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# EDUCATION, GENDER AND INCOME INEQUALITIES

*Comparative study between Algeria, Egypt, Lebanon and  
Tunisia*

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## ABSTRACT

*The aim of this article is to identify and compare the impact of human capital investment, gender and labour market characteristics on income inequality in the different categories of young employed people in four Arab countries (Algeria, Tunisia, Egypt and Lebanon). We are supported by the results of the SAHWA Youth Survey 2015. The main results show a significant impact of human capital investment on incomes in the countries studied. It is greatest in Lebanon and Tunisia. Additionally, when levels of human capital are equal, young Lebanese are the best paid. Educational inequalities linked to social origin have a confirmed effect on the investment in education, above all in Egypt and Lebanon. What is more, the effects of gender inequalities are clearly evident despite women investing more than men in human capital: with equivalent levels of education and experience women's income is 54% lower on average than men's. This differential is still more pronounced in Algeria and Egypt. For Algeria, though the impact of social origin on education inequalities is modest compared to the other countries, the study shows that it is at the lower end of the scale when it comes to the return on human capital and income equality between men and women. The difficulty of incorporating the best educated into the labour market, the social management of employment and the absence of a clear wage policy in the private sector may explain these income inequalities.*

**Keywords:** *income inequalities, human capital, gender, social origin, labour market, young people, Algeria, Lebanon, Tunisia, Egypt.*

# **EDUCATION, GENDER AND INCOME INEQUALITIES**

## ***(Comparative study between Algeria, Tunisia, Egypt and Lebanon)***

### **INTRODUCTION**

Fighting social inequalities is the primary goal of all social change. Indeed, the demonstrations and demands for sociopolitical change in Arab countries were the result not only of difficulties finding work and housing, but were motivated, above all, by the sense that the economic, political and social systems are unjust (Stiglitz, 2012). These inequalities take different forms and the economic dimension strongly feeds the feelings of social injustice.

Of these economic inequalities, those relating to income in Arab countries are seldom addressed by socioeconomic research on the region or by international institutions. As the last *Global Wage Report* published by the International Labour Organization in 2015 explains, this makes the comparison of wage trends difficult (ILO, 2015).

To this end, the SAHWA Survey, on which this paper is based, provides us with a new opportunity to glimpse the economic impact of education on young people and to discern the income inequalities that are linked to other factors such as the education system, the social differences between men and women, and the nature of the labour market.

Indeed, several mechanisms that go beyond the economic domain come into play, notably, the inequalities in investment in human capital. The work on Arab countries confirms the relative impact of education level on income in employment (Benhayoun and Benzen, 1995; Destré and Nordman, 2002; El Hamidi, 2005; Ben Halima, Kocoglu and Ben Halima, 2010; Lassassi and Muller, 2014; Dhaoui, 2015).

Inequalities linked to gender also provide some explanation of the income inequalities; our focus, after all, is Arab countries – patriarchal regimes par excellence in which the division of social roles between men and women is very marked. Indeed, eighteen countries in the MENA region impose restrictions on the type of jobs women can hold, a situation that leads to large wage gaps by comparison to men (ILO, 2015). Lassassi and Muller (2014) have also shown that women are paid less than men in the different segments of the Algerian labour market.

Other characteristics associated with the structure of the labour market (such as the legal sector and regional specificity) also impact the return on education and experience, which are greater in the public sector in Tunisia and in Algeria (M. Ben Halima et al., 2010; Lassassi and Muller, 2014). The wage gaps between the private and public sectors explain the

low appeal of the private sector in Tunisia (Ben Halima et al., 2010). In the cases of Egypt and Morocco at the end of the 1990s, El Hamidi (2005) showed that qualifications were not reflected in productivity differences but were well remunerated in the public sector. Hence, human capital in the MENA countries has less effect on economic growth (Pissarides and Varoudakis, 2005 in Ben Halima et al., 2010).

In terms of geographical area, Benhayoun and Benzen (1995) confirmed a positive relationship between investment in human capital and wages in a sample of men, with significant differences found between the Rabat Kenitra and Casablanca areas.

In this paper, the focus is on economic differences: income inequality among the different categories of young employed people in the labour market in four Arab countries (Algeria, Tunisia, Egypt and Lebanon). The article is structured as follows: first we will present a brief review of the literature on the theory of human capital, as the main theory addressing income inequalities in the labour market and, specifically, the Mincer earnings function; based on the criticisms and limitations of this model in relation to social origin, gender and the heterogeneity of the labour market, we will attempt to improve our basic econometric model; then we will set out the methodology and results of the model.

## **THEORETICAL FRAMEWORK**

The analysis of income inequalities primarily rests on the theory of human capital. This theory has undergone several evolutions, with more extensive explanations being added to it principally from the sociology of education, gender studies and the theory of the heterogeneity of the labour market. In what follows, we will go on to set out a brief synthesis of each theory.

### ***1. Human capital and critical theories***

The theory of human capital shaped by Gary Becker provides an original interpretation of wage gaps between individuals. It rests on the concept of the *homo economicus*. This rational individual seeks to maximise their profits by investing in their human capital, which is the set of productive capacities an individual acquires through the accumulation of general and specific knowledge, know-how and so on (G. Becker, 1964). Hence, the central hypothesis of this theory considers education (of individuals and society) to be an investment that favours increased productivity. This determines, by consequence, the distribution of individual earnings and economic growth. Denison (1962) and Shultz (1963) found that the education of

the workforce contributes in a significant way to the economic growth of the United States (Denison, 1962; Shultz, 1963; in Logossah, 2004).

Thus, Mincer shows that as well as reducing the risks of unemployment, high levels of education ensure higher salaries (Mincer, 1974). According to Mincer, there are two complementary forms of human capital: educational investments on the one hand and investments in the form of professional experience on the other. Though this has given clear credit to the hypothesis put forward by the theorists of human capital (Jarousse and Mingat, 1986), it has been widely criticised because of the complexity of the education variable and the number of other factors that come into play, taking it away from the perfect competition situation in which the theory places itself.

### ***1.1 The education system and income inequality***

The education system's complexity is due to the involvement of several variables that play an indisputable role in configuring the distribution of individual schooling. From this point of view, where the education variable is used in the theory of human capital, specifically in the Mincer earnings function, it does not allow the system's influence to be felt in all its complexity, such as the impact of family environment or social origin on income. This is one of the most significant criticisms made of this theory (Riboud, 1978; Kiker and Heath, 1985; Boumahdi and Plassard, 1992).

For its part, the sociological and economic literature has tended to provide explanations. Bourdieu and Passeron showed in the foundational work of educational sociology, *Héritiers*, that the democratisation of education, instead of reducing educational inequalities among the various social classes, has led to the opposite: to the reproduction of the social structure of the dominant class. According to these two authors, the educational success of this social class (children of executives) is not explained by their talent but by their cultural heritage (mastery of the language, method of reasoning, common knowledge, etc.). Democratic schooling enhances this through teaching methods and content (Bourdieu and Passeron, 1968).

Staying within the Marxist tradition, like Bourdieu, Bowles and Gintis are influenced by this school of thought (1975; 1976). They have also advanced the idea that the school is in the service of the capitalist system and serves to perpetuate the domination of its ruling class. Compulsory education that is limited to working class children only instils the attitudes necessary for manual labour, while the higher education reached mainly by the children of the middle and upper classes (those of the proletariat being eliminated) tends to confer the

attitudes needed to take on management and innovation tasks (cf. Bowles and Gintis, 1975; 1976; in Logossah, 2004).

In contrast to Bourdieu and Passeron, Boudon finds that families' individual strategies according to their social origin are more important in the determination of education inequalities than the functioning of the school: the costs and benefits of education investment are estimated differently according to social origin. Rich families underestimate the cost of their children's education and overvalue qualifications, while families with modest origins overestimate costs and undervalue qualifications (Boudon, 1973). These different strategies have repercussions for social success, notably in terms of remuneration in the labour market. Boudon's results have been revisited by several researchers such as Goux and Maurin (1995), and Durut-Bellat (2002). For Ballion (1982), this is the consumerist behaviour of well-off families who benefit from the room for manoeuvre offered by the school system in order to facilitate the educational success of their children in private education; we may also add the use of private tutoring particularly in the case of Algeria.

Likewise, by studying the influence of social factors such as family environment (parents' level of education, profession, income) on the demand for education, Anderson confirmed a marked effect of social origin on access to secondary and higher education (Anderson, 1983; in Logossah, 2004).

## ***1.2 Gender income inequalities***

Sociological and economic studies have shed some light on the salary gap that exists between men and women in the labour market. The theory of domination justifies this gap between different demographic groups (sex, race, etc.) as an effect of the domination exercised by the categories that hold most power in society (Reich, 1981; in Logossah, 2004). Similarly, patriarchal beliefs have an effect which is used to explain this sexual segregation through male dominance, which takes its power from the financial authority of the man as head of household (Cova, 2009). This leads employers, generally men, to keep the best-paid jobs for themselves (Hartmann, 1978).

For its part, the economics of discrimination begun by F. Edgeworth (1922) specifies that income differences between races or sexes are the result of discrimination exercised according to the preferences of economic actors (employers, salaried men and consumers) (Becker, 1957). Additionally, the prejudices and expectations of employers uncertain about the productivity of individuals may result in lower incomes and less well paid jobs for women and minorities (Phelps, 1972; Arrow, 1973).

In the same line, Joshi (1989) brings new precision to the issue of salary discrimination according to sex. This reveals two types of discrimination, which are, in fact, linked to one another. The first concerns women who work part time (numerous in Great Britain), the second is associated with the consequences of maternity and the conditions of being the mother of a family (Joshi, 1989 in: Yves Chassard, 1990). Following Becker on the theory of the family (1991) and the sexual division of work (1985), women take care of domestic and family tasks because their income prospects in the labour market are inferior to men's. This division maximises family well-being (Meurs, Paithé and Ponthieu, 2010).

In the same context, fertility and the interruption of women's economic activity is the source of the income divisions between the sexes. Three effects are pointed out by Meurs, Paithé and Ponthieu (2010). The first is visible in the participation of women in the labour market, with maternity leave the main factor interrupting the professional cycle. The second effect concerns part-time work as a way of reconciling family and professional life, which is associated with lower-paid jobs, as shown by Merouani and Nicole in *Au labour des dames, métier masculin et emploi féminin* (1989), paraphrasing the title of Emile Zola's *Au Bonheur des femmes*. Finally, the third effect that holds women back is the suspicion that they are first of all mothers or future mothers who may leave work temporarily or permanently.

Additionally, education inequalities between girls and boys may be the basis of these inequalities in the labour market, particularly when it comes to salaries. The sociological works of Donain (1985), Duru-Bellat and Mingat (1993) "show that teachers do not encourage the same aptitudes among girls and boys. They favour the spirit of competition among boys and the respect for rules among girls. The culture of competition instilled in boys leads them to overestimate their capacities, an important factor in their orientation and then on their choice of better paid jobs, while the girls, by contrast, hesitate to seek the scientific fields".

### ***1.3. The heterogeneity of the labour market and income inequalities***

The theory of human capital that has served as the basis for explaining income inequalities has undergone major evolution, while maintaining the main hypothesis relating to the positive relationship between human capital and productivity. Theories on the heterogeneity of the labour market have contributed to this evolution: these are based on the existence of several different markets such as the formal and the informal. The first determines its remuneration by following administratively constructed matrices, while the second obeys the law of supply and demand. In other words, this theory places itself on the



side of demand, in which the variability of incomes is determined by the market and does not depend on the worker's productivity (Logossah, 1994).

## **2. Data and Methodology**

In order to analyse the income inequalities in four Arab Mediterranean countries (Algeria, Tunisia, Egypt and Lebanon), this paper uses the data from the original SAHWA Survey. At least in Algeria, this is the first survey conceived especially for young people (15–29 year olds). The survey's originality lies, first of all, in the advantage it provides for the comparative study of the four countries. Second, the survey provides a set of variables rich enough to touch upon all the domains that concern young people and allows the more overlooked paths to be explored.

Thus, to analyse of the effect of human capital on income inequalities in the labour market, the SAHWA database (2015) informs us about a sample of 2508 employed people, of whom 1839 are salaried and 669 employers, the self-employed and caregivers. Among these employed people, only 307 have taken professional training, most at a middle or secondary level.

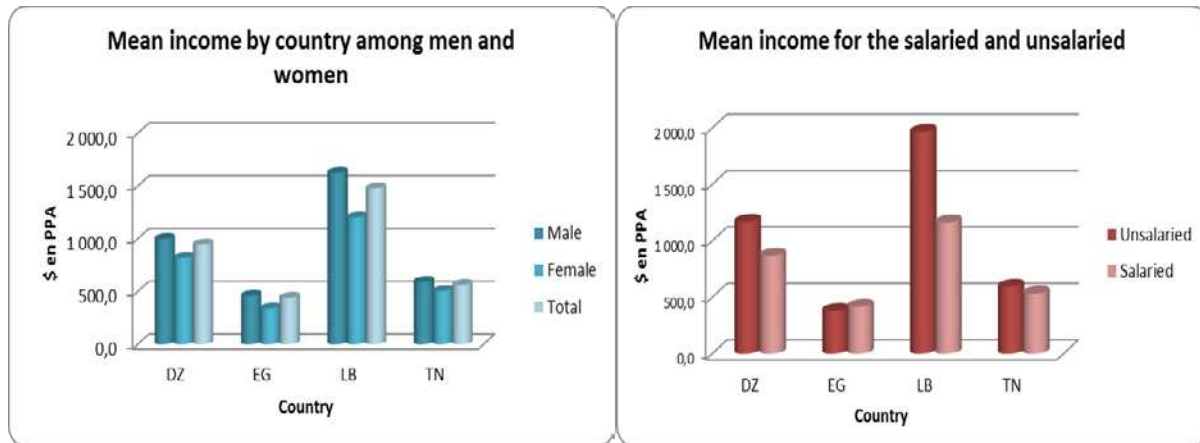
In terms of the phenomenon we wish to study, the SAHWA Survey gives us the opportunity to observe the distribution of net earnings in the month prior to the reference month<sup>1</sup> in local money. This information is not always available for several of the countries. For the purposes of the comparability of monetary, these net earning have been converted into a common unit, in this case purchasing power parity in dollars (\$PPP)<sup>2</sup>. A first descriptive overview reveals two important results (Figure 1). First, it turns out that young Lebanese people are paid, on average, one and half times (1.5) more than Algerians, two and a half times as much (2.6) as Tunisians and more than three times (3.3) as much as Egyptians.

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<sup>1</sup> The SAHWA Survey reference months are January 2016 for Egypt and November 2015 for the other countries.

<sup>2</sup> The GDP deflators of the World Bank were used for calculation.

Figure 1



Source: compiled by the authors.

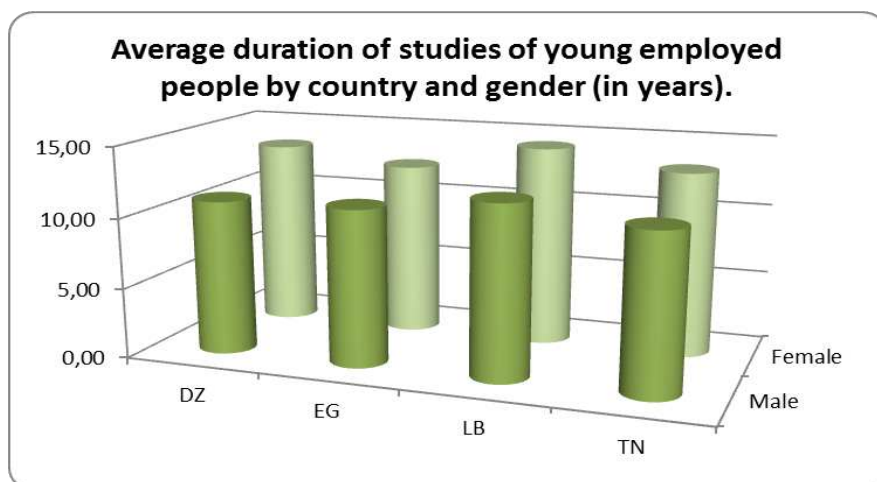
Furthermore, the gap between male and female pay is much wider in Lebanon and Egypt at 15% than in Algeria and Tunisia with 10% and 7.9%, respectively. Looking at the professional situation, we note that in general the salaried are less well paid than the unsalaried. This difference is clearly evident in Lebanon (+ 1.7 points). In Egypt, by contrast, the trend is the opposite. Note that the two categories of salaried workers, full-time and part-time, are grouped together.

All in all, we can clearly see that incomes vary from one region to another according to different criteria. If we take the effect of human capital as the principal determinant, we can see that its provision in each country is different. But other observable and unobservable characteristics come into play, affecting the incomes directly or indirectly.

For the needs of our analysis, the key information on young students' level of education is indispensable. From this survey we have an approximation of the duration of studies thanks to the "year of finishing studies" variable from which we calculate the age at the end of studying.<sup>3</sup> This variable is slightly biased, being data from which we cannot extract repeated years or studying being stopped for one reason or another. However, the number of years of study is considered a good proxy for measuring education (Green, 2011). The graph below (figure 2) informs us of the average duration of studies in each country. This is around 11.5 years of study, except for Lebanon where it reaches 13 years. The clear difference between girls (13.5 years study on average) and boys (11.4) in the four countries must be emphasised. This difference is less accentuated in Egypt (Annexe, Table 6).

<sup>3</sup>The first six (06) years are of course not counted, with the assumption being that in the four (04) countries official schooling begins at the age of 6.

Figure 2



Source: compiled by the authors.

From another angle, thanks to the variable "age at first employment", with each professional category mixed up, we can approximately calculate the length of each individual's professional experience. The length of a possible period of unemployment between one job and another is not taken into account. As a result, the duration of studies and professional experience will possibly be overestimated.

However, unlike for entrepreneurs (self-employed, business creators), for the salaried we only have information on the legal and economic sectors of their companies. And yet the size of the company, its location and competitive position in the labour market are supposedly significant elements in the determination of the income obtained. Jointly with the levels of education and professional experience, these factors explain 25% of the wage gap between workers, while the phenomenon of discrimination accounts for 10% of that gap (Blau and Feber, 1992; Altonji and Blank, 1999). This study will, unfortunately, be forced to omit this aspect despite its importance. By contrast, the scale of job precariousness can be examined by assessing the formal or informal nature of the jobs held based on social security registration.

The survey gives us access both to a set of information on the living conditions of the young people surveyed, the region they live in and the personal characteristics of their parents. The next section presents the results of the estimates of the return on education and professional experience in the income of each employed young person, and discusses the effect of other factors liable to influence the initial model along with the base hypotheses.

### 3. Empirical framework

Mincer's theory (1974), tested time and again by the theorists of human capital and the labour market, still remains the inevitable basis of all initial exploratory work addressing the functioning of supply in the labour market. Despite its demonstrated limitations (Logossah, 2004; Mingat, 1986; and others), it all the same establishes the principal hypotheses on which occupational choice is based in the labour market: the formation of human capital, both educational and professional, is the key determinant of employment and remuneration. For Mincer, human capital is the capitalisation of a certain level of skills accumulated through education and professional training and experience in the labour market.

#### *Basic Mincer function*

First, taking the basic Mincer function as a first illustration, it is interesting to note the gross effect of human capital on income variability perceived following an occupational choice. In other words, in a perfect competition model. Indeed, it is assumed that the individual makes rational decisions. They must manage their capital (increase their investment in education or training) in order to maximise their income, assuming that there is a linear relationship between income and human capital potential. Wage gaps merely reflect different skills levels. The socioeconomic hazards of the labour market and the characteristics of the company are, thus, not taken into account. This theory proclaims the marginal productivity of the employee to be the sole determinant of the salary. Thus, all individuals with the same level of skill should have equal chances of recruitment.

Hence, Mincer's standard equation (1974) appears as follows:

$$\ln \text{Income}_i = a + b * \text{Duration of studies}_i + c * \text{Experience}_i + d * \text{Experience}_i^2 + \varepsilon_i$$

Coefficients b and c represent the return on education and experience, respectively. The square of experience is introduced to examine the linearity of the latter, which is possibly concave.  $\varepsilon_i$  represents the estimation error due to unobservable factors that should fall within the explanation of the model.  $a$  is a constant that represents the base or reserve salary, without taking the human capital into account.

With a simple log-linear regression of income, it is clear that the two variables have some effect on the variability of income, according to the estimate below. Nevertheless, they only explain a minimal part of the income logarithm variability, namely 6.7% ( $R^2=0.067$ ; see Annexe, Table 7).

$$\text{Ln Income}_i = 5.598 + 0.057 * \text{Study\_length}_i + 0.066 * \text{Experience}_i - 0.004 * \text{Experience}_i^2 + \varepsilon_i$$

(69.76)
(11.44)
(4.96)
(-4.485)

( ) Student statistic (see Annexe, Table 6).

### ***Improved Mincer model***

However, do two individuals starting out with the same observed level of qualification really find themselves in similar positions in the labour market?

The simplified Mincer equation cannot answer this question. The hypothesis of perfect competition is not verified. Hence, more objectivity should be brought to the model of the labour market operation, bringing in other fundamental factors such as individual characteristics and working conditions.

$$\text{Ln Income}_i = a + b * \text{Duration of studies}_i + c * \text{Experience}_i + d * \text{Experience}_i^2 + d * X_i + \varepsilon_i$$

$X_i$  represents these additional aspects that will complete the initial Mincer equation. The first aspect, so disputed in theory, is the gender difference we explained above. It is essential to know the impact of gender on the earnings functions we have just been estimating. We must also take into account the spatial dimension, notably between the urban and the rural. We will add the acquisition of professional training and finally, to in some way define the characteristics of the labour market and its effects on income, we will introduce the professional situation of the young person (salaried/unsalaried), the legal sector and sector of economic activity of the post held and social security registration.

**Table1: Definition of variables**

Variable	Name used in the model	Characteristics/ Values Modalities
Duration of studies	Study_duration	Number of years
Professional experience	PEX	Number of years
Professional experience squared	PEX2	Number of years squared
Sex	sex	Man: 1 Woman: 0
Professional	PT	Yes: 1 No: 0
Salaried	SALR	Salaried: 1 Unsalariated: 0
Legal sector	LS	Public: 1 Private: 0
Sector of economic activity	SAA SAI AB	Agriculture Industry BTPH

	SAH SAED SAC SAOM SAAN	Health Education Commerce Other market services Administration, non-market services
Social security	SS	Registered: 1 Unregistered: 0
Algeria	DZ	Yes: 1 No: 0
Egypt	EG	Yes: 1 No: 0
Lebanon	LB	Yes: 1 No: 0
Tunisia	TN	Yes: 1 No: 0

Source: compiled by the authors.

Before assessing this model, we must be sure of the hypothesis of exogeneity of the explanatory variables introduced required by the ordinary least squares (OLS) method, which is the method that is classically used to estimate earnings functions. With the data, cross-sectional in our case, this hypothesis is often unverified and the estimators give biased effects (Balsan, Hanchane and Werquin, 1996). This bias is due to a measurement error of the endogenous variable. Technically, part of explanation of the endogenous variable at the same time explains the dependent variable. In this case, the standard OLS estimator is non-convergent as a result of the presence of errors in the measurement of the explanatory variables (Racicot, 1993).

What is more, the estimation by OLS underestimates the return of education and experience on salaries (Boumahdi and Plassard, 1992). This underestimation stems from the fact that young people have unobserved assets or characteristics that would also explain the income variability.

### ***Impact of social origin on investment in human capital***

In the literature, the supposedly endogenous variable in the earnings equation is, unanimously, education. It is, in fact, the result of optimal decisions (Griliches, 1977). Indeed, several factors relating to social origin such as social status of parents or size of household in one way or another influence children's level of education. The use of the Hausman test (1978) confirms this hypothesis. This test, which consists of comparing the estimators of the ordinary least squares (OLS) method and the two-stage least squares (2SLS) method shows the correlation between the error that results from the regression of the education variable and the error in the model of earnings estimation as a whole (see Inset 1). What is more, the

results reveal that there is certainly a difference between the coefficients of the two methods that validates the endogeneity hypothesis of the education variable (see Table 3).

**Inset 1: the Hausman test**

Under the null hypothesis that  $plim \hat{b}_{2SLS} = plim \hat{b}_{OLS}$ ,  $H = \frac{(\hat{b}_{2SLS} - \hat{b}_{OLS})^2}{\sigma^2} \rightarrow \chi^2(k_1)$

Where  $\hat{b}_{2SLS}$  and  $\hat{b}_{OLS}$  represent, respectively, the 2SLS and OLS estimators of the endogenous variable.  $\sigma^2$  is the variation  $Var(\hat{b}_{2SLS} - \hat{b}_{OLS})$  and  $\chi^2(k_1)$  represents the distribution of chi-square to k degrees of freedom, relative to the number of endogenous variables (Crépon, 2005).

In our case, since the respective standard deviations are:  $\sigma_{2SLS} = 0,017$  &  $\sigma_{OLS} = 0,004$ ,  $H = 32.77$ . As the critical value at the 95% significance level of the chi-square distribution to one degree of freedom is equal to 3.84, the null hypothesis is therefore rejected. In other words, the OLS estimator does not converge.

Hence, to mitigate the effect of the endogeneity of the variable of young people's education we introduce the parents' human capital into a second equation as a corrector, which we call an instrumental variable, supposing that it affects the level of the young person's education and not the level of their earnings.

Duration of studies = function (level of father's education, level of mother's education,  $Z_i$ ).

By  $Z$  we designate all the explanatory variables we have introduced into the model.

$Z_i = (\text{Study\_length}, \text{experience}, X_i)$ .

The income equation thus becomes:  $Ln \text{ Income}_i = a + b Z_i + v_i$ , where  $v_i$  represents the new error potential of the estimation, that is, once the  $X_i$  factors are taken into account.. Which means applying a two-stage least square.

It should be noted that, in the case of parents, the SAHWA database does not provide us with the duration of studies, but only the level of education by educational level. In consequence, we will introduce each level as a dichotomous variable, inserting as a reference the level "without education".

**Table 2: Definition of the variables of the parents' level of education**

Education level of father:	Primary	LeF_Prim	Yes: 1; No: 0
	Middle	LeF_Mid	Yes: 1; No: 0
	Secondary	LeF_Sec	Yes: 1; No: 0
	Higher	LeF_High	Yes: 1; No: 0

Education level of mother:	Primary	LeM_Prim	Yes: 1; No: 0
	Middle	LeM_Mid	Yes: 1; No: 0
	Secondary	LeM_Sec	Yes: 1; No: 0
	Higher	LeM_High	Yes: 1; No: 0

Source: compiled by the authors.

Table 3 provides the results with OLS and 2SLS. The first piece of striking information that emerges from this table is the confirmation of an underestimation of the return on most of the explanatory factors, notably education. Indeed, for each additional year of study, the young person will have average earnings of over 3.7% more with the estimation using OLS and 14% more with 2SLS. That is more than ten points. This finding shows us the importance of the social origin of a young person in the evolution of their studies which is subsequently reflected in income; we will develop this point further later on, in the results. The regression of the education variable (first stage of the 2SLS method) shows us that the higher the level of parents' education, the more the length of children's studies increases. This applies more for the father than for the mother (see Annexe, Table 2).

However, it should be underlined that the use of instrumental variables also has its limitations. It reduces the precision of the model and necessitates a larger sample size ( $R^2=37\%$  robustness compared to 42%).

**Table 3: Estimation of the equation of earnings, comparison between OLS and 2SLS**

	OLS			2SLS		
	B	t	Sig.	B	t	Sig.
(Constant)	5.900	73.264	0.000	4.662	20.060	.000
Duration of studies	.036	8.512	.000	.132	7.633	.000
Experience	.030	2.767	.006	.047	3.777	.000
Experience squared	-.001	-1.268	.205	.000	-.484	.629
Sex	.328	9.290	.000	.432	9.981	.000
SS	.408	12.114	.000	.198	3.797	.000
Region of residence	-.099	-3.031	.002	-.015	-.387	.699
Salaried	-.226	-6.259	.000	-.238	-5.883	.000
Egypt	-.709	-15.865	.000	-.804	-15.319	.000
Lebanon	.394	9.393	.000	.298	5.993	.000
Tunisia	-.479	-10.676	.000	-.512	-10.156	.000
$R^2$	0.42			0.37		



F	155.270	124.880
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- a. Dependent variable: log income last month in \$PPP
- b. Algeria: reference.

### *Earnings equation factors in each country*

In the first stage, we applied our earnings equation to the whole sample of the employed people and to each country separately (Table 4).

We note that professional training and sector of economic activity did not have significant effects in this model, which led us to exclude them (see Annexe, Table 1).

Table 4: OLS equation estimations for income

	Model 1 AMC		Model 2 DZ		Model 3 EG		Model 4 LB		Model 5 TN	
	B	%	B	%	B	%	B	%	B	%
<b>(Constant)</b>	4,662*** (0.232)		5,377*** (0.388)		4,611*** (0.388)		4,357*** (0.388)		3,436*** (0.583)	
<b>Study_duration</b>	,132*** (0.017)	13,2	,079* (0.030)	7,9	,065** (0.030)	6,5	,181*** (0.026)	18,1	,172*** (0.043)	17,2
<b>PEX</b>	,047*** (0.012)	4,7	NS	NS	NS	NS	,053** (0.024)	5,3	,054* (0.032)	5,4
<b>PEX2</b>	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
<b>Sex</b>	,432*** (0.043)	54	,548*** (0.100)	73	,412*** (0.100)	51	,444*** (0.069)	56	,374*** (0.102)	45
<b>SS</b>	,198*** (3,052)	22	,369*** (0.104)	45	,253*** (0.104)	29	NS	NS	,383*** (0.108)	47
<b>Rég</b>	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
<b>SALR</b>	-,238*** (0.040)	-21	-,287*** (0.092)	-25	-,010 (0.092)		-,395*** (0.065)	-33	-,065 (0.102)	NS
<b>EG</b>	-,804*** (0.052)	-55								
<b>LB</b>	,298*** (0.050)	35								
<b>TN</b>	-,512*** (0.050)	-40								
<b>R<sup>2</sup></b>	0,368	36,8	0,184	18,4	0,082	8,2	0,219	21,9	0,155	15,5

NB: - The percentages (%) represent the return of each variable on the log of income. The calculation method is the following:  $100(\text{EXP}(B)-1)$  for dummy variables; B is the coefficient obtained in the estimation.

- The figures in parentheses represent the standard deviations.
- The degree of significance of the coefficients are represented by: \*\*\* (1%), \*\* (5%) and \* (10%).

Source: compiled by the authors.

The robustness of the estimate presents a valid overall model of close to 37%. Distribution by country gives estimates that are not very robust, notably for Egypt (the model only explains 8% of the income gap). That is due on the one hand to the weakness of the

observed sample, but also to the particularities of the economic and social context of each country, which would likely produce individual explanatory factors for each.

### *Earnings equation factors by gender and situation in the labour market*

We now look at our estimate of the samples divided by category – salaried/non-salaried, private/public and woman/man – to better capture the relative effect of each variable (Table 5).

**Table 5: OLS equation estimations for income**

	Model 4				Model 5				Model 6			
	Unsalaries	%	Salaried	%	Private	%	Public	%	Female	%	Male	%
<b>(Constante)</b>	3,404*** (0.595)		4,865*** (0.223)		4,499*** (0.243)		4,331*** (0.561)		3,796*** (0.437)		5,604*** (0.241)	
<b>Study_ duration</b>	,189*** (0.038)	18,9	,102*** (0.016)	10,2	,130*** (0.017)	13	,128*** (0.038)	12,8	,156*** (0.034)	15,6	,107*** (0.018)	10,7
<b>Sex</b>	,632*** (0.113)	88	,318*** (0.045)	37	,442*** (0.047)	56	,409*** (0.110)	51	–	–	–	–
<b>SS</b>	,235** (0.112)	27	,257*** (0.054)	29	,180*** (0.056)	20	,220* (0.121)	25	,174* (0.103)	19	,236*** (0.057)	27
<b>PEX</b>	,096*** (0.036)	9,6	,031*** (0.012)	3,1	,058*** (0.013)	5,8	NS		,056** (0.026)	5,6	,033** (0.014)	3,3
<b>PEX2</b>	NS		NS		NS		NS		NS		NS	
<b>SALR</b>	–		–		–		–		NS		–,309*** (0.044)	–27
<b>FP</b>	NS		NS		NS		NS		,181** (0.089)	20	NS	
<b>EG</b>	–1,129*** (0.154)	–68	–,747*** (0.051)	–53	–,877*** (0.060)	–58	–,775*** (0.115)	–54	–,704*** (0.124)	–51	–,808*** (0.060)	–55
<b>LB</b>	,330** (0.130)	39	,250*** (0.051)	28	,300*** (0.059)	35	,326*** (0.121)	39	,297*** (0.095)	35	,300*** (0.059)	35
<b>TN</b>	–,720*** (0.135)	–51	–,459*** (0.050)	–37	–,562*** (0.057)	–43	–,331*** (0.121)	–28	–,354*** (0.096)	–30	–,583*** (0.058)	–44
<b>R2</b>	,354	35.4	,396	39.6	,381	38	,292	29	,371	37.1	,394	39.4

NB: - the percentages (%) represent the return of each variable on the log of income. The calculation method is the following: 100(EXP (B)-1); B is the coefficient obtained in the estimate.

- The figures in parentheses represent the standard deviations.
- The degree of significance of the coefficients is represented by: \*\*\* (1%), \*\* (5%) and \* (10%).

Source: compiled by the authors.

The breakdown by category, on the other hand, gives fairly convincing results. The variation of the factors chosen explains between 29% and 39% of the income variability, which is largely satisfactory with a sample of this size (2008 employed people). It is still necessary to go into the issue of advantage to find fuller explanations for this phenomenon.

Equally, the effect of selection that has not been addressed in this paper must not be forgotten. The fact of not taking into consideration that employed young people know that the unemployed are also looking for work, for whom the wage is probably their top decision criterion, effectively engenders a selection bias. Addressing this would certainly improve the quality of the earnings model presented.

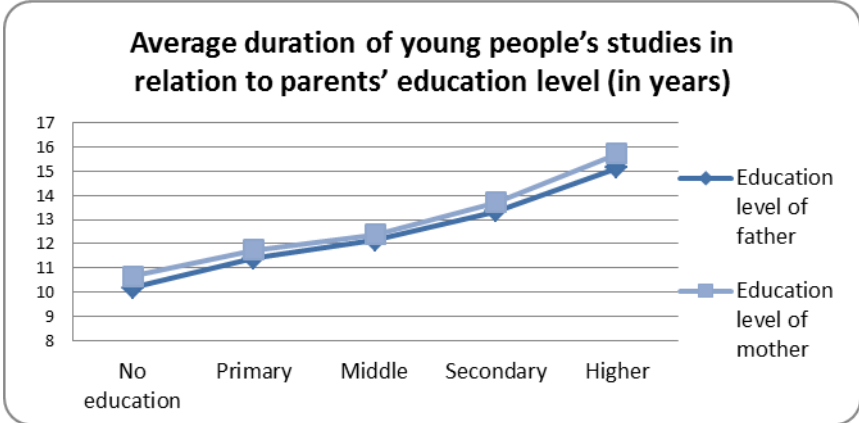
The next section will give a socioeconomic reading of the empirically obtained results.

**RESULTS**

Investment in human capital can explain nearly 29% of the variability in earnings in the four countries studied, more specifically, 14.5% for education and the same for professional experience.

When it comes to the investment in education, we have shown above that social origin, especially parents’ level of education (among other factors), impacts considerably on the educational progress of children in a linearly positive manner (Figure 3). Three explanations for the effect of parents' education on children’s educational success can be put forward. High levels of parental education can guarantee good social status for children. Among other reasons, good material conditions allow them to remain in the education system for a long time. Indeed, 42.3% of fathers with higher level of studies are in senior management (see Annexe, Table 8). They can also monitor their children in their studies, acting positively on the children’s perception of the social value of education.

**Figure 3**



Source: compiled by the authors.

On the other hand, the comparison between the four AMCs reveals that the impact of parents' education, notably that of the father, is greater in Egypt and in Lebanon than in Tunisia and Algeria. In relative terms, the modest effect of parents' education seen in Algeria

may be related to state policy in terms of social education services. This policy has effected a relative reduction of the education inequalities linked to social origin. Indeed, the free nature of primary to higher education along with the social support given to the disadvantaged (education allowance and free distribution of school materials and books) and the significant sums earmarked by the education ministry for social works (transport, catering, accommodation and scholarships for all unemployed students) has enabled greater access to school.

On the other hand, although Algeria shows fewer inequalities connected to social origin, the return of education on earnings is lower than in Lebanon and Tunisia. Each additional year of study brings just 8% growth to earnings in Algeria, compared with 18.1% and 17.5% in Lebanon and Tunisia, respectively. This is the same for experience, which seems only to be significant in these two countries (5.3% and 5.4%, respectively; Table 4). It must, however, be recalled that we are dealing with employed young people, possibly holders of their first job.

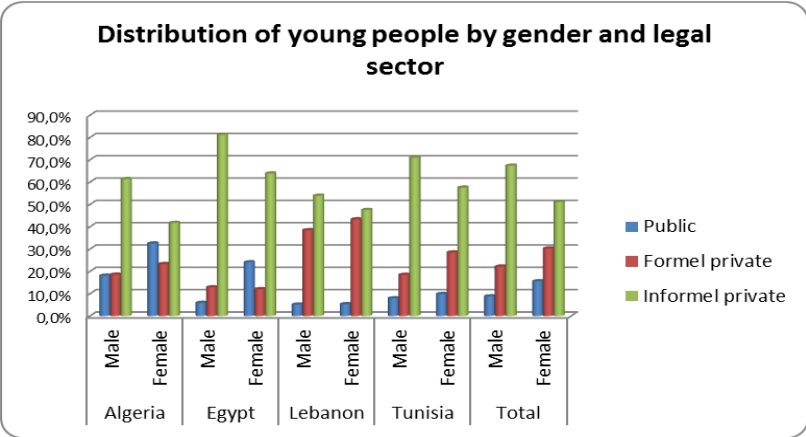
In terms of income inequalities linked to gender, the results in the four countries show that the return on education is relatively greater among women than men (close to 15.6% as opposed to 10.7% among men). The same result is shown for professional experience in terms of gender (5.6% for women and 3.3% for men; Table 5). This leads us to believe that women invest more in their human capital as an integration strategy for the purposes of establishing themselves in the labour market as the results in the four countries show.

Furthermore, a notable effect also revealed by this study is the marked income gap between men and women, which surpasses 50% for the countries studied (Table 4). This appears to be greater in Algeria than in the other countries (73%).

Analysing these income gaps in the four countries through education level and legal sector, we observe that gender discrimination is present, notably in the private informal sector, regardless of education level. We note that just as with the boys, the majority of girls in most countries find themselves in the informal sector (67.4%; see Annexe, Table 4 and Figure 4). The earnings gap in this sector widens so that girls holding middle or secondary level education are paid two (02) times less than boys in the same kind of profession, which is mainly retail or handicrafts, where the pay is already low. In the formal private sector, where 22% of the girls were employed, the gap was around half a point (0.5) on average between boys and girls, measured from the mean level. Egypt and Lebanon are special cases at the mean level, where the gap rises to over two points (02). But we are unable to comment on the case of Egypt, given that the group concerned is minimal. What is more, the public sector is

no exception to the rule. It also reveals salary discrimination towards women although, relatively, it is less significant. Since the state is meant to guarantee equality between men and women in the labour market, notably in Algeria and Tunisia, this finding probably stems from the difference between sectors of economic activity, as is confirmed otherwise by the theory of the heterogeneity of the labour market (see Annexe, Table 9 to 12). Nevertheless, in general, we can state that unsalaried men are 88% better paid than unsalaried women in these countries as a whole.

**Figure 4**



Source: compiled by the authors.

On the other hand, the unsalaried have a 10% higher margin of income for each additional year of experience compared to the salaried, who have only a 3.6% increase. This result seems logical since the salaried have a stable income which only increases by an established proportion with a rise in grade or position. While the unsalaried theoretically find themselves in a competitive market, all additional experience allows them to take further steps, to explore other markets and thereby multiply their income. In developing countries such as the AMCs, competition is not significant in what is a virgin market. At present, with equal levels of experience and education, the salaried are always paid less than the unsalaried in these countries (21% less). This is much more the case for men and those in the public sector (Table 5). In Egypt, the gap is growing less because of all the legal statutes.

Finally, a no less important finding emerges from this empirical analysis. Young Egyptians are paid 56% less than Algerians, and Tunisians 40% less, levels of human capital being equal. The Lebanese, by contrast, receive 33% more than the Algerians.

**CONCLUSION**

The aim of this paper was to identify and compare the impact of the return of human capital on income distribution among young people aged 15–29 years old in four Arab Mediterranean countries (Algeria, Tunisia, Lebanon and Egypt). The first finding showed a considerable impact of human capital investment on earnings. This is greatest in Lebanon and Tunisia.

The results confirm the sizeable effect of social origin on the investment in education, which raises questions, first and foremost about the education policies in each country – above all Egypt and Lebanon – aiming to reduce education inequalities.

Inequalities linked to gender added to education inequalities reveal that in these countries women receive 54% less income than men with equal levels of studies and experience: this result is most marked in Algeria and Egypt. It should also be stressed that women's investment in human capital, which is greater than men's, represents a rational strategy for joining the labour market.

For Algeria, though the impact of social origin on education inequalities is modest compared to the other countries, the study shows that it is at the lower end of the scale when it comes to the return on human capital and income equality between men and women. This poor performance of human capital is linked, first of all, to the difficulty of incorporating young people into the labour market, notably the best educated, due to the mismatch between supply and demand in university training and the changes in the structure of the labour market, which offers more jobs for the less well educated in the informal sector. The adoption of a passive policy which pays paltry salaries in the framework of aid to employment schemes also contributes.

It should also be noted that even if the return on professional experience does not play a large part in explaining the variability of earnings given the age category studied, it is no less important to state that the private sector and even the informal sector require experience. Given that there are no bridges between school and the labour market, young first-time jobseekers still have difficulties finding work.

In terms of gender inequalities, less well educated girls are the least well protected in the labour market and the most discriminated against in terms of pay. This comes as a result of the absence of a clear wage policy to protect women in the sector. These inequalities also persist for girls protected in social security terms, having achieved at least an average level, notably in the formal private sector. To conclude, a no less important finding emerges from this empirical analysis. Young Egyptians are paid 56% less than Algerians and Tunisians 40% less, levels of human capital being equal. The Lebanese, by contrast, receive 33% more than

the Algerians. The low earnings of young people in Egypt and Tunisia may be explained by the fragile socioeconomic situation since the revolutions. For Algeria, the current state of the labour market, characterised by precariousness and informality may explain that decline in terms of earnings. In terms of the Lebanese, who are the best paid, this result relates to the quality of young employed people's education, of whom 38% have a higher level of education, as we have underlined above.

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## ANNEXE

Table 1: OLS

### Coefficients<sup>a</sup>

Model	Unstandardised coefficients		Standardised coefficients	t	Sig.
	B	Standard deviation	Beta		
1 (Constant)	5.826	.095		61.399	.000
Duration of studies	.037	.004	.166	8.654	.000
Experience	.029	.011	.132	2.672	.008
Experience squared	-.001	.001	-.057	-1.157	.247
Sex	.307	.037	.153	8.323	.000
SS	.397	.035	.214	11.346	.000
Region of residence	-.092	.033	-.050	-2.765	.006
Salaried	-.228	.037	-.109	-6.149	.000
Industrial sector	.148	.066	.057	2.245	.025
Building and public works	.078	.066	.030	1.190	.234
Healthcare sector	.136	.088	.033	1.553	.121
Education sector	-.109	.084	-.031	-1.306	.192
Commercial sector	.108	.063	.047	1.700	.089
Other market services	.055	.062	.026	.881	.379
Administration, non-market services	.147	.072	.051	2.045	.041
Egypt	-.716	.045	-.350	-15.966	.000
Lebanon	.404	.043	.206	9.501	.000
Tunisia	-.485	.045	-.223	-10.724	.000

a. Dependent variable: log income last month in \$PPP

b. Agriculture: Reference

c. Algeria: Reference

Table 2: Regression of the education variable

### Coefficients<sup>a</sup>

Model	Unstandardised coefficients		Standardised coefficients	t	Sig.
	B	Standard deviation	Beta		
1 (Constant)	11.516	.314		36.651	.000
Experience	-.114	.052	-.118	-2.188	.029
Experience squared	-.006	.003	-.093	-1.747	.081
Sex	-1.006	.167	-.113	-6.012	.000
SS	1.766	.161	.213	10.997	.000
Education level of father: Primary	.654	.217	.072	3.012	.003
Education level of father: Middle	.984	.248	.097	3.969	.000

Education level of father: Secondary	1.729	.268	.161	6.460	.000
Education level of father: Higher	2.581	.352	.172	7.341	.000
Education level of mother: Primary	.024	.215	.003	.113	.910
Education level of mother: Middle	.550	.259	.050	2.122	.034
Education level of mother: Secondary	.939	.277	.083	3.394	.001
Education level of mother: Higher	1.706	.423	.088	4.035	.000
Region of residence					
Salaried	-.371	.161	-.045	-2.311	.021
Egypt	.230	.170	.025	1.349	.178
Lebanon	.611	.218	.067	2.805	.005
Tunisia	.281	.215	.032	1.305	.192
Tunisia	.238	.221	.025	1.075	.282

a. Dependent variable: Duration of studies

Table 3: Distribution of mean income by gender in \$PPP in Algeria

Income last month in \$PPP		Female		Male	
Gender of respondent		Mean	N	Mean	N
Formal public	Middle	487.6588	3	893.6927	25
	Secondary	974.6270	10	1263.8710	24
	Higher	1009.1219	37	1189.6776	16
	Total	968.0155	50	1088.4680	67
Formal private	Middle	1236.0054	9	1158.8413	28
	Secondary	902.5903	6	1951.9506	26
	Higher	885.8569	23	1424.1560	12
	Total	968.5882	38	1489.7229	70
Informal private	Primary	493.0542	6	745.8700	32
	Middle	571.4433	25	844.8402	131
	Secondary	429.4523	15	944.9079	50
	Higher	936.7763	10	626.4477	17
	Total	585.6928	56	837.8576	234

Table 4: Distribution of young employed people by gender and legal sector

Legal sector and SS	Algeria		Egypt		Lebanon		Tunisia		Total	
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
Formal public	18.1%	32.5%	5.9%	24.1%	5.1%	5.3%	8.0%	9.9%	8.8%	15.6%
Formal private	18.6%	23.3%	12.9%	12.0%	38.5%	43.3%	18.5%	28.5%	22.2%	30.3%
Informal private	61.4%	41.7%	81.2%	63.9%	53.9%	47.5%	71.0%	57.6%	67.4%	51.1%
Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Table 5: Average length of studies by employed young people

Country		Mean	N	Standard deviation
DZ	Male	10.97	367	3.176
	Female	13.35	146	3.989
	Total	11.65	513	3.587
EG	Male	11.13	490	4.133
	Female	12.36	97	3.659
	Total	11.33	587	4.082
LB	Male	12.27	429	4.108
	Female	14.26	232	3.728
	Total	12.97	661	4.088
TN	Male	11.24	327	3.859
	Female	13.12	164	3.912
	Total	11.87	491	3.973
Total	Male	11.42	1613	3.903
	Female	13.47	639	3.875
	Total	12.00	2252	4.003

Table 6: Standard Mincer function

Coefficients <sup>a</sup>					
Model	Unstandardised coefficients		Standardised coefficients	t	Sig.
	B	Standard deviation	Beta		
1 (Constant)	5.598	.080		69.766	.000
Duration of studies	.057	.005	.254	11.443	.000
experience	.066	.013	.307	4.964	.000
Experience squared	-.004	.001	-.276	-4.485	.000

a. Dependent variable: log income last month in \$PPP

Table 7: Quality of standard Mincer model

Recapitulation of the models				
Model	R	R <sup>2</sup>	Adjusted R <sup>2</sup>	Standard estimation error
1	.263 <sup>a</sup>	.069	.068	.86578

a. Predictors: (Constant), Experience squared, Duration of studies, experience

Table 9: Education level of fathers of young people surveyed

% In Education level of father

		Employment status of father									Total
		Employer	Tradesman, self-employed and artisan	Farmer	Professional and Senior Executive	Middle manager	Employee	Skilled labourer	Unskilled labourer	Inactive	
Education level of father	No education	4,2%	12,4%	18,6%	1,6%	1,7%	9,4%	10,4%	22,3%	19,5%	100,0%
	Primary	4,0%	18,4%	9,0%	3,8%	7,7%	10,0%	12,9%	24,8%	9,3%	100,0%
	Middle	7,6%	18,5%	6,8%	4,0%	20,2%	16,9%	9,1%	10,6%	6,3%	100,0%
	Secondary	8,8%	21,0%	1,5%	8,7%	33,2%	11,1%	5,5%	5,1%	5,0%	100,0%
	Higher	11,1%	10,4%	,6%	42,3%	24,5%	4,7%	2,1%	,6%	3,6%	100,0%
Total		6,6%	16,9%	8,0%	8,5%	16,3%	11,0%	8,9%	14,6%	9,2%	100,0%

Table N°9: Average length of studies, average experience, average age and average income by gender

Gender of respondent		Male			Female			Total		
		Average	Standard error of the mean	N	Average	Standard error of the mean	N	Average	Standard error of the mean	N
Duration of studies	DZ	10,97	,166	367	13,35	,330	146	11,65	,158	513
	EG	11,13	,187	490	12,36	,372	97	11,33	,168	587
	LB	12,27	,198	429	14,26	,245	232	12,97	,159	661
	TN	11,24	,214	327	13,12	,305	164	11,87	,179	491
Experience	DZ	5,55	,177	401	4,05	,302	157	5,12	,156	558
	EG	7,53	,198	559	3,89	,390	108	6,95	,185	667
	LB	5,28	,173	486	3,90	,190	263	4,80	,133	749
	TN	5,72	,216	353	3,82	,273	173	5,09	,175	525
Age	DZ	24,37	,181	402	24,94	,258	163	24,53	,149	565
	EG	23,69	,151	559	24,04	,344	108	23,75	,138	667
	LB	24,58	,170	486	25,37	,207	263	24,85	,133	749
	TN	23,50	,198	353	24,38	,240	173	23,79	,156	525
Income last month en \$PPA	DZ	1002,78	41,96	377	817,10	42,04	148	950,38	32,56	525
	EG	461,26	19,68	523	340,63	26,42	90	443,62	17,32	613
	LB	1627,03	73,34	468	1202,18	70,41	252	1478,34	54,16	720
	TN	593,30	24,72	339	506,36	27,34	160	565,41	19,01	499

Table N°10: Average duration of studies, average experience, average age and average income according to social security affiliation

Affiliation to Social Security		Not affiliated			Affiliated		
		Average	Standard error of the mean	N	Average	Standard error of the mean	N
Duration of studies	DZ	10,21	,178	283	13,42	,229	231
	EG	10,71	,191	450	13,37	,295	137
	LB	11,56	,219	345	14,50	,198	316
	TN	11,25	,206	337	13,23	,326	154
experience	DZ	5,78	,213	319	4,24	,214	239
	EG	7,23	,211	524	5,92	,371	143
	LB	5,14	,200	409	4,38	,164	340
	TN	5,13	,216	366	5,01	,294	160
age	DZ	23,71	,209	325	25,65	,185	239
	EG	23,22	,157	524	25,66	,229	143
	LB	23,99	,200	409	25,89	,148	340
	TN	23,07	,190	366	25,44	,219	160
Income last month en \$PPA	DZ	789,38	33,60	300	1 164,29	58,39	226
	EG	404,66	19,47	471	573,45	35,69	141
	LB	1 393,72	90,71	390	1 578,33	49,32	330
	TN	461,45	19,05	350	809,50	38,59	149

Table N°11: Average length of studies, average experience, average age and average income by occupational status

Salaried		Unsalariated			Salaried		
		Average	Standard error of the mean	N	Average	Standard error of the mean	N
Duration of studies	DZ	10,57	,260	139	12,05	,190	374
	EG	10,65	,345	117	11,50	,191	470
	LB	11,98	,279	213	13,44	,190	448
	TN	11,09	,384	107	12,09	,202	384
Experience	DZ	6,54	,324	155	4,58	,168	403
	EG	7,67	,398	146	6,74	,209	521
	LB	5,73	,255	241	4,35	,150	508
	TN	6,34	,413	119	4,73	,188	407
Age	DZ	24,67	,290	161	24,48	,174	403
	EG	23,19	,317	146	23,90	,153	521
	LB	25,02	,237	241	24,77	,160	508
	TN	23,81	,327	119	23,78	,177	407
Income last month en \$PPA	DZ	1175,45	101,50	139	869,04	23,70	386
	EG	558,99	90,64	99	421,44	10,93	514
	LB	2077,78	153,40	228	1200,55	27,36	492
	TN	607,61	52,26	114	552,93	19,19	385

Table N°12: Average length of studies, average experience, average age and average income by legal status of employment

Job in public or private sector		Public			Private		
		Average	Standard error of the mean	N	Average	Standard error of the mean	N
Duration of studies	DZ	13,67	,304	133	10,93	,171	379
	EG	13,64	,405	55	11,09	,178	532
	LB	14,17	,479	59	12,85	,168	602
	TN	14,96	,447	59	11,46	,186	431
Experience	DZ	3,76	,268	137	5,58	,182	421
	EG	5,26	,529	59	7,11	,195	608
	LB	5,36	,382	61	4,75	,140	688
	TN	3,69	,343	61	5,27	,191	463
Age	DZ	25,72	,250	137	24,15	,176	427
	EG	25,76	,362	59	23,55	,145	608
	LB	26,33	,360	61	24,72	,140	688
	TN	25,43	,330	61	23,58	,169	463
Income last month en \$PPA	DZ	1012,12	42,34	128	930,65	40,90	396
	EG	547,65	45,00	58	432,78	18,49	555
	LB	1429,03	87,00	60	1482,82	58,56	660
	TN	866,81	64,24	56	528,11	19,11	442



