Characteristics and Determinants of Underemployment in Cameroon

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Research Paper 375

Bringing Rigour and Evidence to Economic Policy Making in Africa

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By

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Abstract

The objective of this study was to improve the analysis of the labour market in Cameroon, through a better understanding of the characteristics and determinants of underemployment. Specifically, this study aims to: identify the profile of an average visible and invisible underemployed; identify the determinants of the visible and invisible underemployment; and assess the contribution of these determinants to the underemployment gap existing between rural and urban residents. The method used for empirical analysis was both descriptive and econometric. The level of visible underemployment was 11.5% among individuals aged between 15 and 64 years. It showed no disparity in age, gender and place of residence, and increased with education. The estimated invisible underemployment rate was about 62.7%. Visible underemployment affects young people and women the most. Although it is more accentuated in rural areas, the informal sector represents the seat of the low-income jobs. Probit and sample selection, and Fairlie decomposition (2006) are the econometric techniques used to model the probability of being underemployed. The results of the probit models suggest that education, business sector, employment sector, socio-professional category, sex, age and location have significant impact on the probability of being underemployed. The total gap in mean probability of the invisible underemployment between rural and urban workers was 26.4%. Results of the Fairlie decomposition shows that 81.1% of this gap are explained by the difference in the distribution of observable characteristics between rural and urban populations. The remaining 18.9% can be assigned to the difference due to the effects of observed characteristics. The findings also indicate that the business sector has the highest contribution (36.4%) in the distribution of observable characteristics, alongside education (13.1%) and the employment sector (10.8%).

Keywords: labour market, characteristics, determinants, underemployment,
             the probit model with sample selection

1. Introduction

Until the mid 1980s, the economy of Cameroon was ranked among the top in sub-Saharan Africa. The second half of the 1980s marked the start of an economic crisis, arising from the combined effects of a decline in oil production and the falling prices of major export products.This crisis severely affected all the sectors of the national economy, especially employment. To cope with the situation, the government with the support of the World Bank, adopted in early 1989, Structural Adjustment Programmes firstly aiming to correct macroeconomic imbalances and microeconomic inefficiencies, and secondly to reduce the vulnerability of the economy to the shocks from trade with the outside world (Fomba, 2008).

These reforms affected most areas of the national economy, particularly the labour market (Fomba, 2008). Then a new labour code was quickly adopted in 1990 with many changes, including relaxation of pay scales, authorization of direct negotiation between employees and employers, and reduced compensation in case of dismissal (Gauthier, 1994).

However, it is admitted that the collapse of the labour market in Cameroon began to be felt after the double decline in salaries, which occurred in 1993, and the devaluation of the CFA franc in January 1994. Most of the measures taken to redress the economic situation caused significant changes in the labour market, with the expansion of the informal sector and the holding of a second job as the after-effects. Therefore, the characteristics of working time changed and the structure of the labour market moved progressively from the formal public structure to an employment structure dominated by the informal and a high rate of precarious jobs (Rosanvallon, 2002). Statistics from the third Cameroonian household survey show, for example, 92% of workers are engaged in the informal sector.

The government has initiated efforts to rectify these shortcomings in the labour market. The Strategic Document for Growth and Jobs (DSCE) addresses the issue of employment in three main perspectives: increasing the number of decent jobs; matching labour demand; and improving the efficiency of the labour market. Achieving these goals requires prior knowledge of the labour market situation. It is an essential condition to implement effective and appropriate public employment policies.

Generally, to assess the situation of the labour market in an economy, the most widely used indicator is unemployment rate. As defined by the International Labour

Organization (ILO), unemployment rate measures the gap between supply and demand of labour. However, given certain circumstances, this indicator does not allow a deep analysis of the labour market. In Cameroon, for example, the Main Report of the Second Survey on Employment and the Informal Sector (EESI2) conducted in 2010 by the National Institute of Statistics shows that the unemployment rate in 2010 was 3.8%, while it was 4.5% in 2005. At first sight, this suggests a full employment situation, and therefore the efficiency of the labour market. However, this is an illusion because while the unemployment rate in Cameroon remains relatively low, more than 70% of the labour force are underemployed (Singh, 2012). EESI2 data reveal that 63.7% of workers in 2010 earned a wage from their main job that was lower than the minimum salary. This rate of precarious and vulnerable jobs in Cameroon is the highest in Central Africa — for example, it was 43.2% in Congo Brazzaville in 2011 (CNSEE, 2012), 40.8% in Chad in 2011 (INSEED, 2013) and 38.2% in DRC in 2005 (UNDP, 2009). Paradoxically, the minimum wage in Cameroon remains the lowest[1].

Since most developing countries do not have programmes to assist the unemployed, most workers carry out subsistence activities that sometimes do not fit their training. It is, therefore, obvious to understand that although low, the unemployment rate would be an inadequate indicator of the labour market in developing countries. In addition, a person with no job who practises an activity for only one hour during the reference period (survey) is considered unemployed person according to ILO, even though he remains available in the workforce. As well, there are some realities in the labour market especially in developing countries, that the unemployment rate cannot reveal, like inadequate working time, inequality of income, job quality. All these expose the weakness of a labour market analysis that is solely based on the unemployment rate.

To address these shortcomings, labour statisticians have introduced another concept called underemployment to accompany the unemployment rate, for a more appropriate understanding of the labour market. Its definition, in the broadest sense of the word, is very complex. Underemployment exists when a person's employment is inadequate in relation to specified norms or alternative employment, considering his or her occupational skill (training and working experience). In general, there are two types of underemployment: visible and invisible. Visible underemployment concerns all persons in paid or self-employment, involuntarily working less than the normal duration of work determined for the activity, and who are seeking or are available for additional work during the reference period. Invisible underemployment is primarily an analytical concept reflecting a misallocation of labour resources or a fundamental imbalance as between labour and other factors of production (ILO, 1998). Characteristic symptoms might be low income, underutilization of skill and low productivity. In this study, we intend to analyse invisible underemployment through the hourly worker's income, adopting the minimum wage as threshold-crossing, as justified in Section 4. On the other hand, a given worker will be classified in visible underemployment when the working time is less than 35 hours per week as set in the current Labour Code in Cameroon.

The surveys EESI1 and EESI2 conducted in 2005 and 2010, respectively, show that visible underemployment rate was 12.1% in 2005 and 12.3% in 2010, meaning that it was stable during the period. However, visible underemployment was more pronounced in the public sector (28.5%) and the non-agriculture sector (18.5%) than in the other sectors. Invisible underemployment remained high and was estimated at 69.3% in 2005 and 63.7% in 2010 (INS, 2005, 2010)[2]. Some differences were apparent in the underemployment rate among employment sectors and areas of residence. Underemployment was less pronounced in the public (12.3%) and the formal private sectors (20%) than in the informal sector (46.7% in the non-agriculture and 84.0% in the agriculture sector). In addition, a gap of 31.5 percentage points in the underemployment rate was revealed between workers from rural (74.4%) and urban areas (42.9%). This gap raises several questions, particularly about the conditions of employment in rural and urban areas.

For a long time, policy makers and economic studies have focused on the factors that determine unemployment in an economic system, neglecting the analysis of underemployment. Therefore, further analyses of underemployment are justified in all countries, including Cameroon. This study investigated the characteristics and determinants of underemployment in Cameroon to refine the diagnosis of the labour market and suggest policies favouring full and decent employment. Moreover, it examined the relative contribution of each of these determinants to the underemployment gap between rural and urban residents.

Objectives of the study

The main objective of this study was to improve the analysis of the labour market in Cameroon through a better understanding of the characteristics and determinants of underemployment. Specifically, this study aimed to:

a) Identify the profile of a visible and invisible underemployed
b) Identify the determinants of the visible and invisible underemployment
c) Assess the contribution of these determinants to the underemployment gap existing between rural and urban residents.

The rest of the paper is organized as follows. Section 2 consists of the literature review. Section 3 provides the econometric models, and Section 4 presents the data used. Empirical results are found in Section 5. The conclusion and policy recommendations are presented in Section 6.

2. Literature review

The literature on underemployment dates back to the pioneering work of Robinson (1937) and Rosentein-Rodan (1943), who used the term "disguised unemployment" to specify underemployment. The concept of underemployment comes from some theorists of underdevelopment such as Nurkse (1953), Lewis (1954), Leibenstein (1957) and Dasgupta (1957), who aimed to provide credible analysis of the existing problems in developing economies. For these theorists, underemployment is a primary dysfunction of the labour market encountered in developing countries.[3] Two kinds of underemployment have been defined: Malthusian underemployment, which considers disguised unemployment as a result of an excess of the population that provides a surplus labour force in the agriculture sector; and structural underemployment, which deems that disguised unemployment is due to an inefficient allocation of the factors of production between the different sectors of production.

Various meanings are given to the concept of underemployment. According to the ILO definition, underemployment includes all employed people, salaried or not, involuntarily working fewer than normal hours in their business and who were looking for additional work or were available for work during the reference period (ILO, 1998). Two classes of underemployment are considered: underemployment related to hours of work or visible underemployment (when the working hours are insufficient for a worker, compared with another position that he/she would have liked to take) and the other forms of inadequate employment (work situations that reduce the skills, abilities and well-being of workers in relation to other jobs.) The 16th International Conference of Labour Statisticians (ICLS) recognizes three types of underemployment: inadequate employment that is characterized by insufficient use of professional qualifications; inadequate employment related to income (invisible underemployment) that concerns those earning below a threshold set by national norms and who wish or seek to change their current job to another one in order to increase their income; and inadequate employment related to an excessive number of working hours, that concerns people who wish or seek for fewer hours of work, either in the same job or elsewhere, with a corresponding reduction in earnings. Feldman (1996) distinguished several forms of underemployment: having an educational level which is higher than that required by a position; being engaged in a job that does not match an individual's training; having skills that are not used in employment; being involuntarily employed part-time, temporary or occasionally; or earning relatively low wages.

Underemployment has been the subject of analysis for specialists in labour economics and human resources in particular. Labour economics specialists mainly focus on the different forms of underutilization of the labour force. Thus, three forms of underutilization of the labour force are retained: underemployment of employees, unemployment and discouraged unemployed workers (Wilkins, 2004). These studies use economic theories on unemployment to explain underemployment. These theories indicate the role of fluctuations in demand as the main source of the variation of underemployment and indicate the relationship between the business cycle, the perception and response of people facing underemployment (Wilkins and Wooden, 2011). Following the ILO definitions, Wilkins and Wooden (2011) examine three forms of underemployment: time-related, skill-related and income-related underemployment. Indeed, these authors associate skill-related underemployment to over-qualification that is well developed in some domains such as industrial and organizational psychology and organizational and behavioural psychology. Likewise, labour economists explain income-related underemployment through all forms of distortion of the labour market that could lead a worker to poor income. From the above, one can identify some predictors listed by authors that theoretically refer to underemployment, for example, educational level of the worker, part-time job, the location, equipment of the corporation and the type of contract.

Human resource economics specialists, for their part, analyse the phenomenon of underemployment from four theories.

The first theory is the human capital theory (Becker, 1964, 1993) which states that people make their investment decisions in human capital based on expected gains from the potential level of human capital acquired. Similarly, companies base their employment decisions on the level of human capital of the applicants (Lepak and Snell, 1999). Thus, underemployment occurs once there is a mismatch between the human capital owned by a given person and the skills required for the role that he plays in the company. Secondly, there is the theory of conformity based on "Person-Job Fit" (Edwards, 1991; Kristof, 1996) which considers that underemployment due to the degree of incompatibility between the knowledge and the proficiency of a given person's requirements for his or her job. Third is the theory of relative deprivation which is based on the subjective assessments that individuals make on their own jobs (Crosby, 1976). Thus, individuals will be underemployed when they consider that they deserve better jobs than they currently hold. Finally, the theory of re-employment, which stresses the importance of balance in the process of job exploration (Latack et al, 1995; McKee-Ryan et al, 2009). Indeed, McKee-Ryan et al (2009) identify downgrade as a determinant of underemployment when they state that employees who experienced a downgrade return to an equilibrium situation only when they are re-employed in a position that is equivalent to the standard they previously lost. In this context, they experience underemployment until they find a job which is equivalent to the one they most valued in the past.

From the first theory, Lepak and Snell (1999) consider gender as an underemployment antecedent. The fact that women are more underemployed than men is a consequence

of career disruptions, re-entry into the workforce after breaks, the tendency to be disproportionately laid off, and/or the tendency to settle for lower salaries and positions. Other determinants related to human capital theory are age (Tam, 2010), race (De Jong and Madamba, 2001) and education. Weststar (2009) demonstrated that highly educated employees are more likely to experience higher levels of underemployment, because they are unlikely to be employed in jobs that are commensurate with their education. Tam (2010) thinks that young (between 18 and 24 years old) and older workers are underemployed more than others, and this assumption was attested to by the U-shaped patterns of underemployment along age categories in many empirical results.

Most of the studies carried out on underemployment in developed countries focused on the involuntary part-time employment. In the United States, for example, Leppel Clain (1988), Stratton (1994, 1996), Julian et al (2010) examine the preferences and employment opportunities, and find that part-time workers would really prefer a full time position. Slack and Jensen (2014) showed over a long time frame in United States, as well as Jefferson and Preston (2010) in Australia, that visible underemployment occurs in industries and companies experiencing difficult economic situations, with a continued shift toward part-time work, as a direct result.

In Europe, Ruiz-Quintanilla and Claes (1996) used data collected from 1988 to 1990 on young workers in Belgium, England, Italy, Portugal, Spain, and the Netherlands to show that education, occupation group and job search experience affect the pattern of underemployment. Moreover, organization and societal factors appear to have a greater influence than behavioural variables such as job search strategies and demographic variables such as gender and age. Thus, time-related underemployment tends to have similar dimesions in developed countries such as part-time workers, young people aged between 16 and 17 years, low-skilled workers operating low-income. These findings might justify the rapid rise in the visible underemployment in 2010 in United Kingdom as a result of the influx of young job seekers into the labour market over this period.

Studies on underemployment in developing countries, like that of Tasci (2006) conducted in Turkey, are much fewer. Holger and Strobl (2001) investigated the determinants of visible underemployment in the Republic of Trinidad and Tobago using a standard probit model. The estimation of the model concludes that the public sector is less affected than the private sector, and that the informal sector remains the most affected. Involuntary part-time is also has a positive influence on visible underemployment. In those studies, as well as in the studies of Mecharla (2002) in India and Siphambe (2003) in Botswana, it is proved that visible underemployment decreases with education. Holger and Strobl (2001) showed that visible underemployment decreased with the size of the company. These results would be proved seven years later in Pakistan (Dilawar et al, 2008).

In Africa, especially in Kenya, Kiiru et al (2009) investigated the factors of visible underemployment among young people. They found that being under 25, being a woman, being single or landing a low-skilled job (sales, domestics, laborers...) increased the risk of involuntarily spending less than 35 hours a week in the main job.

As far invisible underemployment is concerned, to the best of our knowledge the literature is not well supplied, given that it is not easy to measure the utilization of the skills and the productivity of a worker regardless of the position held during a survey. For example, Thakur and Thakur (1993) decided to use the index of production to assess the invisible underemployment in India. They found small size agricultural companies were more likely to be affected. Most of the studies had to adopt a simplified definition based on the worker's hourly income (ILO, 1998).

As Wilkins and Wooden (2011) mentioned in the theoretical literature, the area of residence is a potential determinant of skilled-related underemployment. This was confirmed by Toscano and Phimster (2004), who found underemployment significantly differs between rural and urban workers and should be considered when evaluating employment hardship in Canada.

Likewise, in the USA, since the mid-1980s, it seems income-related underemployment is a more prevalent problem in rural than in urban areas (Deller et al, 2001). And this difference cannot be explained only by demographic characteristics or level of education, although it is clear that employment opportunities are not the same in both environments. Service industry workers (tertiary sector) in general are more likely to earn lower wages and work insufficient hours, relative to manufacturing workers (secondary sector), but the likelihood is even greater among rural residents. However, Deller (2001) and Toscano and Phimster (2004) could have used a decomposition model to investigate factors attributable to this gap, as well their relative contributions, between the wages of urban and rural workers.

On the whole, and to the best of our knowledge, literature based on underemployment related to the underutilization of skills and productivity of the worker is not scarce. Recently, a study was carried out on determinants of underemployment in Cameroon (INS, 2013). INS researchers used the minimum wage to build a simple logit model from the EESI2 dataset and demonstrated that unskilled workers, rural workers and people working in the informal sector were more likely to experience the underutilization of skills. However, no aspect of selection effect was assessed in their methodology, though the data consisted of both workers and unemployed people. In addition, they focused on the invisible underemployment, while minimizing the visible underemployment rate in Cameroon, which was close to 12% in 2010. This was indeed very low compared to the invisible underemployment (63%), but it shows about one million people[4] in the labour force needed additional working time, whether in their current job or in a new job, and could certainly increase the country's GDP if they switched to a suitable position. This paper aims to examine these shortcomings. Moreover, to better address the issue of underemployment in Cameroon, this study intends to explain the wide gap between urban and rural underemployment, and improve policies necessary to reduce the underemployment rate in Cameroon, as provided in the Strategic Document of Growth and Employment. The paper will enrich the literature on underemployment that was hitherto focused on the magnitude and factors of the visible underemployment in both developed and developing countries.

3. Econometric model

This study used statistical and econometrical methods. Statistical methods comprised calculating some indicators (mean, frequency etc) to measure the level of visible and invisible underemployment in Cameroon and to identify the average profile of a visible and invisible underemployed. Thereafter, two econometric models were built: one for invisible underemployment, and the other for visible underemployment. We dismissed part-time because it was inconsistent with the realities of the labour market in Cameroon. Moreover, only people aged between 15 and 64 years were considered in the study since ILO regards those below 15 years old as school going and those above 64 years old as retired.

The dichotomous model used is the probit with sample selection. This model aims to explain the occurrence of the relevant event (the situation of underemployment) based on several observed characteristics of the individuals in the sample.

The use of the Heckman probit model with sample selection is justified by the fact that the dependent variable in the model of interest (being underemployed) was not observable for non-employed (unemployed in the broader sense). Therefore, only the employed were selected in the model of interest. The estimation of the determinants of underemployment without considering the lack of information (whether underemployed or not) for non-employed could lead to biased results (Heckman, 1976, 1979) if unobservable factors affect simultaneously the probability of being employed and the probability of being in a situation of underemployment.

In general, the selection bias correction consists of adding to the equation of interest, a correction factor called inverse Mills ratio calculated from the estimated coefficients of the selection equation, as shown in the following.

Consider that the variable Em is an indicator of the current occupational status of a given individual. It represents the utility of the individual of entering in the labour market and is defined as follows: Em = 1 if the individual is employed and Em = 0 if the individual is unemployed.

Suppose that Em^* is a continuous latent variable associated to Em, and Z is a vector of factors known to influence an individual's decision to work such as her education, her marital status, then, the selection equation for entering in the labour market might be:

$$Em^* = \alpha Z + \varepsilon_1 \qquad (1)$$

where ε_1 is the error term of the equation, and α the parameters to be estimated.

Consider that the variable Underemp is an indicator of the current employment status of a given individual. Underemp is observable if and only if Em = 1, (or Em* > 0). Then Underemp = 1 if the individual (a worker) is underemployed, and Underemp = 0 otherwise.

Suppose that Underemp* is a continuous latent variable associated with Underemp, X the vector of explanatory variables of an individual. The structural equation of underemployment can be written as:

$$Underemp^* = \beta X + \varepsilon_2 \tag{2}$$

where ε_2 is the error terms, and β the vector of parameters that should be estimated. Furthermore, we make the following assumptions about the distribution of ε_1 and ε_2, and the relationship between the error terms in the selection and outcome equations:

ε_1 and ε_2 are independent of Z and X,

The couple $\begin{pmatrix} \varepsilon_1 \\ \varepsilon_2 \end{pmatrix}$ follows a bivariate normal distribution $N\left(\begin{pmatrix} 0 \\ 0 \end{pmatrix} ; \begin{bmatrix} 1 & \rho \\ \rho & \sigma_{\varepsilon_2} \end{bmatrix} \right)$, and ρ is the correlation coefficient between ε_1 and ε_2.

Under these assumptions the conditional expectation of the underemployment variable is obtained in Equation 3 as follows:

$$E[Underemp|Em = 1, X] = E[Underemp|Z, X, \varepsilon_1]$$

$$= E[\beta X + \varepsilon_2|Z, X, \varepsilon_1]$$

$$= \beta E[X|Z, X, \varepsilon_1] + E[\varepsilon_2|Z, X, \varepsilon_1]$$

$$= \beta X + E[\varepsilon_2|Z, X, \varepsilon_1] \quad \text{while X and } \varepsilon_1 \text{ Independent}$$

$$= \beta X + E[\varepsilon_2|Z > -\alpha Z], \quad \text{notice that Em = 1 implies Em}^* > 0.$$

$$= \beta X + \rho\sigma_{\varepsilon_2}\frac{\emptyset(-\alpha Z)}{1 - \Phi(-\alpha Z)} = \beta X + \rho\sigma_{\varepsilon_2}\frac{\emptyset(\alpha Z)}{\Phi(\alpha Z)}$$

$$= \beta X + \rho\sigma_{\varepsilon_2}\lambda(\alpha Z)$$

where $\emptyset$ and Φ are respectively the density and the cumulative distribution function of the normal distribution, and $\lambda(\alpha Z)$ is the inverse Mill's ratio for employed individuals.

Thus, $E[Underemp|Em = 1, X] = \beta X + \rho\sigma_{\varepsilon_2}\lambda(\alpha Z)$ (3)

When $\rho \neq 0$ the results obtained from a standard probit model are biased. The Heckman probit with sample selection against allows for obtaining efficient estimators.

The estimation of the structural model was carried out as follows. In the first step, we estimated the model (probit) of employment by maximum likelihood estimation and obtained the estimates of α. In this step, we also computed $\lambda_i = \dfrac{\emptyset(\alpha_i Z)}{\Phi(\alpha_i Z)}$ for every i individual (Greene, 2003).

In the second step, the selectivity-corrected model (probit again) is estimated by using maximum likelihood to regress Underemp* on X and λ_i (Greene, 2003), as shown in the following:

$$Underemp^* = E[Underemp|Em = 1, X] + \delta, \text{ so that } cov(\delta; \varepsilon_1) = 0.$$

$$= \beta X + \beta_\lambda\lambda(\alpha Z) + \delta$$ (4)

The last step is devoted to the endogeneity of the business sector.

For a given worker, being employed in the primary sector, in the industrial sector or in sales and services firms is not a fact of chance. The choice is usually motivated by more or less observable factors. It may come from the worker's own aspiration, hereditament or parents "willing," the labour market trend in the location or any other unobserved factor that could be linked to underemployment. The use of the business sector in our underemployment equation might cause a potential bias of endogeneity. This is the same for the employment sector, but in this paper we only deal with the endogeneity of omission related to the business sector.

The first instrumental variable used to solve the problem of endogeneity is fringe benefits. It encompasses any form of non-wage compensation such as bonuses, housing, transportation, medical assistance and social security. We assume that depending on the utility, benefits can influence the choice of business sector of an individual. Among the 18,614 Cameroonian workers surveyed in 2010, only 1,986 (10.7%) carried on an activity with at least one form of provision of service. The second instrument chosen is the presence of other wage earners in a household. Thus, we use a multinomial probit in Equation 5 to estimate our multiple business sector choice model. As presented, S[5] is the multiple business sector choice indicator, Benefits and Otherearners are the instruments mentioned above and T represents the explanatory variables such as sex, age, level of education, place of residence, employment sector and business category, second job holding, and the place of work.

$$\Pr(S = k/k = 1, X) = \pi_1 Benefits + \pi_2 Otherearners + \mu T + \eta \qquad (5)$$

where k = 1,2 and 3, representing the primary sector, the sector of industry and the sector of sales and services, respectively. π_1, π_2 and μ are the estimates of the multinomial probit (5) and η is the error term.

   After estimating the model in Equation 5, two inverse Mills ratios are computed for the industry sector and the sector of sales and services that should be included in the underemployment Equation 4 as additional explanatory variables. The final structural model of underemployment is given as follows:

$$Underemp^* = \beta X + \beta_\lambda \lambda(\alpha Z) + \sum_{i=1}^{2} \omega_i A_i + v \qquad (6)$$

where A_1 is the IMR for the sector of industry, and A_2, the IMR for the sector of sales and services. In this way, selection bias and endogeneity are solved at the same time by estimating coefficients $\beta_\lambda, \omega_i, v$ is the error term.

   After identifying the factors, the rural-urban gap[6] in underemployment is decomposed using Fairlie (2006) method to isolate the share due to differences in the independent variables across rural and urban workers.

Decomposition of the rural–urban underemployment gap

To assess the differential of underemployment following the area of residence, we use of the decomposition of Fairlie (2006) which is an extension to the probit and logit models of the decomposition technique developed by Oaxaca (1973) and Blinder (1973). We decomposed into two parts the difference in mean probability of being underemployed among workers according to their living area. According to Fairlie (2006), the decomposition in the case of non-linear models can be expressed as follows:

$$\bar{Y}^U - \bar{Y}^R = \left[\sum_{i=1}^{N^U} \frac{F(X_i^U \beta^U)}{N^U} - \sum_{i=1}^{N^R} \frac{F(X_i^R \beta^U)}{N^R}\right] + \left[\sum_{i=1}^{N^R} \frac{F(X_i^R \beta^U)}{N^R} - \sum_{i=1}^{N^R} \frac{F(X_i^R \beta^R)}{N^R}\right] \qquad (7)$$

   F (.) is the cumulative distribution function of the probit law. $\bar{Y}^j$ is the average probability of being underemployed in the group j (j = U to the group of workers living in urban areas and j = R for the group of workers living in rural areas). N^j is the size of the sub-sample j, X^j corresponds to the distribution of observable characteristics in the

sub-sample j, β^j represents the estimated coefficients of the variables of the probit models in the sub-sample j. The decomposition given in Equation 7 takes the urban sample as reference because the estimated coefficients in the sub-sample of urban workers are used to weight the first term of the equation, when the distributions of rural workers characteristics are used to weight the second term. This choice might penalize the sub-sample of rural workers (Blinder, 1973; Oaxaca, 1973).

The decomposition of the difference in mean probability of being underemployed can be written in different ways using the sub-sample of workers living in rural areas as a voluntary reference population rather than the sub-sample of workers living in urban areas as follows:

$$\bar{Y}^U - \bar{Y}^R = \left[\sum_{i=1}^{N^U} \frac{F(X_i^U \beta^R)}{N^U} - \sum_{i=1}^{N^R} \frac{F(X_i^R \beta^R)}{N^R} \right] + \left[\sum_{i=1}^{N^U} \frac{F(X_i^U \beta^U)}{N^U} - \sum_{i=1}^{N^U} \frac{F(X_i^U \beta^R)}{N^U} \right] \tag{8}$$

In this case, β^R is used to weight the first term of the decomposition, while the average distribution of observable characteristics in the population of workers living in urban areas X^U is used to weight the second term of the expression. This choice might also penalize the subsample of urban workers (Blinder, 1973; Oaxaca, 1973).

Whatever reference is chosen, the difference in average probability of being underemployed is split into two parts. The first part refers to a difference due to the distribution of observable characteristics, while the second represents a difference due to the effects of these characteristics (based on the estimates). Although both (7) and (8) are equivalent in the decomposition, they often lead to different results.

Fairlie (2006) method suggests the use of coefficient estimates β^*, from the probit regression, to determine the relative contribution of each determinant to the difference in the average probability of being underemployed between the two sub-samples of workers. The contribution of an observable characteristic X_1 can be expressed as follows:

$$\frac{1}{N^R} \sum_{i=1}^{N^R} F\left(\alpha^* + X_{1i}^U \beta_1^* + X_{2i}^U \beta_2^*\right) - F\left(\alpha^* + X_{1i}^R \beta_1^* + X_{2i}^U \beta_2^*\right) \tag{9}$$

Thus, the contribution of the variable X_1 to the underemployment gap is calculated from the change in average predicted probabilities resulting from sequentially switching off the urban distribution of X_1 to its rural distribution.

The sum of the relative contributions of each variable will be equal to the total contribution of all variables evaluated on the total sample.

4. Data source and variables

This study used data collected in 2010 as part of the second survey on employment titled Enquête Sur l'Emploi et le Secteur Informel (EESI2), conducted by the National Institute of Statistics of Cameroon. The sample selected for the survey was made in order to be representative at national level, by area of residence (urban, rural and semi-urban) and the 12 surveyed areas (Douala, Yaoundé, Adamawa, Centre (without Yaoundé), East, Far-North, Littoral (Douala free), North, Northwest, West, South and Southwest). The sampling design used for the survey was inspired by the enumeration areas (EAs)[7] from the cartographic work of the last General Census of Population and Housing 2005, provided by the Central Bureau of Census and Studies population.

The EESI2 sample was stratified and drawn in two stages. In the first stage, the EAs were drawn in each field of study. In the second, the households were selected within each EA. In the first stage, 756 EAs were drawn with a probability proportional to the number of households. At the second stage, a fixed number of households were selected in each EA drawn during the first stage. The number of households selected by EAs was 14 in Douala, 12 in Yaoundé and 10 in the other strata. In this approach, 8,160 households were selected for the survey. However, instead of 8,160 households, 7,932 were effectively identified and successfully investigated, representing a coverage rate of 97.2% (see Table 1). All EAs were covered bringing the final sample to more than 34,400 individuals.

Table 1: Distribution of enumeration areas and households by region (survey areas)

Survey areas	Douala	Yaoundé	Adamawa	Centre (Yaoundé free)	East	Far-North	Littoral (Douala free)	North	North west	West	South	South west	Whole
Number of enumeration areas (EAs)	100	100	40	51	34	104	35	66	67	76	29	54	756
Number of expected households	1400	1200	400	510	340	1040	350	660	670	760	290	540	8160
Number of investigated households	1323	1139	395	495	335	1032	344	652	665	752	280	520	7932

Source: INS (2011).

About the guaranteed minimum wage

Australia passed the world's second national minimum wage laws way back in 1902, after New Zealand in 1894 (Wendy, 2007). France introduced its first minimum wage law in 1950 as part of the Interprofessional Guaranteed Minimum Wage Act. In France, the years before 1950 were politically contentious but focused on economic reconstruction from the devastation of the Second World War. Historically, most French colonies, including Cameroon, still have a law on the Interprofessionel Guaranteed Minimum wage (SMIG) today. The minimum wage is computed on the basis of a legally standard labour time and represents the lowest remuneration that employers may legally pay to workers, or a price floor below which workers may not sell their labour. It's purposely set to assure a minimum standard of purchasing power to workers earning the lowest salaries. Therefore, the minimum wage is a way for a government to show his commitment to social justice in favour of those at the bottom of the income distribution, commonly known as the poorest and near-poorest workers.

Opinions are much divided on the contribution of the minimum wage to the reduction of poverty. Some authors argue that the minimum wage may have a relative effect on poverty rates. Sutherland (2001), for example, found that the minimum wage encourages people to enter paid employment and then reduces unemployment; that it also increases the income of low-earners and may raise some household income above the poverty line. He concluded that in-work top-up benefits from a paid work are the main contribution of minimum wage in poverty reduction. In contrast, some authors argue that the minimum wage is not an efficient tool for fighting poverty. Neumark and Wascher (1997), the foremost experts on minimum wages, conclude that the balance of evidence is that minimum wage hikes negatively affect employment among young and low-skilled workers. For example, when the government imposes a high minimum wage without corresponding increases in productivity, employers find ways to operate with fewer workers, with reduction of job offers and increases in wages for skilled workers as direct results. This appears to be typical of developed countries, which should be proud of having economic systems that ensure the respect of the minimum wage. While in developing countries, particularly in sub-Saharan Africa, most job offers are by mutual agreement, a large number of workers are paid below the minimum wage.

Talking about the minimum wage as part of invisible underemployment is an indirect way to examine the relationship between the wage of workers, the use of their skills and their productivity in the enterprise. It is possible in some specific contexts, to bring invisible underemployment close to income-related underemployment. Several theories approved this approach. For example, Solow (1980) and Akerlof (1982) show in the Efficiency Wage Theory that there is a positive correlation between the wages of workers and their marginal productivity, meaning that low wages do not stimulate in any case the efforts of workers. In other words, for a group of workers in low-paid jobs, wage increase is a source of motivation

and incentive to the effort. Literature (Leibenstein, 1957; Stigliz, 1987; Weiss, 1991) regards the improvement of nutrition and health in developing countries as the direct effect of wages on productivity.

The second argument concerns displacement.[8] Workers engaged in jobs below their qualifications might feel, in the medium and long-term, the desire to be reclassified, or to find other jobs in line with their experience. This "sense of exploitation" might act negatively on productivity. In the Cameroonian context, where hiring was gradually made by mutual agreement since the advent of the structural adjustment programmes, the displacement phenomenon has increased. Indeed in 2010, almost 79% of graduates eventually accepted jobs requiring lower skills because the labour market did not offer jobs in line with their qualifications. Moreover, over 97% of those earning less than the minimum monthly wage (28,500 CFA francs in 2010, around US$48) said: "The job doesn't match the training I received"[9]. Incidentally, these employees considered their pay low relative to their qualifications or compared with the level of satisfaction they gave to the employer. Other workers in the same situation felt their competences were underused. In both cases, these workers are more likely to migrate to other jobs that would bring them more utility, or to engage in one or more secondary activities to recapitalize their skills that remained unused or unrewarded.

Going back to the original role of the minimum wage (to ensure a minimum purchasing power for low-wage workers, necessary to access essential goods and services), it should also be better to examine income poverty that is an indicator known by ILO to measure welfare in households, especially in developing countries. The poverty line in Cameroon was estimated at 22,454 CFA francs[10] in 2007 (INS 2008), which is slightly less than the minimum wage in 2010. Our estimates show that only 11% of workers earning less than the minimum wage live above the poverty line. These findings imply that for the majority of workers in Cameroon, the minimum wage and the poverty line are expressing the same fact regarding the well-being of people. Therefore, any mechanism that could increase the wage might certainly have a positive effect on the productivity of the worker, and that of the company.

Dependent variables

The definition and the measurement of underemployment has already been the subject of debate at the International Conference of Labour Statisticians (ICLS) six times,[11] starting from the problem of reduced working hours (visible underemployment), to the inclusion of criteria misuse of skills and low productivity (ILO, 1957). Even until 1998 (Sixteenth ICLS), only a limited number of countries had committed to the extent of underemployment; probably because of the lack of clarity in the international definition of visible underemployment (threshold problem) and the lack of an operational definition of invisible underemployment. For the specific case of invisible underemployment, ILO recommends using three low values variables

to measure income, competence and productivity, but without specifying how to use it. The literature shows that many authors, especially those in Latin America (Costa Rica, Equator, Peru and Mexico), who devoted themselves to this indicator, used working time and worker's income (ILO, 1998).[12] Thus, hourly income appears to be an adequate tool in the invisible underemployment analysis.

In this study, invisible underemployment corresponds to the situation of a worker whose hourly earnings from the main job during the reference month are lower than the minimum guaranteed wage of 36,270 CFA francs per month (or FCFA239.14 /hour)[13] set in July 2014. However, this paper considers the amount of 28,500 CFA francs per month (or FCFA187.9 /hour) set in June 2008 as the minimum guaranteed wage in force in 2010 when data for the estimations were collected. This method remains open to debate as to whether similar methods can prove as useful in the case of other countries. Thus,

$$g_{invisible} = \begin{cases} 1 \ if \ earnings/hour < 187,9 \\ 0 \ \ otherwise \end{cases} \tag{10}$$

The visible underemployment is the situation of a worker who involuntarily works less than 35 hours per week in his or her main job, for reasons related to the employer or because of poor economic conditions.

$$g_{visible} = \begin{cases} 1 \ if \ [(h\_work\_weekly < 35) and (motive = employer; bad \ economic \ situation) \ ] \\ 0 \ if \ [(h\_work\_weekly \geq 35) or (motive = refusal; personnal \ reasons)] \end{cases} \tag{11}$$

h_work_weekly = weekly volume of work in the main job.

As far as the reasons that justify the fact that some people work fewer than 35 hours a week is concerned, EESI2 shows that 29.5% of individuals were willing to do so; and 12.2% did so because of the law or the employer. For 13.3% of individuals, the reason was the poor economic situation; some 33.5% of individuals had personal reasons; and 10.7% gave other reasons.

Explanatory variables

Socioeconomic and demographic of the surveyed persons

Sex: This is one of the possible determinants of underemployment due to the discrimination that may be observed in some jobs in the labour market (Kiiru et al, 2009). Sex is measured as a dummy variable where the response is scored 1 if the individual is a male, and 0 if female.

Age: Age is an important determinant of underemployment according to the literature. It can capture the work experience and then penalize young people under 25 who look for a well-paid job (Helen, 2010).

Education: The skill of a worker is a relevant factor in getting a job, and it is usually measured by the educational level. The human capital theory postulates that individuals who have achieved a higher education have more human capital and a higher probability of being employed in a secured and full-time job. The education variable here is set by four binary variables: no education (reference), primary level, secondary level and university.

The living area: The area of residence may also be an important factor in the topic of employment. In general, employment opportunities are different in rural and urban environments (Deller, 1996). Incomes are higher in urban areas than in rural areas and jobs in urban areas are usually more secured with contracts.

Information related to job situation of the surveyed persons

Non-labour income: This variable was used in our models as a proxy for wealth because it contributes to determining the human capital acquisition, or influences the decision to work and for how long. A higher non-labour income generates a pure income effect and negatively affects the likelihood of the labour market. This is also a dummy variable equal to 1 when the sources of an individual's income do not come from his or her job, and 0 if not.

Employment sector: In general, the informal sector is less organized than the public and formal private sectors. This imbalance, therefore, affects the welfare of the worker, in particular the wage, which is very low in the informal sector, and the working time, which is generally mismanaged in the public sector (INS, 2011). Three dummies were generated: public sector, private sector and informal sector. The reference group comprised those working in the informal sector.

Experience: This variable refers to the number of years of service in the same job. The more a worker stays in a job, the more he or she acquires technical skills (either by retraining or by experience in the job) necessary to increase productivity in the corporation. The expected sign for this variable is therefore the negative sign.

The corporation size: Literature shows that the size of a corporation has an effect on invisible underemployment. Kushwaha and Thakur (1984) show in their study that in India this underemployment affected more small businesses than large ones. In the meantime, Dilawar et al (2008) found that visible underemployment is evolving in the opposite way. The dummy takes 1 if the individual is by oneself in the corporation, and 0 otherwise.

Business sector: This is a categorical variable, which has been classified into three dummies: primary sector, secondary (industry) and tertiary sector (sales and services).

Socio-professional category: This is a categorical variable, which has been classified into four dummies: executive staff, skilled worker, unskilled worker and self-employed. The dummy "self-employed" was chosen as reference with the view to compare the situation of a given worker in any class to the situation he or she might face by being self-employed.

Second job holding: This indicator that can assess the shortcomings of the main activity in terms of welfare and working hours. It is measured as a dummy variable where the response takes 1 if the individual has more than one job, and 0 otherwise.

Fringe benefits: These benefits indicate whether an individual receives any pay-off advantage such as incentive bonuses, social security, health insurance, housing allowance and transport. This dummy might influence the decision of an individual to engage in a business sector.

Table A1 in the annex gives the descriptive statistics of the explanatory variables.

5. Empirical results

The characteristics of underemployment in Cameroon

Survey data on employment reveal that, according to the ILO definition, 70% of the working population in Cameroon are either employees or job seekers (INS, 2011). This participation rate has not changed since 2005 when it was 71.5%. However, the labour market in the country experienced some significant changes between 2005 and 2010. Several indicators fell slightly. For example, the unemployment rate reduced from 4.4% in 2005 to 3.8% in 2010. The rate of vulnerable employment[14] also decreased between 2005 and 2010. Nevertheless, according to the socio-professional category, employment is still dominated by self-employed people (48.6% as against 10.5% of executive staff, 14.6% of skilled workers and 26.4% of unskilled workers and trainees). Some other indicators increased, such as the employee rate[15] (from 12.3% in 2005 to 20.3% in 2010), the guaranteed minimum wage (from 23,500 CFA francs in 2005 to 28,500 in 2010), and the average monthly income from the main job (from 26,800 CFA francs in 2005 to 39,400 in 2010).

This section presents the situation of underemployment in Cameroon in 2010. Only individuals aged between 15 and 64 years are considered. The characteristics of underemployment in Cameroon are summarized in Tables A2 and A3 in the annexes.

The characteristics of visible underemployment

The visible underemployment rate in Cameroon was estimated at 11.5% in 2010. It has not really changed since 2005. The general trend shows that the rate did not vary significantly with gender, but it increased with education. The underemployment rate was higher among workers with post-secondary education (23.6%). Women were more affected (27.7%) than men (21.7%)

Urban and rural areas faced roughly the same level of visible underemployment at 12.4% and 11%, respectively. Similar findings were obtained between people in the age range 15–39 and those in the range 40–64.

As far as the employment sector is concerned, the analysis indicates that visible underemployment was much higher in the public sector (21%) than in the private formal and informal sectors. It was higher among women in the public sector (30%) than among the men (15.6%). Visible underemployment also showed some disparity according to the socio-professional category. Executive staff were more

affected (21.1%) than unskilled workers (10.7%), skilled workers (10.8%) and the self-employed (11.1%).

Workers who were hired without any help were more likely to be underemployed than others.

On the whole, visible underemployment does not really change regardless of age and living area, but it increased with education. Likewise, it does not vary with gender but conditionally to education; graduate men are slightly less affected than graduate women.

The characteristics of the invisible underemployment

Invisible underemployment rate in Cameroon was estimated at 62.7% in 2010. Although this indicator was down by more than five percentage points compared with the one of 2005, it still underlined the precariousness of the Cameroonian labour market: more than six in 10 workers had an hourly income less than 187.9 CFA francs[16] in their main jobs. This high rate of precarious jobs hides some disparities according to the age, sex, educational level, occupational sector, place of residence etc., which need to be put into perspective.

The analysis of an invisible underemployed profile shows that men are less likely affected (54.9%) than women (71.02%) (Table A3). It also shows that the higher the educational level, the lower the invisible underemployment rate. About 81% of people with no education were underemployed and only 15% of workers with post-secondary education experienced invisible underemployment.

Moreover, workers aged between 15 and 39 years were more affected (65.6%) than those in the 40–64 (55.8%) range.

Invisible underemployment was more accentuated in rural than in urban areas. Approximately 74% of rural residents were underemployed against 44.8% of urban residents.

In the employment sector, the informal category was highly affected by underemployment, as shown in Table A3, with 80.6% in the agriculture informal and 53.9% in the non-agriculture informal. The public sector (13.4%) and the formal private sector (22.8%) had the lowest rate.

Concerning the socio-professional category, statistics showed that about 90.3% of unskilled workers and 61.8% of the self-employed were underemployed. Table A3 also emphasizes that unskilled workers (both rural and urban) were twice as underemployed as skilled workers. Still in employment, the descriptive analysis indicated that corporations with few people (not more than 10 workers) were more affected by invisible underemployment, with a rate of 68.7%, against 36.8% for those with more than 10 workers. Specifically, 71.1% of self-employed were underemployed and most were hawkers, street vendors and domestics.

Concerning the occupational sector, the primary sector was the most affected with up to 80% of employed people earning less than 187.9 CFA francs per hour. This can justify, to some extent, the rise of hidden unemployment in rural areas, which constituted about 85.7% of the activities of the primary sector in Cameroon.

In conclusion, invisible underemployment mostly affects younger workers than older ones. Women are more likely to be underemployed. Although the rural residents are the most affected, overall, invisible underemployment is undoubtedly mainly in the informal sector (particularly the agriculture informal sector).

Results of the Heckman probit models

Two single probit models with sample selection where the dependent variable is the type of underemployment (visible and invisible) were estimated. The model was computed in STATA 12 in three steps. The results are presented in three categories. First, the labour market participation model (Table 1) for urban areas, rural areas and for the full sample. Second, the determinants of the choice of occupational sector (multinomial probit) in the full sample (see Table 2). Third, the structural models of visible and invisible underemployment (Table 3) for the full sample. The summary of separate models of underemployment among individuals living in urban and those in rural areas is given in Table A4.

Probit estimates of decision of entering the labour market

Table 2 shows that in the full sample, age and educational level positively increasesthe probability of being employed. However, having a university degree reduces this probability. This last result may be explained by the precariousness and the informality of the labour market in Cameroon, which offers fewer opportunities to highly-educated jobseekers. Likewise, an inverse-U relationship was observed between age and unemployment (in the broader sense). This means that the probability of being employed initially increases with age, and then declines. Previous researches have highlighted that age-based stereotypes distort employment markets and reduce the perceived employability of older workers, who are seen as less adaptable (Wilson et al, 2007). Table 2 also indicates that according to the expectation, the coefficient of variable sex is also positive and statistically significant, meaning that men are more likely to be employed than women. Indeed, women often face more difficulties than men in accessing their first job, earn less than men and are more likely to have part-time employment (OECD, 2012). For example, in Cameroon, statistics show that in 2010, the activity rate was 74.1% for men and 64.2% for women. Similarly, the employment rate was 71.7% for men against 61.4% for women (INS, 2011).

Non-labour income and living area had negative coefficients that were statistically significant in the pooled model. This result means that people who have at least one non-labour income (who live in urban areas) are relatively less employed than people without non-labour income (rural residents). This result is in line with statistics in Table A3, which show that the rate of participation in the labour market is smaller in the sub-sample of individuals having at least one non-labour income (66%) and living in urban areas (67%) than in the sub-sample of individuals without a non-labour income (83%) and living in rural areas (83%) .

Table 2:   Labour market participation model (employment)

Variables	Urban		Rural		Full sample	
	Coefficient	Standard error	Coefficient	Standard error	Coefficient	Standard error
education (ref = no education)						
Primary	0.551***	0.058	0.531***	0.047	0.533***	0.036
Secondary	0.294***	0.053	0.045	0.044	0.191***	0.034
University	-0.056	0.059	-0.210**	0.102	-0.106***	0.044
Sex (1 = male)	0.5280***	0.027	0.427***	0.035	0.490***	0.021
Age	0.2256***	0.006	0.147***	0.007	0.194***	0.005
Agesquare	-0.002***	0.000	-0.001***	0.0001	-0.002***	6.91e-5
Non-labour income	-0.471***	0.034	-0.401***	0.053	-0.456***	0.028
Location (1 = urban)	(omitted)		(omitted)		-0.551***	0.024
Constant	-4.18***	0.122	-2.17***	0.127	-3.02***	0.085
-Log pseudo likelihood	5,627.27		3,327.27		8,998.96	
Wald chi2	2,379.27		1,049.17		3,744.62	
Prob > chi2	0.0000		0.0000		0.0000	
Observations	10,780		7,771		18,551	

Note: Estimates computed by the authors, using data from the EESI2 survey conducted by the INS in 2010 (INS, 2011).
***, **, * denote that the significance is established at 1% level, 5% level and 10% level respectively.

Multinomial probit estimates of determinants of business sector choices

Three sectors were considered in this study: primary, industrial, and sales and services. The primary sector was the benchmark alternative in the multinomial model. The equality of coefficients between industrial and service industries was rejected, as shown in Table 2 through the Wald test statistic. This result indicates the heterogeneity of both the sectors and justifies the fact that they were separately introduced in the model.

The instruments used appear to be significant in the model in Table 3. Fringe benefits significantly increased the probability of engaging in both the manufacturing and service industry sectors by 6.5% and 13% respectively, relative to the primary sector. This finding reflects the deterioration of jobs quality in the primary sector and fits with the expectation. Table 3 also shows that the presence of another wage earner in the household had different effects on the choice between both sectors. It increased the likelihood to choose a work in secondary production by 3.3% and reduced the likelihood of working in the service industry by 7.1%, relative to the primary sector.

Another result in Table 3 is that according to predicted probabilities, workers in Cameroon are twice as likely to work in the tertiary sector than in the manufacturing sector (0.4 vs 0.2), relative to the primary sector. This result refers to the weakness of industrialization in Cameroon and might be one of the reasons for the abandonment of the primary sector.

Table 3: Determinants of choice of the business sector (multinomial model)

	Industry sector		Sales and services sector	
	Coefficient (standard error)	Marginal effects	Coefficient (standard error)	Marginal effects
Age	0.026*** (0.003)	0.003*** (0.0005)	0.0282*** (0.004)	0.005*** (0.0011)
Education (ref = no education)				
Primary	0.004 (0.062)	-0.039*** (0.013)	0.341*** (0.059)	0.103*** (0.016)
Secondary	0.407*** (0.066)	4.1x10-4 (0.0129)	0.766*** (0.066)	0.183*** (0.018)
University	0.271* (0.156)	-0.096*** (0.025)	1.323*** (0.145)	0.367*** (0.034)
Employment sector (ref = informal sector)				
Public sector	0.525* (0.285)	0.117*** (0.038)	0.0041 (0.294)	-0.061 (0.062)
Private sector	1.166*** (0.199)	0.152*** (0.025)	0.914*** (0.204)	0.138*** (0.041)
Experience	-0.075*** (0.005)	$-5.2 \times 10-3$***($8.2 \times 10-4$)	-0.097*** (0.007)	-0.021*** (0.002)
Corporation size (1 = less than 6)	-0.269*** (0.065)	-0.081*** (0.012)	0.169*** (0.066)	0.083*** (0.017)
Socio-prof. category (ref = self-employed)				
Executive staff	0.957*** (0.114)	0.109*** (0.019)	0.886*** (0.109)	0.154*** (0.025)
Skilled workers	1.594*** (0.132)	0.114*** (0.018)	2.044*** (0.131)	0.429*** (0.027)
Unskilled workers	-0.388*** (0.059)	-0.0097 (0.012)	-0.652*** (0.054)	-0.151*** (0.015)
second job holding (1 = yes)	-0.078 (0.051)	0.024** (0.0097)	-0.352*** (0.046)	-0.097*** (0.012)
Instruments				
Fringe benefits (1 = yes)	0.651*** (0.104)	0.065*** (0.016)	0.684*** (0.101)	0.129*** (0.023)
Other wage earners (1 = yes)	0.0297 (0.049)	0.033*** (0.0096)	-0.221*** (0.045)	-0.071*** (0.012)
Constant	-0.732*** (0.125)		-0.443*** (0.121)	
Log pseudo likelihood = -9423.55 Obs: 11,857	Wald chi2 = 1692.36		Prob > chi2 =0.000	
Pr(predict)	0.1725949		0.4072174	

Note: estimates computed by the authors, using data from the EESI2 survey conducted by the INS in 2010 (INS, 2011).
***, **, * denote that the significance is established at 1% level, 5% level and 10% level respectively.

The primary and secondary sectors are complementary and are mutually supporting with respect to both inputs and outputs because in the process, industries use materials from the primary sector to produce finished products and, therefore, generate income. The poor number of manufacturing industries (21% of the whole occupational sector; see Table A1 in the annex) in Cameroon reduces job opportunities in the primary sector (11%) such as agriculture, mining and lumberjack activities.

These findings agree with some trends in the economy of Cameroon. For example, in 2010, the tertiary sector contributed almost 45% of GDP due to increased activity in commerce, transportation, tourism and in telecommunication domains (Tchapga, 2014).

One can also observe that a higher age significantly increased at 1% level the likelihood of engaging in the industrial sector or in the sales and services sectors relative to the primary sector. Furthermore, an additional year of experience was more likely to reduce this probability.

Education is also an important determinant of choice of the business sector. In general, full training in primary school, secondary school or university makes it easy to find a job in the tertiary sector.

The employment sector is another determinant of choice of the business sector. The probability of being engaged in the private sector is higher in secondary production and service industry by 15.2% and 13.8% respectively, than in the primary sector. The results tend to be similar to those in the socio-professional category apart from unskilled workers. For example, a skilled worker has more than a 42.9% chance of being engaged in the service industry relative to the primary sector. The second job dummy also had a significant effect on the choice of occupational sector.

People with many jobs are more likely to work in the primary sector. This result conforms to the study expectations because working in a manufacturing business needs a particular physical effort, while thriving in the tertiary sector requires dexterity.

Probit estimates of the underemployment model

When the Heckman probit model was run and tested for its appropriateness over the standard probit model, the results indicated the presence of a sample selection problem (dependence of the error terms from the outcome and selection models) in the visible and invisible underemployment models, justifying the use of the Heckman probit model with rho significantly different from zero in these models of interest.[17] This shows that sample selection is indeed present and ignoring it would lead to biased estimates.

In both underemployment equations, the inverse of Mills ratios are positively related to underemployment, meaning that an individual with average characteristics in the whole population has a higher probability of being underemployed than any individual chosen at random in the sub-sample of working people. However, when considering sub-samples of rural and urban workers, the problem of selection occurs only in the context of the study of the urban visible underemployment (see Table A4).

The inverse of Mills ratios related to the sector of industry is also significant statistically, as shown in Table 4, and attests to the assumption that the industry sector is endogenous in the models. Much more, depending on the sign of IMR, the

probability to earn a wage lower than the minimum wage for a given worker with average characteristics in the full sample is greater than for any individual randomly selected in the sub-sample of industrial workers. The opposite effect was observed for a given worker with average characteristics, whose weekly working time is less than 35 hours. In the same way a worker with average characteristics in the full sample is less likely to experience invisible underemployment than any individual randomly selected among workers engaged in the sales and service industry, although the estimates were less significant than those of IMR related to industrial sector. This result was also observed in urban areas, but reversed in rural areas.

Table 4:   The determinants of underemployment

Models	Visible		Invisible	
Variables	Coefficient	Standard error	Coefficient	Standard error
Education (ref = no education)				
Primary	0.017	(0.056)	-0.159***	(0.049)
Secondary	0.042	(0.055)	-0.278***	(0.047)
University	0.511***	(0.109)	-0.996***	(0.099)
Employment sector (ref = informal sector)				
Public sector	-0.551***	(0.169)	-0.538***	(0.155)
Private sector	-0.585***	(0.101)	-0.393***	(0.078)
Business sector (ref = primary sector)				
Industry	0.325***	(0.054)	-0.641***	(0.046)
Sales and services	0.243***	(0.051)	-0.479***	(0.042)
Socio-prof. category (ref = self-employed)				
Executive staff	-0.221***	(0.079)	-0.287***	(0.067)
Skilled workers	-0.183***	(0.063)	0.222***	(0.048)
Unskilled workers	-0.046	(0.051)	1.162***	(0.049)
Second job holding (1 = yes)	0.161***	(0.041)	0.108***	(0.036)
Sex (1 = male)	0.052	(0.046)	-0.296***	(0.038)
Age	0.013	(0.016)	-0.046***	(0.014)
Agesquare	-0.00012	(2×10^{-4})	0.00048***	(1.7×10^{-4})
Location (1 = urban)	-0.105**	(0.054)	-0.186***	(0.045)
_cons	-0.946*	(0.526)	-1.06**	(0.443)
Selection bias correction				
Inverse of Mills ratios	0.469***	(0.148)	0.347***	(0.135)
Endogeneity of occupational sector				
IMR for the industry sector	-1.55***	(0.607)	4.31***	(0.534)
IMR for the trade and services sector	0.265	(0.304)	-0.425*	(0.243)
Log pseudo likelihood	-3860.31		-5939.51	
Prob > chi2	0.000		0.000	
Observations	11,830		11,830	

Note: estimates computed by the authors, using data from the EESI2 survey conducted by the INS in 2010 (INS, 2011). ***, **, * denote that the significance is established at 1% level, 5% level and 10% level respectively.

Apart from the selection and the endogeneity problems, Table 4 also presents the determinants of underemployment. As far as educational level is considered, the estimated coefficients of the education dummies have mixed signs and significances in the Heckman models (Table 4). But in general, educated individuals had a lower probability of being underemployed than individuals with no education. People with a university degree had less than a 29% chance of being paid below the minimum wage, relative to those with no education. Even if the primary, secondary and university dummies were positive in the visible underemployment model, only the university dummy was statistically significant. The negative impact of education on underemployment has been proved in previous studies. For example, the study by Mecharla (2002) shows that visible underemployment decreases with educational level in Trinidad and Tobago. This result has been confirmed in the United Kingdom (Helen, 2010). Although Mosca and Wright (2010) found that underemployment was a serious problem among graduates of Scottish higher education institutions, their study revealed that it was more accentuated among undergraduates. About 33.6% of undergraduates from Scottish higher education institutions, who are employed six months after graduation, work in jobs that do not require the skills they obtained through their study. This figure is 9.7% among postgraduates.

According to existing studies, the employment sector is an important variable that determines the probability of being underemployed. The findings suggest that workers in the public and formal private sectors are less likely to be underemployed than workers in the informal sector. Similar findings have been obtained in the Republic of Trinidad and Tobago (Dilawar et al, 2008).

This study also tested the influence of the business sector on the probability of being underemployed. The estimates show that the industry dummy and the service dummy are statistically significant and have mixed signs in both the underemployment equations. Industrial workers, and those of the sales and service sector, are less likely to experience invisible underemployment but are more likely to experience visible underemployment, relative to those working in the primary sector. This finding is consistent with that in the literature and the estimated coefficient is significant at 1% level. The result is not surprising because informal activities are more accentuated in the primary sector. EESI data show that among workers aged between 15 to 64 years old, the informal sector represents 99.4%, 85.2% and 76.6% of activities in the primary sector, the industrial sector and the sales and services sector, respectively.

The variable sex is also relevant in the invisible model. The model shows that men were less likely to be paid below the minimum wage than women. This finding confirms the result of previous studies which show that women face several forms of employment inequalities, including wage inequality, unequal access to promotion, unequal distribution of domestic work in the family, and unequal access to employment.

Another significant determinant of invisible underemployment was the living area. The model reveals that working in an urban area seems to decrease the likelihood of being underemployed, meaning that the labour market is more structured in urban areas in Cameroon than in rural areas, just as in the USA in the 1980s (Deller, 1996). Moreover, the socio-professional category had mixed effects on invisible

underemployment. Results of the visible model show that executive staff, skilled workers and unskilled workers were less likely to be underemployed than self-employed people. As far as the invisible model is concerned, the findings suggest that except the executive staff, skilled and unskilled workers were more likely to be underemployed than self-employed people. In other words, skilled workers who were not self-employed were more likely to earn a wage lower than the hourly minimum wage. This result also fits with the expectations of this study. Self-employment is a tool for managing underemployment. Self-employment is first considered as a way out of unemployment, but it can also be considered as a tool for adjusting precarious situations for low-skilled or vocationally employed workers. This finding also shows a clear difference in remuneration between the position of self-employed and staff manager in an enterprise with more than two workers.

Age has a negative and significant impact on invisible underemployment, and there is no inverse U relationship between age and this underemployment. It means the probability of having an income lower than the minimum wage continuously decreases with age. This result, which is very consistent, shows the advantage of the maturity and experience of the worker in obtaining a secured and well-paid job in the labour market in Cameroon.

Second job holding has a positive significant effect on the likelihood of being underemployed. The first meaning of this finding is that people holding more than one job were more likely to work less than 35 hours per week in their main job, and to earn less than hourly minimum wage in the main job. In Cameroon in 2010, the rate of second job holders in the working-age population was estimated at about 24%, with about twice as many people working in rural areas as in urban areas. Approximately 10.9% of second jobs are in the formal sector, 46.9% in informal agriculture and 42.2% in informal non-agriculture (INS, 2011). Moreover, Tables A2 and A3 show 13.6% of individuals who hold a second job needed to supplement the hourly deficit observed in the main job, while 60.6% of them wanted to increase the low income from the main activity. This implies that the idea of second job holding comes from the willingness to improve wage conditions and take advantage of the free time from the main job.

Results of the decomposition of the rural–urban underemployment gap

The decomposition in Table 5 is made by taking into account the sex of a worker which is a relevant factor in the study of underemployment. There are three decompositions of the underemployment gap, corresponding to the sub-sample of men, women and the pooled sample. The urban–rural gap remained constant in the three samples, but it is mostly explained by Fairlie's model in the women population with about 93% of total explained.

The probability of being underemployed (invisible underemployment) in the rural sector, estimated at 0.7225, was much higher than of being underemployed in the urban sector (0.4586). The rural–urban gap in predicted probability of being underemployed in the invisible model is 0.2638. This large gap[18] could be from the poorer employment opportunities in rural areas than in urban areas, as Deller (1996)

noticed in USA. The explanation of this gap by the variables included in the models is 0.2155 (about 81.2% of the gap), meaning that 81.2% of the underemployment gap is explained by the difference in the distribution of observable characteristics between rural and urban populations. Thus, the perceived inequalities of invisible underemployment might fall by about 81% if rural workers had the same demographic and economic characteristics as urban workers. The remaining 19% can be attributed to the difference due to the effects of the observed characteristics. This result was more noticeable in the women population than in that of men.

Moreover, education, employment sector, the business sector and the socio-professional category were the most relevant determinants in the average explanation of the location gap, all of which had positive contributions. This implies that the lowest level of these determinants in the rural sub-sample partly explain the higher likelihood of experiencing invisible underemployment. For example, the lack of education among rural workers is the origin of their lower payment and poor productivity.

Table 5:   Probit decomposition of invisible underemployment in urban and rural areas

Invisible	Men		Women		Full sample	
	Coeffi-cient (standard error)	Relative contri-bution (%)	Coeffi-cient (standard error)	Relative contri-bution (%)	Coeffi-cient (standard error)	Relative contri-bution (%)
Age	0.0118 (0.0067)	4.34	0.0000352 (0.0084)	0.02	0.0021 (0.0055)	0.80
Agesquare	0.0187 (0.0049)	6.88	0.0052 (0.0092)	2.24	0.0133 (0.0054)	5.04
Sex	(Omitted)	0.00	(omitted)	0.00	0.0038 (0.0007)	1.44
Education	0.0298 (0.0070)	10.96	0.0319 (0.0096)	13.75	0.0347 (0.0057)	13.14
Sector of employment	0.0274 (0.0049)	10.07	0.0201 (0.0068)	8.66	0.0285 (0.0040)	10.80
Business sector	0.1015 (0.0108)	37.32	0.0876 (0.0134)	37.76	0.0961 (0.0083)	36.40
Socio-prof category	0.0146 (0.0076)	5,37	0.0703 (0.0110)	30.30	0.0357 (0.0060)	13.52
Percentage explained		74.73		92.73		81.14
Urban(G=1/G=0)		0.656		0.787		0.722
Rural (G=1/G=1)		0.384		0.555		0.458
Difference		0.272		0.232		0.264
Total explained		0.204		0.215		0.214
Number of observations		6,895		6,064		12,959

Note: estimates computed by the authors, using data from the EESI2 survey conducted by the INS in 2010 (INS, 2011).
***, **, * denote that the significance is established at 1% level, 5% level and 10% level respectively.

6. Conclusion and policy recommendations

This paper provides analytical elements for the definition of a good policy aimed at reducing underemployment in Cameroon. The study allowed the assessment of the level of visible and invisible underemployment in the country. In addition, it provided a better characterization of the profile of (average) visible and invisible underemployed and the identification of the factors explaining the situation of underemployment of most Cameroonian workers. The level of visible underemployment was 11.5% among individuals aged between 15 and 64 years, while the estimated invisible underemployment rate was about 62.7%. Results from the probit models with sample selection estimated suggest that education, business sector, employment sector, socio-professional category, experience, sex, age and location have a significant impact on the probability of being underemployed. Results of the Fairlie (2006) decomposition show that the set of determinants we considered can explain about 81.6% of the gap in predicted probability of being underemployed (invisible underemployment) between urban and rural workers. Some policy recommendations may be drawn from this study:

- Authorities should encourage and sensitize women about the need for them to participate in the job market. Moreover, the authorities should ensure respect for the regulations governing the labour market and the abolition of any form of discrimination regarding the women, that some employers might practise.

- The study reveals that skilled or unskilled workers are highly likely to experience income-related underemployment, relative to those in self-employment. This finding is in line with the promotion of self-employment, which seems to be the first response to unemployment among young people entering the labour market. It is also the response of workers who have involuntarily lost their jobs and who do not want to engage if working conditions do not offer them the same utility as they had in their previous jobs, as Latack (1995) indicated in the theory of re-employment. However, the practice of self-employment must meet some preconditions (at the risk of producing precarious or short-term jobs), in particular the skills of workers in the activity they want to create and the opportunity of this activity in the labour market and throughout the national economy. In Cameroon, self-employment accounts for almost half the employment structure (48.57%), and

is almost uniformly concentrated in the primary and tertiary sectors.[19] Moreover, invisible underemployment in Cameroon covers almost 62% of the self-employed population (Table A3), meaning that activities developed in self-employment in 2010 were unsustainable and sometimes lacked planning and monitoring. Thus, promoting self-employment in the context of Cameroon is not the best idea to reduce underemployment. Policy makers should rather question the conditions of employability of workers in the labour market. The Ministry of Employment and Social Security might ensure compliance with the collective agreements voted by the trade unions, as provided for in the Labour Code of Cameroon.

- According to the Cameroon National Institute of Statistics, incomes have been very weak in rural areas since 2005, while unemployment has been higher in urban areas. This report indicates that rural areas in Cameroon are not well valued. One could finance private initiatives in rural areas to absorb urban unemployment problems, and fight against the development of the informal sector.

- Previous policies have been implemented to improve the income and productivity of the informal sector to reduce poverty and bring economic and employment conditions closer to those in the formal sector. These include microcredits and the development of micro-insurance. However, empirical studies have shown that in the long run, these policies have not had an impact on flows to the formal sector. Rather they have contributed to strengthening the informal sector. In the case of Cameroon, between 2005 and 2010, there was a real increase in income, particularly in the informal sector. But the informality rate remained constant at about 90.5%. Authorities should encourage actors in the informal sector to think beyond taxes by making them aware of the known advantages of formal employment.

- Given that Cameroon is still a developing country with a lot of natural resources, authorities should better capitalize the advantage of what is directly harvested from the earth; not to sell raw materials but to encourage people to invest in the manufacturing sector and create new export opportunities. Therefore, the primary sector will grow, especially agriculture, which provides employment to a vast army of uneducated and unskilled workers. They might also develop good policies for persuading foreign investors to come to Cameroon and hire many local workers.

Notes

1. The minimum salary was 28,500 CFA Francs (US$ 48.6) in Cameroon, 60 000 CFA francs (US$102.7) in Congo Brazzaville in 2009 (CNSEE, 2011), 60 000 CFA francs (US$102.7) in Chad in 2011 (INSEED, 2013), 54,128 FC (US$32.7) in DRC (IRD, 2014), and 150 000 CFA francs (US$256.8) in Gabon in 2010. Taken 1US$= 584.2 XAF

2. However, it is difficult to appreciate the difference between these underemployment rates because they were computed under two different thresholds, corresponding to the minimum wage values of each period of survey.

3. These countries are characterized by a dual economy in which coexists between two sectors: a modern sector (formal sector, industrial sector, organized sector, etc.) and a primary sector (agriculture, unorganized sector).

4. The INS reports of EESI2 say that 3.9 million people in the working age in Cameroon (about 31%) are inactive. So in 2010, about 8.7 million Cameroonians were either working or seeking a job.

5. The reference category of the business sector is the primary sector.

6. The significance of this gap was properly tested for both the visible and invisible underemployments (Table A5).

7. EA is a portion of the nationwide territory limited by a visible detail, with a range of 700-1,100 people and on which we can list between 140 and 220 households. Cameroon's territory was divided into 17,800 EA, considered as basic units.

8. Displacement characterizes the situation of "over-graduates" compared with their occupation.

9. This is how the question was asked during the investigation of the EESI survey.

10. About US$ 38.4 per month.

11. In 1925 (second CIST), in 1947 (sixth CIST), in 1954 (eighth CIST), in 1957 (ninth CIST), in 1966 (eleventh CIST) and in 1982 (thirteenth CIST).

12.   See the annex

13.   On the basis of 35 hours per week for a typical worker, the total time of work per year is 1,820 hours (35*52 = 1,820). By multiplying the minimum wage by 12, the total minimum wage per year is obtained. For a typical worker, this annual minimum wage divided by the total time of work per year gives the hourly minimum wage.

14.   The ratio of the self-employed and unpaid family workers to the total employed population.

15.   The ratio of the number of the employed to the total number of working population.

16.   About US$0.32.

17.   Rho associated with the inverse of Mill's ratio is statistically significant in the two models and the Wald test suggests the rejection of the Ho: rho = 0 (see Table 4).

18.   This gap is significantly tested, as presented in Table A5.

19.   These estimates were computed by the authors, using data from the EESI2 survey conducted by the INS in 2010 (INS, 2011).

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Annex

Table A1: Descriptive statistics of some variables

Variable	Urban					Rural				
	Obs.	Mean	Standard deviation	Min.	Max.	Obs.	Mean	Standard deviation	Min.	Max.
Age	10,835	30.52395	11.74425	15	64	7,779	31.80679	12.93716	15	64
Sex (1 = male)	10,835	0.4937702	0.4999843	0	1	7,779	0.4656125	0.4988482	0	1
education										
No education	10,835	0.0762344	0.2653851	0	1	7,779	0.286155	0.4519918	0	1
Primary level	10,835	0.2260268	0.418276	0	1	7,779	0.3664996	0.4818791	0	1
Secondary level	10,835	0.5488694	0.497629	0	1	7,779	0.3198355	0.4664426	0	1
University	10,835	0.1488694	0.3559761	0	1	7,779	0.02751	0.1635745	0	1
Marital status										
(1 = in couple)	10,835	1.438302	0.4962016	0	1	7,779	1.577709	0.4939561	0	1
Corporation size										
(1 = self-employed)	5,938	0.3632536	0.4809775	0	1	5,973	0.2918132	0.4546348	0	1
Social network	6,761	0.3955036	0.4889948	0	1	6,198	0.4409487	0.4965408	0	1
employment sector										
public	6,761	0.1161071	0.320377	0	0	6,198	0.0377541	0.1906164	0	1
Formal private sector	6,761	0.0840112	0.2774252	0	0	6,198	0.0204905	0.1416822	0	1
informal	6,761	0.7998817	0.4001183	0	0	6,198	0.9417554	0.2342243	0	1
Occupational sector										
Primary	6,761	0.1067889	0.3088676	0	1	6,198	0.6940949	0.4608269	0	1
Industry	6,761	0.2094365	0.4069365	0	1	6,198	0.1029364	0.3039004	0	1
Trade and services	6,761	0.6837746	0.4650364	0	1	6,198	0.2029687	0.4022419	0	1

continued next page

Table A1 Continued

Variable	Urban					Rural				
	Obs.	Mean	Standard deviation	Min.	Max.	Obs.	Mean	Standard deviation	Min.	Max.
Socio-professional category										
Executive staff	6,761	0.1567815	0.3636216	0	1	6,198	0.0484027	0.214633	0	1
Skilled worker	6,761	0.222896	0.4162199	0	1	6,198	0.0616328	0.2405068	0	1
Unskilled workers	6,761	0.2100281	0.4073584	0	1	6,198	0.3220394	0.4672957	0	1
Self-employee	6,761	0.4102943	0.4919235	0	1	6,198	0.5679251	0.4954047	0	1
Contract (1 = with a contact)	3,347	0.4362115	0.4959884	0	1	2,389	0.1682712	0.3741853	0	1
Non-labour income	10,835	0.1979695	0.3984875	0	1	7,779	0.1118396	0.3151892	0	1
Length of service	6,752	7.968602	9.616351	0	1	6,195	14.55061	12.58243	0	1
Work place	5,948	0.7594149	0.4274747	0	1	5,976	0.9335676	0.2490572	0	1
Second job holding	6,753	0.1480823	0.3552079	0	1	6,196	0.3395739	0.4736029	0	1
Fringe benefits	10,814	0.1424079	0.0951106	0	1	7,754	0.0056873	0.0317138	0	1

Note: Estimates computed by the authors using data from the EESI2 survey conducted by the INS in 2010 (INS, 2011).

Table A2: The visible underemployment rate, by location in Cameroon in 2015

Variables		Urban	Rural	Full sample
Sex	Male	10.45	11.72	11.20
	Female	14.88	10.26	11.82
		12.38	10.98	11.50
Age	15–39	14.12	9.72	11.10
	40–64	11.88	11.49	11.65
		12.38	10.98	11.50
Education	No education	12.38	10.23	10.45
	Primary level	9.20	9.76	9.60
	Secondary level	11.76	11.37	11.58
	University	20.22	35.71	23.58
		12.38	10.98	11.50
Marital status	Single	13.38	10.97	12.02
	In couple	11.49	10.98	11.15
		12.38	10.98	11.50
Non-labour income	Yes	16.58	10.06	14.17
	No	11.25	9.91	10.59
		12.08	9.92	11.05
Length of service	Less than 12 years	12.22	11.99	12.10
	Above 12 years	13.04	9.97	10.58
		12.38	10.98	11.50
Corporation size	Self-employed	10.71	9.75	10.05
	Not self-employed	13.21	12.05	12.52
		11.65	10.43	10.85
Employment sector	Public	18.26	26.69	21.01
	Formal private sector	3.94	10.50	5.41
	Non-agricultural informal	12.46	14.84	13.30
	Agricultural informal	12.14	8.99	9.21
		12.38	10.98	11.50
Occupational sector	Primary	12.14	9.04	9.25
	Industry	13.05	15.29	13.94
	Trade and services	12.19	16.40	13.51
		12.38	10.98	11.50
Socio-professional category	Executive staff	15.21	22.13	17.60
	Skilled worker	8.60	16.12	10.76
	Unskilled worker	11.48	10.38	10.68
	Self-employees	13.82	9.80	11.01
		12.38	10.98	11.50
Second job holding	Yes	17.30	11.83	13.60
	No	11.19	8.94	10.26
		12.38	10.98	11.50

Note: Estimates computed by the authors, using data from the EESI2 survey conducted by the INS in 2010 (INS, 2011).

Table A3: The invisible underemployment rate, by location in Cameroon in 2015

Variables		Urban	Rural	Full sample
Sex	Male	36.88	67.37	54.89
	Female	55.02	79.22	71.03
		44.77	73.42	62.68
Age	15–39	75.12	85.25	82.06
	40–64	36.13	68.59	55.71
		44.77	73.42	62.68
Education	No education	55.93	83.87	81.02
	Primary level	58.52	72.46	68.58
	Secondary level	45.63	68.14	55.92
	University	13.19	21.34	14.96
		44.77	73.42	62.68
Non-employment income	Yes	45.19	64.19	52.22
	No	46.00	73.13	59.43
		45.86	72.26	58.49
Length of service	Less than 12 years	47.87	70.26	59.37
	More than 12 years	32.99	76.58	67.85
		44.77	73.42	62.68
Corporation size	Self-employed	50.51	80.69	71.10
	Not self-employed	45.51	62.04	55.30
		48.63	75.35	66.09
Employment sector	Public	8.93	22.71	13.42
	Formal private sector	18.89	36.16	22.77
	Non-agricultural informal	50.64	59.27	53.68
	Agricultural informal	72.97	81.19	80.63
		44.77	73.42	62.68
Occupational sector	Primary	72.48	81.13	80.54
	Industry	42.86	57.53	48.70
	Trade and services	41.84	51.22	44.77
		44.77	73.42	62.68
Socio-professional category	Executive staff	8.43	24.49	13.97
	Skilled worker	34.81	47.29	38.39
	Unskilled workers	81.22	93.59	90.25
	Self-employees	46.50	68.45	61.83
		44.77	73.42	62.68
Second job holding	Yes	44.70	68.11	60.57
	No	46.03	74.39	57.82
		45.87	72.27	58.49

Note: Estimates computed by the authors, using data from the EESI2 survey conducted by the INS in 2010 (INS, 2011).

Table A4: The determinants of underemployment with marginal effects

Models	Visible		Invisible	
Variables	Coef. (standard error)	Marginal effects (standard error)	Coef. (standard error)	Marginal effects (standard error)
Education (ref = no education)				
Primary	0.017 (0.056)	0.0031 (0.010)	-0.159*** (0.049)	-0.045*** (0.013)
Secondary	0.042 (0.055)	0.0075 (0.0098)	-0.278*** (0.047)	-0.079*** (0.013)
University	0.511*** (0.109)	0.091*** (0.019)	-0.996*** (0.099)	-0.282*** (0.027)
Sector of employment (ref = informal sector)				
Public sector	-0.551*** (0.169)	-0.097*** (0.030)	-0.538*** (0.155)	-0.153*** (0.044)
Private sector	-0.585*** (0.101)	-0.103*** (0.017)	-0.393*** (0.078)	-0.111*** (0.022)
Business sector (ref=primary sector)				
Industry	0.325*** (0.054)	0.057*** (0.0096)	-0.641*** (0.046)	-0.181*** (0.012)
Sales and services	0.243*** (0.051)	0.043*** (0.0091)	-0.479*** (0.042)	-0.136*** (0.012)
Socio-prof. category (ref=self-employed)				
Executive staff	-0.221*** (0.079)	-0.039*** (0.014)	-0.287*** (0.067)	-0.081*** (0.019)
Skilled workers	-0.183*** (0.063)	-0.032*** (0.011)	0.222*** (0.048)	0.063*** (0.014)
Unskilled workers	-0.046 (0.051)	-0.008 (0.0089)	1.162*** (0.049)	0.330*** (0.013)
Second job holding (1=yes)	0.161*** (0.041)	0.028*** (0.007)	0.108*** (0.036)	0.0307*** (0.011)
Sex (1=male)	0.052 (0.046)	0.0088 (0.008)	-0.296*** (0.038)	-0.084*** (0.016)
Age	0.013 (0.016)	0.0023 (0.0028)	-0.046*** (0.014)	-0.0131*** (0.004)
Agesquare	-0.00012 (2×10^{-4})	-2.2×10^{-5} (3.5×10^{-5})	4.87×10^{-4} ***(1.7×10^{-4})	0.00013*** (4.7×10^{-5})
Location (1 = urban)	-0.105** (0.054)	-0.018* (0.0096)	-0.186*** (0.045)	-0.053*** (0.013)
_cons	-0.946* (0.526)		-1.06** (0.443)	
Selection bias correction				
Inverse of Mills Ratios	0.469*** (0.148)	0.083*** (0.026)	0.347*** (0.135)	0.098*** (0.038)

Table A4 Continued

Models	Visible		Invisible	
Variables	Coef. (standard error)	Marginal effects (standard error)	Coef. (standard error)	Marginal effects (standard error)
Endogeneity of occupational sector				
IMR for the sector of industry	-1.55*** (0.607)	-0.275*** (0.107)	4.31*** (0.534)	1.22*** (0.150)
IMR for the sector of trade and services	0.265 (0.304)	0.046 (0.054)	-0.425* (0.243)	-0.121* (0.069)
Log pseudo likelihood	-3860.31		-5939.51	
Prob > χ^2	0.000		0.000	
Observations	11,830		11,830	
Pr(predict)	0.1049757		0.6155656	

Note: Estimates computed by the authors, using data from the EESI2 survey conducted by the INS in 2010 (INS, 2011).

Table A5: Determinants of underemployment

Variables	Visible underemployment model						Invisible underemployment model					
	Urban		Rural		Full sample		Urban		Rural		Full sample	
	Coef.	Standard error	Coef.	Standard error	Coef	Standard error	Coef.	Standaed error	Coef.	Standard error	Coef	Standard error
Education (ref = no education)												
Primary	0.099	(0.104)	-0.138	(0.084)	0.017	(0.056)	-0.273***	(0.087)	-0.157**	(0.069)	-0.159***	(0.049)
Secondary	0.167*	(0.096)	-0.022	(0.072)	0.042	(0.055)	-0.441***	(0.079)	-0.138**	(0.062)	-0.278***	(0.047)
University	0.661***	(0.149)	0.303	(0.220)	0.511***	(0.109)	-1.221***	(0.129)	-0.681***	(0.196)	-0.996***	(0.099)
Sector of employment (ref = informal)												
Public sector	-0.453**	(0.198)	-0.69**	(0.352)	-0.551***	(0.169)	-0.457**	(0.198)	-0.682**	(0.279)	-0.538***	(0.155)
Private sector	-0.487***	(0.117)	-0.73***	(0.208)	-0.585***	(0.101)	-0.329***	(0.093)	-0.539***	(0.158)	-0.393***	(0.078)
Business sector (ref = primary)												
Industry	0.235***	(0.085)	0.349***	(0.074)	0.325***	(0.054)	-0.718***	(0.074)	-0.624***	(0.064)	-0.641***	(0.046)
Sales and services	0.139*	(0.079)	0.303***	(0.069)	0.243***	(0.051)	-0.597***	(0.069)	-0.387***	(0.057)	-0.479***	(0.042)
Socio-prof. category (ref = self-employed)												
Executive staff	-0.311***	(0.101)	0.051	(0.131)	-0.221***	(0.079)	-0.252***	(0.085)	-0.339***	(0.115)	-0.287***	(0.067)
Skilled workers	-0.179**	(0.078)	-0.069	(0.119)	-0.183***	(0.063)	0.1428^{**}	(0.059)	0.371***	(0.094)	0.222***	(0.048)
Unskilled workers	-0.140*	(0.077)	0.028	(0.068)	-0.046	(0.051)	1.279***	(0.067)	1.058***	(0.071)	1.162***	(0.049)
Second job holding (1=yes)	0.215***	(0.064)	0.101***	(0.055)	0.161***	(0.041)	0.139**	(0.058)	0.041	(0.047)	0.108***	(0.036)
Sex (1 = male)	0.049	(0.073)	-0.019	(0.071)	0.052	(0.046)	-0.469***	(0.061)	-0.225***	(0.059)	-0.296***	(0.038)
age	0.019	(0.027)	-0.021	(0.023)	0.013	(0.016)	-0.081***	(0.024)	-0.063***	(0.019)	-0.046***	(0.014)
agesquare	-0.00014	(0.00032)	0.00019	(0.00027)	-0.00012	(2×10^{-4})	8×10^{-4}***	(0.00029)	7×10^{-4}***	(0.00023)	0.00048***	(1.7×10^{-4})
Location (1=urban)	----		----		-0.105**	(0.054)	----		----		-0.186***	(0.045)
_cons	-2.233***	(0.866)	0.754	(0.785)	-0.946*	(0.526)	-0.196	(0.711)	-0.109	(0.698)	-1.06**	(0.443)

Table A5 Continued

Variables	Visible underemployment model						Invisible underemployment model					
	Urban		Rural		Full sample		Urban		Rural		Full sample	
	Coef.	Standard error	Coef.	Standard error	Coef	Standard error	Coef.	Standaed error	Coef.	Standard error	Coef	Standard error
Selection bias correction												
Inverse of Mills	0.615***	(0.198)	-0.312	(0.331)	0.469***	(0.148)	0.119	(0.178)	-0.075	(0.306)	0.347***	(0.135)
Endogeneity of occupational sector												
IMR for industry	-0.499	(0.841)	-2.48***	(0.957)	-1.55***	(0.607)	5.192***	(0.706)	2.221***	(0.881)	4.31***	(0.534)
IMR for trades and services	0.649	(0.411)	0.261	(0.466)	0.265	(0.304)	-1.538***	(0.333)	1.017***	(0.385)	-0.425*	(0.243)
-Log pseudo likelihood	-2014.95		-1816.99		-3860.31		-3177.40		-2732.24		-5939.51	
Prob > χ2	0.000		0.000		0.000		0.000		0.000		0.000	
Observations	5,891		5,939		11,830		5,891		5,939		11,830	

Note: Estimates computed by the authors, using data from the EESI2 survey conducted by the INS in 2010 (INS, 2011).

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