Public Sector Jobs: Evidence from Egyptian Household Survey Data* Economics Department, SOAS, Working Paper no 136.
- Said, M. (2002, March). *A Decade of Rising Wage Inequality? Gender, Occupation and Public-Private Issues in the Egyptian Wage Structure: 1988-1998*. Published in: Assaad, R. (2002). *The Egyptian Labor Market in an Era of Reform*. Cairo, New York: The American University in Cairo Press.

- Sakellarou, C. (2003, April). *Rates of Return to Investments in Formal and Vocational Education in Singapore*. *Education Economics*, v.11,iss.1, pp.73-87.
- Sato, M. (1987). “*Vocational Training in the Takeoff Period*”, and Toyoda, T. (1988). “*Vocational Education in the Industrialization of Japan*”, The United Nations University, Tokyo: University of Tokyo Press.
- UNDP (2003). *Arab Human Development Report: Building a Knowledge Society*. New York: UNDP.
- UNESCO (1984). *Policy, planning and management in technical and vocational education : a comparative study*, Trends and issues in technical and vocational education 3.
- Waterbury, J. (1983). *The Egypt of Nasser and Sadat : the political economy of two regimes*, Princeton University Press.
- Weiss, D and Wurzel, U. (1998). *The economics and politics of transition to an open market economy : Egypt*, Development Centre Studies, OECD Development Centre.
- Wilson, K. (2001). *The Determinants of Educational Attainment: Modeling and Estimating the Human Capital Model and Education Production Functions*. *Southern Economic Journal*, 67(3), 518–551.
- World Bank (2005). *Reforming TTET in the Middle East and North Africa: experiences and challenges*, Washington DC.
- World Bank (1995a). *Priorities and Strategies for Education: A World Bank Education Sector Review*. Education and Social Policy Department, World Bank, Washington, D.C.
- World Bank (1993). “The East Asia Miracle”, Oxford University Press.
- World Bank (1991). *Egypt : Alleviating poverty during structural adjustment*, A World Bank country study.
- World Bank (1986). *Regional review of alternative modes of vocational training and technical education : final report*, Education and Manpower Development Division, Europe, Middle East and North Africa Region.
- World Bank (1978). *Staff appraisal report, Second education project*, Arab Republic of Egypt, Education and Manpower Development Division, Europe, Middle East and North Africa Region, 2112-EGT.
- Zhang, H. (2003, August). *Sample Selection Bias and Returns to Education in Egyptian*

Labor Market, 1988, and 1998. Humphery Institute of Public Affairs, University of Minnesota.