**ASPROWORDA**

# Gender Analysis of Labor Force Outcomes: Evidence from Cameroon

*Jean C. Kouam,*
*Simplice A. Asongu,*
*Robert Nantchouang*
    *&*
*Denis Foretia*

*Association for Promoting Women in Research and Development in Africa*

# Gender Analysis of Labor Force Outcomes: Evidence from Cameroon[1]

**Jean C. Kouam**
Nkafu Policy Institute,
Opposite College Jesus-Marie,
Simbock, Yaoundé – Cameroon
E-mails: jkouam@foretiafoundation.org,
jcedrickouam@yahoo.fr


**Simplice A. Asongu**
Nkafu Policy Institute,
Opposite College Jesus-Marie,
Simbock, Yaoundé – Cameroon
E-mails: asongusimplice@yahoo.com,
asongus@afridev.org


**Robert Nantchouang**
Nkafu Policy Institute, Opposite College Jesus-Marie,
Simbock, Yaoundé – Cameroon
E-mail: rnantchouang@foretiafoundation.org


**Denis Foretia**
Nkafu Policy Institute, Opposite College Jesus-Marie,
Simbock, Yaoundé – Cameroon
E-mail: dforetia@foretiafoundation.org

---

# Gender Analysis of Labor Force Outcomes: Evidence from Cameroon

**Jean C. Kouam, Simplice A. Asongu, Robert Nantchouang & Denis Foretia**

## Abstract

The present study contributes to the extant literature by assessing how financial and human developments moderate the incidence of vulnerable female employment on female labour force participation in Cameroon for the period 1987 to 2020 using the generalized least squares (GLS) estimation approach. Human development and financial development moderating or policy variables are also employed in order to improve space for policy implication. It is apparent from the findings that human development in the perspective of the human development index (HDI) and broad money supply are necessary and sufficient conditions to moderate vulnerable female employment for female labour force participation. Accordingly, HDI thresholds of between 0.591 and 0.634 are needed to reverse to the negative incidence of female vulnerable employment on female labour force participation. Furthermore, a threshold of 30.294 (% of GDP) of broad money supply is also needed to reverse the negative incidence of vulnerable female employment on female labour force participation. Other implications for policy are discussed.

*Keywords*: Gender: Labor force; Cameroon; Sustainable development
*JEL Classification*: G20; I10; I32; O40; O55

## 1. Introduction

The positioning of a study on gender analysis of labor force outcomes in Cameroon is motivated by three main strands in the policy and scholarly literature, notably: (i) the growing policy syndrome of inequality in Africa in general and Cameroon in particular; (ii) the importance of gender inclusion in the post-2015 development agenda of sustainable development goals (SDGs), especially in the light of the low involvement of women in the formal economic sector and (iii) the relevance of bridging gaps in the extant literature. These three motivational elements are substantiated in what follows in the same chronology as highlighted.

First, the involvement of women in the formal economy is clearly articulated in SDG5 (i.e. "*achieve gender equality and empower all women and girls*") of the post-2015 development agenda of sustainable development by the United Nations. The relevance of this policy insight is, *inter alia*, to mitigate income inequality that has been established as the main setback to the achievement of SDGs in Africa. For instance, according to a recent study by Bicaba *et al.* (2017), unless the policy concern of inequality is addressed in Africa, most countries on the continent are not likely to achieve most SDGs related to poverty and inequality. Cameroon is among countries in Africa with a substantial rate of inequality (Alvaredo et al., 2021; Etoh-Anzah & Njong, 2021; Nanche, 2021; Ntembe et al., 2021) and the scholarly position that income inequality has to be addressed for most SDGs in Africa to be achieved is consistent with a growing strand of contemporary development literature focusing on SDGs (Tchamyou, 2019, 2020; Asongu & le Roux, 2019; Asongu & Odhiambo, 2019). It is worthwhile to emphasize that the SDG poverty related target consists of reducing extreme poverty to a critical mass of below 3% which is the acceptable threshold for the achievement of the underlying SDG.

Second, SDG5 on gender equality is clearly articulated in SDGs as critical to boosting economic development in most developing countries. This is essentially because the involvement of women in the formal economic sector has been documented to boost economic development (Achuo *et al*., 2022), not least, because most women in developing countries and especially African countries are involved in unpaid and informal economic activities such as farming and petty trading ( Ngono, 2021; Asongu *et al*., 2021a). Moreover, Africa has documented been

documented to be the continent with the highest rate of female poverty (Hazel, 2010; Nwani & Osuji, 2020).

Third, this study contributes to the extant literature on gender economic outcomes in Africa in general and Cameroon in particular, not least, because to be best of knowledge, the extant Cameroon-centric literature has failed to engage the problem statement. In essence, extant contemporary studies on gender inclusion in Cameroon have largely focused on *inter alia*: income inequality under colonial rule (Alvaredo *et al*., 2021); rural income inequality within the remit of non-timber forest incomes and economic welfare (Etoh-Anzah & Njong, 2021); income inequality in an urban area in Cameroon such as Douala (Nanche, 2021) and healthcare redistributive effects (Ntembe *et al*., 2021). The Cameroon gender-centric literature has largely focused on *inter alia*, nexuses between gender, ethnicity and vulnerability to climate change (Azong & Kelso, 2021); earnings gap between men and women in the informal labor market (Wirba et al., 2021) and drivers of gender gap in financial inclusion (Ndoya & Tsala, 2021).

Beyond the direct nexus between gender inclusion and SDGs, it is also important to clearly show how gender inclusion is conceptually linked to sustainable development in the light of extant literature. The theoretical nexus between gender inclusion and sustainable development is within the remit of Amavilah *et al*. (2017) who have established that for inclusive development to be sustainable it should be sustained and for sustained development to be sustainable, it should be inclusive. It follows that gender inclusion is theoretically linked to sustainable development because one of the purposes of this study is to assess how gender inclusion can be promoted and by extension, sustained.

In the light of the above, the present study contributes to the extant literature by assessing how financial and human developments moderate the incidence of vulnerable female employment on female labour force participation in Cameroon. The corresponding research question is therefore: how do human and financial developments moderate the effect of vulnerable female employment on female labour force participation in Cameroon? The intuition for the nexus between vulnerable female employment and labor force participation is simple to follow, not least because, women with vulnerable employment are likely to lose employment and by extension, reduce the participation of women in the labour force (Asongu & Odhiambo, 2020; Nchofoung *et al*., 2022).

The rest of the study is structured as follows. This introduction is followed by the Section 2which provides insights into the data and methodology. The empirical results are provided in Section 3 while Section 4 concludes with implications and future research directions.

## 2. Methodology and data

### 2.1 Data

The theoretical descriptions between the different explanatory variables of the model and the explained variable are justified in this section. The explained variable is naturally "female labor force" ($fem_{lf}$). According to the World Bank (2020), the female labor force as a percentage of the total of labor force shows the extent to which women are actively involved in the labor force. Accordingly, labor force entails people aged 15 and older who supply labor to be used in the production of goods and services within a specified period.

The explanatory variables used in the model are:

- *Total benefits from natural resources as % of GDP ($ressour\_nat$):* According to the World Bank, total natural resource revenues is the sum of revenues from oil, natural gas, coal, minerals and forests. The inclusion of this variable in the model is crucial given Cameroon's dependence on export revenues, which are mostly made up of revenues from raw materials such as oil. Indeed, according to a report published by the United Nations (2021), it was concluded that unequal access to ownership and control of natural resources between men and women significantly affects natural resource governance.

- *GDP growth ($y$):* Gross domestic product (GDP) reflects the sum of value added by all its producers. Value added corresponds to the value of the gross output of producers minus the value of intermediate goods and services that is consumed in production, prior to accounting for consumption of fixed capital in production. Girón (2021) shows that there is a negative and significant relationship between the Gender Inequality Index and economic growth. Also, Cabeza-García (2018) shows that gender inequality has a negative impact on economic growth. Furthermore, the study notes that educating women can reduce fertility and increase the level of education of future generations and that women with more education have more job opportunities, which directly impacts economic growth.

- *Vulnerable employment, ($fem\_ve$):* Vulnerable employment entails contributing family workers as well as own-account workers as a percentage of total employment.

Schwidrowski et al (2021) show that policies supporting women's employability could reduce persistent labor market inequalities in middle-income countries in Africa.

- *Inflation* ($infl$): Inflation, as represented by the consumer price index, indicates the annual percentage change in the cost to the average consumer of acquiring a basket of goods and services that may be fixed or changed at specific intervals, such as each year. The link between inflation and gender inequality has been established in the literature. According to Neyer and Stempel (2021), after a negative demand shock, the economic downturn is more severe in comparison to a non-discriminatory environment, as the shock implies an increase in the inefficient utilization of female and male productivity; and the working time allocation between women and men becomes more inefficient.

- *Financial development* ($dev\_fin$). Financial development is captured by broad money as a percentage of GDP. Broad money represents the sum of currency outside banks, demand deposits other than those of the central government as well as time deposits, foreign currency deposits and savings deposits of the resident sectors other than the central government, traveler's checks and bank as well as other securities such as commercial paper and certificates of deposit. Fanta (2016) investigates the impact of financial inclusion on gender inequality and concludes that financial services are biased against females.

- *Annual population growth rate* ($pop\_growth$): Annual growth rate of the population for year $t$ is the exponential rate of growth of the population in mid-year from year $t-1$ to $t$, in terms of percentage. Population is premised on the *de facto* definition of population that takes into account all residents regardless of citizenship or legal status. According to Veas and al (2021), gender inequalities have a significant impact on population health. Moreover, the authors show that promoting gender equality in public policy is essential to optimizing health at the population level.

- *Foreign direct investment* ($FDI$): According to the World Bank (2020), Foreign direct investment is the net inflow of investment needed to acquire a substantial interest (10 percent or more in terms of the voting shares) in a corporation in an economy other than that of the investor. Such represents the sum of equity, other long-term capital, reinvested earnings, and short-term capital recorded in the balance of payments. According to several studies, women are more risk-averse than men in investment decisions and that women favor stable, easy-to-manage investments generally investing less in securities and being more conservative investors (Bernasek & Shwiff, 2001). For Graham (2002), gender is the third most powerful determinant of investing, after age and income are considered.

- *Corruption* ($corrupt$): As a proxy for political risk. According to Swamy et al. (1999), parliaments with more female members correlate with lower levels of corruption. Research has also shown that women tend to speak up more for the interests of communities and promote women's rights legislation as well as children's rights.

- *Trade openness* ($trad\_open$): Defined as the share of trade in the national income. The rationale for taking the variable "trade openness" in this study includes the fact that greater integration with global markets leads to increased gender inequalities in literacy (Lutz, 2007). Similarly, according to Leanne (2011), a reduction in tariffs on labor-intensive imports hurts the employment of women compared to the employment of men.

- *Human development index* ($HDI$): which measures the average level of human development achieved by each country in three key areas: longevity and health; income and education. Its mapping allows us to understand the distribution of inequalities in the world. Gender inequality is one of the greatest barriers to human development progress. According to United Nations Development Programme (2010), when girls stay in the education system, they have more opportunities, better-educated and healthier children, which in turn stimulate national development.

- *Urbanization* ($urban$): As a proxy variable for infrastructures. According to Bruin (2022), urbanization reduces gender differentials in unpaid work. Urbanization is often associated with greater independence and opportunity for women. But in many cities, there are also high risks of violence and constraints on employment, mobility and leadership that reflect deep gender-based inequalities.

- *Female unemployment* ($fem\_unempl$), which entails the share of the labor force that is not having work but available for and seeking employment. Schwidrowski et al (2021) show that policies supporting women's employability could reduce persistent labor market inequalities in middle-income countries in Africa.

- *Gross fixed capital formation, share of GDP* ($GFCF$) is the acquisition less disposal of fixed assets by resident producers. Fixed assets are tangible or intangible assets derived from production processes and used repeatedly or continuously in other production processes for at least one year. The relationship between capital investment and women's work is well illustrated in the literature. For example, a study by Noland, et al. (2016) indicates that having 30% women in management positions can be associated with a 1% increase in net margin, equivalent to 15% of profitability.

After the summary description of the variables, the model to be estimated takes the following form:

$$fem\_lf_t = \beta_0 + \beta_1 ressourc\_nat_t + \beta_2 y_t + \beta_3 fem\_ve_t + \beta_4 infl_t + \beta_5 dev\_fin_t +$$
$$\beta_6 pop\_growth_t + \beta_7 FDI_t + \beta_8 corrupt_t + \beta_9 trad\_open_t + \beta_{10} HDI_t +$$
$$\beta_{11} GFCF_t + \beta_{12} urban_t + \varepsilon_t$$

It is important to note that the expected signs from the control variables are not of major interest because the study involves interactive regressions in which the potential multicollinearity between the independent variables of interest and control variables is overlooked (Tchamyou *et al*., 2019). It is for this reason that in interactive regressions, the corresponding concern of multicollinearity is addressed by computing net effects and/or thresholds associated with the independent variables of interest. Such net effect entails both the unconditional and conditional effects linked to the attendant independent variables of interest (Nchofoung *et al*., 2022).

## 2.2. Methodology

By searching for a parsimonious model ensuring a good balance between the goodness of fit and the variance of the parameters in order to minimize the empirical risk, we implement a "stepwise" regression, based on the existence of a possible heteroscedasticity of the errors (i.e. robust regression). A variable elimination step is introduced by the algorithm after each step of selection in order to purge the model of variables that become less useful owing to the newly introduced variables. The stepwise regression enables the study to obtain the best linear regression model by the generalized least squares (GLS) method. It proceeds by stepwise selection of explanatory variables with a stopping rule. Indeed, stepwise regression is a popular data-mining tool that uses statistical significance to select the explanatory variables to be used in a multiple-regression model (Smith, 2018). Stepwise regression selects explanatory variables for multi-regression models based on their statistical significance. Although it has often been subject to criticism for the misapplication of single-step statistical tests to a multi-step procedure, stepwise regression has gained popularity with Big Data as it is a very efficient way to select a relatively small number of explanatory variables from a large set of possibilities. Hence, we examine whether it is appropriate to drop some of the explanatory variables previously retained and no longer needed. These introductions and rejections are done through Student's significance tests at levels set by the statistical software.

In the literature, several authors have emphasized the importance of using the generalized least squares method. This is notably the case of Ahmad et al. (2014) who have used the generalized

least squares estimation technique when the distribution of the data is not normally distributed and the use of ordinary least squares (OLS) to analyze the sample data can produce biases and inefficient estimators. According to Menke (2015), the generalized least squares (GLS) method uses both data and prior information to solve for a best-fitting set of model parameters. Kantar (2015) demonstrates that standard regression models are useful for estimating distribution parameters due to their simplicity of calculation and graphical presentation. However, these regression models typically have heteroscedasticity and/or correction problems that can be corrected by weighted least squares estimation or alternative estimation methods such as generalized least squares.

In this model, a quantitative variable $Y$ to be explained (or response, exogenous, dependent) is related to $p$ quantitative variables$(X^1 . . . X^p)$ known as explanatory (or control, endogenous, independent, regressors, predictors). The data are assumed to come from the observation of a statistical sample of size$n$ $(n > p + 1)$de: $\mathbb{R}^{p+1}$ :

$$(x_i^1, \ldots \ldots x_i^j, \ldots \ldots \ldots x_i^p, y_i) \qquad\qquad i = 1, \ldots \ldots \ldots n$$

The writing of the linear model in this situation leads to the assumption that the expectation of Y belongs to the subspace of$\mathbb{R}^n$ generated by $\{1, X^1, \ldots \ldots \ldots X^P \}$ where 1 denotes the vector of$\mathbb{R}^n$. The $(p + 1)$ random variables verify:

$$Y_i = \beta_0 + \beta_1 X_i^1 + \beta_2 X_i^2 + \ldots \ldots + \beta_p X_i^p + \varepsilon_i, \qquad i = 1, \ldots \ldots \ldots n$$

With the following assomptions :

- The $\varepsilon_i$ are independent and identically distributed error terms;$E(\varepsilon_i) = 0, Var(\varepsilon) = \sigma^2 I$.

- The terms $X^j$ are assumed to be deterministic (controlled factors) or the error ε is independent of the joint distribution of:$X^1, \ldots, X^p$. In the latter case, we write that:

  $$E(Y|X^1, \ldots, X^p) = \beta_0 + \beta_1 X^1 \beta_2 X^2 + \ldots \ldots \ldots + \beta_p X^p$$

And :

$$Var(Y|X^1, \ldots, X^p) = \sigma^2$$

- The unknown parameters $\beta_0 \ldots \beta_p$are assumed to be constant.

- Optionally, for the specific study of the laws of the estimators, a fourth assumption considers the normality of the error variable ε ($N (0, \sigma^2 I)$). The $\varepsilon_i$ are then $i.i.d.$ of law $N (0, \sigma^2)$.

The data are arranged in a matrix $X(n \times (p + 1)$ of general term$X_i^j$, whose first column contains the vector 1 ($X_0^i = 1$), and in a vector Y of general term Y_i. Noting the vectors $\varepsilon = [\varepsilon_1, \ldots \ldots, \varepsilon_p]'$ and $\beta = [\beta_0 \beta_1, \ldots \ldots, \beta_0]'$, the model is written matrix-wise:

$$Y = X\beta + \varepsilon.$$

In our study, the results of the GLS estimate of the relationship between the dependent variable and the variables retained at a level set at 5%. The following section presents the variables used and the sources of the data collected.

It is important to clarify that the estimation technique is based on interactive regressions because the present study is designed to assess how financial and human developments moderate the incidence of vulnerable female employment on female labour force participation. As clarified in the previous section, in interactive regressions, net effects and/or thresholds are computed in order to account for the concern of multicollinearity that is overlooked (Tchamyou *et al.*, 2019; Nchofoung *et al.*, 2022).

## 2.2. Sources of variables

The data used come from two main sources. First, we use annual data from the World Bank's World Development Indicators (2020). Second, data specific to institutional variables are taken from Polity IV Project Online (2017). The series considered are annual and are in the form of time series. They cover the period from 1987 to 2020. The choice of this period is mainly justified by the availability of data as well as the liberal gender promotion policies, implemented in the country since the 1980s. The descriptive statistics suggest little variation for some of the descriptive variables. The summary statistics is used by the research to confirm the perspective that the variables being considered are comparable from the perspective of mean values. Furthermore, the corresponding variations from the standard deviations also provide insights into the perspective that reasonable estimated nexuses can be obtained from the regressions.

**Table 1: Summary statistics**

|  | fem_ve | corrup | dev_fin | y | GFCF | fem_lf | FDI | HDI | infl | trad_open | pop_growth | ressourc_nat | urban |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mean | 5.22 | 2.51 | 16.21 | 2.18 | 18.33 | 47.71 | 8.67 | 0.48 | 3.41 | 5.31 | 2.76 | 7.57 | 46.12 |
| Median | 4.80 | 2.42 | 16.52 | 3.68 | 18.31 | 48.12 | 8.75 | 0.47 | 2.04 | 6.94 | 2.71 | 7.30 | 46.14 |
| Maximum | 6.70 | 3.75 | 21.63 | 7.05 | 24.70 | 48.54 | 9.50 | 0.56 | 35.09 | 9.61 | 3.18 | 13.10 | 54.94 |
| Minimum | 3.50 | 2.00 | 10.27 | -7.93 | 13.76 | 46.64 | 7.00 | 0.43 | -3.21 | -11.20 | 2.55 | 5.09 | 36.21 |
| Std. Dev. | 1.12 | 0.54 | 3.50 | 3.90 | 1.81 | 0.78 | 0.59 | 0.05 | 6.29 | 4.20 | 0.17 | 2.02 | 5.44 |
| Skewness | 0.15 | 0.69 | -0.08 | -1.41 | 0.60 | -0.42 | -1.48 | 0.51 | 3.99 | -2.22 | 1.33 | 0.68 | -0.04 |
| Kurtosis | 1.30 | 2.43 | 1.64 | 3.94 | 7.12 | 1.36 | 5.21 | 1.78 | 20.35 | 8.37 | 3.76 | 2.92 | 1.84 |
| Jarque-Bera | 3.71 | 2.85 | 2.49 | 12.59 | 26.07 | 4.39 | 14.84 | 3.14 | 516.59 | 68.75 | 10.82 | 2.54 | 1.74 |
| Probability | 0.16 | 0.24 | 0.29 | 0.00 | 0.00 | 0.11 | 0.00 | 0.21 | 0.00 | 0.00 | 0.00 | 0.28 | 0.42 |
| Sum | 156.47 | 77.92 | 518.83 | 74.23 | 623.15 | 1478.95 | 225.40 | 14.47 | 115.79 | 180.58 | 93.75 | 249.71 | 1429.68 |
| Sum Sq. Dev. | 36.43 | 8.75 | 380.09 | 502.14 | 107.69 | 18.25 | 8.70 | 0.06 | 1306.43 | 582.71 | 0.90 | 130.56 | 886.46 |

*Notes: Female labor force ($fem_{lf}$); Total benefits from natural resources as % of GDP ($ressour\_nat$); GDP growth ($y$); vulnerable employment, ($fem\_ve$); inflation ($infl$); financial development ($dev\_fin$); annual population growth rate ($pop\_growth$); foreign direct investment (FDI); corruption ($corrupt$); trade openness ($trad\_open$); human development index (HDI); urbanization ($urban$); Female unemployment ($fem_{unempl}$). Source: Authors*

The objective of the correlation matrix (see Table 2 below) is to control for potential issues of multicollinearity which could substantially bias estimated coefficients. By examining the correlation matrix, it appears that all variables are weakly correlated with the variable "Female

labor force." However, the existing correlations between these variables are not high to create serious multicollinearity problems except between $fem\_ve$ and $HDI$ (0.84) for on the one hand and between $urban$ and $HDI$ (0.94) on the other hand. However, due to the fact that the correlation coefficient between the vulnerable female employment variables and the human development index is high and negative, we will not include these two variables in the model at the same time. Indeed, a threshold of 0.7 has been established by Kennedy (2008) for assessing the concern surrounding multicollinearity which could affect the signs of estimated coefficients and by extension, engender misplaced policy implications. Furthermore, by evaluating the signs of the variables that reflect a higher correlation coefficient, it appears that the $HDI$ and $fem\_ve$ variables reflect opposite signs, which means that there is a real multicollinearity problem between them. This additional assessment is based on the fact that when there is a conflict of substitution due to multicollinearity problems, the two highly collinear variables emerge from the regression result with opposite signs, as only one of them emerges with the expected sign (Beck et al., 2003; Asongu et al., 2021b).

**Table 2: Correlation matrix**

| | fem_ve | corrup | dev_fin | y | GFCF | fem_lf | FDI | HDI | infl | trad_open | pop_growth | ressourc_nat | urban |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| fem_ve | 1 | -0.30 | -0.58 | -0.32 | -0.53 | 0.53 | 0.22 | -0.84 | 0.18 | -0.26 | 0.02 | -0.30 | -0.86 |
| corrup | -0.30 | 1 | 0.15 | -0.44 | -0.26 | 0.14 | -0.61 | -0.08 | 0.19 | -0.36 | 0.62 | 0.57 | -0.14 |
| dev_fin | -0.58 | 0.15 | 1 | -0.10 | 0.17 | -0.70 | -0.57 | 0.73 | -0.17 | 0.15 | 0.45 | 0.06 | 0.53 |
| y | -0.32 | -0.44 | -0.10 | 1 | 0.80 | -0.15 | 0.51 | 0.37 | 0.08 | 0.16 | -0.81 | 0.02 | 0.57 |
| GFCF | -0.53 | -0.26 | 0.17 | 0.80 | 1 | -0.27 | 0.35 | 0.56 | -0.05 | 0.27 | -0.62 | 0.03 | 0.71 |
| fem_lf | 0.53 | 0.14 | -0.70 | -0.15 | -0.27 | 1 | 0.10 | -0.84 | 0.09 | -0.20 | -0.04 | -0.05 | -0.71 |
| FDI | 0.22 | -0.61 | -0.57 | 0.51 | 0.35 | 0.10 | 1 | -0.07 | 0.17 | 0.06 | -0.80 | -0.45 | 0.14 |
| HDI | -0.84 | -0.08 | 0.73 | 0.37 | 0.56 | -0.84 | -0.07 | 1 | -0.22 | 0.36 | -0.12 | 0.03 | 0.94 |
| infl | 0.18 | 0.19 | -0.17 | 0.08 | -0.05 | 0.09 | 0.17 | -0.22 | 1 | -0.95 | 0.06 | 0.10 | -0.22 |
| trad_open | -0.26 | -0.36 | 0.15 | 0.16 | 0.27 | -0.20 | 0.06 | 0.36 | -0.95 | 1 | -0.33 | -0.15 | 0.42 |
| pop_growth | 0.02 | 0.62 | 0.45 | -0.81 | -0.62 | -0.04 | -0.80 | -0.12 | 0.06 | -0.33 | 1 | 0.19 | -0.37 |
| ressourc_nat | -0.30 | 0.57 | 0.06 | 0.02 | 0.03 | -0.05 | -0.45 | 0.03 | 0.10 | -0.15 | 0.19 | 1 | 0.06 |
| urban | -0.86 | -0.14 | 0.53 | 0.57 | 0.71 | -0.71 | 0.14 | 0.94 | -0.22 | 0.42 | -0.37 | 0.06 | 1 |

*Notes: Female labor force ($fem_{lf}$); Total benefits from natural resources as % of GDP ($ressour\_nat$); GDP growth ($y$); vulnerable employment, ($fem\_ve$); inflation ($infl$); financial development ($dev\_fin$); annual population growth rate ($pop\_growth$); foreign direct investment (FDI); corruption ($corrupt$); trade openness ($trad\_open$); human development index (HDI); urbanization ($urban$); Female unemployment ($fem_{unempl}$). Source: Authors*

## 3 Empirical results

### 3.1. Stationarity tests

We performed the Augmented Dickey Fuller test (ADF Test) to analyze the level of Stationarity between the variables. This is *statistical test* usually *used to verify whether a time series is stationary or not.* The unit root test is then carried out under the null hypothesis $(\pi_i = 0)$ against the alternative hypothesis $(\pi_i < 0)$. The statistics from the ADF test can be significant at 1%, 5% and 10% levels. The value of the test statistic is compared with the p-value for time series. When the value of test statistic is greater than 0.01, 0.05, and 0.1, then the decision criteria will fail to reject the alternative hypothesis and the time series is stationary.

Our results show that the variables fem_ve and fem_unempl are integrated of order 2 [$I(2)$], while the variables $fin\_dev$; $HDI$; $pop\_growth$; $resourc\_nat$ are integrated of order 1 [($I(1)$)]. These variables will be introduced into the model by stationarizing them once for the [$I(1)$] variables and twice for the $I(2)$ variables.

This method has been used by Wolters et al. (2005) where they reveal that the occurrence of unit roots in economic time series has substantial consequences for both univariate and multivariate econometric modelling. Hence, unit root tests are in the contemporary era, the starting point of most empirical research building on time series data. The Dickey and Fuller (1979) test appear to be one of the most widely used test.

For Perron (2001), when there are errors that are characterized by a moving-average root close to $-1$, an augmented auto regression of high order is necessary for unit root tests to reflect good size. However, the information criteria such as the *AIC* and the *BIC* tend to choose a truncation lag ($k$) that is substantially small.

**Table 3: Unit root tests**

|  | *Statistics* | *Probability* | *level of Cointegration* |
|---|---|---|---|
| $fem_{ve}$ | $-5.15$ | 0.0003 | I(2) |
| $fin_{dev}$ | $-4.94$ | 0.0004 | I (1) |
| $HDI$ | $-2.85$ | 0.0645 | I(1) |
| $FDI$ | $-3.29$ | 0.0262 | I(0) |
| $pop\_growth$ | $-2.85$ | 0.0641 | I(1) |
| $urban$ | $-1.97$ | 0.0482 | I(0) |
| $ressourc_{nat}$ | $-6.531$ | 0.0000 | I(1) |
| $trad\_open$ | $-2.14$ | 0.0333 | I(0) |
| $fem\_unempl$ | $-5.04$ | 0.0000 | $I(2)$ |
| $y$ | $-1.90$ | 0.0552 | $I(0)$ |
| $inf$ | $-8.94$ | 0.0000 | $I(0)$ |
| $GFCF$ | $-4.6006$ | 0.0008 | I(0) |
| $Corruption$ | $-3.98978$ | 0.0047 | I(1) |

*Notes: Female labor force ($fem_{lf}$); Total benefits from natural resources as % of GDP ($ressour\_nat$); GDP growth ($y$); vulnerable employment, ($fem\_ve$); inflation ($infl$); financial development ($dev\_fin$); annual population growth rate ($pop\_growth$); foreign direct investment (FDI); corruption ($corrupt$); trade openness ($trad\_open$); human development index (HDI); urbanization ($urban$); Female unemployment ($fem_{unempl}$). Source: Authors*

### 3.1 Empirical results

Considering model (5), which takes into account most of the variables retained in the study, it appears that over the period from 1987 to 2020, any increase in the number of vulnerable jobs among women leads to a decrease in the female labor force. As such, a 10 percent unconditional increase in the number of vulnerable jobs for women leads to a 8.19 percent decline in the female labor force as a percentage of the total labor force. This result implies that a decrease in the number of vulnerable jobs for women would unconditionally strengthen the female labor

force or women's participation in economic activity. This result is similar to that obtained by Pissarides (2006).

Similarly, over the period, we show that the relationship between financial development and female labor force participation in Cameroon was negative and significant. Specifically, a 10 percent increase in money supply as a percentage of GDP (a proxy for financial development) would results in a 0.6 percent decrease in women's participation in economic activity. This negative correlation between financial development and women's labor force can be explained by, on the one hand, persistent wage inequalities between men and women and on the other, the difficulties women face in accessing credit (finance) in most SSA countries. This finding is similar to that obtained by Morsy and Youssef (2017) who show that credit rationing through high interest rates deters proportionally more female entrepreneurs than male entrepreneurs from applying for loans, while the lack of collateral may imply that they have less access to loans than their male counterparts. Accordingly, when they do have access, women generally face stricter loan conditions than men. Moreover, in the credit market, factors such as a lack of financial literacy, risk aversion, and fear of failure may prevent women entrepreneurs from applying for loans. The same is true of infrastructure development (urbanization). A 10% improvement in the quality of infrastructure contributes to a decrease of about 2.65 % in the participation of women in the labor force.

Furthermore, our results reveal that a 10% increase in foreign direct investment between 1987 and 2020 in Cameroon would have resulted in a 3.73% decrease in women's participation in economic activity. Such a result means that women tend to lose their jobs to more qualified men when industries are modernized through the transfer of technology from foreign direct investment. While foreign direct investment contributes globally to the feminization of labor in developing countries (Saadi, 2010), the high wage gap between men and women still negatively affects women's productivity and consequently their know-how.

The relationship between population growth and female labor force participation in economic activity is however positive and significant over the period considered. Our results show that a 10% increase in the total population contributes to a 62.6% increase in the female labor force. Indeed, an increase in demand, via the increase in population, stimulates investment which in turn drives economic growth. Following May and Guengant (2020), we show that population growth, under certain conditions, positively affects economic growth via the massive participation of women in economic activity. We also show that greater trade openness improves women's participation in economic activity. In essence, Cameroon's economy is extroverted and most of the products exported are from agriculture, which has a higher

proportion of women. Accordingly, agriculture in the rural sector is mainly dominated by women who represent 71.6% in the informal agricultural sector (OCHA, 2019)[2].

**Table 4: Empirical results (GLS method)**

|  | (1) | (3) | (4) | (5) |
|---|---|---|---|---|
| $HDI(-1)$ | $-119.51^{**}$ (0.0593) | $-102.27^{***}$ (0.0872) | $166.22^{***}$ (0.0040) | $-132.52^{***}$ (0.0099) |
| $fem_{ve}(-2)$ | $-0.091^{**}$ (0.0441) | $-0.680$ (0.1205) | $-1.326^{***}$ (0.0023) | $-1.066^{***}$ (0.0061) |
| $fem_{ve}(-2) * HDI(-1)$ | $1.52$ (0.1093) | $1.215$ (0.1649) | $2.241^{***}$ (0.0084) | $1.681^{***}$ (0.0267) |
| $pop_{growth}(-1)$ | $-$ | $-$ | $-$ | $-$ |
| $y$ | $0.1732^{**}$ (0.0004) | $0.051$ (0.1167) | $0.1143^{**}$ (0.0116) | $0.1228^{**}$ (0.0031) |
| $corrupt(-1)$ | $-$ | $0.601^{***}$ $-$ | $-$ | $0.359^{**}$ (0.0242) |
| $ressourc_{nat}(-1)$ | $-0.031$ (0.4226) | $0.0009$ (0.9833) | $-0.093^{**}$ (0.0491) | $-0.121^{***}$ (0.0080) |
| $Urban$ | $-0.035$ (0.1267) | $-$ | $-$ | $-$ |
| $fin_{dev}(-1)$ |  |  | $-0.093^{**}$ (0.0491) | $-0.1074^{*}$ (0.0687) |
| $infl$ | $-0.2293^{**}$ (0.0007) | $-0.033$ (0.1311) | $-0.166^{**}$ (0.0236) | $-0.12^{*}$ (0.0657) |
| $trad\_open$ | $-0.5183^{**}$ (0.0005) |  | $-0.4024^{***}$ (0.0076) | $-0.03014^{**}$ (0.0245) |
| $fem_{unempl}(-2)$ | $-$ | $-$ |  | $-$ |
| $GFCF$ | $-$ | $-$ |  | $-$ |
| $FDI$ |  | $-$ |  | $-0.543^{*}$ (0.0541) |
| $C$ | $123.19^{***}$ (0.0004) | $104.09^{***}$ (0.0017) | $156.65^{***}$ (0.0000) | $137.62^{***}$ (0.0000) |
| Net Effect of fem | na | na | -0.250 | -0.259 |
| HDI threshold | na | na | 0.591 | 0.634 |
| $R - Squared$ | 0.9033 | 0.8379 | 0.933 | 0.989 |
| $R$ Squared adjusted | 0.8603 | 0.7839 | 0.896 | 0.980 |
| $F - statistic$ | 21.024 | 15.514 | 25.103 | 30.67 |
| $Prob(F - statistic)$ | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| $DW\ stat$ | 1.241 | 0.555 | 1.4842 | 1.8115 |

*Notes: The explained variable is the female labor force ($fem\_lf$). \*\*\*, \*\* and \*, significant levels at 1%, 5% and 10% respectively. The explained variable is naturally "female labor force" ($fem_{lf}$). The explanatory variables are: Total benefits from natural resources as % of GDP (ressour_nat); GDP growth ($y$); vulnerable employment, ($fem\_ve$); inflation (infl); financial development (dev_fin); annual population growth rate ($pop\_growth$); foreign direct investment (FDI); corruption (corrupt); trade openness (trad_open); human development index (HDI); urbanization (urban); Female unemployment ($fem_{unempl}$). Source: Authors*

Following contemporary literature (Tchamyou & Asongu, 2017; Nchofoung *et al*., 2021, 2022) on interactive regressions, this study computed net effects of vulnerable female employment on female labour force participation as well as the corresponding HDI thresholds, in order to avoid the pitfalls of interactive regressions documented in Brambor et al. (2006). In accordance with the attendant literature (Tchamyou *et al*., 2019; Tchamyou, 2020), interactive regressions are

---

[2]UN Office for the Coordination of Humanitarian Affairs (2019), *Data on gender equality in Cameroon*, October 2019.

not interpreted as in linear additive models which is why net effects and/or thresholds, involving both the unconditional and unconditional effects should be computed. Accordingly, by computing these thresholds and net effects, the potential concern of multicollinearity which is overlooked in interactive regressions is taken into account (Brambor et al., 2006).

In the light of the above, in the last specification of Table 4, the net effect of vulnerable female employment on female labour force participation is -0.259 =([0.48 × 1.681] + [-1.066]). In the attendant computation, 0.48 is the mean value of human development (i.e. HDI) apparent in the summary statistics, 1.066 is the unconditional effect of vulnerable female unemployment while 1.681 is the corresponding interactive or conditional effect. It is worthwhile note that net effects are not computed in regressions for which at least one estimated coefficient needed for the computation of such net effects is significant. In the light of computed net effects, human development has to reach a certain thresholds in order to mitigate the negative incidence of female vulnerable employment on female labour force participation. For instance, the corresponding HDI threshold in the last column (i.e. 0.634=[1.066/1.681) should be reached before the human development can effectively moderate vulnerable female employment to promote female labour force participation. It is also worthwhile to note that corresponding HDI thresholds are within theoretical range (i.e. 0.000 to 1.000).

**Table 5: Empirical results (GLS model specification)**

| | (1) | (2) | (3) |
|---|---|---|---|
| $dev\_fin$(-1) | 0.349 (0352) | −1.244* (0.0818) | 0.284 (0.447) |
| $fem_{ve}$(-2) | −0.368*** (0.002) | −0.515*** (0.0012) | −0.265*** (0.0027) |
| $fem_{ve}(-2) * dev\_fin(-1)$ | 0.00041 (0.427) | 0.017*** (0.0806) | −0.0051 (0.327) |
| $pop_{growth}$(-1) | − | − | 1.305 (0.174) |
| $HDI$(-1) | 30.539*** (0.000) | 33.359*** (0.000) | −40.416*** (0.000) |
| $y$ | − | 0.025 (0.146) | − |
| $corrupt$(-1) | − | − | −0.081 (0.277) |
| $debt$ | | −0.0091** (0.0073) | |
| $ressourc_{nat}$(-1) | −0.069** (0.0005) | −0.048** (0.0063) | −0.074*** (0.0005) |
| $Urban$ | −0.108** (0.0098) | −0.014** (0.0843) | − |
| $GFCF$ | 0.048** (0.037) | − | 0.057** (0.0356) |
| $infl$ | 0.002 (0468) | 0.0047 (0.3057) | −0.023 (0.498) |
| $trad\_open$ | − | − | −0.056 (0.391) |
| $fem_{unempl}$(-2) | −0.764*** (0.0000) | −0.515*** (0.0012) | −0.682*** (0.0000) |
| $FDI$ | −0.171 (0.1521) | − | −0.280** (0.0192) |
| $C$ | 99.103*** (0.0000) | 104.82*** (0.0000) | 89.244*** (0.0000) |
| $Net\ Effect\ of\ fem$ | na | -0.239 | na |
| $dev\_fin\ threshold$ | na | 30.294 | na |
| $R-Squared$ | 0.992 | 0.989 | 0.992 |
| $R\ Squared\ adjusted$ | 0.987 | 0.981 | 0.986 |
| $F-statistic$ | 202.57 | 136.96 | 153.25 |
| $Prob\ (F-statistic)$ | 0.000 | 0.000 | 0.000 |
| $DW$ | 2.11 | 1.26 | 2.82 |

*Note: The explained variable is the female labor force ($fem\_lf$). ***, ** and *, significant levels at 1%, 5% and 10% respectively. The explained variable is naturally "female labor force" ($fem_{lf}$). The explanatory variables are: Total benefits from natural resources as % of GDP ($ressour\_nat$); GDP growth ($y$); vulnerable employment, ($fem\_ve$); inflation ($infl$); financial development ($dev\_fin$); annual population growth rate ($pop\_growth$); foreign direct investment (FDI); corruption ($corrupt$); trade openness ($trad\_open$); human development index (HDI); urbanization ($urban$); Female unemployment ($fem_{unempl}$). Constants are included in all regressions. "na", not applicable because at least one estimated coefficient needed for the computation of the net effects and/or thresholds is not significant. Source: Authors.*

The computation framework employed in Table 4 is used in Table 5 with the following exceptions: (i) in the computation of net effects, the mean value of the moderating or financial development variable is 16.21. (ii) A threshold can be computed exclusively for Specification 2, because the unconditional and conditional effects have opposite signs that are significant. In the attendant specification, the unconditional effect of vulnerable female employment is negative while the interactive or conditional effect is positive. This implies that there is a critical mass or threshold of financial development at which the incidence of vulnerable female employment on the outcome variable changes from negative to positive. The critical mass is

30.294 of broad money as a percentage of GDP. (iii) When the unconditional and conditional effects have the same signs, we no longer talk of policy thresholds or thresholds for complementary policies. We instead talk of negative synergies (i.e. when both signs are negative) or positive synergies (i.e. when both signs are positive), because thresholds cannot be computed.

To put the above into greater perspective, at the 30.294 broad money threshold, the net effect of vulnerable female employment on female labour force participation is zero or $0.000 = ([30.294 \times 0.017] + [-0.515])$. Hence, policy makers should tailor measures such that the broad money supply (% of GDP) exceeds the targeted threshold in order for vulnerable female employment to no longer negatively affect female labour participation. This main policy recommendation can be achieved, *inter alia*, with the following policy suggestions.

## 4   Increasing human development and broad money supply: some policy directions

The development of the financial sector thus appears to be one of the essential components of women empowerment in Cameroon. According to our findings, this can contribute to decrease women's jobs vulnerability by enabling them to have access to finance. Otherwise, women's job vulnerability can have serious repercussions on the economic growth and price levels most of them being involved in the agricultural sector. In such a situation, financial intermediation becomes inefficient and therefore hinders economic activities. Furthermore, when the financial sector is not able to influence the allocation of resources and manage information in a timely manner, economic resources cannot be used productively (Gelbard & al., 2014). This allows us to make the following policy suggestions:

- *Reform the education system by making it more capable of responding to the needs of the society:* An education system at the service of social innovation and social entrepreneurship insofar as it provides solutions to the needs of society that are little or not solved proves to be an essential condition for the improvement of the HDI in Cameroon (acceleration of the needs for basic essential services, education, health, access to water, sanitation, housing, food, by way of illustration). Furthermore, education, when objective, will necessarily contribute to the improvement of human capital, to the satisfaction of the population's health care needs and to the increase in the population's income, with young people having greater access to paid and decent work. Overall, increased education, information and awareness of population growth and efforts to create jobs and opportunities for young people, especially girls and

adolescents, would make a significant and positive contribution to solving population and development problems.

- ***Government should promote the financial inclusion of women entrepreneurs***: In Cameroon, only 23% of women have an account in a formal financial institution, compared to 31% of men (Findex, 2017). The main reasons generally cited are: financial institutions are too far away, financial services are too expensive, lack of necessary documents, lack of trust in financial institutions, religious reasons, insufficient funds, because someone in the family has an account or because there is no need for financial services. Promoting women's financial inclusion by developing cheap and innovative financial products and diversifying financial institutions would significantly contribute to greater equality and empowerment. However, it should be stressed that this financial inclusion of women must be well supervised, both from the point of view of prudential controls and market behaviour to avoid potential systemic risk.

- ***Financial authorities should enhance women's access to credit***: Although there is a national policy on gender equality, it does not extend to women's economic and financial empowerment. Indeed, only 16.8% of women receive credit for any purpose in the country. The main reasons are that most women are involved in the informal sector and do not have the necessary collateral to apply for a loan. Only 3% of women own a house without a land title and 1.6% has a land title in their name. While it is true that some of them do own parcels of land that they develop, this does not allow them to have control over such land because they rarely receive an inheritance from their parents and/or husband. Thus, when land is at stake, women have few possibilities to assert their rights.

- ***Develop specific insurance products to strengthen the resilience of women's jobs.*** According to the World Bank (2020), 81% of women's jobs in Cameroon are vulnerable. Women are generally involved in seasonal and low-wage sectors of activity, where employment is always more vulnerable to economic crises (textiles-clothing and agri-food, e-trade, etc). These jobs are generally very vulnerable to shocks which plunge almost 79.2% of them into a situation of underemployment. Developing specific insurance products for them can contribute to strengthen the resilience of jobs.

## 5. Concluding implications and future research directions

This study assesses linkages between vulnerable female employment and female labour force participation in Cameroon for the period 1987 to 2020 using the generalized least squares (GLS) estimation approach. Human development and financial development moderating or policy variables are also employed in order to improve space for policy implication. It is apparent from the findings that human development in the perspective of the human development index (HDI) and broad money supply are necessary and sufficient conditions to moderate vulnerable female employment for female labour force participation. Accordingly, HDI thresholds of between 0.591 and 0.634 are needed to reverse to the negative incidence of female vulnerable employment on female labour force participation. Furthermore, a threshold of 30.294 (% of GDP) of broad money supply is also needed to reverse the negative incidence of vulnerable female employment on female labour force participation. It follows that human development (i.e. HDI) and financial development within the remit of broad money become necessary and sufficient moderators only when critical masses of HDI and broad money supply are reached. Other implications for policy, especially as it pertains to increasing human development and broad money supply have been discussed.

The findings obviously leave room for further research, especially in the light of considering other mechanisms by which vulnerable female employment affects female labour force participation. Moreover, other mechanisms and outcomes could also be considered within the framework of this study. In other words, human development and financial development can still be employed as moderating variables when other mechanisms (such as income inequality and gender inclusive education) and sustainable development outcomes (e.g. environmental sustainability and poverty alleviation) are considered.

**References**

1. Achuo, E. D., Asongu, S. A., & Tchamyou, V. S., (2022). "Women empowerment and environmental sustainability in Africa", *ASPROWORDA Working Paper* No. WP/22/004, Yaoundé.
2. Ahmad, A. C, J, & Mohd, A (2014), "Institutional Ownership and Market-based Performance Indicators: Utilizing Generalized Least Square Estimation Technique. Procedia", *Social and Behavioral Sciences*, 164, 477–485.

3. Alvaredo, F., Cogneau, D., & Piketty, T., (2021). "Income inequality under colonial rule. Evidence from French Algeria, Cameroon, Tunisia, and Vietnam and comparisons with British colonies 1920–1960", *Journal of Development Economics*, 152(September), 102680

4. Amavilah, V., Asongu, S. A., & Andrés, A. R., (2017). "Effects of globalization on peace and stability: Implications for governance and the knowledge economy of African countries", *Technological Forecasting and Social Change*, 122 (September), pp. 91-103.

5. Asongu, S. A., & le Roux, S., (2019). "Understanding Sub-Saharan Africa's Extreme Poverty Tragedy", *International Journal of Public Administration*, 42(6), pp. 457-467.

6. Asongu, S. A., & Odhiambo, N. M., (2019). "Basic formal education quality, information technology, and inclusive human development in sub-Saharan Africa", *Sustainable Development*, 27(3), pp. 419-428.

7. Asongu, S. A., & Odhiambo, N. M., (2020). "How enhancing gender inclusion affects inequality: Thresholds of complementary policies for sustainable development". *Sustainable Development*, 28(1), pp. 132-142.

8. Asongu, S. A., Biekpe, N., & Cassimon, D., (2021b). "On the diffusion of mobile phone innovations for financial inclusion", *Technology in Society*, 65(May), 101542.

9. Asongu, S. A., Nounamo, Y, Njangang, H., & Tadadjeu, S., (2021a). "Gender inclusive intermediary education, financial stability and female employment in the industry in Sub- 19 Saharan Africa", *Finance Research Letters*, 43(November), 101968.

10. Azong, M. N. & Kelso, C. J. (2021). "Gender, ethnicity and vulnerability to climate change: The case of matrilineal and patrilineal societies in Bamenda Highlands Region, Cameroon", *Global Environmental Change*, 67 (March), 102241.

11. Beck, T., Demirgüç-Kunt, A., & Levine, R., (2003). "Law and finance: Why Does Legal Origin Matter?" *Journal of Comparative Economics*, 31(4), pp. 653-675.

12. Bicaba, Z., Brixiova, Z., &Ncube, M., (2017). "Can Extreme Poverty in Sub-Saharan Africa be eliminated by 2030?" *Journal of African Development*, 19(2), pp. 93-110.

13. Brambor, T., Clark, W. M., & Golder, M. (2006). "Understanding Interaction Models: Improving Empirical Analyses", *Political Analysis*, 14 (1), 63-82.

14. Demirgüç-Kunt A. & Levine R. (2008), « Finance, Financial Sector Policies and Long-Run Growth », Banque mondiale, *Policy Research Working Paper*, n° 4469, janvier.

15. Dickey, D. A., & Fuller, W. A. (1979). Distribution of the estimators for autoregressive time series with a unit root. *Journal of the American Statistical Association*, *74*(366a), 427–431.

16. Etoh-Anzah, P. A., & Njong, M. A., (2021). "Non-timber Forest Incomes and Economic Welfare in the South-west Region of Cameroon: An Approach towards the Incidence on Rural Income Inequality", *Modern Perspectives in Economics, Business and Management*, 2(2021), pp. 88-101.

17. Gelbard, E & Gulde, A, M & Maino, R (2014). "Développement financier en Afrique subsaharienne : les enjeux pour une croissance soutenue," *Revue d'économie financière,* Association d'économie financière, vol. 0(4), pages 19-42.

18. Kantar, Y. M (2015), "Generalized Least Squares and Weighted Least Squares Estimation Methods for Distributional Parameters", *Statistical Journal*, Vol.13, 3, 263–282.

19. Kennedy, P. (2008). A Guide to Econometrics. Oxford: Blackwell Publishing.

20. May J.F., & Guengant Jean-Pierre. (2020). *Démographie et émergence économique de l'Afrique subsaharienne.* Bruxelles : Académie Royale de Belgique, 152 p. (L'Académie en Poche). ISBN 978-2-8031-0756-8.

21. Menke, W. (2015), "Review of the Generalized Least Squares Method", *Surv Geophys*, 36, 1–25 (2015). https://doi.org/10.1007/s10712-014-9303-1

22. Mohamed, S.S (2010), "Investissement direct étranger et emploi féminin au Maroc », Critique économique n° 26, *Institut Supérieur de Commerce et d'Administration des Entreprises,* Casablanca, Eté-Automne 2010, pp 43-61.

23. Morsy, H., & Youssef, H. (2017). "Access to Finance—Mind the Gender Gap." EBRD Working Paper 202, European Bank for Reconstruction and Development, London.

24. *Nanche, B. R. (2021).* "Income Inequality and the Poverty of Youth in the Douala Metropolis of Cameroon", *World Academy of Science, Engineering and Technology International Journal of Humanities and Social Sciences*, 15(4), pp. 384-400.

25. Nchofoung, T. N., Asongu, S. A., Kengdo, A. A. N., (2022). "Linear and non-linear effects of infrastructures on inclusive human development in Africa", *African Development Review*, 34(1), 81-96.

26. Nchofoung, T.N., Achuo, E.D. &Asongu, S. A., (2021). "Resource rents and inclusive human development in developing countries". Resources Policy, 74(4), 102382.

27. Nchofoung, T.N., Asongu, S. A., Tchamyou, V. S., & Edoh, O. (2022). "Gender political inclusion and democracy in Africa: some empirical evidence". *Politics & Policy*; Forthcoming.

28. Ndoya, H. H., & Tsala, C. O., (2021). "What drive gender gap in financial inclusion? Evidence from Cameroon", *African Development Review*, 33(4), pp. 674-687.

29. Ng, S., & Perron, P. (2001). "Lag Length Selection and the Construction of Unit Root Tests with Good Size and Power". *Econometrica*, 69, pp. 1519-1554.

30. Ngono, J. F. L., (2021). "Financing women's entrepreneurship in Sub-Saharan Africa: bank, microfinance and mobile money", *Labor History*, 62(1), pp. 59-73.

31. Ntembe, A., Tawah, R. & Faux, E. (2021). "Redistributive effects of health care out-of-pocket payments in Cameroon". *International Journal for Equity in Health* 20, 227 (2021).https://doi.org/10.1186/s12939-021-01562-8.

32. Nwani, S. E, & Osuji, E., (2020). "Poverty in Sub-Saharan Africa: The dynamics of population, energy consumption and misery index", *International Journal of Management, Economics and Social Sciences*, 9(4), pp. 247-270.

33. Noland, M., Moran, P, &Kotschwar, B (2016), "Is Gender Diversity Profitable? Evidence from a Global Survey", *Peterson Institute for International Economics*, Working papers series, WP 16-3, February 2016. https://www.piie.com/sites/default/files/documents/wp16-3.pdf

34. Pissarides, C. (2006). "Lisbon Five Years Later: What Future for European Employment and Growth?" Keynote Address delivered at the Austrian Presidency Conference on Innovations in Labor Market Policies: Challenges in Times of Globalization.

35. Saadi. M (2010), "Essays on Foreign Direct Investment, Technology Transfer and International Trade: Ricardian Approaches and Empirical Evidence", Economics and Finance. Université Paris-Est, 2010. English. (NNT: 2010PEST3011). (Tel-00592187)

36. Smith, G. (2018), "Step away from stepwise", *Journal of Big Data*, 5, 32 (2018). https://doi.org/10.1186/s40537-018-0143-6

37. Swamy, A., St. Knack, Y. Lee and O. Azfar (1999), "Gender and Corruption." Draft Paper, IRIS Center, University of Maryland, July.

38. Tchamyou, V. S., & Asongu, S. A., (2017)."Information Sharing and Financial Sector Development in Africa", *Journal of African Business*, 18(7), 24-49.

39. Tchamyou, V. S., (2019). "The Role of Information Sharing in Modulating the Effect of Financial Access on Inequality". *Journal of African Business*, 20(3), pp. 317-338.

40. Tchamyou, V. S., (2020), "Education, Lifelong learning, Inequality and Financial access: Evidence from African countries", *Contemporary Social Science*, 15(1), pp. 7-25.

41. Tchamyou, V.S., Asongu, S. A., & Odhiambo, N. M., (2019). "The role of ICT in modulating the effect of education and lifelong learning on income inequality and economic growth in Africa", *African Development Review*, 31(3), 261-274.

42. UN Office for the Coordination of Humanitarian Affairs (2019), *Data on gender equality in Cameroon*, October 2019.

43. Wirba, E. L., Akem, F. A., & Baye, F. M. (2021). "Earnings gap between men and women in the informal labor market in Cameroon", *Review of Development Economics*, 25(3), pp. 1466-1491.

44. Wolters, J & Hassler, U (2005), "Unit root testing", *Diskussionsbeiträge*, No. 2005/23, Freie Universität Berlin, Fachbereich Wirtschaftswissenschaftliches, Berlin.

# Appendices

## Source of variables

| Variables | | Source |
|---|---|---|
| Female Labor Force | $fem_{lf}$ | WDI |
| Total Benefits From Natural Resources As % Of GDP | $ressour\_nat$ | WDI |
| GDP Growth | $y$ | WDI |
| Vulnerable Employment | $fem\_ve$ | WDI |
| Inflation | $infl$ | WDI |
| Financial Development (M2/GDP) | $dev\_fin$ | Authors' calculations based on World Bank data |
| Annual Population Growth Rate | $pop\_growth$ | WDI |
| Foreign Direct Investment | $FDI$ | WDI |
| Corruption | $corrupt$ | Polity IV Project Online (2017). |
| Trade Openness (X-M/2GDP) | $trad\_open$ | Authors' calculations based on World Bank data |
| Human Development Index | $HDI$ | Countryeconomic.com |
| Urbanization | $urban$ | WDI |
| Female Unemployment | $fem_{unempl}$ | WDI |