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**Working Paper**

## Impact of Employment Support Programs on the Quality of Youth Employment: Evidence from Senegal's Internship Program

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# A G D I Working Paper

WP/23/079

## **Impact of Employment Support Programs on the Quality of Youth Employment: Evidence from Senegal's Internship Program**

Forthcoming: Sustainable Development

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## Research Department

**Impact of Employment Support Programs on the Quality of Youth Employment:  
Evidence from Senegal's Internship Program****André D. Tsambou, Malick T. Diallo, Benjamin Fomba Kamga & Simplicé A. Asongu****Abstract**

Youth unemployment is major policy concern in Senegal. The country has in recent years, implemented several programs to combat unemployment and the precariousness of youth employment in the labor market. However, the results of these programs are to date hardly perceptible. The objective of this work is to assess the impact of employment support programs on the quality of youth employment. We provide empirical evidence of the effect of the apprenticeship program implemented by the National State-Employer Convention in facilitating youth access to quality employment. Job quality is determined using an index that captures multiple wage and non-wage dimensions of job quality. Using survey data on the improvement of employment policies from 2746 individuals, we use the endogenous switching regression method and the propensity score matching method to assess and compare the impact of the apprenticeship program on the quality of jobs held by young men and women. The results show that the apprenticeship program has a positive and significant impact on job quality. Indeed, we find that the quality of employment is better for young men and women who benefited from the internship program than for those who did not. We find, however, that there is a difference in job quality between males and females who received the program. The differences in job quality are explained more by differences in job characteristics but are not directly related to gender or age.

*Keywords:* Youth, Labor market, quality of employment, Senegal, Apprenticeship.

*JEL Classification:* J4; E24 ; O55 ; M53

## 1 Introduction

Countries in Africa that were affected by the 1987 economic recession took some measures to reduce public deficit, such as suspension of the recruitment of more staff in the public sector, thus providing space for a hitherto non-existent private sector to start accommodating a significant proportion of new recruitments. The unemployment situation was made worse by unrests (such as civil wars, inter-ethnic wars and socio-political conflicts) that led to a deterioration of the economic fabric.

Added to this is the demographic boom that has seen the African population multiply by 5 between 1960 and 2020 (UNPD, 2019). However, the extent of the break in the pace of job creation has highlighted the weaknesses of a rent-based economic model, leading to soaring unemployment and underemployment of young graduates. The labor market in Sub-Saharan Africa is characterized by precariousness in employment, with 72% of vulnerable jobs and between 34% and 72% of jobs in the informal sector (AFDB, 2018). Moreover, whereas the rate of youth unemployment is estimated to be over 12%, a good portion (38.1%) of working youths live in poverty (ILO, 2018). This number of workers living in poverty (about 250 million) is anticipated to rise by an average of four million annually given the population growth rate (AFDB, 2019).

In order to tackle the concern of unemployment among the youth, many African countries, including Senegal, have implemented active labor market programs aimed at linking youths to wage and self-employment. In this context, policies on youth employment into public corporations and the civil service have shifted to active employment measures that tackle unemployment within an economy by addressing the causes of unemployment. Moreover, policies on passive employment that tackle unemployment in a society by addressing the living conditions of those unemployed are also worthwhile. This change, which includes new components such as vocational training, intermediation and support for entrepreneurship, has led to the creation of public employment support services, the objective of which is to fight against socio-economic exclusion through the labor market. In the 2000s, several initiatives were implemented in Senegal with the purpose of addressing the issues pertaining to youth unemployability and unemployment. These include: “Agence pour l'Emploi des Jeunes des Banlieues (AJEB)”, “Agence Nationale de l'Emploi des Jeunes (ANEJ)”, “Fonds National de Promotion des Jeunes (FNPJ)” and “Agence Nationale d'Appui aux Marchands Ambulants (ANAMA)”. The underlying initiatives are crucial because they were, proved not to be

effective, engendering the coordination of youth employment actions under a single umbrella known as the National Agency for the Promotion of Youth Employment (ANPEJ). Since it was created in 2014, stakeholder proliferation has been apparent with multiple programs that directly and indirectly act on employment policy such as the National Agency and the Supervision of Small and Medium-sized Enterprises (ADEPME), the Community Agricultural Domains Program (PRODAC), the Rapid Entrepreneurship Delegation (DER), the Agency for the Promotion and Development of Handicrafts (APDA), the School-Enterprise Training Program, and the National State-Employer Convention (CNEE).

In spite of the plethora interventions, it is worthwhile to note that unemployment and job insecurity among young people are still a major concern (ILO, 2018; PAP, 2019-23). The employment rate is higher among adults in the 35-44 age group, for whom it is estimated at 66.2% in 2018, compared to 21.2% among youths aged 15-24 and 50.6% among youths aged 25-34. Young people in the 15-34 age groups, who make up an average of nearly 58.6% of the working age population, represent, on average, only 45.1% and 44.2% of those employed in 2017 and 2018, respectively. This shows that the unemployed workforce is predominantly made up of young people. The unemployment rate is also higher among youths aged 15 to 24 (20.8% in 2017 and 20.4 in 2018) and youths aged 25 to 34 (18.9% in 2017 and 18.4 in 2018) compared to adults aged 35 to 44 (13.2% in 2017 and 13% in 2018). In addition, more than six out of ten unemployed workers (63.7% in 2017 and 62.6% in 2018) are youths, indicating that the unemployed workforce is predominantly young. Analysis of job quality reveals that young people aged 15-34 years accounted for 76.1 and 67.9% of caregivers in 2017 and 2018 respectively (ANSD, 2020). In addition to working in vulnerable jobs, more than half of youths are in the informal sector. Indeed, 3 out of 4 youths operate in the informal economy characterized by high job insecurity in both remuneration and working conditions (MEPC, 2022). Each year, about 300,000 youths move into the labor market in Senegal, but only 30,000 formal jobs are created, leaving a large number of youths either unemployed or underemployed (World Bank, 2018). Senegalese youths seeking employment often face many challenges, including a lack of job skills and experience necessary to obtain formal employment (CFYE, 2021). When recruiting, companies typically require applicants to have a minimum amount of work experience, which is often to the disadvantage of youths.

In this context, the government of Senegal has put in place the “Convention Nationale Etat-Employeur (CNEE)” to help young people who have difficulties in finding a job due to a lack of training or work experience. The CNEE was signed in 1987, renegotiated in 2000, and

renewed in 2009 and 2015. It is an initiative that promotes the development of professional and technical skills of young people for sustainable integration. Within the CNEE is the internship program. The main objective of the internship programs is to ensure the integration of young job seekers after a period of internship or practical training in a company. These programs constitute an effective public-private partnership framework to ensure regular and active youths employment promotion by sharing the costs between the State and private sector companies. This partnership aims to generate more and better employment opportunities through internships that provide skills development and work experience.

The young beneficiaries of the apprenticeship program receive a monthly allowance paid in full by the company where the training takes place. The company then prepares a training report of the trainees as well as the totality of the allowances paid to them and the Senegalese government reimburses 50% of the allowances paid. This human resource development program aims to facilitate access to qualified manpower for companies in the short, medium and long term, and at a lower cost. This program operates on both the supply and demand sides of the employment market. On the one hand, it aims to improve the employability of young people through vocational training and the acquisition of initial work experience that increases their productivity and facilitates their integration into the labor market. On the other hand, they increase the demand for labor by companies through employment subsidies. This type of program helps maintain the labor supply in a country and prevents some young people from becoming long-term unemployed or suffering a loss of human capital (McKenzie, 2017). The subsidy for this employment support program reduces hiring costs for firms and contributes to an increase in quality employment through the experience gained via hands-on learning (Kane et al., 2020b).

The objective of this work is to assess the impact of the internship program on the quality of jobs obtained by young beneficiaries of the program. We provide empirical evidence on the impact of the apprenticeship program implemented by the national state-employer agreement on job quality and gender disparities in Senegal. We use survey data from 2746 individuals conducted by the “Centre de Recherche et de Formation pour le Développement Economique et Social (CREFDES)” with financial and technical support from the International Development Research Centre (IDRC). We assess and compare the quality of employment of individuals after their passage or not to the internship program of learning in business. We then compare the quality of employment between men and women. Job quality is assessed through a synthetic index that captures multiple non-wage and wage dimensions of job quality. To examine job

quality, the endogenous switching regression (ESR) method is employed to account for problems of selection bias on the one hand, and observed and unobserved endogeneity on the other hand. The propensity score matching (PSM) method compares differences in outcomes between the group of individuals receiving and not receiving the program, and the Oaxaca-blinder decomposition method elicits the gender variations in job quality.

This study contributes to the extant literature on a multiple of fronts. First, empirical studies on the evaluation of employment policies in developing countries are limited, and in particular, data on program monitoring and evaluation are scarce. While evidence is emerging for the socio-professional integration of youth, the quality of their employment in the labor market is often neglected by policymakers who are much more concerned with integration policies. Although a large body of existing work assesses the impact of employment policies on youths' employability (Ayenew et al., 2017; Meemken et al., 2019; Kane et al., 2020b; Fabry et al., 2022), the literature on the impact of employment support programs on job quality is still very sparse. This work provides new empirical evidence to address this gap. Second, most studies focus on the monetary and non-monetary values of job quality. Our approach consists in the construction of a synthetic indicator that enables a better comprehensive evaluation of the quality of jobs.

The rest of the study is organized as follows: Section two presents the methodology. Section three presents the results and discussions. Section four presents the robustness of the results and the last section concludes.

## **2 Literature review**

### **2.1 Theoretical basis between employment support programs and beneficiaries' employability**

Human capital is a set of productive capacities that an individual acquires throughout his or her life through the accumulation of general and specific knowledge and know-how (Becker, 1962). This shows that each individual seeking employment has his or her own capital, whether innate or acquired through various forms of training, which has accumulated over time through investment in human capital. By investing in human capital, an individual can agree to slow down his entry into the labor market if he believes that his future income will be more substantial. This investment, which leads to the accumulation of human capital, has interesting economic implications in terms of increased productive potential, labor productivity, returns

over the remainder of working life, and business profitability. Becker (2009) shows that investment in the education, training, and skills of young people is essential to improving their employability and job quality. As the integration of young people into quality employment is a major challenge for governments, a multitude of public authority interventions have been implemented, the role of which is to offer employment support programs to assist young people in their search for work.

Although numerous theories have developed following the theory of human capital (Becker, 1962), such as the theory of job search (Stigler, 1962) and the company-unemployed matching model (Mortensen and Pissarides, 1994; Mortensen and Pissarides, 1999), these agree on the idea that human capital appears to be a determining factor in integration into the labor market. Although they have developed optimal job-seeking strategies, the issue of employment-oriented training remains linked to the match between training and employment, wages, or income. Employment support programs therefore aim to strengthen the human capital of young people by offering them opportunities for vocational training, apprenticeships, and skill development. By focusing on the relationship between labor supply and demand, these programs seek to reduce imbalances in the labor market by improving the match between young people's skills and employers' needs (Stiglitz, 2000; Cahuc and Zylberberg, 2004). Some of these programs focus on promoting youth entrepreneurship by offering financial support, entrepreneurship training, and advice to young people. Shane and Venkataraman (2000) and Acs et al. (2013), respectively, show in this sense that business creation can be a viable route to youth employment. Building on the development of individuals' capacities to realize their aspirations and participate fully in society, some programs can incorporate this approach by offering holistic support that takes into account young people's specific needs in education, health, housing, and other aspects related to their well-being (Deneulin and Shahani, 2009). Building on this theoretical foundation, a large body of empirical work has been developed to demonstrate the link between employment policies and the employability of beneficiaries.

## **2.2 Employment support programs and employability**

To provide practical responses to the problem of youth employment, many countries have set up public employment services to implement active employment policies effectively. While few studies have assessed the effect of these programs on young people, the few existing impact studies are not unanimous on the effectiveness of these programs (Card et al., 2010). Some studies show that participation in an employment support program does not always enable



young people to get a job or reduce their duration of unemployment (Cockx and Dejemeppe, 2002; Kluve et al., 2019). On the other hand, others show a positive effect of employment assistance programs on the employability and income of beneficiaries (Betcherman et al., 2007; Ehlert et al., 2012; Ibarra et al., 2014; Groh et al., 2016; Card et al., 2018, Perkins et al., 2023). The existing literature on the evaluation of these employment programs presents diverging conclusions regarding the effectiveness of public employment programs.

Some show that employment support programs have a positive impact on the employability and wages of beneficiaries (Betcherman et al., 2007; Ehlert et al., 2012; Ibarra et al., 2014; Groh et al., 2016; Card et al., 2018, Billett et al., 2022). McKenzie (2017) shows that employment support programs through vocational training increase the skills and qualifications of jobseekers and enable them to move quickly out of unemployment. These programs increase the chances of finding a job (Bollens and Nicaise, 1994), reduce the duration of unemployment spells (Cockx, 2000), increase women's chances of finding a formal job (Maitra and Mani, 2017; Attanasio et al., 2017; Donald et al., 2024), increase the frequency of hiring (Eberwein et al., 1997; Chakravarty et al., 2019; Bolton-King, 2022), increase the chances of accessing regular and stable employment (Kane et al., 2020a; Matsumoto, 2022), and improve the employability and increase the income of jobseekers (Card et al., 2018; Kluve et al., 2019, Quinlan and Renninger, 2022). Although these studies show positive effects of employment support programs on labor market indicators, others, on the contrary, show a significantly negative effect of these programs (Cockx and Dejemeppe, 2002; Hujer et al., 2006; McKenzie, 2017; Neroorkar, 2022).

While a large body of empirical literature exists on the analysis of employment support programs, conclusions remain divergent regarding the effectiveness of these programs (Chakravarty et al., 2019; Matsumoto, 2022), with little focus on job quality (Crépon and Van Den Berg, 2016; Premand et al., 2016). Although studies on decent employment and rural workers can be observed in Tanzania (Ayenew et al., 2017), Côte d'Ivoire (Meemken et al., 2019), and Senegal (Kane et al., 2020b; Fabry et al., 2022), examining the effect of employment support programs on job quality may provide new empirical evidence. Job quality is a multidimensional concept that takes into account the level of income and social protection of the activity as well as the quality of the working environment. Improving job quality is an international and national concern. For example, striving to achieve full and productive employment and decent work for all in the Sustainable Development Goals (SDG 8), focusing on job quality in the ILO's Decent Work Agenda (ILO, 2018), and adopting employment

support policies through apprenticeship schemes in Senegal (Kane et al., 2020b). While young people often face difficult working conditions and high levels of underemployment (Fabry et al., 2022; Van Hoyweghen et al., 2021), it is not known whether active employment policies, in this case the apprenticeship scheme, enable young people to access better-quality jobs (Kane et al., 2020b). Moreover, very few studies have examined the specific cases of African countries in general and Senegal in particular (Kane et al., 2020a). Access to productive and decent jobs is particularly difficult for young people in Senegal (Estruch et al., 2019). Between 2015 and 2018, 195 companies were enrolled under the CNEE, and 11,725 young job seekers were placed in internships (RAC, 2019). However, little information is available on the quality of jobs created for young people.

### **3 Methodology**

#### **3.1 Data Source**

This work uses primary data from the Survey on the Improvement of Employment Policies (EAPE) that was conducted in 2018 among 2,746 individuals in Senegal by the “Research and Training Centre for Economic and Social Development” with financial and technical support from the International Development Research Centre (IDRC). The main purpose of this survey was to assess the effectiveness of the programs implemented by the services of public employment within the remit of the National State-Employer Agreement (CNEE) in order to improve the youth’s integration into the labor market. The underlying reason it worthwhile to analyze the job creation channels, as well as the perception of the targets in view of policies related to public employment support. The underlying survey provides insights into demographic features, gender, socio-professional category, job seeker contacts, and income of individuals after and before participation in the various PES programs between 2012 and 2015. Accordingly, the strategy of the study was to go to the NECC and gather information via the information sheets on all applicants. The corresponding information that is disclosed provided a sampling frame to identify some of the individuals that applied for the CNEE service.

With this sampling frame, two individuals’ groups were created: the first group consisted of individuals who had achieved some form of reward from at least one CNEE program while the second group of individuals entailed non-recipients who had either not applied for CNEE services or did but were not successful. Individuals in the underlying two groups were selected randomly and contacted by telephone for potential face-to-face interviews. A new random telephone number was contacted when the initial telephone number was unable to be reached.

Moreover, when the initially contacted person was unavailable for the appointment, a new person was randomly drawn and reached-out to. The information gathered for these categories of individuals is linked to changes in their socio-demographic characteristics, their work history, information about the program they received, and the status of their activity before and after their transition to a program.

2,746 individuals were surveyed at the end of the survey, of which 41.26% were women while 58.74% were men. Although the collected information is likely to vary between surveyed period and the date of registration with the CNEE, 33.07% of the individuals surveyed were not registered with the CNEE, 66.94% registered with the CNEE, 41.19% had benefited from at least one of their programs and 55.81% had not benefited from any program. Of the beneficiaries, 86.2% attended the work experience program. Our work focuses only on the beneficiaries of the apprenticeship program, which aims to provide young apprentices with methodical and practical vocational training in companies. While this program is a work-based program, employers were not asked whether the jobs they obtained after the practical training were more productive for their companies. The study focuses primarily on the group of young people with a high need for training and integration into the labor market (ages 15 to 35). This group is consistent with the definition of youth adopted by the African Union's 2006 African Youth Charter in The Gambia. A comparative analysis of the situation of males versus females is conducted to highlight any differences in outcomes between the two groups of youth, as a way to see if females are more disadvantaged than males in terms of access to quality employment.

### **3.2 Measuring Job Quality**

Much of the work on decent work draws on a fairly substantial body of empirical work on job quality (Fabry et al., 2022). These authors propose measures of job quality by highlighting the multidimensional nature of the concept of job quality and its multiple definitions. Leschke et al. (2012) use an overall job quality indicator and sub-indicators based on 17 indicators divided into 6 dimensions. These authors assume identical subjective weighting for the dimensions grouping the indicators. Although these authors' model incorporates a large number of indicators, it is sensitive to the weights associated with the indicators. Green and Mostafa (2012) use in their study of job quality in Europe, an intrinsic indicator of job quality based on four dimensions comprising of 17 indicators. The authors calculate a sub-index for each dimension from the sum of the scores of the indicators concerned and then calculate the overall

index by averaging the given sub-indices without any weighting of these sub-indices. Noting the limitations of the synthetic index of job quality not using weights, some authors opt for the method of analyzing relative weights for each indicator using regressions (Holman and McClalland, 2011). While others, due to the presence of outliers, use the normalization and standardization method to construct a synthetic index of job quality without weighting along three broad dimensions and numerous indicators (Tangian, 2007). Of this existing literature, the authors are not unanimous about using any single method. The method used in each study depends on the data available (Grande et al., 2020). Regardless of the method used, the resulting job quality score is collapsed to a scale of 0-100 to facilitate analyses (Muñoz de Bustillo et al., 2011; Green and Mostafa, 2012; Amossé and Kalugina, 2012).

To analyze the job quality of youths after their passage through the CNEE employment support program, we constructed a synthetic index of job quality (SIQE) following the guidelines imposed by Leschke et al. (2012) and Fadry et al. (2022), but with some adaptations imposed by the data used. The available data give us the opportunity to take a look at aspects of the Senegalese labor market by constructing a synthetic indicator of job quality in order to assess the effectiveness of employment support programs in terms of access to quality employment. Since job quality is a multidimensional concept, we construct an indicator of job quality using the six (6) dimensions reported in Table A1 in the Appendix. (i) Compensation or monthly salary, which is based on cash payment, frequency of payment, and number of hours worked. Most workers in Senegal receive a fixed salary in cash that is paid at a variable frequency depending on the activity and type of contract. (ii) Working time and work-life balance, which indicates whether the individual is employed more or less than 40 hours per week, at hours set by the employer, or according to economic conditions. (iii) Working conditions and job security, which indicates social protection, social contributions, paid leave (sick leave, annual leave, maternity leave), promotion in employment, health insurance and bonuses. (iv) Representation of the collective interest and social dialogue, which indicates membership in a trade union and in an employers' or workers' association. (v) Competence and career development, which indicates whether employees are undergoing professional capacity building or retraining in the job, and whether the job corresponds to the training taken. (vi) Job stability, which indicates the type of contract (written, oral, or no contract), the status of the job (regular, occasional). These selected job quality dimensions are similar to other proposals such as job quality indicators proposed by Leschke et al. (2012) and Green et al. (2013) or by Green and Mostafa (2012). Like these authors, we assume identical subjective weights for these

dimensions. Each dimension contributes to the measure of job quality, but if we consider these dimensions individually, we cannot obtain a sufficient measure of the phenomenon.

While some studies argue that the indicator masks the diversity found in the measurement of job quality, these dimensions are interrelated (or even correlated), hence the relevance of combining them to create an indicator that adds up the different situations of workers (Amossé and Kalugina, 2012). Looking at these dimensions individually, it is difficult to grasp the overall trends that emerge in the Senegalese labor market. This summary indicator of job quality covers the monetary and wage dimensions of employment as well as the non-monetary and non-wage dimensions that can substantially constitute to overall job benefits. Each dimension entails a multitude of indicators that are selected on the basis of the literature and available data. Since the selected dimensions for the calculation of this indicator are measured at different scales, we construct sub-indices for each dimension and aggregate them into an overall composite index as shown in Leschke et al. (2012) and Fabry et al., (2022).

Given that the indicators are measured at various scales in terms of sub-indices, in order to normalize the indicators, the study adopted the following equation from UNDP (2014) that is relevant in calculating human development indices and the multidimensional poverty index (Alkire and Foster, 2011). We used the following formula:

$$IndexA_i = \frac{A_i - A_{\min}}{A_{\max} - A_{\min}} [1]$$

where  $A_i$  denotes the actual value of an indicator apparent in a dimension and  $A_{\max}$  and  $A_{\min}$  respectively represent the maximum and minimum values of a specific indicator in the data set. Upon normalization, the corresponding indices are between 0 and 1 to respectively denote a low and high score. The degree by which the indicators in a dimension reflect a unified concept is shown by the "Cronbach's alpha" statistic. Indicators for which an inclusion would substantially reduce the alpha, or which poorly correlate with the index formed by the remaining indicators were not included. Upon standardizing each of the indicators, the value of corresponding dimensions with more than one indicator was computed by averaging the values of the indicators with the help of the following equation:

$$SIQ_i = \frac{\sum_{i=1}^n IndexA_i}{n} [2]$$

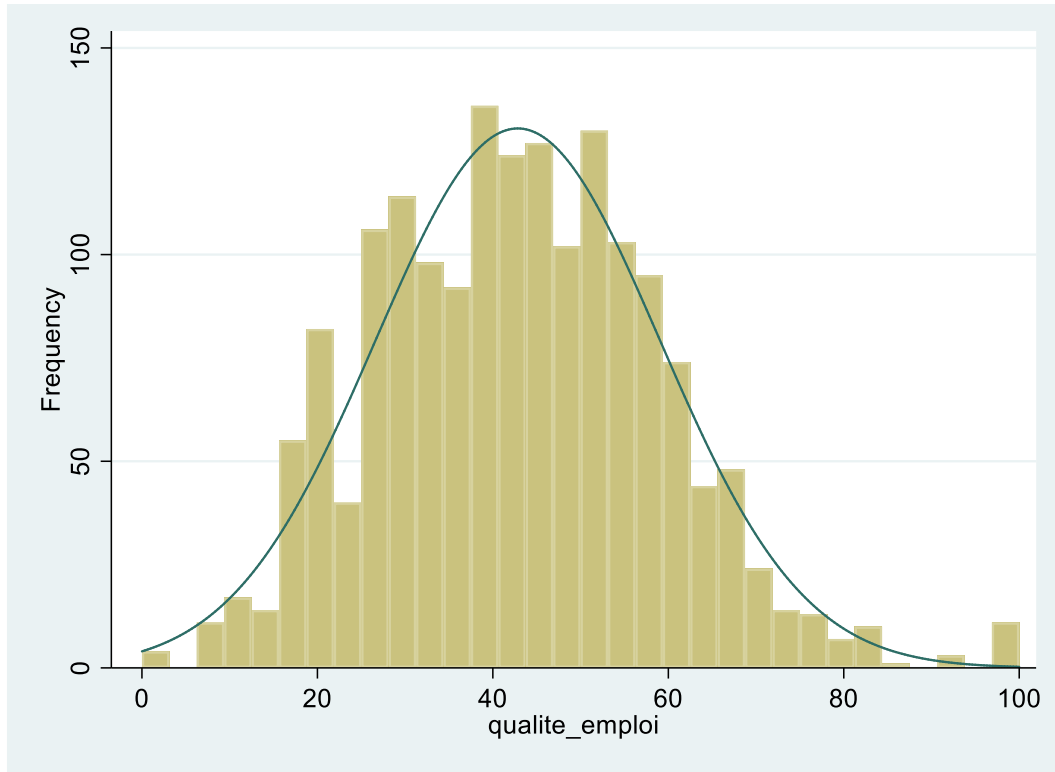
Where  $SIQ_i$  is a sub-index calculated for each of the six dimensions from the sum of the scores of the indicators concerned.  $IndexA_i$  is the indicator(s) that constitute each dimension and constitute the number of indicators within each dimension. After computing the sub-indices for the 6 main dimensions, the synthetic index of job quality is derived by averaging the values of the index for the 6 dimensions with the help of the following equation:

$$ISQE_i = \frac{\sum_{i=1}^{n=7} SIQ_i}{N} [3]$$

Where  $ISQE_i$  is the synthetic job quality index of youth  $i$  and  $SIQ_i$  is the sub-index of each of the six dimensions and  $N$  is the total number of dimensions that constitute the job quality index ( $N=6$ ). Next, the summary index of job quality is normalized to a scale of 0 to 100 to facilitate interpretation of the results. The resulting index is the average of the sub-indicators since no weighting of the sub-indices is used (Green and Mostafa, 2012; Leschke et al., 2012). A score around 0 shows a low-quality job, whereas around 1 reflects high job quality.

This synthetic index of job quality constructed from individual data (data on the features of individual jobs/workers) has a different interpretation from the job quality indices constructed by Grande et al. (2020) from firm-level data. In this case, the analysis reflects individual employees and each individual index should be interpreted as a proxy for the average quality of a given job or employee (Muñoz de Bustillo et al., 2011; Fabry et al., 2022). Figure 1 below shows the distribution of the synthetic index of job quality. This figure shows a concentration of youths in high quality jobs in a range of about 25 to 55 on the 100-point scale. Moreover, at both ends, there is a long string of low-quality jobs.

Figure 1: Distribution of the Job Quality Index



Source: authors' illustration from 2018 APEAF survey data

### 3.3 Econometric Model Specification (ESR and PSM)

To assess the effectiveness of employment support programs in terms of labor market insertion, the literature presents several analytical techniques such as experimental and quasi-experimental methods (Darnall et al., 2008), the combination of matching techniques, and the simple regression method (Jiang et al., 2016, Lundgren and Zhou, 2017). Despite the fact that these methods provide conclusive results, they do not account for the unobserved effects. For this work, we use the endogenous switching regression model, that takes into account both observed and unobserved factors, allowing us to address self-selection and endogeneity of participation in an employment support program. Next, we use the propensity score matching method to assess the robustness of the significance of the results. First, we use a decision model for participation in the apprenticeship program to examine the main factors that promote or limit youth access to the program. Individuals who are aware of the impact of this type of program on labor market integration decide whether or not to participate in the program. This participation ( $A$ ) is an apparent manifestation of the unobservable latent variable ( $A_i^*$ ) of individual  $i$ .

$$A_i = \begin{cases} 1 & \text{if } A_i^* > 0 \\ 0 & \text{if not} \end{cases} \text{ with } A_i^* = Z_i\alpha + \varepsilon_i \quad , \quad [4]$$

where  $Z_i = (1, z_{i1}, z_{i2}, z_{i3}, \dots, z_{ik})$  denotes a vector of explanatory variables,  $\alpha$  shows a vector of parameters that are to be estimated,  $\varepsilon_i$  reflects realization of random events distributed with respect to a normal distribution.  $A_i$  is a variable showing the situation of individual  $i$ , which is equal to unity if individual  $i$  participated in the internship program ( $A_i = 1$  or  $A_i^* > 0$ ) and 0 otherwise. Participation in this program is linearly dependent on the vector of explanatory variables ( $Z$ ) such as the individual's socio-demographic characteristics, parents' characteristics, characteristics of the socio-economic environment and the residual ( $\varepsilon_i$ ).

Second, we examine the effectiveness of the apprenticeship program through the quality of employment of the youth recipients. After exploring several functional forms, the most robust would be a specification with a simpler approach to examining the effectiveness of the program by including in the job quality equation (5), a dummy variable ( $A_i$ ) equal to 1 if the individual participated in the program, and then apply ordinary least squares (OLS). However, this approach may result in less biased estimates given that it assumes that participation in the apprenticeship program is exogenously determined when it is potentially endogenous. This points to self-selection in program participation that is an endogeneity source, usually at the individual level. An accurate way to explicitly account for this endogeneity is to use endogenous switching regression (ESR), which specifically accounts for any possible selection bias and endogeneity in the sample (Freeman et al., 1998; Maddala, 1983).

In fact, the decision to participate or not in the program is voluntary and may be based on individual self-selection by individuals. Individuals who participated in the program may have systematically distinct features than individuals who did not participate. In addition, individuals may have decided to participate in the program based on expected job quality or labor market prospects. Unobservable characteristics of individuals may influence both the decision to participate in the program and the labor market indicators. Thus, accounting for the endogeneity of the decision to participate in the program, we estimate a simultaneous equation model of the decision to participate in the internship and apprenticeship program and the job quality indicator with endogenous maximum likelihood switching to full information. Unlike studies that use the values generated automatically by the nonlinearity of the selection model to account for endogeneity, the study relies on exclusion restrictions to identify the parameters of the internship-apprenticeship program participation equation from those of the job quality equation (Maddala, 1983). This restriction is necessary when there are certain variables that directly



influence the selection variable (program participation), but not the outcome variable proxied by the job quality indicator.

We will use the instrumental variables method, with the likely variables being the parents' level of education and the proportion of participants by region. These variables should affect participation in the apprenticeship program but only affect job quality through the apprenticeship. Qualitative research shows that high parental education is strongly correlated with children's education and training (Kuepie, 2016; Toutouom et al, 2018). In fact, parents are their child's primary caregivers. They impart the education necessary for the child's physical and intellectual development. Since the child learns a lot through imitation, the parent is the first source of inspiration. Thus, the parents' high level of education encourages their children's tenacity and skills to navigate the paths to success. We therefore used parental education as an exclusionary restriction in our analysis, believing that the impact of this variable would affect job quality through participation in the work-based learning experience. The choice of this variable as an instrument is widely used in the literature (Kuepie, 2016; Toutouom et al, 2018). Presuming that this instrument is weak, we use a second instrument, which is the proportion of training participants per region in the vocational training participation decision of young people in that region. This variable is similar to those used by Aakvik et al. (2000) and Lokshin and Sajaia (2011). One of the motivations for choosing these variables is that the number of participants in an employment support training program in a region may influence the decision of young people in that region to participate in a training program, but not access to employment or job quality in the labor market. With the development of information and communication technologies, people from backgrounds with well-connected social networks can benefit from better training opportunities to acquire more education (Riddell and Song, 2011). The eligibility of this instrument was done after a falsification test (Di Falco et al., 2011).

To account for selection bias, we adopt an endogenously switched regression model of job quality in which individuals face two regimes: [1] beneficiary of the work-based learning internship program and [2] non-recipient. The regression model is defined as Di Falco et al. (2011).

$$\begin{cases} \text{Regime 1 : Training Beneficiary} & Y_{1i} = X_{1i}\beta_1 + \theta Z_{1i} + \mu_{1i} \text{ if } A_i = 1 & (a) \\ \text{Regime 2 : Not training beneficiary} & Y_{2i} = X_{2i}\beta_2 + \theta Z_{2i} + \mu_{2i} \text{ if } A_i = 0 & (b) \end{cases} \quad [5]$$

Where  $A$  denotes the probability of taking part in the apprenticeship program,  $Y_i$  represents the job quality in regimes 1 and 2,  $X_i$  shows the vector of explanatory variables.  $\beta_1$  and  $\beta_2$  denote the vectors of the parameters that are to be estimated,  $\mu_{1i}$  and  $\mu_{2i}$  are the error terms.  $Z_{1i}$  and  $Z_{2i}$  are instrument vectors that in terms of definition bear no direct effect on job quality except via program participation. It is assumed that the error terms follow a normal distribution, with a mean of zero and a non-singular covariance matrix ( $\Sigma$ ). In other words, the error terms  $\varepsilon_i$ ,  $\mu_{1i}$  and  $\mu_{2i}$  in the selection [4] and outcome [5] equations are assumed to have a trivariate normal distribution  $((\varepsilon, \mu_1, \mu_2): N(0, \Sigma))$ .

$$\text{With } \Sigma = \begin{pmatrix} \sigma_{\varepsilon}^2 & \sigma_{\varepsilon\mu_1} & \sigma_{\varepsilon\mu_2} \\ \sigma_{\mu_1\varepsilon} & \sigma_{\mu_1}^2 & \cdot \\ \sigma_{\mu_2\varepsilon} & \cdot & \sigma_{\mu_2}^2 \end{pmatrix} \quad [6]$$

where  $\sigma_{\varepsilon}^2$  denotes the variance of the error in the selection of equation [4], which can be assumed to be equal to 1 given that the coefficients can only be estimated up to a scale factor (Maddala, 1983),  $\sigma_{\mu_1}^2, \sigma_{\mu_2}^2$  are the variances corresponding to the error terms in the outcome functions [5a] and [5b],  $\sigma_{\mu_1\varepsilon}$  and  $\sigma_{\mu_2\varepsilon}$  denote the covariance of  $\varepsilon_i$ ,  $\mu_{1i}$  and  $\mu_{2i}$ . Since  $Y_{1i}$  and  $Y_{2i}$  are not observed simultaneously, the covariance between  $\mu_{1i}$  and  $\mu_{2i}$  is not defined. In the light of the error term of the selection equation [4], a relevant implication of the error structure is that  $\varepsilon_i$  is correlated with the error terms of the outcome functions [5a] and [5b] ( $\mu_{1i}$  and  $\mu_{2i}$ ). The expected values of  $\mu_{1i}$  and  $\mu_{2i}$  conditional on sample selection are zero:

$$\begin{cases} E[\mu_{1i} | A_i = 1] = \sigma_{\mu_1\varepsilon} \frac{\phi(Z_i\alpha)}{\Phi(Z_i\alpha)} = \sigma_{\mu_1\varepsilon} \lambda_{1i} \\ E[\mu_{2i} | A_i = 0] = \sigma_{\mu_2\varepsilon} \frac{\phi(Z_i\alpha)}{1 - \Phi(Z_i\alpha)} = \sigma_{\mu_2\varepsilon} \lambda_{2i} \end{cases} \quad [7]$$

Where  $\lambda_{1i} = \frac{\phi(Z_i\alpha)}{\Phi(Z_i\alpha)}$ ,  $\lambda_{2i} = \frac{\phi(Z_i\alpha)}{1 - \Phi(Z_i\alpha)}$ ,  $\phi(\cdot)$  is the standard normal probability density function,  $\Phi(\cdot)$  the normal cumulative density function. If the estimated covariances

$\hat{\sigma}_{\mu_1\epsilon}$  and  $\hat{\sigma}_{\mu_2\epsilon}$  are statistically significant, then job quality and program participation are correlated. Thus, we have:

$$\ln L_i = \sum_{i=1}^N A_i \left[ \ln \Phi \left( \frac{\mu_{1i}}{\sigma_{\mu_1}} \right) - \ln \sigma_{\mu_1} + \ln \Phi(\theta_{1i}) \right] + (1 - A_i) \left[ \ln \Phi \left( \frac{\mu_{2i}}{\sigma_{\mu_2}} \right) - \ln \sigma_{\mu_2} + \ln(1 - \Phi(\theta_{2i})) \right] \quad [8]$$

Where  $\theta_{ji} = \frac{(Z_i \alpha + \rho_j \mu_{ji} / \sigma_j)}{\sqrt{1 - \rho_j^2}}$   $j=1,2$  with  $\rho_j$  is the correlation coefficient between the error

term  $\epsilon_i$  in selection equation [4] and the error terms  $\mu_{ji}$  in equations [5a] and [5b] respectively. This model allows, from the post estimation analyses, to compare the expected situation of individuals who benefited from the internship and apprenticeship program (a) versus individuals who did not benefit (b).

In addition, we can assess the expected impact of the internship and apprenticeship program in the hypothetical counterfactual (c) for individuals who benefited from the program in case they did not receive it, as well as for individuals who did not benefit (d) in case they did. These conditional expectations of the impact of the apprenticeships in the four cases are defined as follows:

$$\begin{cases} E(Y_{1i} / A_i = 1) = X_{1i} \beta_1 + \sigma_{\mu_1\epsilon} \lambda_{1i}, & (a) \\ E(Y_{2i} / A_i = 0) = X_{2i} \beta_2 + \sigma_{\mu_2\epsilon} \lambda_{2i}, & (b) \\ E(Y_{2i} / A_i = 1) = X_{1i} \beta_2 + \sigma_{\mu_2\epsilon} \lambda_{1i}, & (c) \\ E(Y_{1i} / A_i = 0) = X_{2i} \beta_1 + \sigma_{\mu_1\epsilon} \lambda_{2i}, & (d) \end{cases} \quad [9]$$

Cases (a) and (b) in equation (9) represent the expected actual outcomes for individuals who participated in the observed work-based learning program in the sample. Cases (c) and (d) represent the expected outcomes of the counterfactuals (individuals who did not benefit from the program). Furthermore, following Heckman et al. (2001) as shown in Di Falco et al. (2011), we calculate the treatment effect (the impact) of the apprenticeship program on the treated (ATT) as the difference between (a) and (c). Thus, we have :

$$ATT = E(Y_{1i} | A_i = 1) - E(Y_{2i} | A_i = 1) = X_{1i} (\beta_1 - \beta_2) + (\sigma_{\mu_1\epsilon} - \sigma_{\mu_2\epsilon}) \lambda_{2i} \quad [10]$$

Similarly, it is necessary to calculate the treatment effect (ATU) on individuals who did not receive the program as the difference (d) and (b).

$$ATU = E(Y_{1i} | A_i = 0) - E(Y_{2i} | A_i = 0) = X_{1i} (\beta_1 - \beta_2) + (\sigma_{\mu_1\epsilon} - \sigma_{\mu_2\epsilon}) \lambda_{2i} \quad [11]$$

Consistent with the extant literature, the estimation of the underlying ESR model is implemented by means of a single step with the help of the maximum likelihood method (Freeman et al., 1998). Upon estimation, the average treatment impact can be computed as the variation between the anticipated outcome of individuals who received the program and the anticipated outcome of individuals who did not (Di Falco et al., 2011).

Given the sensitivity of the instrumental variables related to the endogenous switching regression model, we use propensity score matching (PSM) to assess the robustness of the significance of the treatment effects.  $Y_1$  as the indicator of the job quality of individuals who benefited from the apprenticeship program ( $A_i = 1$ ) and  $Y_2$  the indicator of the job quality of individuals who did not benefit ( $A_i = 0$ ), it is possible to observe the outcome variable of individuals who benefited ( $E(Y_{1i} | A_i = 1)$ ), but not the outcome variable of non-recipients if they had benefited ( $E(Y_{2i} | A_i = 1)$ ). Although the ESR method is more robust, the estimation by the SHP linked to three hypotheses (conditional independence, existence of a common support and the unit value of the treatment) allows us to verify the consistency of the significance of the treatment effects (Rosenbaum and Rubin, 1983; Khandker et al., 2009).

Except that it only accounts for selection bias due to observable factors. It is supposed by the conditional independence assumption that this bias in selection can be controlled for if a set of observable variables is apparent for which independence of treatment assignment can be assessed. While the common support assumption denotes the support of the distribution of propensity score and ensures that the individuals within each group of analysis are sufficiently similar for a meaningful comparison to be apparent. Thus, the conditional probability between the outcome variable no program ( $Y_{2i}$ ) and the status of the apprenticeship program ( $A_i$ ) is statistically independent and defines the propensity score  $e(X_i)$  of participation in said program as follows:

$$e(X_i) = \Pr(A_i = 1 | X_i) \quad , \quad [12]$$

where  $A_i = 1$  for the treatment (participation in the apprenticeship program),  $A_i = 0$  for the control (non-participation in the program),  $X_i$  represents the set of observed covariates. The application of the underlying matching technique is possible if there are individuals who did not benefit from the apprenticeship program with similar characteristics to those who did. The individuals who are compared have the same probabilities of benefiting or not from the

apprenticeship program as those who did not  $0 < e(X_i) < 1$ . Respecting these assumptions leads to specify the estimator of the average treatment effect (ATT) by PSM as follows:

$$ATT = E\{Y_{i1} | A_i = 1, e(X_i)\} - E\{Y_{i2} | A_i = 1, e(X_i)\} \quad , \quad (13)$$

The estimation of this equation is done in several steps: we first estimate the probability of participation in the apprenticeship program by a Probit model, which allows us to estimate the propensity scores for each individual. Subsequently, each individual who participated in the program is matched with one or more individuals with a similar propensity score in order to estimate the ATT value. With this approach, PSM compares the variation between the outcome variables of individuals who received the apprenticeship program and those of individuals who did not receive it with similar characteristics. Although several matching techniques (nearest neighbor method, kernel, Radius, etc.) have been developed in the literature, none of these methods appear to be superior to any other, and no consensus has been established in the literature on the most satisfactory method (Lecocq et al., 2014). This work uses the nearest neighbor method applied on the job quality indicator to test the consistency of the significance of the results.

## 4 Results and discussion

### 4.1 Statistical Analysis

Table 1 presents a brief statistical description (means, standard deviations, and the results of the test of comparison of means) of individuals according to their participation status or not in the apprenticeship program. Job quality is a summary index constructed from several indicators. The quality of employment of individuals who have benefited from the apprenticeship program is relatively good compared to that of non-recipients. The average index for male beneficiaries is 0.4854 compared to 0.4807 for female beneficiaries, while it is 0.3854 for male non-beneficiaries compared to 0.3956 for female beneficiaries. These averages are significantly different from 8.305 between male beneficiaries and non-beneficiaries at the 1% threshold (respectively 8.09 for women), which shows that individuals who benefited from the apprenticeship program had better quality jobs than those who did not benefit from the program. The beneficiaries of this socio-professional integration support program are made up of 49% young men with an average age of 32 years and 51% young women with an average age of 31 years. This shows the respect of gender parity in job search support, which is essential to reduce gender inequalities in the labor market. Overall, participation in the apprenticeship program is not homogeneous according to place of residence. 69% of male beneficiaries (respectively 74%

of female beneficiaries) are in Dakar. The same is true for non-recipients. Although these statistics suggest that residents of Dakar are more likely to benefit from the program than residents of the other departments surveyed, this can be explained more by the proximity of the agencies responsible for promoting employment, the population density and the economic agglomeration in this region of the country.

The majority of youths seeking services from employment promotion programs come from large households with an average of 7 to 8 people in the household. This suggests that individuals from large families tend to seek out training opportunities in order to be professionally independent. In addition, 35.29% of the people who benefited from the program have a difficult financial situation. With regard to the characteristics of the individual's family background, there is a difference in the socio-professional category of the parents between those who benefit from the apprenticeship program and those who do not. The proportion of beneficiaries whose parents are senior executives is 42% for male beneficiaries (50% for female beneficiaries). The significant difference at the 1% level between beneficiaries and non-beneficiaries for men and for women whose parents are senior managers shows that the socio-professional category of the parents has an impact on the training of the children. In fact, being in upper management leads to better income, this increases the overall household income, which can lead to greater investment in the human capital of children.

These young people are mostly single (61%) and want to enter the workforce. Very few of the male beneficiaries are married (37%), while 50% of the female beneficiaries are married. A very important result is the substantial proportion of applicants with a higher education level among men (13% for the BTS and DUT, 30% for the bachelor's degree, 42% for the master's degree) and among women (11% for the BTS and DUT, 37% for the bachelor's degree, 35% for the master's degree). Thus, there is a high proportion of Bachelor's and Master's level graduates in the sample of beneficiaries. This trend is similar for non-recipients. Male beneficiaries with a Master's degree are more numerous than women, while women benefit more with a Bachelor's degree than men.

Table 1: Descriptive statistics

Variables	Designation	Men			Women			Together		
		Benefi ciary	No Benefi ciary	Difference	Benefi ciary	No Benefi ciary	Difference	Benefi ciary	No Benefi ciary	Difference
<b>Gender</b>	Men's gender							0.5273 (0.499)	0.6139 (0.487)	-0.087**
<b>Index</b>	ISQE	0.4854 (0.165)	0.3891 (0.139)	8.305***	0.4807 (0.167)	0.3956 (0.135)	8.09***	0.4839 (0.166)	0.3918 (0.138)	8.227***
<b>Age</b>	Age	31.87 (4.652)	31.44 (6.328)	0.428*	30.98 (5.423)	30.56 (7.985)	0.419**	31.45 (5.048)	31.10 (7.025)	0.348*
<b>Marital status</b>	Married	0.374 (0.485)	0.3618 (0.481)	0.012	0.5151 (0.500)	0.4517 (0.498)	0.063***	0.4406 (0.497)	0.3965 (0.489)	0.044**
<b>Household size</b>	Number of children	7.212 (4.620)	8.254 (5.206)	-1.042**	6.764 (4.144)	7.854 (4.997)	-1.09***	7.00 (4.405)	8.0998 (5.128)	1.099***
<b>Difficult financial situation</b>	Difficult situation	0.2365 (0.425)	0.4705 (0.499)	-0.234**	0.2437 (0.429)	0.4245 (0.494)	-0.180**	0.2399 (0.427)	0.4527 (0.498)	- 0.213*
<b>Political activist</b>	Political activist	0.0856 (0.280)	0.1317 (0.338)	-0.046**	0.0502 (0.219)	0.0993 (0.299)	-0.049**	0.0689 (0.253)	0.1192 (0.324)	0.050**
<b>Study level</b>	No diploma	0.0022 (0.047)	0.1095 (0.312)	-0.107**	0.0050 (0.071)	0.0707 (0.256)	-0.066**	0.0035 (0.059)	0.0945 (0.293)	-0.091**
	CFEE	0.0045 (0.067)	0.0795 (0.271)	-0.075**	0.0125 (0.111)	0.0598 (0.237)	-0.047**	0.0083 (0.090)	0.0719 (0.258)	-0.063**
	BFEM	0.0405 (0.197)	0.1360 (0.343)	-0.095**	0.0301 (0.171)	0.1075 (0.309)	-0.077**	0.0356 (0.185)	0.1250 (0.330)	-0.089***
	BAC	0.0946 (0.293)	0.1728 (0.378)	-0.078**	0.1130 (0.317)	0.1959 (0.397)	-0.082**	0.1033 (0.304)	0.1817 (0.386)	-0.078***
	BTS	0.1329 (0.339)	0.0667 (0.249)	0.066***	0.1105 (0.314)	0.0993 (0.299)	0.011	0.1223 (0.328)	0.0793 (0.270)	0.043***
<b>Activity sector</b>	Bachelor's degree	0.2995 (0.458)	0.2215 (0.415)	0.078***	0.3718 (0.484)	0.2707 (0.445)	0.101***	0.3337 (0.472)	0.2405 (0.427)	0.093***
	Master	0.4257 (0.495)	0.2138 (0.410)	0.212***	0.3568 (0.479)	0.1959 (0.397)	0.161***	0.3931 (0.489)	0.2069 (0.405)	0.186***
	agricultural	0.0045 (0.067)	0.0293 (0.169)	-0.025**	0.0025 (0.051)	0.0088 (0.093)	-0.006	0.0036 (0.060)	0.0216 (0.145)	-0.018***
	Industry	0.0455 (0.208)	0.0848 (0.279)	-0.039**	0.0179 (0.133)	0.0229 (0.149)	-0.005	0.0325 (0.177)	0.0617 (0.240)	-0.029***
	Commercial	0.0660 (0.249)	0.1581 (0.365)	-0.092**	0.0665 (0.249)	0.1813 (0.385)	-0.115**	0.0663 (0.249)	0.1667 (0.373)	-0.100***
<b>Parents' socio- professional category</b>	Services	0.8838 (0.320)	0.7277 (0.445)	0.156***	0.9130 (0.282)	0.7869 (0.409)	0.126***	0.8976 (0.303)	0.7498 (0.433)	0.148***
	Senior executive	0.4234 (0.494)	0.2284 (0.419)	0.195***	0.5075 (0.500)	0.2870 (0.453)	0.220***	0.4632 (0.498)	0.2510 (0.434)	0.212***
	Employee	0.0991 (0.299)	0.0496 (0.217)	0.049***	0.1005 (0.301)	0.0612 (0.239)	0.039*	0.0997 (0.299)	0.0519 (0.226)	0.045***
	Employer	0.1193 (0.324)	0.2233 (0.417)	-0.104**	0.1105 (0.314)	0.1659 (0.372)	-0.055*	0.1152 (0.319)	0.2011 (0.401)	-0.086***
	Home Help	0.0518 (0.222)	0.0735 (0.261)	-0.022*	0.0352 (0.184)	0.0762 (0.265)	0.041**	0.0439 (0.205)	0.0746 (0.263)	-0.030***
<b>Location of residence</b>	Dakar	0.6959 (0.460)	0.5825 (0.493)	0.113***	0.7437 (0.437)	0.6095 (0.488)	0.134***	0.7185 (0.449)	0.5929 (0.491)	0.125***
	Pikine	0.1712 (0.377)	0.2036 (0.403)	-0.032*	0.1281 (0.335)	0.2272 (0.419)	-0.099**	0.1508 (0.358)	0.2127 (0.409)	-0.062***
	Guediawaye	0.0856 (0.280)	0.1445 (0.352)	-0.059**	0.0904 (0.287)	0.1088 (0.312)	-0.018**	0.0879 (0.283)	0.1308 (0.337)	-0.043***
	Rufisque	0.0473 (0.212)	0.0693 (0.2540)	-0.022**	0.0377 (0.190)	0.0544 (0.227)	-0.017	0.0427 (0.202)	0.0635 (0.244)	-0.020***
<b>Parents' level of education</b>	At least high school	0.4099 (492)	0.2532 (0.435)	0.156***	0.5226 (0.500)	0.3456 (0.476)	0.177***	0.4632 (0.499)	0.2888 (0.453)	0.174***

**Note:** ISQE = synthetic index of job quality; BAC = baccalaureate; BTS = Higher Technician Certificate; DUT = University Technician Diploma; BFEM = secondary school leaving certificate; standard deviations in parentheses.

## 4.2 Determinants of participation in the apprenticeship program

Employing the endogenous switching regression model, we analyze the relationship between the apprenticeship program and the job quality of individuals who do and do not benefit from the program. Table 2 presents the results of the full information maximum likelihood estimations. According to these results, the Wald statistic (76.36) is greater for men (respectively 64.76 for women) than the value of the theoretical chi-square statistic at the 1% threshold ( $\text{Prob} > \chi^2 = 0.0000$ ), with the test of independence significant at the 1% threshold (rejection of the hypothesis of independence between equations 4 and 5 of the model). This means that this model is applicable and globally significant.

Tables 2 and 3 present the estimation results. In the different regressions, for both men and women, socio-demographic characteristics, parents' socio-professional category, parents' level of education and young people's financial situation have a significant impact on the decision to participate in the apprenticeship program. The level of education has a positive influence on the probability of participating in the apprenticeship program for both women and men. Regardless of the degree obtained from bachelor's degree onward, youths seek to participate in the apprenticeship training or internship program to improve their employability. Having at least a bachelor's degree increases the chances of both men and women participating in the employment support program to increase the chances of getting a stable and regular job. This shows that the higher the education level, the more likely young people are to take vocational training in order to enter the workforce. The reality in Senegal is that after obtaining at least the baccalaureate, young people, regardless of gender, fall back on job hunting and informal resourcefulness to enter the workforce. This corroborates the results of Fabry et al. (2022) showing that higher levels of education in Senegal increase the probability of having a decent job with higher wages.

In addition, the analyses in the table reveal that the socio-professional category of the parents has a positive and significant influence for both men and women. This indicates that, individuals who have a parent who is a senior manager at their place of service are more likely to participate in the apprenticeship program. This shows that parents, through their work experience, pass on cultural skills and values to their children that enable them to choose employability-oriented training that best fits their beliefs and values that they consider paramount in their children's education. Although parents have the duty to choose wisely and conscientiously the education



given to their children, not all of them have the same capacity to guide them in terms of vocational training in companies. This ability to orient children can be linked to the educational level of the parents-senior executives, but also to the social and relational capital of these parents through the socio-professional environment.

The financial situation of individuals engenders a negative incidence on the probability of participating in the apprenticeship program. The strong negative significance on the participation of men in the program shows that the difficulty in meeting basic needs is a brake on participation in the vocational training program.

The instrumental variables "proportion of participants by department" have a positive influence on participation in the company-based vocational training program (table 2). Significance at the 1% level of the proportion of participants by department suggests that young people living in participating urban areas are more likely to exchange knowledge with other individuals and to have more information about future job market prospects, enabling them to orient themselves towards job-oriented training programs. With the ever-increasing penetration of ICTs, particularly the Internet (46%) and broadband (4G) connections on smartphones (62.4%) in Senegal, information on the availability of training and internship opportunities is circulating rapidly in the agglomerations of individuals within departments such as Dakar, Pikine, Guediawaye and Rufisque. This proportion of participants per department would have a positive influence on labor market wages through better training opportunities to acquire the skills and practical ability needed to secure stable, regular, better-paid employment. This analysis is in line with that of Riddell and Song (2011), who show that people from advantaged backgrounds with well-connected social networks can benefit from better training opportunities to acquire more education.

The exclusion variable "parents' level of education" positively influences participation in the apprenticeship program. Significance at the 1% level suggests that Senegalese youth whose parents have at least upper secondary education are more likely to participate in the training program offered by the national state-employer agreement. More educated parents support children in their daily learning and contribute to their autonomy through the values and references they instill in their children. Thus, more educated parents can influence their children's education or participation in specific training, which can subsequently contribute to access to stable and regular employment. Parental educational and vocational guidance of children will positively influence their labor market outcomes through their participation in the

training program necessary to improve their employability. This result is consistent with Totouom et al. (2018) for women's education and Kuepie (2016) for exogenous education supply.

**Table 2:** Estimation result by the endogenous switching regression method

Variables	Designation	Selection		Non beneficiary		Beneficiary	
		Male Coefficient	Female Coefficient	Male Coefficient	Female Coefficient	Male Coefficient	Female Coefficient
Age	Age	0.330 (0.317)	0.343 (0.372)	-0.0477 (0.0361)	-0.0342 (0.0486)	0.171** (0.0666)	0.0160 (0.0770)
Marital status	Married	0.0464 (0.0986)	-0.114 (0.116)	-0.0426*** (0.0130)	-0.0206 (0.0176)	-0.0329* (0.0191)	-0.0246 (0.0207)
Household size	Number of children	0.0685 (0.0647)	-0.0995 (0.0980)	0.0226*** (0.00826)	-0.0139 (0.0138)	0.0133 (0.0125)	1.89e-05 (0.0185)
Difficult financial situation	Difficult situation	-0.367*** (0.104)	-0.0705 (0.131)	0.0659*** (0.0130)	0.0791*** (0.0183)	0.0151 (0.0222)	0.0741*** (0.0242)
Political activist	Political activist	-0.250 (0.154)	-0.246 (0.234)	0.00395 (0.0184)	0.0986*** (0.0287)	-0.0706** (0.0325)	0.0304 (0.0446)
	BAC	0.996*** (0.179)	0.584** (0.243)	-0.0176 (0.0212)	-0.0337 (0.0320)	0.131*** (0.0470)	0.0686 (0.0531)
	BTS / DUT	1.481*** (0.183)	0.509** (0.240)	-0.0400 (0.0304)	-0.0251 (0.0313)	0.140*** (0.0502)	0.0502 (0.0523)
Study level	Bachelor's degree	1.385*** (0.162)	0.823*** (0.204)	-0.0439* (0.0243)	0.0135 (0.0319)	0.177*** (0.0468)	0.0920*** (0.0486)
	Master	1.470*** (0.156)	0.943*** (0.213)	-0.0561** (0.0255)	-0.0706** (0.0360)	0.173*** (0.0472)	0.0812*** (0.0490)
	Industry	0.559 (0.466)	0.200 (0.405)	-0.0316 (0.0398)	-0.129** (0.0666)	0.0194 (0.112)	0.0133 (0.0678)
Activity sector	Commercial	0.324 (0.455)	-0.644*** (0.186)	-0.00215 (0.0373)	0.0322 (0.0263)	-0.0147 (0.109)	0.00895 (0.0405)
	Services	0.682 (0.434)		-0.0158 (0.0360)		-0.0186 (0.105)	
	Senior executive	0.280*** (0.104)	0.262** (0.125)	0.00671 (0.0153)	-0.0182 (0.0220)	0.0260 (0.0188)	0.0305 (0.0215)
Parents' socio-professional category	Employee	0.106 (0.166)	-0.0867 (0.185)	-0.0712*** (0.0264)	0.0276 (0.0285)	0.0226 (0.0299)	0.0575*** (0.0329)
	Employer	-0.0642 (0.125)	0.141 (0.183)	0.00760 (0.0145)	-0.0426* (0.0260)	-0.0207 (0.0254)	0.0523 (0.0341)
	Home Help	-0.241 (0.192)	-0.291 (0.257)	0.0551** (0.0230)	0.0616** (0.0336)	0.0254 (0.0398)	-0.0423 (0.0535)
	Dakar	0.00236 (0.195)	0.0135 (0.255)	-0.0408* (0.0229)	-0.0592** (0.0342)	-0.0275 (0.0409)	0.0913** (0.0492)
Location of residence	Pikine	0.0421 (0.209)	-0.168 (0.285)	-0.0436* (0.0246)	-0.0458 (0.0383)	-0.0385 (0.0435)	0.0244 (0.0542)
	Guediawaye	-0.0616 (0.229)	-0.0683 (0.294)	-0.0641** (0.0264)	-0.0331 (0.0397)	-0.0563 (0.0476)	0.103** (0.0559)
Proportion of training participation	Proportion by region	0.646** (0.310)	0.650*** (0.180)				
Parents' level of education	At least high school	0.0636*** (0.0898)	0.220*** (0.0983)				
Constant		-3.441*** (1.183)	-1.841 (1.308)	0.695*** (0.130)	0.659*** (0.166)	-0.466* (0.258)	0.0194 (0.276)
Sigma	$\sigma$			0.1497*** (0.00547)	0.1421*** (0.0056)	0.1800*** (0.0149)	0.1822*** (0.01903)

Rho	$\rho$			0.2549 (.2207)	0.01729 (0.3828)	0.8379 (0.0636)	0.9180 (0.0603)
Wald chi2		79.36***	64.76***	79.36***	64.76***	79.36***	64.76***
Prob > chi2		0.000	0.000	0.000	0.000	0.000	0.000
Observations		1,050	576	1,050	576	1,050	576

Note : significance \*\*\*p < 0.01; \*\*p < 0.05%; \*p < 0.1; (.) standard deviation;  $\sigma$  indicates the square root of the variance of the error terms  $\mu_{ji}$  in the outcome equations (5a) and (5b);  $\rho_j$  indicates the correlation coefficient between the error term  $\varepsilon_i$  of the selection equation (4) and the error term  $\mu_{ji}$  of the outcome equations (5a) and (5b).

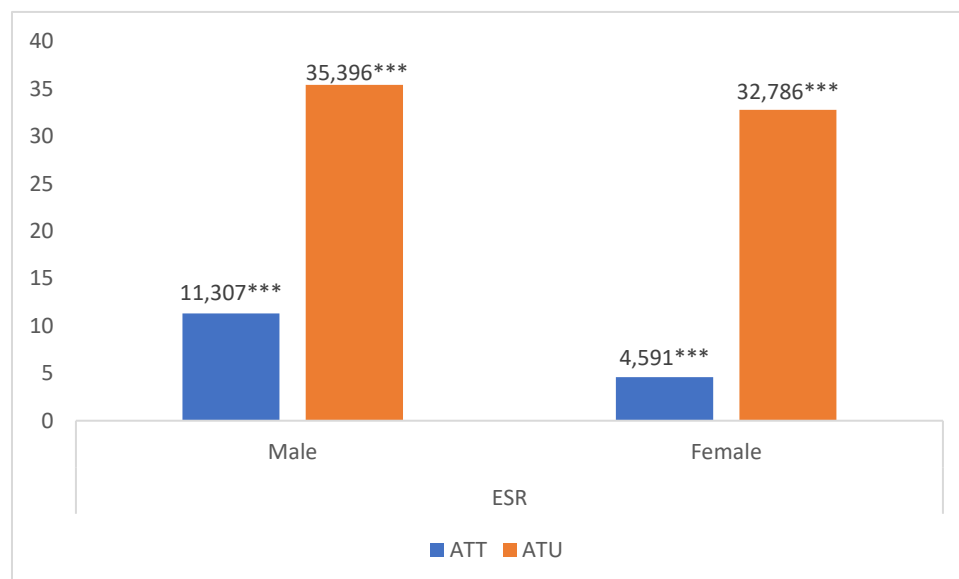
This exclusion variable is validated by the Fisher test (F=19.90) which shows significance at the 1% level of the variables in the job quality model (Table A2). This implies that we cannot neglect the presence of this instrument in the model. The impact of this instrumental variable on job quality should be mediated by its impact on participation in the apprenticeship program. This validity is confirmed by the falsification test which shows that there is no direct impact of this instrumental variable (IV) on job quality (Table A2). This variable does have an indirect effect on job quality through its effect on participation in the work-based learning program. The job quality of individuals who did not participate in the apprenticeship program is regressed on the IV with all other variables in the model. The non-significance of the coefficient on this IV suggests that there is no direct impact on job quality. This shows that the model has acceptable predictive power and can be used to predict unobservable values (Di Falco et al., 2011).

### 4.3 Impact of the Apprenticeship Program on Job Quality

Table 3 presents the expected job quality score under actual conditions and under counterfactual scenarios for participation in the apprenticeship program; where (a) and (b) indicate the expected job quality score that can be observed from the sample. This expected job quality score of youths is about 0.5012 for males (respectively 0.4434 for females) who benefited from the apprenticeship program while it is on average 0.1274 for males (respectively 0.1436 for females) who did not benefit. (c) and (d) show the job quality score in the counterfactual scenarios. In case (c), men who actually benefited from the apprenticeship program would have a job quality score on average of 0.3881 (respectively 0.3975 for women) if they had not benefited from the program. In case (d), if the men (respectively women) who did not receive the program had received it, their job quality score would average 0.4814 (respectively 0.4798 for women). The job quality score levels of the observed and counterfactual cases can be compared within individuals in each regime.

Thus, the treatment effects of participation in the work-based learning program on recipients' job quality score (JQS) are the difference between (a) and (c). This difference is 0.11307 percentage points for men (respectively 0.04591 for women); this shows that the gain in terms of average job quality score of men who benefited from the apprenticeship program is 11.30% (respectively 4.59% for women). Women (respectively men) who actually benefited from the program would have lower job quality scores if they had not benefited. The impact of the apprenticeship on the job quality score of non-recipients (ATU) is calculated as the difference between cells (d) and (b). This effect shows a loss of 0.3278 percentage points in the average job quality score for women (respectively 0.3539 for men) due to the absence of the apprenticeship. This result corroborates with that of Kane et al. (2020b) revealing that participation in job promotion programs increases the chances of finding regular and stable employment. Women (respectively men) who did not benefit from the apprenticeship program would have a higher job quality score if they had benefited (figure 2). These results as also reflected in Figure 3 show that the apprenticeship program in Senegal leads not only to gains in job quality scores, but also to significant losses resulting from the absence of apprenticeship. This result corroborates with Kluve et al. (2019) showing that employment subsidy programs produce positive effects.

Figure 2: Average treatment effect of treated and the counterfactual case.



In Senegal, it is difficult to find a first job when you are a young graduate with no experience. Especially in view of the experience required in the advertisements. The internship program offers young people the opportunity to develop their methodical and practical skills in a

company in order to acquire the experience necessary for a job either in the same company or in another company of their choice. This apprenticeship program has a positive and significant impact on the job quality score of youth beneficiaries. Compared to non-recipient youths, participation in this program provides youths with experience, which increases their chances of accessing a higher quality job. This increase in the likelihood of accessing better quality employment is greater for males (11.30) compared to females (4.59). This shows that men in Senegal are twice more likely to find a better job than women after completing a capacity building apprenticeship. The apprenticeship enables men to access regular and stable jobs with social security and a contract more than women, which directly increases the quality of employment. While this employment support program allows beneficiaries to improve their employability, this program would be more beneficial to non-recipients, as they would have had more opportunities for quality employment than beneficiaries. This result is consistent with that of Kane et al. (2021) showing that employment promotion programs increase the chances of finding regular and stable employment.

**Table 3:** Treatment effect of participation in the ESR employment support program

	Variables	Beneficiary	No Beneficiary	Treatment effect
	Beneficiary	(a) 47.5117(0.1927)	(b) 39.4433(0.1373)	ATT=8.0684(0.2367) ***
<b>Together</b>	No Beneficiary	(d) 48.3121(0.1660)	(c) 17.2131(0.1185)	ATU=31.099(0.2039) ***
	Beneficiary	(a) 50.1232(0.215)	(b) 38.8155(0.149)	ATT=11.3077(0.2619) ***
<b>Male</b>	No Beneficiary	(d) 48.1408(0.1763)	(c) 12.7452(0.1495)	ATU=35.3956(0.2311) ***
	Beneficiary	(a) 44.3493(0.2497)	(b) 39.7578(0.2010)	ATT=4.5915(0.3205) ***
<b>Female</b>	No Beneficiary	(d) 47.1505(0.2012)	(c) 14.3647(0.1653)	ATU=32.7858(0.2603) ***

Note : significance \*\*\*p < 0,01 ; \*\*p < 0,05% ; \*p < 0,1 ; (.) standard deviation.

#### 4.4 Consistency of results

To check the robustness of our results, we use the SHP. After computing the propensity scores, we apply the nearest neighbor algorithm (Leuven and Sianesi, 2003). The pseudo R<sup>2</sup> is 14.1% and the LR (chi2) of 230.99 is significant at the 1% level (see Table A2 in the Appendix). These statistics show that the model is globally fitted and that at least one of the explanatory variables explains the decision to adopt environmental protection policies.

Table A3 shows the reduction in standardized bias before and after matching, while Figure 4 shows the common support for matched firms. There are significant differences between

individuals who received the apprenticeship program and those who did not. Whereas no differences are apparent before and after matching between the means of the explanatory variables for individuals who benefited from the program, there are however, substantial variations before and after matching between the means of the explanatory variables for non-recipients. This highlights a presumption of selection bias, which the comparison between beneficiaries and non-beneficiaries reduced by an average of 20.2% before matching and 2.2% after matching (Table A4). The total bias is thus reduced to 15.7% through the matching process. Moreover, the maximum likelihood p-values (0.000) show the model's significance before matching whereas the pseudo-R<sup>2</sup> denotes the performance level of the Probit model. This pseudo-R<sup>2</sup> is 14.1% before matching and 0.4% after matching. This confirms that after matching, there is no significant difference in the distribution of the two sub-populations (recipients and non-recipients). This strong reduction in bias shows that the individuals are similar after matching. The low level of pseudo-R<sup>2</sup> (0.004), the low level of mean bias (2.2), the high level of bias reduction (15.7), and the non-significance of maximum likelihood after matching indicate that the specification of the propensity score estimation process successfully balances the distribution of covariances between individuals who benefited from the apprenticeship program and those who did not.

The results of estimating the average impact of the apprenticeship program estimated by the nearest neighbor matching methods are presented in Table 4. These results show that the apprenticeship internship has a statistically positive and significant impact on the job quality score. This impact is 0.04963 percentage points on the job quality score for men and 0.05215 percentage points on the job quality score for women. Compared to male non-beneficiaries, those who completed an apprenticeship in a company increase their chance of accessing a higher quality job by 0.0496. Compared to non-recipient women, those who completed an apprenticeship in a company increase their probability of accessing a quality job by an average of 0.05215. In fact, the in-company apprenticeship allows young graduates to develop a synergy between the company and their skills, know-how and interpersonal skills, which enables them to get a better quality job in the same company or elsewhere. The strong positive significance of these SHP treatment effects is similar to that of the endogenous switching regression; this confirms the positive impact of the apprenticeship program on the improvement of the job quality score of men and women. This result is consistent with that of Card et al. (2018), Meemken et al., (2019), Fabry et al. (2022) showing that employment support policies in terms

of strengthening the motivation and capacity of young people have a positive impact on employment.

**Table 4:** Impact of MSP Participation in the Employment Support Program

Variables	Estimation technique	Treatment	Control	Treatment effect (ATT)
<b>Male</b>	Nearest Neighbor	0.437977	0.388338	0.049638(0.011456)***
<b>Female</b>	Nearest Neighbor	0.448387	0.396228	0.052159(0.013875)***

The results of the analysis of the decomposition of individuals' job quality after their passage through the apprenticeship program are presented in Appendix Table A5. The decomposition at the level of individual characteristics shows that 94% of the gender gap in job quality is related to the endowment effect and thus explained by differences in observed characteristics. Only 6% of the gender gap in job quality observed among individuals who benefited from the apprenticeship program can be attributed to a structural effect or to unobservable factors. Individual characteristics are found to be unimportant. This suggests that the gender gap in job quality observed after their passage through the apprenticeship program is associated with women's occupational status and much less with their level of education or experience.

Overall, employment support programs are having a significant impact on the quality of jobs for young people. Specifically, the apprenticeship program aims to facilitate access to quality employment for young people by offering internship and training opportunities in companies, as well as subsidies and salary support for young people to carry out apprenticeships in companies. In fact, the employment support programs provided by the CNEE offer young people vocational training opportunities that enable them, through apprenticeships, to acquire specific skills in demand on the job market, thereby enhancing their employability and preparing them for higher-quality jobs. In Senegal's hostile working environment, participation in the apprenticeship program facilitates young people's access to formal jobs with regular employment contracts and social benefits. This helps to improve job quality by offering social protection and more favorable working conditions.

Senegal is one of the member states of the West African Economic and Monetary Union (WAEMU), which encompasses eight countries (Togo, Côte d'Ivoire, Burkina Faso, Guinea-Bissau, Niger, Mali, Senegal, and Benin) in French-speaking Sub-Saharan Africa. A close examination of the data in Table A6 in the appendix shows that some WAEMU member states, such as Côte d'Ivoire, and other Economic and Monetary Community of Central Africa (CEMAC) member states, such as Cameroon, Chad, and Congo, have several similarities in

their socioeconomic structure and labor market. The youth employment rate remains low and deteriorated between 2010 and 2021 from 53.75% to 51.23% in Cameroon, from 44.46% to 36.87% in Chad, from 36.35% to 32.5% in Congo Brazzaville, from 34.01% to 27.62% in Côte d'Ivoire, and from 29.44% to 25.6% in Senegal. Although the youth unemployment rate was perceived to be low in this country, the underemployment rate remained high between 2010 and 2021, rising from 77.62% to 71.3% in Cameroon, from 90.07% to 92.25% in Chad, from 83.13% to 77.31% in Congo Brazzaville, from 78.4% to 69.31% in Côte d'Ivoire, and from 70.38% to 62.8% in Senegal. This is consistent with the literature showing that young people appear to be more underemployed (Kane et al., 2020a, Fabry et al., 2022). With the exception of Congo, the youth's unemployment rate tends to be declining in Senegal in 2021.

However, the vulnerable employment rate remains very high compared to other countries. More importantly, these countries have implemented similar active employment policies in terms of the creation of youth employment support structures such as the National Employment Fund (FNE) in Cameroon, the National Office for the Promotion of Employment (ONAPE) in Chad, the Rural Employment Development Support Program (PADER) in Congo Brazzaville, the Youth Employment Agency (AEJ) in Côte d'Ivoire and the National Agency for the Promotion of Youth Employment (ANPEJ) in Senegal. The similar objective of these employment structures is to provide young people with practical training or apprenticeships in companies, intermediation and support for entrepreneurship to facilitate their socio-professional integration.

Furthermore, the database used for this research is a survey database on the improvement of employment policies in French-speaking Sub-Saharan Africa collected in a harmonized manner on the five countries in Table A6. A close examination of these data shows that all of these states have similarities in economic structures and in the implementation of active employment policies. Given these similarities, and with reference to the work of Kane et al. (2020b), Tsambou and Fomba (2021), and Fabry et al. (2022), it is expected that, with a few exceptions, the results obtained in the case of Senegal will be applicable in other countries within the remit of the study. This extension of the results to the sample countries is motivated by the fact that the five study countries share the same language (French) and the same currency (the CFA franc).



## 5 Conclusion

The objective of this work is to assess the impact of the apprenticeship program on job quality using micro-data from 2746 individuals in Senegal. By applying an endogenous switching regression model and the propensity score matching (PSM) method, our results suggest that the apprenticeship program has a positive and significant impact on access to a better quality job. The analysis of the determinants of participation in the apprenticeship program revealed very interesting results for both men and women. The level of education, the difficulty in meeting basic needs, the education of the parents and the socio-professional category of the parents have a significant influence on their participation in the apprenticeship program. As the level of education increases, young people tend to move towards specific training courses that transform unskilled labor into skilled labor with a view to improving insertion into the labor market.

Participation in the apprenticeship program increases the likelihood of accessing higher quality jobs. Interesting patterns emerge when analyzing this result for both groups of youth recipients and non-recipients. Youths who completed the apprenticeship program tend to more likely access higher quality jobs than non-recipients in the hypothetical case that they did not complete the program. The youths who attended the apprenticeship program have certain unobserved characteristics and skills that ensure socio-professional integration with a better -quality job. This is explained by the finding that the impact of the apprenticeship on the job quality score is lower for youth who did not actually benefit from the apprenticeship, if they had benefited from it. This beneficial effect of the apprenticeship is more important because, if youths who did not complete the apprenticeship had completed it, they would have had the greatest opportunity to access regular, stable employment with higher earnings than youths who completed the apprenticeship program.

Apprenticeships have a significant impact on the quality of employment for young people in Senegal. Apprenticeships enable young people to develop specific skills related to their field of study or professional interest. By working alongside experienced professionals in a company, young people acquire practical and technical skills that enhance their employability and open up higher-quality job opportunities in that company. These types of employment support programs offer young Senegalese hands-on experience in a real working environment. This enables them to familiarize themselves with professional standards and expectations, understand the dynamics of the world of work, and develop cross-cutting skills such as communication, teamwork, and time management. This early work experience can strengthen

their profile and give them an edge in their subsequent job search. Being in a networking environment, apprenticeships enable young people to connect with professionals in their field of interest, establish valuable contacts, and develop their professional network, which can facilitate their future job search and access to better career opportunities.

Regardless of gender, young people who have actually benefited from the apprenticeship program of the national state-employer agreement are respectively 0.1130 more likely among men and 0.0459 more likely among women to have access to a better quality job than those who have not followed this program. Thus, Senegalese youth job seekers who did not complete the apprenticeship program have a lower rate of quality employment than those who completed the CNEE apprenticeship program. These apprenticeships play an important role in improving the quality of employment for young Senegalese, by providing them with skills, work experience, networking opportunities and career guidance.

These results are important for the design of policies aimed at developing effective human capital formation strategies to address the problems of youth socio-professional integration. In fact, the government, in collaboration with private sector employers, should encourage and sustain apprenticeship programs in order to reduce the distance between young people and the labor market. This policy should take into account the specificities of women in order to improve their situation after benefiting from the employment support program. In addition, the government should ensure that apprenticeships are structured in such a way as to offer real value to young people and foster their transition to better jobs.

One of the limitations of this work is related to the data, which do not allow for an analysis by sub-sector of activity. In addition, these data are cross-sectional and do not allow for a long-term analysis. A perspective on this type of analysis would be necessary by using panel data that would allow for an intertemporal viewpoint. Also, future studies can assess the effectiveness of this apprenticeship program in terms of the labor productivity of youth in the labor market.

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## **Expression of interest**

There is no conflict of interest for this article.

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## Appendix

### Appendix 1: Decomposition Analysis

To analyze the gap in job quality between men and women after transitions to the work-based learning program, the Oaxaca-Blinder decomposition is applied. This approach is widely employed to assess sources of wage inequality (Fabry et al., 2022). The gap in job quality is decomposed into two parts (Blinder, 1973; Kitagawa, 1955; Oaxaca, 1973). One part is explained by differences in observable covariates between the two groups (men and women), particularly job, socio-demographic and company features. A portion that is explained by differences in performance and unobservable characteristics. The first part, called the endowment effect, is associated with disparities in employment status, contract type and activity; while the second part, called the structure effect, may be related to wage discrimination and the impact of unobservable and uncontrolled characteristics. To better understand the source of the gender gap in job quality, we use the Blinder-Oaxaca decomposition method. This entails estimating separate outcome equations (14a) and (14b) respectively, for women and men.

$$\begin{cases} ISQE_F = \alpha_F + \beta X_{Fi} + \mu_{Fi} & (a) \\ ISQE_H = \alpha_H + \beta X_{Hi} + \mu_{Hi} & (b) \end{cases} \quad [14]$$

where  $ISQE_F$  denotes the expected value of the job quality index for the female and  $ISQE_H$  male groups,  $X$  is a vector of covariates, and  $\mu_{Fi}$  and  $\mu_{Hi}$  are the error terms with respect to the gender-disaggregated estimations. Under the simplifying hypothesis of zero means of the error terms, the total impact of gender is the variation between the mean scores of the two groups.

$$D_{moyenne} = E(ISQE_F) - E(ISQE_H) = b_F E(X_F) - b_H E(X_H) = b_F E(X_F) - b_H E(X_H) + E(X_H)(b_F - b_H) \quad [15]$$

Where  $b_F$  and  $b_H$  are the regression estimates for  $\beta_F$  and  $\beta_H$ , respectively. The first component of equation [15] presented in the results as the "explained component" measures the gender gap in outcomes, which is determined by the average differences in outcomes in the covariates between women and men, estimated using the coefficients of the first component. The second component encompasses variations in job quality that are not elicited by the features observed. This component may be traceable to a heterogeneous response of covariates in terms of gender, or it may simply be a reflection other unobserved drivers of job quality, or an interaction of the two (Jann, 2008).



This decomposition method is based on two main assumptions: the first is consistent with ignorability, which suggests that the distribution of unobservables is similar in both groups. Factors such as skills are likely to influence job quality when they are not controlled for and may vary between women and men. This requires careful attention in interpreting the structural effect as direct discrimination of the disadvantaged group. The second, less constraining assumption is the overlap of supports, which shows that none of the groups is identified perfectly by the vector of observable factors (X). There is none of the variables that is excluded in the group-specific regressions for women and men, implying that this assumption is satisfied.

**Table A1:** Dimensions and Indicators Used to Calculate the Job Quality Index

Dimensions		Indicators
1	Salaries	- Annual remuneration (in thousands of CFA francs)
2	Working hours and work/life balance	- Benefit from a bonus (housing, 13th month, electricity): 1= yes and 0 otherwise
		- Time spent at main job in last 7 days (in hours worked).
		- Working less than 40 hours in last 7 days: 1= Don't want to work more; 2= Schedule set by law; 3= Schedule set by employer; 4= Less work due to bad weather; 5= Personal problem (health, housework); 6= Other to specify
		- Worked more than 40 hours in the last 7 days: 1= Normal/occupationally appropriate hours; 2= Excessive work due to good business conditions; 3= Excessive work to survive; 4= Other to specify
3	Working conditions, job security and social protection	- Benefit from a social contribution: 1= yes and 0 Otherwise
		- Benefit from paid sick leave: 1= yes and 0 Otherwise
		- Benefit from paid annual leave: 1= yes and 0 Otherwise
		- Benefit from maternity/paternity leave: 1= yes and 0 Otherwise
		- Benefit from a promotion within the company: 1= yes and 0 Otherwise
		- Benefit from health insurance: 1= yes and 0 Otherwise
		- Benefit from a work equipment: 1= yes and 0 Otherwise
4	Representation of the collective interest and social dialogue	- Union membership: 1= yes and 0 otherwise
		- Membership in an employer group: 1= yes and 0 Otherwise
5	Competence and Qualification	- Have taken professional training/retraining in your job: 1= yes and 0 otherwise
		- The job you are doing corresponds to the training you have taken: 1= yes and 0 otherwise
6	Employment stability	- Type of contract: 1= Written contract for an indefinite period; 2= Written contract for a definite period; 3= Verbal agreement; 4= Nothing at all
		- Employment status: 1= Regular; 2= Occasional
		- Receive an active pay slip: 1= Yes and 0 Otherwise

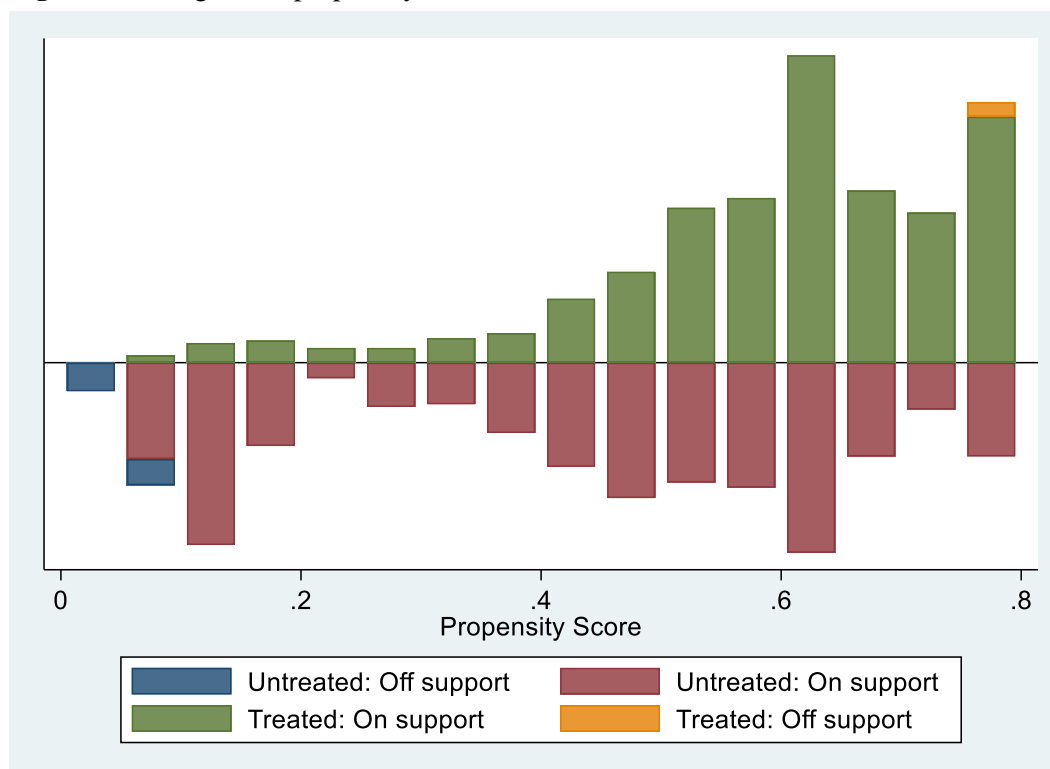
**Table A2:** Instrumental variable validation test (falsification test)

Variables	Participation in the apprenticeship program	Job quality of non-recipients
	Coefficient	Coefficient
Male gender	-0.118** (0.0595)	-0.00249 (0.0106)

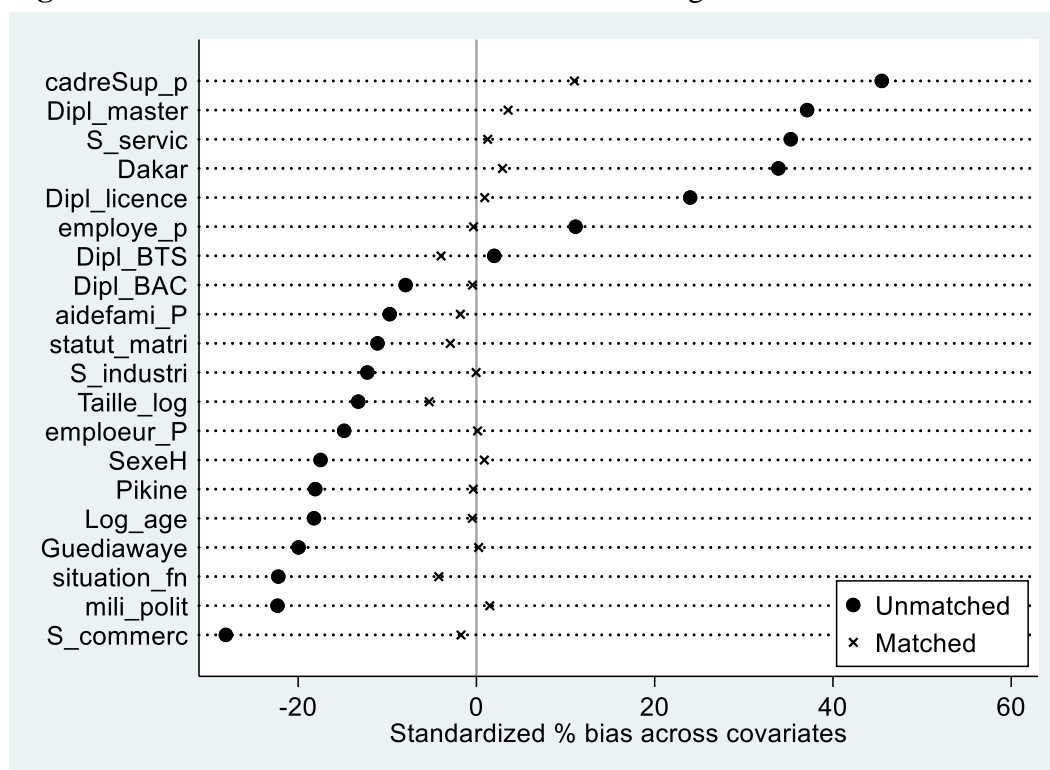
<b>Age</b>	0.196 (0.193)	-0.0448 (0.0289)
<b>Marital status</b>	0.0445 (0.0627)	-0.0340*** (0.0105)
<b>Household size</b>	-0.00676 (0.0440)	0.0112 (0.00711)
<b>Difficult financial situation</b>	-0.267*** (0.0636)	0.0718*** (0.0102)
<b>Political activist</b>	-0.178* (0.104)	0.0302** (0.0153)
<b>BAC</b>	0.733*** (0.116)	-0.0386** (0.0158)
<b>BTS/DUT</b>	1.084*** (0.121)	-0.0623*** (0.0181)
<b>Bachelor's degree</b>	1.065*** (0.102)	-0.0375*** (0.0139)
<b>Master</b>	1.194*** (0.101)	-0.0801*** (0.0141)
<b>Industry</b>	0.609* (0.363)	-0.0623 (0.0386)
<b>Commercial</b>	0.358 (0.348)	-0.0143 (0.0357)
<b>Services</b>	0.798** (0.337)	-0.0408 (0.0345)
<b>Senior executive</b>	0.224*** (0.0675)	0.000263 (0.0126)
<b>Employee</b>	0.109 (0.105)	-0.0215 (0.0199)
<b>Employer / entrepreneur</b>	-0.115 (0.0863)	-0.00513 (0.0128)
<b>Homemaker</b>	-0.221* (0.121)	0.0625*** (0.0191)
<b>Dakar</b>	0.165 (0.130)	-0.0494** (0.0194)
<b>Pikine</b>	0.0448 (0.142)	-0.0467** (0.0209)
<b>Guediawaye</b>	-0.0117 (0.154)	-0.0599*** (0.0223)
<b>Arents' level of education</b>	0.136** (0.0655)	-0.0185 (0.0123)
<b>Participant Proportion by region</b>	0.422** (0.185)	0.201 (0.138)
<b>Constant</b>	-2.741*** (0.750)	0.724*** (0.106)
<b>LR chi2</b>	442.25***	
<b>Prob &gt; chi2</b>	0.000	
<b>Pseudo R2</b>	0.1448	
<b>F</b>		19.91***
<b>Prob &gt; F</b>		0.000
<b>R<sup>2</sup></b>		0.158
<b>Observations</b>	2746	1017

Note: significance \*\*\*p < 0,01 ; \*\*p < 0,05% ; \*p < 0,1 ; (.) standard deviation

**Figure 3:** Histogram of propensity scores



**Figure 4:** Standardized bias before and after matching



**Table A3:** Test of difference before and after matching.

Variable	Designation		Mean		% reduction		t-test		V(T)/ V(C)
		Matching	Treatment	Control	% Bias	Bias	t de student	p> t	
<b>Gender</b>	Male	Before	0.578	0.66261	-17.5		-3.01	0.003	.
		After	0.58375	0.57949	0.9	95.0	0.15	0.881	.
<b>Age</b>	Age	Before	3.4435	3.4719	-18.2		-3.14	0.002	0.61*
		After	3.4437	3.4444	-0.5	97.5	-0.09	0.929	0.88
<b>Marital status</b>	Married	Before	0.43514	0.49043	-11.1		-1.91	0.057	
		After	0.43449	0.44909	-2.9	73.6	-0.51	0.610	
<b>Household size</b>	Number of children	Before	1.774	1.8609	-13.3		-2.28	0.023	0.93
		After	1.7686	1.8034	-5.3	60.0	-0.95	0.345	1.01
<b>Difficult financial situation</b>	Difficult situation	Before	0.19869	0.29391	-22.2		-3.83	0.000	
		After	0.20066	0.21877	-4.2	81.0	-0.77	0.440	
<b>Political activist</b>	Political activist	Before	0.06076	0.12522	-22.3		-3.86	0.000	
		After	0.06136	0.05705	1.5	93.3	0.32	0.751	
	BAC	Before	0.09852	0.12348	-7.9		-1.37	0.172	
		After	0.0995	0.1009	-0.4	94.4	-0.08	0.936	
<b>Study level</b>	BTS	Before	0.12479	0.11826	2.0		0.34	0.731	
		After	0.12604	0.13902	-4.0	-98.7	-0.66	0.506	
	Bachelor's degree	Before	0.33498	0.22783	24.0		4.12	0.000	
		After	0.33831	0.33418	0.9	96.1	0.15	0.879	
	Master	Before	0.39901	0.22957	37.1		6.37	0.000	
		After	0.39303	0.37683	3.5	90.4	0.58	0.564	
	Industry	Before	0.03612	0.06261	-12.2		-2.11	0.035	
		After	0.03648	0.03657	-0.0	99.7	-0.01	0.994	
	Commercial	Before	0.0624	0.14783	-28.1		-4.86	0.000	
		After	0.06302	0.06829	-1.7	93.8	-0.37	0.712	
<b>Activity sector</b>	Services	Before	0.89819	0.7687	35.3		6.09	0.000	
		After	0.89718	0.89255	1.3	96.4	0.26	0.794	
	Senior executive	Before	0.47291	0.25913	45.5		7.81	0.000	
		After	0.46766	0.416	11.0	75.8	1.81	0.071	
<b>Parents' socio-professional category</b>	Employee	Before	0.09852	0.06783	11.1		1.91	0.057	
		After	0.09453	0.09546	-0.3	97.0	-0.05	0.956	
	Employer	Before	0.11987	0.17217	-14.8		-2.56	0.011	
		After	0.12106	0.12063	0.1	99.2	0.02	0.982	
	Home Help	Before	0.04105	0.06261	-9.7		-1.68	0.094	
		After	0.04146	0.04547	-1.8	81.4	-0.34	0.733	
	Dakar	Before	0.70936	0.54783	33.9		5.83	0.000	
		After	0.70647	0.69254	2.9	91.4	0.53	0.598	
<b>Location of residence</b>	Pikine	Before	0.14778	0.21739	-18.1		-3.12	0.002	
		After	0.14925	0.15063	-0.4	98.0	-0.07	0.947	
	Guediawaye	Before	0.09524	0.16174	-20.0		-3.44	0.001	
		After	0.09619	0.09537	0.2	98.8	0.05	0.962	

**Table A4:** Matching quality

Matching	Pseudo R2	LR chi2	p>chi2	Biais moyen	Biais médiane	B	R	%Var
Before	0.141	230.99	0.000	20.2	18.1	91.4*	0.35*	50
After	0.004	7.40	0.995	2.2	1.4	15.7	1.15	0

**Table A5:** Decomposition of gender differences in job quality

<b>A. Difference in job quality after benefiting from the program</b>				
Male			0.31138(0.00968)***	
Female			0.26044(0.01129)***	
Difference (male-Female)			0.05094(0.0149)***	
Explained			0.00296(0.00687)***	
unexplained			0.04798(0.01615)***	
Report (Male/Female)			1.1954	
The part of the difference between the sexes			16.35%	
<b>B. Global decomposition</b>				
Endowment effect			94%	
Structure effect			6%	
<b>C. Details of the decomposition</b>				
Variables	Designation	Endowment effect	Male structural advantage	Male structural disadvantage
Age	Age	0.00381 (0.00261)	0.1310* (0.0778)	0.0740 (0.0793)
Marital status	Married	-0.00558* (0.00338)	0.0402* (0.0222)	-0.0935*** (0.0233)
Household size	Number of children	0.000472 (0.00109)	0.0236* (0.0140)	0.0095 (0.0203)
Difficult financial situation	Difficile	0.000426 (0.00124)	-0.0412* (0.0230)	0.0082 (0.0265)
Political activist	Difficult situation	-0.00200 (0.00156)	-0.0599* (0.0351)	0.0280 (0.0515)
Study level	BAC	-0.00128 (0.00185)	0.0757 (0.0540)	-0.0417 (0.0608)
	BTS/ DUT	0.000947 (0.00154)	0.0387 (0.0519)	-0.0086 (0.0609)
	Bachelor's degree	-0.00552 (0.00430)	0.0786 (0.0490)	-0.0147 (0.0540)
	Master	0.00335 (0.00359)	0.0510 (0.0478)	-0.0259 (0.0546)
	Industry	-0.00573 (0.00495)	-0.2070 (0.1549)	0.2773 (0.2323)
Activity sector	Commercial	0.00010 (0.0039)	-0.2302 (0.1523)	0.2327 (0.2216)
	Services	0.00760 (0.00695)	-0.2600* (0.1477)	0.2230 (0.2175)
	Senior executive	-0.00185 (0.00197)	0.0223 (0.0219)	0.0049 (0.0248)
	Employee	0.00445 (0.000456)	-0.0214 (0.0319)	0.0294 (0.0375)
Parents' socio-professional category	Employer	0.000415 (0.000801)	0.0311 (0.0307)	0.0237 (0.0374)
	Home Help	-0.00992 (0.000723)	-0.0059 (0.0432)	0.0266 (0.0617)
	Dakar	0.00187 (0.00290)	-0.0327 (0.0475)	-0.0116 (0.0580)
Location of residence	Pikine	-0.00106 (0.00106)	-0.0210 (0.0210)	-0.0678 (0.0678)

		(0.00261)	(0.0508)	(0.0651)
	Guediawaye	0.00639	-0.0023	0.0404
		(0.000157)	(0.0562)	(0.0685)
Parents' level of education	At least high school	0.00110	-0.0094	0.0101
		(0.00247)	(0.0209)	(0.0240)
Constant		0.202	0.0329	-0.1692
		(0.469)	(0.2991)	(0.3608)
Observations		830	439	391

Note:significance \*\*\*p < 0,01; \*\*p < 0,05%; \*p < 0,1 ; (.) standard deviation

**Table A6:** Evolution of the youth employment and underemployment rate

Pays	Variables	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
<b>Came- roon</b>	Youth employment rate	53.750	53.675	53.580	53.468	53.325	53.06	52.803	52.491	52.149	51.771	50.734	51.231
	Youth unemployment rate	6.298	6.231	6.165	6.096	6.028	6.09	6.167	6.239	6.300	6.366	6.654	6.639
	Vulnerable employment rate	77.620	76.900	75.930	75.170	74.390	73.93	73.350	72.520	71.810	71.300		
<b>Chad</b>	Youth employment rate	44.465	43.766	43.073	42.377	41.681	40.98	40.282	39.583	38.885	38.467	35.747	36.827
	Youth unemployment rate	1.592	1.592	1.579	1.570	1.557	1.54	1.531	1.512	1.490	1.522	2.244	2.439
	Vulnerable employment rate	90.070	89.880	89.400	90.440	90.230	90.30	91.470	92.070	92.220	92.250		
<b>Congo</b>	Youth employment rate	36.358	35.050	33.772	33.853	33.888	33.85	33.840	33.770	33.648	33.458	31.337	32.499
	Youth unemployment rate	7.346	7.889	8.436	8.436	8.440	8.46	8.496	8.503	8.508	8.533	9.745	10.078
	Vulnerable employment rate	83.130	81.740	80.550	79.600	78.560	78.26	78.280	77.820	77.030	77.310		
<b>Cote d'Ivoire</b>	Youth employment rate	34.014	32.914	31.894	32.201	31.488	30.77	30.026	28.551	28.279	28.007	27.424	27.628
	Youth unemployment rate	9.699	10.003	10.127	6.425	5.568	4.70	3.837	5.379	5.456	5.535	5.770	5.683
	Vulnerable employment rate	78.400	78.210	76.880	75.700	74.610	73.97	73.000	71.850	70.590	69.310		
<b>Senegal</b>	Youth employment rate	29.443	28.580	27.962	27.322	26.695	26.05	26.403	26.687	26.603	26.468	24.846	25.601
	Youth unemployment rate	13.139	12.719	11.543	10.408	9.205	8.03	6.425	4.891	4.452	4.008	4.934	5.038
	Vulnerable employment rate	70.380	69.290	68.420	67.780	66.670	65.72	65.040	64.200	63.520	62.800		

Source: Constructed from World Bank (WDI) 2021 data.