Use of ICTs: What Effect on Youth Access to Employment in Cameroon?

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Abstract

Based on ECAM4 (2014) database, this paper aims at analysing the effect of Information and Communication Technologies (ICTs) based on youth’s access employment aged between 15-35 years old in Cameroon. The cases of employees of more than 15 and those of more than 35 years old are considered for comparisons. In order to solve the endogeneity bias of the simple probit model, a robust instrumental variable probit model was used, and this gave consistent results with regard to the diagnostics based on the specificity/sensitivity tests. The estimates suggest that: (i) using the internet increases the chances of getting a job, and this for all age group considered; (ii) this increase it between 17-38% for youth, 0.39-1.118% for seniors and 18-40% for all works; (iii) compared to senior employees, the young internet users are 25 times luckier to find a job. Finally, this result is in accordance with the literature which considers ICTs as the most important component of labor market.

Keyboards: Instrumental variable (IV), ICTs, young, employment, Cameroon.

JEL Code : C26, J13, J21, O55.

Introduction

Since the middle of the 20th century, ICTs have experienced considerable growth, especially through the development of television, computer, telephone and Internet. This evolution has considerably transformed the world, which has become a “global society” (Matellart, 2017). Moreover, the development of ICTs in the most diverse areas the society has led some to predict the advent of a “new economy”. These technologies have established themselves as the main vectors of economic and social activity, both in developed countries and in emerging and developing countries (Kossai, 2015).

At the global level, the European Commission (EC) indicated that ICTs represented almost 5.2% of the Gross Domestic Product (GDP) in 2015 (EC, 2015); which led McKinsey (2013) to highlight an expected contribution to GDP growth of 10% in 2025. Nowadays, digital technology affects all sectors of activity and plays an important role in employment and growth. The EC also emphasizes that their distribution therefore appears to be a source of productivity gains (Brynjolfsson and Hitt, 2003; Kossai., 2015; Luo and Bu, 2016). According to Youssef and Henni (2004): "In the new economies, technology is the major driver of improved quality of life for the underdeveloped or developing people..." Thus, the exploitation of ICTs could constitute a means of improving the well-being of populations in developing countries.

In Cameroon, ICTs represent a strategic asset whose significant contribution could change the national situation (Wamba and Ndjie, 2019). Indeed, ICTs have experienced a gradual diffusion in society since the reform of the Telecommunications sector following Law 98/014 of July 14, 1998. The number of Internet subscribers

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1 According to the World Bank (1990), ICTs refers to a "Set of technologies resulting from the convergence of information technology and advanced multimedia and telecommunications techniques, which have enabled the emergence of more efficient means of communication, by improving the processing, storage, dissemination and exchange of information".
(fixed and mobile) has literally increased, from 47 miles in 2011 to nearly 12 million in 2017, for a penetration rate rising from 0.24% to approximately 52.32% over the same period (ART\textsuperscript{2}, 2017). Over time, the proportion of households with a telephone (fixed and/or mobile) has increased significantly to nearly 90% compared to 30.2%, in 2017 and 2005 respectively.

In addition, between 2005 and 2016, the penetration rate of mobile phones also increased respectively from 12.26% in 2005, to 43.96% in 2010 and then to 82.87% in 2016. According to the Cameroon Strategic Plan 2020, the percentage of households with internet access increased from 6% in 2016 to 20% in 2020. Depending on the age group, there is a differentiated use of ICTs. Indeed, Tamokwe (2013) points out that young people constitute the segment of the population that mostly uses these tools. The dissemination of these technologies is thus part of the 2020 digital development objectives set by the government.

In addition to their significant contribution to the economic growth of nations, as mentioned above, ICTs above all presupposes a significant increase in the flow of information both globally and nationally. The labor market is not on the sidelines of this development. Indeed, information is a determining factor of efficiency (Stigler, 1962; Lippman and McCall, 1976). Also, ICTs are important tools for acquiring the skills necessary for employment access, by improving operational skills related to the world of work (Kalika, 2006).

The problem of integration into the labor market is more acute in the young fringe of populations (Stiglitz, 2012; Verdier and Vultur, 2016). In Cameroon, the analysis of the labor market reveals worrying situations both for those in activity and for that unemployment (Njikam, 2005). Thus, in the broad sense, the unemployment rate of young people aged 15 to 34 rose from 8.9% to 10.5%\textsuperscript{5} between 2010 and 2016. Furthermore, these same sources also reveal an increase in the visible underemployment rate, which rose from 70.6% to 75.8% \textsuperscript{6}. The choice made on this fringe of the population could be expressed by an ever-increasing number of young people exposed to unemployment or confined to precarious, temporary or generally poor-quality jobs. According to the INS (2014), young people aged between 15-34 represent 65.37% of the working age population, 59.43% of the active population and 37.53% of the whole population. They are proportionally more numerous in urban areas (61.17%) than in rural areas (38.82%); and they are the most vulnerable segment of the population.

The objective of this article is to analyze the effects of Information and Communication Technologies (ICTs) employment access for young people in Cameroon. Indeed, very little work has been done in this direction. We find in particular Njikam et al. (2005) which essentially deals with the characteristics and determinants of youth employment in Cameroon; Tchakounté and Mbam (2016) which essentially deal with the participation of Cameroonians in the informal sector labor market on the other hand. Tamokwe (2013) studied the determinants of internet access and use in the Cameroonian context. Furthermore, Bakehe et al. (2017) and Fambeu (2021) analyzed the evolution of the factors that determine Internet use. Overall, it was therefore about the study of the digital device. However, the specific relationship between ICTs and employment access has not yet been studied.

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\footnote{\textsuperscript{2}Annual report of the Telecommunications Regulatory Agency (2017).}
\footnote{\textsuperscript{3}This could be explained by the flexibility, the time needed for training in the use of these tools.}
\footnote{\textsuperscript{4}Republic of Cameroon (2016), \textit{Digital Cameroon Strategic Plan 2020}, Republic of Cameroon.}
\footnote{\textsuperscript{5}ESSI2 (2010); ECAM (2014); ECAM (2016).}
\footnote{\textsuperscript{6}This increase could be explained by the preponderance of the informal sector, the mismatch between training and employment and the insufficient supply of jobs in relation to demand.
This article is structured into four parts. The first part presents a literature review of the question. The second part presents the methodology study. The third part presents the results and the fourth part, present the results analysis and the conclusion.

1. Literature review

The analysis of access to employment is part of a theoretical framework marked by the multitude of traditional channels available to an individual during the integration process. The objective of this first part is to present the different channels of employment access (1.1), then highlight the preponderant place of ICTs (1.2) and finally review the various works at the empirical level (1.3).

1.1. Traditional channels of access to employment

The problem of access to employment emerged with the great crisis of 1929. It was Keynes (1936) who drew attention to this problem which was presenting itself with greater acuity. He then spoke of involuntary unemployment and underemployment. Indeed, in traditional thoughts, the essential problem was microeconomic, by which individuals decided to enter into activity or not. The analysis of employment access was essentially based on the neoclassical model of arbitration between paid work and leisure. With the emergence of the problem of job availability on a global scale, the question of the channels to access them began to arise. De Schweinetz (1932) distinguished two methods of job search method: formal and informal. Economists and sociologists of work have since multiplied studies to better specify and evaluate them.

Rees (1966) in his founding work offers a fruitful reading grid to characterize their diversity. Indeed, it groups them into two categories, namely informal channels, characterized by the good quality of the information made available, and formal channels characterized by a large quantity of information disseminated. The different channels are summarized in the following table:

<table>
<thead>
<tr>
<th>Formal Channels</th>
<th>Informal Channels</th>
</tr>
</thead>
<tbody>
<tr>
<td>-Public and private placement intermediaries:</td>
<td>-Professional networks</td>
</tr>
<tr>
<td>National Employment Fund (NEF)</td>
<td>-Relations of parents, friends and acquaintances</td>
</tr>
<tr>
<td>-Advertisements (press, ICTs)</td>
<td>-Spontaneous applications</td>
</tr>
</tbody>
</table>

*Source: authors, based on Rees (1966).*

This specification becomes all the more important as it now arises for individuals the question of choices at the level of these channels. Indeed, the channels are differentiated by the quality of information transmitted; each channel has a cost and an expected efficiency, and individuals then make the choice. The individual is assumed to opt for the most efficient channels. For Spence (1973) the probability of obtaining a job depends on the channels used by the unemployed to give signals of productivity to employers. Granovetter (1973), on the other
hand, insists on the preponderance of networks (personal relations) as an effective means of access to employment. Indeed, these networks would be, among other arguments, a source of quality information for job seekers. Several empirical works carried out in various contexts support this thesis (Fernandez et al., 2000; Wapot, 2013; Zaharieva, 2015). However, other authors favor formal channels, given the advantages they provide. Indeed, these channels lead to permanent and better paid jobs (Kamanzi et al. 2010; Coffie, 2015).

However, these various traditional channels suffer for many problems, in particular the high cost of access to information, a long delay in accessing this information and the inefficiency in ensuring transparency on the job offers available. With regard to these various limitations, individuals are more likely to use the ICTs channel which seems to be devoid of these shortcomings. As a result, job search via the Internet (Internet job search) replaces traditional channels because it is less expensive and faster. In addition, websites dedicated to employment (job boards) take advantage of network externalities generated by the combined attraction of candidates and companies seeking to get in touch (Caillaud and Julilien, 2003; Rochet and Tirole, 2003).

Job search theory developed by Stigler (1962) highlighted information as the main determinant of access to employment. It stemmed from a relaxation of the assumption of perfect information on potential jobs in a labor market as put forward by the traditional theory. Indeed, for the proponents of this theory, the job provider is an information seeker. These relate to jobs, wages, qualifications, working conditions, etc. In fact, the individual will not only devote time to job prospecting and research, but also financial resources, which is generally reflected in terms of opportunity cost (Coase, 1937; Williamson, 1975). Consequently, the job provider will stop prospecting when the expected marginal gain equals the marginal cost of visiting a company or finding a job. In its basic version, the job search model considers the situation of an individual looking for a job (Lippmann and McCall, 1976): he receives job offers and incurs search costs. When an offer is proposed to him, he accepts or rejects it, and in the latter case, he continues his prospecting.

The importance of the informational factor in the context of job search gives a broad echo to ICTs. Indeed, their advent has revolutionized the circulation of information on a global scale. Their potential for information flow has been shown to be exceptional, thus affecting the structure of economies and first and foremost the labor market.

1.2. Access to employment: the role of ICT

In the specification drawn up by Rees (1966), ICTs figure among the formal channels of access to employment. Despite the increasing frequent use of ICTs, Mastafi (2016) notes that there is not absolute unanimity on the definition of this concept. The authors are particularly divided as to the elements to be taken into account in its content. Thus, according to Dieuzeide (1994), ICTs refers to all instruments carrying immaterial messages (images, sounds, character strings). He then subdivides ICTs into three categories: audiovisual (sound and image), computing and telecommunications. In the view of Castells (1998), information technology (IT) brings together all the technologies of computing, microelectronics and telecommunications. According to Volle (1999), ICTs designates the body of knowledge, techniques and processes relating to the processing, storage and communication

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7 The term job board designates the site model that developed in the United States in the mid-1990s, and, for example, all current services of this type. The literal translation, “employment panel”, expresses the initial idea well: it was simply a question of offering on the Internet lists of offers updated in almost real time. Posting an advertisement on a job board rather than in the written press thus makes it possible both to give and to obtain more information at a lower cost on more and more recent offers in more diverse places. Thus, according to ( Autor, 2001), posting an advertisement on a job board rather than in the written press thus makes it possible both to give and to obtain more information at a lower cost on more offers. more recent in more diverse places.
of information. Beheton (2010), goes further in this sense, also defining the term “ICTs” as a set of all technologies ensuring the communication, transmission, storage, creation, sharing or exchange of information.

In addition, several institutions also offer definitions of the concept. For the World Bank (BM, 1990), UN (1998) and UNESCO (2010), ICTs integrates all the technologies that include computing, advanced multimedia and telecommunications techniques, which have favored the processing, storage, dissemination and exchange of information. ICTs can thus profoundly modify the job search process. Indeed, prospecting for a job has a cost, particularly the costs induced by the search for information on the availability of jobs as well as on salaries (Coase, 1937; Williamson, 1975; Stigler, 1962). Therefore, having a direct impact on the availability of information, ICTs can allow job seekers to have access to information on the characteristics of job offers for which they wish to apply, at a lower cost (Stigler, 1962; Autor, 2001; Kuhn and Skuterud, 2004). Recent analyzes of the new microeconomics tell us more about the role that ICTs can play in reducing job search time. Thus, thanks to the Internet, a large amount of information is available to job seekers and fully justifies the migration of labor market to the Internet (Mellet, 2004).

ICTs are part of formal employment access channels and more specifically a component of advertisements. Since the mid-1990s, ICTs, in this case the Internet, have played an increasing role in the coordination of the labor market (Fondeur, 2006). In this wake, many are those who argue that we could do without the public placement service (Kuhn, 2000). In addition, the use of the Internet would have become obvious for job seekers, as the gains made possible by this tool compared to other job search methods are perceptible (Godefroy et al., 2006). In their study, these authors came to the conclusion that some say they prefer ICTs (Internet) to other media, such as the press or networks. Thus, ICTs constitute for job seekers not only the main job search tool but also their main source of information on the labor market and an effective channel for access to employment; according to human capital theory (Schultz, 1961; Becker, 1964).

1.3. ICT and access to employment: an empirical review of the literature

The analysis of the effect of ICTs (Internet) on employment access has been the subject of numerous empirical studies in various contexts. Indeed, by exploring the impact of the expansion of the internet on the results of finding and obtaining a job, our study contributes to the (still limited) literature that focuses on the different job search channels, including research via ICTs (internet) and its impact on labor market outcomes.

Kuhn and Skuterud (2000; 2004) were the first to exploit individual variations on Internet use and assess the impact of online research on unemployment durations for the years 1998-2000 in a French context based on the Current Population Survey (CPS). They arrived at the result that unemployed people searching online do not find re-employment any faster than their non-online job-seeking counterparts. Furthermore, using the same data set, Fountain (2005) performs logistic regressions with a job search indicator as the dependent variable.

However, Kuhn and Mansour (2014) reproduced Kuhn and Skuterud (2004) analysis, this time combining information from the CPS database with the longitudinal Survey of Youth. By comparing the relationship between internet use and unemployment durations in 1998-2000 and 2008-2009, the authors found that if internet use was inefficient ten years ago, it is associated with a reduction in the duration of unemployment by about 25% in 2008-2009. Furthermore, Gurtzgen et al. (2021) studied the effects of the introduction of a new mass media (Internet) on the re-employment probabilities of unemployed job seekers in the German labor market. They arrived at the result that the introduction of high-speed internet increases the probability of re-employment. This result is similar to that found by Bagues and Labini (2007) in Italy who, analyzing the impact of Internet access on the university-
employment transition, conclude that the Internet reduces the probability of unemployment among graduates by approximately 1.6 point.

However, the Internet has not yet imposed itself, far from it, as a dominant access channel on the entire labor market. Thomsen and Wittich (2010) used a German socio-economic panel to explore the effectiveness of various job search channels on the probability of finding a job. According to the authors, the use of the Internet does not significantly increase the probabilities of re-employment. Moreover, in their study, Bessy and Marchal (2003) qualified this result by showing that traditional mail remains dominant in the reception of unsolicited applications (nearly 91%), far ahead of the Internet (about 23%).

However, it should be noted that ICTs has some limitations, including the difficulty of processing the large amount of information made available. Fondeur (2006) qualifies this limit in terms of the "transparency-noise" dilemma. Indeed, when the quantity of information is increased without reducing its heterogeneity, it becomes more difficult for job seekers to distinguish the "signal" of relevant information from the "noise" of that which is not. According to Kuhn and Skuterud (2004), ICTs tools, by reducing search and application costs, it leads to an influx of "poor quality" applications and lead recruiters to favor traditional recruitment channels.

Moreover, Feldman and Klaas (2002), Brencic and Norris (2008) maintain that the level of jobs available via the Internet is lower than that of other job access channels.

These different studies show that the importance of ICTs as channels for access to employment has not yet been decided, at least not in all contexts. In the case of Sub-Saharan Africa in general and Cameroon in particular, very few studies have focused on the issue; hence the need for more empirical studies, particularly on the labor market.

2. Methodology Study

This part will be devoted to the presentation of the econometric model and the technical estimate (2.1), the presentation of the study data (2.2), as well as the descriptive statistics (2.3).

2.1. Empirical model and technical estimate

Remind that this article aims at analyzing the link between ICTs and access to employment for young people in Cameroon. In light of recent guidelines (Bellon et al., 2010), the measurement of ICTs in this study refers to the use, rather than the adoption of ICTs tools. The use of ICTs in this study refers to the use of Internet services by employed workers. This orientation is mainly dictated by the availability of data, given that "internet" is the only component of ICTs among the items relating to the following question addressed to employed persons: Through what channel did you obtain your job (or undertake this activity)? In particular, we will focus on active young people, that is to say whose age is between 15-35 years (ACTIFJ), in accordance with the definition recommended by the National Institute of Statistics (NIS) and the Cameroonian government. In order to carry out a comparative analysis, our analysis will be extended to all employed persons (ACTIF) whose age is greater than 15 years. ICT is a binary categorical variable which is worth 1 if an employed worker claims to have used the Internet to find his current job and 0 otherwise. Thus, an active person will choose among the job search channels (options) the one that maximizes his utility.

Let us set $y_{ij}$ the maximum utility expected by an asset $i$ when it makes the choice between the two options $j$ (uses of ICTs) and $j'$ (not-use). This utility is decomposed into a deterministic component ($X \beta_j$) and a stochastic component ($\epsilon_{ij}$).
\[
y_{ij} = X_i \beta_j + \epsilon_{ij}
\]

With \( J = j \); \( X \) represents the vector of observable characteristics, \( \beta \) the vector of parameters and \( \epsilon \) the error term. Moreover, this utility is unobservable and it is rather the latent variable \( y_i^* \) which defines the difference between the two observed utilities, namely:

\[
y_i^* = y_{ij} - y_{ij}'
\]

This decision is made by comparing these two utilities (the utility provided by the use of ICTs \( y_{ij} \)) and the utility provided by the inverse option \( y_{ij}' \). Thus, the use of ICTs will be the option chosen by a worker \( i \) if and only if this difference is positive:

\[
y_i = \begin{cases} 1 & \text{si } y_i^* > 0, \text{ if the worker is employed} \\ 0 & \text{si } y_i^* \leq 0, \text{ if not} \end{cases}
\]

Ultimately, we end up with a system of simultaneous equations whose structural form is:

\[
\begin{align*}
y_i^* &= \alpha_0 + x_i \beta_1 + \text{TIC}_i \gamma_1 + \epsilon_i > 0 \\
\text{TIC}_i &= \pi_0 + x_i \beta_2 + x_{2i} \gamma_2 + \mu_i
\end{align*}
\]

Equation (5) is written in its reduced form, \( x_{2i} \) represents the vector of instrumental variables. Furthermore, it is assumed that \( (\epsilon_i, \mu_i) \approx N(0, \Sigma) \), and that the standard deviation is normalized to 1. \( \gamma_2 \) and \( \beta_2 \) are the parameter matrices of the model in its reduced form; and \( \gamma_1 \) et \( \beta_1 \) are the parameters of the structural model.

Usually, the Logit / Probit model is used to separately estimate each of equations (4) and (5). However, estimating one equation without considering the other usually leads to biased results (Lollivier, 2002; Lee, Maddala and Trost, 1980), because the two equations would be related to each other, and the expectation of the error term in equation (5) is not zero. Failure to take this condition into account is, according to Baltagi (2008), the main cause of the problems of estimator inconsistency. In order to solve this problem, we proposed the following methodology, although they have been more limited to linear models\(^8\), unlike non-linear models. In the latter case, a methodology initially proposed by Amemiya (1978) has been widely used and extended to the method of instrumental variables applied to dichotomous models. Thus, we have from (4) and (5) the equation (6) below:

\[
y_i^* = \alpha_0 + z_i \varphi + \epsilon_i
\]

\[
\text{TIC}_i = \pi_0 + d_i \delta + \mu_i
\]

With \( z_i = (\text{TIC}_i, x_i) \), \( \varphi = (\beta_1', \gamma_1') \), \( \delta = (\beta_2', \gamma_2') \), the parameter vector, and \( \epsilon_i \) et \( \mu_i \) the assumed error terms iid. The likelihood function (ML) in the presence of an endogenous regressor is then the following:

\[
ML_i = \ln L_i(\theta) = \ln \left( \int \Phi(\text{m}_i) \left[ (1 - \Phi(\text{m}_i)) \right] \right)
\]

Where \( m_i = \frac{z_i \varphi - \Phi(\gamma_2')}{\sigma} \); \( \Phi(\cdot) \) et \( \Phi(\cdot) \) represent respectively the density function and the standard normal distribution function; \( \sigma \) and \( \rho \) define the standard deviation of \( \mu_i \) and the correlation coefficient between \( \epsilon_i \) et \( \mu_i \).

In order to test the validity of the instrument, we will use the Chi square minimum estimator. More precisely, it is

\(^8\)Among the available approaches, the augmented regression method makes it possible to perform specification tests efficiently and inexpensively. The difficulty in practice consists in finding good instruments.
a test of exogeneity of the instrument which makes it possible to decide on the absence (null hypothesis) of correlation between \( \varepsilon_i \) and \( \mu_i \). If \( \text{prob (Chi} = 0) \leq 0.05 \), then the null hypothesis of exogeneity is rejected. Under the null hypothesis, estimation of (7) by a simple probit is recommended, while under the alternative hypothesis, an instrumental variable probit is efficient. The latter also has the advantage of directly providing the results of the marginal effects. We will carry out, in order to reinforce the quality of our results, the robust version of this test, as well as the sensitivity tests.

2.2. Data Presentation and descriptive statistics

After presenting the data used in this study as well as the variables retained, we will proceed to their descriptive analysis.

2.2.1. Data and description of variables

For this study, we use data from the Fourth Cameroonian Household Survey (ECAM 4) conducted by the National Institute of Statistics (NIS) in 2014. This survey covers a total of 13,000 randomly selected households and provides additional, information on the characteristics of households, their working conditions, and so forth. which makes possible the empirical analysis of the relation between ICTs and access to employment.

In addition, the dependent variable of this study is the access to employment of young working people (ACTIFJ), in other words, it concerns working people aged between 15-35 years who were in employment at the time of the survey. In order to carry out a comparative analysis, the analysis will be extended to all workers over the age of 15 (ACTIF) and to seniors over the age of 35 (ACTIFSEN).

Table 2: Presentation and description of variables.

<table>
<thead>
<tr>
<th>Variables</th>
<th>Definitions</th>
<th>Frequencies</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACTIFJ</td>
<td>1 if the employed worker is between 15-35 years old 0 otherwise</td>
<td>0.3509 (0.477)</td>
<td>16,637</td>
</tr>
<tr>
<td>ACTIF</td>
<td>1 if the occupied worker is more than 15 years old 0 otherwise</td>
<td>0.483 (0.4831)</td>
<td>39,372</td>
</tr>
<tr>
<td>ACTIFSEN</td>
<td>1 if the age of the employed worker is over 35 years old 0 otherwise</td>
<td>0.2185 (0.4132)</td>
<td>10,200</td>
</tr>
<tr>
<td>ICTs</td>
<td>1 if the internet is the channel used by a worker to get a job 0 otherwise</td>
<td>0.00047 (0.021)</td>
<td>19,022</td>
</tr>
<tr>
<td>Area residence</td>
<td>1 if the individual lives in an urban area 0 if he lives in a rural area</td>
<td>0.5000 (0.499)</td>
<td>46,666</td>
</tr>
<tr>
<td>Without diploma</td>
<td>1 if the worker has no diploma 0 otherwise</td>
<td>0.165 (0.371)</td>
<td>46,666</td>
</tr>
<tr>
<td>Primo</td>
<td>1 if the worker has his first job 0 otherwise</td>
<td>0.3934 (0.488)</td>
<td>39,387</td>
</tr>
</tbody>
</table>

It covered the 10 regions of the country plus the metropolises of Yaoundé and Douala, i.e. 12 regions in total.
According to table (2), 35.1% of respondents are young workers (ACTIFJ). All employed workers aged 15 and above (ACTIF) are retained in order to check the robustness of our results, and in this sample, it represents 48.31%. With regard to our main interest variable, namely the use of ICTs (Internet) as a channel for accessing employment, 0.4% of employed workers declare having used it to access their job. In relation to their area of residence (area residence), 53% of employed workers live in urban areas compared to 47% in rural areas. In addition, 11.8% of working people declare that their job corresponds to their training (qualification). Regarding gender, 49% are male against 51% female. In relation to the level of education, 16.5% of working people have no diploma (no diploma) while 12.3%, 23% and 15.2% are respectively graduates of primary education (LV 1), secondary (LV 2) and higher (LV 3). In addition, 40% claim to be first time job seekers (Primo), while 51% and 13% claim that their original households have access to electrical energy (Electric) with at least one member who practices electricity and farming (Agri).

### 2.2.2. Descriptive statistics

**Table 3: Evolution of the rate of activity of people aged 15 and above**

<table>
<thead>
<tr>
<th>Year</th>
<th>Urban (%)</th>
<th>Rural (%)</th>
<th>National (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2005</td>
<td>66</td>
<td>85</td>
<td>77</td>
</tr>
<tr>
<td>2007</td>
<td>71</td>
<td>88.9</td>
<td>81.9</td>
</tr>
<tr>
<td>2010</td>
<td>68</td>
<td>83.5</td>
<td>76.2</td>
</tr>
<tr>
<td>2014</td>
<td>66</td>
<td>76.3</td>
<td>72.1</td>
</tr>
</tbody>
</table>

**Source:** authors, based on data from ECAM3, ECAM4, EES11, EES12.

In a context characterized in particular by the population growth estimated at 2.5% in 2014, the rate of activity of people aged 15 or above, as defined by the ILO, falls to 72.1% in 2014 against 76.2% in 2010 and
81.9% in 2007. The population living in rural areas has higher rates than those residing in urban areas, with respective activity rates of 76.3% and 66%, i.e., a difference of 10%. The employment rate for people aged 15 or above rose from 69.6% in 2014 to 79.5% in 2007 (ECAM 4, 2014).

In 2013 (Table 4), the ILO adopted new indicators which, unlike the controversial unemployment rate, better characterized the situation of the labor market. These are the combined rate of unemployment and time-related underemployment, and the combined rate of unemployment and the potential labor force. Examination of these indicators shows a slight improvement.

**Table 4: Labor underutilization among people aged 15 or older.**

<table>
<thead>
<tr>
<th>Area</th>
<th>Urban (%)</th>
<th>Rural (%)</th>
<th>National (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2005</td>
<td>17.8</td>
<td>9</td>
<td>13.3</td>
</tr>
<tr>
<td>2007</td>
<td>15.2</td>
<td>5.1</td>
<td>10</td>
</tr>
<tr>
<td>2010</td>
<td>19.8</td>
<td>10</td>
<td>18.2</td>
</tr>
<tr>
<td>2014</td>
<td>17.8</td>
<td>9.6</td>
<td>12.1</td>
</tr>
</tbody>
</table>

*Source: the authors, based on data from ECAM3, ECAM4, EESI1, EESI2.*

Indeed, the rate of the composite measure of labor underutilization among people aged 15 or above falls by 2 points from 19.8% in 2010 to 17.8% in 2014, but has deteriorated compared to 2007 when it was 15.2%. The combined unemployment and time-related underemployment rate is 15.7% in 2014 and 17.7% in 2010, the combined unemployment and labor force rate is 5.9% against 6.6% in 2010 (ECAM 4, 2014).

Database survey Ecam 4 (2014) presents the different channels of access to employment for workers in the sample. This survey shows that 14.3% of workers did not use any channel to get their job against 86.29% who choose between the different channels offered by the labor market. Thus, 28.25% of working people have recourse to personal relations or networks (parents, friends). 14.53% went through unsolicited applications against 4.32% who used placement intermediaries (public and private). In addition, 2.26% used ICTs as a channel against 9.84%, 0.09% and 1.81% who got their job respectively through competitions, personal initiative and promotion/appointment.

### 3. Presentation of the results

This section reviews the results from the estimation of the effects of using the Internet as a job search channel on access to employment. In addition to the segment of employed workers aged between 15-35 years (young people), the analysis also includes workers aged over 35 (seniors) and over 15 years (young people and seniors). For each of these groups, the results by the simple probit method and the robust version of the probit with instrumental variables are presented in tables (5) and (6). The analysis of the robustness of the results using sensitivity, specificity and classification tests is also presented below.

Using a simple Probit model (1), the results of the marginal effects presented show that it is the components of the level of education that significantly influence the probability of young people's access to employment.
In particular, holding a primary, secondary and higher education diploma contributes positively employment access by 0.967, 0.922 and 0.708%. On the other hand, it appears that the effect of ICTs on access to employment is negative, but it is statistically insignificant, which corroborates Bessy and Marchal (2006).

Note that this result could be biased, as Hug (2010) points out the poor specification that characterizes the simple probit model. Indeed, and in view of the reasons mentioned above, it is important to verify whether the use of ICTs is not endogenous to access to employment. To do this, the ICT variable is instrumented by access to electrical energy and the type of worker. In Table 5, the results under (2) and (3) are obtained by retaining these last two variables respectively as instruments; and finally, when they are simultaneously retained, we can read under (4) the results. Therefore, it appears that the chi square test allows to accept the null hypothesis of exogeneity
of ICT in model (2), and leads to retaining the results provided under (1); whereas in the two other cases (3) and (4), this hypothesis will be rejected. This result shows that the coefficients resulting from the simple probit estimation are biased, and that we should retain the results under (3) and (4) because this bias has been corrected there. To justify this choice, we referred to Kamdem (2012) who showed that the use of electrical energy is significantly correlated with human capital, but not correlated with access to employment in rural areas in Cameroon. This last result is, according to Bonjowo (2011), the consequence of the perception of ICTs tools as factors that do not fit with the basic needs for the development of Africa.

At the end of these estimates, it appears that the use of ICTs contributes significantly and positively to access to employment for young people. This is also the conclusion reached by Fondeur (2006), and Kuhn and Skuterud (2004) in a French context, then Gurtzgen et al. (2021) in German context. In particular, it turned out that Internet users, active in the labor market and youths have between 17-38% more chances of getting a job, compared to their counterparts who make more use of other channels than that of the Internet. We thus confirm Bagues and Labini (2007) for whom ICTs is an important tool for stimulating the transition of young students from the education system to the labor market. Furthermore, working people without a diploma have between 0.337 and 0.389% more chances of getting a job.

Moreover, when we examine the results of table (6) which focuses on working people aged 15 and over (ACTIF) and over 35 (ACTIFSEN), it appears that ICTs also play a decisive role in the process of integrating workers into the labor market, regardless of their age group. The results obtained by the probit method are not significant, and Wald's exogeneity test confirms that this result is biased, independently of the vector of instrumental variables used.

Table 6: Internet use and access to employment (over 15 years and over 35 years)

<table>
<thead>
<tr>
<th>VARIABLES</th>
<th>ACTIF (1)</th>
<th>ACTIF (2)</th>
<th>ACTIF (5)</th>
<th>ACTIFSEN (4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ICT</td>
<td>0.297</td>
<td>39.52***</td>
<td>17.73***</td>
<td>1.183*</td>
</tr>
<tr>
<td>Area residence</td>
<td>-0.413***</td>
<td>-0.0622***</td>
<td>-0.0833**</td>
<td>-0.0915***</td>
</tr>
<tr>
<td>without diploma</td>
<td>-0.297***</td>
<td>0.00734</td>
<td>0.0467</td>
<td>-0.344***</td>
</tr>
<tr>
<td>LV 1</td>
<td>0.0652</td>
<td>0.0440*</td>
<td>0.111</td>
<td>-0.0215</td>
</tr>
<tr>
<td>LV 2</td>
<td>0.278***</td>
<td>-0.00364</td>
<td>0.0416</td>
<td>0.193***</td>
</tr>
<tr>
<td>LV 3</td>
<td>0.522***</td>
<td>0.0834**</td>
<td>0.174*</td>
<td>0.546***</td>
</tr>
<tr>
<td>Qualifier</td>
<td>0.0110</td>
<td>-0.00618</td>
<td>0.00345</td>
<td>0.00462</td>
</tr>
<tr>
<td>Primo</td>
<td>-0.0899</td>
<td>0.0131</td>
<td>0.00192</td>
<td>-0.139</td>
</tr>
<tr>
<td>Agri</td>
<td>-0.0351</td>
<td>0.159*</td>
<td>0.0418</td>
<td>0.0370</td>
</tr>
</tbody>
</table>

Instrument validity
Thus, in a population made up of employed workers, the marginal contribution of access to employment due to the use of ICTs (internet) is between 18-40%, whereas among senior workers, it is only 1.183.

3.1. Robustness tests

For the analysis of the robust version of our estimates, it is recommended, in order to make a relevant decision, to assess the quality of the results obtained. To do this, the classification\textsuperscript{10} test, the sensitivity/specificity test, the ROC (Receiver Operating Characteristic) goodness-of-fit test for the job access model are presented below, as well as the graphs correspondents.

Graph 2: employed workers aged between 15-35: sensitivity/specificity test

\textbf{Source}: authors, from the STATA 16 software.

\textsuperscript{10}Pearson’s goodness-of-fit test (or Hosmer et al. 2013), which is also generally applied, is however not applicable for the robust version of the ML estimation.
Thus, the results obtained show a correct classification with an overall rate estimated at 63.38% for the model of youth access to employment and a rate which is established at 67.3% for the second model, which takes into account all worker aged 15 and above. These results allow us to conclude that each of these models are very reliable for the validation of the classification of the observations with precision. The curves shown above show a plot of sensitivity/specificity versus cut point probability. Moreover, the frequency of the correctly classified normal weight group (specificity) is quite strong and is roughly equal (69%) for the three categories of assets studied. As for the sensitivity of the model, that is to say the frequency of the correctly classified “low weight” group, it is 58.25; 63.5, and 29.5% for the sample of young people, all workers and employed seniors, respectively. It appears that the sensitivity and specificity are good, but more so in the young active model, because the two graphs intersect fairly close to the vertical axis (ordinate axis).
The ROC charts above are plotted to determine the extent of the area under the ROC curve; which corresponds, in fact, to a measurement of the variation explained by the probit regression model with instrumental...
variables. Thus, in the model of employed young workers, the area under the ROC curve is 68.29%, while the model of employed senior workers has a rate of 67.60% and in the global model, it is 69.12. Thus, the area under the curve indicates that this model has some predictive power. The large proportion of explained variation shows that the model is reliable in explaining the variability of access to employment as a function of ICTs use, and other control variables for analysis in the IV probit regression.

4. Discussion of results and Conclusion

This study aimed to assess the effect of ICTs on employment access for young people in Cameroon. From the data provided by the National Institute of Statistics, which were collected from households during the fourth national survey (ECAM4), we have, after having shown that the estimation by a simple probit tends to provide biased results, used a probit model with instrumental variables, in order to overcome this bias. In this study, ICTs is reduced to the use of the Internet by workers employed at the time of the survey, and who got their job via this channel; and a young person, is an individual aged between 15-35 years. In addition, the results obtained were compared with those of working people over the age of 15 overall, and also of working senior workers (over 35 years old).

Estimates show that the use of ICTs contributes significantly and positively to access to employment, regardless of the age group of the individual. More specifically, it turned out that the use of this job search channel improves between 17-38% the probability for a young person to get a job. Thus, ICTs constitutes a factor of (positive) discrimination of professional mobility on the labor market. Autor (2001), Kuhn and Skuterud (2004) who obtained the same result provide an explanation by indicating that this state of affairs is due to the improvement in the level of access and the reduction in the cost of information. In the same vein, a study carried out in the Cameroonian context by Tamokwe (2013) points out the extent to which the digital divide is a Cameroonian reality, which plays an important role in socio-economic disparities. Moreover, contrary to the negative (Thonsen and Wittich, 2010) or insignificant (Fountain, 2005) effects of ICTs on access to employment, our result is similar to those of Kuhn and Mansour (2004), Fondeur (2006), Mallet (2004) and Gurtzgen (2021).

In addition, this link highlights a certain heterogeneity depending on the age group of individuals, given that the marginal contribution of ICTs varies between 17-38% in young people, 18-40% in the sample of older workers over 15 years old, and 0.39-1.118% among seniors. Thus, the amplitudes of the effects obtained between the first two categories of employed workers are almost identical, which could be associated with the fact that the labor force is essentially young, who also constitute the bulk of Internet users. And as one might expect, seniors find in certain channels a greater efficiency, compared to that of the Internet, to access employment, which would reflect the low contribution, relative to that observed in the entire working population.

Moreover, it cannot be ruled out that the possession of a diploma can serve as an instrument for promoting and selecting young people on the labor market. Indeed, our analyzes show that this factor plays a positive and significant marginal role, with higher and lower contribution rates between primary and higher education graduates, respectively. This indicates in other words that integration into the labor market decreases with the level of qualification. From this result, it turns out that in Cameroon, the most educated workers are more demanding in terms of the quality of employment, compared to their relatively less educated counterpart, which could justify the meaning of this results. This result is also dependent on the structure of the labor market, which is more informal
and of poor quality (lack of social protection, low salary, etc.) and which, according to Njikam (2005), recruits most young workers graduate and not employed. In this perspective, the level of education would play a non-discriminatory role on the employability of workers. This can be understood insofar as, on the one hand, young people with a secondary school diploma in particular, nourish the dream of pursuing studies in higher education, and therefore are more reluctant towards available jobs. And on the other hand, in the light of the conclusions formulated by Camara (2010) who found a negative link between education and employment, it is possible that this link provides educated and unemployed workers with a bad signal on performance of secondary education. Higher education graduates have a lower frequency of access to jobs, because this category of workers is more demanding in terms of working conditions. Overall, the same results are obtained with the single sample of senior working people, but with the difference that the contribution frequencies are lower. Thus, young graduates have a higher chance of getting a job, compared to all employed workers, which corroborates Njikam et al. (2005) and, Thiaw and Cabral (2019) in the West African Economic and Monetary Union (WAEMU) Zone. Indeed, this situation would reflect the strong participation of young people in the labor market, and as the main users of ICTs according to the INS (2014).

With regards to the other factors, place of residence and level of education have significant impacts on access to employment for each of these two categories of workers. Furthermore, regardless of the group considered, the influence of place of residence is significant and positive at the 1% level. Indeed, urban active seniors have less than 0.091 percentage point chance of finding a job, compared to their rural counterparts. This proportion is between 0.0833 and 0.0622 percentage point in the working and employed population as a whole. This result is due to urban employability difficulties, unlike in rural areas where almost all households have agricultural fields, which can be exploited by working people; all things that contribute positively to their employability.

In view of these results, it is essential in Cameroon to place the question of employment in general and youth employment in particular at the heart of the development issue.

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