# Formal Vs Informal Sector Choice and Wage Differentials in Algeria

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## ABSTRACT

In this paper, we analyze the determinants of formal vs. informal employment choice and gender wage differentials in Algeria. Using the Algerian national consumption survey, we estimate wage equations with correction of selection bias based on switching regression model. The results show that women are systematically underpaid in all sectors especially in the Informal sector. However, the public sector is the one that best protects women from wage discrimination. The returns to education are generally higher in the public and formal sector for both men and women. Regional characteristics influence the choice of the sector and partly explain the wage gap between men and women. Finally, the choice of working in the public sector versus working as informal employees is mainly due to the pattern of wages. However, the financial benefit is not a motivation for choosing the public sector compared to self-employment. This result suggests that there should be a non-monetary benefit that influences the choice of the public sector in Algeria.

ملخص

في هذا المقال، نقوم بتحليل محددات اختيار العمل الرسمي مقابل العمل غير الرسمي والفروق في الأجور بين الجنسين في الجزائر. وباستخدام مسح الاستهلاك الوطني الجزائري، قمنا بتقدير معادلات الأجور مع تصحيح تحيزات الاختيار بناء على تغيير نموذج الانحدار. وتظهر النتائج أن المرأة تتقاضى أجورا منخفضة بشكل منهجي في جميع القطاعات وخاصة في القطاع غير الرسمي. ومع ذلك، فإن القطاع العام هو الذي يوفر حماية أفضل للمرأة من التمييز في الأجور. وعادة ما تكون العائدات إلى التعليم أعلى في القطاع العام والقطاع الرسمي لكل من الرجال والنساء. وتعتبر الخصائص الإقليمية من المؤثرات على اختيار القطاع وتفسر جزئيا الفجوة القائمة في الأجور بين الرجال والنساء. ويرجع

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اختيار العمل في القطاع العام مقابل العمل كعمال غير رسميين أساسا إلى نمط الأجور. ما لا يجعل المنفعة المالية دافعا لاختيار القطاع العام مقارنة بالعمل الحر. وتشير هذه النتيجة إلى وجوب وجود فائدة غير نقدية تؤثر على اختيار القطاع العام في الجزائر.

**ABSTRAITE**

Dans cet article, nous analysons les déterminants du choix de l'emploi formel ou informel et les écarts de salaire entre les sexes en Algérie. En utilisant l'enquête nationale sur la consommation en Algérie, nous estimons les équations de salaire avec correction du biais de sélection sur la base d'un modèle de régression à commutation. Les résultats montrent que les femmes sont systématiquement sous-payées dans tous les secteurs, en particulier dans le secteur informel. Cependant, le secteur public est celui qui protège le mieux les femmes contre la discrimination salariale. Le rendement de l'éducation est généralement plus élevé dans le secteur public et formel, tant pour les hommes que pour les femmes. Les caractéristiques régionales influencent le choix du secteur et expliquent en partie l'écart salarial entre les hommes et les femmes. Enfin, le choix de travailler dans le secteur public ou de travailler tant qu'employé informel est principalement dû à la structure des salaires. Toutefois, l'avantage financier n'est pas une motivation pour choisir le secteur public par rapport au travail indépendant. Ce résultat suggère qu'il devrait y avoir un avantage non monétaire qui influence le choix du secteur public en Algérie.

## 1.    Introduction

The empirical works on the determinants of wages has received more attention in recent years, especially in the case of developed countries and Latin America. The question of wages remains very controversial but rarely studied in the Arab countries especially in Algeria. In the current context, affected by strong social protest, it is important to devote more attention on the issue of wages in Algeria.

The analysis of wages determinants has received much attention in developed countries (Pedersen & al, 1990) for Danemark, (Van Der Hoek, 1989; Van Ophem, 1993; Jacobson and Ohlsson, 1994) for Sweden, (Heitmueller A, 2004) for Scotland, (Dustmann & van Soest, 1995) for Germany, (Card D, 1999; Katz & Krueger, 1991; Krueger, 1988; Lewis,

1988; Moulton, 1990; Belman & Heywood, 1989) for the United States. Most of these studies analyzed the determinants of wages by comparing two segments (public vs private, formal vs informal…) in the labor market.

Many studies indicate significant differences in the wage structure between public and private sectors, with rewards in the public sector, often higher than those in the private sector. Benjamin et al. (1998) find differences of the order of 5 to 10% in Canada and the United States, but they assert that these gaps diminish with time and they are more important for women and low-wage workers.

Tansel (1999) studied the wage gap between the formal and informal sectors in Turkey using the Survey of Household Spending 1994. The results indicate significant wage differentials between formal and informal workers for men and women, suggesting a strong segmentation of the labor market in Turkey. Tansel (2001) extends the analysis by integrating the self-employed into the model. She follows a similar methodology and examines the determinant of the choice of the employment sector and the wage differentials for formal, informal and self-employed workers with a gender-based analysis. She finds that formal salaried men are better off compared to employees not covered by social security and the self-employed. Approximately, male salaried workers who are covered win twice as much as their female counterparts.

Whereas, male workers' wages are close to parity with those of female workers.

Carneiro and Henley (2001) analyze the determinants of wages and the selection of workers in formal and informal employment using the Brazilian household survey 1997. In order to modeling the selection, they adopt the Lee procedure (1985). The results indicate that: age, experience, education and gender are determining factors of wages. In addition, they report that the selectivity correction term is statistically significant in the earnings equation, thus, quantitatively important in the modeling of wage differentials.

Badaoui et al (2008) re-examine the determinants of wage differentials between the formal and informal sectors on a sample of South African employees. They point out that the potential bias of selection is the main

challenge in measuring the wage gap between the formal and informal sector. From several specifications, they try to measure the impact of different groups of variables on wage differentials between these two segments.

Bargain and Kwenda (2009) examine the wage gap between the informal sector and the formal sector in Brazil, Mexico and South Africa using panel data. The sample is designed to include only the men aged 15-65 living in urban areas. The results reveal a similar distribution outline of earnings between the two segments in all countries. This Wage gap is mainly observed in the lower income quintiles and disappears in the superior quintiles.

Blunch (2001) examines the determinants of wage gap between the formal and informal sector in Serbia by testing different measures of the informality (company registration, employment contract, size of the firm, etc.). The results show a large income gap between the formal and informal sectors. The analysis of the breakdown of wage differentials shows that individual characteristics such as education account for a large part of the wage gap between the two segments: formal vs informal whatever the specification of informality.

Günther and Launov (2012) extend the existing literature by formulating a new econometric methodology that allows for a heterogeneous structure in the informal sector in the case of Côte d'Ivoire (cross-sectional data from). They find that the earnings of informal workers differ considerably depending on their segment. The results show that the informal sector is composed of two segments, one of which is higher levels of education and experience, gains and returns than the other.

For developing countries, particularly in the case of Arab countries, there are few empirical studies on the returns to education. The analysis of the determinants of wages in each segment of the labor market can help to identify the extents to which institutional are responsible for labor market segmentation.

The formal vs informal dichotomy does not constitute a satisfactory explanatory framework for the Algerian labor market situation. We have segmented the labor market into four segments: Self-employed, Public sector employees, Informal employees and Formal employees in the private sector.

The outline of this paper is as follows. After the introduction, Section 2 presents the institutional context in Algeria. Section 3 discusses the data used and the methodology followed. Section 4 presents the results of the

analysis in several parts. The first part examines the results of gender wage differentials based on switching model. The second part focuses on the determinants of formal vs. informal employment based on structural equation. Section 5 concludes.

## 2.   The Issue of Wages in Algeria

The discussion about wages remains very controversial but very little studied in Algeria. The wage survey was interrupted in 1996. There are, irregular surveys carried by Ministry of Labor or indicators published by the National Social Insurance (CNAS). Also, there are some attempts of indirect analysis (Bouklia & Talahite, 2008; Boutaleb, 2013).

Since the implementation of the reforms (1989), the role of the State in the regulation of wages has been limited, on the one hand, the establishment of a national grid for the public sector and, on the other hand, Minimum wage (SNMG) after consultation with the social partners (trade unions and employers' organizations). The fixing of wages in the economic world (public and private) is governed by collective agreements between workers and employers, with deposit with the services of the Ministry, in charge of labor.

The basis of the wage system in Algeria is fixed by the State, namely the national guaranteed minimum wage (SNMG) valid for all sectors of activity. In determining the SNMG, the following indicators are taken into account: national average productivity, consumer price index and general economic conditions. In 1994, faced with the economic crisis, Algeria will modify the composition of the minimum wage, which now includes not only post salaries, but also includes allowances and bonuses of any kind. The SNMG thus reflects the rise in the level of wages. Between 2002 and 2009, the guaranteed national minimum wage increased from 8,000 DA (61 EUR) to 12,000 DA (91 EUR), but these increases in fact only maintain the purchasing power of employees as inflation remains relatively high.

Overall, the average monthly wage in public sector for all activities combined is 1.73 higher compared to the private sector. In terms of monetary value, employees in the public sector receive an average of 17300 DA (177 EUR) more in comparison with employees in the private sector. By activity, it appears that the largest gap between the public and

private sector is observed in the extractive sector with a ratio of 3.8 higher for public sector employees. In monetary value the difference is 55500 DA (570 EUR). The only sector where the average monthly wage is higher (in the private sector versus the public sector) is the financial activities sector. Indeed, in this sector, employees in the private sector receive 1.23 more than public sector employees. In monetary terms, private sector employees receive 10100 DA (103 EUR) more. The smallest gap is observed in the services sector "Hotel and Catering", less than 1600 DA (17 EUR). The analysis by qualification shows that: 1) in the financial activities sector, wages are higher in the private sector than in the public sector, whatever the qualifications of employees (senior managers, supervisors, executing agents). 2) the average wage gap between public and private sector employees varies according to the qualification: for senior managers, wages are higher for private sector employees in the sectors of manufacturing, trade, financial activity. For supervisors, wages are higher for private sector employees in the hotel / restaurant, financial sectors. For executing agents, wages are higher for private sector employees in the financial activities sector.

## 3.    Data and Methodology

We use the latest available survey on household consumption conducted by the National Statistics Office (ONS) in 2000. Previous editions were carried out in 1967-1968, 1979-1980 and 1988-1989.

**Table 1: Characteristics of the different segments (% in line)**

|  | Employees in Public Sector | Employees in Formal Private Sector | Employees in Informal Private Sector | Self-employment | Total |
|---|---|---|---|---|---|
| **Demographic characteristics** |  |  |  |  |  |
| **Gender** |  |  |  |  |  |
| Male | 48,2 | 4,3 | 22,8 | 24,7 | 100 |
| Female | 70,8 | 3,7 | 12,9 | 12,6 | 100 |
| **Age** |  |  |  |  |  |
| 15 – 24 years | 33,8 | 3,7 | 45,2 | 17,3 | 100 |
| 25 – 34 years | 51,8 | 5 | 22,6 | 20,6 | 100 |
| 35 – 44 years | 57 | 4,1 | 16,9 | 22 | 100 |
| 45 – 54 years | 57,1 | 4 | 11,9 | 27,1 | 100 |
| 55 – 64 years | 37,7 | 3,6 | 9,8 | 48,9 | 100 |

| | Employees in Public Sector | Employees in Formal Private Sector | Employees in Informal Private Sector | Self-employment | Total |
|---|---|---|---|---|---|
| **Demographic characteristics** | | | | | |
| **Gender** | | | | | |
| Male | 48,2 | 4,3 | 22,8 | 24,7 | 100 |
| Female | 70,8 | 3,7 | 12,9 | 12,6 | 100 |
| **Marital status** | | | | | |
| Married | 52,2 | 4 | 16,7 | 27 | 100 |
| Other | 48 | 4,7 | 30 | 17,4 | 100 |
| **Human Capital** | | | | | |
| Without instruction | 33,7 | 3,4 | 25,2 | 37,7 | 100 |
| Primary | 39,3 | 4,7 | 26,8 | 29,2 | 100 |
| Intermediate | 46,9 | 4,8 | 27,2 | 21,1 | 100 |
| Secondary | 69,6 | 3,5 | 12,9 | 13,9 | 100 |
| University | 83,4 | 4,5 | 3,5 | 8,6 | 100 |
| **Job characteristics** | | | | | |
| Agriculture | 8,5 | 0,9 | 40,1 | 50,5 | 100 |
| Industry | 59,8 | 10,3 | 19 | 10,9 | 100 |
| Construction | 18 | 7,6 | 55,3 | 19,1 | 100 |
| Trade | 6,1 | 6,2 | 24,4 | 63,3 | 100 |
| Services | 75,9 | 2,5 | 9,1 | 12,6 | 100 |
| **Household characteristics** | | | | | |
| Presence of children under 5 years | 49,7 | 4,1 | 21,8 | 24,4 | 100 |
| Presence of public employees | 40,4 | 26,8 | 25,7 | 22,8 | 100 |
| Presence of formal employees | 2,7 | 12,0 | 2,5 | 1,9 | 100 |
| Presence of informal employees | 11,0 | 12,5 | 33,8 | 12,1 | 100 |
| Presence of self-employment | 12,8 | 12,5 | 16,6 | 23,4 | 100 |
| **Strate** | | | | | |
| Urban | 56,3 | 4,8 | 18,4 | 20,5 | 100 |
| Rural | 44 | 3,6 | 25,5 | 26,8 | 100 |
| **Average wages (DA)** | 11900 | 10700 | 8000 | 13500 | |
| **Sample** | **6452** | **544** | **2766** | **2983** | **12745** |

Source: Constructed from consumption survey data (2000) -ONS.

Our sample is composed of 41807 observations, the distribution according to the individual situation is as follows: 12910 occupied, 6612 unemployed, 18954 housewives and 3331 other inactive. The employed population aged 15-64 consists of 12,745 observations (11,356 men and 1,369 women). Of these, 9762 are employees (8548 men and 1214

women) and 2983 self-employed (2808 men and 175 women). For those employed, there are 6452 workers in the public sector (5468 men and 984 women), 544 working in the private sector and affiliated to social security (493 men and 51 women) and 2766 who work in the private sector but are not affiliated to social security (2587 men and 179 women). The sample is composed of individuals (employees and self-employed) aged between 15 and 64 years.

The table above shows:  1) More than 50% (about 66% of employees) of the employed are employees working in the public sector. Women work more (about seven out of ten women) as employees in the public sector. On the other hand, they are less represented in the status: self-employment (12.6% compared to men 24.7%). 2) The proportion of the employed working as employees in the private sector and benefiting from social security coverage is relatively low for both men (4.3%) and women (3.7%). 3) Among the youth category (15-24 years), the proportion of those who work as informal wage earners is relatively high (over 45%). Young people are the most vulnerable in the labor market. 4) The proportion of employed persons working as informal wage-earners decreases progressively with the age. On the other hand, it increases for the employed working in the public sector and for self-employed until the age of 54 years. Several empirical works on the topic of occupational choice (Rees and Shah (1986), Kidd (1993), Evans and Leighton (1989), Blanchflower and Meyer (1994), Blanchflower (2000) find positive influence of the experience on the choice of self-employment one of the interpretations of this relation is that people who start working younger accumulate not only Knowledge and skills in their field but also the capital needed to start their own business. 5) Among married persons, more than 52% are employees working in the public sector, this is the most dominant form of employment for this category of people. 6) More than 83% of those with a high level of education are employees in the public sector. This sector has long been the guarantor of skilled jobs for educated people. The proportion of employed persons in the public sector increases with the level of education. On the other hand, it decreases with the evolution of educational attainment for both self-employed and informal workers. For uneducated persons, 25% are informal employees, 33% are employees in the public sector and 37% are self-employed, while those with a higher level 83.4% are employees in the public sector, 8.6% are self-employed and 3.5% informal workers. 7) The dominant form of employment in the agricultural sector is employees without social security

(40.1%) and self-employment (50.5%), for industry and services the public sector is dominant (about 60% for industry and more than 75% for services). For trade, the dominant form of employment is self-employment (63.3%), while for the construction sector, informal employees (55.3%) dominate. 8) The situation of the occupied in the different segments is positively correlated with the presence of the members of the individual's household in similar segments. 9) The dominant form of employment in urban areas is wage-earning in the public sector (56.3%). There are more informal and self-employed workers in rural areas than in urban areas. 10) The average wage is higher for the self-employed, followed by public sector employees, formal wage earners and, finally, informal wage earners in the private sector.

**Figure 1:** Distribution (density) of monthly wages by segment

**Figure a:** Self-employment vs Salariat **Figure b:** Public vs. Private **Figure c:** Formal vs. Informal
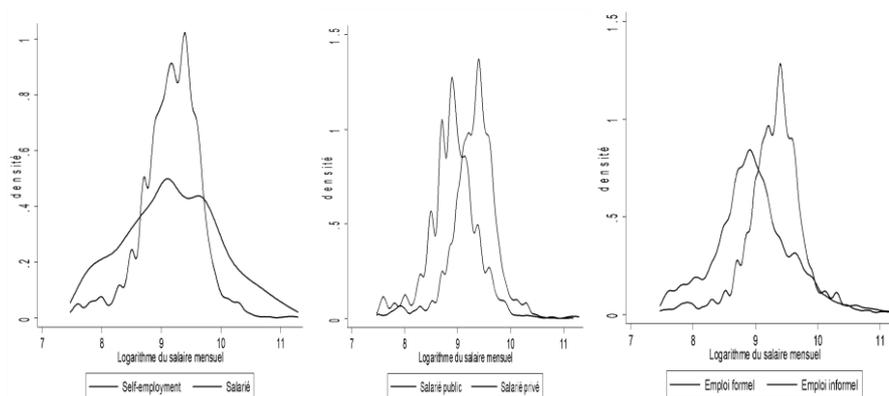


Source: Constructed from consumption survey data 2000 – ONS.

Analysis of the logarithm distribution of the monthly wages by segments shows that: 1) the wage distribution in informal sector is shifted to the left and its apex is slightly lower compared to formal sector, reflecting lower wages in the informal sector. 2) We find the same result for individuals working in the private sector compared to those in the public sector. 3) the wage distribution of individuals working as self-employed appears more flattened, which is due to the greater dispersion of their wages compared to the employees.

The Kolmogorov-Smirnov test[1] shows that the wage distribution is different, whatever the specification: formal jobs vs informal jobs, public employee's vs private employees and self-employment vs employees.

We estimated several switching equations. This model allows, estimating separately the wage equations for two sectors taking into account the selection effect between these two sectors. In our work, we estimate different switching models between different combinations of sectors taking into account the different selection biases: participation bias and allocation bias in the different segments.

Suppose that $y_{1i}$, $y_{2i}$, $y_{3i}$, $y_{4i}$, $y_{5i}$ ,,,, $y_i$ are the monthly wages in public segment, private segment for affiliated wage earners, private segment for unaffiliated wage earners and self-employed workers respectively. Thus, the wage equations to be estimated are respectively:

Regime 1: $Lny_{1i} = \beta_1 X_{1i} + \varepsilon_{1i}$          (1)

Regime 2 : $Lny_{2i} = \beta_2 X_{2i} + \varepsilon_{2i}$          (2)

Regime 3 : $Lny_{3i} = \beta_3 X_{3i} + \varepsilon_{3i}$          (3)

Regime 4 : $Lny_{4i} = \beta_4 X_{4i} + \varepsilon_{4i}$          (4)

Regime 5 : $Lny_{5i} = \beta_5 X_{5i} + \varepsilon_{5i}$          (5)

The estimation requires the combination of two regimes. And we estimate simultaneously two different regimes.

The dependent variable is the logarithm of the monthly wage. In the wage equations we introduced three blocks of variables: demographic characteristics, human capital and job characteristics. In the selection equation in addition to demographic characteristics and human capital, we introduced two other blocks of variables: household characteristics and territory characteristics. These last two blocks of variables are supposed to influence the choice of the employment sector but not affect directly the wages.

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[1] See annex 1.

## 4. Estimation Results of Switching Model

### 4.1. Selection equation

**Demographic characteristics**

The marital status has a positive effect on the choice of the self-employment. A married person may take more risk for creating an activity if the spouse works, because the spouse's salary is like a security, in the case where the project fails. The marital status has different effects on participation depending on the combination of segments. In fact, marital status (for married people) has a negative effect on public and private sector entry as informal wage earners in reference to self-employment, but it has a positive effect on entry into the labor market as employees in the public sector in reference to formal employees in the private sector.

Youth are less likely to start their career as self-employed. This is because young people would have fewer resources to start their own businesses. The probability of choosing self-employment decreases with age up to the age group 45-54 years. The likelihood of being self-employed increases for the elderly (55-64 years), this may be due to the fact that older people may have accumulated the resources needed to start their own business. Taken the public sector as a reference, we find that young people are more likely to start their working lives as employees in the private sector (but more as informal wage earners) and as self-employed. The probabilities of being in these sectors decrease with age. This result indicates that young people are more confronted with precariousness and insecurity in the labor market.

Human capital is an important factor in the choice of the employment sector. The self-employed likelihood decreases systematically with the level of education. In other words, more a person is educated more the likelihood is greater that he/she chooses to be in the wage system especially in the public sector that provides more stability and security. In all models where the public sector is taken as a reference, we find that the level of education has a positive effect on the choice of wage in the public sector, the higher levels of education, have greater likelihood to choose this sector compared to others (self-employment, informal employees and formal employees). Thus, education has a positive effect on the choice of the formal employment sector. In the latter model (self-employment vs

informal wage-earner), the level of education has a positive effect on self-employment. This result shows the importance of human capital for more stable and protected employment.

**Household characteristics**

The Size of the household has a positive effect to fall into self-employment. This can be agreeing that the financial insurance assistance that can be provided by the members of the household (who are employed) for a person in the household who wants to create an independent activity. The size of the household is significant with a positive effect to be in the public sector with reference to the private sector (formal and informal).

The presence of employees in the household (working in the public or private sector) has a negative effect on the choice of self-employment. Hence, the presence of self-employed individual in the household increases the likelihood of self-employment choice, this may mean by the transmission for entrepreneurship, as it may mean that the presence of a member of self-employed households can facilitate the access to this segment through their relationships, experience and possibly financial support. The presence of self-employed persons in the household increases the likelihood of public sector choice (for other members of the household) compared to other sector. On the other hand, the presence of members of the household as employees in the public sector increases the probability for the other members of the household to be in the public sector. Overall, we find similar effects for the presence in the household of formal and informal employees in the private sector on the choice of the same sector by the other members of the household.

**Table 2: Wages Equation -switching regression- withe selection effect correction**

|  | Employees in Informal Private Sector | Employees in Public Sector | Employees in Informal Private Sector | Employees in Formal Private Sector | Self-employment | Employees in Informal Private Sector |
|---|---|---|---|---|---|---|
|  | lnws0 | lnws1 | lnws0 | lnws1 | lnws0 | lnws1 |
| Gender Male (ref) Female | -0.492*** (0.0344) | -0.187*** (0.0134) | -0.491*** (0.0342) | -0.433*** (0.0662) | -0.593*** (0.0622) | -0.489*** (0.0344) |
| Number of years of study | 0.0216*** (0.00382) | 0.0198*** (0.00218) | 0.0213*** (0.00334) | 0.0266*** (0.00761) | 0.0351*** (0.00640) | 0.0231*** (0.00331) |
| Experience | 0.0226*** (0.00274) | 0.0240*** (0.00162) | 0.0223*** (0.00234) | 0.0281*** (0.00535) | 0.0247*** (0.00416) | 0.0237*** (0.00244) |
| Experience Square | -0.000299*** (4.82e-05) | -0.000294*** (2.82e-05) | -0.000294*** (4.62e-05) | -0.000389*** (9.96e-05) | -0.000243*** (6.63e-05) | -0.000310*** (4.60e-05) |
| Agriculture | -0.0445 (0.0310) | -0.235*** (0.0313) | -0.0327 (0.0312) | 0.0845 (0.107) | -0.0968 (0.0637) | -0.0448 (0.0311) |
| Construction | 0.169*** (0.0295) | -0.180*** (0.0245) | 0.177*** (0.0295) | 0.0128 (0.0500) | -0.104 (0.0725) | 0.170*** (0.0295) |
| Service | -0.0414 (0.0294) | -0.177*** (0.0128) | -0.0355 (0.0293) | -0.0738* (0.0444) | -0.0888 (0.0617) | -0.0416 (0.0294) |
| Trade | -0.00200 (0.0338) | -0.101** (0.0423) | 0.00470 (0.0337) | -0.0930* (0.0545) | -0.0702 (0.0643) | -0.000520 (0.0338) |
| Senior manager | 0.195* (0.113) | 0.464*** (0.0305) | 0.206* (0.113) | 0.558*** (0.123) | 0.618*** (0.0679) | 0.196* (0.113) |
| Middle manager | 0.534*** (0.143) | 0.422*** (0.0248) | 0.473*** (0.142) | 0.483*** (0.131) | 0.945*** (0.177) | 0.541*** (0.143) |
| Employee | 0.170*** (0.0501) | 0.253*** (0.0157) | 0.162*** (0.0498) | 0.266*** (0.0715) | 0.575*** (0.143) | 0.172*** (0.0501) |
| Worker | 0.121*** (0.0188) | 0.234*** (0.0131) | 0.119*** (0.0188) | 0.161*** (0.0496) | 0.335*** (0.0652) | 0.120*** (0.0188) |

**Table 2: Wages Equation -switching regression- withe selection effect correction**

|  | Employees in Informal Private Sector | Employees in Public Sector | Employees in Informal Private Sector | Employees in Formal Private Sector | Self-employment | Employees in Informal Private Sector |
|---|---|---|---|---|---|---|
|  | lnws0 | lnws1 | lnws0 | lnws1 | lnws0 | lnws1 |
| **Affiliation to Social Security** Affiliate (ref) |  |  |  |  | -0.305*** (0.0377) |  |
| Correction term λ | 0.0884** (0.0398) | 0.217*** (0.0200) | 0.0892*** (0.0241) | -0.137** (0.0659) | 0.198*** (0.0641) | 0.0650** (0.0293) |
| lns0 | -0.873*** (0.0140) |  | -0.865*** (0.0150) |  | -0.258*** (0.0247) |  |
| Lns1 | -1.029*** (0.00892) |  | -0.890*** (0.0429) |  | -0.875*** (0.0135) |  |
| r0 | -0.0777 (0.0947) |  | -0.304*** (0.0950) |  | -0.402*** (0.122) |  |
| r1 | 0.0923** (0.0436) |  | -0.323** (0.152) |  | 0.0167 (0.0868) |  |
| Constant | 8.963*** (0.0832) | 9.093*** (0.0538) | 8.961*** (0.0670) | 8.787*** (0.172) | 9.466*** (0.173) | 8.924*** (0.0680) |

**Table 2: Wages Equation -switching regression- withe selection effect correction**

| Selection Equation | Non-affiliated employees vs. Public employees | Non-affiliated Vs. Non-affiliated | Public vs. Non-affiliated |
|---|---|---|---|
| Household size | 0.0227** (0.00926) | -0.0161 (0.0173) | -0.0168 (0.0103) |
| Number of children <= 5 years | -0.0173 (0.0219) | 0.0393 (0.0393) | 0.0355 (0.0240) |
| Number of women 15+ | -0.0282* (0.0171) | 0.00664 (0.0313) | -0.0178 (0.0186) |
| Number of employees in the public sector | 0.131*** (0.0256) | 0.0182 (0.0518) | -0.0115 (0.0327) |
| Number of employees affiliated with the private sector | 0.0152 (0.0937) | 0.419*** (0.109) | 0.0784 (0.108) |
| Number of unaffiliated private sector employees | -0.316*** (0.0302) | -0.385*** (0.0652) | 0.332*** (0.0348) |
| Number of self-employment | 0.0324 (0.0409) | 0.0595 (0.0787) | -0.322*** (0.0386) |
| Married | 0.529*** (0.0502) | 0.440*** (0.0925) | -0.424*** (0.0571) |
| Other (ref) | 1.053*** (0.0645) | 0.668*** (0.124) | -0.724*** (0.0744) |
| Age 25 to 34 years old | 1.493*** (0.0755) | 0.926*** (0.144) | -1.096*** (0.0853) |
| Age 35-44 years | 1.528*** (0.105) | 1.040*** (0.195) | -1.582*** (0.106) |
| Primary | 0.263*** (0.0530) | 0.137 (0.0977) | -0.151*** (0.0533) |
| Intermediate | 0.642*** (0.0595) | 0.335*** (0.113) | -0.276*** (0.0637) |
| Secondary | 1.210*** (0.0640) | 0.458*** (0.126) | -0.435*** (0.0741) |
| Superior | 1.829*** (0.0998) | 1.163*** (0.182) | -0.717*** (0.137) |

**Table 2: Wages Equation -switching regression- withe selection effect correction**

| | | | |
|---|---|---|---|
| Density | -0.000517 (0.00244) | 0.00286 (0.00456) | 0.00284 (0.00329) |
| Local unemployment rate | 0.246 (0.171) | -0.0929 (0.292) | 0.0482 (0.182) |
| Industry rate in the district | -0.00179 (0.00230) | 0.00507 (0.00411) | -0.000680 (0.00265) |
| Construction rate in the district | 0.00274 (0.00197) | 0.00488 (0.00381) | -0.00195 (0.00201) |
| Rate of trade in the district | -0.00609** (0.00238) | 0.00210 (0.00421) | -0.000323 (0.00249) |
| Service rate in the district | -0.00322* (0.00193) | 0.00564 (0.00358) | -0.00231 (0.00203) |
| Public employee rate in the district | 0.0148*** (0.00410) | -0.00748 (0.00717) | 0.0252*** (0.00451) |
| Affiliated private employee rate in the district | -0.00854 (0.00617) | 0.0688*** (0.00988) | 0.0286*** (0.00692) |
| Unaffiliated private employee rates in the district | -0.0221*** (0.00197) | -0.0163*** (0.00372) | 0.0371*** (0.00198) |
| Informal employment rate in the district | 0.00115 (0.00395) | -0.00935 (0.00698) | 0.00513 (0.00421) |
| Constant | -1.103*** (0.394) | -1.263* (0.706) | -1.212*** (0.426) |
| Observations | **9218** | **3310** | **5749** |

Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1   **Source:** Estimation based on data from ONS survey consumption 2000.

## Characteristics of the territory

The empirical results of the analysis of the relationship between the unemployment rate and self-employment by testing the theories "Push" and "Pull" are contradictory. Under the assumption of "push effect", high unemployment may reduce the possibility of obtaining paid employment and there is a positive effect on self-employment. The increase of unemployment rate means more difficulties to find a job as salaried workers and more people eastern themselves on self-employment to create their own job. According to the "pull effect" assumption, high unemployment rate can negatively affect individual expectations on the success of self-employment. The first hypothesis would imply a positive relationship between the rate of entry into self-employment and unemployment. On the other hand, the second hypothesis would imply a negative relationship. Bregger (1963), Rayr (1975), Becker (1984) concluded that the unemployment rate has a positive "push" effect on self-employment, Self-employment has a counter-cyclical effect in the case of United States, on the other hand, Creigh et al. (1986) concluded that unemployment does not have a net effect on the evolution of self-employment in the case of United Kingdom. Unemployment has a negative effect "Pull" on self-employment and therefore self-employment has a cyclical effect.

In our work, we find that the unemployment rate is negatively correlated with self-employment, it means that the likelihood of self-employment is lower in regions with high unemployment rate. It is rather the "Pull" theory that is verified in the Algerian case.

The local unemployment rate is significant only in the first model (self-employment vs public sector) with a positive effect on the choice of the public sector. This means that the higher the unemployment rate is in a region, the greater is the probability of entering the public sector. The public sector plays as a shock absorber of social tensions in the periods of economic shocks.

We introduced variables that measure the concentration rates of sector activities (agriculture, industry, construction, trade, services), different segments of the labor market (public employee, affiliated private employee, unaffiliated private employee) at the district level, density of the population and the local unemployment rate. The likelihood of being

self-employed is higher in regions with low levels of agricultural activity, but is relatively high in regions with a high concentration of trade, services and industry. Finally, the likelihood of being self-employed is higher in the regions where the dominant form of employment is self-employment. This means that there is a dissemination and specialization effect in the activities by region. Finally, there are some important effects of the characteristics of the regions on the choice of a particular employment sector.

## 4.2.    Wages Equation

### Demographic Characteristics and Human Capital

Women would earn less than men regardless of the employment sector they choose. If they choose the public sector, the wage gap varies between 18.4% and 18.9% compared to men, regardless of the sector referenced. The choice of self-employment causes women to lose between 60% and 63.1% of the potential salary compared to men. Being in the formal wage sector decreases the potential wages of women from 41.9% to 42.6% compared to men. Finally, women who opt for the informal wage receive a lower salary (49.7%) than men. It also emerges from this finding that the public sector is the sector that guarantees more equal wages between women and men. The performance of the experiment varies according to the sectors with a positive effect on wages but with decreasing returns. The effect of experience is greater in the self-employment sector compared to the public and informal wage sectors. Also, the effect of experience is greater in the formal wage compared to self-employment and informal wage-earning. The effect of experience is greater in the public sector compared to formal and informal wage in the private sector. Human capital is an important factor not only in the choice of sectors but also in the determination of the potential wages. As a result, returns to human capital are generally higher in formal employment sector than in the public sector and in the private formal sector.

### Job characteristics

The effect of the sector of activity is different between the two sectors: employees and self-employment. For the former, we find that wage earners in industry earn higher wages than their counterparts in other sectors (agriculture, service and trade). For the second sector, only

dummy construction is significant with a negative effect on wages compared to the industry sector. It is the only dummy where the signs are opposed between the two sectors. This means that in the construction sector, a person would earn more if he is in the first sector (wage-earning). For the wage sector, we also introduced the variables: occupation and legal sector. For the profession, we find that the wages increase systematically with the hierarchy in the position occupied. For the legal sector, we note that private sector employees earn 13.1% less than employees in the public sector. Non-affiliation to social security has a negative effect on wages in both sectors, meaning that people covered by social security will earn more than unheated persons in both sectors, but non-covered persons will earn more if they choose the wage sector where the wage gap between covered and uncovered persons is 15.6% against 36.8% in the second sector.

Working in the industry sector increases the potential wage (compared to other sectors) in all employment sectors except for informal wage earners where the potential wage is higher in the construction sector. The potential wage gap (between the industry sector and the other sectors) is less important in the self-employment. Also, the wage gap is larger in the public sector compare to formal and informal wage sectors. In the formal wage, the expected wages are higher in all occupational categories compared to the informal wage sector. Expected wages are also higher in the public sector in all occupational categories except for middle managers where the potential wage is higher in the informal wage sector. Finally, the expected wages are lower in the public sector for all grades except for workers compared to the private sector. The public sector is the one that protects the least qualified employees.

The selection terms are significant across the models, which mean that there was indeed a selection effect in the determination of wages.

## 4.3.    Structural equation for sector choice

First, we estimate structural equations for the choice between two segments, several specifications are estimated. In Second time, we estimate a structural equation for the choice of various segments in a multinomial framework. In the multinomial logistic model, every individual (i) has to choose between four alternatives (j = 1 to 4):

employees in the public sector, formal employees, informal employees and self-employed.

## Demographic Characteristics and Human Capital

The model shows a negative relationship between the age and the probability of access to formal and informal salaried segments, but with greater effects for the latter segment compared to the "public sector". For the self-employment segment, we observe that people aged between 35 and 54 years are less likely to be in this segment with reference to the public sector. On the other hand, for those aged between 25-34 years and 55-64 years, they are more likely to have access to the self-employment segment compared to younger people (15-24 years) with reference to the public sector. Hence, married people are more likely to be self-employed instead of being employees in the public sector. Or else, they are less likely to be informal employees with reference to the public sector.

Human capital increases the likelihood of access to the public sector, therefore, they have less chance for entry into other segments. We observe a positive relationship between education and the entry into the public sector. In other words, when the level of education is higher, the chance for access to the public sector is greater.

**Table 3:** Multinomial Logistic Estimation of the Structural Equation

|  | Self-employment | Formal | Informal |
|---|---|---|---|
| Age |  |  |  |
| 25 -34 years | 0.191** | 0.160 | -0.439*** |
|  | (0.0843) | (0.157) | (0.0776) |
| 35-44 years | -0.299*** | -0.441** | -1.262*** |
|  | (0.104) | (0.194) | (0.104) |
| 45-54 years | -0.354*** | -0.680*** | -1.897*** |
|  | (0.115) | (0.221) | (0.124) |
| 55 - 64 years | 0.397*** | -0.523* | -1.958*** |
|  | (0.137) | (0.287) | (0.172) |
| Marital status |  |  |  |
| Married | 0.196** | -0.110 | -0.199** |
| Other (ref) | (0.0777) | (0.142) | (0.0845) |
| Primary | -0.199*** | -0.188 | -0.281*** |
|  | (0.0742) | (0.163) | (0.0851) |
| Intermediate | -0.720*** | -0.633*** | -0.920*** |
|  | (0.0877) | (0.184) | (0.0977) |
| Secondary | -1.349*** | -1.355*** | -1.762*** |
|  | (0.0986) | (0.202) | (0.111) |
| University | -1.922*** | -1.460*** | -2.946*** |
|  | (0.142) | (0.249) | (0.203) |
| Household size | 0.00823 | -0.0545** | -0.0435*** |
|  | (0.0132) | (0.0270) | (0.0146) |
| Number of children <= 5 years | -0.0309 | 0.00724 | 0.0317 |
|  | (0.0311) | (0.0630) | (0.0348) |
| Number of women 15 and over | 0.0350 | 0.0480 | 0.0316 |
|  | (0.0244) | (0.0485) | (0.0270) |
| Number of employees in  public sector | -0.260*** | -0.226*** | -0.199*** |
|  | (0.0397) | (0.0765) | (0.0426) |
| Number of employees in formal private sector | 0.0248 | 0.857*** | 0.0231 |
|  | (0.136) | (0.132) | (0.144) |
| Number of employees in informal private sector | -0.103* | -0.164 | 0.509*** |
|  | (0.0551) | (0.119) | (0.0471) |
| Number of self-employment | 0.412*** | -0.0569 | -0.0790 |
|  | (0.0502) | (0.122) | (0.0621) |
| Density | -0.00384 | 0.00337 | -0.00549 |
|  | (0.00409) | (0.00640) | (0.00412) |
| Local unemployment rate | -0.546** | -0.337 | -0.691** |
|  | (0.256) | (0.481) | (0.271) |
| Industry rate in the district | 0.00768** | 0.0106 | 0.00885** |
|  | (0.00345) | (0.00662) | (0.00370) |
| Construction rate in the district | -0.00173 | 0.00638 | -0.00118 |
|  | (0.00290) | (0.00618) | (0.00303) |
| Rate of trade in the district | 0.0114*** | 0.0177** | 0.0132*** |
|  | (0.00340) | (0.00719) | (0.00373) |
| Service rate in the district | 0.0104*** | 0.0144** | 0.0101*** |
|  | (0.00273) | (0.00600) | (0.00305) |
| Public employee rate in the district | -0.0691*** | -0.0363*** | -0.0307*** |
|  | (0.00541) | (0.0107) | (0.00650) |
| Affiliated private employee rate in the district | -0.0436*** | 0.116*** | 0.0108 |
|  | (0.00906) | (0.0142) | (0.00989) |
| Unaffiliated private employee rates in the district | -0.0281*** | 0.00967 | 0.0339*** |
|  | (0.00289) | (0.00627) | (0.00305) |
| Informal employment rate in the district | -0.0130** | -0.0215** | -0.00511 |
|  | (0.00507) | (0.0106) | (0.00627) |
| **Earnings differential** | -0.452** | 0.487 | -1.176*** |
|  | (0.191) | (0.341) | (0.213) |
| Constant | 3.899*** | -0.410 | 1.463** |
|  | (0.519) | (1.078) | (0.631) |
| Observations | **13,910** | **13,910** | **13,910** |

**Source:** Estimation based on consumption survey data 2000-ONS.

**Household characteristics**

The household size has a negative effect on the access to formal and informal wage segments in the private sector with reference to the public sector. The number of children (under 5 years old) and the number of women (aged over of 15 years old) in the household is not significant for the choice of the sectors. These variables influence the decision to participate in the labor market.

The presence of household members working as employee in the public sector increases the likelihood of entry into this segment. On the other hand, the presence in the household of self-employed workers increases the likelihood of entering other members of the household in this segment.

**Characteristics of the territory**

The model shows some regional specificity influencing the access to the different sectors in the labor market. The effects of these variables are different according to the sectors analyzed. Thus, the local unemployment rate decreases the probability of entering in the self-employment and that of informal wage-earners compared to the public sector.

**The Differential earnings**

In this model, the differential earnings are the difference between the potential wage in the public sector and the maximum wage potential in the other three segments. The variable is significant in the self-employment and informal wage segments but with a negative sign which means that those who choose to work as employees in the public sector earn less in this segment compared to other segments. This means that pecuniary gains are not a motivation for choice the public sector, other factors must influence the decision for the choice of this sector.

## 5.    Conclusion

This work shows that returns to education and experience are higher in the public sector for both men and women, but the impact of these two factors on wages is less important for the segments: informal and self-employed workers.

This work also allowed us to see that, regardless of the segment in the labor market, women are paid less than men. The public sector is the one that most protects women from wage discrimination but the situation remains very difficult for women with the reduction of opportunities to find a job in the public sector. There, we speak of protection for women only with higher levels of education, since there are barriers to entry into the sector. We wonder about the fate of this category of women. The largest gap is recorded in the informal and self-employed segments.

In the private sector and in particular for informal wage earners, the gap between men and women is due more to discrimination against women, since in the latter segment, the gap is only slightly explained by the variables relating to human capital and social capital.

Another result, wages in the public sector are higher than in other sectors and that overall returns to education (all occupational situations) are higher in the public sector for men and women, but there is evidence that wages in the public and private sectors vary over time for most countries due to changes in policy or the economic environment. The results do not mean that public sector employees are always overpaid.

Some regional specificities (geographical areas, density of population and local unemployment rate) influence the choice of the sector and explain in part the differences in wages between men and women.

The analysis of the evolution over time of wage differentials between different segments (public vs private, formal vs informal, wage vs self-employment) using comparable data and similar techniques should be carried out.

## References

Badaoui, E., Strobl, E. and Walsh, F. (2008), "Is there an Informal Employment Wage Penalty? Evidence from South Africa," *Economic Development and Cultural Change*, n°56, 683-710.

Bargain, O. and Kwenda, P. (2009), "The Informal Sector Wage Gap: New Evidence Using Quantile Estimations on Panel Data," *IZA Discussion Papers,* n° 4286.

Becker, E.H. (1984), "Self-Employed Workers: An Update to 1983," *Monthly Labor Review*, Vol.107, n°7,14–18.

Belman, D. and Heywood, J.S. (1989), "Government wage differentials: A sample selection approach," *Applied Economics*, n°21, 427-438.

Benjamin, D. and al. (1998), *Labour Market Economics* (4th edition), *Toronto, McGraw-Hill Ryerson.*

Blanchflower, D.G. and Meyer, B. (1994), "A longitudinal analysis of the young self-employed in Australia and the United States," *Small Business Economics*, n° 6, 1-19.

Blanchflower, D. G. (2000), "Self-employment in OECD countries," *Labour Economics*, n°7, 471-505.

Blunch, N. H., Canagarajah, S. and Raju, D. (2001), "The Informal Sector Revisited: A Synthesis across Space and Time," *Social Protection Discussion Paper Series,* n° 0119, The World Bank.

Bouklia, H.R. and Talahite, F. (2008), "Marché du travail, régulation et croissance économique en Algérie," *Revue Tiers Monde*, n° 194, 413-437.

Boutaleb, K. (2013), *Politique des salaires : fondements théoriques et analyses empiriques de l'expérience algérienne,* office des publications universitaires, Alger.

Bregger, J.E. (1963), "Self-Employment in the United States 1948–62," *Monthly Labor Review*, Vol. 90, n°1, 37-43.

Card, D. (1999), "The Causal Effect of Education on Earnings," *Handbook of Labor Economics,* Vol.3A. Amsterdam: Elsevier.

Carneiro, F.G. and Henley, A. (2001), "Modelling formal vs. informal employment and earnings: micro-econometric evidence for Brazil," University *of Wales Aberystwyth School of Management and Business Research Paper,* n°2001-16.

Creigh, S and all. (1986), "Self-Employment in Britain: Results from the Labour Force Surveys 1981-84," Employment Gazette, Vol. 95, n°6, 183-194.

Dustmann, C. and Van Soest, A.   (1995), "Generalised switching regrssion analysis of private and public sector wage structures in Germany," *University College London*, Discussion Paper 95-06.

Evans, D.S. and Leighton, L.S. (1989), "Some Empirical Aspects of Entrepreneurship," *American Economic Review*, n°79, 519-535.

Günther, I., Launov, A. (2012), "Informal employment in developing countries: opportunity or last resort?," *Journal of Development Economics*, n°97, pp.88-98.

Heitmueller, A. (2004), "Public-Private Sector Wage Differentials in Scotland: An Endogenous Switching Model," *IZA DP* n°992.

Jacobson, T. and Ohlsson, H. (1994), "Long-run relations between private and public sector wages in Sweden," *Empirical Economics*, n°19, 343-360.

Katz, L.F. and Krueger, A.B. (1991), *Changes in the structure of wages in the public and private sectors.* Research in Labor Economics. JAI Press, Greenwich, Connecticut.

Kidd, M.P. (1993), "Immigrant wage differential and the role of self-employment in Australia," *Australia Economic Papers*, n°32, 92-115.

Krueger, A.B. (1988), *Are public sector workers paid more than their alterative wage? Evidence from longitudinal data and job queues*. In: Freeman, R.B. and Ichniowski, C. (Eds.), When Public Workers Unionize. University of Chicago Press, NBER, 217– 240.

Lee, R. (1985), **"**The Entry to Self-Employment of Redundant Steelworkers,**"** *Industrial Relations Journal***,** Vol. 16, n°2, 42-49.

Lewis, H.G. (1988), "Union/nonunion wage gaps in the public sector," *In: Freeman, R.B., Ichniowski, C. (Eds.), When Public Workers* Unionize. University of Chicago Press, NBER, 169– 193.

Moulton, B.R. (1990), "A reexamination of the federal –private wage differential in the United States," *Journal of Labor Economics*, n°8, 270-293.

Pedersen, P.J., Schmidt-Sorensen J.B., Smith N. and Westergard-Nielsen N. (1990), "Wage differentials between the public and private sectors," *Journal of Public Economics*, n°41, 125-145.

Rayr, N. (1975), "A Report on Self-Employed Americans in 1973," *Monthly Labor Review*, Vol. 102, n°1, 49-54.

Rees, H. and Shah, A. (1986), "An Empirical Analysis of Self-employment in the U.K," *Journal of Applied Econometrics*, n°1, 101-108.

Tansel, A. (1999), "Public–private employment choice, wage differentials and gender in Turkey," Center Discussion Paper n°. 797, Yale University.

Tansel, A. (2001), *Self-employment wage employment and returns to schooling by gender in Turkey*. In Labor and Human capital in the Middle East: Studies of Markets and Household Behavior, ed. D. Salehi-Isfahani, Reading, UK: Ithaca Press.

Van Der Hoek, M.P. (1989), "Pay differentials between the private and public sector in the Netherlands," *Public Finance Quarterly*, n°17, 84-95.

Van Ophem. (1993), "A modified switching regression model for earnings differentials between the public and private sectors in the Netherlands," *Review of Economics and Statistics*, 215-224.

## ANNEX I

**Table 1:** Kolmogorov-Smirnov test for equality of distribution

| Smaller group | D | P-value | Corrected | |
|---|---|---|---|---|
| **Formal vs informal employment** | | | | |
| Formal employment Emploi formel | 0.0104 | 0.514 | | Different distribution function |
| Informal employment Emploi informel | -0.3682 | 0.000 | | |
| Combined K-S: | 0.3682 | 0.000 | 0.000 | |
| **Public employee vs. private employee** | | | | |
| Public employee | 0.0042 | 0.926 | | Different distribution function |
| Private employee | -0.4319 | 0.000 | | |
| Combined K-S: | 0.4319 | 0.000 | 0.000 | |
| **Slef-employment vs employee** | | | | |
| Self-employment | 0.1634 | 0.000 | | Different distribution function |
| Employee Salariat | -0.1822 | 0.000 | | |
| Combined K-S: | 0.1822 | 0.000 | 0.000 | |
| **Agricultural employment vs non-agricultural employment** | | | | |
| Agricultural employment | 0.2838 | 0.000 | | Different distribution function |
| Non agricultural employment | -0.0346 | 0.026 | | |
| Combined K-S: | 0.2838 | 0.000 | 0.000 | |