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Labour mobility and the informal sector in Algeria: a cross-sectional comparison (2007-2012)

Philippe Adair[1] and Youghourta Bellache[2]

Abstract

Thanks to a multinomial logit model, we identify the determinants of access to the various labour market segments in Bejaia, a central-eastern region of Algeria. We first use cross-sectional analysis upon two samples of 1,252 and 2,026 individuals collected from two household surveys we have conducted in 2007 and 2012. The labour market patterns encompass the formal/ informal divide as well segmentation within the informal sector – upper tiers vs. lower tier. Determinants of labour mobility depend on the social and demographic characteristics (age, gender and marital status) and human capital of individuals. Then, we sketch an exploratory investigation upon a small cohort of 445 individuals between 2007 and 2012. The aforementioned determinants explain the significant mobility of individuals taking place across sectors that is oriented towards the informal sector. To a lesser extent, individuals shift within the informal sector itself, which is essentially limited to its 'lower tier' segment.

Keywords: Algeria, cohort, cross-section analysis, labour mobility, logit model, the informal sector

JEL: 017, J24, J62

La mobilité du travail et le secteur informel en Algérie : une comparaison transversale (2007-2012)

Grâce à un modèle logit multinomial, nous identifions les déterminants de l'accès aux différents segments du marché du travail à Bejaia, une région du centre-est de l'Algérie. Nous réalisons d'abord une analyse transversale sur deux échantillons de 1252 et 2026 personnes tirés de deux enquêtes sur les ménages que nous avons menées en 2007 et 2012. Les modèles de marché du travail englobent la fracture formel / informel ainsi la segmentation dans le secteur informel lui-même entre un palier supérieur et un palier inférieur. Les déterminants de la mobilité de la main-d'□uvre dépendent des caractéristiques sociales et démographiques (âge, sexe et état matrimonial) et du capital humain des individus. Ensuite, nous esquissons une enquête exploratoire sur une petite cohorte de 445 personnes entre 2007 et 2012 : les mêmes déterminants expliquent une mobilité significative des individus, laquelle est principalement intersectorielle et dirigée vers le secteur informel ; celle-ci se manifeste, dans une moindre mesure, au sein du secteur informel lui-même qui est essentiellement constitué par le segment inférieur.

Mots-clés : Algérie, analyse transversale, cohorte, mobilité de la main-d'□uvre, modèle logit, secteur informel

Introduction

The growth of informal employment during the 2000s makes it a structural component of the labour market in developing countries (Jutting and Laiglesia, 2009). For most countries of the MENA region, including Algeria, such growth occurs in the context of weak job creation from the formal private sector (Elbadawi and Loayza, 2008). It results from both a large increase in the working age population and the rising participation of women in the labour market.

Informal employment in Algeria rose significantly (Charmes, 2009) since the process of economic liberalisation in the 1990s, and fuels the formal / informal segmentation of the labour market. A few studies focus on the quantitative assessment of informal employment in Algeria (See Adair and Bellache, 2008). However, they fail to capture the explanatory factors of access to the informal sector as well as the determinants of earnings that drive the behaviour of individuals as well as public employment policies (Adair and Bellache, 2009).

So far, no national survey has been dedicated to the informal sector in Algeria. The annual employment survey of the National Statistics Office (ONS) provides aggregated data upon informal employment but information regarding the individual characteristics of informal workers proves unavailable. Hence, we designed two representative surveys in the region of Bejaia in Algeria: 2007 (522 households) and 2012 (1,016 households). Thanks to a multinomial logistic model, we highlight the determinants of access to the labour market for two samples of 1,252 and 2,026 individuals from the two aforementioned surveys. According to our knowledge, this is the first repeated cross-sectional analysis in Algeria

Section one outlines the theoretical framework of the informal sector within models of workforce mobility in developing countries and points out their limitations. Section two examines the trends and main characteristics of informal employment in Algeria according to aggregated data from annual national

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surveys. Section three presents the methodology (sampling and the choice of variables) we used in order to identify the determinants of access to the various labour market segments including informal 'upper tier' and 'lower tier' for both our samples. Section four analyses the outcomes from our multinomial logit model upon these samples. Section five focuses upon the mobility of a cohort of individuals between 2007 and 2012. Conclusion recapitulates the results and discusses the shortcomings of our study.

1. The informal sector and mobility patterns of the labour market in developing countries

Since the publication of the ILO report on employment in Kenya in 1972, the informal sector has been subject to a large number of studies in most developing countries. Over time, several models of the informal sector have been designed. Prior the ILO report, the informal sector is completely absent from the first generation of so-called dualistic models (Lewis, 1954: Todaro, 1969), which describe the workforce migration process from rural to urban areas. Compared to the classical model of Lewis, wherein labour mobility from the traditional / rural sector nurtures the modern sector, the probabilistic model of Todaro includes a third parameter that is the unemployment situation in urban environment.

The main labour market models with a built-in informal sector are those of Fields (1975, 1990) and Lopez Castano (1989), which extend the Todaro model. Lopez (1970) includes the possibility for urban workers excluded from the formal labor market to operate in the informal sector, but fails taking into account urban unemployment.

In his first model, Fields (1975) assumes the informal sector is primarily a subsistence sector, without any real barriers to entry and wherein earnings are below those provided in both the modern sector and the traditional/ rural sector. In his revised model, Fields (1990) assumes that segmentation takes place within the informal sector itself. The 'lower tier' segment is accessible for subsistence activities and provides low earnings as well as a training workplace for young and unskilled individuals; those are hired primarily as employees, trainees or family helps. Access to the 'upper tier' segment is restricted to rather mature and skilled self-employed workers; they were formerly wage earners who voluntarily choose to enter the informal sector because it provides higher incomes. Fields acknowledges the existence of mobility between the formal modern sector and the informal 'upper tier' segment.

The three stages model of Lopez Castano (1989) addresses the mobility between formal and informal sectors in terms of lifecycle. The career of workers follows three phases: first, the inclusion in the informal 'lower tier' as a young employee, family helps or apprentices; then, they access the formal sector as employees, when there is an opportunity; eventually, once they are 40-50 years old, they choose to return to the 'upper tier' informal sector as self-employed or employers. This model is challenged by Roubaud (1994) according to whom only a tiny minority of people remains active over 60-65 years old. In addition, albeit this model may be relevant to men, it does not apply to women whose specific career covers a series of phases of activity and inactivity.

In line with the models of Fields and Lopez, Maloney (1999, 2004) addresses the segmentation of the informal sector and mobility factors using panel data from Latin America in the 1990s. The 'lower tier' is mostly a salaried segment, whose access is associated with low educational attainment and the lack of professional experience of young unemployed and unskilled individuals (school leavers and migrants), and wherein they forge their on-the-job training. The 'upper tier' is mostly a self-employment segment, whose access is associated with a larger professional experience (acquired in the formal sector) and a higher educational attainment of more mature workers looking for higher incomes and motivated by desire for independence. The labour market comprises four segments: the formal wage employment, self-employment, contract-based employment and informal wage employment, among which the last three are defined as informal employment. Mobility takes place between formal wage employment and informal employment. Contract-based employment, which can be approximated to self-employment because income levels and motivations are similar, and the self-employed represent the informal 'upper tier' segment.

Najman and Pailhé (2001) analyse mobility on the Russian labour market through the estimation of transition matrices using microeconomic panel data (1994-1998) from the Russia Longitudinal Monitoring Survey (RLMS). The labour market segmentation is based on five categories of activities: no job (unemployed and inactive), multiple-job handling, single job, formal and informal employment and work on the plot. Strong mobility across segments explains the paradox of low unemployment in a context of decline in output and real wages over the period. On the one hand, upward mobility into formal or informal self-employment and multiple-job handling are experienced by young men with a relatively high educational attainment as well as rural workers. On the other hand, a large share of employees becomes either unemployed or work on the plot. Downward mobility is mainly experienced by women, older people and

poorly educated workers. As in Maloney (1999, 2004), all self-employed are consolidated in the same category, which does not allow for the distinction between formal and informal self-employment. Hence, the mobility of entrepreneurs between the formal and informal sectors is ignored. As we show in Section five, this is a significant trend on the labour market in Algeria, wherein multiple-job handling is uncommon (Adair, 2002; Bellache, 2010).

Günther and Launov (2006, 2012) use data from the 1998 household survey of C□te d'Ivoire in order to test two opposing theories regarding informal employment. Segmentation theory, according to which entry barriers restrict the mobility of workers across segments, posits that informal employment is an involuntary choice. In contrast, comparative advantage theory assumes that informal employment is a voluntary choice. Assuming a homogeneous formal sector and a heterogeneous informal one that is divided into 'upper tier' and 'lower tier', the model identifies the optimal number of segments and detects through probability estimation the distribution of labourforce in each segment. All segments have different expected wage equation: education and experience are highly significant in the formal sector and informal 'upper tier', but not significant in the 'lower tier'. The estimate posits that the expected wage in the formal sector is twice the one of the informal, and the expected wage in the informal 'upper tier' is twice the one in the 'lower tier'. The first equation estimates the actual distribution, whereas the second looks at the hypothetical distribution based on workers' earning maximization, given their individual characteristics, i.e. in which segment they are better off; it is assumed that workers are free to move across segments in the absence of entry barriers. Actual distribution of the labourforce in the formal sector is half the hypothetical one, i.e. only half of the workers that are better off in the formal sector are actually working there. Alternatively, the actual distribution of workers in the informal 'lower tier' is twice the hypothetical one, i.e. half of the actual workers in this segment is not better off. Thus, both cases exhibit involuntary employment. Conversely, actual distribution of workers in the informal 'upper tier' is almost equal to that of the hypothetical one, suggesting it results from a voluntary choice. Conclusion is that the informal sector is neither fully segmented nor fully mobile; hence, it includes both voluntary and involuntary employment.

Bensidoun and Souag (2013) compare two national employment surveys (2001 and 2007) to investigate mobility in Algeria. They use a subjective approach to estimate the probability of workers to be satisfied with the job, focusing exclusively upon formal and informal employees. Most formal employees are non-mobile and supposedly experience job satisfaction, while more than half informal workers are dissatisfied with their job. Gaps in job satisfaction indicate that the status of formal salaried is attractive and therefore chosen, whereas that of informal salaried is a constraint. Besides the subjective approach used, restricting the scope of the study only to employees, whereas self-employed are excluded, severely limits its relevance. The issue of mobility for self-employed, both within the informal sector as well as across the formal and informal sectors is obviously missing.

Indeed, the patterns of voluntary mobility from formal salaried to informal self-employment do challenge the dualistic view of the informal sector. However, the informal sector itself including its 'upper tier' is quite heterogeneous; hence, it calls into question the often-assumed homogeneity of self-employment (Adair and Bellache, 2012). In addition, the participation of women in the informal sector especially in certain industries (Bellache, 2010); as well as significant gender gap in terms of earnings, employment status (Charmes, 2009) and professional career (Roubaud, 1994) make gender an essential variable, which is ignored in the aforementioned models of mobility.

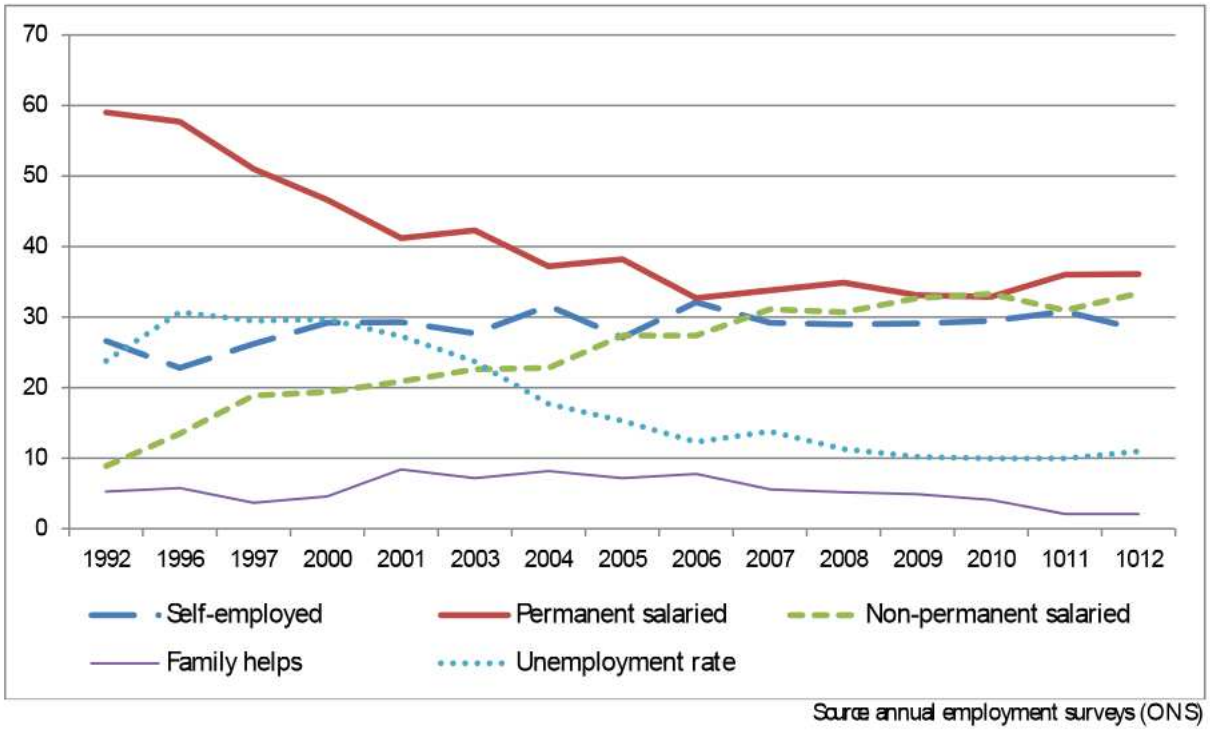
2. Informal employment in Algeria: trends and characteristics

According to national employment surveys, the trends of the labour market in Algeria display strong growth in self-employment and non-permanent salaried, which essentially make informal employment (ILO, 1993, 2002).

Non-permanent salaried has grown dramatically: its number multiplies by 7.7 between 1992 and 2012; its relative share in total employment increased by less than 10% in 1992 (8.9%) to one-third (33.4 %) in 2012, surpassing the number of permanent salaried for the first time in 2010.

The observed unemployment rate increased during the 1990s and decreased significantly over the last decade: 29.7 % in 2000 and 11 % in 2012. A striking observation is that decline in the unemployment rate parallels an almost symmetrical increase in non-permanent employment as well as self-employment, which is mainly informal in 2012 (ONS 2013a). See Figure 1.

Figure 1. Trends and structure of the employed population (1992-2012)



Source annual employment surveys (ONS)

In 2011, 45.6% of the total employed population do not register with social security and constitute the informal employment according to the ILO definition. It consists in almost half (49.7%) self-employed and 38.4% of non-permanent employees, of which respectively 82.5% and 56.4% belong to the informal sector. Excluding agriculture, informal employment represents 3,486,000 occupied workers in 2011, or 40.7% of total non-agricultural employment; it has experienced a sharp increase in the last decade, starting from 33.5% in 2001 (ONS, 2013a). It dominates in building and construction (34.5%), trade (26%), transport and services (20.1%) as well as in the manufacturing sector (19.4%) (ONS, 2012).

2.2. Increase in female participation rate and female informal employment

The female participation rate is constantly growing, especially in urban areas under the combined effect of rising education and the corollary decline in fertility as well as increasing urbanization. Employment opportunities for women arise, particularly in trade and the service industries, whereof a substantial share works in the informal sector.

Between 1977 and 2011, female employment increased 13.4 times, whereas total employment increased only 3.7 times. The share of women in the urban workforce rose from 10.5% in 1991 to 17.7 % in 2011 (ONS, 2013a), albeit that is still a low share.

Nearly one third of employed women (30.8% of 1,561,000) is not registered with social security in 2011 and thus nurtures informal employment; although this share has declined with regard to 2005 (38.1%). Female informal employment mainly comprises self-employed (67%), 7% are family helps and 21.2 % are non-permanent employees. In addition, nearly nine out of 10 (87.9%) self-employed women work in the informal sector (ONS, 2013a).

3. The determinants of access to employment: a repeated cross-sectional analysis

3.1. Sampling, selection criteria and variables

Our econometric study covers two samples comprising respectively 1,252 and 2,026 non-agricultural active individuals from two household surveys we conducted in 2007 and 2012. We have drawn the two samples randomly from the same 12 urban and rural municipalities of Bejaia, a region located in east-central Algeria. They represent nearly a quarter of all municipalities and over a half (53%) of all households in the province, who were identified through the pre-census conducted in 2007 and the general population census that took place in 2008. Although both samples are representative, they face two biases. The first relates to the overrepresentation of urban versus rural areas. The second is due to the low quality of some interviews resulting in inaccurate answers or missing data (e.g., a woman responding in the absence of her husband as regards his activity).

The dependent variable to be explained is the access to various labour market segments according to the formal / informal divide. It encapsulates five situations: unemployed, employee in the formal sector, employee in the informal sector, formal self-employed and informal self-employed. An informal employee corresponds here to an unprotected employee, who is not registered with the National Social Insurance Fund (CNAS); an informal self-employed is one who is not registered with the Non-Salaried Social Insurance Fund (CASNOS) and does not pay taxes.
The independent variables used in the multinomial logit model are related to the social and demographic characteristics of individuals (age, gender and marital status), their human capital (approximated by of educational attainment), status of prior employment and place of residence (urban versus rural).

3.2. The multinomial logistic model

We designed a multinomial logit model to highlight factors that explain the access of individuals to the labour market segments, especially the salaried and self-employment informal segments. We estimate an equation of labour supply to calculate the probability that an individual is included into one of the labour market segments rather than remaining unemployed. Five options are available to individuals: staying unemployed or working as an employee in the formal sector, as an employee in the informal sector, as a self-employed in the formal sector, and as a self-employed in the informal sector. Provided these five alternatives are independent, and assuming that there is a logistic distribution for the error terms, our model is the following:

$$P_{ij} = \frac{e^{\beta_j x_i}}{\sum_{j=1}^{5} e^{\beta_j x_i}} \qquad (1)$$

In equation (1), (i) and (j) are the respective indices for individuals and choices; β_j is the vector of parameters related to the characteristics x_i; the model generates an uncertainty that a simple normalization ($\beta_j = 0$) overcomes. Each probability (P) is comprised between 0 and 1 and the sum of the probabilities is equal to unity. The model is stated as follows:

$$P(y_i = j / x_i) = \frac{e^{\beta_j x_i}}{1 + \sum_{j=2}^{5} e^{\beta_j x_i}} \qquad (2)$$

With $j = 1,2,\ldots,5$

This model identifies the determinants of labour supply of all active individuals aged over 15 years old. These are grouped into the five labour market segments with respect to the two samples: unemployed (262 and 467), employees in the formal sector (480 and 849), employees in the informal sector (135 and 263), self-employed in the formal sector (156 and 207), and self-employed in the informal sector (219 and 240)[3]. The unemployed being the reference category (whose coefficients are normalized to 0), we estimate the effect of some explanatory variables on the probability (logarithm of the odds of choice) to access the other four labour market segments rather than remaining unemployed. In addition, we assess the likelihood for an individual to access formal salaried employment rather than informal, or formal self-employment rather than informal, by comparing the estimated coefficients for these segments
Three types of variables are included into the model: continuous variables (age and age squared), binary variables (gender, marital status and place of residence) and qualitative variables with more than two options (educational attainment and status in prior employment).

4. Determinants of access to the informal sector

The results of the two models estimated using maximum likelihood for 1,252 and 2,026 individuals of the two samples (Tables 1 and 2) exhibit rather satisfactory quality. The explanatory variables are significant as regards the positioning of individuals in the various segments: χ^2 is highly significant. The explanatory power is acceptable: pseudo R2 is 50.8% for the first sample and 41.1% for the second. The predictive ability is rather satisfactory: 56.2% and 50.4% of individuals, with respect to the 2007 and 2012 samples, are correctly classified.

[3] Family helps (68 in the 2007 survey and 45 in the 2012 survey) are all informal workers and were included into the self-employed related segment. The informal self-employed segment, respectively 219 in the 2007 survey and 240 in the 2012 survey, includes 81 (36.9%) and 91 (37.9%) female homeworkers.

In both models, determinants of access to the labour market segments, especially to the informal sector segments, depend on the influence of variables - gender, age, marital status and human capital related to the social and demographic characteristics of individuals.

Table 1. Estimate of the determinants of access to the labour market segments (sample 1) - 2007

Variables	Formal salaried		Informal salaried		Formal self-empl.		Informal self-empl.	
	B	Exp(B)	B	Exp(B)	B	Exp(B)	B	Exp(B)
Demography								
Male	1,128***	3,089	,906***	2,475	1,631***	5,111	-1,270***	,281
Age	,273***	1,313	,165**	1,179	,280***	1,324	,185**	1,204
(Age)²	-2,13E-03**	,998	-2,19E-03**	,998	-2,07E-03*	,998	-1,44E-03	,999
Married	2,407***	11,104	,486*	1,625	3,070***	21,536	2,246***	9,451
Education								
None or primary school (max. aged 11)	-1,423***	,241	,282	1,326	-1,387***	,250	3,366***	28,957
Medium school (aged 11-14)	-,991***	,371	,355	1,426	-,610	,543	3,105***	22,318
Secondary school (aged 15-18)	-9,34E-0,2	,911	,784*	2,191	,515	1,674	3,484***	32,605
Professional training	-,728**	,483	5,901E-02	1,061	-,793*	,452	2,370**	10,697
Employment								
Urban area	,162	1,176	-3,18E-02	,969	,179	1,196	,288	1,334
Formal salaried	-,667**	,513	-,794**	,452	-,543	,581	-,749*	,473
Informal salaried	-1,540***	,214	-1,079***	,340	-1,333***	,264	-,983**	,374
Formal self-employed	-2,071**	,126	-1,564	,209	-,985	,374	-1,484	,227
Informal self-employed	-2,322***	9,803E-0,2	-1,457**	,233	-,723	,486	-,565	,568
Constant	-6,334***		-3,729***		- 9,158***		- 7,438***	
-2 Log likelihood	2565,889							
⍰2 (sig)	825,378 (,000)							
Pseudo R² (Nagelkerke)	0,508							
Correctly predicted cases (%)	56,2%							
N	1,252							

a) reference category : unemployed. b) * = significant at 10%; ** = significant at 5%; *** = significant at 1%

Source: Survey of the informal sector in Bejaia, 2007

Table 2. Estimate of the determinants of access to the labour market segments (sample 2) - 2012

Variables	Formal salaried		Informal salaried		Formal self-empl.		Informal self-empl.	
	B	Exp(B)	B	Exp(B)	B	Exp(B)	B	Exp(B)
Demography								
Male	-,150	,861	8,648E-02	1,090	,549**	1,731	-,106	,899
Age	,202***	1,224	2,099E-02	1,021	5,673E-02	1,058	,123**	1,130
(Age)²	-1,74E-03**	,998	-5,41E-05	1,000	-1,47E-04	1,000	-1,28E-03*	,999
Married	1,039***	2,826	,526**	1,693	1,457***	4,293	1,078***	2,939
Education								
None or primary school (max. aged 11)	-1,498***	,224	1,214***	3,368	-1,288***	,276	1,817***	6,152
Medium school (aged 11-14)	-,982***	,375	1,428***	4,171	-,971***	,379	1,661***	5,266
Secondary school (aged 15-18)	-,420**	,657	,737**	2,091	-,162	,850	1,744***	5,719
Employment								
Urban area	-2,86E-02	,972	-,146	,864	-,119	,888	-8,7E-02	,917
Formal salaried	19,278***	2,4E+08	19,185***	2,1E+08	19,792***	3,9E+08	19,563	3,1E+08
Informal salaried	19,758	3,8E+08	20,000	4,9E+08	19,845	4,2E+08	19,581	3,2E+08
Formal self-employed	19,177***	2,1E+08	18,676***	1,3E+08	19,666***	3,5E+08	20,086	5,3E+08
Informal self-employed	19,480***	2,9E+08	19,669***	3,5E+08	20,403***	7,3E+08	20,175	5,8E+08
Constant	-4,082***		-2,699**		-3,304**		-5,431***	
-2 Log likelihood	3686,723							
⍰2 (sig)	997,372 (,000)							
Pseudo R² (Nagelkerke)	0,411							
Correctly predicted cases (%)	50,4%							
N	2,026							

a) reference category : unemployed. b) * = significant at 10%; ** = significant at 5%; *** = significant at 1%

Source: Survey of the informal sector in Bejaia, 2012

4.1. The role of social and demographic variables

In both models, gender is a significant variable. In 2007, being a man increases the probability of access to the labour market as formal and informal salaried as well as formal self-employed rather than remaining unemployed: men are respectively 3, 2.4 and 5.1 times more likely to access than women. However, being a woman increases the probability of access to the informal sector as self-employed in relation to the unemployed and other categories; this is due to the importance of home-based work exercised by women that represents almost one third of self-employment and almost half of informal self-employment. In 2012, with respect to women being a man favours access to the labour market as a self-employed in the formal sector.

In both models, age is a significant variable. Age increases the likelihood to access the formal and informal labour market segments, with respect to the unemployed. Older individuals are more likely to be self-employed and employees in the informal sector. In addition, older individuals are more likely to be employees in the formal sector rather than employees or self-employed in the informal sector.
In both models, with respect to bachelors, being married increases the probability of access to employment particularly as employees or self-employed in the formal sector rather than as employees in the informal sector. In the informal sector, married individuals are more likely to work as self-employed rather than as employees.

4.2. The role of human capital

In both models the level of human capital plays an important role in the access to the formal and informal labour market segments. Compared to the top level (higher education), low educational attainment increases on the one hand the probability to access the informal labour market, especially as self-employed with respect to the unemployed as well as employees and self-employed in the formal sector; on the other hand, it reduces the likelihood of choice to access the formal labour market segment.

As paradoxical as it may seem, with respect to individuals with high educational attainment, vocational training increases the probability of access to self-employment in the informal sector and reduces the probability of access to the formal sector as an employee or as a self-employed. This suggests, on the one hand, that vocational training is better valued in the informal sector than in the formal sector. On the other hand, there is a mismatch between labour supply from learning and training centers (CFPA) and labour demand from formal companies, resulting in the difficulties experienced by young trainees to access the formal labour market (Adair and Bellache, 2009).

4.3. Occupational mobility

As regards 2007, occupational mobility has a negative impact upon access to employment in both the formal and the informal sector. Individuals with a prior job are less likely to find another job especially in the formal sector, with respect to formal and informal individuals without prior job and the unemployed. This finding is consistent with the first model of Fields (1975) according to which the unemployed are more likely to get a job in the formal and the informal sector. In contrast, as regards 2012, occupational mobility has a positive impact upon the access to employment in both the formal and the informal sector.
This puzzling evidence may be due the difference in the size (1,252 vs. 2,026 individuals) and composition of the two samples. It underlines the limits of a simple cross-sectional analysis of labour mobility, which is less relevant than a longitudinal analysis we tackle in the next section.

5. Labour mobility between 2007 and 2012 and its determinants: tracking a cohort

In order to capture better the determinants of labour mobility, we focus upon a cohort of 109 households and 445 individuals derived from the common sample to the two surveys (2007 and 2012). This subsample amounts over one-third (35%) of individuals in the 2007 survey. Table 3 first provides descriptive statistics regarding mobility, both statutory (upward or downward) and across segments.

Table 3. Labour mobility from 2007 to 2012

Status and segment (2007)	Status and segment (2012)									
	Formal salaried		Informal salaried		Formal self-empl.		Informal self-empl.		Unemployed	
	N	Prob	N	Prob	N	Prob	N	Prob	N	Prob
Formal salaried (175)	137	.78285	7	0,04	8	.04571	19	0,10857	4	.02285
Informal salaried (52)	7	.13461	11	.21153	3	.05769	25	.48076	6	.11538
Formal self-employed (63)	6	.09523	1	.01587	35	.55555	18	.28571	3	.04761
Informal self-employed (72)	7	.09722	3	.04166	12	.16666	38	.52777	12	.16666
Unemployed (83)	23	.27710	20	.24096	7	.08433	14	.16867	19	.22891
Total (445)	180		42		65		114		44	

Source: our calculation

5.1. A three stages path that is specific to the informal sector

Mobility affects almost half of the cohort (46%, i.e. 205 individuals). It concerns mainly informal employees (almost eight out of 10) and the unemployed (over seven out of 10). Among the 83 unemployed in 2007, almost three out of 10 found a job as employees in the formal sector, and nearly a quarter became employees in the informal sector in 2012. Nearly half of the employees in the informal sector in 2007 became informal self-employed in 2012, hence experiencing upward mobility within the same sector. More than half of self-employed in the informal sector have not changed as regards status or segment, whereas only a minority

joined the formal sector or became unemployed. In addition, a significant share of formal self-employed (almost three out of 10) has joined the informal sector as self-employed.
Mobility declines with age as well as with professional experience (seniority). Mobility across sectors involves most of mobile individuals: they are well-experienced employees and self-employed who shift from the formal sector to informal self-employment. Mobility within the informal sector is less obvious: individuals move from salaried towards self-employment. Unemployed get a job in the informal sector rather than the formal one. Some mobile individuals withdraw from employment.
Bearing in mind that these are not the same individuals, these various patterns of mobility thus highlight one path to the informal sector that is specific. The first move occurs when the unemployed access to salaried employment in the informal sector lower tie. As regards the second move, upward mobility takes place from salaried employment to informal self-employment. The first move as a last resort strategy supports the thesis of formal/ informal segmentation on the labour market. The second move as a voluntary choice may comply with the comparative advantage theory (see Gunther and Launov, 2012).
Moreover, the lack of mobility of the majority of formal employees (78.2%) and the high rate of unemployment among young graduates point out a preference for formal employment (See Bensidoun and Souag, 2013).

5.2. Determinants of mobility

Again, we used the multinomial logit model in order to focus upon the individual characteristics that determine mobility. The dependent variable consists in seven options corresponding to situations of transition, i.e. moving from one status to another or maintaining initial status. Out of the 25 cases described in Table 3, we thus adopted the series of options with highest share and the most significant transition probabilities (see colored cells in Table 3).
These include four types of transition: 25 active individuals informal salaried (IS)-informal self-employed (ISE); 18 formal self-employed (FSE)-informal self-employed (ISE); 23 unemployed (U)-formal salaried (FS); 20 unemployed (U)-informal salaried (IS). There are three types of absence of mobility: 137 formal salaried (FS)-formal salaried (FS); 35 formal self-employed (FSE)-formal self-employed (FSE); 38 informal self-employed (ISE)-informal self-employed (ISE). The reference category in this estimate is formal salaried (FS)-formal salaried (FS). The independent variables are age, sex, marital status, educational attainment and place of residence.
The model estimated by maximum likelihood for all individuals in the sample (296) proves of acceptable quality (See Table 4 in the appendix). The explanatory variables are significant as regards the positioning of individuals in different segments: □2 is very significant. The explanatory power is relatively high (pseudo R2 is 47.4%) and the predictive ability of the model is satisfactory (52.7% of individuals in the sample were correctly classified).
Results highlight the influence of social and demographic variables - age, sex, marital status and human capital (approximated with education attainment) upon mobility or absence of mobility.
Thus, the transition from informal salaried towards informal self-employed concerns uneducated individuals; they are 20 times more likely to make this upward mobility within the informal sector, with respect to better educated informal workers.
On the one hand, this result challenges that of Maloney (1999) and Najman and Pailhé (2001) according to which access to formal and informal self-employment is associated with a higher educational attainment. This may come from the lack of distinction between formal and informal self-employment. Indeed, as we have shown above (See section 4), low educational attainment promotes access to self-employment in the informal sector; conversely, higher educational attainment facilitates access to formal self-employment.
On the other hand, in accordance with the results of Maloney (1999) as well as Gunther and Launov (2006, 2012), the transition from unemployed status to that of informal employee concerns the young, single and uneducated individuals. Thus, older workers are less likely to move from unemployment to informal salaried. Being married reduces the probability of moving from unemployment to informal salaried relative to bachelors. Finally, individuals with no education are 38.8 times more likely to make this transition, with respect to either those with higher educational attainment or the formal employees.
Moreover, being a man favours remaining formal self-employed in relation to women and non-mobile formal employees (reference category). Men are 7.4 times more likely than women to stick to formal self-employment. With regard to informal self-employment, being a man reduces the probability of remaining in the informal sector as self-employed. Conversely, women are nine times more likely than men to remain self-employed in the informal sector.

In addition, our results are in accordance with the estimated earnings functions for informal and formal employees from the two samples 2007 and 2012 (Bellache et al, 2014), which highlights work experience, gender, age and the industry as determinants of informal workers compensation. Professional experience compensates for low education attainment of the informal workers; gender (being male), age and working in the construction industry contribute to improved wage earnings for informal employees. As regards formal employees, educational attainment and gender (being male) are essential factors that contribute to income level and explain the wage gap, with respect to informal employees.

Conclusion

Our purpose was to identify the determinants of access to the informal sector and ultimately to test the hypothesis of the formal / informal labour market segmentation.

We used two representative samples for repeated cross-sectional analysis thanks to a multinomial logit model, the results of which display the major role of social and demographic characteristics and human capital in order to access employment either in the formal or informal sector.

Gender (being a woman), young age, marital status (single) and the low level of education reduces the probability of access to employment in the formal sector (especially in self-employment); conversely, it promotes access to the informal sector. Being a woman helps to access the informal sector, especially self-employment. Low level of human capital and age (to a lesser extent) increase the probability of access to self-employment in the informal sector. The importance of home-based activity performed by women in the region of Bejaia and the low (official) rate of female activity are in accordance.

A longitudinal analysis of a cohort common to both surveys (2007 and 2012) highlights, on the one hand, the influence of low educational attainment on the mobility within the informal sector, as individuals shift from salaried employment to self-employment. On the other hand, it emphasizes the role of (young) age of individuals, being bachelors and their low educational attainment in the transition from unemployment to salaried employment in the informal sector.

Large gaps in human capital and socio-demographic profiles between formal and informal workers confirm the thesis of the labour market segmentation. However, segmentation within the informal sector seems less obvious: it suggests that the informal sector mainly corresponds to the 'lower tier' or subsistence segment in Bejaia and possibly in Algeria.

However, one should not take these results at face value. On the one hand, the small size of the two surveys (522 and 1,016 households) and their geographic setting in the region of Bejaia do not allow generalisation to overall Algeria. On the other hand, the cross-sectional analysis may be consistent for some more mature individuals, save young people who have not yet carried on their career.

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Appendix

Table 4. Estimate of the determinants of mobility (2007-2012)

	No mobility				Mobility across sectors				Mobility from unemployement			
Variables	FSE-FSE		ISE-ISE		IS-IE		FS-ISE		U-FS		U-IS	
	B	Exp(B)	B	Exp(B)	B	Exp(B)	B	Exp(B)	B	Exp(B)	B	Exp(B)
Demography												
Age	-,178	,837	-,178	,837	-1,12E-02	,989	-,208	,812	,361	1,435	-,456***	,634
(Age)²	1,974E-03	1,002	2,321E-03	1,002	-1,67E-03	,998	2,599E-03	1,003	-8,86E-03	,991	5,107E-03**	1,005
Man (ref.: woman)	2,005*	7,429	-2,149***	,117	,113	1,120	-,275	,760	-,545	,580	-,147	,863
Married (ref.: bachelor)	,436	1,546	-7,59E-02	,927	-,434	,648	,913	2,493	,161	1,174	-2,898***	5,512E-02
Education (ref.: higher learning)												
None	1,375	3,955	3,293***	26,920	3,025***	20,592	-,662	,516	1,040	2,829	3,659***	38,827
Primary	-,227	,797	2,569***	13,053	,701	2,016	1,473	4,363	-,457	,633	,927	2,527
Medium	1,233	3,433	2,188**	8,917	,432	1,541	,806	2,239	-,276	,759	5,457E-02	1,056
Secondary	,648	1,911	1,104	3,015	,356	1,428	-,140	,869	,140	1,151	,306	1,359
Residence (ref.: rural)												
Urban	-,344	,709	-9,15E-02	,913	,683	1,979	-,566	,568	,119	1,127	-,194	,824
Constant	-,241		1,325		-1,076		-4,037		-4,037		6,308*	
-2 Log Likelihood	729,995											
□2 (sig)	180,310 (,000)											
Pseudo R^2 (Nagelkerke)	0,474											
(%) Correctly predicted cases	52,7%											
N	296											

a) reference category : unemployed. b) * = significant at 10% ; ** = significant at 5% ; *** = significant at 1%
Source Survey of the informal sector in Bejaia, 2007 and 2012

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