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Gender Inequalities on the Labour Market in North Africa: Issues, Estimates and Benchmarking of Inclusiveness

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Issues, Estimates and Benchmarking of Inclusiveness***

Final report (revised)

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Abstract

The paper designs a pooled sample of almost 3,027 active people from the *Sahwa* dataset using a common questionnaire carried out in 2015 among 7,816 Algerian, Egyptian, Moroccan and Tunisian youth aged 15 to 29. The research question is the determinants of youth employment, more specifically youth gender inequalities in North Africa with respect to the formal/informal segmentation. A binary logistic model first investigates these determinants of access to the formal and informal labour market segments. Next, a Mincer earnings function focuses upon gender distribution over the formal/informal employment divide. Quantile regressions highlight the patterns of wage distribution according to gender wage differentials and labour market segmentation. Last, an Oaxaca-Ransom decomposition model gauges the gender wage gap, which remains mostly unexplained. Conclusion recaps key findings and points out the limited scope of this report.

Keywords: decomposition model; earning functions; gender; household surveys; informal employment; logistic regressions; North Africa; quantile regressions; wage differentials.

JEL: E26, J46.

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Introduction: background and rationale

Gender inequality is one of the most pressing issues facing the current working environment. Worldwide, women have significantly fewer opportunities than men to access the labour market (ILO, 2017) and, once included in the labour force, they are also less likely than men to find a job (World Bank, 2011). In this respect, besides South Asia, the Middle East and North Africa experience the highest inequality (OECD, 2012).

In North African countries (Algeria, Tunisia, Morocco and Egypt), female participation rates in economic activity display a dramatic gender gap between men and women, whereas female unemployment rate is the highest worldwide. With respect to the world average, the overall female activity rate remains rather low: for every 100 economically active men in North Africa, only 23 women are in the same situation (ILO, 2016; Charmes, 2019), which represents the largest gender gap worldwide (Locoh & Ouadah-Bedidi, 2014).

These gender disparities persist, while most women in these countries would prefer to be gainfully employed (ILO, 2015). Many factors are related to both the patriarchal nature of these societies, the economic situation and employment policy in each country, as well as recent socio-economic changes that disrupted Tunisia and Egypt.

Underemployment, informality and precarious employment are major patterns of the labour market for a growing share of young North African females, despite the fact that they enjoy significant progress in schooling.

Informal employment in North African countries represents 50.2% of total non-agricultural employment (Charmes, 2016). It is 43 per cent in Algeria, 50 per cent in Tunisia, 45 per cent in Morocco and 53 per cent in Egypt (ILO, 2017). Almost two thirds of the North African females and one third of the males hold vulnerable jobs with little or no social protection coverage (ILO, 2017).

In Algeria, the female informal employment rate reached 24% (Charmes & Remaoun, 2014; ONS, 2015; Adair and Bellache, 2018). In Egypt, over a quarter of female workers is employed in the informal sector (World Bank, 2014; Charmes, 2015). Tunisia records more than 27% of females operating in the informal economy, mostly as informal wage-earners (Charmes, 2016). In Morocco, 40% of females are employed in the informal sector as unpaid family workers (HCP, 2017).

Traditional sexual division of labour reflects stereotypes based primarily on patriarchal beliefs and male domination, the latter derives its social legitimacy from the financial authority of the male head of household who is usually the breadwinner. Sexual division of labour hinders females' participation to the labour market and nurtures wage differentials (Ponthieux and Meurs, 2004; Meurs, 2014; Chauffaut, 2016). This is especially relevant in North Africa, wherein this gender issue is little documented. Noteworthy is the *Sahwa* survey (2016), which uncovers a significant share of young people in the four North African countries think that men should be the breadwinners, and that they should be better entitled to work than women. This finding confirms the persistence of gender stereotypes and how young women internalise patriarchal values.

The gender dimension is the core of our analysis and it focuses upon a representative sample of youth across four North African countries. The caveat is that we do not document gender bias irrespective of age. This report addresses the issue of gender inequality for youth from three perspectives. First, we investigate the access of women to the labour market and the mechanisms by which they face more precarious a job status than their male counterparts (Musette, 2013). Second, we examine the distribution of females labour supply vs. their male counterpart, with respect to the formal/informal employment divide. Last, we analyse the gender wage gap.

Section 1 is devoted to the literature review – human capital theory, discrimination theory, feminist theory and the economic theory of the family.

Section 2 examines the patterns of the labour market in North Africa, especially a few stylised facts regarding informal employment and gender issues.

Section 3 provides an analysis of the determinants of youth employment in North Africa; first, throughout the estimation of a binary logistic regression according to gender and informal employment. Men are more likely to access formal employment, whereas women enter informal employment or remain unemployed. Higher educational attainment may be a deterrent to enter the labour market. Married individuals are less likely to be active than singles people. Individuals from poor and large households are more likely to become active. Next, a Mincer earnings function focuses upon gender distribution over the formal/informal employment divide. Human capital variables increase the income of both genders. Women working in the informal sector that come from rural areas experience lower earnings compared with urban women. Women working on a fixed-term contract earn less than men in the same occupational status. Women are more likely to work for lower wages than men.

In Section 4, an Oaxaca-Ransom decomposition model gauges gender wage differentials.

The purpose is to disentangle the wage gap between an explained part and a part due to discrimination. The first part comes from the differences in the endowments of men and women (human capital, job position, etc.). The second part comes from the difference in valuation of these characteristics between the two groups. Women face inequality that is unrelated to their characteristics on the labour supply side, which may be due to discrimination on the demand side. Conclusion recaps main findings and sketches research issues that remain undocumented.

1. Literature review

1.1. Theories and hypotheses

The research issue on economic differential characteristics between men and women originated from the theory of human capital (Mincer & Polachek, 1974; Polachek, 1981), and the theory of discrimination on the labour market (Becker, 1985). According to the human capital theory, women generally expect to stay in the labour market for a shorter period of time, due to the family responsibilities they ensure (Magidimisha & Gordon, 2015). As a result, they invest less in vocational training and are thus paid less (ILO, 2015). However, empirical studies show that differences in productivity do not fully explain gender wage differentials (Bergmann, 1974; Aigner & Cain, 1977). Is as much as the theory of human capital does not provide a sufficient explanation, it becomes necessary to complete the explanation of the phenomenon, calling upon the theory of discrimination (Blau, 1984; Phelps, 1972).

The theory of discrimination is the major rival hypothesis of the human capital theory. It stipulates that earnings differentials based on gender are the outcome of discrimination on the demand side of the labour market, i.e. companies would offer the females the lowest earnings. Discrimination however is not uniform: it can be of statistical type (Phelps 1972) and only translates a rational behaviour of employers in the face of uncertainty. It may also be a “taste” for discrimination (Becker, 1975), which would directly affect the gains, or would manifest itself by a functional segregation targeting the lowest-paid jobs for females.

Furthermore, other reasons may explain the absence of females on the labour market. Feminist theories assume that females belonging to households with heavy household charges (several young children or number of members) should take little part in economic activity. The male is supposed to earn a better income on the labour market, hence, he is the

breadwinner, while the female is supposed to focus upon household activities that are priority (Lollivier, 2001).

The theories of household survival strategies hold that the females' employment is based on the distribution of resources available to the household. In this respect, the neoclassical economic theory of the family (Becker, 1985) postulates that each household maximizes its utility by allocating the available time of each of its members across the labour market and household activities.

The concept of a single labour market, an assumption upon which human capital theory is based is challenged by the theory of labour market segmentation: the "primary" sector opposing the "secondary" sector (Doeringer & Piore, 1971); the divide between the formal and the informal sector (Fields, 1975). Segmentation can also take place within the informal sector itself: the informal "lower tier" provides easy access to low paid jobs, whereas the informal "upper tier" includes barriers to entry (Fields, 1990). This reports takes stock of the theory of labour market segmentation.

Several papers document informality on the North African labour market (Angel-Urdinola, 2012; Gatti et al, 2014), which is both a positive and a normative issue (Gallien, 2018). The relationship between informality and wage inequality is seldom tackled (El-Haddad & Gadallah, 2018). To our best knowledge, no paper so far has addressed the major issue of youth gender inequalities in North Africa with respect to the formal/informal segmentation.

1.2. Research hypotheses

North Africa has the lowest level of equality between men and women, it is 47.3 only on a scale of 100 while the world average is 75. This means that these countries grant women less than half the rights granted to men as regards access to employment, remuneration, travel, entrepreneurship, etc. Despite the efforts made in this region, upgrading proves very weak (World Bank, 2019).

Hypothesis 1: Relevance of gender inequality analysis

The existence of significant gender differences both in terms of earnings and status in occupation (Branisa et al, 2014) make relevant a focus on the analysis of gender inequalities in North African countries.

Hypothesis 2: Relevance of a comparative study between countries

A comparative approach between North Africa countries experiencing a comparable level of development should make it possible to uncover the fundamental causes of the existence of gender inequalities, and to sketch out the design and implementation of the means lessening this persistent gap (Adema & Thévenon, 2016).

Hypothesis 3: Relevance of investigating the formal/informal divide on the labour markets

In as much as North African labour markets experience a large segmentation (Charmes, 2019), it seems relevant to investigate the formal/informal divide in employment as a key explanation of both the gender distribution and the gender wage gap.

2. Patterns of the labour market in North Africa

2.1. Participation, employment and unemployment in North Africa

The labour market in North Africa is characterised by low rates in participation and employment. The participation rate in the workforce did not exceed 50% between 2010 and 2018 in the four countries. The under representation of females in the work force might be the

main explanation of this low rate. It should be noted that North Africa has the second largest gap between male and female participation rates in the world, after the Arab world (ILO, 2017).

The participation of females in the labour force in Algeria remains the weakest in comparison with Tunisia, Morocco and Egypt. In contrast, Tunisia recorded the highest rate in the region. The employment rate clearly reflects a small capacity of the economies of North Africa to use their human resources. This rate remains below 45% during the same period (ILO, 2017). The labour market in Algeria records the lowest rates of activity and employment rates: this is linked in particular to the low participation of females in the labour market (17%) (ONS, 2018). The underestimation of the economic activity of females, particularly of the females working at home in the informal sector and who are supposedly inactive from a statistical point of view, makes it difficult to grasp the economic activity of females in Algeria (Hammouda, 2009).

A particularly worrisome statistic showing the inability of the economy to provide jobs to its youth despite an increased investment in girls' education in recent years and with regard to the large number of young people in the population in this region.

The participation rate in the workforce declined by about 4 percentage points in Egypt and 3 percentage points at Morocco. The labour market in Egypt is marked, in this period, by a significant decline in the participation rate of males, which lost more than 7 percentage points against 2 points not only with the females. Morocco experienced a decline by about 3 percentage points in the participation rate of both sexes. Decline is mainly recorded in the 15-24-year age group, whose participation rate has lost about 17 percentage points between 2000 and 2017 (from 45% to 28.7%).

Employment in the private sector is prominent in North Africa: 90.8% of total employment in Morocco, 80% in Tunisia, 76.3% in Egypt and 63.1% in Algeria. Females in Morocco (90.5%) are predominantly employed in the private sector. As for Egypt, more than two thirds of the females are in the private sector and one third in the public sector. The public sector is the first employer of females in Algeria. The tertiary sector is the largest provider of employment in North Africa, especially for 70% of employed females in Algeria and Egypt.

Table 1. Distribution and trend of the participation rate in percentage by gender and country

| Country | Participation rate | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 |
|----------------|--------------------|------|------|------|------|------|------|------|------|------|
| Algeria | Males | 68.2 | 65.3 | 67.8 | 69.5 | 66.2 | 66.8 | 66.6 | 66.3 | 66.7 |
| | Females | 14.2 | 14.2 | 15.8 | 16.6 | 14.2 | 16.4 | 16.6 | 17 | 16.6 |
| | Total | 41.2 | 40 | 42 | 43.2 | 40.7 | 41.8 | 41.8 | 41.8 | 41.9 |
| Tunisia | Males | 69.3 | 70.6 | 69.9 | 69.7 | 68.6 | 68.7 | 68.4 | 68.4 | 68.4 |
| | Females | 24.8 | 25.7 | 25.2 | 26 | 26.4 | 26.3 | 26.6 | 26.6 | 26.6 |
| | Total | 46.9 | 47.8 | 47.2 | 47.5 | 47.7 | 47.1 | 47.1 | 47.1 | 47.1 |
| Morocco | Males | 74.6 | 74.9 | 73.6 | 72.9 | 72.8 | 71 | 72.2 | 71.6 | |
| | Females | 25 | 25.1 | 24.1 | 25.1 | 24.4 | 24.4 | 22.4 | 22.4 | |
| | Total | 49.1 | 49.2 | 48.1 | 48.2 | 47.8 | 46.9 | 47 | 46.7 | |
| Egypt | Males | 75 | 74.6 | 74.1 | 73.4 | 72.3 | 70.5 | 70.4 | 67.5 | |
| | Females | 23.2 | 22.5 | 22.4 | 22.9 | 23.1 | 22.5 | 21.7 | 21.1 | |
| | Total | 49.3 | 48.8 | 48.3 | 48.5 | 48 | 46.9 | 46.4 | 44.9 | |

Source: Authors from Statistical Offices -ONS, HCP, CAPMAS and INS (2010-2018).

Between 2010 and 2018, the highest unemployment rates are recorded in Tunisia, peaking in 2011 (18.9%). Egypt comes next, the unemployment rate rose by three percentage points over 2010-2011 and dropped from 2015. These two countries experienced socio-political changes and political instability in this period (ILO, 2015). As for Morocco and Algeria, unemployment, which remains relatively low, fluctuates between 8 and 11%. Females are

most exposed to unemployment in North Africa. Notably in Tunisia, the female unemployment rate reached 28.2% in 2011 (INS, 2018) and declined from 2012; it remained high, fluctuating within the range of 21-24%. Egypt ranks second with a high 25.9% unemployment rates (CAPMAS, 2018). Nevertheless, there is a different effect of the Arab spring in comparison with Tunisia, females in Egypt were less affected by these changes in comparison with the males, whose unemployment rate increased by 4 percentage points over 2010-2011. Algeria recorded almost a 20% female unemployment rate, it is even higher (25.9%) among University graduates (ONS, 2018). Morocco records the lowest female unemployment rate (14.7%) in comparison with the other three countries (HCP, 2017).

Inequalities between males and females are declining in some areas such as literacy, education and health, but the gap remains important in the domain of employment. Strong unemployment rates in the region (44.3%) (ILO, 2017) social conservatism and traditional gender paradigms hinder the economic participation of females, who, nevertheless, are very present in the informal sector.

2.2. Informal sector, informal employment and the informal economy in North Africa

The informal sector (ILO 1993) includes the unincorporated enterprises, a subset of the institutional household sector, gathering both own-account workers and employers. These economic units provide some legal market output (i.e. not illegal) and are not registered or their employees are not registered or their size stands below five permanent paid employees.

Informal employment (ILO 2003) encapsulates all jobs carried out in both informal as well as in formal enterprises by workers who are not subject to labour regulation, income taxation or social protection due to the absence of declaration of the jobs or the employees, casual or short duration jobs, jobs with hours or wages below a specified threshold, work place outside the premises of the employer's business. The extensive definition is based on non-payment of social contribution rather than the absence of social protection, in as much as individuals may access to social protection thanks to the contribution of another family member (Charmes 2019, 18). Theoretically, the informal sector is included within informal employment like Russian dolls.

The first edition of *Women and men in the informal economy: A statistical picture* (ILO, 2002) compiled data from indirect and residual methods for North Africa, providing figures throughout the mid-late 1990s. The residual method, consists in the comparison of total employment (from population censuses or labour force surveys) and registered employment (from economic or establishment censuses or administrative records); censuses of establishments – where they exist – allow identifying the informal sector on the one hand and informal employment outside the informal sector on the other hand.

The second edition (ILO, 2013a) combined the enterprise-based concept of employment in the informal sector with a broader job-based concept of informal employment using data from national surveys (ILO, 2003). Unfortunately, North Africa was not investigated. It is included in the third edition (ILO, 2018), wherein Algeria is missing, and data are compiled from labour force surveys according to the criteria of the ILO (2013b) and focusing upon a worker's main job.

Informal employment or employment in the informal economy includes three components: (i) employment in the informal sector (the largest component), (ii) informal employment in the formal sector and (iii) informal employment in households (domestic workers and contributing family workers).

2.3. Informal employment, age and gender issues in North Africa: a few salient facts

According to the expert benchmarking provided by Charmes (2019), North Africa is the region wherein which macroeconomic estimates of the informal economy are the most numerous since the 1970s. Taking stock, three stylised facts are worth mentioning.

Table 2. Average percentage of non-agricultural employment in the informal economy: North Africa

| 5-year periods | 1975–1979 | 1980–1984 | 1985–1989 | 1990–1994 | 1995–1999 | 2000–2004 | 2005–2009 | 2010–2014 |
|----------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| % | 39.6 | N/A | 34.1 | N/A | 47.5 | 47.3 | 53.0 | 48.8 |

Note: 5-year periods. N/A: not available.

Source: Charmes (2019, p. 41)

A first stylised fact is suggested by Table 2. Average (non-agricultural) employment in the informal economy throughout North Africa has been growing slightly over 50% in the 2000s and declining slightly below 50% since the early 2010s. This suggests that informal employment is a lasting or structural phenomenon.

A second stylised fact is that informal employment is countercyclical: on rise when economic growth slows down until the late 2000s, it contracts with upgraded economic growth, hence experiencing a reversal in trend in the early 2010s. However, this general pattern requires a thorough inspection with respect to the behaviour of the various components of informal employment in North Africa. Furthermore, the trends as well as the level may differ across countries, according to the impact of economic shocks (structural adjustment and crises) and the employment policies designed to absorb these (See Adair and Souag, 2019, as for Algeria).

A last stylised fact is that employment in the informal economy is negatively related to GDP per capita; in this respect, Morocco experiences the lowest GDP per capita among North African countries and the highest share of employment in the informal economy.

Turning to a restricted picture of informality, i.e. the informal sector subset, it is noteworthy that labour productivity in the informal sector is weak, as illustrated by its low contribution to GDP, whether agriculture is included or not (See Table A1 in the Appendix).

Trends in the share of informal economy in non-agricultural employment (See Figure A1 in the Appendix) should be interpreted with caution due to heterogeneous sources. In the 1990s, figures come from mixed surveys and focus on the informal sector, whereas the labour force surveys in the 2000s provide figures on informal employment and employment in the informal economy (Charmes 2019, p. 38). Morocco displays the highest level (below 70%) in early 2010s, increasing since the 1980s (below 60%) and experiencing a dip (45%) during the 1990s. Egypt started from the highest level in the 1970s (60%), dropping twice in the 1980s and the 1990s down to 25% and increasing again up to almost 50% in the early 2010s. Tunisia displays a similar but smoother trend: starting from almost 40% in the mid-1970s down to 35% in the mid-1980s and up to over 45% in the late 1990s, before dropping back within a 35-40% corridor throughout the 2000s and the early 2010s. In contrast, informal employment in Algeria has experienced almost continuous growth since the mid-1970s up to the late 2000s (from over 20% to 45%), before declining in the early 2010s.

Beyond these stylised facts, ~~which we do not further investigate~~, we address two features of informality, such as age and gender, which remain little documented in North Africa.

According to Charmes (2019), the level of informality is more likely to be higher among young people and older persons: three out of four are in informal employment worldwide. In addition, the employment of older persons is more likely to be informal than that of young people whatever the socio-economic development of a country and region. This inverted U-shaped distribution of age groups requires more investigation, especially as regards youth.

By and large, informal employment is a larger source of jobs for men than for women, whatever the classification of countries, be it developing or developed countries and for agricultural and non-agricultural informal employment. In contrast, as for low and lower-middle income countries, a higher proportion of women are in informal employment than men (Charmes, 2019). The gender divide regarding informal employment also deserves some additional investigations.

According to Table 3, the share of self-employment in non-agricultural employment has been rising in all North African countries over the 1980s and the 1990s. The gender distribution shows that the percentage of women became or remained dominant in all countries, respectively as of Algeria, Morocco and Tunisia, Egypt being excepted.

Table 3. Self-employment in North Africa (% of non-agricultural employment), by gender (1980-2000)

| | 1980-1990 | | | 1990-2000 | | | Trend (1980-2000) | | |
|--------------|-----------|-------|-----|-----------|-------|-----|-------------------|-------|-----|
| | All | Women | Men | All | Women | Men | All | Women | Men |
| Algeria | 13 | 5 | 13 | 28 | 35 | 27 | + | + | + |
| Egypt | 24 | 4 | 27 | 25 | 12 | 27 | + | + | |
| Morocco | 36 | 44 | 33 | 40 | 46 | 37 | + | + | + |
| Tunisia | 21 | 40 | 15 | 30 | 61 | 20 | + | + | + |
| North Africa | 23 | 23 | 22 | 31 | 38 | 28 | + | + | + |

Source: ILO (2002)

According to Table 4, as of the late 1990s, the share of informal employment in non-agricultural employment varies across countries from the lowest in Algeria (43%) to the highest in Egypt (55%). With respect to the components of non-agricultural employment, self-employment is the main one, varying across countries from the lowest in Egypt (50%) to the highest in Algeria (67%). As for gender distribution, the ratio of women in self-employment is always higher than that of men.

Table 4. Informal employment in North Africa (% of non-agricult. employment), by gender and component

| 1994-2000 | Non-agricultural employment | | | Non-agricultural informal employment | | | | | |
|-----------|-----------------------------|-------|-----|--------------------------------------|-------|-----|---------------------|-------|-----|
| | Informal employment (%) | | | Wage employment (%) | | | Self-employment (%) | | |
| | Total | Women | Men | Total | Women | Men | Total | Women | Men |
| Algeria | 43 | 41 | 43 | 33 | 19 | 36 | 67 | 81 | 64 |
| Egypt | 55 | 46 | 57 | 50 | 33 | 53 | 50 | 67 | 47 |
| Morocco | 45 | 47 | 44 | 19 | 11 | 22 | 81 | 89 | 78 |
| Tunisia | 50 | 39 | 53 | 48 | 49 | 48 | 52 | 51 | 52 |

Source: ILO (2002)

Furthermore, according to Table A2 (in the Appendix), as of the early 2010s, the share of informal employment in non-agricultural employment varies across countries from the lowest in Egypt (49.8%) to the highest in Morocco (75.6%), with Algeria missing. With respect to gender distribution, the ratio of women in informal employment is always lower than that of men.

We did not tackle whether entering the informal economy is a matter of voluntary choice (or comparative advantage) vs. last resort strategy (Gunther and Launov, 2012), especially as regards gender. In this respect Merouani et al. (2018) apply a logistic model with interaction effects to a stratified small sample selected from the *Sahwa* dataset, 1,525 young workers aged below 30 from three Maghreb countries (Algeria, Morocco and Tunisia) in 2016. The average participation rate to social security in the three countries is only 32%. As for country distribution, it is highest in Algeria (41%) and lowest in Morocco (21%), while Tunisia stands in between (30%). The paper suggests that most youth workforce have voluntarily chosen to evade social security coverage: the lowest share being in Algeria (56%), the highest in Morocco (77%) and Tunisia standing in between (70%), in contrast with the minority of those

adopting a last resort (i.e. involuntary) strategy. The impact of education proves positive both on the probability of being insured, but also on that of choosing informality, irrespective of gender, although females are less likely to choose informality. Self-employed are more likely to choose informality; this is due to the fact they are excluded from some benefits (accident at work and maternity leave). Unfortunately, the role of women within family income-seeking strategies in informal employment is not addressed.

3. Determinants of youth employment in North Africa

Data come from *Sahwa*, a youth survey funded by the European Union that was conducted in 2015 upon four countries (Algeria, Tunisia, Morocco and Egypt). It uses a common in-depth questionnaire covering education, employment and integration, political participation, values and culture, gender issues, and migration and international mobility. The sample includes 7,816 individuals aged 15-29, 3,937 females (50.4%) and 3,879 males (49.6%).

According to Table 5 the labour force comprises 3,027 young individuals both males and females –a 38.7% activity ratio, among which a quarter (783) is unemployed, which makes a high 25.86% youth unemployment rate in year 2015.

Table 5. Distribution of the labour force by gender and country in North Africa (2015)

| Gender | Country | Employed (%) | Unemployed (%) | Labour force (%) |
|---------------|--------------|----------------------|--------------------|-----------------------|
| Male | Algeria | 401 (69.68) | 173 (30.32) | 574 (100.00) |
| | Egypt | 559 (93.01) | 42 (06.99) | 601 (100.00) |
| | Morocco | 334 (89.54) | 39 (10.46) | 373 (100.00) |
| | Tunisia | 353 (62.15) | 215 (37.85) | 568 (100.00) |
| | Total | 1,647 (78.84) | 469 (22.16) | 2,116 (100.00) |
| Female | Algeria | 163 (67.64) | 78 (32.36) | 241 (100.00) |
| | Egypt | 108 (69.68) | 47 (30.32) | 155 (100.00) |
| | Morocco | 153 (95.03) | 8 (04.97) | 161 (100.00) |
| | Tunisia | 173 (48.87) | 181 (51.13) | 354 (100.00) |
| | Total | 597 (65.54) | 314 (34.46) | 911 (100.00) |
| Total | Algeria | 564 (69.20) | 251 (30.80) | 815 (100.00) |
| | Egypt | 667 (88.23) | 89 (11.77) | 756 (100.00) |
| | Morocco | 487 (91.20) | 47 (08.80) | 534 (100.00) |
| | Tunisia | 526 (57.05) | 396 (42.95) | 922 (100.00) |
| | Total | 2,244 (74.13) | 783 (25.86) | 3,027 (100.00) |

Note: Figures for Morocco are currently updated.

Source: Authors.

In Table 6, the variables selected in the different estimates are, first of all, related to the specific characteristics of individuals. The sample is split into three age groups: [15-19], [20-24] and [25-29] years old. This allows us to understand the potential linked to the experience of individuals and also to gauge the rate of school losses for the [15-19] years old. These individuals that are supposed to attend school are on the labour market. They recorded a rate of 13% (including 22% of females and 77% of males), the largest numbers are in Egypt. Over a third of the active people is aged 20-24 years, and half is aged 25-29 years.

Table 6. Distribution of the labour force by gender and age group in North Africa (2015).

| Gender | Age group | Employed | Unemployed | Labour force |
|----------------|--------------|--------------|------------|--------------|
| Females | [15 - 19] | 63 | 28 | 91 |
| | [20 - 24] | 192 | 131 | 323 |
| | [25 - 29] | 342 | 155 | 497 |
| | Total | 597 | 314 | 911 |
| Males | [15 - 19] | 247 | 70 | 317 |
| | [20 - 24] | 569 | 179 | 748 |
| | [25 - 29] | 831 | 220 | 1,051 |
| | Total | 1,647 | 469 | 2,116 |
| Total | [15 - 19] | 311 | 98 | 409 |

| | | | |
|--------------|--------------|------------|--------------|
| [20 - 24] | 762 | 310 | 1,072 |
| [25 - 29] | 1,171 | 375 | 1,546 |
| Total | 2,244 | 783 | 3,027 |

Source: Authors

Marital status takes the value of 1 for married individuals and 0 for singles. The sample is made up of singles (83%, including 0.6% divorced and widowed individuals) and singles (17%). Educational attainment is divided into three levels: higher learning (24%), secondary (36%) and medium level at most including no education (40%). Urban (57%) and rural areas (43%) account for the place of residence. The "household standard of living" is split into three categories: poor (53.5%), average (22.5%) and rich households (24%). The distribution of the labour force includes 922 Tunisians (30.45%), 815 Algerians (26.92%), 756 Egyptians (24.97%) and 534 Moroccans (17.64%).

These variables enable us to test three main theories addressing the determinants of access to the labour market. First, human capital theory with "educational attainment"; second, the theory of survival strategies with "household standard of living"; last, "feminist" theory with family variables (marital status, household size and place of residence).

3.1. Estimation of binary logistic regressions upon youth's labour force participation

What are the key factors determining the access to (or participation in) the labour market as regards youth in North African countries? To what extent, do they differ between young males and young females? In order to address this issue, we design two binary logistic regression models addressing the female participation in the labour market (See Box 1).

Box 1. The dichotomous participation model

The decision to participate in the labour market can be formalised by a discrete choice structure wherein the individual i chooses ($Y_i = 1$) or not ($Y_i = 0$) to participate in the labour market.

The logistic regression model corresponds to the logistic law, introduced specifically for this type of model with a distribution function Λ as follows:

$$F(X_i \theta) = \Lambda(X_i \theta) = \frac{e^{X_i \theta}}{1 + e^{X_i \theta}} = \frac{1}{1 + e^{-X_i \theta}} \quad [1]$$

The corresponding density, usually noted λ , is the following:

$$f(X_i \theta) = \lambda(X_i \theta) = \frac{e^{X_i \theta}}{(1 + e^{X_i \theta})^2} = \Lambda(X_i \theta)(1 - \lambda(X_i \theta)). \quad [2]$$

x_i : vector of individual characteristics including variables that capture the potential productivity, which impacts women's participation in the labour market (educational attainment, age and marital status).

θ : vector of family characteristics (place of residence, household size, income of the head of household, industry wherein which the household head operates, formal/informal job status).

Source: Authors

The first participation model applies to the male labour force and then to the female labour force. The dependent variable is 1 if the individual is employed and 0 if he or she is unemployed. Table 7 reports the estimation of as for males vs. females' participation in the labour market.

For both genders, "educational attainment" brings an advantage in their access to the labour market. The relative odds for an individual to be employed rather than unemployed double, when level rises from uneducated to secondary level (1.7 percentage points for females) and increase with "higher learning", which has the highest impact upon females. Weakly significant is that males with higher learning increase by three percentage points their chances to be employed as compared to uneducated males. Strongly significant is that a married male decreases by 3.2 percentage points his chances of being employed as compared to singles. "Age" proves only weakly significant for females belonging to the [25-29] age group.

The size of the household positively influences the participation of females in the labour market. These results, therefore, could be one of the household survival strategies, whereby females will bring in additional income in the household. Rural females are less likely to have a job (6.7 percentage points) compared to urban females. The probability of being employed for a Tunisian female is higher (2.6 percentage points) than for an Algerian female, as well as for a Tunisian male (1.3 percentage points) versus an Algerian male. An Egyptian male enjoys less chance (0.2 percentage point) being employed than an Algerian male. Likewise in Morocco, the chances of being employed are lower compared to Algeria for both genders: 0.28 percentage point for males and 0.05 percentage point for females. Tunisia is the most advanced country with respect to the inclusion of youth into the labour market.

Table 7. Estimation of logistic regressions as for males-vs. females' labour force participation

| Variables | Coefficient | Males | | Females | | |
|--|-----------------------------|-------|--------|-----------------------------|-------|--------|
| | | Prob. | Exp(B) | Coefficient | Prob. | Exp(B) |
| Age (ref.: [15-19]) | | | | | | |
| [20-24] | 0.483 | 0.487 | | 2.120 | 0.145 | |
| [25-29] | 0.102 | 0.749 | | 3.254* | 0.071 | |
| Educational attainment (ref.: <i>medium</i> at mos) | | | | | | |
| <i>Secondary</i> | | | | | | |
| <i>Tertiary</i> | 0.003 | 0,146 | | 0,555** | 0,006 | 1.742 |
| | 3.051* | 0,081 | | 0.732*** | 0,000 | 2.079 |
| Marital status (ref.: <i>single</i>) | | | | | | |
| <i>Married</i> | -1.132*** | 0,000 | 0.322 | 0.323 | 0,570 | |
| Standard of living (ref.: <i>poor</i>) | | | | | | |
| <i>Medium</i> | 0,727* | 0,099 | 3.165 | 0,133 | 0,715 | |
| <i>Rich</i> | -0,540*** | 0,000 | 0.17 | 0,289 | 0,289 | |
| Household size | 2.680 | 0,102 | | 0.085** | 0,027 | 1.089 |
| Place of residence (ref.: <i>urban</i>) | | | | | | |
| <i>Rural</i> | 0.287 | 0,592 | | -0,395** | 0,014 | 0.674 |
| Country (ref.: Algeria) | | | | | | |
| Tunisia | 0.326*** | 0,010 | 1.385 | 0.978*** | 0,000 | 2.658 |
| Egypt | -1.575*** | 0,000 | 0.207 | 0,051 | 0.821 | |
| Morocco | -1.242*** | .0000 | 0.289 | -1.900*** | 0.000 | 0.051 |
| Constant | -0.775*** | 0,000 | 0.461 | -1.507*** | 0,00 | 0.396 |
| Log likelihood-2 | 1987.555^c | | | 1024.001^b | | |
| Cox & Snell R -square | ,112 | | | ,150 | | |
| Nagelkerke Pseudo R -square | ,172 | | | ,207 | | |
| N (observations) | 2,116 | | | 911 | | |

Note: *** p<0.01, ** p<0.05 and * p<0.1.

Source: Authors

We tested the same explanatory variables from the previous estimate by gender. Table 8 reports educational attainment of the labour force by age group according to gender. It shows that the females with higher learning level account for the largest share (38%) in the workforce; whereas, the least educated males account for the largest share (48%) in the workforce. For both genders, the majority of active individuals belong to the 25-29-year age group compared to other age groups: (54%) females versus (49%) males. However, there is a significant rate of young people aged 15-19 on the labour market: (30%) males and (14%) females. (63%) males of this age group experience low educational attainment (at most medium), slightly more than their (59%) female counterparts.

Table 8. Distribution of the labour force according to educational attainment, age group and gender

| Gender | Age | Medium (at most) | % | Secondary | % | Higher | % | Total | % |
|----------------|--------------|---------------------|------------|--------------|------------|------------|------------|--------------|------------|
| Females | [15 - 19] | 54 | 19 | 29 | 11 | 8 | 2 | 91 | 10 |
| | [20 - 24] | 90 | 31 | 127 | 46 | 107 | 31 | 324 | 35 |
| | [25 - 29] | 141 | 50 | 120 | 43 | 235 | 67 | 496 | 55 |
| | Total | 285 | 100 | 276 | 100 | 350 | 100 | 911 | 100 |
| Males | [15 - 19] | 200 | 20 | 112 | 15 | 5 | 1 | 317 | 15 |
| | [20 - 24] | 346 | 34 | 286 | 38 | 118 | 33 | 750 | 35 |
| | [25 - 29] | 468 | 46 | 345 | 47 | 236 | 66 | 1050 | 50 |
| | Total | 1,014 | 100 | 743 | 100 | 359 | 100 | 2,116 | 100 |
| Total | [15 - 19] | 254 | 19 | 141 | 14 | 13 | 1 | 408 | 14 |
| | [20 - 24] | 436 | 34 | 413 | 40 | 225 | 33 | 1074 | 35 |
| | [25 - 29] | 610 | 47 | 465 | 46 | 470 | 66 | 1545 | 51 |
| | Total | 1,300 | 100 | 1,019 | 100 | 708 | 100 | 3,027 | 100 |

Source: Authors

3.2. Estimation of binary logistic regressions in four North African countries

In Table 9, the second participation model estimates the probability of labour force participation, separately upon the four countries (Algeria, Tunisia, Morocco and Egypt), wherein the reference category is the inactive population; hence, the dependent variable is 1 if the individual participates in the labour market and 0 if he or she is inactive. Hereafter, we design four estimates, one for each country, separately upon the sub-sample of the inactive population, which includes 2,000 Algerians (25.6%), 1,947 Egyptians (24.9%), 1,862 Moroccans (23.8%) and 2,008 Tunisians (25.7%). The distribution of the sub-sample shows that two thirds of inactive individuals are females; over one half enjoys secondary level of education. Almost half the females aged 25-29 enjoy primary level of education, whereas over one third of males aged 25 to 29 enjoys primary or medium level of education. Variables related to gender, education and the household's standard of living display substantial differences.

Table 9. A binary logistic estimation of the labour market participation for each North African country

| Country Variables | Coeff. | Algeria Exp (B) | Prob. | Coeff. | Egypt Exp (B) | Prob. | Coeff. | Morocco Exp (B) | Prob. | Coeff. | Tunisia Exp (B) | Prob |
|--|-----------------|--------------------|-------|-----------------|------------------|-------|-----------------------------|--------------------|-------|-----------------|--------------------|--------|
| Age (ref.: [15-19]) | | | | | | | | | | | | |
| [20-24] | 1.606*** | 4.984 | 0.00 | 1.259*** | 3.523 | .000 | 0.780*** | 2.181 | .000 | 1.701*** | 5.47 | .000 |
| [25-29] | 2.545*** | 11.632 | 0.00 | 2.479*** | 11.927 | .000 | 2.372*** | 10.72 | .000 | 2.593*** | 13.3 | .000 |
| Gender (ref.: female) | | | | | | | | | | | | |
| Male | 1.536*** | 4.646 | .000 | 2.687*** | 14.96 | .000 | 1.377*** | 3.962 | .000 | 0.919*** | 2.506 | .000 |
| Marital status (ref.: single) | | | | | | | | | | | | |
| Married | -.515*** | 0.597 | .004 | -0.42*** | 0.657 | .009 | -0.46*** | 0.627 | .0008 | -1.03*** | 0.355 | .000 |
| Educational attainment (ref.: medium or below) | | | | | | | | | | | | |
| Secondary | -.520*** | 0.595 | .000 | -0.316** | 0.729 | .0025 | -0.55*** | 0.57 | .000 | -0.64*** | 0.523 | .000 |
| Tertiary | -.705*** | 0.494 | .000 | -0.73*** | 0.479 | .000 | -1.16*** | 0.313 | .000 | -0.63*** | 0.528 | .000 |
| Standard of living (ref.: poor) | | | | | | | | | | | | |
| Medium | .127 | | 0.722 | 0.126 | | 0.722 | 0.019 | | 0.891 | 1.094 | | 0.2960 |
| Rich | .402 | | 0.526 | -0.61*** | 0.541 | 0.003 | 0.019 | | 0.891 | -0.347** | 0.707 | .007 |
| Place of residence (ref.: urban) | | | | | | | | | | | | |
| Rural | .218 | | 0.641 | 0.283** | 1.327 | 0.020 | 0.267 | | 0.605 | 3.696* | | 0.055 |
| Household size | | | | | | | | | | | | |
| Constant | 3.750* | | 0.053 | 1.184 | | 0.277 | 0.194*** | 0.824 | 0.000 | 0.929 | | 0.335 |
| | -2.33*** | | .000 | -2.84*** | | .000 | -1.66*** | | .000 | -1.50*** | 0.221 | .000 |
| Log likelihood-2 | 2141.594 | | | 1832.485 | | | 1737.163^c | | | 2253.250 | | |
| Cox & Snell R-2 | .245 | | | .326 | | | .233 | | | .227 | | |
| Nagelkerke Pseudo R-2 | .331 | | | .443 | | | .334 | | | .303 | | |
| N (observations) | 2,000 | | | 1,946 | | | 1,862 | | | 2,008 | | |

Note: *** p<0.01, ** p<0.05 and * p<0.1.

Source: Authors

Age is significant for both age groups and in the four countries at 1% threshold. This means that age is a determining factor and explains to a large extent the access of youth to the labour market. Males are twice as likely as females to be active in all four countries. Being a male increases by 14 percentage points his chances of participating in the labour market in Egypt, 4.6 percentage points in Algeria, 3.9 percentage points in Morocco and 2.5 percentage points in Tunisia. This outcome seems consistent with national statistics regarding female participation rate in these countries, whereby Tunisia ranks in the first place.

Educational attainment is correlated with the participation in the labour market of youth from the four North African countries. Actually, education seems to be a deterrent to an early inclusion of young people into the labour market (negative sign of the coefficients). The probability of participation is decreasing from secondary level to higher learning level in all countries. A university degree no longer guarantees a formal job.

Although this puzzling result may look counterintuitive, it is consistent with similar findings as for two surveys upon representative samples in Algeria: at national level using time series analysis (Adair and Souag, 2019), and at the regional level using longitudinal analysis (Adair and Bellache, 2018). The rationale could be the following: On the supply side, with respect to policies, various assistance mechanisms to employment promote precarious jobs for youth without necessarily providing social insurance; hereby fostering informal employment is. On the demand side, with respect to unemployed young graduates, getting a paid job makes them better off than remaining unemployed.

Married individuals are less likely to participate than singles. The *marital status* variable is significant and negative in the four countries with respect to bachelors. The characteristics of the sample may explain this result, in as much as it includes 82% of singles against 18% of married individuals.

Variables related to the family environment are non-determinant as for access to employment. Poverty strongly explains our dependent variable. Being born in a "rich" household decreases by 0.7 percentage point the chances of Tunisians to be active and by 0.54 percentage point in Egypt. The richer the household the less it needs a complementary income from youth members. The size of the household impacts positively upon the inclusion of youth into the labour market. The larger the size of the household, the more young people of working age must contribute to household income: by 3.7 percentage points in large households in Algeria and by 0.8 percentage point in Morocco. As for rural areas, individuals are more likely to be active in Egypt and Tunisia; a large workforce operates in agriculture in these two countries, whereas the variable is not significant in Algeria and Morocco.

3.3. Robustness of the estimations

We performed a few robustness tests to ensure the quality of our results.

Of course, removing one variable and adding another one may not stand as a robustness test. For instance, we used the *age* variable, both linear and quadratic, then we decomposed this variable into age groups; both estimations providing similar significant outcomes. The same applies to the *level of education*, a variable we first estimated with educational attainment (level) and then by duration (years) of schooling, both results being similarly satisfactory.

The robustness test controls for grouping at the country level, when the number of observations in the groups is too heterogeneous and likely to affect the error term in the regressions. In as much as we included four countries in the pooled sample using a dummy variable for each country, we applied the test to the logistic regressions, the results show there is no major difference with and without any given country, especially when removing Morocco, whose data did undergo (re)calibration (See Table A4 in the Appendix).

4. Determinants of youth earnings according to the Mincer model

An earnings function stemming from a model of optimal accumulation of human capital (Mincer, 1974; see box 2) identifies the determinants of earnings of the individuals participating in the labour market.

Box 2. The Mincer earnings function

| | |
|--|----------------------------------|
| $LnW_{it} = LnW_{i0} + r_{is} + \sum_{t=s}^{t-1} r_{it}k_{it} + U_{it}$ <p>W_{it}: wages of individual i at time t LnW_{it}: logarithm of wages S_i: number of years of schooling (within the education system) by individual i $r_s S_i$: return on schooling U_{it}: set of random elements involved in the determination of wages</p> <p>The contribution of schooling to the increase in the individual's earnings (r_{is}) expresses how much, on average, one year of schooling increases wages in %.</p> <p>The introduction of the second component of human capital, the professional experience of individual (learning acquired during working life) leads to the following earnings function:</p> $nW_{it} = W_0 + r_s S_i + r_e EXP_{it} + U_{it}$ <p>$r_e EXP_{it}$: the return on the professional experience of individual i at time t</p> <p>The contribution of professional experience to the increase in the individual's earnings expresses how much, on average, one year of experience increases wages in %.</p> <p>The hypothesis of diminishing marginal productivity of professional experience, which declines with age, leads to the introduction of a quadratic variable in the earnings function.</p> $LnW_{it} = W_0 + r_s S_i + r_e EXP_{it} + r_{e^e} (EXP)^2 + U_{it}$ | <p>[1]</p> <p>[2]</p> <p>[3]</p> |
|--|----------------------------------|

Source: Authors

The evaluation of education returns consists in the regression of the logarithm of wages perceived by an individual on a set of variables that are characteristics; the basic Mincer model includes the number of years of schooling and professional experience as explanatory variables. Other explanatory variables (gender, industry, work contract, occupational status, etc.) can be added in an 'augmented' Mincer model.

4.1. Estimation of an earnings function with correction for endogeneity

According to Wooldridge (2001, Chapter 5), one well-known limitation of OLS is that it provides a biased estimator. Estimation should be corrected for endogeneity with two-stage least squares (2SLS) using an instrumental variable (IV). The instrumental variable applied here is educational attainment of the father and of the mother. Educational attainment of the parents explain to a large extent the duration of schooling of their child(ren). Hence, it is relevant a variable (Boumahdi and Plassard, 1992; Block, 2010). Social capital theory implies that educated parents are more socially integrated, thus facilitating their children's access to the labour market.

Table 10. Distribution of the labour force by industry and work contract according to gender

| Gender | Labour contract | Manuf. | Build. | Health | Educ. | Trade | Services | Admin. | Total |
|---------|---------------------|------------|------------|-----------|-----------|------------|------------|------------|--------------|
| Females | Indefinite duration | 12 | 2 | 21 | 26 | 6 | 10 | 19 | 96 |
| | Fixed term contract | 20 | 2 | 11 | 14 | 10 | 14 | 13 | 84 |
| | Employ. assistance | 2 | 5 | 3 | 10 | 0 | 4 | 9 | 33 |
| | No contract | 24 | 7 | 9 | 27 | 48 | 71 | 15 | 201 |
| | Total | 58 | 16 | 44 | 77 | 64 | 99 | 56 | 414 |
| Males | Indefinite duration | 35 | 5 | 15 | 11 | 25 | 21 | 46 | 158 |
| | Fixed term contract | 46 | 12 | 5 | 11 | 16 | 22 | 34 | 146 |
| | Employ. assistance | 2 | 5 | 0 | 1 | 5 | 1 | 4 | 18 |
| | No contract | 120 | 228 | 13 | 7 | 120 | 169 | 69 | 726 |
| | Total | 203 | 250 | 33 | 30 | 166 | 213 | 153 | 1,048 |
| Total | Indefinite duration | 47 | 7 | 36 | 37 | 31 | 31 | 65 | 254 |

| | | | | | | | | |
|---------------------|------------|------------|-----------|------------|------------|------------|------------|--------------|
| Fixed term contract | 66 | 14 | 16 | 25 | 26 | 36 | 47 | 230 |
| Employ. assistance | 4 | 10 | 3 | 11 | 5 | 5 | 13 | 51 |
| No contract | 144 | 235 | 22 | 34 | 168 | 240 | 84 | 927 |
| Total | 261 | 266 | 77 | 107 | 230 | 312 | 209 | 1,462 |

Source: Authors

In Table 10, the estimate relates to a sample of the 1,941 employees outside agriculture in four countries (Tunisia, Morocco, Algeria and Egypt). The predictors of earnings of the individuals tested are the following variables: human capital (years of schooling and work experience), industry (manufacturing, building, trade, health, education, services and public administration) and work contract (indefinite duration, fixed term, employment assistance and absence of contract).

Table 11. Estimation of the earnings function with correction for endogeneity

| Explanatory variables | Coefficient | P-value |
|---|--------------------|----------------|
| <i>Experience</i> | 0.014 | 0.415 |
| <i>Experience –square</i> | 0.002* | 0.237 |
| Gender (ref.: <i>female</i>) | | |
| <i>Male</i> | 0.255*** | 0.000 |
| Duration of schooling | 0.111*** | 0.000 |
| Labour market segment (ref.: <i>informal</i>) | | |
| <i>Formal</i> | 0.275** | 0.000 |
| Status of occupation (ref.: <i>self-employed</i>) | | |
| <i>Employee</i> | -0.097 | 0.766 |
| Sector (ref.: <i>public sector</i>) | | |
| <i>Private</i> | -0.081 | 0.252 |
| Work contract (ref.: <i>indefinite duration contract</i>) | | |
| <i>Fixed term contract</i> | 0.009*** | 0.883 |
| <i>Employment assistance device</i> | -0.345* | 0.008 |
| Industry (ref.: <i>manufacturing</i>) | | |
| <i>Building & construction</i> | -0.152 | 0.162 |
| <i>Health</i> | -0.158*** | 0.000 |
| <i>Education</i> | -0.472*** | 0.000 |
| <i>Trade</i> | -0.169** | 0.041 |
| <i>Other market services</i> | -0.107 | 0.132 |
| <i>Non-market services (administration)</i> | -0.089 | 0.310 |
| Country (ref.: <i>Algeria</i>) | | |
| <i>Egypt</i> | -0.755*** | 0.000 |
| <i>Tunisia</i> | -0.429*** | 0.000 |
| <i>Morocco</i> | -0.020** | 0.862 |
| Constant | 5.180*** | 0.000 |
| Multiple R | 0.517 | |
| R-square | 0.268 | |
| Adjusted R-square | 0.256 | |
| Standard Error | 0.706 | |
| N (observations) | 1,941 | |

Note: *** p<0.01, ** p<0.05 and * p<0.1.

Source: Authors

Table 11 records the results of the model, whose explanatory power (adjusted R2) is 25%. Variables related to human capital are positively significant on females' earnings. An additional year of schooling increases individuals' earnings by 11%. Work experience is not significant given the young age of the individuals surveyed. Males' incomes are 2.5 times higher than those of females. Operating in the formal sector increases the earnings of individuals by 2.7 times as compared to the informal sector. Contract is significant, it is negative as for those who are recruited with an employment assistance device. Operating in the building industry decreases the earnings of youth by 1.5 times compared to those in the manufacturing industry. Education industry reduces the earnings of individuals by 4.7 times

as compared to those in manufacturing. Trade reduces the earnings of youth by 1.6 times as compared to those in manufacturing.

4.2. Estimation of earnings functions in the formal and informal sectors

We take into account the gender wage gap between males and females with respect to labour market segmentation (i.e. the formal/informal divide). We first highlight the heterogeneous characteristics that are not assessed the same way as for females vs. males. Hereafter, Table 10 records the outcomes of earnings functions applied to a sample of 1,941 individuals employed outside agriculture, among which 1,324 operate within the informal sector -25% females and 75% males, whereas 617 operate within the formal sector -34% females and 66% males. We observe from Table 12 that the variance of gains explained with the Mincer is better explained for formal females (22.9%) and informal females (10.6%) than for formal males (16.6%) and informal males (7.5%). Hence, the Mincer function seems to apply better to females vs. males but far less to informal workers, regardless their gender. However, returns from human capital are lower for females. An additional year of schooling increases the income of females in the formal sector by (16%) and that of males (18%). An informal female who comes from a rural environment decreases her return by (-13%) as compared to a female from an urban setting. Operating in the informal with a fixed-term contract decreases the earnings of females (-3.9%), whereas it increases that of males by (26%), which confirms the precarious nature of women's informal jobs (Gherbi and Adair, 2016; Charmes, 2019). Operating in the private sector decreases the performance of informal females by (-15%); in contrast, informal males working in the private sector increase their incomes by (22%).

Table 12. Estimation of earnings function for females vs. males in formal vs. informal employment

| Variables | Females | | | | Males | | | |
|---------------------------------|-----------------------|---------|-------------------------|---------|-----------------------|---------|-------------------------|---------|
| | Formal Coefficient | P-value | Informal Coefficient | P-value | Formal Coefficient | P-value | Informal Coefficient | P-value |
| Human capital | | | | | | | | |
| <i>Experience</i> | 0.065 | 0.413 | 0.49 | 0.497 | -0.006 | 0.912 | 0.39 | 0.265 |
| <i>Experience –square</i> | -0.002 | 0.789 | -0.02 | 0.775 | 0.005 | 0.184 | -0.001 | 0.605 |
| <i>Duration of schooling</i> | 0.163** | 0.032 | 0.107 | 0.435 | 0.184** | 0.004 | 0.004 | 0.921 |
| Place of residence: | | | | | | | | |
| <i>Rural</i> | -0.284 | 0.123 | -0.133* | 0.061 | -0.096 | 0.461 | -0.19 | 0.831 |
| Work contract | | | | | | | | |
| <i>Indefinite duration</i> | 0.297 | 0.279 | 1.521 | 0.199 | 0.126 | 0.545 | -2.192 | 0.185 |
| <i>Fixed term contract</i> | -0.231 | 0.614 | -0.399* | 0.067 | -0.271 | 0.607 | 2.261* | 0.078 |
| <i>Employ. assis. device</i> | -0.423 | 0.603 | -0.939 | 0.424 | -0.238 | 0.898 | -1.78 | 0.514 |
| <i>Private sector</i> | -0.052 | 0.801 | -0.150* | 0.071 | 0.180 | 0.481 | 0.225* | 0.071 |
| Industry | | | | | | | | |
| <i>Manufacturing</i> | 0.797* | 0.059 | -0.248 | 0.558 | -0.16 | 0.964 | -0.032 | 0.894 |
| <i>Building & construc.</i> | 0.333 | 0.569 | -0.601 | 0.318 | -0.91 | 0.859 | -0.004 | 0.973 |
| <i>Trade</i> | 0.370 | 0.380 | -0.027 | 0.962 | -0.59 | 0.893 | 0.068 | 0.698 |
| <i>Health</i> | 0.351 | 0.347 | -0.027 | 0.962 | -0.022 | 0.954 | 0.0447 | 0.243 |
| <i>Market services</i> | 0.704* | 0.067 | -0.757 | 0.302 | -0.173 | 0.674 | 0.41** | 0.008 |
| <i>Public administration</i> | 0.453 | 0.269 | -0.437 | 0.421 | 0.096 | 0.790 | 0.005 | 0.981 |
| Country | | | | | | | | |
| <i>Egypt</i> | -0.641** | 0.022 | -0.137*** | 0.000 | -0.11*** | 0.000 | -0.54*** | 0.000 |
| <i>Tunisia</i> | -0.255 | 0.738 | 0.092 | 0.441 | -0.31** | 0.042 | -0.67*** | 0.000 |
| <i>Morocco</i> | -0.265 | 0.897 | 0.236 | 0.236 | 0.258 | 0.234 | -0.258* | 0.025 |
| Constant | 3,823*** | 0,004 | 5,627*** | 0,00 | 4,63*** | 0,00 | 5,940*** | 0,000 |
| R-square | 0.313 | | 0.210 | | 0.220 | | 0.101 | |
| Adjusted R-square | 0.229 | | 0.106 | | 0.166 | | 0.075 | |
| N (observations) | 212 | | 335 | | 405 | | 989 | |

Note: *** p<0.01, ** p<0.05 and * p<0.1.

Source: Authors

These result are in line with the observation according to which females are more likely to operate within the low-income informal sector (ILO, 2018). Holding a formal job in the "manufacturing industry" increases the females' earnings by (79%), and by (70%) in the "market services" industry; in the latter industry, the income of males operating in the informal sector increases by (41%). The gains of Egyptian females and males in both formal and informal employment is below that of Algerians. An Egyptian female earns 64% less than a Algerian female in the formal sector and 13% in the informal sector. Similarly for males, an Egyptian earns 11% less than an Algerian in the formal sector and 54% in the informal sector. The earnings of Tunisian males are 31% lower in the formal sector and 67% in the informal sector than that of the Algerian males.

4.3. Determinants of earnings and distribution issue: quantile regressions

In the previous section devoted to the Mincer earnings function we used OLS in order to investigate to what extent the average monthly wage depends on the explanatory variables. However, it is unlikely that these explanatory variables exert the same impact on all levels of the wage distribution. Hence, we use quantile regressions to find out how the influence of explanatory variables on all levels of the wage distribution varies, including the lowest and highest wages. We perform interquartile regressions -Q1 (25%), Q2 (50%) and Q3 (75%) as well as decile regressions D1 (10% lowest) and D9 (10% highest). Table 13 records the results of quantile regressions.

Table 13. Quantile regressions: logarithm of wages

| Variables | (OLS) | D1 (0.1) | Q1 (0.25) | Q2 (0.5) | Q3 (0.75) | D9 (0.9) |
|--|--------------|-----------------|------------------|-----------------|------------------|-----------------|
| Experience | (0.014) | 0.001 | 0.121 | 0.015 | 0.111 | 0.105 |
| Experience–square | (0.002) | 0.012 | 0.225 | 0.014 | 0.123 | 0.014 |
| Gender (ref.: female) | | | | | | |
| <i>Male</i> | (0.255***) | 0.268*** | 0.255*** | 0.195*** | 0.147** | 0.120** |
| Duration of schooling | (0.111***) | 0.009*** | 0.081*** | 0.101** | 0.121*** | 0.179*** |
| Labour market segment(ref.: informal) | | | | | | |
| <i>Formal</i> | (0.275**) | 0.075*** | 0.101*** | 0.258*** | 0.316*** | 0.451*** |
| Status of occupation(ref.: self-employed) | | | | | | |
| <i>Employee</i> | (-0.097) | -0.256 | 0.236 | -0.258 | 0.234 | 0.356 |
| Sector(ref.: public sector) | | | | | | |
| <i>Private</i> | (-0.081) | 0.256 | 0.487 | -0.147 | 0.569 | 0.245 |
| Place of residence (ref.: urban) | | | | | | |
| <i>Rural</i> | (-0.064) | -0.156 | 0.450 | 0.0123 | 0.236 | 0.215 |
| Work contract (ref.: indefinite duration) | | | | | | |
| <i>Fixed term contract</i> | (-0.009) | -0.256 | 0.123 | 0.147 | 0.489 | 0.124 |
| <i>Employment assistance device</i> | (-0.345***) | -0.256** | -0.145** | -0.102** | -0.452*** | -0.541*** |
| Industry(ref.: manufacturing) | | | | | | |
| <i>Building & construction</i> | (-0.158) | -0.142 | 0.125 | 0.789 | 0.569 | 0.654 |
| <i>Health</i> | (.158***) | -.123*** | -.125*** | -.129*** | -.126** | 0.150** |
| <i>Education</i> | (-0.472***) | -0.347*** | -0.236 | -0.222 | 0.569 | 0.785 |
| <i>Trade</i> | (-0.169**) | -0.258** | -0.126** | -0.251** | 0.263** | 0.450*** |
| <i>Other market services</i> | (0.132) | 0.0125 | 0.256 | 0.589 | 0.236 | 0.548 |
| <i>Non-market services (administration)</i> | (-0.089) | 0.125 | 0.125 | 0.025 | -0.256 | -0.157 |
| Country (ref.: Algeria) | | | | | | |
| <i>Egypt</i> | (-.755***) | -0.236 | -0.247 | -0.369 | -0.236 | -0.895 |
| <i>Tunisia</i> | (-.429***) | -0.263 | -0.214 | -0.369 | -0.236 | -0.581 |
| <i>Morocco</i> | (-.020***) | -0.258 | -0.0785 | -0.0256 | -0.236 | 0.125 |
| Constant | (5.180) | 5.001 | 5.123 | 5.159 | 5.001 | 5.161 |
| Multiple R | 0.268 | 0.245 | 0.219 | 0.238 | 0.198 | 0.258 |
| R-square | (0.256) | 0.239 | 0.201 | 0.230 | 0.187 | 0.247 |

Note: *** p<0.01, ** p<0.05 and * p<0.1.

Source: Authors

Noteworthy is that *work experience*, *status of occupation* as an employee, a *rural place of residence* and the *private sector* play no role, in line with OLS. Unlike OLS, *country* proves non-significant.

As for *males' earnings*, the influence of the gender variable is (very) significant and exhibits a clear-cut pattern. Unlike OLS with an average wage differential of 25%, this influence declines continuously across all levels of the wage distribution, from the first decile (26%) to the last decile (12%).

Duration of schooling exerts a positive effect. Unlike OLS with an average wage differential of 11%, this effect increases throughout all levels of the wage distribution. This is consistent with human capital theory.

Operating in the *formal labour market segment* shifts continuously upwards the earnings of individuals at all levels of distribution, compared with those who work in the informal sector. The rising pattern is clear-cut: a 7.5% gap in the first decile and a 40% in the ninth decile. This is consistent with labour market segmentation theory.

As for work contract, a *fixed term contract* has no impact, whereas an *employment assistance device* exerts a negative effect, which proves consistent with labour market segmentation theory.

With respect to industries, *Health* (highest decile excepted) and *Trade* (highest quartile and decile excepted) prove both negative, whereas trend is rising throughout all levels of the wage distribution; *Education* proves only significant and negative at the lowest decile

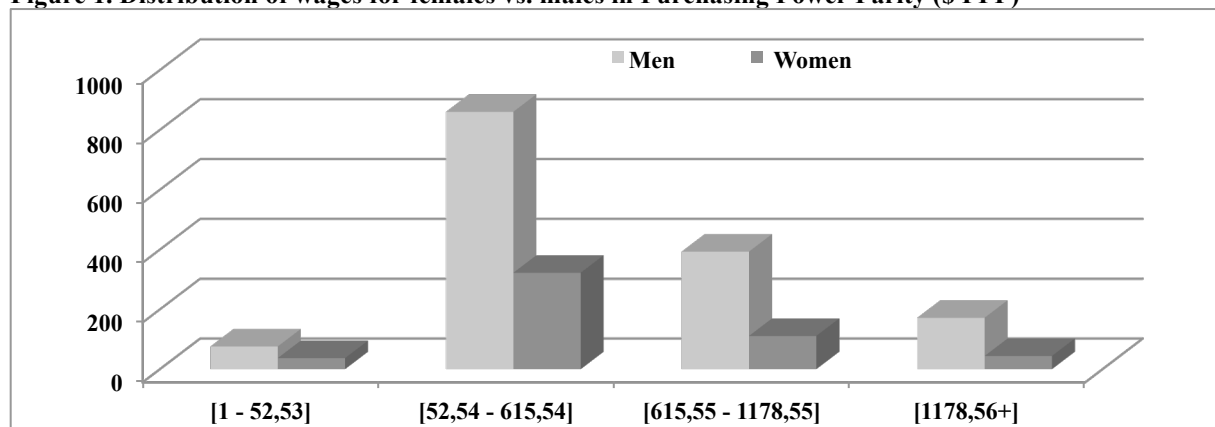
5. Gender wage gap: distribution and estimation with a decomposition model

5.1. Gender distribution

The variable to be explained here is the "monthly income" expressed in Purchasing Power Parity (US \$). Our sub-sample comprises 2014 employed or unemployed wage earners who reported their income, it includes 1,500 males (74%) and 514 females (26%). We split their income into four categories from \$1 up to \$52.53; [\$52.54-\$614.54]; [\$615.55-\$1178.55], \$1178.56 and more. Figure 1 reports the distribution into income groups for females.

The distribution of wages according to PPP proves unfavourable to females compared to that of males. The average wages of females in the sample is \$541.9 whereas that of males is \$640.77, an 18.24% gap. With regard to the \$429.07 standard deviation of the female wage series, that of the male wage series is \$600.14, a 28% gap. Female wages concentrate more in the lower income groups than those of males. Respectively, 62% of females and 69% of males earn \$615. The share of females earning very high wages (8%) is lower than that of males (12%).

Figure 1. Distribution of wages for females vs. males in Purchasing Power Parity (\$ PPP)



Source: Authors

5.2. Estimation of the income gap with the Oaxaca-Ransom decomposition model

To go beyond gender distribution of the earnings gap we use the Oaxaca-Ransom decomposition model between males and females (See box 3).

Box 3. The Oaxaca Ransom model of decomposition

The Oaxaca Ransom model (1994) designs a non-discriminated norm enabling the estimation of a gain equation over the entire sample. It allows a finer decomposition of the unexplained part: namely an advantage for men and a disadvantage for women.

The difference in average monthly gross wages expressed in logarithm is broken down into three parts: one (1st term) is explained by the characteristics of the two groups valued with the norm; another one (2nd term) expressing the additional output of being a man; a last one (3rd term) expressing the deficit in output from the characteristics of being a woman.

The Oaxaca Ransom model is designed as follows:

$$\ln \omega_M = \alpha_M + \beta_M \chi_M + \varepsilon \quad [1]$$

$$\ln \omega_F = \alpha_F + \beta_F \chi_F + \varepsilon \quad [2]$$

ω_M : gross monthly wages of men;

ω_F : gross monthly wages of women;

α : constants;

β : vector of the returns on characteristics χ

χ : vector of the characteristics allowing to measure labour productivity;

ε : error term.

$$\ln \bar{\omega}_M - \ln \bar{\omega}_F = \beta_N (\bar{\chi}_M - \bar{\chi}_F)' + \bar{\chi}_M (\beta_M - \beta_N) + \bar{\chi}_F' (\beta_N - \beta_F) \quad [3]$$

= (1st term) (2nd term) (3rd term)

β_N : norm;

β_M : returns of men;

β_F : returns of women;

$\ln \bar{\omega}_M$: logarithm of the average income of men;

$\ln \bar{\omega}_F$: logarithm of the average income of women;

$\bar{\chi}_M (\beta_M - \beta_N)$: advantage of men;

$\bar{\chi}_F' (\beta_N - \beta_F)$: disadvantage of women;

$\beta_N (\bar{\chi}_M - \bar{\chi}_F)'$: part of the wage gap related to structural differences between men and women.

Source: Authors

The results of the Oaxaca-Ransom model estimate reported in Table 14 show that the average gross wage gap between males and females varies according to the reference structure chosen. (26%) if the reference structure is that of females. (14%) if the reference structure is that of males.

Table 14. The Oaxaca -Ransom model estimate: decomposition of the male/female wage differentials

| | Coefficient | Prob. | $\ln \bar{\omega}_M - \ln \bar{\omega}_F$ (%) |
|--|---------------|-------|---|
| Structure of reference: Females | | | |
| Endowments | 0.2686037*** | 0.000 | 100 |
| Coefficients | -0.2485701*** | 0.001 | -92 |
| Interaction | 0.3576409 | 0.134 | 133 |
| | 0.1595329** | 0.044 | 59 |
| Structure of reference: Average | | | |
| Explained differentials | -0.1386355*** | 0.001 | -51. |
| Unexplained differentials | 0.4072392** | 0.050 | 151. |
| Structure of reference: Males | | | |
| Endowments | 0.146226* | 0.098 | 100 |
| Coefficients | -0.2243579*** | 0.003 | -153 |
| Interaction | 0.2686236** | 0.011 | 183 |
| | 0.1019606 | 0.204 | 69 |
| Structure of reference: Pooled | | | |
| Explained differentials | -0.156774*** | 0.000 | -107 |
| Unexplained differentials | 0.3030003*** | 0.002 | 207 |

Note: *** p<0.01, ** p<0.05 and * p<0.1.

Source: Authors

In each of the two structures, the gap is divided into three components, i.e. "endowments" or "characteristics", "coefficient" or "valuation" and "interaction". In the first reference structure (i.e. "females"), the share of "endowments" represents -0.248 or (-92%) of average gross deviation. This means that the effect of individuals' "endowments" is less the average gross income gap.

This share reflects the increase in the females' incomes assuming they have the same characteristics as the group of males. In the absence of inequalities, the females' "endowments" contribute negatively (-92%) to average gross income gap, thus do not explain the gap. The share of "coefficient" represents 0.357 or (133%) of average gross deviation, the highest of the three components that brings in an advantage to males compared to females, due to inequalities. The share of "interaction", which measures the simultaneous effect between "endowments" and "coefficients", amounts to 0.15 or 59% of average gross deviation.

If the reference structure is the "pooled" intermediate structure, the explained variance is estimated at (-51%) the average gross deviation from the unexplained deviation (155%) of the overall gap. The inequality in earnings between males and females is strongly explained by the "coefficients", as by the "endowments" of individuals. This means that if the level of the male coefficients were adjusted to those of the females, the males' gains would increase by (133%).

If the reference structure is that of "males" the average gross deviation declines to 14%. The "endowment" share represents (-0.22) or (-153%) of the overall gap; the difference is thus not explained by characteristics of the males. The "coefficient" share represents 0.268 or (183%) of the overall gap. The "interaction" share represents 0.10 or (69%) of average gross deviation. In view of these results, the discrepancy is therefore explained by "coefficients", mainly due to inequalities between males and females. If the reference structure is the "pooled" intermediate structure, unexplained deviation is still most dominant (207%) within the overall deviation, against an explained variance of -0.15 or (-107%).

Hence, irrespective of the reference structure, the share of the unexplained gap is very high against females. This disadvantage is unrelated to their individual characteristics (human capital, age, professional experience, etc.). Thus, it is considered to be "pure discrimination" that reaches 207 percentage points. Perhaps, it is due to limited access to the most profitable activities, and/or because the products and services carried out by females target a low purchasing power clientele.

Conclusions, recommendations and limitations

We first recap our key findings. The results of the binary logistic estimate show that in the four North African countries, men are more likely to have access to the labour market. Age is a key determinant of access, the younger the individuals, the more likely they become active; a higher level of education is a deterrent to entry into the labour market and a university degree no longer guarantees a job. Married individuals are less likely to be active than single people. Individuals from poor households have a higher probability of participating in the labour force. Conversely, belonging to a wealthy household decreases the probability of participating in the labour force. The size of the household has a positive impact upon the inclusion of youth into the labour market, alongside residence in rural areas, as for Egypt and Tunisia.

According to the two binary logistic estimates applied separately to gender, the chances of finding a job are higher for a Tunisian female than for an Algerian female, whereas an Egyptian male is less likely to find a job than an Algerian male. In Morocco, both genders are

less likely to work than in Algeria. Tunisia is the most advanced country as for the inclusion of youth into the labour market and specifically for women.

A robustness test was carried out upon the logistic regressions, as for the influence of each country on the significance of the results once having removed Morocco, the results remaining robust. Noteworthy is that the database for Morocco is currently updated and this improve our findings.

Outcomes of the earnings function show that human capital variables increase the income of both genders. Women working in the informal sector and who come from rural areas enjoy lower returns as compared with urban women. Women who work in the informal sector on a fixed-term contract earn less than men in the same occupational status. Women are more likely to work for lower wages than men. Wages of the Egyptians are lower than those of the Algerians, while Moroccans earn less than Algerians. Although Tunisians are more likely to access the labour market, they earn less than Algerians.

Unlike OLS, quantile regressions provide a series of patterns as for the influential explanatory variables tested on the wage distribution. The gender wage gap declines continuously across the wage distribution, from the first decile (26%) to the last decile (12%). Consistent with human capital theory, the effect of schooling duration upon the wage gap is rising across the wage distribution. Consistent with labour market segmentation theory, working in the formal labour market segment vs. in the informal sector rises earnings continuously across distribution.

According to the decomposition of income differentials, the incidence of individual characteristics, for both men and women (age, education and place of residence), does not account very much for the average gross gap. This gap remains mostly unexplained regardless of the reference structure selected by the analysis. The disadvantage women face is not related to their characteristics on the labour supply side. It may be due to discrimination on the demand side (work contract, industry and occupational job status) as regards their uneasy access to the (formal) labour market, an issue we did not further discuss.

Persistent gender inequalities on the North African labour market, especially for youth, deserve policy recommendations, whose implementation and monitoring require a dedicated workforce from public administration and NGOs. Despite different economic, institutional and socio-cultural context from one country to another North African countries do share common features. Time span for transition from school to work is becoming longer for women; females remain aloof from the labour market, although their educational attainment is rising, due to pervasive stereotypes based on marriage and related family obligations, that shape mentalities persistently. When women enter the labour market, they move more towards the public sector where formal employment is better protected (e.g. maternity leave and adjusted working schedule).

First, a better understanding of female participation to the labour market requires data collection and disclosure from North African statistical offices, as well as the development of indicators enabling to gauge estimates. This is especially relevant for targeted categories of informal female workers, e.g. women who are homeworkers or family helps that operate in the informal sector, including agriculture (See WIEGO). Second, weak female participation in the labour market is related to the trade-off between the socially attributed role of women inside the family (household chores, child care, etc.) and paid work outside the family (Berniell et al, 2019).

Furthermore, a high rate of unemployment among university female students calls for the promotion of internships, entrepreneurship and vocational training in the academic curriculum.

A blend of enforcement and incentives -stick and carrot policies, is appropriate. On the demand side, providing day-care centers, promoting part-time protected jobs in the private sector as well as in the public sector and enforcing social protection for workers should be fostered, with a special attention towards females (ILO, 2018). Incentives for entrepreneurship including subsidised credit (and access to microfinance) to start a business can spur job creation in the private sector. On the supply side, monitoring wages in the private sector and promoting female unionisation (See Self-Employed Women Association –SEWA, Charmes, 2019) as a driver towards equal pay proves effective.

Beyond the diagnosis sketched in this report, there are limitations and forthcoming research avenues that should be tackled.

As for limitations, the workers last resort strategy versus voluntary choice to enter informality remains an open question our report did not address. The outcomes of this report can probably find already upstream their origins in large gender inequalities as for inclusion in the North African labour market. As previously mentioned, the Oaxaca Ransom decomposition model concentrates on all jobs from the least skilled to the most skilled, from rural to urban environment, from the formal to the informal sector. However, the self-selection of males with respect to females and the obvious gap in participation rate according to gender do not allow much to validate the existence of a high discrimination gender pay.

With respect to research avenues, larger data sets collection and/or a closer focus on the conditions of recruitment and job remunerations would improve our work in progress. On the demand-side, the sample we used is too aggregated, bringing together different hiring practices and remuneration policies depending on the country, the legal status of the recruiting institution (public/private) and also industry. On the supply-side, decomposition does not allow to take into account a selection effect in access to employment, which may be explained by unobserved individual characteristics. Disentangling the analysis according to the urban/rural residential environment may prove relevant as for inequalities. Going beyond the descriptive study sketched from *Sahwa* by Badrouni (2018) and tackling the case of young people, who are neither in education, nor in employment (NEET), might prove useful. Last, we do not document gender bias irrespective of age.

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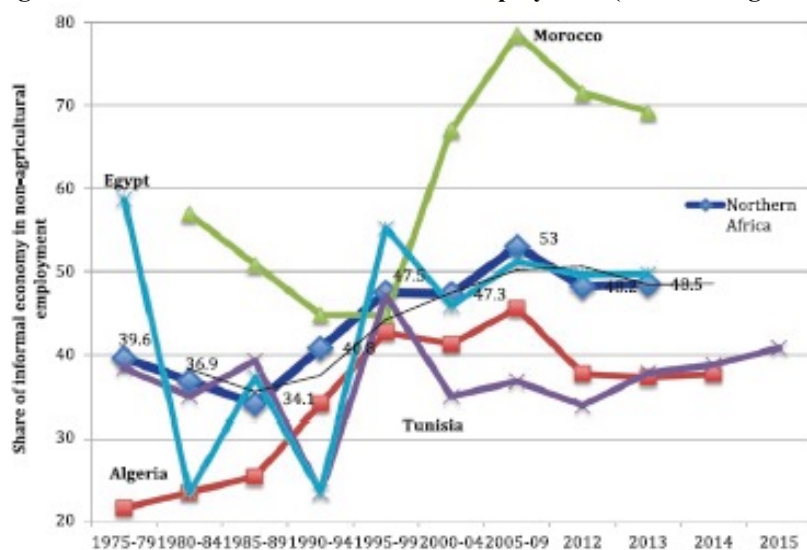
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Appendix

Figure A1. Trends and levels in informal employment (% of non-agricultural employment): North Africa



Note: Five-year period until 2009 and one year period since 2010. The black curve is a two-year moving average that is unweighted

Source: Charmes (2019, p. 42)

Table A1. Contribution of the informal sector to GDP in North Africa: 2000s and 2010s decades

| Countries (years) | Inf. sector (includ. agri.) in % of total GDP | Inf. sector (exclud. agri.) in % of non-agricultural GVA | Inf. sector (exclud. agri.) in % of total GDP |
|---------------------|--|---|--|
| North Africa (2000) | 35.1% | 27.1% | 23.9% |
| North Africa (2010) | 34.1% | 24.1% | 20.6% |
| Algeria (2003) | 37.9% | 30.4% | 27.1% |
| Algeria (2013) | 43.5% | 39.4% | 33.8% |
| Egypt (2008) | 27.8% | 16.9% | 14.7% |
| Egypt (2012) | 21.1% | 9.2% | 7.5% |
| Morocco (2007) | 32.8% | N/A | N/A |
| Morocco (2014) | 29.9% | N/A | N/A |
| Tunisia (2004) | 41.8% | 34.1% | 29.8% |
| Tunisia (2012) | 41.7% | 23.8% | 20.5% |

Note: Inf. Sector = Informal sector; includ. = including; exclud. = excluding; agri. = agriculture. N/A: not available.

Source: Charmes (2019, pp. 72 & 74)

Table A2. Share of informal employment in non-agricultural employment (%), by gender (2010)

| | Total | | Informal sector | | Total | | Informal sector | |
|---------|-------------|------|-----------------|-------|-------|-------|-----------------|-------|
| | Men + women | Men | Men | Women | Men | Women | Men | Women |
| Egypt | 49.8 | 43.4 | 54.4 | 48.3 | 26.3 | 18.3 | | |
| Morocco | 75.6 | 53.3 | 77.2 | 56.6 | 67.6 | 36.8 | | |
| Tunisia | 53.5 | 47.6 | 55.5 | 51.2 | 46.9 | 35.6 | | |

Note: Algeria missing; Egypt 2013 Labour force survey; Morocco 2010 Household and youth survey; Tunisia 2014 Labour market panel survey

Source: ILO (2018)

Table A3. Share of informal employment in non-agricultural employment (%), by occupational status

| | Total | | Employees | | Employers | | Own-account workers | | Family workers | |
|---------|-------|----------|-----------|----------|-----------|----------|---------------------|----------|----------------|----------|
| | Total | Informal | Total | Informal | Total | Informal | Total | Informal | Total | Informal |
| Egypt | 49.8 | 43.4 | 35.0 | 26.7 | 92.9 | 92.9 | 99.0 | 99.0 | 100 | 98.1 |
| Morocco | 75.6 | 53.3 | 66.5 | 32.6 | 63.2 | 63.2 | 96.4 | 96.4 | 100 | 100.0 |
| Tunisia | 53.5 | 47.6 | 41.3 | 33.7 | 98.7 | 98.7 | 99.5 | 99.5 | 100 | 100.0 |

Note: Algeria missing; Egypt 2013 Labour force survey; Morocco 2010 Household and youth survey; Tunisia 2014 Labour market panel survey

Source: ILO (2018)

Table A4. Estimation of logistic regressions as for males-vs. females' access to employment (without Morocco)

| Variables | Males | | Females | |
|---|-----------------------|---------|-----------------------|----------|
| | Coefficient | P-value | Coefficient | P-value. |
| Age (ref.: [15-19]) | | | | |
| [20-24] | 0.044 | 0.834 | 2.049 | 0.152 |
| [25-29] | 0.104 | 0.845 | 2.175 | 0.140 |
| Educational attainment (ref.: <i>medium</i> at most) | | | | |
| <i>Secondary</i> | 2.118 | 0.146 | 0.489** | 0.017 |
| <i>Tertiary</i> | 0.339** | 0.028 | 0.608*** | 0.002 |
| Marital status (ref.: <i>single</i>) | | | | |
| <i>Married</i> | -1.118*** | 0.000 | 1.572 | 0.210 |
| Standard of living (ref.: <i>poor</i>) | | | | |
| <i>Medium</i> | 2.727* | 0.099 | 0.136 | 0.815 |
| <i>Rich</i> | -0.560*** | 0.000 | 2.289* | 0.089 |
| Household size | 1.789 | 0.181 | 3.771** | 0.052 |
| Place of residence (ref.: <i>urban</i>) | | | | |
| <i>Rural</i> | 1.729 | 0.189 | -0.445*** | 0.005 |
| Country (ref.: <i>Algeria</i>) | | | | |
| <i>Tunisia</i> | 1.599** | 0.026 | 0.891*** | 0.000 |
| <i>Egypt</i> | -1.904*** | 0.000 | 0.759 | 0.384 |
| Constant | -0.491*** | 0.000 | -0.926*** | 0.00 |
| Log likelihood-2 | 2162.931 ^c | | 1024.001 ^b | |
| Cox & Snell R-square | .093 | | .086 | |
| Nagelkerke Pseudo R-square | .165 | | .178 | |
| N (observations) | 1,767 | | 709 | |

Note: *** p<0.01, ** p<0.05 and * p<0.1.

Source: Authors

Table A5. Dictionary of variables

| Characteristics | Code | Name | Type | Definition | Units | Source |
|--------------------------------|---------------|--|------------|---|-------------------------------|---------------------|
| Country sample | | <i>Country</i> | Discrete | DZ (Algeria) = 1 EG (Egypt) = 2 MA (Morocco) = 4 TN (Tunisia) = 5 | Ordinal (1, 2, 4, 5) | Sahwa |
| | ID5 | <i>Household stratum</i> | Discrete | 1. Urban = 1 2. Rural = 2 | Binary (1, 2) | Sahwa |
| Individual / Household: | HM22_1 | <i>Family relationship of the respondent</i> | Discrete | 1. Head of household = 1 2. Spouse of head = 2 3. Children of head + 5. Grandchild = 3 4. Father or mother of head = 4 6. Other relatives of head + 7. Unrelated = 5 | Ordinal (1, 2, 3, 4, 5) | Sahwa Calculated |
| | HM23_1 | <i>Gender</i> | Discrete | 1. Male = 1 2. Female = 2 | Binary (1, 2) | Sahwa |
| Individual | HM24_1 | <i>Year of birth</i> | Discrete | Age class (date of survey-year of birth): Below 16 = 0 (not further investigated) 16-19 = 1 20-24 = 2 24-29 = 3 30-59 = 4 (not further investigated) 60+ = 5 (not further investigated) | Ordinal (0, 1, 2, 3, 4, 5) | Sahwa Calculated |
| | HM25_1 | | Discrete | 1. No education+ 2. Pre-school+ 3. Primary+ 4. Middle = 1. at most primary school 5. Secondary = 2. at most secondary school 6. Higher learning = 3. | Ordinal (1, 2, 3) | Sahwa Calculated |
| | | <i>Duration of schooling</i> | Continuous | | Quantitative | Sahwa Calculated |
| | | | | | | |

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| | | | | | | |
|-------------------|---------------|--|------------|---|-------------------------|----------------------------|
| Individual | HM26_1 | <i>Marital status</i> | Discrete | 1. <i>Single</i> + 3 + 4 = 1. 2. <i>Married</i> = 2 3. <i>Divorced/separated</i> 4. <i>Widow(er)</i> | Binary (1, 2) | Sahwa <i>Calculated</i> |
| Individual | HM27_1 | <i>Employment status</i> | Discrete | 1. <i>Employed (including military service)</i> + 2. <i>Unemployed</i> = 1. Labour force 3. <i>Student/ schoolchild</i> + 4. <i>Retired/ pensioner</i> + 5. <i>Housewife</i> + 6. <i>Other inactive</i> = 2. Inactive | Binary (1, 2) | Sahwa <i>Calculated</i> |
| | HH128 | <i>Household size (Number of people)</i> | Continuous | | Quantitative | Sahwa <i>Calculated</i> |
| | INF16 | <i>Education level of father</i> | Discrete | 1. <i>No education</i> + 2. <i>Pre-school</i> + 3. <i>Primary</i> + 4. <i>Middle</i> = 1. at most primary school 5. <i>Secondary</i> = 2. at most secondary school 6. <i>Higher learning</i> = 3. | Ordinal (1, 2, 3) | Sahwa <i>Calculated</i> |
| | INF19 | <i>Education level of mother</i> | Discrete | 1. <i>No education</i> + 2. <i>Pre-school</i> + 3. <i>Primary</i> + 4. <i>Middle</i> = 1. at most primary school 5. <i>Secondary</i> = 2. at most secondary school 6. <i>Higher learning</i> = 3. | Ordinal (1, 2, 3) | Sahwa <i>Calculated</i> |
| Individual | EMP311 | <i>Type of contract</i> | Discrete | 1. <i>Indefinite duration</i> 2. <i>Fixed-term</i> 3. <i>Employment aid (assistance) measures</i> 4. <i>No contract</i> | Ordinal (1, 2, 3, 4) | Sahwa <i>Calculated</i> |
| Individual | EMP312 | <i>Industry</i> | Discrete | 1. <i>Agriculture</i> 2. <i>Manufacturing</i> 3. <i>Building and public works (construction)</i> 4. <i>Health services</i> 5. <i>Education</i> 6. <i>Trade</i> 7. <i>Other commercial services</i> 8. <i>Administration, non-commercial services</i> | Ordinal (1, 2, 3, 4) | Sahwa <i>Calculated</i> |
| Individual | EMP315 | <i>Job insured by the social security system</i> | Discrete | <i>Are you insured by the social security system?</i> 1. <i>Yes = Formal employment</i> 2. <i>No = Informal employment</i> | Binary (1, 2) | Sahwa <i>Calculated</i> |
| Individual | EMP324 | <i>Income last month</i> | Continuous | <i>What was your income in the last month?</i> | Quantitative | Sahwa <i>Calculated</i> |
| Individual | | <i>Standard of living</i> | Discrete | Poor = 1 Middle class = 2 Rich = 3 | Ordinal (1, 2, 3) | Sahwa <i>Calculated</i> |

Source: Sahwa Codebook (2016), authors