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Informal Employment in the Kabylia Region (Algeria): Labour Force Segmentation, Mobility and Earnings

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Abstract

A pooled sample of 3,290 Algerian workers from two regional household surveys captures the determinants of access to the formal vs. informal labour market segments. Youth, female gender and low educational attainment drive informal employment. Segmentation does not preclude occupational mobility, rather towards formal segments. Earnings functions on a sub-sample of 1,753 of formal and informal employees highlight an average 25 per cent wage gap, being lower among women, whereas gender pay gap is lower in informal employment. A quantile regression confirms that the distribution of earnings according to informality is somehow gender specific. A decomposition model shows that over two thirds of formal/informal segmentation are explained, whereas unexplained variables account for the highest share of the male/female wage gap.

JEL classification: E26, J46

Keywords: Algeria; decomposition model; earning functions; informal employment; mobility; segmentation.

Introduction

The informal employment issue aroused in the early 1970s (Charmes, 2019) and it is closely linked to the theory of labour market segmentation (Doeringer and Piore, 1971). The divide between the formal and the informal sector (Fields, 1975) challenges the core assumption of human capital theory, i.e. the concept of a single labour market. The formal sector proves attractive, because it provides better-paid jobs and enjoys social protection that are missing in the informal sector. Segmentation can also take place within the informal sector itself: the informal "lower tier" (or subsistence sector) wherein women operate provides easy access to low paid jobs, whereas the informal "upper tier" includes similar barriers to entry as in the formal sector (Fields, 1990). In as much as education and experience explain wage (or income) differentials, human capital

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theory fits quite well the formal sector but it fails to explain such wage (or income) differentials in the informal sector.

Informal employment, both as for wage earners and self-employed status within the meaning of the ILO, (ILO, 2013), has expanded in many developing countries, becoming norm of the labour market (Jutting and Laiglesia, 2009).This is the case for Algeria we tackle in this paper.

Three stylised facts are noteworthy as for the macroeconomic picture of informal employment (Charmes, 2019, p. 41). First, average (non-agricultural) informal employment is a lasting or structural phenomenon. Second, informal employment is negatively related to GDP per capita. Last, informal employment is countercyclical: rising with economic growth slowing down until the late 2000s and contracting with upgraded economic growth in the early 2010s. The trends and level differ according to the impact of economic shocks and the employment policies designed to absorb these (Adair and Souag, 2019).

Labour Force Surveys (LFS) conducted by the National Statistics Office (ONS) in Algeria from 1997 to 2013 show that informal employment has been rising throughout 1997-2007 and stabilizes between 2008-2013 (Souag, Adair and Hammouda, 2017). This remarkable expansion from 33.5 per cent of total non-agricultural employment (2001) to 45.6 per cent (2010) was accompanied by an almost symmetrical drop in the unemployment rate, from 27.3 per cent to 10 per cent during the same period. The trend of these two indicators (See Figure 1 in the Appendix) supports the hypothesis of absorption of unemployment by informal employment (Adair and Souag, 2019). However, informal employment fell back to 32.5 per cent in 2016, whereas the unemployment rate remained roughly stable around 10-11 per cent, questioning the absorption assumption. In addition, the LFS does not collect any income data and does not shed any light on the determinants of employment and informal employment.

The level of informality follows an inverted U-shaped distribution, more likely to be higher among young and older workers (Charmes, 2019).

Informal employment is a larger source of jobs for men than for women (Charmes, 2019). The share of self-employment in non-agricultural employment, a proxy for the informal sector increased over the 1980s and the 1990s in Algeria (ILO, 2002).

Informal female employment is mainly self-employment: three out of four women in the informal sector are self-employed (67% and 7% are family workers), whereas over one fifth are non-permanent employees. In addition, almost nine out of ten (87.9%) self-employed women operate in the informal sector (ONS, 2013).

According to the ONS, from 2010 to 2018, the average participation rate is over fourth times higher for men (66.8%) than for women (16.4%).

Beyond these stylised facts, little is known about the determinants of access to the labor market and formal / informal segmentation, occupational mobility patterns, the associated gains as well as the gender inequality that this article addresses on a regional scale.

In this respect, we take advantage from two household surveys carried out in 2012 in Bejaia (Bellache, 2012) and in Tizi-Ouzou in 2013 (Babou, 2014), as a pooled and thus substantially enlarged sample comprising 3,290 workers (1,552 households) of all working age groups. We focus on gender inequality that goes hand in hand with informal employment (Malta et al, 2019), documenting the gender wage gap for formal and informal female employees with respect to their male counterparts, an issue that has not been tackled so far in Algeria. We use a consistent subsample of 827 workers to address occupational mobility from and towards formal/informal employment, a topic that is little documented regarding Algeria. Eventually, we apply a decomposition model in order to investigate the explained vs. unexplained parts of the wage gap with respect to the formal/informal divide and gender; it disentangles the factors relating to labour supply (human capital variables) from those relating to labour demand (job status and position variables). To our best knowledge, this issue has not been examined yet in Algeria.

Section 1 is devoted to the literature review on informal employment in Algeria according to the definition from the ILO, in particular the main results of the households surveys carried out from 2007 to 2015. Section 2 presents the sample and descriptive statistics, whereas a multinomial logistic regression investigates the determinants of access to the various formal and informal segments of the labour market. Section 3 examines occupational mobility towards and from formal employment vs. informal employment. Section 4 uses earnings functions to analyse the determinants of wages for formal and informal employees, and a decomposition model

to identify the explained and unexplained parts of the segmentation between formal and informal employees, from supply-side and demand side factors.

1. Informal employment in Algeria: definitions and literature review

We list hereafter the works carried out on the informal economy in Algeria, which inspire from the ILO definition of informal employment (See box 1).

As Charmes and Remaoun (2014) point out, two categories of studies should be distinguished: (i) those relating to businesses and the informal sector, (ii) those relating to informal paid employment. The first category addresses the definition of concepts (Musette and Charmes, 2006), descriptive statistics (CNES, 2004; ONS, 2012) and a review of measurements (Hammouda, 2006). The second category gathers five surveys carried out respectively in 2000 (Adair, 2002), in 2007 (Bellache, 2010; Adair and Bellache, 2012), in 2012 (Bellache et al, 2014; Gherbi, 2014; 2016) and in 2013 (Babou, 2014; Babou and Adair, 2016). A last survey regarding exclusively young people (16-29 years old) from the MENA region in 2015 includes a sample from Algeria (Merouani et al, 2018; Gherbi et al, 2019; Gherbi and Adair; 2020).

Box 1. Definition of informal employment

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, which provide some legal market output, are not registered or their employees 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. This is 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, workplace 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, p. 18). Theoretically, the informal sector is included within informal employment like Russian dolls.

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 household members producing goods and services for their own final use).

So far, no national survey has captured informal employment in Algeria, apart from a non-representative survey carried out in 2000 in five regions (Adair and Bounoua, 2003). The household survey carried out in Bejaia in 2007 is the very first regional investigation (Bellache, 2010). In 2012, a new household survey was conducted in Bejaia (Bellache et al, 2014), while a mixed household and business survey took place in Tizi-Ouzou in 2013 (Babou and Adair, 2016). The surveys carried out in Bejaia in 2007 and 2012 give rise to a longitudinal analysis, which identifies mobility patterns according to age and throughout the various labour market segments (Adair and Bellache, 2018).

These cross-sectional surveys did document the determinants and earnings of informal workers on a regional scale. Such is not the case for time series studies on the absorption of unemployment by informal employment, which restated the aggregated data from the ONS (Souag et al, 2018; Adair and Souag; 2019) and do not provide any income information.

Bellache (2010) and Adair and Bellache (2012) identify the determinants of access to informal employment with binary logistic regression, whereas Bellache et al (2014) use a multinomial logistic regression, and estimate the earnings functions of informal employees upon a first sample (1,252 workers) drawn from a first household survey conducted in 2007 in the region of Bejaia. Bellache et al (2014) conducted in 2012 a second household survey in the same region of Bejaia on a larger sample (2026 workers), addressing the same issue of access to informal employment. In addition, Adair and Bellache (2018) investigate occupational mobility between 2007 and 2012 throughout a longitudinal survey. The demographic characteristics (age, gender and marital status) and weak human capital determine the access to informal employment. The estimated earnings function of informal workers highlights the role of professional experience, age of employees, gender and industry in the determination of income. Differences in human capital and demographic profiles between formal and informal workers is consistent with the thesis of the labour market segmentation from the supply-side. Demand-side factors are not investigated.

Babou (2014) and Babou and Adair (2014; 2016) apply a logistic multinomial regression on a sample of 1,267 non-agricultural workers from a households survey carried out in 2013 in the region of Tizi-Ouzou. Sociodemographic characteristics (age,

marital status and gender) and human capital (educational attainment and experience) play a major role in the choice of entering a given segment of the labour market.

Babou, Bellache and Adair (2019) use a pooled sample of 3,290 workers from two household surveys (1,552 households) conducted upon a similar questionnaire in two regions in Algeria: Bejaia (2012) and Tizi-Ouzou (2013). Logistic regressions capture the determinants of informal employment compared to those of formal employment: age (youth), marital status (single), gender (female), and (low) level of educational attainment increase the likelihood of informal employment. Earnings functions estimate the wages of formal and informal employees: work experience increases the earnings of formal and informal employees; formal and informal female employees earn less than males; formal wage employment in the manufacturing industry increases earnings with respect to other industries; informal wage employment in building and construction increases earnings with respect to other industries. Main findings corroborate the salient facts from previous regional household surveys and prove consistent with stylised facts from national labour force surveys in Algeria.

Merouani et al. (2018) analyse a sample of 1,525 young workers aged below 30 from Algeria, Morocco and Tunisia in 2015, a selection of the *Sahwa* dataset (Sahwa, 2016). The average rate of affiliation to social security in Algeria is two out of five (41%). It suggests that most youth workforce that is risk-taking and voluntarily choosing to evade social security coverage, is informal. The ambiguous impact of education proves positive both on the probability of enjoying social protection, but also on that of choosing informality, irrespective of gender, although females are less likely to choose informality. Unfortunately, the role of women within family income-seeking strategies in informal employment is not addressed. Noteworthy is that voluntary choice of youth workforce for informal employment runs against the conclusion that informality is mainly an involuntary last resort or subsistence strategy (Bellache, 2010).

Gherbi et al (2019) and Gherbi and Adair (2020) use the *Sahwa* dataset (*Sahwa*, 2016) in order to address the issue of formal/informal segmentation with respect to youth gender inequalities in North Africa (Algeria, Egypt, Morocco and Tunisia). The labour force sample includes 3,027 individuals, among which over a quarter (815) from Algeria.

Sahwa (2016), a survey funded by the European Union, was conducted in 2015 upon a sample of 10,000 young people aged 16-29 years old from five countries of the Middle East and North Africa region (Algeria, Morocco, Tunisia, Egypt and Lebanon). It uses a same in-depth questionnaire covering education, employment and integration, political participation, values and culture, gender issues, migration and international mobility.

Access to the labour market increases with age. Males are twice as likely to be active compared with females, who enjoy on average higher educational attainment, which is negatively correlated with the participation the labour market. According to quantile regressions, the wage gap between formal and informal employees proves substantial, whereas the wages of female employees, whether formal or informal, are systematically below those of their male counterparts, and the gender gap is rising throughout the distribution of earnings.

Surveys using the *Sahwa* database are limited to the age group of working people below 30, which generates a "magnifying glass effect", and their outcomes cannot be extrapolated to other age groups.

2. Determinants of access to labour market segments in Bejaia and Tizi-Ouzou

2.1. Sampling and descriptive statistics

The study focused on two representative samples drawn from two surveys: a household survey carried out in Bejaia (2012), and a household survey in Tizi-Ouzou (2013).

The Bejaia sample gathers 2,026 non farming workers (1,016 households), spread over 12 urban and rural municipalities, which represent almost a quarter of all the municipalities in the region and include more than half of all the households identified for the general population and housing census (RGPH) in 2008. The Tizi-Ouzou sample includes 1,264 non-farming workers (536 households), spread over eight urban and semi-urban areas, which concentrate over a quarter of the households and one third of MSMEs (Micro, Small and Medium-sized Enterprises) in the region. These two household surveys do not differ except in the size of the sample but not in the selection procedure and the questionnaire used is the same in both surveys. The surveys are

representative at the regional level, but not at the national level, which has allowed pooling the samples. The non-response rate for the household pooled sample is 4.5% (70/ 1526).

We compare the active population in the regional sample with the national Labour Force Survey (LFS) regarding gender, age, education, employment status and informality (Table A1, Appendix).

Women are overrepresented as for both the employed population and the unemployed population in the regional sample.

Women head over one third of households (34.8%) in Kabylia, whereas the countrywide share of female household heads is only one out of ten (10.4%) in 2008 (ONS, 2008). In addition, the 2008 population Census (ONS, 2014a) shows that female participation rate in Kabylia (22.3% in Tizi-Ouzou and 16.1% in Bejaia) is significantly higher than the national rate (14.3%). The large participation of women to the labour force is also due to exhaustive investigation of the informal sector, taking into account the importance of 'invisible' female homeworking in Kabylia (Bellache 2010), particularly in the craft industry, which is not usually investigated.

Age distribution of the active population proves very similar in both samples.

As for the distribution of education levels in the active population, the share of secondary and tertiary educated workers is higher in the regional sample, particularly for academics.

The distribution of the employed population according to employment status is roughly equivalent in both samples.

The informal employment rate, based on non-affiliation with social security outside agriculture is lower in the regional sample vs. national sample (31.5% against 37.7%). However, the breakdown by gender for the self-employed and the employees is similar in both samples, the informality rate of self-employed is much higher among women; whereas the informality rate of employees is lower among women, in comparison with their male counterparts.

2.2. Determinants of access to the labour market segments in Bejaia and Tizi-Ouzou

We apply a multinomial logistic regression model on the overall sample of 3,290 individuals (See Box 2).

The dependent variable to be explained is access to the various formal and informal segments of the labour market. This variable has five modalities: unemployed, employed in formal employment, employed in informal employment, formal self-employed and informal self-employed.

In accordance with the definition of the ILO (ILO, 2013), the informal employee here corresponds to the unprotected employee, that is to say an individual not affiliated with the national social insurance fund (CNAS) and the informal self-employed is one not affiliated with CASNOS (social insurance fund for the self-employed) and who does not pay taxes.

Box 2. The logistic regression model

The logistic regression relates the occurrence of an event to a set of explanatory variables developing a predictive model.
The logistic regression model is expressed as follows:

$$y_i = \frac{j}{xi} = \frac{\exp(X\beta)}{1+\exp(X\beta)} \quad (1)$$

With respect to individuals and choices the indices are *i* and *j*, β is the vector of parameters related to the characteristics *xi* such as the model generates an indeterminacy that is removed with a simple normalisation $\beta = 0$.
In the context of multinomial logistic regression, the probability (*Pr*) of the occurrence of an event (the dependent variable *yi*), all things being equal, varies between 0 and 1.
The multinomial logistic regression model is expressed as follows:

$$Pr(Y_i) = 1 \mid x_i) = \mathrm{F}(x_i'\beta) = \frac{\exp(X\beta)}{1+\exp(X\beta)} = \Lambda(X\beta) \quad (2)$$

$$Pr(Y_i) = 0 \mid x_i) = \mathrm{F}(x_i'\beta) = \frac{1}{1+\exp(X\beta)} = 1 - \Lambda(X\beta) \quad (3)$$

The independent variables used in the multinomial logistic model relate to the socio-demographic characteristics of the working population (age, gender, marital status), their human capital being approximated here by educational attainment, the status of previous employment and the area of residence (urban, semi-urban or rural).

We estimate a labour supply equation to calculate the probability that an individual enters one of the labour market segments, rather than remaining unemployed. Five alternatives are available to (3,290) individuals aged 15 and over: unemployed (738), formal employee (1,422), informal employee (384), formal self-employed (327) and informal self-employed (419).

We define the unemployment situation as a reference variable and we estimate the effect of certain explanatory variables on the probability of entering the four other labour market segments.

T hree types of variables are included into the model (see Table A3 in the Appendix), continuous variables (age and age^2), binary qualitative variables (gender, marital status and the place of residence) and qualitative variables with more than two modalities (educational attainment and previous employment status).

Table 1 reports the outcomes.

Table 1. Determinants of access to the labour market segments in Bejaia and Tizi-Ouzou (2012)

Variables	FE		IE		FSE		ISE	
	B	Exp (B)	B	Exp (B)	B	Exp (B)	B	Exp (B)
Demographics								
Age	,202***	1,223	,045	1,046	,158***	1,171	,143***	1,154
Age 2	-,002***	,998	,000	1,000	-,001*	,999	-,001**	,999
Male	,135	1,144	,359**	1,432	1,040***	2,828	,397***	1,488
Married	,782***	2,187	,497**	1,643	1,340***	3,820	1,009***	2,742
Education								
None/primary	-1,472***	,230	,819***	2,269	-,914***	,401	1,331***	3,783
Medium	-,923***	,397	1,105***	3,020	-,455**	,635	1,438***	4,213
Secondary	-,450***	,638	,506**	1,658	,200	1,221	1,445***	4,242
Employment								
Urban area	-,038	,963	-,355**	,701	,201	1,223	-,439***	,645
Formal employee	19,060***	1,895E+08	19,334***	2,492E+08	19,615***	3,301E+08	19,290	2,385E+08
Informal employee	4,522***	92,020	5,199***	181,063	4,892***	133,227	4,611***	100,582
Formal self-emp.	18,944***	1,687E+08	19,163***	2,101E+08	19,761***	3,821E+08	19,845	4,153E+08
Informal self-emp.	19,291***	2,387E+08	19,679***	3,519E+08	20,193***	5,884E+08	19,999	4,848E+08
Size of the sample	3,290							
% of predicted cases	50.2%							
2 Log likelihood	- 5436							
Khi-square	1498 (,000)							
Pseudo R2 Nagelkerke	0,388							

*Note: Note: FE=formal employee, IE=informal employee, FSE=formal self-employed, ISE=formal self-employed. Reference is unemployed. * p<0.1; **p<0.5; *** p<0.01.*

Source: Surveys in Bejaia, 2012, and Tizi-Ouzou, 2013.

Demographic variables (gender, age and marital status) are all significant.

Being a man promotes better access to various labour market segments, relative to women. Almost three times more likely (2.828) to access employment as a formal self-employed, rather than remaining unemployed. Conversely, women are less likely to get a job than men are.

Age increases the probability of entering the formal and informal labour market, relative to the unemployed. Older people are more likely to be in formal employment as employees or self-employed rather than in the informal sector first as self-employed and then as employees. Conversely, young people are less likely to access formal employment, starting their working life either as unemployed or as informal workers. This is in line with ONS (2012) showing that unemployment in Algeria affects much more youth and the most educated (See also Gherbi and Adair, 2020).

Being married increases the probability of access to a job, particularly as formal employee or self-employed, compared to single people. In the informal sector, married individuals are more likely to be self-employed than employees.

Human capital of individuals also plays an important role in accessing the formal and informal labor market segments. Compared to tertiary level of education, a low level of education increases the probability to entering the informal labor market as a self-employed or employee, relative to the unemployed and formal workers, on the one hand, and reduces the probability of getting access to formal labour market segments on the other hand.

Last, socio-professional mobility exerts a positive effect on access to employment, both in formal and informal employment. Individuals with previous employment are more likely to find a job relative to formal and informal workers without previous employment and the unemployed. This could be explained by the recourse to social capital networks, formed during their previous employment.

2.3. Occupational mobility: a subsample of 827 formal and informal workers

We focus hereafter on the occupational mobility of a subsample of 827 workers who documented whether they did or not experience a change in their work status. Table 2 reports that over three out of five workers (522) did experience such a change.

Table 2. Labour market status and occupational mobility of 827 workers in 2012-2013

Previous job/Current job	**FE**	**IE**	**FSE**	**ISE**	**Total workers = 827**
FE	188	45	66	58	357
IE	132	74	39	48	293
FSE	21	5	11	16	53
ISE	49	20	23	32	124
Subtotal = 522 mobile workers	202	70	128	122	

Note: FE=formal employee, IE=informal employee, FSE=formal self-employed, ISE=formal self-employed.

Previous job in column, current jobs in rows.

Source: Authors

Slightly less than half (169) of the 357 formal employees (FE) did access a formal job, most previously being informal employees or self-employed workers (FSE or ISE), and they should be better off.

Three-quarters (219) of the 293 informal employees (IE) did become informal, almost half (132) previously being formal employees, and they should be worse off.

About four out of five formal self-employed (42/53) did change, as well as three-quarters (124) of the informal self-employed.

The most mobile workers are informal employees and self-employed. Conversely, more than half (188) of the 357 formal employees were not mobile and they should not be worse off.

We run a multiple correspondence factor analysis (MCFA) and an automatic classification (AC) The MCFA explains 70% of the overall variance, identifying three distinct groups of individuals. Whereas AC confirms this distribution into three distinct clusters or classes according to a series of four variables (See Table A2 in the appendix)

Class 1 consists in 325 active individuals, including three sub-groups: (i) non-mobile individuals (mob-1) who are women and young workers enjoying tertiary educational attainment; (ii) mobile individuals moving towards informal employment (mob-3) and (iii) mobile individuals within informal employment itself (mob-5). Class 2 gathers 307 mobile individuals, men (sex-1) moving towards formal employment (mob-2). Class 3 includes 195 mobile individuals with medium or secondary level of education who are moving within formal employment from the status of employee to that of self-employed (mob-4).

3. Earnings functions, quantile regressions and the decomposition model

3.1. Average wage differentials for employees: Descriptive statistics

Going back to the wage employment sub-sample, we focus upon the wage gap according to the formal/informal divide and the gender pay gap. Total wage employment includes 1,753 individuals divided into 1,387 formal employees (53.56% males and 46.44% females) and 366 informal employees (60.38% males and 39.62% females). Informality affects one out of five employees and three out of five are males.

Table 3. Average wage differentials according to the formal/informal divide and gender

Average wage differentials	Amount in Algerian Dinar (DZD)	Gap (Percentage)
Average formal wage	31,294.88	
Average informal wage	22,742.34	
Formal / informal wage gap	8,552.54	27.3
Average formal male wage	34,102.68	
Average informal male wage	24,078.73	
Male formal / informal wage gap	10,023.95	29.3
Average formal female wage	28,046.03	
Average informal female wage	20,705.51	
Female formal / informal wage gap	7,340.52	26.1
Gender pay gap in formal employment	6,056.65	17.76
Gender pay gap in informal employment	3,373.22	14.0
Average overall (formal+informal) male wage	31,733.61	
Average overall (formal+informal) female wage	25,348.69	
Average overall (formal+informal) gender wage gap	6,348.92	25.1

Note: DZD 100 = $ 0.78

Source: Authors

The wage gap (27.3%) between formal and informal employment is roughly equivalent to that (25.2%) in the study of Lassassi and Muller (2014) based on the 2000 consumption survey.

This gap may be explained by the difference in human capital and to a lesser extent by that of professional experience between formal and informal employees. In formal employment, four out of ten employees enjoy a higher educational attainment

against one out of ten informal employees. Seniority is higher for formal employees than for informal employees. Noteworthy is that the wage gap between formal and informal employees is higher among men (29.3%) than among women (26.1%).

According to our findings, the gender pay gap is higher in formal employment (17.7%) than in informal employment (14%), whereas according to Lassassi and Muller (2014) the gender pay gap is higher in informal employment (40.3%) than in formal employment (32.4%), which seems odd.

The informal sector is a subset of informal employment; conversely, informal employment (ILO, 2003) is larger than employment within the informal sector (ILO, 1993). In addition, the public sector includes some informal employment (i.e. youth not getting social protection coverage). Gender pay gap is indeed larger in formal employment than in informal employment. In addition to individual characteristics, this gap could be explained by job status. Earnings differentials may be due to underemployment (below 40 statutory working hours per week) and formal part-time jobs, which affect especially women in the public sector, who are underpaid (Blunch et al , 2011; ONS Survey 2016).

According to Table 4, the wage gap between men and women in formal employment is all the more unjustified as women are better endowed with human capital than men are. On the one hand, the share of female employees enjoying a higher level of education is larger (45.5%) than that (39.7%) of men is. On the other hand, male employees experience a longer seniority relative to women. As for informal employment, the gender gap for education is less obvious, whereas men enjoy a longer seniority.

Table 4. Characteristics of employees according to the formal/informal divide and gender

Characteristics	Formal employees						Informal employees					
	Males		Eemales		Total		Males		Females		Total	
	743	%	644	%	1387	%	221	%	145	%	366	%
Education												
Primary at most	88	11,8	68	10,5	156	11,2	50	22,6	34	23,4	84	22,9
Medium	179	24,0	106	16,4	285	20,5	117	52,9	67	46,2	184	50,2
Secondary	228	30,6	176	27,3	404	29,1	32	14,4	29	20,0	61	16,6
Tertiary	248	33,3	294	45,6	542	39,7	22	9,9	15	10,3	37	10,1
Seniority												
1 - 3 years	140	18,8	206	31,9	346	24,9	67	30,3	43	29,6	110	30,0
4 -10 years	165	22,2	128	19,8	293	21,1	53	23,9	42	28,9	95	25,9
11-20 years	152	20,4	136	21,1	288	20,7	50	22,6	25	17,2	75	20,4
Over 20 years	286	38,4	174	27,0	460	33,1	51	23,0	35	24,1	86	23,4

Note: Percentages read on the vertical axis.

Source: Authors

Lassassi and Muller (2014) find that employed females are on average less paid than their male counterparts are, in all labour market segments (formal, informal and public) and particularly those enjoying a higher educational attainment. Our findings are consistent with those of Lassassi and Muller (2014) and thus quite opposite to those of the 2011 consumption survey (ONS, 2014b), according to which the average female wage (DZD 33,900) is higher than the average male wage (DZD 28,687), a gap of 18.1% in favour of women. This favourable gap is due to higher educational attainment for female employees compared to that of male employees. Noteworthy is that almost two-thirds of the wage bill is provided by the public sector, wherein female labour force (only 15.6% of overall labour force) is over-represented as for education and health services. The wage gap against women declines with rising level of education, a difference of 17.1% and 8% respectively for the primary level and for the tertiary level. The same observation applies to socio-professional categories. In domestic services (which are mainly informal), the gender wage gap is 57.6% in favour of men.

3.2. Earnings functions: the formal/informal divide and gender

In order to capture the determinants of earnings for formal (1,387) and informal (366) employees from the pooled sample, we estimate an "extended" earnings functions. In addition to the human capital variables (educational attainment and professional experience) in the basic Mincer model (box 3), we include into our extended model additional variables: demographics (gender, age and marital status), the place of

residence (urban or rural), industry and previous employment status. The model estimates the logarithm of the average monthly wages.

Box 3. The Mincer earnings function

$$Ln\, W_{it} = Ln\, Wi_0 + r_{is} + \sum_{t=s}^{t-1} r_{it}\, k_{it} + U_{it} \quad (1)$$

W_{it}: wages of individual *i* at time *t*
LnW_{it}: logarithm of nominal 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

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 percentage.
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:

$$Ln\, W_{it} = W_0 + r_s S_i + r_e\, EXP_{it} + U_{it} \quad (2)$$

$r_e EXP_{it}$: return on the professional experience of individual *i* at time *t*
The contribution of professional experience to the rise in the individual's earnings expresses how much, on average, one year of experience increases wages in percentage.
The hypothesis of declining marginal productivity of professional experience, alongside with age, leads to the inclusion of a quadratic variable in the earnings function.

$$LnW_{it} = W_0 + r_s S_i + r_e EXP_{it} + r_{e^2}\, (EXP)^2 + U_{it} \quad (3)$$

Source: Authors from Mincer (1974).

3.2.1. Formal employees

Table 5 records the estimation of the earnings function for the 1,387 formal employees and the determinants of their income. The estimated model explains 24.9 per cent of the differentials in earnings of these employees. It highlights the influence of human capital (level of education and professional experience), age, gender, industry and previous employment status.

Employees with a very low level of education (uneducated or primary at most) earn one third less an income than those with a higher level of education. Employees with a medium or secondary level earn respectively 24.4 per cent and 22.3 per cent less compared to those enjoying a higher education level. Professional experience increases to a lesser extent the income of formal employees. Thus, an additional year of experience increases, on average, income by 2.7 per cent.

Table 5. Estimation of the earnings function: formal employees (1387)

Explanatory variables	**Coefficient**	**Standard Error**	**t-Stat (Student)**	**Prob (significance)**
Primary at most	-0.333084***	0.045645	-7.297283	0.0000
Medium	-0.244045***	0.035466	-6.881109	0.0000
Secondary	-0.223163***	0.031619	-7.057810	0.0000
Professional experience	0.027943***	0.005124	5.453736	0.0000
Professional experience^2	-0.000491***	0.000125	-3.925442	0.0001
Age	0.022525*	0.012529	1.797753	0.0724
Age^2	-0.000129	0.000153	-0.844804	0.3984
Male	0.120714***	0.026648	4.529952	0.0000
Married	0.002532	0.034070	0.074305	0.9408
Urban	-0.007896	0.029604	-0.266719	0.7897
Manufacturing industry	0.007943	0.034491	0.230292	0.8179
B & Construction	0.040720	0.049399	0.824314	0.4099
Trade	0.110359***	0.040426	2.729904	0.0064
Formal employee (FE)	-0.017592	0.037815	-0.465202	0.6419
Informal employee (IE)	-0.155453***	0.044627	-3.483370	0.0005
Formal self-employed (FSE)	-0.197490*	0.106724	-1.850474	0.0645
Informal self-employed (ISE)	-0.163391**	0.068584	-2.382348	0.0173
Constant	9.415556***	0.229521	41.02271	0.0000
R^2	0.258985			
Adjusted R^2	0.249777			

*Note: *** p<0.01, ** p<0.5, * p<0.1. Formal employee (FE), Informal employee (IE), Formal self-employed –FSE) and Informal employee (ISE) refer to previous job-status.*

Source: Authors

Age and gender also influence the earnings function. Being a man brings in a 12 per cent gain in wages and one additional year increases this gain by 2.2 per cent. Working in the trade industry also increases income by 11 per cent. Last, a previous job

allows to earning more than beginners earn. Having already worked as an informal employee or as an informal or formal self-employed rises wages respectively by 15.5 per cent, 16.3 per cent and 19.7 per cent.

3.2.2. Informal employees

Table 6 reports the earnings function for the 366 informal workers, which explains 20.9 per cent of their income differentials.

Table 6. Estimation of the earnings function: informal employees (366)

Explanatory variables	Coefficient	Standard Error	t-Stat (Student)	Prob (significance)
Primary at most	-0.378516***	0.093233	-4.059895	0.0001
Medium	-0.240187***	0.085897	-2.796202	0.0055
Secondary	-0.251568***	0.096819	-2.598341	0.0098
Professional experience	0.019743***	0.006345	3.111477	0.0020
Professional experience^2	-0.000157	0.000131	-1.195092	0.2329
Age	0.030922**	0.015384	2.010006	0.0452
Age^2	-0.000359*	0.000202	-1.774561	0.0768
Male	0.151413***	0.049743	3.043910	0.0025
Married	0.050593	0.069281	0.730252	0.4657
Urban	-0.055738	0.052593	-1.059796	0.2900
Manufacturing industry	-0.038091	0.053279	-0.714925	0.4751
B&Construction	0.057526	0.043394	1.325686	0.1858
Trade	-0.015796	0.047435	-0.333009	0.7393
Formal employee	0.100386	0.077723	1.291592	0.1974
Informal employee	-0.024406	0.064322	-0.379443	0.7046
Formal self-employed	-0.120910	0.325875	-0.371031	0.7108
Informal self-employed	-0.098867	0.107677	-0.918179	0.3592
Constant	9.279872***	0.293515	31.61634	0.0000
R^2	0.246326			
Adjusted R^2	0.209509			

*Note: *** p<0.01, ** p<0.5, * p<0.1.*

Source: Authors

The effect of educational attainment on the earnings of informal workers is stronger than on formal workers. Thus, those with a low level of education have a 37.8 per cent lower income compared to those with a tertiary level of education. Those with

a medium or secondary level earn respectively 24 per cent and 25.1 per cent less than those with a tertiary level earn. On the other hand, professional experience is less valued in informal employment than in formal employment. An additional year of experience in informal employment allows a gain of 1.9 per cent (2.7% in formal employment). Age and gender also influence the earnings of informal employees, as in the case of formal employees. Being a man brings in a 15.1 per cent gain in wages relative to women and one additional year increases income by three per cent.

3.3. Quantile regressions

Quantile regressions show that the distribution of earnings is not always symmetrical for males and females with respect to informality, which may be gender specific.

As for males, *Informal* increases wage penalty for all quantiles of earnings, except for highest Q75 and Q90. In line with the Mincer function, no education explains wage penalty for all quantiles except Q90, whereas tertiary education brings in wage premium for all quantiles, mostly for Q90, and it increases with each quantile from Q25 to Q90. Experience also explains wage premium for all quantiles, except Q90. Living in rural area explains wage penalty for all quantiles except Q10. Workers in manufacturing, building and trade industries suffer wage penalty. The absence of contract explains wage penalty for all quantiles except Q90. See Table A3 in the appendix.

As for females, *Informal* increases wage penalty for the lowest quantile of earnings. In line with the Mincer function, tertiary education brings in wage premium for all quantiles, mostly for lowest Q10. Experience also explains wage premium for all quantiles, except Q90. Absence of contract explains wage penalty for all quantiles except lowest Q10. See Table A4 in the appendix.

3.4. An Oaxaca-Blinder decomposition of wage differentials

To determine the share of explained vs. unexplained variables as regards the difference between employees (separately formal/informal and male/female), we design an Oaxaca-Blinder wages decomposition (Oaxaca, 1973; Blinder, 1973). As in the previous models, we explain ln Income by a vector of determinants, according to the following regressions:

$$\ln Income_{it} = \begin{cases} \beta^{Informal} x_{it} + u_{it}^{Informal}, if\ Informal \\ \beta^{Formal} x_{it} + u_{it}^{Formal}, if\ Formal \end{cases} \quad (4)$$

Where x is the vector of determinants and β is the vector of parameters including an intercept.

The gap between formal and informal employees is calculated as:

$$\ln Income^{Formal} - \ln Income^{Informal} = \beta^{Informal}\Delta x + \Delta\beta x^{Informal} + \Delta\beta\Delta x = E + C + I \quad (5)$$

Where $\Delta x = x^{Formal} - x^{Informa}$, $\Delta\beta = \beta^{Formal} - \beta^{Informal}$ E represents the endowments, C – the coefficients and I – the interaction between endowments and coefficients.

The endowments quantify the mean increase in the income of informal employees if they had the same characteristics as formal employees.

The coefficients represent the change in the income of informal employees when applying the coefficients of formal employees to the characteristics of informal employees.

The interaction term measures simultaneous effect of both endowments and coefficients (Jann, 2008).

Table 7 reports Oaxaca-Blinder decomposition between formal and informal employees.

Overall explained variables (endowments and interaction) account for 71 per cent of the difference (0.218 out of 0.309), whereas unexplained variables (coefficients) account for 29 per cent of the difference (0.091 out of 0.309). We first look at the formal/informal wage gap: average log income of formal employees, which is higher than that of informal employees (10.204 versus 9.896).

Assuming that informal employees have the characteristics of formal employees (i.e. same human capital) their average income would increase by 0.079, which would not be enough to bridge the wage gap. Variables accounting for the formal/informal wage gap come mostly from the supply-side, are the following (in descending order): experience, absence of contract, enjoying tertiary education. Variables with lower

explanatory power include being located in the Tizi-Ouzou region and working in the building and construction industry.

Table 7. Oaxaca-Blinder decomposition, formal vs. informal

Variables	Overall	Endowments	Coefficients	Interaction
Female		-0.007	0.002	0.000
Tizi-Ouzou		0.013*	0.007	0.003
Age_16 to 25		0.007	-0.018	0.012
Age_36 to 45		0.001	-0.029	-0.001
Age_46 to 55		-0.009	0.008	0.011
Age_56 to 73		-0.003	0.016	0.004
Single		0.003	-0.001	0.000
No education		0.010	0.004	-0.002
Secondary education		-0.006	0.011	0.008
Tertiary education		0.043*	0.006	0.016
Experience		0.055***	0.178*	0.039*
Experience²		-0.005	-0.138***	-0.037**
Rural		0.002	0.003	-0.001
Manufacturing		-0.002	-0.005	0.001
Building & Construction		-0.024*	-0.022	0.016
Trade		-0.003	0.006	-0.002
Previous formal employee		0.001	-0.007	-0.001
Previous informal employee		0.002	-0.020	0.010
Previous formal self-employed		-0.001	-0.000	-0.000
Previous informal self-employed		0.002	-0.003	0.001
Working hours below 20		-0.007	0.018***	0.012*
Working hours over 40		-0.008	-0.007	0.003
No contract		0.016	-0.086*	0.047*
Formal	10.204***			
Informal	9.896***			
Difference	0.309***			
Endowments	0.079**			
Coefficients	0.091***			
Interaction	0.139***			
Constant			0.168	
Observations	1,753	1,753	1,753	1,753

*Note: *** p<0.01, ** p<0.5, * p<0.1. Standard errors are omitted.*

Reference categories: Male, Bejaia, Age_26 to 35, Married, Medium education, Urban, Transportation and services, Previous no employment, Working hours 21 to 40, Fixed-term contract

Source: Authors

Table 8 reports Oaxaca-Blinder decomposition between male and female employees.

Table 8. Oaxaca-Blinder decomposition, male vs. female

Variables	Overall	Endowments	Coefficients	Interaction
Informal		0.006*	0.004	-0.001
Tizi-Ouzou		-0.035***	-0.114***	0.038***
Age_16 to 25		-0.006*	0.016**	0.005
Age_36 to 45		0.000	-0.002	-0.000
Age_46 to 55		-0.002	0.006	-0.002
Age_56 to 73		0.001	0.015	-0.007
Single		-0.003	-0.001	-0.000
No education		0.001	-0.005	0.000
Secondary education		-0.000	-0.022	0.001
Tertiary education		0.027***	-0.025	-0.010
Experience		-0.062***	0.177	-0.032
Experience²		0.022**	-0.089	0.021
Rural		0.002	-0.015	-0.007
Manufacturing		-0.004	-0.028**	0.008*
Building & Construction		-0.005	-0.014	0.006
Trade		-0.008*	-0.027*	0.014*
Previous formal employee		-0.001	-0.006	0.001
Previous informal employee		0.003	-0.008	0.002
Previous formal self-employed		0.001	0.002	-0.001
Previous informal self-employed		0.000	-0.000	0.000
Working hours below 20		0.002	-0.005	-0.001
Working hours over 40		-0.002	-0.019	0.002
No contract		-0.006**	-0.016	-0.003
Male	10.212***			
Female	10.051***			
Difference	0.161***			
Endowments	0.0323***			
Coefficients	0.0935***			
Interaction	0.0351*			
Constant			0.045	
Observations	1,753	1,753	1,753	1,753

*Note: *** p<0.01, ** p<0.5, * p<0.1. Standard errors are omitted.*

Reference categories: Formal, Bejaia, Age_26to35, Married, Medium education, Urban, Transportation and services, Previous no employment, Working hours_21 to 40, Fixed-term contract

Source: Authors

We now look at the gender wage gap. Overall explained variables (endowments and interaction) account for 42 per cent of the difference (0.067 out of 0.161), whereas unexplained variables (coefficients) account for 58 per cent of the difference (0.094 out of 0.161). Average log income of male employees is higher than that of female employees (10.212 versus 10.051).

Assuming that female employees have the characteristics of male employees (i.e. same human capital) their average income would increase by 0.032, which would prove insufficient to bridge the wage gap. The variables that account for the gender wage gap, mostly on the supply-side, are the following (in descending order): being located in the Tizi-Ouzou region, experience, working in the manufacturing industry, enjoying tertiary education and being young (16-25 years old).

4. Conclusion

Our investigation on informal employment complies with the definition from the ILO. It did take.advantage of a large pooled sample (3,290 workers) from two household surveys conducted at a regional level, which proves quite representative and the only one of its kind in Algeria. We come up with robust results from several converging sources and various subsamples.

First, multinomial logistic regressions applied to the overall sample of 3,290 individuals capture the individual determinants of access to the formal vs. informal segments of the labour market: age, marital status, gender and education. Hence, being a young single female with a low educational attainment increases the likelihood of informal employment.

Labour market is segmented along the formal/informal divide but workers are mobile. Mobility occurs from informal segment towards formal segments rather than the other way round. In the second place, these results are confirmed by the subsample of 827 workers who documented whether they did or not experience occupational mobility, and three out of five workers (522) did experience mobility. Such is also the case with a probit model applied to a small cohort of 445 individuals from Bejaia over 2007-2012, among which almost half was mobile. Age (youth), gender (female) and (low) educational attainment positively influence the probability of mobility towards informal employment, compared to those endowed with a university degree.

Third, earnings functions analyse the determinants of wages for the sub-sample of 1,753 formal and informal employees, wherein informality affects twenty per cent of employees among which three out of five are males. The wage gap between formal and informal employment that is over twenty-five per cent may be due to the difference in human capital and to a lesser extent by that of professional experience between formal and informal employees. Noteworthy is that the wage gap between formal and informal employees is higher among men than among women. The gender pay gap is higher in formal employment than in informal employment.

Fourth, according to quantile regressions, the distribution of earnings is not always symmetrical for males and females with respect to informality, which may be gender specific for the highest vs. the lowest quantiles.

Last, a decomposition model disentangles the explained and unexplained parts of the segmentation between formal and informal employees as well as the male/female divide, from the most prominent supply-side and the less prominent, demand side factors. As for the formal/informal segmentation, overall explained variables account for 71 per cent of the difference, whereas unexplained variables account for 29 per cent. With respect to the male/female divide, overall explained variables account for 42 per cent of the difference, whereas unexplained variables account for 58 per cent.

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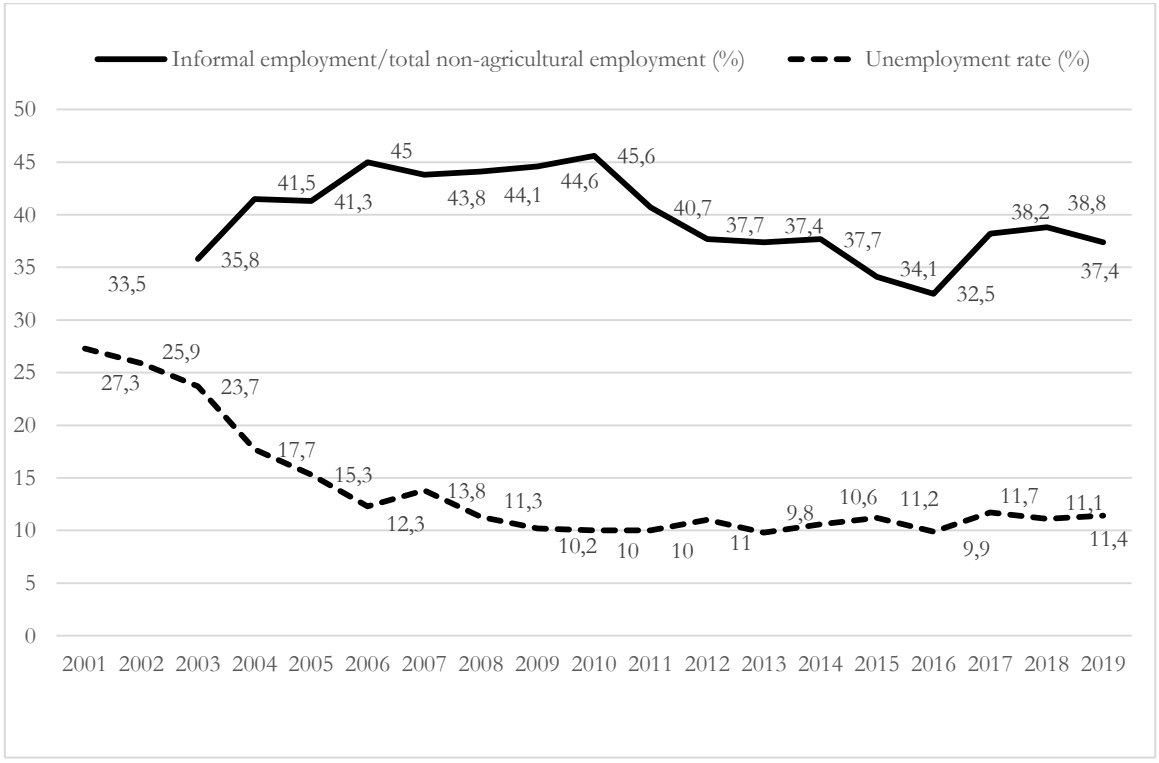
Appendix

Figure A1. Trends in informal employment and the unemployment rate (per cents): Algeria (2001-2019)



Source: Labour force surveys (ONS) and Souag et al (2019)

Table A1. Descriptive statistics for regional and national samples

	Regional sample: Kabylia (2012, 2013)						National sample: Algeria (2012)					
	Males		Females		Total		Males		Females		Total	
	N	%	N	%	N	%	N	%	N	%	N	%
Labour force[a]	1874	57	1416	43	3290	100	9281	81,2	2142	18,7	11423	100
Employed	1521	59,6	1031	40,4	2552	100	8393	82,5	1778	17,4	10170	100
Unemployed	353	47,8	385	52,2	738	100	888	70,8	365	29,1	1253	100
Age												
15-29	572	30,5	587	41,5	1159	35,3	3183	34,2	874	40,8	4058	35,5
30-54	1151	61,4	775	54,7	1926	58,5	5340	57,5	1190	55,5	6530	57,1
55 +	151	8,1	54	3,8	205	6,2	758	8,16	78	3,6	836	7,3
Education												
Primary at most	293	15,6	215	15,2	508	15,4	-	28,5	-	16,3	-	26,2
Medium	628	33,5	361	25,5	989	30,1	-	39,4	-	18,2	-	35,4
Secondary	531	28,3	369	26,1	900	27,4	-	21,1	-	26	-	22
Tertiary	422	22,5	471	33,7	893	27,1	-	11	-	39,6	-	16,4
Employment status												
Self-employed	512	33,7	234	22,7	746	29,2	2455	29,3	429	24,1	2882	28,3
Employees	1009	66,3	797	77,3	1806	70,8	5938	70,8	1349	75,9	7288	71,6
Total	1521	100	1031	100	2552	100	8393	100	1778	100	10170	100
Non-affiliation/ social security												
Self-employed	262	51,2	157	67,1	419	56,2	1249	62,6	320	82,2	1568	65,8
Employees	236	23,4	148	14,4	384	21,3	1752	31,4	127	9,6	1880	27,3
Total	498	32,7	305	29,6	803	31,5	3047	40,3	446	26,2	3493	37,7

Note: [a] Non-agricultural labour force aged 15+. Percentages read on both horizontal and vertical axes.

Source: Surveys in Bejaia (2012) and Tizi Ouzou (2013), LFS 2012 (ONS) and authors' calculations

Table A2. Variables used in the MCFA and AC

Variables	Content (code)
Mobility	1. Non-mobile (mob-1) 2. Mobility towards formal employment (mob-2 3. Mobility towards informal employment (mob-3) 4. Mobility inside formal employment (mob-4) 5. Mobility inside informal employment (mob-5)
Sex	1. Male (sex-1) 2. Female (sex-2)
Age	1. Below 30 (age-1) 2. 30-49 (age-2) 3. 50 + (age 3)
Education	1. Primary at most (edu-1) 2. Medium (edu-2) 3. Secondary (edu-3) 4. Tertiary (edu-4)

Source: Authors

Table A3. Quantile regression upon the distribution of earnings: males

Variables	Q10		Q25		Q50		Q75		Q90	
Informal	-0.115*	(0.060)	-0.144***	(0.049)	-0.147***	(0.034)	-0.095	(0.060)	-0.098	(0.086)
Aged 16-25	-0.276*	(0.142)	-0.126	(0.081)	-0.095*	(0.051)	-0.210***	(0.063)	-0.251**	(0.104)
Aged 36-45	-0.064	(0.111)	0.044	(0.066)	0.027	(0.072)	0.074	(0.059)	0.058	(0.116)
Aged 46-55	-0.066	(0.132)	0.106	(0.100)	0.025	(0.090)	0.102	(0.080)	0.130	(0.179)
Aged 56-73	-0.090	(0.155)	0.092	(0.147)	0.007	(0.138)	0.114	(0.115)	0.182	(0.218)
Single	0.029	(0.070)	0.030	(0.063)	-0.036	(0.049)	-0.033	(0.055)	0.017	(0.109)
No educ.	-0.146*	(0.080)	-0.163***	(0.058)	-0.100**	(0.044)	-0.098**	(0.046)	-0.098	(0.073)
Second educ.	-0.012	(0.062)	-0.019	(0.048)	-0.009	(0.040)	0.043	(0.045)	0.214**	(0.088)
Tert. educ.	0.187**	(0.079)	0.185***	(0.052)	0.269***	(0.044)	0.363***	(0.045)	0.551***	(0.098)
Experience	0.039***	(0.012)	0.026***	(0.007)	0.023***	(0.007)	0.014**	(0.006)	0.013	(0.010)
Experience2	-0.001**	(0.000)	-0.000**	(0.000)	-0.000	(0.000)	-0.000	(0.000)	-0.000	(0.000)
Rural	0.080	(0.076)	0.123**	(0.055)	0.122***	(0.037)	0.131***	(0.044)	0.166**	(0.077)
Manufact.	0.015	(0.074)	0.090	(0.056)	0.091*	(0.048)	0.124***	(0.044)	0.179**	(0.076)
Building	0.099	(0.085)	0.137**	(0.064)	0.154***	(0.046)	0.180***	(0.061)	0.165**	(0.078)
Trade	0.179***	(0.066)	0.148***	(0.052)	0.138***	(0.042)	0.163***	(0.061)	0.236**	(0.114)
Prev. fe	0.038	(0.077)	0.053	(0.047)	-0.013	(0.047)	-0.017	(0.053)	-0.076	(0.099)
Prev. ie	-0.138**	(0.070)	-0.123**	(0.057)	-0.151***	(0.057)	-0.137**	(0.055)	-0.244***	(0.084)
Prev. fse	-0.074	(0.649)	-0.053	(0.240)	-0.206*	(0.118)	-0.198	(0.165)	-0.225	(0.214)
Prev. ise	-0.118	(0.129)	-0.174*	(0.101)	-0.192**	(0.089)	-0.075	(0.121)	-0.093	(0.117)
W. hours <20	0.133	(0.100)	0.050	(0.081)	0.021	(0.116)	0.156*	(0.082)	0.170	(0.206)
W. hours>40	0.078	(0.067)	0.080*	(0.044)	0.085**	(0.038)	0.026	(0.039)	0.061	(0.067)
No contract	-0.117*	(0.070)	-0.101**	(0.046)	-0.144***	(0.032)	-0.146***	(0.051)	-0.093	(0.081)
Constant	9.347***	(0.122)	9.590***	(0.087)	9.921***	(0.074)	10.155***	(0.067)	10.291***	(0.143)
Observations	964		964		964		964		964	

*Note: Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1*

Source: Authors

Table A4. Quantile regression upon the distribution of earnings: females

Variables	Q10		Q25		Q50		Q75		Q90	
Informal	-0.335**	(0.136)	-0.030	(0.076)	0.038	(0.055)	-0.063	(0.059)	-0.102	(0.069)
Aged 16-25	0.220*	(0.115)	0.044	(0.069)	-0.080	(0.063)	-0.100	(0.080)	-0.180**	(0.083)
Aged 36-45	0.077	(0.101)	0.061	(0.075)	-0.007	(0.093)	-0.052	(0.089)	-0.000	(0.094)
Aged 46-55	0.119	(0.120)	0.069	(0.126)	0.101	(0.139)	0.007	(0.132)	0.199*	(0.118)
Aged 56-73	0.092	(0.255)	0.090	(0.222)	0.178	(0.164)	0.143	(0.193)	0.474**	(0.186)
Single	-0.101	(0.073)	0.013	(0.054)	-0.000	(0.057)	-0.068	(0.066)	0.019	(0.064)
No educ.	-0.061	(0.103)	-0.122	(0.087)	-0.080	(0.069)	-0.059	(0.059)	-0.072	(0.085)
Second educ.	-0.064	(0.097)	-0.013	(0.073)	-0.073	(0.050)	-0.050	(0.064)	-0.037	(0.065)
Tert. educ.	0.210**	(0.084)	0.186**	(0.084)	0.118*	(0.068)	0.142*	(0.074)	0.141*	(0.075)
Experience	0.056***	(0.012)	0.033***	(0.010)	0.032***	(0.009)	0.024***	(0.008)	0.015	(0.009)
Experience2	-0.001***	(0.000)	-0.000	(0.000)	-0.000**	(0.000)	-0.000	(0.000)	-0.000*	(0.000)
Rural	0.013	(0.061)	-0.050	(0.049)	-0.063	(0.044)	-0.011	(0.047)	-0.061	(0.061)
Manufact.	-0.170	(0.127)	-0.062	(0.070)	-0.064	(0.065)	-0.038	(0.063)	-0.094	(0.092)
Building	0.085	(0.087)	-0.012	(0.065)	-0.097	(0.075)	-0.098	(0.084)	-0.091	(0.082)
Trade	0.000	(0.132)	-0.105	(0.112)	-0.074	(0.094)	0.015	(0.106)	-0.053	(0.089)
Prev. FE	0.007	(0.121)	-0.055	(0.063)	-0.008	(0.072)	-0.039	(0.070)	0.047	(0.071)
Prev. IE	-0.046	(0.101)	-0.164*	(0.093)	-0.240***	(0.073)	-0.202**	(0.083)	-0.122	(0.094)
Prev. FSE	-0.082	(0.205)	0.269	(0.296)	0.068	(0.209)	-0.175	(0.192)	0.168	(0.239)
Prev. ISE	0.147	(0.103)	-0.030	(0.083)	-0.182**	(0.077)	-0.329***	(0.090)	-0.221*	(0.120)
W. hours <20	-0.025	(0.168)	0.084	(0.123)	0.095	(0.082)	0.144	(0.113)	0.159	(0.162)
W. hours>40	0.066	(0.065)	-0.037	(0.051)	-0.005	(0.047)	-0.008	(0.050)	-0.032	(0.074)
No contract	-0.129	(0.082)	-0.121**	(0.061)	-0.180***	(0.064)	-0.144***	(0.055)	-0.125*	(0.069)
Constant	9.060***	(0.137)	9.472***	(0.119)	9.891***	(0.091)	10.310***	(0.110)	10.595***	-
Observations	789		789		789		789		789	

*Note: Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1*

Source: Authors

Table A5. Dictionary of variables

Variables	Modalities	Nature	Code
1. *Income* (in DZD)		Continuous	Inc
2. Region	1. Bejaia 2. Tizi-Ouzou		Reg1 Reg2
3. Gender	1. Male 2. Female		Sex1 Sex2
4. *Age*		Continuous	Age1
5. Age²		Continuous	Age2
6. Marital status	1. Married 2. Single		Mari1 Mari2
7. Educational attainment	1. No education/primary at most 2. Medium 3. Secondary 4. Tertiary		Edu1 Edu2 Edu3 Edu4
8. Professional experience		Continuous	Exp1
9. Professional experience²		Continuous	Exp2
10. Place of residence	1. Urban 2. Rural		Area1 Area2
11. Industry	1. Manufacturing 2. Building & Construction 3. Trade 4. Transportation and services		Ind1 Ind2 Ind3 Ind4
12. Previous employment	1. Formal employee (FE) 2. Informal employee (IE) 3. Formal self-employed (FSE) 4. Informal self-employed (ISE) 5. No former employment		Prev1 Prev2 Prev3 Prev4 Prev5
13. Weekly working hours		Continuous	Work
14. Contract	1. Unwritten 2. Fixed-term contract		Cont1 Cont2
15. Legal sector	1. Public 2. Private		Sect1 Sect2

Source: Authors