

Studies of African Economies

From Past to Future

Vol.7

Siméon Maxime **Bikoue**
Kwami Ossadzifo **Wonyra**
Editors



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Studies of African Economies: From Past to Future, Vol.7

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Preface

Ch.1) This research analyses the effects of structural transformation on sectoral employment and sectoral labour productivity in WAEMU countries. To achieve this, the methodological approach adopted consists of decomposing the economy into three sectors, namely agriculture, industry and services. The results show that the agricultural sector employs 70% of the available labour force as against 10% and 20% respectively for the industrial and service sectors. In terms of value added, the agricultural (rural) sector and the service sector contribute 40% each against 20% for the industrial sector to the Gross Domestic Product (GDP) for the Sahelian countries. For all WAEMU countries as a whole, the agricultural sector accounts for 30%, industry for 20% and services for 50%. Reallocation effects show that the service sector is the sector benefiting from a better reallocation of the labour factor. This reallocation effect is very pronounced in Burkina Faso compared to all Sahelian countries and all WAEMU countries.

(Ch.2) The aim of this chapter is to analyse the determinants of moonlighting in the context of falling worker's wages in Cameroon. From a sample of Cameroonian workers with a main

job a bivariate structural probit model analysis shows that the participation in moonlight jobs is inversely correlated with the level of education and the female gender. But it is positively correlated with both the wage of the main job and age. Moonlighting seems to play a different role in the transition from working life to retirement in Cameroon compared to developed countries.

(Ch.3) This chapter clarified the concept of the informal sector and highlighted its role and importance in the strategy for tax revenue mobilization. More specifically, it discusses the different approaches to the concept of the informal sector before looking at the issues related to its taxation. The data analyzed in this paper has helped to establish the socio-economic importance of informal sector activities in developing countries in general and in Burkina Faso in particular. The data analyzed indicates that in Burkina Faso, the majority of IPU's are illiterate (33.2% of IPU's have no education) with, however, a non-negligible level of benefit for the majority of IPU's (around 65%). IPU's that make an average profit of more than 10,000,000 FCFA represent 8% of the total. The statistics clearly show that IPU's generate income, however small, which could contribute to the financing of public expenditure.

(Ch.4) The aim of this chapter is to show that the phenomenon of corruption appears as an essential explanatory variable in the banking crisis which has shaken Cameroon since the end of the 1980s. To identify the effects of this phenomenon on the banking system, the authors use the contract and agency theory, and in particular the role of asymmetric information as a generator of adverse selection and moral hazard in the game of the financial intermediation function. The observation reveals that corruption has generated and reinforced information asymmetry and disrupted bank credit contracts. The persistence of corruption has made it difficult to conduct effective bank restructuring. In addition, it has accentuated the loss of credibility of the banking system.

(Ch.5) This chapter reviews the literature on taxation of the informal sector, taking stock of the main debates and drawing attention to recent innovations. Traditionally, debates on taxation have often focused on the limited revenue potential, the high cost

of collection and the potentially negative impact on small businesses. Recently, arguments have increasingly focused on the more indirect benefits of informal taxation concerning growth, tax compliance and governance. The results on the probability of UPI registration show that only the direct tax variable has a significant negative effect on the UPI at a rate of 1%. The efficiency of the taxation system applicable to the informal sector should be sought through a lower tax rate for small IPU and a high tax rate for large IPU.

(Ch.6) The purpose of this chapter is to highlight the determinants of child labour for children aged 5 to 17 in Cameroon. The study uses microeconomic data from the third Cameroonian household survey (ECAMIII). The bivariate probit model reveals that the risks for a child who works are great if he does not go to school, he is fatherless or both parents are dead, the head of the family is not educated, he works in the agricultural sector, the standard of living of the household is low and he resides in rural areas. The study suggests that the issue of child exploitation in Cameroon is more global and necessarily falls within an economic and social development policy. From this perspective, the strategy to combat the particularly harmful exploitation of child labour should be cross-sectional because of the various dimensions of the phenomenon.

Editors
S.M. Bikoué & K.O. Wonyra
December 23, 2020

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1

Structural transformation and labour force reallocation effects: evidence from West African Economic and monetary Union (WAEMU)

Kwami Ossadzifo WONYRA

Messan KINVI

Honoré TENAKOUA

Introduction

By 2050, the population of Sub-Saharan Africa (SSA) will account for 21% of the world's population, while its youth aged 15 to 24 will account for 30% of the world's youth. This rapid population growth will impact the labour market. Indeed, in the next fifteen years, nearly 375 million young people will be of working age. These young people will be looking for income generating activities (Losch, 2016). The challenge of youth employment is unique and persistent in African countries. The challenge relates to the capacity of African economies to cope with unproductive, temporary, insecure or unpaid employment. Africa's youth continues to grow, creating an ever-increasing demand for multi-sectoral strategies to ensure a better transition to a labour market with decent jobs (ILO, 2016).

To face this important employment challenge, Sub-Saharan African countries have potential assets to feed their development trajectory. The demographic dividend is complemented by the breadth of the geographical space, the diversity of ecosystems, the

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endowments of natural resources and the rapid growth of domestic markets offering opportunities to meet the needs of domestic demand without overlooking the potential for regional integration and the capacity of these economies to integrate into the global market. The Sahelian countries, by virtue of their geographical characteristics and the security instability they have been facing over the past decade, must therefore put in place public policies aimed at ensuring greater integration of young people into the labour market, especially in rural areas, in order to make this segment of the population less vulnerable.

The structural transformation of economies remains an adequate trajectory for addressing employment challenges in African economies, particularly in SSA. Sahelian countries all those in SSA in general experience low economic diversity, high levels of poverty and low levels of human capital and infrastructure. The primary sector, especially agriculture, accounts for a substantial share of the economy, with the industrial sector making little progress. In light of this, structural transformation of these economies is emerging as a solution to the employment challenges of youth, women and men (ILO, 2016).

Many countries in Sub-Saharan Africa have adopted industrial policies aimed at boosting economic growth. Indeed, the majority of African countries' industrialization strategies target specific economic sectors. Currently, in SSA, out of twenty-six identified industrialization strategies, nineteen target light manufacturing industry as a key sector for development, including agro-industry, wood, clothing, textiles, leather and footwear; sixteen strategies address aspects of sustainable development, such as the use of renewable energy and water protection; 15 strategies focus on agriculture, in particular livestock farming, forestry and fisheries products; 13 strategies deal with tourism and high-tech services; 11 strategies focus on mining and the extraction of resources such as copper, oil and natural gas; 8 strategies make the energy sector a priority, and 5 do the same with construction.

However, it should also be noted that Africa's industrialization will not be like that of other regions of the world - if only because of the different profiles of the 54 African countries, which will therefore follow different trajectories. Secondly, this

industrialization will not be based solely on the manufacturing sector, which, at 11 per cent of the continent's GDP, remains small. Industrial policies for the 21st century can target sectors with high growth potential, such as agribusiness and value-added services ([African Economic Outlook, 2017](#)).

In this context, what is the effect of structural transformation on employment and labour productivity in Sahelian countries? The general objective of this paper is to analyse the effect of structural transformation on employment and labour productivity. Specifically, it is a question of: (i) analysing the dynamics of structural transformation in the WAEMU countries (i) analysing the effect of structural transformation on employment and labour productivity according to the different sectors of activity (ii).

The relevance of this research lies in highlighting the effects of a structural transformation of economies on poverty reduction. Today, one of the social problems facing governments, especially in low-income countries, is unemployment, which makes the various segments of the population vulnerable. It is therefore no less relevant to consider the effects of structural transformation on the employment problem following a sectoral approach in the Sahelian countries.

The methodological approach adopted consists of breaking down the economy into three sectors, namely agriculture, industry and services. For these different sectors, we have highlighted the intra-sectoral effects (effect within), the inter-sectoral effects (effects between) and the effects of the terms of trade between different sectors. The Divisia index is used to capture the total effect. The results show that the agricultural sector employs 70% of the available labour force against 10% and 20% respectively for the industrial and service sectors. In terms of value added, the agricultural (rural) sector and the service sector contribute 40% each against 20% for the industrial sector to the Gross Domestic Product (GDP) for the Sahelian countries. For all WAEMU countries as a whole, the agricultural sector accounts for 30%, industry for 20% and services for 50%. Reallocation effects show that the service sector is the sector benefiting from a better reallocation of the labour factor. This reallocation effect is very pronounced in Burkina Faso compared to all WAEMU countries.

The rest of the article is organized as follows. Section 2 presents an overview of the theoretical and empirical work; Section 3 is devoted to the analytical methodology and data; results and interpretations are presented in Section 4. Section 5 concludes.

Literature review

The Economic Commission for Africa understands "structural transformation" to mean all fundamental changes in economic and social structures that promote equitable and sustainable development. Structural transformation can be accelerated through three intrinsic dimensions: employment, production and society. Thus, employment plays a key role in creating a two-way link between economic growth (production) and social development (society). To this end, it then focuses on increasing labour productivity, promoting decent employment and improving education and skills.

Review of theoretical work

Structural transformation and its influence on economic performance

Early models of economic growth ignored structural changes, as they focused on a single production sector. However, models proposed over the past decade have attempted to replicate the structural changes observed, by modifying assumptions of standard growth models (Acemoglu, 2008, Syrquin, 2010, Jiang, 2011). Lewis (1954) hypothesized that structural transformations are an important source of economic growth. Then the work of de Chenery, Robinson & Syrquin (1986) and Syrquin (1995), have their part analyzed the effect of structural change and allocation of production factors in development economics. These authors show that structural change is an important factor explaining countries' economic performance. Most recent studies manage to show that the effects of technological change and factor allocation on economic performance are significant (Akkemik, 2005; Berthelemy, 2001; Nelson & Pack, 1999; Ngai & Pissarides, 2007).

Recent work focuses on the role of structural changes in productivity growth in the nonagricultural and manufacturing sectors in developed and emerging countries. For example, Timmer & Szirmai (2000) find a positive effect of the allocation of

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factors across sectors on industrial growth in four industrialized and emerging Asian countries, namely South Korea, Taiwan, India and Indonesia.

The vectors of structural transformation

According to McMillan & Rodrik (2011), structural transformation has two elements: (i) the rise of new, more productive activities, and (ii) the shift of resources from traditional activities to these new activities, which raises overall productivity. In the absence of the first element, there are insufficient means for the economy to take off. In the absence of the second, productivity gains in the growth sectors do not spread to the rest of the economy. It emerges that the main vectors of structural transformation are innovation and the reallocation of factors in favour of high value-added sectors.

a- Innovation as a driving force for structural transformations

Schumpeter is the first author to analyse the primordial role of innovations in explaining the evolution of economies. Innovation and technical progress through the phenomenon of "creative destruction" is a source of productivity gains. Innovative activities concern as much the production of new goods and services as the development of new production methods, the opening of new markets, access to new sources of raw materials and the creation of new organisational modes.

Recent studies on the innovation-productivity relationship generally identify four types of innovation: (i) product innovation (new product or significant improvement of existing goods and services), (ii) process innovation (change in production or distribution methods), (iii) organizational innovation (change in managerial strategies, work organization or external relations) and (iv) marketing innovation (change in product design, packaging, placement or pricing policy).

The Economic Commission for Latin America and the Caribbean (ECLAC) observes that innovation is mainly motivated by the search for technological rents in industrialized countries, while in less developed countries it is generally limited to the incorporation of productive branches, goods or processes that have already reached a certain degree of maturity in more advanced

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economies. This limitation may be explained by the dynamism of entrepreneurs.

b- Reallocation of production factors: catalyst for factor productivity growth

The movement of labour from low-productivity semi-subsistence agriculture to more productive manufacturing and services in both urban and rural areas is necessary to fuel increases in overall productivity and improved living standards that can reduce poverty.

Kuznets' analysis shows that economic dynamics revolve around manufacturing industry, whose share of activity has taken the form of an inverted U-shaped curve: it increases during the low stages of development, as capital accumulates, and then declines during the high stages of development, when improved incomes drive demand for services and rising labour costs weigh on manufacturing output. This transition to manufacturing and then to services takes place partly within rural areas. However, it involves, to a large extent, migration to urban centres, motivated by the search for formal employment opportunities. In general, urban workers tend to have higher labour productivity, partly as a result of greater specialization, better access to capital and internal and external economies of scale. To these two vectors should be added the constraints of the structural transformation process. In order for the process to take place, the relevant productive branches must have access to the factors of production. If these are rationed or immobile, structural change will be impossible. The required elasticity of factors can be ensured by the prior existence of idle or under-utilized resources and regional or international factor mobility.

Review of empirical work

Structural transformation - youth employment in Africa

Many people refer to the youth employment problem as a "youth unemployment problem", while actual unemployment in low-income Africa is only 3 per cent; even in middle-income countries outside Southern Africa, unemployment is not high (Fox & Thomas, 2013). This low rate in Africa is simple: most people of working age in sub-Saharan Africa cannot afford to be

unemployed. Many families cannot fully support a young graduate looking for work, and many young people have not completed high school, so they would not be eligible for formal employment (Filmer & Fox, 2014). They will have to earn a living either by obtaining land and farming or by starting a non-farm business.

Considering the low overall youth unemployment rate in low-income countries, there is a high unemployment rate among urban graduates. It is no coincidence that these graduates come mainly from the top of the income distribution; only the wealthiest parents can afford to help young people in a thorough job search.

Alfani *et al.*, (2012) showed that Mozambique, for example, is a poor country where more than half of the population is considered extremely poor. Youth unemployment in rural areas is almost non-existent; the rate is 1.7%. But in urban areas, 20% of young people meet the strict definition of unemployment given by the ILO. People with secondary or higher education are clearly over-represented in the unemployed group. Two thirds of the urban unemployed reported having been unemployed for more than a year. In high-income countries with broader safety nets, high unemployment persists, including among young people.

South Africa is known for its high unemployment rate. Overall, South Africa's quarterly Labour Force Surveys for 2014 show that 25% of the population was unemployed during the survey month and the unemployment rate for young people aged 15-29 was 42% (Bhorat *et al.*, 2016). Other resource-rich and middle-income countries show similar rates; in Gabon, for example, the youth unemployment rate was 35% in 2013, while in Namibia it was 34% in the same year.

Magruder (2012) indicates that wage rigidities account for only one percentage point of unemployment in South Africa, so the problem is lack of demand. Alternatives to wage employment are not widely available in South Africa. Partly because of urban zoning and other regulations that create high barriers to entry, the informal sector does not absorb many of the least educated young people compared to poor countries in Africa and even middle-income countries outside Africa.

In the same vein, (Fox, 2014) Fox highlights the "aspirations gap", i.e. the expectations of young people and their parents regarding employment, compared to the opportunities available, especially in the informal sector. Ismail highlights one of the main reasons why politicians cannot find solutions: they take a top-down approach and ignore policies and programmes that could channel the energies and resources of their own youth into productive activities. South Africa is particularly cautious, especially for resource-rich countries in sub-Saharan Africa, a group that is growing as a result of new mining explorations and recent discoveries in countries such as Kenya, Uganda and Ghana. Safety nets for the unemployed are better than nothing, but economic growth would be even better, creating many low-skilled jobs.

Methodology, variables and data

The analytical approach adopted in this article consists of a sectoral analysis of the distribution of employment and output or value added. This is done by calculating the respective shares of employment and value added in each sector of the economy. The level of disaggregation considered is three. These are agriculture, industry and services. This is justified by the fact that this research aims to analyse the sectoral effects of structural transformation on the level of sectoral employment and productivity by controlling for the specificity of each sector. The data used are from ILO statistics and from UNCTAD statistics.

Structural transformation, sectoral employment and value added

Considering the n levels of disaggregation, total employment and total output can be calculated by adding up the number of workers in each sector. Thus, by formalizing, we can write total employment, L , and total value added, X , like:

$L = \sum_{i=1}^n L_i$ and $X = \sum_{i=1}^n X_i$ where L_i is the employment or number of workers in the sector i and X_i the nominal value added of the sector i .

The distribution of employment and value added across sectors is obtained by the ratio of sectoral employment and sectoral value added to total employment and value added. We can therefore write:

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$$\sum_{i=1}^n \frac{L_i}{L} = \frac{L_1}{L} + \frac{L_2}{L} + \dots + \frac{L_i}{L} = \sum_{i=1}^n \lambda_i \quad (1)$$

$$\sum_{i=1}^n \frac{X_i}{X} = \frac{X_1}{X} + \frac{X_2}{X} + \dots + \frac{X_i}{X} = \sum_{i=1}^n \theta_i \quad (2)$$

λ_i and θ_i are the shares of each sector in total employment and total value added, respectively.

Quantification of the effect of structural transformation on labour productivity

The economic literature indicates that labour productivity can be determined in three ways. Within each sector, productivity can grow through the accumulation of human capital, the exploitation of economies of scale, technological change, or through learning. This is known as the direct productivity effect or the within effect. Moreover, during the process of structural transformation, labour moves across sectors. This is the movement of labour from low-productivity sectors to high-productivity sectors making the latter larger. In this context, we speak of structural change or the reallocation effect (the effect between). Finally, changes in productivity can occur as a result of the difference in relative prices between the different sectors. This change is called the terms-of-trade effect. The latter effect is not considered in this article since it is only marginally observed.

Let us decompose aggregate labour productivity as follows:

$$\Delta PT_t = \sum_{i=1}^n \theta_{i,t-k} \Delta PT_{i,t} + \sum_{i=1}^n PT_{i,t} \Delta \theta_{i,t} \quad (3)$$

PT_t and $PT_{i,t}$ represent economy-wide and sectoral labour productivity, respectively. $\theta_{i,t}$ is the share of employment in sector i at time t . Δ captures the change in labour productivity (ΔPT_t) or the change in the workforce $PT\Delta_{i,t}$ between the period $t - k$ and t . The first component of equation 3 represents intra-sectoral labour productivity growth weighted by the employment share of the sector. This is the intra-sector component of productivity growth. Intuitively, this component captures the idea that "the larger the sector with labour productivity growth above the economy-wide average labour productivity growth, the greater the aggregate economy-wide labour productivity growth. The second component captures the impact of the movement of labour across sectors of

the economy over any period (De Vries *et al.*, 2015; Mc-Millan & Rodrik, 2011; Timmer & de Vries, 2009; Timmer *et al.*, 2014b).

Method of decomposing productivity and employment growth: Divisia index

This method consists of decomposing aggregate labour productivity and the employment-topopulation size ratio through effects in a sectoral contribution approach based on the Divisia index (Sato, 1976). The index divisia method is a weighting of the sum of the logarithms of growth rates in which the weights are components of shares in total values (Ang, 2004). The first step in this decomposition analysis is to define the aggregates to be decomposed. In the case of this research, we consider labour productivity in an aggregate form calculated as the ratio of real total value added and total employment. Aggregate labour productivity reflects intra- and inter-sectoral dynamics.

Suppose a saving to n sectors. Each sector i produces real added value X_i (i.e. the value of output at constant prices) and employs L_i workers. Total employment is,

$L = \sum_{i=1}^n L_i$. Because prices differ between sectors, it is not possible to calculate the sum of sectoral value added. Thus, real value added is calculated as the sum of the nominal value added of each sector deflated by the overall price index. Aggregate labour productivity is written as follows:

$$\beta = \frac{X}{L} = \frac{\sum_{i=1}^n P_i X_i}{\sum_{i=1}^n P L_i} \quad (4)$$

Let's move on to the transformation of equation 4 by multiplying it by the ratio $\frac{L_i}{L}$. This allows aggregate labour productivity to be defined as the product of factors.

$$\beta = \sum_{i=1}^n \frac{P_i X_i}{P L_i} \frac{L_i}{\sum_{i=1}^n L_i} = \sum_{i=1}^n v_i \beta_i \gamma_i \quad (5)$$

$\beta = \frac{X_i}{L_i}$ refers to sectoral labour productivity; $\gamma_i = \frac{L_i}{L}$ is the share of sectoral employment; and $v_i = \frac{P_i}{P}$ is the term of the exchange. Labour productivity growth can be decomposed into different contributing factors. Observed changes in sectoral productivity are

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referred to as intraproductivity effects; changes in the structure of the economy are measured by the labourshares that led to the structural change effects; the terms of trade reflect the effects of market structure.

Assuming that the variables are continuous, the differentiation of equation 5 with respect to time and dividing the two members of the equation by productivity. β we get:

$$\frac{\ln(\beta)}{dt} = \sum \theta_i \left[\frac{d\ln(v_i)}{dt} + \frac{d\ln(\beta_i)}{dt} + \frac{d\ln(\gamma_i)}{dt} \right] \quad (6)$$

The weighting coefficient θ_i is the share of the sector i in the total nominal value added. By integrating the equation ... over the time interval $[0, T]$, we obtain the Divisia decomposition of labour productivity growth.

$$l_n \frac{\beta_T}{\beta_0} = \int_0^T \sum \theta_i [d\ln(v_i)/dt] + \int_0^T \sum \theta_i [d\ln(\beta_i)/dt] + \int_0^T \sum \theta_i [d\ln(\gamma_i)/dt] \quad (7)$$

The exponential form of equation 7 gives:

$$D_{ag} = D_{prod} D_{str} D_{prix} \quad (8)$$

Where the components are:

$$D_{prod} = \exp \left[\int_0^T \theta_i [d\ln(\beta_i)/dt] dt \right] \quad (9)$$

$$D_{str} = \exp \left[\int_0^T \theta_i [d\ln(\gamma_i)/dt] dt \right] \quad (10)$$

$$D_{prix} = \exp \left[\int_0^T \theta_i [d\ln(v_i)/dt] dt \right] \quad (11)$$

Applying this decomposition to the discrete variables, we obtain:

$$D_{prod} = \exp \left[\int_0^T [\ln(\beta_i)(\theta_{i,0} + \theta_{i,T})/2] \right] \quad (12)$$

$$D_{str} = \exp \left[\int_0^T [\ln(\gamma_i)(\theta_{i,0} + \theta_{i,T})/2] \right] \quad (13)$$

$$D_{prix} = \exp \left[\int_0^T [\ln(v_i)(\theta_{i,0} + \theta_{i,T})/2] \right] \quad (14)$$

From a job creation perspective, a fundamental observation to note is that a sector creates a lot of jobs if its output per capita grows faster than its labour productivity (Ocampo *et al.*, 2009). In more detail, we start from this identity $\varphi = L/P$, P is the size of the population. The labour productivity of sector i is $\beta_i = \frac{X_i}{L_i}$ and the per capita output of the sector is defined by $\beta_i = \frac{X_i}{P}$. An algebraic transformation gives the following employment-to-population ratio:

$$\varphi = \sum \left(\frac{\pi_i}{\beta_i} \right). \quad (15)$$

We can decompose the ratio as follows:

$$\ln \frac{\varphi_T}{\varphi_0} = \sum_{i=1}^n [\ln \ln(\pi_i) - \ln \ln(\beta_i)] (\gamma_{i,0} + \gamma_{i,T})/2 \quad (16)$$

The γ_i are the sectoral employment shares. In a multiplicative form, the Divisia index decomposition of the employment-to-population size ratio relative to the growth rate gives:

$$D_{empl} = \frac{D_{inc}}{D_{prod}} \quad (17)$$

D_{inc} is the per capita income index and D_{prod} is the productivity index.

Shift-share decomposition method

This is a method of decomposing the change recorded within a business segment or from one segment to another. Shift-share decomposition is a descriptive accounting technique that helps to break down the change in an aggregate into structural components, i.e. changes in the composition of the aggregate, and captures the changes within individual units that cause the change in the aggregate Fagerberg (2000: 400).

Either P , the productivity of the labour force; Q , value added; N , labour input in terms of work years; i , industry ($i = 1, \dots, m$). The decomposition of labour productivity can be written as follows:

$$P = \frac{Q}{N} = \frac{\sum_i Q_i}{\sum_i N_i} = \sum_i \left[\frac{Q_i}{N_i} \frac{N_i}{\sum_i N_i} \right] = \sum_i P_i S_i \quad (18)$$

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$P_i = \frac{Q_i}{N_i}$ is labour productivity in industry i and S_i is the industry's share of total employment. To capture the effects of variation, we differentiate equation 18. In doing so, we obtain:

$$\frac{\Delta P}{P} = \sum_i \left[\frac{P_{i0} \Delta S_i}{P_0} + \frac{\Delta P_i \Delta S_i}{P_0} + \frac{S_{i0} \Delta P_i}{P_0} \right] \quad (19)$$

In equation 19, the first term captures the contribution to productivity growth of changes in reallocation across industries. It is positive if the share of high-productivity industries in total employment increases. The second term measures the interactions between the changes observed in each industry and the changes observed in employment shares (the inter component). This component is positive if industries with high labour productivity growth increase their employment shares. The last term measures the contribution of productivity growth within the industry weighted by the employment share of those industries (intra component).

Results and interpretation

The results of this research are presented through a three-level sectoral approach, namely the agricultural sector (rural aspects), industry and services. This categorisation is justified by the nomenclature adopted by the available data sources. Thus, we present in turn, employment by sector (i), value added and labour productivity by sector (ii), direct effects, reallocation effects and term of trade effects chained to the Divisia index (iii).

Evolution of employment by sector from 2010 to 2017

The results in Table 1 show the change in the share of sectoral employment between 2010 and 2017. The analysis shows that between 2010 and 2017, the change in the sectoral employment rate is almost nil. This shows that the structure of the Sahelian and WAEMU economies as a whole really did not change during this period. The agricultural sector employs 70% of the available labour force against 10% and 20% respectively for the industrial and service sectors.

Table 1. *Share of employment by sector*

Country	Share of employment by sector					
	2010			2017		
	<i>agr</i>	<i>ind</i>	<i>serv</i>	<i>agr</i>	<i>ind</i>	<i>serv</i>
Benin	0,5	0,1	0,4	0,4	0,1	0,5
Burkina Faso	0,8	0,1	0,1	0,8	0,0	0,1
Ivory Coast	0,6	0,1	0,3	0,6	0,1	0,4
Guinea Bissau	0,6	0,1	0,3	0,7	0,0	0,3
Mali	0,7	0,1	0,2	0,7	0,1	0,3
Niger	0,6	0,1	0,3	0,6	0,1	0,3
Senegal	0,5	0,1	0,3	0,5	0,2	0,3
Togo	0,5	0,1	0,4	0,5	0,1	0,4
UEMOA	0,6	0,1	0,3	0,6	0,1	0,3

Source: Author's calculations

Sectoral contribution to wealth creation and labour productivity in the Sahel

In the light of the results in Table 2, on average, the agricultural (rural) sector and the service sector contribute 40% each, compared to 20% for the industrial sector, to the Gross Domestic Product (GDP) for the Sahelian countries. For the WAEMU countries as a whole, the agricultural sector accounts for 30%, industry for 20% and services for 50%. This result indicates that WAEMU countries as a whole have a smaller share of the agricultural sector than the Sahel countries. This is justified by the economic geography of these countries. Countries such as Togo, Benin, Côte d'Ivoire, Guinea Bissau have access to the sea against Senegal; the only Sahelian country in WAEMU with access to the sea.

Table 2. *Sectoral value added and labour productivity*

Country	Shares of nominal value added						Sectoral labour productivity					
	2010			2017			2010			2017		
	<i>agr</i>	<i>ind</i>	<i>serv</i>	<i>agr</i>	<i>ind</i>	<i>serv</i>	<i>agr</i>	<i>ind</i>	<i>serv</i>	<i>agr</i>	<i>ind</i>	<i>serv</i>
Benin	0,4	0,1	0,5	0,4	0,1	0,5	787	1 537	1 300	1 036	2 135	1 343
Burkina Faso	0,3	0,2	0,5	0,3	0,2	0,5	218	3 890	4 022	559	7 191	3 741
Ivory Coast	0,3	0,2	0,5	0,3	0,3	0,4	1 317	4 840	3 851	981	6 079	3 975
Guinea-Bissau	0,4	0,2	0,4	0,5	0,1	0,4	820	3 665	2 687	659	3 108	1 578
Mali	0,5	0,1	0,4	0,4	0,2	0,4	866	2 658	2 235	922	5 005	1 789
Niger	0,4	0,2	0,5	0,4	0,2	0,4	653	1 172	1 289	725	1 232	1 053
Senegal	0,2	0,2	0,6	0,2	0,2	0,6	604	2 996	2 853	739	2 421	4 333
Togo	0,4	0,3	0,4	0,5	0,2	0,3	718	2 186	1 231	573	2 572	955
SAHEL	0,4	0,2	0,4	0,4	0,2	0,4	579	2 573	2 515	735	4 476	2 194
UEMOA	0,3	0,2	0,5	0,4	0,2	0,4	748	2 868	2 434	774	3 718	2 346

Divisia index calculation result: Direct and reallocation effect analysis

On average, structural transformation has led to higher productivity in the agricultural sector compared to the industrial and service sectors in Sahelian countries. Looking at WAEMU countries, it is the industrial sector that has benefited from direct productivity. As a result of the reallocation effect of structural transformation, the service sector is the sector that has benefited from a reallocation of labour in the Sahelian countries as in the WAEMU as a whole. Burkina Faso is the country with the highest reallocation score in favour of the services sector.

Table 3. *Direct effects, reallocation effects, terms of trade and Divisia index*

Country	Direct Productivity			Reallocation effect			Terms of trade			Divisia index			
	Agr	Ind	Ser	Agr	Ind	Ser	Agr	Ind	Ser	Direct	Réalloc	TDE	Total
Benin	0,10	0,04	0,02	-0,03	-0,03	0,08	-0,01	0,03	-0,02	1,17	1,01	1,00	1,18
Burkina Faso	0,30	0,12	-0,04	-0,02	-0,04	0,35	-0,02	0,07	-0,04	1,46	1,32	1,01	1,96
Ivory Coast	-0,09	0,06	0,01	0,01	-0,13	0,02	0,04	0,09	-0,10	0,98	0,91	1,04	0,93
Guinea-Bissau	-0,10	-0,02	-0,21	0,02	-0,12	0,03	-0,11	0,04	0,03	0,72	0,94	0,96	0,65
Mali	0,03	0,11	-0,09	-0,04	-0,03	0,10	0,00	0,02	-0,03	1,05	1,04	0,99	1,08
Niger	0,04	0,01	-0,09	0,02	-0,03	-0,01	-0,03	0,06	-0,02	0,96	0,98	1,01	0,96
Senegal	0,04	-0,05	0,25	-0,03	0,13	0,00	0,04	0,01	-0,05	1,26	1,11	1,00	1,40
Togo	-0,09	0,04	-0,09	-0,01	-0,09	0,03	0,12	-0,06	-0,05	0,87	0,94	1,01	0,82
UEMOA	0,03	0,04	-0,03	-0,01	-0,04	0,08	0,00	0,03	-0,04	1,06	1,03	1,00	1,12

Source: Author's calculations

Final remarks

African countries are adopting many strategies to achieve better economic performance and reduce poverty. The last decade has been marked by a new dimension in the search for growth, that of structural transformation of economies. It is a process of transition from low productivity sectors to high productivity sectors generating effects on the structure of employment and generating effects on labour productivity. This research aims to analyse the effects of structural transformation on sectoral employment and sectoral labour productivity in Sahelian WAEMU member countries. To achieve this, the methodological approach adopted consists of breaking down the economy into three sectors, namely agriculture, industry and services. For these different sectors, we

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have highlighted the intra-sectoral effects (effect within), the inter-sectoral effects (effects between) and the effects of the terms of trade between different sectors. The Divisia index is used to capture the total effect. The results show that the agricultural sector employs 70% of the available labour force against 10% and 20% respectively for the industrial and service sectors. In terms of value added, the agricultural (rural) sector and the service sector contribute 40% each against 20% for the industrial sector to the Gross Domestic Product (GDP) for the Sahelian countries. For all WAEMU countries as a whole, the agricultural sector accounts for 30%, industry for 20% and services for 50%. Reallocation effects show that the service sector is the sector benefiting from a better reallocation of the labour factor. This reallocation effect is very pronounced in Burkina Faso compared to all WAEMU countries. It emerges that special attention should be paid to the services sector, which benefits more from the reallocation of factors, especially labour.

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2

The determinants of moonlighting in the context of falling wages in Cameroon: A bivariate structural Probit model analysis

Siméon Maxime BIKOUE

Introduction

In developing countries (D.C.) people rely on various sources of financial income. Leibbrand Woolard & Woolard (2000) have empirically shown that it is the case in South Africa. Furthermore, Glick (1999) argues that in the case of Guinea, financial gains are often completed by extensive engagement in domestic production. The situation is likely to be similar in other sub-Saharan African countries and in other developing countries. This suggests that studies on labour market participation and labour supply in developing countries should be initiated from the assumption that the practice of moonlighting is the norm and not the exception. Except the work of Glick (1999) and Jolifle (2004), this is not however the case in the literature of economics. Therefore, the main goal of this paper is to examine the extent of the practice of moonlighting in the Cameroonian context, and to analyse the factors that lead individuals to get moonlight jobs. Our interest in the phenomenon of moonlighting in developing countries stems from the observation that the real wages of Cameroonian workers in the formal sector were cut in January and

November 1993. Such a drop in real wages raises a number of questions:

- How do these workers manage to cope on a daily basis?
- Has their financial standard of living deteriorated accordingly way or have the real low wages led workers to increase their working hours in their main job or in the moonlight job?
- In particular, has the participation of workers with a main job in moonlighting increased?

- Glick (1999) and Joliffe (2004) address some of these questions, but due to lack of data, these authors had to use scale models of the moonlight job models. Conversely, since the publication of the seminal article by Shishko & Rostker (1976), research on moonlight jobs in industrialized countries has largely relied on structural forms of models which are usually more informative than scale forms of models. This methodological difference is mainly due to the problem of observing what individuals earn in developing countries when they work in the informal sector. Deaton (1997) emphasizes the difficulties encountered in measuring income in developing countries. Glick¹ (1999) investigates the determinants of women's labour supply both in domestic production and on the labour market in Conakry, Guinea. His analysis is based on an empirical approach which takes into account the joint effect inherent in the decision to allocate time to domestic production and to the different production activities of the market. Unlike the rural data used in the majority of work, he uses urban data and concludes that individual characteristics and household characteristics have a great influence on women's time allocation in productive activities. "In this research paper, as a continuation of Theisen's research (2005), we suggest, a new orientation to this problem. The suggested method enables the estimation of the reduced form of the multiple-use model. To the best of our knowledge, except for the work of Theisen (2005), scale models of moonlight jobs had not been previously estimated using data from developing countries. While Shishko & Rostker (1976) as well as most work on moonlight jobs rely on data from developing countries to estimate labour supply equations, this paper is limited

¹ Glick (1999) uses an empirical approach based on the simultaneous Tobit model discussed by Amemiya (1974).

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to the study of participation in moonlight jobs. This limitation is mainly due to the availability of data and is linked to the above-mentioned problem of measuring income.

This study focuses exclusively on workers with a main job and a moonlight job. Previous papers by Gindling (1991), Pradhan & Van Soest (1995) and Funkhauser (1996) have examined the factors that determine the choice of individuals to work in the formal or informal sector in Brazil, Bolivia and Central America. However, these contributions are all based on the assumption that the individual will work exclusively either in the formal sector or in the informal sector.

Consequently, this paper attempts, following the work of Theisen (2005), to complete the spirit of this literature. To the best of our knowledge, apart from this work which analyses the case of Tanzania, the participation functions explaining moonlighting have not been previously estimated in Africa.

This article is organized into four sections. Section I establishes an econometric model consisting of two alternative specifications of the conditions for participating in moonlighting. The second section contains a presentation of the data used and a descriptive analysis of participation in moonlighting. Section III deals with the main estimated results. Section IV enables to conclude.

Econometric model

Assuming that an individual whose behaviour is guided by the utility function $U(X, L)$, where X is the volume of Hicks' aggregate good, and L is leisure. This utility can be maximized under two constraints, that of goods and that of time.

When the single price of the aggregate good is normalized to 1, the constraint of the goods takes the following form $X = V + W\bar{N} + ZF(H)$ where V is non-wage income, W the formal wage rate, \bar{N} the hours of work in the formal sector, Z an index of productivity, H the time spent on domestic production and $F(H)$ a function in which we suppose that $F(0) = 0$ and that $F(H)$ is increasing and concaving in H^2 . In general, consumer goods can be

² Indeed, the first and second derivatives of this function are respectively positive ($F_H > 0$) and negative ($F_{HH} \leq 0$)

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financed from three sources: non-wage income (V), wage income and domestic production ($ZF(H)$). Domestic production is similar to that of Gronau (1977), and the model implies the assumption that domestic goods and goods purchased on the market are perfect substitutes in consumption. Factors of production other than domestic time such as capital, land, skills, etc. may affect the term Z in the domestic production function, but are not specified in the theoretical model (Theisen, 2005).

The second restriction under which the individual maximizes his utility is the constraint of time, $L + H + \bar{N} = T$, where T is the total time available, with L , H and T not being all negative. Working time in the formal sector is assumed to be determined by labour market demand. Consequently, it is exogenous to the individual and indicated by \bar{N} . Moreover, we assume that the individual who wants a job in the formal sector must agree to work full time. This hypothesis is in line with the observation that part-time work in the formal sector is practically non-existent in Cameroon.

The combination of these two constraints of good and time leads to the budget constraint.

The problem of optimizing the consumption of this individual can then be defined as follows: $MaxU(V + W\bar{N} + ZF(H), T - \bar{N} - H$ under the time constraint (H)³.

The solution⁴ to this problem involves a trade-off between labour and leisure. Thus, if the utility lost for one leisure hour is offset by the utility of an additional hour of in a moonlight job, the individual renounces leisure in favour of work. This is the case when the marginal productivity of the individual is greater than the expected wage ($W^* = U_L/U_X$).

Let us suppose that the real offer of participation in the moonlighting market is proportional to the hourly time allocated to such a production $X_H = ZH$. The following equality emerges from

³ The constraint H is given by $H = f(\hat{W}\hat{V}) - \bar{N}$ with $\hat{W} = ZF_H(H)$ with the value of the marginal productivity of a moonlight job and \hat{V} the income from a moonlight job.

⁴ A two-step solution: the first one being the decision to participate in the moonlight job market, while the second is the decision about working time.

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this $\widehat{W} = \bar{W} = Z$ in which \bar{W} is the average rate of job wages. This average rate seems to be a restriction but it is in line with the hypothesis of exogeneity of the wage rate made in most studies on labour supply, in particular on moonlighting (Moffrtt, 1984; Ginding, 1991; Averett, 2001; Theisen, 2005).

The utility function used to define the conditions for participation in moonlighting is as follows (Pencavel, 1986; Theisen, 2005):

$$U(X, X + \bar{N}; R, e_u) = \left(\frac{\varepsilon_y (H + \bar{N}) - \varepsilon_w}{(\varepsilon_y)^2} \right) \exp \left\{ \frac{\varepsilon_y (\varepsilon_0 + \varepsilon_y X + \varepsilon'_R R + \varepsilon'_Q Q + \varepsilon_U)}{\varepsilon_y (H + \bar{N}) - \varepsilon_w} \right\} \quad (1)$$

Where are $\omega, (i = 0, \widehat{W}, \bar{V})$ individual parameters⁵, ω'_R, ω'_Q are vectors of parameters and ε_U is the stochastic error term. This error term can be interpreted as a taste known to the worker but unknown to the employer. But we assume that $\varepsilon_U \sim N(0, \sigma_U^2)$. R and Q are column vectors of taste changes known to both the worker and the employer.

The calculation of the partial derivatives enables us to find the marginal rate of substitution of labour for leisure which corresponds to the structural form of participation in moonlight jobs as follows:

$$U_x = \left(\frac{\omega_y (H + \bar{N}) - \omega_w}{(\omega_y)^2} \right) \left(\frac{(\omega_y)^2}{\omega_y (H + \bar{N}) - \omega_w} \right) \exp \left\{ \frac{\omega_y (\omega_0 + \omega_y X + \omega'_R R + \omega'_Q Q + \omega_w)}{\omega_y (H + \bar{N}) - \omega_w} \right\} = \exp \left\{ \frac{\omega_y (\omega_0 + \omega_y X + \omega'_R R + \omega'_Q Q + \omega_w)}{\omega_y (H + \bar{N}) - \omega_w} \right\} = \exp Y \quad (2)$$

Knowing that;

$$(H + \bar{N}) = T - L$$

⁵ In fact, $\bar{V} - V + W\bar{N} + ZF(H) - \widehat{W}(\widehat{N} + H) = V + (ZF(H) - \widehat{W}H) + (W - \widehat{W})\bar{N} = V + \left(\frac{ZF(H)}{H} - \widehat{W} \right) H + (W - \widehat{W})\bar{N} = V + \bar{W} - \widehat{W}H + (W - \widehat{W})\bar{N}$ where $\bar{W} = ZF_H(H)/H$ is the moonlight job average rate? With $\widehat{W} = \bar{W}$, the term $(\widehat{W} - \bar{W})H$ disappears from the expression \bar{V} which implies some adjustments in the constraint H .

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$$\begin{aligned}
 U_L &= \left(\frac{-\omega_y}{(\omega_y)} \right) \exp Y \\
 &+ \left(\frac{\omega_y(H + \bar{N}) - \omega_y}{(\omega_y)^2} \right) \left\{ \frac{((\omega_y(\omega_0 + \omega_w X + \omega'_R R + \omega'_Q Q + \varepsilon_y) - \omega_w)\omega_y)}{(\omega_y(H + \bar{N}) - \omega_w)^2} \right\} \exp Y \\
 U_L &= - \left\{ \frac{(H + \bar{N}) - (\omega_0 + \omega_V X + \omega'_R R + \omega'_Q Q + \varepsilon_U)}{(\omega_V(H + \bar{N}) - \omega_w)} \right\} \exp Y
 \end{aligned} \tag{3}$$

So,

$$\begin{aligned}
 \frac{U_L}{U_X} &= \frac{- \left\{ \frac{(H + \bar{N}) - (\omega_0 + \omega_V X + \omega'_R R + \omega'_Q Q + \varepsilon_U)}{(\omega_V(H + \bar{N}) - \omega_w)} \right\} \exp Y}{\exp Y} = \\
 &\left\{ \frac{(H + \bar{N}) - (\omega_0 + \omega_V X + \omega'_R R + \omega'_Q Q + \varepsilon_U)}{(\omega_V(H + \bar{N}) - \omega_w)} \right\}
 \end{aligned} \tag{4}$$

However, the linear equation of domestic production enables us to write: $Z = \widehat{W} = \bar{W}$

$$\begin{aligned}
 X = V + W\bar{N} + ZH = V + W\bar{N} + \bar{W}N + \widehat{W}H - \widehat{W}H + \widehat{W}\bar{N} + Z = V + H(\bar{W} - \widehat{W}) + \\
 \bar{N}(W - \widehat{W}) + \widehat{W}H + \widehat{W}\bar{N}
 \end{aligned} \tag{5}$$

By replacing (5) in (4) we get:

$$\begin{aligned}
 \frac{U_L}{U_X} &= - \left\{ \frac{(H + \bar{N}) - (\omega_0 + \omega_V(\widehat{V} + \widehat{W}H + \widehat{W}\bar{N}) + \omega'_R R + \omega'_Q Q + \varepsilon_U)}{(\omega_V(H + \bar{N}) - \omega_w)} \right\} = \\
 &\left\{ \frac{(\omega_0 + \omega_V\widehat{V} + \omega_V\widehat{W}H + \omega_V\widehat{W}\bar{N} + \omega'_R R + \omega'_Q Q + \varepsilon_U - H - \bar{N})}{(\omega_V(H + \bar{N}) - \omega_w)} \right\}
 \end{aligned} \tag{6}$$

But the first order condition of participation in the moonlight labour market gives us,

$$\frac{U_L}{U_X} = \widehat{W} = ZF_H(H)$$

Which enables us to write:

$$\begin{aligned}
 \left\{ \frac{(\omega_0 + \omega_V\widehat{V} + \omega_V\widehat{W}H + \omega_V\widehat{W}\bar{N} + \omega'_R R + \omega'_Q Q + \varepsilon_U - H - \bar{N})}{(\omega_V(H + \bar{N}) - \omega_w)} \right\} &= \widehat{W}; \\
 \omega_0 + \omega_V\widehat{V} + \omega_V\widehat{W}H + \omega_V\widehat{W}\bar{N} + \omega'_R R + \omega'_Q Q + \varepsilon_U - H - \bar{N} \\
 &= \omega_V\widehat{W}H + \omega_V\widehat{W}\bar{N} - \omega_V\widehat{W}H + \omega_V\widehat{W}
 \end{aligned}$$

Hence the following moonlight employment participation function:

$$hhH = \omega_0 + \omega_V \hat{V} + \omega_V \hat{W} + \omega'_R R + \omega'_Q Q - \bar{N} + \varepsilon_U \quad (7)$$

For non-participants in moonlight jobs, $hhH = 0$, $\hat{W} = ZF_H(0)$.

Knowing that the marginal rate of substitution of moonlight work for leisure must be positive for participants and negative or zero for non-participants, we can write the condition below:

$$\left\{ \frac{(\omega_0 + \omega_V \hat{V} + \omega_V \hat{W}H + \omega_V \hat{W}\bar{N} + \omega'_R R + \omega'_Q Q - H - \bar{N} + \varepsilon_U)}{(\omega_V(H + \bar{N}) - \omega_w)} \right\} \begin{cases} \leq & (\text{non participation } H = 0) \\ > & (\text{participation } H > 0) \end{cases}$$

For an individual k in the structural form of participation in a moonlight job, it is:

$$\omega_0 + \omega_V \hat{V}^k + \omega_V \hat{W}^k + \omega_R \hat{R}^k + \omega'_Q Q^k - \bar{N}^k + \varepsilon_u^k \begin{cases} \leq & \text{for } H=0 \\ >0 & \text{for } H>0 \end{cases} \quad (8)$$

It is assumed that the error term ε_u^k is distributed according to a reduced centred normal distribution rule and therefore relationship (8) constitutes a variant of the probit model.

To derive the reduced form of participation in moonlight employment, we first specify the earnings function of the moonlight job sector of the type introduced by Mincer (1974) as follows:

$$\ln \hat{W}^k = \eta + \rho'_s S^k + \rho'_s Q^k + \varepsilon_E^k \quad (9)$$

Where \hat{W}^k is the hourly wage rate for moonlight jobs, η the constant, P'_s and P'_Q are the column vectors of parameters, S^k is a column vector of the explanatory variables included in the earnings function but not in the utility function and Q^k the column vector of the explanatory variables included in both the earnings function and in changes in the taste of the earnings function. ε_E^k is the stochastic error term assumed to follow a reduced centred normal law ($\varepsilon_E^k \sim N(0, \sigma_E^2)$) and that ε_E^k is not correlated to the error term of the condition of participation in moonlight jobs, i.e.

The reduced form is therefore the following:

$$\omega_0 + \omega_V \hat{V}^k + \omega_R \hat{R}^k + \omega_s S^k - \omega_Q Q^k + \varepsilon^k \begin{cases} \leq 0 & \leq 0 \text{ for non-participation } (H=0) \\ > 0 & > 0 \text{ for participation } (H>0) \end{cases} \quad (10)$$

With $k = 1, 2, \dots, K$

Where $\bar{V}^k = (V^k + W^k \bar{N}^k)$ is the exogenous income $\hat{w}_0 = (\omega_0 + ((\omega_w - \omega_{\bar{v}})\eta - 1)\bar{N}^k$,

$$\begin{aligned} \bar{\omega}'_s &= ((\omega_w - \omega_{\bar{v}})\rho'_s \bar{N}^k), \\ \bar{\omega}'_Q &= ((\omega_w - \omega_{\bar{v}})\rho'_Q \bar{N}^k + \omega'_Q), \quad \text{and} \\ \bar{\varepsilon}^k_Q &= ((\omega_w - \omega_{\bar{v}})\bar{N}^k \varepsilon^k_E + \varepsilon^k_U) \end{aligned}$$

As the expressions $\bar{\omega}_0, \bar{\omega}'_s$ and $\bar{\omega}'_Q$ are functions of \bar{N}^k , it is obvious that the participation condition given by equation 10 contains explanatory variables correlated with the error term ε^k . Consequently, a good estimate of the parameters of the scale form of the equation would not be possible.

Note, however, that in principle part-time work is not practiced in the formal sector in Cameroon. For this purpose, it is reasonable to impose the restriction $\bar{N}^k = \bar{N} \forall k$. The terms $\bar{\omega}_0, \bar{\omega}'_s$ and $\bar{\omega}'_Q$ thus become constants and the correlation between the error term and the other terms given in the condition of the equation 10 no longer exist. In addition, the term and the constant $\bar{\omega}_0$ which appear separately in equation 8 are included in the constant \bar{N}^k of equation 10. This fusion of the constant and the original constant enable to avoid multicollinearity.

As in the work of Theisen (2005), our solution to the absence of data on virtual wages leads to a cost. Indeed, in the estimation of our model, we can only identify the parameters of the scale form $(\hat{w}_0, \omega_v, \omega'_R, \omega'_S, \omega'_Q)$ and (ω_v, ω'_R) . Only two of these parameters $\bar{N}^k = \bar{N} \forall k$ are those of the structural function of participation in moonlighting and of the utility function. Overall, the restriction $\bar{N}^k = \bar{N} \forall k$ enables us to make a coherent estimate of the parameters of the scale equation for participation in moonlighting, just as it makes it possible for us to identify the impact of hourly time on participation in the main job.

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For those not participating in moonlight jobs, the labour supply given by equation 10 is negative and can be interpreted as a latent supply (H_1) while it is positive for the participants. The variable (H_1) enables us to define a binary indicator (\hat{H}^k) which takes the value 1 if the individual k participates in a secondary job and 0 in the opposite case.

Which leads to the participation model:

$$\hat{H}^k = \begin{cases} 0 & \text{if } H^k \leq 0 \\ 1 & \text{if } H^k > 0 \end{cases} \quad k = 1, 2, \dots, K \quad (11)$$

Because the error terms of Equations 8 and 9 follow a scale centred normal law,

With $E[\varepsilon_U^k \varepsilon_E^k] = 0 \quad \forall k$ the error term in Equation 10 also follows a scale centred normal law. Moreover, the restriction $\bar{N}^k = \bar{N} \quad \forall k$ makes it possible to conclude that the statistical distribution of the error term will be identical for all workers. The binary indicator of equation 11 therefore represents a standard probit model for which the error term is assumed to follow a scale centred normal law $\varepsilon_E^k \sim N(0,1)k$.

The phenomenon of endogenization of the salary of the main job can be specified as follows:

$$\ln \hat{W}^k = \eta + \rho_s' S^k + \rho_s' Q^k + \varepsilon_E^k \quad (12)$$

But participation in a moonlighting is influenced by the characteristics of the main job and particularly the wages in the main job⁶. We can thus write:

$$\ln S^k = X_{i1} \beta_1 + \delta_i$$

Where X_{i1} is a vector of instruments, β_1 the vector of associated parameters to estimate and δ_i the error term. The error

⁶ As a rule, the higher the salary of the main job, the more reluctant the individual will be to engage in moonlighting in favor of leisure; and the lower this salary, the more he invests himself in moonlighting to the detriment of leisure...

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terms ε_E^k, δ are assumed to follow a bivariate normal law with 0 as an average and as a variance– covariance matrix:

$$\ln S^k = X_{i1}\beta_1 + \delta_i \quad (13)$$

We set $E(\delta^2) = 1$ to ensure the identity of the model while ρ is the correlation coefficient of the error terms.

The control vector X_0 includes all the variables likely to influence the moonlight job wage (education, professional experience, sex, parents' education, marital status, age, sector of activities...). The vector X_1 includes the determinants of the main job (wage).

We can use the following multinomial probit model for estimating the parameter vector β_{ij} :

$$P_j = \frac{\exp(\beta_j Z)}{1 + \sum_{j=1,2} \exp(\beta_j Z)} \quad (J = 1, 2) \quad (14)$$

Where P_j is the probability that a worker is in sector j , Z is a vector of covariances and where the private sector coefficient vector β_0 is normalized to 0 (Green, 2000).

The output of this multinomial probit model is used to estimate the following selection term for the moonlight job earnings function:

$$\hat{T} = \frac{\phi[\beta_j Z]}{\phi(\beta_j Z)} \quad (15)$$

Where ϕ is the normal distribution density function $N(0,1)$ and Φ is the cumulative function of the normal law.

Introducing this selection term into equation (12) gives us the following gain function:

$$\ln \hat{W}^k = \eta + \rho_s' S^k + \gamma T^k + \rho_Q' Q^k + \varepsilon_E^k \quad (16)$$

Where γ is a parameter to be estimated and the error term is $\varepsilon_E^k \sim N(0,1)k$.

Data and descriptive analysis of participation in secondary employment

The second Cameroonian Household Survey (ECAM2), carried out in 2001 among 10,992 households, about 56,924 individuals, made it possible to collect information relating not only to main employment but also and above all to moonlighting. Taking into account the sensitivity of the field of wages and the reluctance of individuals to give reliable information on their earnings, our sample is 3,387 workers with a main job and a moonlight job, and whose age is between 15 and 65 years.

Data relating to the practice of moonlighting in Cameroon can be characterized by essential variables including the salary of the main job, the salary of the moonlight job, age, professional experience in the main job, the individual's working time in both jobs (taking into account that there is no part-time work in the main job) and the level of education. The statistics for these variables are presented in Table 1 below.

Table 1. *Average characteristics of workers in moonlight jobs*

Variables	Average
Age	37.567 (0.201)
Professional experience	12.639 (0.191)
Education	11.070 (0.077)
Main job salary	45891.68 (1785.255)
Moonlight job wages	25546.76 (2.832)
Number of working hours	162.201 (1.348)

Source: ECAM 2, 2001.

We can notice that workers in moonlight jobs have fairly low average wage levels both in the main job and in the secondary job. "An average of FCFA 45,891.68 for the main job with a very high standard deviation which reflects a non-homogeneity of these wages, and an average of FCFA 25,546.76 for moonlight job. These average low wages are accompanied by a fairly low average level of education (11.070 years of study) which pushes to infer that the individuals who get involved in moonlighting are overwhelmingly secondary school graduates. However, it should be noted that the average professional experience (12.639 years), age (37.567 years) is rather high; this is also the case of working time whose average

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Table 2. *Correlation matrix*

	EXP	AGE	EDUC	NHT	SPA	SPR	SEP	SES
EXP	1							
AGE	0.628	1						
EDUC	-0.312	-0.148	1					
NHT	-0.024	-0.014	0.055	1				
SPA	-0.024	0.030	0.108	4.072	1			
SPR	-0.013	-0.074	-0.380	-0.037	-0.414	1		
SEP	0.049	0.071	0.235	0.099	0.075	-0.187	1	
SES	0.048	0.051	-0.033	0.062	0.018	-0.074	0.122	1

Source: ECAM 2, 2001.

This table shows that the correlation between education and professional experience on the one hand, working time and professional experience on the other hand is negative. This reflects the fact that the more educated individuals have little professional experience compared to those of workers whose level of education is less and less high; the more experienced they are, the more they work for a very limited time in the moonlight job site. The correlation between the salary of the moonlight job and professional experience, age, working time, the practice of this job in the para-public sector and the salary of the main job is positive while it is negative both for education and moonlight job in the private sector. The salary of the main job shows a positive correlation with all the variables, except the one which shows holding a moonlight job in the private sector.

Empirical results

We believe it is possible to present the results of the incidence of variables linked to education, professional experience, age, marital status and sector of activity on the main job salary of workers who practice multiactivity before dealing with their influence on the wages of moonlight jobs. Table 3 below gives the results of the estimates in the formal and informal sectors and in general.

Table 3. *Estimates of earnings functions of the main job depending on the formal and informal sectors*

Variables	Formal sector	Informal sector	General
Constant	8.377* (0.416)	9.252* (0.292)	9.852* (0.228)
Education	0.038* (0.013)	0.008* (0.008)	0.014*** (0.007)
Age	0.073* (0.016)	0.017** (0.008)	0.025* (0.007)
Age square	-0.0009* (0.0002)	-0.0001*** (0.0001)	-0.0002* (0.00009)
Professional experience	0.025* (0.018)	0.001 (0.004)	0.004 (0.003)
Square of professional experience	-0.0004 (0.0002)	-0.00003 (0.0001)	-0.00004 (0.00009)
Working time	0.0007* (0.0002)	0.001* (0.0001)	0.001* (0.0001)
Public sector	0.185 0.126	-	0.255** (0.136)
Para-public sector	0.161*** (0.083)	-	0.206*** (0.105)
Private sector	0.255* (0.052)	-0.389* (0.122)	0.557* (0.053)
No diploma	0.060 (0.210)	0.095 (0.217)	0.342** (0.140)
CEP / FSLC	0.111 (0.152)	0.014 (0.195)	0.269** (0.112)
BEPC/CAP/GCEOL	0.254** (0.120)	0.166 (0.194)	0.018 (0.102)
Probatoire/BP	0.309** (0.132)	0.098 (0.237)	0.042 (0.126)
BAC/GCEAL/BEP	0.222** (0.104)	0.360*** (0.210)	0.149 (0.10.3)
Higher education diploma	0.614* (0.150)	1.118* (0.278)	0.831* (0.149)
Single	-0.057 (0.099)	-0.155** (0.073)	-0.072 (0.061)
Monogamous	0.051 (0.094)	0.038 (0.066)	0.007 (0.056)
Polygamous	0.076 (0.108)	0.075 (0.072)	0.086 (0.061)
Religion	-0.014 (0.016)	0.039* (0.011)	0.028* (0.009)
R ² adjusted	0.696	0.396	0.051
Number of observations	773	2614	3387

Source: ECAM 2, 2001. **Notes:** Standard deviations are in parentheses; * coefficient significant at the 100% threshold, ** significant coefficient at the 50% threshold, *** significant coefficient at the 10% threshold.

The results presented above enable us to make several essential remarks. Education has a positive influence on the salary of the main job in both the formal and informal sectors and in general. This influence is more important and significant in the formal sector while it is not significant in the informal sector. Likewise, the older the worker, the more his wages increase, but at a decreasing rate. However, it should be noted that the influence of age on wages is also more significant in the formal sector. Professional experience contributes to account for the increase in the salary of the main job in both sectors but also at a decreasing rate.

The business sector does not have the same influence on wages in the formal and informal sectors. This influence is more significant in the private sector and particularly in the informal sector which offers a greater contribution to account for wages than that of the formal sector. The level of the diploma is on average positively correlated with the salary of the main job. In other words, as the level of the diploma increases, its contribution to account for the salary increases on average. The influence of marital status on the salary of the main job is positive depending on whether the worker is monogamous or polygamous, but negative depending on whether he is single. On the other hand, religion positively and significantly influences the salary of the main job in the informal sector but negatively in the formal sector.

Before examining the interpretation of the results of our estimates, note that our model predicts a negative coefficient of the wage income variable of the main job, given the assumption that leisure is a normal good. An estimate of the results of the participation equation based on Equation 10 is given by Table 4 below. The estimate of the participation equation shows that ten variables (main job salary, education, working time, no diploma, CEP/FSLC, BAC/GCEAL/BEP, single, monogamous, polygamous and religion) are significantly different from zero to 5% or more.

In the same light, before giving the interpretation of our results in detail, we intend to return to the restriction $\bar{N}^k = \bar{N} \forall k$ and the assumptions made about the motivations for participation in moonlight job.

Speaking of the restriction $\bar{N}^k = \bar{N} \forall k$ it must be said that if it is not valid, the results of our estimations could not be consistent. A careful look at our data reveals that 76.67% of individuals in our sample have a working time different from the normal time of 8 hours per day⁷. This deviation is too high, which is evidence that the estimates A, B and C are not weak enough. However, to assess the effect of the variation in working time on the results of our estimates, we proceed to a new estimate of the participation equation using only the sub-sample of 790 individuals working for exactly 8 hours and therefore respecting the restriction. The results of this estimate are presented in column D of Table 4 below. A Student's test comparing the respective coefficients of the variables in columns C and D shows that some coefficients (Age, BEPC / CAP / GCEOL, Probatoire/BP and higher education diploma) are statistically different at the conventional significance thresholds. We can therefore conclude that failure to comply with the restriction on the number of normal working hours $\bar{N}^k = \bar{N} \forall k$ has major consequences on the results of our estimates.

Statistics from our sample reveal that 50.66% of workers are under-employed (less than 8 working hours per day) in their main job while 26% are over-employed (more than 8 working hours per day). In this sense, we can estimate anew the specific moonlight job participation equation using a sub-sample of under-employed workers on the one hand and a sub-sample of over-employed workers on the other in their main job. The respective results are presented in columns C and D. The Student test comparing the coefficients of columns A and C of Table 4 shows that four coefficients (Age, square of age, BEPC / CAP / GCEOL, Probatoire / BP) are statistically different at the conventional significance thresholds. On the other hand, the application of the same test of the coefficients between the coefficients in columns A and D shows that no coefficient is statistically different from the conventional significance thresholds. So, we can conclude that those workers who are under-employed have obvious motivations to participate in moonlight jobs while some who are over-employed have no obvious motivation to participate in moonlight jobs. Consequently,

⁷ 443 people work 5 hours a day, 480 work 6 hours, 232 work 9 hours, 354 work 10 hours.

we can say that Cameroonians seem to participate in moonlight jobs mainly because they are partly rational (especially those who are under-employed) and partly irrational in their choices (especially those who are over-employed). While it is true that a working day in Cameroon lasts approximately as long as that of developed countries, we can think that it is obvious that workers are more motivated to participate in secondary jobs compared to industrialized countries. It is somewhat paradoxical that the number of working hours per day differs very little between countries with extremely different per capita incomes. In practice in Cameroon, a large majority of workers (50.66%) work fewer hours than the norm against a minority (26%) who work beyond the daily hourly norm. Only 23.34% of individuals work for a normal duration, that is to say 8 hours per day. All these estimates are summarized in Table 4 below:

Table 4. *Estimates of the bivariate structural probit model of moonlight jobs decision-making*

Variables	A	B	C	D
Constant	-2.673* (0.675)	-0.163 (0.584)	1.105* 0.491	-0.301 '0.483)
Main job salary	0.331* (0.065)	0.000001* (0.0000003)	0.0000005* (0.0000002)	0.0000001 (0.0000001)
Education	-0.022* (0.006)	-0.042* (0.014)	-0.024* (0.008)	-0.007 (0.012)
Age	0.010 (0.006)	0.025*** (0.015)	0.016** (0.008)	0.012 (0.013)
Age square	-0.0001 (0.00008)	-0.0002 (0.0001)	-0.0002** (0.0001)	-0.0009 (0.0001)
Professional experience	-0.001 (0.003)	0.008 (0.007)	0.003 (0.004)	0.001 (0.006)
Square of professional experience	0.0001 (0.00007)	-0.0002 (0.0001)	-0.0008 (0.0001)	-0.0004 (0.0001)
Woman	-0.017** (0.006)	-0.003* (0.004)	0.026** (0.008)	-0.031 (0.003)
Working time	0.000001* (0.0000003)	0.001 (0.0006)	0.0009* (0.0003)	0.0001 (0.0002)
Para-public sector	-0.036 (0.025)	0.063 (0.123)	-0.154 (0.239)	-0.003 (0.187)
Private sector	0.073 (0.086)	-0.081 (0.121)	-0.175 (0.234)	0.144 (0.122)
No diploma	-0.210*** (0.123)	-0.461 (0.093)	-0.575* (0.175)	*0.131 (1.002)
CEP/FSLC	-0.241**	0.151***	-0.612*	-0.004

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	(0.098)	(0.093)	(0.144)	(0.077)
BEPC/CAP/GCEOL	-0.114 (0.088)	0.461* (0.150)	-0.406* (0.134)	0.074 (0.132)
Probatoire/BP	-0.122 (0.108)	0.353*** (0.199)	-0.328*** (0.170)	0.318 (0.212)
BAC/GCEAL/BEP	-0.203** (0.089)	0.285 (0.194)	-0.405* (0.136)	0.309 (0.182)
Higher education diploma	0.045 (0.141)	0.432*** (0.250)	0.051 (0.957)	0.141 (0.226)
Single	0.167* (0.053)	0.290** (0.117)	0.124*** (0.071)	0.077 (0.101)
Monogamous	0.103** (0.048)	0.188*** (0.106)	0.131** (0.064)	0.012 (0.095)
Polygamous	0.156* (0.053)	0.328* (0.114)	0.182* (0.069)	0.153 (0.105)
Religion	0.026* (0.008)	0.033** (0.017)	0.042* (0.011)	0.029** (0.016)
Formal sector	0.184 (0.221)	0.116 (0.450)	-0.105 (0.350)	0.600 (0.377)
Informal sector	0.078 (0.221)	0.130 (0.453)	-0.195 (0.349)	0.416 (0.378)
R ² adjusted	0.044	0.028	0.050	0.044
Number of observations	3387	790	1716	881

Source: ECAM 2.2041.

Notes: Standard deviations are in parentheses; * coefficient significant at the level of 1%; ** significant coefficient at the 5% level; *** coefficient significant at the 10% level.

A: Together; **B** = Individuals working 8 hours in the main job and having a moonlight job; **C:** individuals working for less than 8 hours in the main job and having a moonlight job; **D:** Individuals working for more than 8 hours in the main job and having a moonlight job.

In all the estimates of the equations given in Table 4 above, all the coefficients of the main job wage variable are statistically significant and positive except that of the category of individuals working more than eight hours per day which is positive but not significant (column D). The latter case has the lowest coefficient, which is evidence that such individuals who spend less time in their moonlight job earn less than workers in estimates B and C.

The education variable, which is a component of human capital, shows a weak negative link with participation in moonlight job, but statistically significant in the estimates A, B and C. The nature of the coefficient of the estimate D shows that the more the worker

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is educated, the less he works for more than eight hours in the main job and participates less in the secondary job.

In all the estimates of our participation equations, all the coefficients of the age variable are positive but only those of the estimates B and C are statistically significant. All things being equal, this relationship shows that individuals are likely to participate in moonlight jobs as their age increases. This positive relationship between participation in moonlight job and age is confirmed by the positive relationship between participation and work experience. This last relationship is in agreement with the interpretation that age is a measure of human capital acquired through experience. This is also in line with the results obtained by Pradhan & Van Soest (1995) in Bolivia, Dasgupta (2003) in India & Theisen (2005) in Tanzania.

Another explanation for the positive relationship between age and participation in moonlight jobs may be that Cameroonians have a strong incentive to engage in moonlight jobs as they approach retirement age due to the fact that retirement pensions are very insufficient to cover the cost of living during retirement.

The female gender weakly and negatively accounts for participation in a moonlight job on the whole (estimate A) but its coefficient is significantly negative. The same is true for the estimate of individuals working eight hours per day in the main job. But, for those individuals working more than eight hours a day, the effect on participation is negative and statistically insignificant. Having a positive coefficient for the female variable for individuals working for less than eight hours seems to reflect the fact that the participation of women in moonlight jobs is only possible when they work for a relatively short time in their main job.

Working time is a weak but positive explanation for participation in moonlight jobs. Its coefficients are significant overall and in the estimate C for individuals working less than eight hours per day.

The survey shows that the practice of multiple jobs does not exist in the public sector but rather in the para-public and especially the private sectors. The coefficients of the para-public sector variable are all negative and not significant except that of

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individuals working for eight hours per day which is positive. This seems to reflect the fact that workers are subject to a discipline of scrupulous respect for working time. The private sector, for its part, although presenting a non-significant coefficient, shows that individuals participate in moonlight jobs although they probably work more than eight hours a day, as shown by the importance of the coefficient of the estimate D (0.144).

The effect of a diploma on participation in moonlight jobs is varied. Our estimates show that the more the individual is educated, the more he participates in moonlight jobs. One explanation for this result is certainly to be found in the relatively low levels of remuneration of workers in their main job according to their diplomas, as shown by Manga Engama (2006).

Marital status accounts for almost participation in moonlight jobs in an almost identical way. Whether one is single, monogamous or polygamous, the participation coefficients are all positive and statistically significant for those who work eight hours and less than eight hours per day. Although positive, these coefficients are quite low and not significant, relevant for those who work more than eight hours a day.

In our estimates, all the coefficients of the religion variable are positive and statistically significant, which is evidence that religion is a determinant of participation in a moonlight job.

Participation in moonlight jobs in the formal or informal sector has a negative correlation with working less than eight hours a day, but the coefficients are positive and quite high for those who work for eight hours and especially those who work for more than eight hours (0.600 and 0.416 respectively for the formal and informal sectors).

Conclusion

To the best of our knowledge, apart from sectorial work by Yamb & Bikoue (2016, 2019), no study has ever been carried out in Cameroon on the estimation of the functions of participation in moonlighting. Our study thus aims at analysing the phenomenon of moonlighting and broadening the scope of the literature on the issue, especially in the African context. This article focuses on individuals who have two jobs, including a main job and a

moonlight job, the latter falling within the para-public sector or the private sector (formal or informal) since the survey does not reveal any moonlight job in the public sector.

Our empirical results imply that leisure is a normal good insofar as the fall in the salary of an individual's main job despite his experience can be compensated by participation in a moonlight job. Like the informal sector in Fields (1975), moonlight jobs play a role of buffer employment.

Our estimates show that the main job wage, age, working time, higher education qualification, marital status, religion, formal sector and informal sector have a positive effect on participation in moonlight jobs while education, the para-public sector and the female gender have the opposite effect. We can notice that participation in a moonlight job increases with the salary of the main job and with age, contrary to what is traditionally postulated by economic theory (Averret, 2001; Lacroix & Fortin, 1992; Shishko & Rostker, 1976).

The positive correlation between the salary of the main job and participation in the moonlight job, apparently contradictory, seems to be explained by the low levels of wages resulting from the salary drop of January and November 1993 in Cameroon, aggravated by the devaluation of January 1994. In order to maintain their standard of living, workers are therefore inclined to find additional income through secondary jobs.

While in developed countries, particularly in the United States, age negatively affects participation in moonlighting (Rostker & Sishko, 1977; Conway & Kimmel, 1998; Averett, 2001), in Cameroon as well as in Tanzania (Theisen, 2005) it is the opposite effect that has been noticed. One possible explanation for these results may probably be related to differences in retirement pension systems. In the case of Cameroon and probably other developing countries participation in moonlight jobs appears to be a "substitute" to the failures of the retirement pension system. Indeed, the salary being low and the pension being only a fraction of this salary, the level of retirement pension also remains very low, hence the need for the individual to find additional income to meet their needs. Conversely, in developed countries such as the United States, the negative impact of age on participation in

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moonlighting suggests that the worker, when approaching retirement age, withdraws first from the moonlight job, and then from the main job. Research subsequent to this article may place particular emphasis on employment during retirement in developing countries in general and in the African context in particular.

In view of the rampant unemployment which is gaining ground in the Cameroonian economy, it would be important to set up an incentive framework for work in the jobs (health insurance, aid for the education of workers' children, performance bonuses, attendance bonuses, punctuality...) in order to limit the participation of workers in moonlighting and give job-seekers a better chance of finding a job.

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3

Informal sector and taxation in Burkina Faso

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Kwami Ossadzifo WONRYA

Introduction

Understanding the real nature of the informal sector in the economic literature, as well as its causes and consequences, appears to be a matter of great concern in Sub-Saharan African countries. The concept of the informal sector emerged in economic history in the 1970s, originally by Hart (1971) and the International Labour Office (ILO, 1972). Indeed, since the discovery of the concept of informal employment in the early 1970s by Keith Hart (1972) in Ghana and by the International Labour Office in Kenya, the concept itself bore the seeds of subsequent debates which have continued to enrich the economic literature ever since.

While Hart saw informal employment, as a source of informal income, as a main feature of the informal sector, the BIT report, by contrast, highlighted the notion of informal enterprises motivated by the search for livelihoods (Swaminathan, 1991). This latter conception prevailed, giving rise to a definition of the informal sector proposed by the ILO report in 1993, which sees the informal sector as "the weak link between formal institutions and

production units that operate on a small scale, with little or no division between labour and capital as factors of production. Labour relations, where they exist, are based mainly on casual employment, kinship or personal and social relationships rather than on contractual arrangements with formal guarantees".

Following these pioneers, several authors from various disciplines have engaged in research to better understand the problems of the informal sector; this has led to theories on concepts and definitions, as the perception of socio-economic phenomena is changing over time (Charmes, 2008). At the origin of the concept of the "informal sector" is the European industrial revolution that developed the practice of wage-earning and homeworking; according to Salais *et al.*, (1986), when permanent employees began to lose their jobs due to cyclical crises, this necessarily led to the gradual unemployment of homeworkers.

The functional approach, on the other hand, defines the informal sector based on the functions it performs within the different economic structures. The functional approach, while emphasising the relations between the formal and informal sectors of the economy, assimilates the latter to small-scale market production, which according to Charmes (1990), plays a fundamental role in the development of the capitalist system. This functional definition finds, in fact, its source in the thesis of the submission of the informal sector to capital; indeed, according to this thesis, which is of Marxist or structuralist inspiration, the informal sector is a sector exploited by the capitalist sector (Amin, 1973; Portes, Benton & Castelles, 1989).

Still, in the wake of the functionalist approach, many authors equate the informal sector with a real nursery of small activities with a vocation to develop progressively. It is precisely the productive segment of the informal sector that is likely to accumulate.

The objective of this article is to clarify the concept of the informal sector and to highlight its role and importance in tax revenue mobilisation strategy. More specifically, it discusses the different approaches to the concept of the informal sector before looking at the issues related to its taxation.

The rest of this paper is structured in three sections: the first section presents the theoretical debates on the notion of the informal sector and its development in developing countries; the second section looks at the empirical evidence of the growth of the informal sector in developing countries, with a particular focus on Burkina Faso; and the third section addresses the issue of taxation in the informal sector.

Economic models explaining the development of the informal sector in developing countries

By analysing the various economic theories that have been designed to explain the emergence of the informal sector phenomenon, we can link the literature on the informal sector, particularly the urban sector, to the development of migration models. The urban informal sector then appears as the surplus of rural labour in search of a subsistence income; as such, the neoclassical-inspired theoretical constructions that have been developed consider a representative individual occupied in a rural area with a certain income and who hopes to join, in probabilistic terms, the formal urban sector. Based on this main idea, models have been elaborated to provide the first attempts to explain the concept related to the dynamics of the informal sector; at this level, the models of Lewis (1954), Todaro (1969) and Fields (1975) are of interest in the literature, given their contribution to the conceptual clarification of the phenomenon of the informal sector. Much more recent economic theories link the spectacular development of the informal sector to state failures.

Lewis' model (1954)

In the context of his research work on the phenomena of migration from rural to urban areas, Lewis was one of the pioneers in highlighting the process by which rural labour contributes to the urban labour market; it seems to us that this theoretical construction can be considered as the basis for the emergence of the phenomenon of the informal urban sector. The Lewis model describes a vision of development based on an analysis of the transfer of resources from a traditional sector (agriculture) to a modern sector (industry).

The Harris-Todaro model (1969)

In contrast to Lewis' model, the Harris-Todaro model bases its approach on three possible states of the labour market; thus, these two authors introduce into their analysis the phenomenon of unemployment in the urban environment in addition to employment in the two sectors (traditional and modern) defined by Lewis. This unemployment would be linked to the increase in migratory flows from the countryside to the cities, due to the persistence of the income gap that would exist between the two sectors (urban salaries much higher than those in the agricultural sector). This observed asymmetry in the level of wages paid is due to the existence of competitive wages in the agricultural sector (the agricultural wage corresponds to the marginal productivity of labour, which is equal to the equilibrium wage) and, conversely, in the modern sector, given the existence of a legal minimum wage, wages are higher than the equilibrium wage; as a result, any increase in the income gap between the two sectors leads to an increase in migratory flows, which in turn leads to the aggravation of unemployment in urban areas. As the urban wage is set above the equilibrium wage, this situation will result in an imbalance in the labour market: $N_d < N_o$ with N_d : demand for labour; N_o : labour supply; $(N_o - N_d)$ is a measure of the level of unemployment.

The fundamental contribution of the Harris-Todaro model lies mainly in highlighting the rationality of migratory behaviour, despite the existence of urban unemployment (Montalieu, 2001). Thus, rural migrants make their decision to migrate to the city based on a comparison of the agricultural wage with the expected urban wage ($W_{u.e}$); the latter is equal to the potential wage (W_e) obtained multiplied by the probability of finding a job (p). $W_{u.e} = W_e \times p$.

The inclusion of the informal sector in Fields models

The inclusion of the informal sector in the analysis of the labour market in developing countries has made it possible to develop models useful for understanding the economic issues contained in this sector; the most important conceptualizations have been represented by the Fields models.

At this level, however, it should be noted that the first model to have taken into account the urban informal sector is that of Lopez (1970), which is, in fact, an extension of the model of Todaro (1969), through the introduction of the possibility for urban dwellers, excluded from the formal labour market, to work in the informal sector. One of the main reasons for the failure of this model was the fact that it did not take into account the phenomenon of unemployment in the urban environment, a fact widely discussed in Fields' approach.

The informal sector in the Lopez model (model of intersectoral mobility)

In Lopez's model, the movement of workers from one sector to another is highlighted following a three-stage trajectory (Lopez Castano, 1989; Lopez Castano in Roubaud, 1994). This trajectory can be summarised as follows:

- The majority of young people start their working life in the informal sector as employees, family helpers or apprentices. This first contact with the world of work allows them to familiarise themselves with the work and to gain some work experience. Non-compliance with labour legislation in the informal sector makes it possible to recruit a significant number of young people who do not meet the necessary age and qualification requirements.
- After a few years of working in the informal sector, these young people choose, when given the opportunity, to enter the modern sector as employees. The attractiveness of this sector would be explained by the high quality of its jobs (protected status, relatively well-paid jobs, social benefits).
- From a certain age (40-50 years), employees in the modern sector (including P&MS), after having accumulated small funds but also technical know-how and a certain social capital, leave the modern sector to set up their own business in the informal sector (as self-employed). This shift from the modern sector to the upper segment of the informal sector is said to be motivated by the search for better income and a certain desire for independence.

The informal sector, a link in the booming economy in developing countries

In developing countries, employment in the informal sector grows annually by less than 2-3% ([Maldonado et al., 1999](#)), while paradoxically the urban population is growing by more than 3%, mainly due to rural exodus; this situation will undeniably lead to the following immediate consequence: the imbalance between supply and demand for urban labour, creating a new dynamic in the labour market, which will lead to an explosive social situation that is difficult to control, and where economic agents will be driven by an instinct for survival to carry out activities on the fringes of any existing regulations.

The distribution of activities by institutional sector highlights the preponderant role that the informal sector plays in the occupation of assets in the WAEMU space; in fact, nearly 76% of the economic agents surveyed operate in this sector against only 24% distributed between the sectors of public administrations, formal public and private enterprises, as well as those of the associative type ([WAEMU, 2004](#)). The inability of the modern public and private sector to ensure the full use of resources explains this proliferation of informal enterprises, which make up for the failure of the policies implemented by the governments of West African countries; this creates social and economic stability, a *sine qua non* for the success of the public investment.

This increase in the number of production units in the informal sector can be explained using economic models that have been constructed to identify the reactions of the two spheres of the economy (formal and informal sectors) in the presence of an exogenous or endogenous macroeconomic shock; it seems to us that the fundamental issues contained in the analysis of the informal sector can be apprehended through a treatment of models of labour and goods market dynamics, as well as through the model of tax evasion.

The presence of the informal sector in developing countries is therefore not a passing, marginal phenomenon destined to disappear in the medium term ([Maldonado, Badiane, & Miélot, 2004](#)); its scale and complexity in the socio-economic and political environment of developing countries, including in particular

African countries, is an increasingly established and undisputed reality. This is corroborated by the fact that in Africa, over the period 1992-2002, estimates have indicated that informal work accounted for almost 80% of non-agricultural employment, 60% of urban employment, 90% of new jobs created; in the specific case of Sub-Saharan Africa, the informal sector accounted for 75% of non-agricultural employment over the same period, compared to a rate of 33% in the 1990s, an increase of 42%; relative to other developing countries, the informal sector in Africa seems much more dynamic when we carry out analyses of comparative statistics with other continents. The specificities related to empirical data on the informal sector in the WAEMU space in general and in Burkina Faso, in particular, are as follows.

Relative dynamics of the informal sector in Africa

Comparing data on the informal sector in Africa with that of Latin America and Asia highlights the dynamism of the informal sector and its relative importance. In Latin America, the ratio of urban informal employment to total urban employment increased from 52% in 1990 to 58% in 1997. This increase is thought to be related, on the one hand, to the growth of the labour force as a result of demographic factors, an increase in the activity rate, particularly of women, and high mobility of workers from rural areas to the cities, and, on the other hand, to the contraction of employment in the formal economic sector. In terms of composition, there was an increase in employment in micro and small enterprises, followed by a renewed interest in self-employment and a more modest increase in domestic work. Overall, following the adoption by several Latin American countries of a definition reducing the threshold from 10 to 5 workers, the estimated size of the informal economy increased from 58 per cent to 48 per cent of total urban employment.

In Asia, the proportion of workers in the informal sector is between 45% and 85% of non-agricultural employment, and between 40% and 60% of urban employment. However, in some parts of East Asia, notably in the Republic of Korea, Hong Kong (China) and Singapore (China) there has been evidence of a decline in the informal economy as a result of the expansion of the

manufacturing and industrial sector and the resulting creation of jobs in the formal economy. The role played in this respect by the emphasis on education and training, which has enabled the labour force to meet the growing demand for skilled workers, is worth recalling.

The informal sector in Burkina Faso

The definition of the informal sector as presented in the literature is not homogeneous. The criteria generally used to define informality are based either on the existence of a record of production units, or on a size criterion (number of employees), or a technical criterion (keeping of accounts, the share of physical capital). This heterogeneity, widely discussed in empirical studies, has led some authors to reject the terminology of "informal sector" (Lautier, 1994; Morisson & Mead, 1996). This leads us to clarify the definition we imply when we use the term 'informal sector' in the context of Burkina Faso. The survey 1 2 3 conducted in the Ouagadougou agglomeration in 2003 used the criterion of administrative non-registration to define the informal sector. At the current stage of the empirical review, this criterion is no longer relevant to⁴ characterise the informal sector in Burkina Faso. Moreover, based on certified data on the informal sector collected in 2013 by CFA Africa in collaboration with the World Bank, the informal sector is defined as "all economic operators handling a low volume of business and operating on the fringes of modern management methods". Macroeconomic data compiled from the country's national accounts indicate that since 2000, the share of the informal sector has averaged 49% of the gross domestic product in Burkina Faso (World Bank, 2012). At the microeconomic level, the World Bank's 2013 survey of informal sector activities produced a good picture of the IPUs that should be examined.

The performance of IPUs

The performance of IPUs reflects the precarious conditions of activity, the weakness of the means of production used, the low level of qualification of the workforce and the strong competition they face. This situation does not allow them to withdraw substantial revenues from the market. Thus, the average turnover

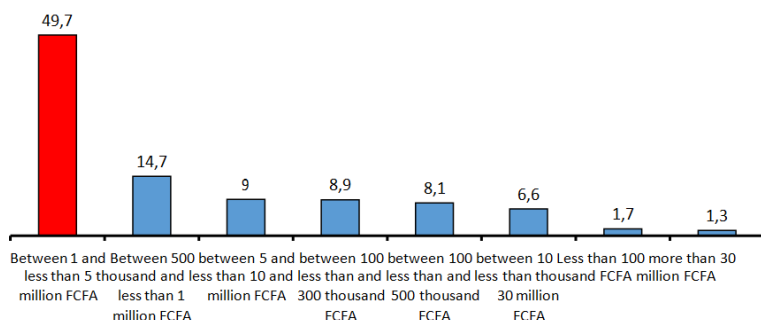
achieved by the IPU during the period surveyed was FCFA 6,961,054. However, this amount varies greatly depending on the branch of activity and even within the same branch of activity. IPU in the "Transport, activities of transport auxiliaries and communications" branch of activity generate an average annual turnover of 10,609,332 FCFA, compared to 2,2 69,056 FCFA for those in the "Collective or personal activities" branch of activity. The minimum turnover (60,000FCFA) is achieved by IPU operating in this branch while the maximum turnover (240,000,000FCFA) is due to IPU in the branch "Transport, activities of transport auxiliaries and communications".

Table 1. *Minimum, average and maximum annual turnover per branch of activity*

Grouped branch of activity	Minimum	Average	Maximum
Manufacturing activities	104 000	5 952 481	68 573 053
Construction	180 000	5 768 156	19 020 000
Wholesale and retail trade, repair of motor vehicles and related articles	90 000	7 611 453	189 780 000
Hotels and restaurants	127 750	7 732 947	137 970 000
Transport, activities of transport auxiliaries and communications	365 000	10 609 332	240 000 000
Real estate, rentals and business services	96 000	6 994 556	27 451 500
IT activities	849 000	7 619 901	21 900 000
Activities of a collective or personal nature	60 000	2 269 056	51 100 000
Total	60 000	*6 961 054	240 000 000

Source: *Survey on the Reform of Taxation of Informal Activities, 2013*

The profit made by the IPU is relatively low; according to the survey data, this profit evaluated excluding taxes and duties varies between FCFA 500,000 and FCFA 5,000,000 for the majority of IPU (about 65%). UPIs that make a profit of more than 10,000,000 FCFA represent 8% of the total.



Graph 1. *Distribution of IPUs according to profit before taxes (in %)*

Source: Survey on the Reform of Taxation of Informal Activities, 2013

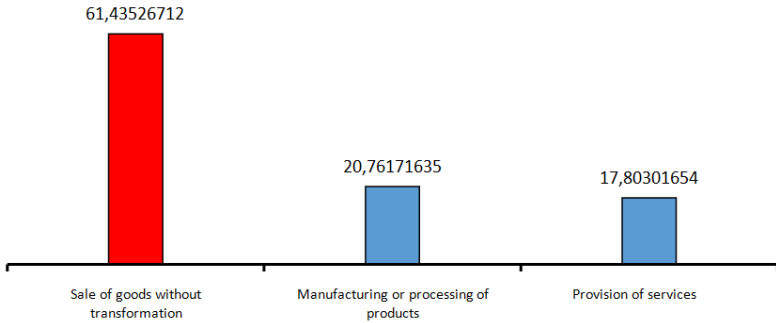
An analysis by the branch of activity shows that UPIs make an average annual profit before tax of FCFA 3,500,000. This profit is not significantly modified by the payment of taxes as shown in the following table:

Table 2. *Average profit by business line*

Branch of activity	Average profit before taxes (Thousands of FCFA/year)	Average profit after tax (Thousands of FCFA/year)
Real estate, rentals and business services	5 000	5 000
Transport, activities of transport auxiliaries and communications	4 400	4 300
IT activities	4 300	4 300
Construction	4 300	4 200
Wholesale and retail trade; repair of motor vehicles and related articles	3 800	3 800
Hotels and restaurants	3 600	3 500
Manufacturing activities	2 800	2 800
Activities of a collective or personal nature	1 600	1 600

Source: Survey on the Reform of Taxation of Informal Activities, 2013.

If IPUs are considered according to the nature of their activity, those selling goods contribute 61.4% of the turnover of the informal sector, followed by manufacturers or processors of products (20.8%), and finally service providers (17.8%).



Graph 2. *Contribution (%) of IPU turnover according to the nature of the activity*

Source: Survey on the Reform of Taxation of Informal Activities, 2013.

The previous analysis shows that the informal sector is a set of activities born to solve personal problems of lack of employment and to create wealth within the national economy. The performance of the IPU we have just presented shows that the informal sector can mobilise more income provided that it benefits from supportive investments by the state. The role of the informal sector in fiscal mobilisation is therefore not negligible.

Synthesis elements on the empirical review

Almost all studies of the informal sector conclude that there is a substantial difference between the labour force in the formal and informal sectors. Self-employment is a characteristic feature of the informal sector and accounts for 62 per cent of employment in the informal sector in North Africa and 70 per cent in sub-Saharan Africa. This proportion rises to 81 per cent if South Africa is excluded (Becker, 2004). Besides, domestic workers and street vendors account for 10-25 per cent of non-agricultural employment in developing countries (ILO, 2002). Work on the informal sector in Botswana, Kenya, Malawi and Zimbabwe indicates that almost two-thirds of informal enterprises in these countries are owner-only (Haan, 2006). Similarly, a study conducted by the Central Bureau of Statistics of Botswana showed that on average 84.2 per cent of informal enterprises are single-employee and 12.7 per cent of enterprises are family-owned (CSO, 2008). From these statistics, it can be seen that most IPU are sole proprietorships. In Latin America, statistics show

that informal self-employment accounts for 40 per cent of the workforce (Maloney, 2004).

Another key characteristic that determines the informal sector is the high proportion of women working in this part of the economy. Indeed, 60% of the female labour force in developing countries is in the informal sector; in sub-Saharan Africa, this rate is 84%. Steel & Snodgrass (2008) show in their work that 59 to 83 per cent of workers in the informal sector are women. This confirms the findings of CSO (2008) which also found in its work that 67.6 per cent of informal sector enterprises in Botswana were owned by women in 2007. In contrast, in Burkina Faso, the World Bank's 2013 Informal Sector Tax Reform Survey on the urban informal sector shows that 72.9 per cent of IPU's are male.

The level of education of the leader is also a distinguishing feature of the informal. La Porta & Shleifer (2008) worked on databases of a selected sample of African and Asian countries and concluded that the probability that the manager of a given firm has reached university level is 6.1 per cent in the informal sector compared to 15.9 per cent in the formal sector. In a study of five African countries, Haan (2006) concludes that about half of the employees in the informal sector have either no education at all or only elementary level, while less than 5 per cent have reached secondary level. Braude (2005), extrapolating from the situation in South Africa, indicates that there is a considerable difference between the educational attainment of workers in the formal and informal sectors: 37 per cent of informal workers in that country have not completed secondary education, compared to only 16 per cent in the formal sector. As a result, the income gaps between the two categories of workers are also significant. Similarly, Gelb *et al.*, (2009), based on an analysis of survey databases for countries in Southern and Eastern Africa, concluded that informal entrepreneurs have lower educational attainment than formal entrepreneurs in almost all countries, except Tanzania and Uganda, where the difference is almost non-existent. In Burkina Faso, analysis of the World Bank database indicates that 33.2 per cent of IPU's have no education at all and 0.8 per cent have the highest level; the informal sector is then considered to be the refuge of those who have not had a

promising school career. Traoré (2014) has also shown that in Burkina Faso, the probability of working in the formal sector increases with the level of education. In the informal sector, education tends to reduce the probability of self-employment relative to wage employment.

Determinants of the taxation of IPU in Burkina Faso

The mobilisation of fiscal resources in Burkina Faso is a major issue for the achievement of development objectives. The informal sector in Burkina Faso, under the legislation applied to it, also contributes to this mobilisation of public revenue. Several factors in the national economy can explain the level of taxation of IPU; we will first analyse the determinants of direct taxation of IPU and then those related to indirect taxation.

Determinants of direct taxation of IPU in Burkina Faso

The taxes under the direct taxation of IPU are the ITUC and the TR. The ITUC is a tax linked to the productive activity of the IPU, while the RT is correlated to the level of comfort of its living environment. The payment of the CSI is linked to certain characteristics of the UPI, in particular the branch of activity, the location and the turnover. Based on the analysis of survey data on the taxation of informal sector activities in Burkina Faso (World Bank, 2013), the highest proportion of IPU paying tax is found in the transport, IT and trade sectors; at the other extreme are the manufacturing, real estate and construction sectors; the following table gives details of these proportions.

Table 3. *Proportion by the branch of activity of enterprises having paid taxes*

Branch of activity	%
Transport, activities of transport auxiliaries and communications	73,2
IT activities	70,0
Wholesale and retail trade; repair of motor vehicles and related articles	65,3
Activities of a collective or personal nature	60,9
Hotels and restaurants	58,5
Manufacturing activities	56,6
Real estate, rentals and business services	55,6
Construction	46,2

Source: Survey on the Reform of Taxation of Informal Activities, 2013.

Besides, certain characteristics such as the exercise of the activity on-premises seem to favour the collection of the CSI tax. Indeed, while 30.39% of the UPIs pay the CSI, this percentage is 84.89% among the localized units. Thus, the proportion of companies with premises is 2.79 times higher for those who pay the tax than for those who do not. On the other hand, the relative differences between branches in terms of ITUC payment are less important among the IPU that are localised.

The size of the IPU measured by the value of its turnover is the other factor that seems to determine the payment of tax. Large taxpayers in the informal sector are more easily identifiable and also have a greater incentive to comply with regulations to avoid a possible tax audit. Indeed, these IPU with large turnover are for the most part illegally included in the informal sector contribution regime concerning the defined thresholds of tax liability. They are then always willing to pay the ITUC on time, the amount of which is well below their actual capacity to pay. This apparent civic-mindedness is intended to distract the attention of tax administration officials from the possibility of considering an audit against them. The following figure shows that the higher the turnover of an IPU, the more likely it is to pay tax on its activity. By way of illustration, among the 10% of UPIs with the lowest turnover, 7.69% pay tax on their productive activities; on the other hand, among the 10% with the highest turnover, 13.63% comply with this obligation.

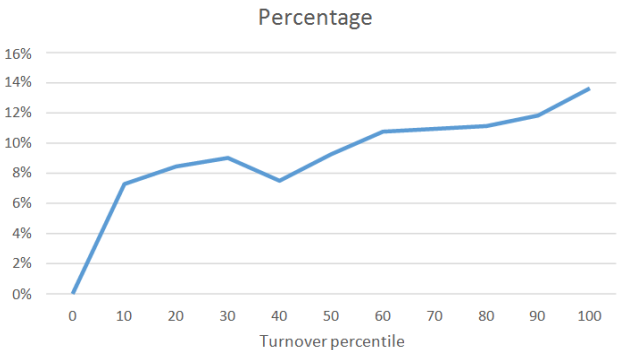


Figure 3. *Distribution of IPU by taxpayers and by turnover*

Source: Constructed by the author using data from the Survey on Tax Reform for Informal Activities, 2013.

Also, among the factors that determine the payment of the ITUC are tax registration and the level of education of the UPI. Thus, among the taxpayers who have paid the ITUC, 58% are registered against 33% who are not. Taxpayers with a high level of education are much more able to pay tax than others: 50% of informal sector taxpayers with a higher level of education paid their taxes compared to 24% for those with no education. On the other hand, age does not seem to have a clear-cut effect on ITUC payment in the light of the data, which show a jagged trend; in fact, the payment rate is 0% for taxpayers aged 15, 50% for those aged 17, 34.21% for those aged 24, 36.36% for those aged 50 and 0% for taxpayers aged 70.

Concerning the residence tax, its payment is determined by the region and the area of residence of the UPI, its age and its level of comfort (possession of electricity, supply to the drinking water network). Thus, of the 2,543 informal sector taxpayers surveyed, 44 are exempt from this tax on the grounds of age (aged 60 and over), and the others are subject to it. In theory, the improvement of the living environment of the population through structural investments should make it possible to improve the level of the residence tax for local authorities. Tax registration also affects the payment of the RT; indeed, to promote better tax collection, settlement receipts are required from taxpayers by CEFOR before the completion of tax registration formalities.

The determinants of indirect taxation of informal sector assets are presented in the following sub-section.

Determinants of indirect taxation of IPU's in Burkina Faso

The main indirect taxes and duties in the informal sector in Burkina Faso are VAT, OPT, excise and customs duties. Zonon's (2007) study highlighted the preponderance of indirect taxation of households, of which IPU's are an integral part, relative to other taxes. The amount paid in indirect taxation of IPU's appears to be partly related to the income effect of IPU's. The income effect weighs heavily on the burden of indirect taxation: the volume and structure of consumption, and consequently the related taxes, obviously increases with income. The study by Zonon (2007) has

shown that the elasticity of the total amount of indirect taxation to income is less than one. The burden of indirect taxation is, therefore, all other things being equal, less than proportional to income. However, it is important to stress that income can only influence indirect taxes through consumption. For each item of expenditure, the amounts of the various components of indirect taxation can be calculated by processing information on quantities consumed. Thus, informal sector workers spend more and therefore bear more indirect taxes compared to farmers, artisans and, persons without a profession. Moreover, between IPU, regional differences appear. Informal sector taxpayers in urban centres bear more indirect taxes than those in rural or semi-rural areas. The socio-demographic characteristics of taxpayers therefore have a non-negligible effect on the level of indirect taxation. Amiel (2003) has shown through a study of the French economy that it is above all the income effect that explains the amounts paid in indirect taxation with a positive elasticity of less than unity. However, this overall income effect may mask important differences according to the nature of the tax. The income effect varies significantly from one indirect tax to another, with VAT predominating.

The attitude of IPU to taxation in Burkina Faso

Taxpayers in the informal sector are generally considered to have an aversion to paying their taxes. The tax administration is said to have much more difficulty collecting taxes from these taxpayers than from those in the formal sector. However, analysis of data from the Informal Sector Activities Survey (World Bank, 2013) shows that the vast majority of IPU are willing to comply with their tax obligations. According to these data, considering the branches of activity, six out of ten informal enterprises pay taxes; in the 12 months preceding the survey, 63% of UPI managers acknowledge having paid at least one tax. The statistics also indicate that, regardless of the sector of activity considered, at least 50% of UPIs state that they have paid taxes to the State or an administrative structure. The following graph shows these results:

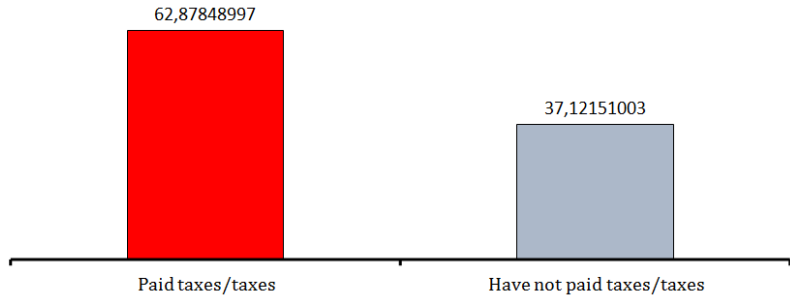


Figure 4. *Distribution (%) of IPUs by tax payment*

Source: Survey on the Reform of Taxation of Informal Activities, 2013.

Looking at the industries, seven out of ten informal production units engaged in the transport and transport auxiliaries paid taxes and duties in the last 12 months. The same is true for IPUs operating in the IT sector. In the trade and repair of vehicles and articles sector, 60% claim to have paid taxes during the same period. The following table gives the proportions by the branch of activity:

Table 4. *Proportion by the branch of activity of enterprises having paid taxes*

Branch of activity	%
Transport, activities of transport auxiliaries and communications	73,2
IT activities	70,0
Wholesale and retail trade; repair of motor vehicles and related articles	65,3
Activities of a collective or personal nature	60,9
Hotels and restaurants	58,5
Manufacturing activities	56,6
Real estate, rentals and business services	55,6
Construction	46,2

Source: Survey on the Reform of Taxation of Informal Activities, 2013.

In terms of taxes due, data from the Informal Activities Tax Reform Survey show that it is the patent and contribution of the informal sector that is paid the most. ITUC is paid more by IPUs operating in the construction and IT sectors. The payment of income tax and value-added tax is very little paid by the IPUs, as the following graph shows:

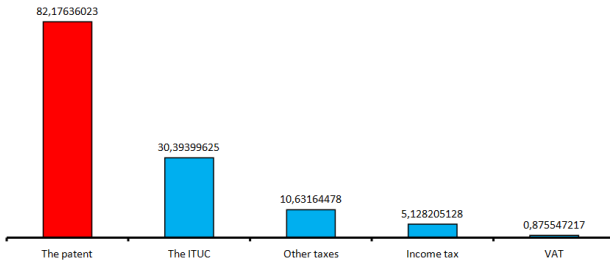


Figure 5. *Distribution (%) of IPU by tax paid*

Source: Survey on the Reform of Taxation of Informal Activities, 2013.

Refined analysis of this survey data indicates that the average amount of taxes paid by IPU is FCFA 20,000. This average amounts to FCFA 23,000 for the patent, FCFA 25,000 for the ITUC and FCFA 32,000 for income tax. In the fields of construction, transport, activities of transport and communication auxiliaries and real estate, renting and business services, the average of taxes paid is 40,000 FCFA. However, IPU engaged in trade, repair of motor vehicles and articles, hotels and restaurants and activities of a collective or personal nature paid taxes on average less than 20,000 FCFA.

IPU managers who do not pay taxes or levies to the state or its branches (37% of the sample surveyed) cite several reasons for this. For some, it is ignorance of their tax obligations, for others, there is no interest in paying the various taxes or levies; the last category refers to the insufficient profit made. The following graph shows the distribution of IPU according to the reasons for non-payment mentioned.

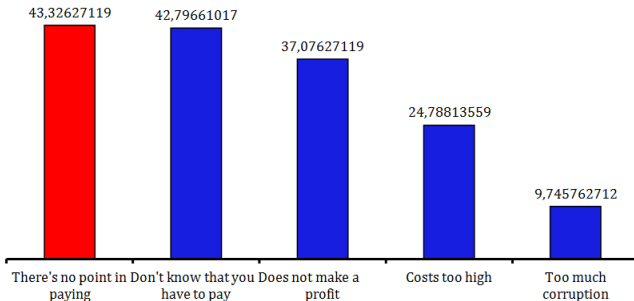


Figure 6. *Distribution of IPU by reasons for non-payment of taxes*

Source: Survey on the Reform of Taxation of Informal Activities, 2013

Of the IPU's that do not pay taxes, half are willing to do so, but under certain conditions. Six out of ten prefer lump-sum taxation, two out of ten opt for taxation in proportion to profits and three out of ten opt for taxation in proportion to turnover, as shown in the graph below:

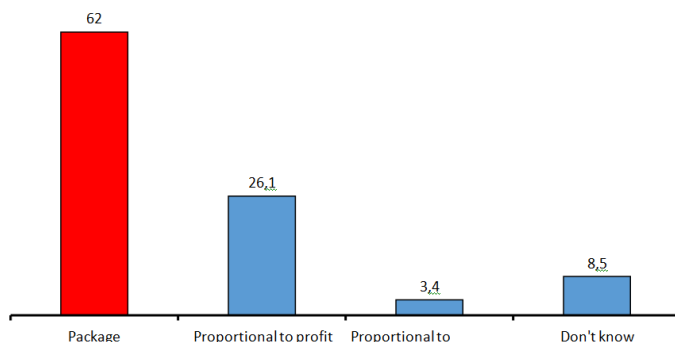


Figure 7. *Distribution of IPU's by tax system to be applied*

Source: Survey on the Reform of Taxation of Informal Activities, 2013.

The average lump-sum proposed by the IPU's is FCFA 11,000 per year. However, in construction and real estate, renting and business services the average lump sum proposed per year is two to three times higher than the general average as shown in the table below:

Table 5. *Average lump sum to be paid by industry*

Branch of activity	Average lump sum (FCFA/year)
Construction	30 000
Real estate, rentals and business services	25 000
Transport, activities of transport auxiliaries and communications	13 500
Manufacturing activities	12 000
Wholesale and retail trade; repair of motor vehicles and related articles	11 000
IT activities	10 500
Activities of a collective or personal nature	10 000
Hotels and restaurants	8 000

Source: Survey on the Reform of Taxation of Informal Activities, 2013.

On the other hand, certain managers of the UPIs are prepared to be taxed at an average of 12% of their profits. Apart from manufacturing activities, where the average proportion is 15%, the average proportions proposed for the other sectors of activity vary significantly around the 12% average.

Conclusion

This article has set out to review the literature on concepts related to the informal sector and the problems of its taxation in developing countries in general and in Burkina Faso in particular. To do so, a clarification of the concept of the informal sector was first proposed. It emerges from this exercise that the first attempts provided by the economic literature to elucidate the concept linked to the dynamics of the informal sector, particularly the urban sector, are due to Lewis (1954), Todaro (1969) and Fields (1975) who proposed models to this effect. From then on, a historical approach to the concept was developed by Hart (1971, 1972), B.I.T (1971) and the functional approach, which focuses on the relations between the formal and informal sectors of the economy, was implemented by Charmes (1990), Lopez, Henao & Sierra (1984), Sethuraman (1976, 1981), Kanbur (2009), the World Bank (2012). In essence, the literature indicates that there are several levels of informality that can be characterized by criteria such as the size of the activity, registration, truthfulness of accounts, fixed workplace, access to credit and the tax status of the firm. From an empirical point of view, the data analysed in this article have made it possible to establish the socio-economic importance of informal sector activities in developing countries in general and in Burkina Faso specifically. The data analysed indicate that in Burkina Faso, the majority of IPU's are illiterate (33.2% of IPU's have no level of education) with, however, a non-negligible level of benefit estimated between 500,000 FCFA and 5,000,000 FCFA for the majority of IPU's (approximately 65%). The UPI's that make an average profit of more than 10,000,000 FCFA account for 8% of the total. The statistics clearly show that UPI's generate income, however small, which could contribute to the financing of public expenditure. These results seem to corroborate the preponderant

role of the informal sector in the mobilisation of domestic resources in Burkina Faso.

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4

Corruption game and banking intermediation crisis in Central Africa: Evidence from Cameroon

Siméon Maxime **BIKOUÉ**

Introduction

Since the end of the 1980s, the Cameroonian financial system has been confronting a serious banking crisis which has led to the liquidation of many banks and to deep restructuring for the banks which have been maintained in activity. The analysis of the causes led to the identification of a set of factors and variables explaining the fragility of the banking system by an inappropriate monetary policy which, through a structure of low interest rates, favoured the financing of unprofitable projects which remained unable to generate enough surplus to ensure the payment of interest and the repayment of credits. Other analyses have questioned the weight of the State which, through budgetary policy, has severely drained the resources of banks or, whose agents exerted strong pressure for the granting of credits on economically unfounded bases. Still others emphasize the inadequacy of the credit structure in relation to bank resources on the one hand and on the other hand, in connection with the financing needs of companies in general, SMEs in particular. To these relevant factors, it is essential for a good appreciation of the

origins and the extent of the banking crisis in Cameroon to add corruption as one of the essential explanatory variables for both the severity of the crisis and the current difficulties of the never-ending bank restructuring process. Corrupt behaviours, as we will see below, have had a deep impact on the functioning of the banking system and continues to play a determining role in the on-going process of bank restructuring.

They have in fact affected credit granting decisions, the assessment of financing requests, and continue today to influence the collections and compensation processes of savers, thus interfering with client confidence and the overall credibility of the system, and the negative effects are all the more serious as the forms are multiple and diverse.

In order to fully understand the impact, we can rely on the contributions of the contract and agency theory to analyse financial intermediation, in particular the role of asymmetric information as a generator of adverse selection and moral hazard in the game of the function of financial intermediation.

The purpose of this paper is to make a contribution to the analysis of this phenomenon of corruption and its effects in the banking crisis in Cameroon. In the first part, we shall recall the lessons of the contract and agency theory to analyse the function of financial intermediation, situate corruption in this perspective to examine the effects in connection with the role assigned to banking intermediaries, and then focus on a typological description of corruption in banking intermediation in Cameroon (I). The second part will be devoted to the analysis of the impact of corrupt behaviour on the Cameroonian banking system (II).

Corruption as a generator of moral risk and adverse selection in financial intermediation

Taking corruption into account in the economic analysis

The theoretical analysis of corruption and its consequences is recent in economics, while the phenomenon has long been the object of analysis and reflection developed in sociology, law and political science where it is overwhelmingly dominated by moral standards. It was towards the end of the 1970s that what J. Carter-Bresson calls the political economy of corruption began to take

shape (Cartier-Bresson, 1992). The approach adopted is mainly microeconomic. It partly borrows from the research carried out by the School of Public Choice as it explains individual behaviours in relation to the sole objective of maximizing well-being in a world of scarcity, thereby excluding morality and community pressure. Corruption is then interpreted as a particular form of rent-seeking; corruption supply and demand are examined from a microeconomic perspective to verify the existence of a more or less competitive market, a price and a consumer optimum (Kruger, 1974; Buchanan, 1980; Tollison, 1982).

The major concern of the analysis in this approach is to explain the way in which economic agents compete for the appropriation of transfers artificially created by the State. Corruption is thus closely linked to the State and to bureaucratic behaviours that create uncompetitive situations which generate the very rents that agents seek to get in the illegal market. Following Becker's work on crime, we retain the fear exerted by the appropriate penal sanctions as the only constraint, and we are concerned with calculating the optimum level of public, legal and police expenditures in a logic of well-being. As J. Carter-Bresson sums it up well, "in the search for competitive rent, rent disappears thanks to the pure and perfect competition reigning on the illegal market. Conversely, non-competitive research situations nurture the rent. Individual appropriation then becomes possible" (Cartier-Bresson, 1992, p.595).

Banfield (1975) says that corruption is possible as long as there are three types of economic actors, namely an agent, a principal, and a third person whose gains and losses depend on the agent. The agent is likely to be corrupt when he has a capacity to conceal his corruption from the principal, and he is corrupt when he sacrifices the interest of the principal to his and thereby breaks the law. This definition enables him to identify three types of incentives to minimize corruption:

- incentives for loyalty through a satisfactory salary policy,
- aggravating the consequences when an act of corruption is unveiled,
- monitoring the activities of agents.

As the fight against corruption entails costs, it will be optimal when the marginal costs of its elimination are equal to the anticipated marginal benefits, this reasoning is typical of Becker. Banfield argues that the control mechanisms are more effective in private companies than in the public sector. But the analysis points to the paradoxical conclusion that there are situations where corruption is tolerable in the private sector, since the only reference to fight corruption is the preservation of profit.

Economically, the existence of intersecting market and non-market allocation processes promotes corruption. In market processes, for example, the development of large units leads to the manipulation of competition rules to their advantage, which distorts the theoretical reference model. As for the electoral processes supposed to reveal preferences, they are based on a system of delegation which makes all betrayals possible. Legislative or regulatory decisions are therefore all the more for sale as the information and control procedures are imperfect.

This analysis thus leads her to criticize the cost / benefit approach adopted by Banfield and to show that an improvement in the law and in the functioning of the State reduces the opportunities for corruption. This accounts for the importance the author attaches to analysing legislative and administrative corruption and establishing its typology. But the approach remains fundamentally utilitarian.

With Cartier-Bresson we can point out the double constraint limiting these liberal analyses based on methodological individualism. On the one hand, human behaviour like corruption cannot be reduced to behaviour of the *Homoeconomicus* type. The analysis also leads to the tolerance of some corrupt practices, for example when they increase profit or well-being. On the other hand, the fiction of perfect market-State substitutability does not allow us to take into account the organizational realities of corruption and to include into the analysis the phenomena of redistribution which, in general, always occur with various cases of corruption and have structuring effects. However, it is essential "to explain the links of dependence and interdependence which is typical of what deserves to be called networks of corruption. Moreover, these can only work well if there are much broader

objectives than the sole individual enrichment, so that the transactions carried out cannot be assessed solely from the utilitarian perspective of purely commercial relations" (Cartier-Bresson, 1992).

This is particularly true when we look at financial intermediation where the corruption game is easily understood if we take into account the recent contributions of contract, agency and signal theory.

Analysis of financial intermediation in the light of contract and agency theory

The traditional analysis of financial intermediation emphasizes the adjustment role played in the economy by the intermediary who collects the savings of the ultimate lenders to whom he sells the securities he issues and transmits them. to ultimate borrowers, by purchasing primary securities. This adjustment causes him, in some cases, to replace the ultimate lenders and lend his own debt through money creation. But the adjustment also leads the intermediary to reconcile the term of the resources collected with that of the needs to be satisfied, hence the transformation aspect typical of financial intermediation. While this function of adjustment and reconciliation through transformation is important, it does not cover all of the dimensions of the financial intermediation function as we have seen in recent years by extending to the analysis of financial intermediation lessons from contract and agency theory.

The starting point of these contributions is the questioning of the hypothesis of perfect information which, in traditional analysis, makes it possible, for example, to postulate the efficiency of the markets, to assess the return on assets and to define a behaviour profile. In this case, adjustments are made to achieve an optimal balance and to maximize the return on the assets.

In a situation of imperfect information, we have to distinguish between:

- those who, on the financial markets, have perfect information, or have privileged access to this information, in particular that relating to the profitability and risks of the various assets,

- those who, on the contrary, do not have access to information, or have only partial access to it.

This difference in access to information creates an asymmetry that affects each other's behaviour. The acquisition of information and the development of communication mechanisms thus become an essential problem justifying the presence and giving special meaning to financial intermediation. Diamond (1984) and Merton (1990) are interested in the way in which financial intermediaries provide this information. Indeed, the financial intermediary can be seen as a producer and distributor of information. He collects it on the agents with financing needs who talk to them, from the elements required of them to ensure the nature, quality and relevance of their needs, and gives this information to agents with the financial capacity who seek the best opportunities for investment and profitability.

As the search for information has a cost, financial intermediaries make it possible to reduce these search costs, both for borrowers who want to know what resources are available at the lowest cost, and for lenders who want to know what the best investment possibilities are and to whom to lend at the least possible cost.

The nature of lender-borrower relationships makes them a possible source of conflicts of interest, resulting precisely from asymmetric information, and financial intermediation helps to resolve these conflicts and to reduce transaction and research costs. (Benston & Smith, 1976; Leland & Pyle, 1977).

The lender does not always have the opportunity to properly observe and assess the qualities and possible defects of the borrower. He therefore operates in a situation of uncertainty. The negative consequences of this uncertainty have been well analysed by Diamond (1984), Ramackrisnan & Thakor (1984), who show in particular how the lender can be the victim of either adverse selection behaviour due to the fact that the quality of the investment opportunities which are offered to him cannot be correctly appreciated, or moral hazard behaviour, because he is not assured that the borrower will keep all the commitments made during the loan contract. Lewis (1992) shows in this context the essential role of the financial intermediary in resolving these

conflicts. He kind of develops and brings together a complex system of contracts, and seeks at the best, to set up a standard contract. The quality and density of the information that he collects forces the adhesion of lenders who trust him because they know that he will invest their funds in the best possible way so they can yield interest, and will carry out an adequate selection of borrowers, eliminating those likely to have a moral hazard or adverse selection-generating behaviour.

The banking system in economies like Cameroon's is the very place for this lender-borrower encounter and for reducing uncertainty on the information and behaviour of various agents; we then better understand the problems and negatives effects of corruption at this level.

Corruption as a factor of bias in the assessment of financing risk

Financial intermediation in general, banking intermediation in particular, as we have already said has the role of facilitating the financing process taking into account the various information costs. The nature of the information that banks collect is indeed impressive. At the conception and definition stage of the project, this concerns the nature of the sector, the state of the market, the nature of competition, the development prospects of the branch, the structure of the company, its organization, its financial capacities, the available human resources, the quality of the managers, the financial situation of the company. The bank also studies the project itself, taking into account the information collected above, in order to ensure the profitability of the project, and its capacity to generate a surplus large enough to ensure the repayment of the debt and the payment of interest which ensures the output of the investment made.

Once the project is accepted and financed, the bank monitors its implementation, with a set of incentives and signals which enable the bank to oblige the borrower to respect his commitments. This is the case with the granting of credit by instalments: each instalment comes after the bank has ensured that the borrower has respected the previous commitments. The same applies to evaluations made in the field and to the communication and analysis of the

borrower's accounting statements. The bank therefore has elements that make it the place for a correct assessment of the financing risks. Moreover, there are institutional mechanisms that allow it to ensure optimal monitoring of the borrower. Thus, the habit of reciprocally communicating available information on different clients has developed between banks. This practice is endorsed, as far as Cameroon is concerned, by the existence of a risk management centre run by the Central Bank.

This information could not be collected by every agent with financial capacity without incurring enormous transaction costs which would jeopardize even the prospects of return. Moreover, the bank's decision to grant financing is analysed, on the side of the lenders, as an indicator that this is a good risk.

However, corruption introduces a perverse bias into this risk assessment. In a situation of corruption, the quality of the information collected by the financial intermediary is doubly called into question.

As a matter of fact, under the influence of corruption the decision-maker no longer collects the right information, either because it is no longer a determining variable of his decision and of his risk assessment, or because he is no longer able to verify whether the information he receives is trustworthy.

On the other hand, even if the information collected is accurate, he will conceal it and will therefore refrain from using it, insofar as it would force him to decide in a direction contrary to the bribe-giver's expectations. Corruption therefore acts as an amplifier of information asymmetry and constitutes a source of adverse selection and moral hazard with serious and negative effects, since economic agents instinctively continue to trust the bank, and therefore continues to invest there. And even the monitoring system is completely affected because the centralized information on risks only gives a distorted image of the nature of the risks taken by a bank, and in general by the banking system.

If we consider that financial intermediation creates a double principal-agent relationship, on the one hand between the bank and the depositor who entrusts the bank with his savings, and on the other hand between the financial institution and the borrower to whom the savings collected or the money created is lent; this

double principal-agent relationship is altered by the fact that the various incentives no longer make it possible to prevent opportunistic behaviour and the occurrence of adverse selection risks and moral hazard.

The extent of the deterioration can be grasped from an analysis of corrupt behaviours in the banking system; the typology of these behaviours makes it possible to understand their extreme complexity and multiple facets.

The impact of corruption on the functioning of the banking system

The impact of corruption on the functioning of the Cameroonian banking system, and therefore on the serious crisis that has affected it since the end of the 1980s, can be understood at different levels, three of which will hold our attention here. The first two levels concern the bank-client relationship, and hence the role of the bank's financial intermediation. We will see that it can no longer be held according to standards and expectations, hence the extent of the crisis which affects it and the difficulties in finding the ways out. The third level refers to the institutional and judicial sphere and makes it possible to understand the difficulties that we encounter here to restructure the system by giving it institutional credibility.

Corruption and asymmetric information in the Bank-Client relationship

The forms of corruption described above make it possible to understand the implications of the relationship between the bank and its client. Corruption affects the dual agency relationship that exists between the bank and its clients. Between the lender who entrusts the bank with the cashes deposits, and the bank which receives this deposit to multiply it, and provide it with a return, there is a principal-agent relationship where the saver, by his deposit gives the bank a mandate to act in his best interests, and the bank will do so, through its credit activity. This allows the bank in turn to make an investment with the borrower, and this creates an agency relationship between the bank and the borrower.

By lending, the bank mandates the borrower to ensure optimal use of the credit and to ensure a return in the form of a bank margin through are fund of both the main amount and interests.

The principal-agent relationship accounts for the implementation of incentives and signals that enable to minimize the risks of adverse selection and moral hazard. Thus, in addition to the information collected on the borrower and the project to be financed, the bank takes guarantees, for example in the form of mortgage or collateral, or takes out insurance to cover the risk of the client's death. Likewise, it incurs expenses to follow-up and monitor the implementation of the project; these expenses enter its operating account as operating expenses. The bank may even add a risk premium to the interest rate that tends to zero depending on the borrower's good behaviour.

However, corruption calls this whole system into question and compromises its effectiveness; thus negatively affecting the bank-client relationship. Between the bank and the beneficiary of the loan, as we have already said, there is asymmetric information. First, it will be because the information collected is no longer accurate. This inaccuracy can be found in the accounts of the company which will, for example, be disguised to reflect a reality other than the actual state of the company and its ability to manage or complete the project. Inaccuracy can also appear at the level of the very destination of the funding when the project presented is not the one that will, in fact, be financed by the credit received from the bank. Cases of credit reorientation from the initial project have thus become a feature of the credit market. It is therefore common, for example, for the client to apply for a home improvement loan which will in fact be used to purchase a vehicle. FONADER was a particularly significant example of these practices where the credits granted to finance agricultural projects were rather used for consumption expenditures.

The information can also be inaccurate on the very identity of the borrower, leading to the constitution of a portfolio of fictitious clients, yet real enough to allow the granting of credit and the realization of disbursements. There is the example of a client having obtained a credit under a given identity, and who some time later, changed identity with all the regulatory papers, being

offended that he could be identified in the name of the beneficiary of the credit known to the bank, with the complicity of the bank agents and the official identification services. We can also mention this other case of a beneficiary of funding who shortly after was declared dead, to escape from his repayment obligations while continuing to go about his business. The informational bias can also be located at the level of the determination of the effective financing need which is likely to be increased to include the very part which will be used by the client to bribe the decision maker.

Beyond the collection of inaccurate or poor information, asymmetric information can result in the failure to take into account the exact information available on the project by the client, and the concealment of said information, particularly in the event of litigation when for example, guarantees must be brought into play or legal action must be taken to force recovery.

On the side of the relation between the depositor and the bank, corruption accentuates asymmetric information insofar as it deteriorates the quality of the information which should secure the depositor. He entrusts his savings to the bank under the assumption that the quality of the information collected by the bank helps to select the right clients to receive loans, and therefore likely to invest the savings in a profitable way. And even though the depositor might incur research costs to have the right information, banking intermediation by its nature dissuades him from doing so and imposes on him the inappropriateness of such research.

The saver is thus the main and the double victim of the double principal-agent relationship between the bank and its clients, and we therefore understand the gravity and the extent of the confidence crisis that has developed in Cameroon between economic agents and clients, and banks, due in particular to the behaviour of bank agents.

On the one hand, corruption, whether it is the act of bank agents or the initiative comes from clients, has favoured the development of opportunistic behaviour such that the regular loan repayment appears to be an aberration, just as the idea that a loan can be granted on the sole basis of the quality of the project and the management of the company is to many economic agents. The

probability of occurrence of counterparty risk is thus greatly increased.

On the other hand, bank failures have developed among savers an anti-banking syndrome such that it seems absurd to deposit or fund accounts payable at the bank. This syndrome has been reinforced by cases of falsification of accounts payable entries leading to undue withdrawals for the benefit of either fictitious accounts or accounts receivable by bank staff, as some famous lawsuits have shown.

Asymmetric information is also reinforced among clients, insofar as corruption creates a differentiation between clients, some of whom are subject to the usual rules governing the granting of loans, and the others are not due to corruption. They thus receive the treatment of stowaways which exempt them either from fulfilling all the requirements prior to the credit decision, or from repaying the totality of the credit and paying the interest, or from bearing only part of it, the rest being left to the charge of the whole community. We thus know that a large part of the restructuring costs was borne by the community, since most of the bad debts were consolidated on the State, and therefore on the taxpayer. Depositors and holders of savings accounts have moreover borne the burden twice, first as a taxpayer, and second as a result of losing their savings.

In terms of comparison, we are here in a game where some players holding a decision-maker position for the normal outcome of the game – because the other players entrust them with the mandate to play the game according to the accepted rules, and indeed believe this is the case – unwittingly modify these rules and play the game as if the rules were still the same, taking advantage of the fact that they are the only ones to know that the rules are modified.

We can then measure the magnitude of the transaction costs that the various players have to bear, and the extent of the counterparty risk run by banks, as evidenced by the volume of bad debts.

Corruption as a generator of significant transaction costs for the economy

Asymmetric information implied by corruption in the bank-client relationship is the source of many transaction costs which appear at different levels and whose consequences can be micro-economic, affecting both the bribe-giver and the bribe-taker; or macroeconomic, because it is the whole economy which must bear all or part of these transaction costs at a given moment and as a last resort.

At the microeconomic level, the nature of the transaction costs depends on the position of each actor in the corruption game.

Corruption generates transaction costs for the borrower, because he must withdraw from his income or his surplus to bribe the decision-maker at the bank, with the risk that this expenditure could be wasted. These costs are all the more burdensome when his project is intrinsically viable, his risk assessment is correct, and he will therefore have to bear an undue burden that will affect how he operates the project. He can for sure charge these costs to the clients by adding them to the price of the merchandise or service, but through this increase in costs he runs the risk of excluding part of the potential clients from the market.

It can also supplement it by modifying the quality of the product or service, then bearing the transaction costs linked to the risk of adverse selection. As a result of corruption, companies and various entrepreneurs have often had to bear additional financial burdens related to financing, the negative consequences of which were visible during the life cycle of the project.

On the bank side, if the manager, or person in charge of guiding the decision-making process does not bear immediate or apparent transaction costs, and even seems to be the main beneficiary of this adverse selection behaviour or moral hazard, it is quite different for the bank as an institution, which will have to bear transaction costs of several types.

The first type of transaction costs is related to the fact that the bank will provide financing on a basis that does not guarantee repayment or payment of interest. The profit margin is therefore compromised from within. But worst still, it even pays a salary not because it wants to derive increasing production from this work

or at least maintain its production and its bank margin, but on the contrary to compromise it. In other words, it incurs costs in order to generate new costs.

The second type of cost relates to the return on the expenses incurred in collecting the information. To the extent that this information is sterilized, or is biased, the transaction costs here are enormous because it has incurred expenses which not only are not profitable but also are harmful to its business. Depending on the size of the funding granted in the context of the corruption game and their number, it is the whole or a significant part of the portfolio that may be compromised. However, the management of this portfolio generates multiple costs, in terms of provisions for doubtful or compromised debts, litigation and collection costs, etc. The counterparty risk thus generates enormous costs for the bank.

Other transaction costs arise when the deterioration of the portfolio and the margin make it impossible for the bank to honour its commitments in compensation for withdrawal requests. In addition to the transaction costs linked to the loss of credibility and which result in particular in less deposits, the bank has the problem of financing compensation for various depositors. The bank then suffers all the negative consequences of liquidity and solvency risk.

However, this is the situation experienced by many Cameroonian banks which, in a few years, have accumulated a portfolio of compromised debts of nearly CFA 400 billion, and part of which consisted of debts linked to operations engaged under the corruption game.

The saver who deposits his surplus in the bank is also one of the main victims of this principal-agent relationship with moral hazard. Having given a mandate, having had confidence in the information produced and shared by the bank which is his agent, and in its ability to ensure the best investment for his savings and provide him with the best possible return, he finds himself not only robbed of its initial surplus at the end of the corruption game, but also having to bear for the community part of the transaction costs resulting from the price to be paid for corruption games in which he was not a party. He will bear the costs in particular as a taxpayer.

Just like the others, the costs can increase as corruption continues and makes the disappearance or the concealment of files to be recovered possible at the level of liquidations. These would have enabled to recover a part of funds for at least a partial compensation of depositors. This problem of disappearance of the cases in collection is today one of the main pitfalls facing bank liquidations in general, and the Cameroonian Recovery Company in particular, all other things being equal.

The normal borrower also bears similar transaction costs in that he will contribute through his repayments and interest payments to at least partially meeting the costs from which the bribe-giving borrower is exempt.

On the macroeconomic level, corruption in the banking system has created many transaction costs for the State and the economy as a whole.

At the State level, the main transaction costs are represented in particular by all the commitments that the State and public authorities have had to assume, in the context of bank liquidation and bank restructuring. On the one hand, the State and public enterprises and other communities have lost significant sums in deposits with liquidated banks, for an amount estimated in 1994 at CFA 250 billion. But, again, the state saw itself consolidate the largest share of the impaired debts for an amount of nearly 400 billion CFA.

Of course, all of these compromised debts and the liquidations that followed are not just related to corruption. We know the role played by the collapse of commodity prices and the general depression of the economy. But we also know that many of these debts were compromised because they arose from loans granted on poorly studied cases, to sometimes fictitious clients whose traces we could not find. One of the arguments for the consolidation of these claims on the State has also been that many of these loans were granted under pressure from State officials, outside the criteria of economic and financial profitability, a modest expression often used to characterize acts of corruption.

Thus, through budget expenditure the State had to socialize transaction costs arising from credit decisions where corruption played a significant role. In addition to these direct transaction

costs, there are indirect transaction costs, in terms of opportunity cost for all essential capital or public consumption expenditures, but which had to be deferred to cover the costs of bank restructuring.

But the State bears another type of transaction costs linked to its loss of credibility with the monetary authorities and which resulted in a rationing of loans to the State and its exclusion from the liquidity circuit, in particular at the level of the money market.

But the state is not alone in bearing these transaction costs; the economy as a whole pays a heavy price.

The economy pays for it first of all because asymmetric information and moral hazard that results from corruption lead to a bad allocation of funding. These are in fact oriented towards projects which cannot generate a sufficient surplus to increase internal capital formation and ensure the repayment of loans and the payment of interest. It thus imposes itself a kind of law of Gresham where the bad projects drive out the good projects which moreover, pay an additional cost, because they are the only ones to have to bear all the expenses of reimbursement and payment of the interests for all the credits granted by the financial system.

Transaction costs also result from the fact that the accumulation of losses in banks and the ensuing crisis lead to significant costs for the economy in terms of jobs and restructuring costs.

Furthermore, the banking crisis and the bank restructuring are the basis of a strengthening of the credit rationing policy. This is reflected in various measures either to increase the cost of financing through a policy of high interest rates or quantitative restrictions in the context of monetary programming, or the implementation of particularly strict prudential standards. Moreover, we can now observe a marked development between banks of a cautious behaviour of overestimating risks and a concentration of credits on a few signatures. Credit discrimination is thus greatly aggravated.

Small and medium-sized enterprises are particularly affected by this rationing, insofar as they are often identified, rightly or wrongly, as having played an important role in the development of acts of corruption and the financing of fictitious or poorly

studied projects. And even when they still access finance, they face particularly high risk premiums.

The importance of transaction costs is so important because corruption is at the origin of a general loss of credibility of all actors in economic life. Indeed, each actor questions the partner's commitment to refrain from opportunistic behaviour and abide by the agreed terms of the contract. And this loss of credibility is accentuated by the fact that the various signals no longer play their role and the various incentives are inoperative. We can thus observe that the guarantees taken by the banks are inoperative either because they are fictitious – the relating information being inaccurate or partial – or because they cannot be realized as the judicial institution and the whole of the institutional system are completely deregulated by the same corruption game.

Corruption as source of institutional and judicial bias

If we consider economic transactions as a set of contracts, Williamsom (1990) shows how it is essential for an institutional and legal system to function allowing arbitrations and conflict resolution. While in an allocation economy, the market is supposed to lead to an equilibrium, and therefore constitutes the ultimate instance of stabilization of relations, it is quite different in an economy where transactions involve costs, insofar as assets are specific. Taking up the analysis already made in 1931 by Llewellyn's, he then shows the importance of an adequate judiciary to correct asymmetries, eliminate transaction costs, and ensure a redistribution of transactions. The performance of an economy, in terms of the organization and distribution of transactions is therefore closely dependent on the judicial and institutional system. In fact, this determines the three variables of credibility of any commitment in individual or group relations: price, specific asset, and the incentive that dissuades from opportunistic behaviour. If we transpose the above to the banking system, we can see the importance of the institutional and judicial system for the proper functioning of banks and their ability to perform their function of financial intermediation.

The institutional system refers, among other things, to banking regulations, project study procedures, standards governing bank

management and the granting of loans, standards of monetary policy, etc. It also refers to the various bodies responsible for the application of these standards, in particular to the control bodies whose irreplaceable role in the functioning of the financial system and in maintaining and strengthening its credibility is well known.

The judicial system intervenes here in particular in contentious cases, especially when it is necessary to ensure the fulfilment of guarantees through binding judicial decisions. The borrower must indeed believe in the effectiveness of the use of guarantees so that they effectively produce a dissuasive effect against any attempt at displaying opportunistic behaviour.

It is the functioning of this institutional system and the dissuasive capacity of the judicial system that are biased and affected by corruption. Judicial arbitration which makes it possible to restore the contractual norm and thus reduce the possibilities of incomplete contracts loses this capacity and the prospect of a sanction is no longer dissuasive enough to prevent one of the parties to the contract from breaking its commitments.

In the case of the banking system, the crisis has been all the more difficult to resolve as the absence or withholding of information concerning some borrowers has been added to the poor functioning of the justice system. By making surprising decisions with regard to the law, the justice system in particular made the realization of guarantees for the banks inoperative. This was so serious because credit decisions were mainly based on the accumulation of guarantees, in particular real collateral in the form of mortgage on real estate (land, buildings, etc.). Banks today continue to denounce the noticeable tendency for all legal proceedings initiated to result in decisions against them. Likewise, they denounce the inexplicable increase in garnishment decisions which affect them and which tend to absorb their own funds.

But downstream, the crisis was more than possible and further accentuated by the fact that the control bodies did not fully play their role. This was the case with Banking Supervision whose power was held by the State, but which proved ineffective either because of insufficient human resources or because of acts of corruption.

One of the lessons learned from this experience was the transfer of this power from the State to a supranational body: the Central African Banking Commission. But its action is often blocked by court decisions that often render its decisions inoperative as in the case of the liquidation of the International Bank of Africa (IBAC). Likewise, we can observe all the obstacles facing the liquidation of Crédit Agricole du Cameroun which illustrate the dysfunctions of the institutional system.

Debt collection is equally constrained with many bank actions taken against unscrupulous clients stopped by the inertia of a judiciary affected by the phenomenon of corruption.

Conclusion

In general, the analysis of the Cameroonian banking crisis makes it possible to understand the negative impact that corruption can have as a generator of moral hazard, risks of adverse selection, and therefore of transaction costs both from the point of view of individual economic agents and from the point of view of the overall functioning of the economy. The extent of the banking crisis in Cameroon cannot therefore be fully understood if the analysis fails to include corruption not only as an essential causal factor of the crisis and its aggravation, but also, as an explanatory factor of the length and difficulty to finalise the bank restructuring process.

Corruption has generated and reinforced asymmetric information and disrupted the very arrangement of credit contracts. But still, its persistence makes it difficult to conduct an effective bank restructuring, insofar as it significantly prevents or constrains the implementation of the decisions taken. However, these constraints accentuate the loss of credibility of the banking system and help to divert part of the economic agents. Corruption makes it difficult for the system to develop a typical banking firm behaviour while it encourages the exclusion of national economic agents from the sector, either by strengthening credit rationing, or by excluding them from banking decision-making centres once they suspected of a greater sensitivity to corruption. The eradication of the phenomenon thus appears to be a requirement, not only of a moral order, but also of an economic order, as a

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condition for consolidating growth which cannot be sustainable
without robust financial intermediation.

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5

Taxation of the Informal sector and tax mobilisation in Burkina Faso

Honoré TENAKOUA

Kwami Ossadzifo WONRYA

Introduction

The informal sector appears to be a significant resource for most developing countries, even if it is not a specific feature of them. However, the data corroborate that the characteristics and economic and social importance of this sector give it a regular character. According to Schneider & Klinglmair (2004), the informal sector accounts for respectively one quarter and one-third of GDP in Asian and Latin American countries; this proportion reaches 16% of GDP in OECD countries. Statistics from some West African countries show that, at the national level, the informal economy represented between 40% and 75% of GDP in 1999/2000; excluding agriculture, this proportion varies between 20% and 37% depending on the country (Charmes, 2000).

These data illustrate the importance of the informal sector in developing countries, particularly in Africa, and partly explain the growing attention paid to this sector by contemporary economists. This growing interest in the informal sector has not failed to challenge the West African Economic and Monetary Union (WAEMU), which has been assigned a difficult challenge to take

up, all the more so because, on the one hand, the very concept of the informal sector remained confused and, on the other hand, the specific and dynamic nature of informal activities seemed to make them elusive. Thus, the methodology of the 1-2-3 survey was designed from 2001 onwards to best meet this double challenge in WAEMU member countries; this methodology is now part of the economist's toolbox to address the issue of the informal sector (AFRISTAT, 2001). Its successful experimentation, first in Cameroon, then in Madagascar, has led to its being the subject of international recommendations (AFRISTAT, 1997) and its use in many developing countries on three continents (Africa, Latin America, Asia). All these strategies are aimed at harnessing the assets of the informal sector to bring them to play a leading role in the mobilization of domestic resources through their taxation.

The objective of this paper is to analyze the efficiency of taxation of informal sector taxpayers in Burkina Faso from a partial equilibrium perspective. Specifically, the aim is to determine whether or not the taxation currently applicable to informal sector assets is favourable to tax mobilisation, on which the state's budget constraint function depends. In other words, it is a question of verifying whether the taxation system faced by IPU in Burkina Faso contributes to a better mobilisation of public resources.

The rest of the paper is structured in three sections: the first section addresses the issue of taxation of the informal sector; the second reviews pioneering studies that have been developed in the economic literature to explain informal sector taxation; and the last section analyses the effect of IPU taxation on tax mobilisation in Burkina Faso using a methodological framework based on the principal-agent theoretical model.

The need to tax the informal sector

The desirability of taxation of the informal sector in developing countries has received particular attention in the economic literature in recent years (Joshi, Prichard, & Heady, 2014). This renewed interest is due to the potential for financial flows that circulate in the informal sector, making it an attractive sector for taxation.

Analysis in terms of income and equity

Much of the debate on taxation of the informal sector has focused on its implications in terms of revenue generation for the state budget and fiscal equity; clearly, taxation of the informal economy appears to be a potential source of government revenue given its growing share in the gross domestic product of developing countries (Schneider *et al.*, 2010; Schneider & Klinglmaier, 2004). However, on-the-ground evidence suggests that this level of tax revenue remains rather modest despite the importance of the sector; income from informal sector workers is low and the corresponding tax rates are quite low, while the costs of tax collection in the informal sector are quite high.

Taxation of the informal economy also increases tax equity because IPU's very often have low incomes and the taxation of such units has a potentially regressive effect (Pimhidzai & Fox, 2012). If efforts to tax the informal sector increase, there will be a coercive risk of increased tax evasion behaviour, so taxation of the informal sector could have a mixed effect on resource allocation in developing countries (Keen, 2012).

The impact of the expansion of taxation of the informal sector in terms of income and equity are much more indirect benefits; another argument in favour of taxing IPU's is that the taxation of IPU's, although not very profitable in the short term, helps to integrate them into the tax net, ensuring an increasingly higher level of tax as they develop; in other words, it is a matter of building a culture of tax compliance in the informal sector.

Another advantage mentioned by some authors and which motivates taxation of the informal sector is that the non-taxation of informal enterprises may be considered by formal enterprises as an unfair attitude on the part of the tax authorities; this will reduce the propensity of these enterprises to pay tax and discourage tax compliance among large enterprises (Alm *et al.*, 2010; Terkper, 2003; Torgler, 2003, 2005).

Finally, there are arguments that formalization can increase equity by providing informal enterprises with the opportunity to protect themselves from arbitrariness and racketeering (Anuradha *et al.*, 2014).

Finally, inequalities of power between the state and small businesses imply that, although formalisation helps to protect them, it can also make them more vulnerable by exposing them to risks of fiscal harassment.

While the costs and benefits of taxing the informal sector can be analysed in terms of its revenue and equity implications, the analysis in terms of growth is no less important.

Analysis in terms of growth and governance

The implications of taxation of the informal sector on growth are as important as its revenue implications. Many tax experts have argued that increased taxation of IPU's harms growth and that the costs of doing so far outweigh the net income generated; the underlying idea is that firms opt for informality precisely because they believe it is more beneficial than the burdens generated by formality ([Anuradha et al., 2014](#)).

Many other studies have concluded that the formalisation of IPU's has a significantly positive effect, or at least no effect at all, on growth ([Kenyon & Kapaz, 2005](#)). While informality helps firms to avoid certain direct or indirect costs, it can also prevent them from accessing some of the opportunities offered to formal firms, such as better access to credit, the ability to engage with large firms and apply for government contracts, and reduced harassment by enforcement officers. The clear evidence that formalization can lead to faster growth comes from the fact that formal enterprises tend to grow much faster than informal sector enterprises. However, the above-mentioned studies have left open the question of causality: do companies develop faster because they are formalized or do growth prospects lead to their formalization?

The implications of informal sector taxation on governance have also been the subject of concern for some authors ([Bates & Lien, 1985](#); [Levi, 1988](#); [Bird & Vaillancourt, 1998](#); [Prichard, 2009, 2010a](#)). According to the contributions of these authors, an important factor motivating recent interest in taxing the informal economy is the possibility that tax payments by informal economy enterprises can promote good governance and accountability through all three channels. First, to encourage informal sector workers to meet their tax obligations, the state can be more

responsive and attentive to the groups that pay their taxes (Bates & Lien, 1985). Second, individuals are more likely to express their needs for public goods if they pay their taxes, because of a sense of ownership over government activities (Prichard, 2009, 2010a). Third, efforts to tax informal sector operators could catalyse collective action and political commitment by informal sector associations (Joshi & Ayee, 2008; Prichard, 2009). These potential linkages suggest that, if maintained in a comparatively contractual manner (Moore, 2008), taxation of the informal economy could become an important stimulus to capture political constituencies among relatively marginalised groups; however, it should be noted that informal sector enterprises face difficulties such as disorganisation, lack of cohesion, lack of political power and fear of retaliation by the central state. Given these difficulties, Meagher & Lindell (2013) question whether the taxation of informal operators enhances public accountability or simply creates new revenues for the state budget. In any case, the majority of authors are unanimous in recognising that governance could be a potentially powerful argument for expanding the taxation of the informal economy; however, the conditions under which such taxation should take place remain to be clarified.

Options for taxing the informal sector

Indirect taxation of the informal sector

According to Keen (2007), the simplest and most flexible way to tax the informal sector is through indirect taxation, which is limited to levying tax on all goods and services that informal sector assets buy or sell through value-added tax (VAT), which is not recovered because IPUs are not subject to import and export duties. The indirect nature of this taxation is linked to the fact that informal sector enterprises are not registered as taxpayers as such, but are nevertheless deemed to be taxed because of the taxes paid on goods and services up and down the value chain. This is a privileged form of taxation of the informal sector, as in practice most informal sector assets are unknown to the tax authorities due to their non-registration; it also shields them from the difficulties associated with the high costs of compliance compared to the limited capacity of the sector. This option is all the more feasible,

especially since in most developing countries VAT is an important source of tax revenue to the detriment of import duties, which have been gradually declining in recent decades.

According to Paula & Scheinkman (2010), another advantage of VAT taxation is that it can create positive incentives for informal sector enterprises that have linkages with those in the formal sector to enter the formal tax system to possibly benefit from tax credits. These two authors demonstrate from studies on Brazil that an IPU is more likely to register for VAT when its suppliers and customers are themselves taxable. Despite the preponderance of VAT in the tax structure of developing countries, import duties have remained an important component of government revenues in some developing countries, particularly low-income countries; Gordon & Li (2009) develop a theoretical model that shows the extent to which such behaviour could be a good strategy to address tax evasion by informal sector taxpayers who are mostly excluded from the banking system. The traditional economic argument against import taxes is that they prevent developing countries from exploiting their comparative advantages, which are much more negatively affecting growth than the collection of domestic taxes and duties; this (theoretical) argument is weakened by the practical difficulties of taxing the informal sector, as Dasgupta & Stiglitz (1974) show that limiting the mobilisation of domestic taxes could justify customs duties.

Heady & Mitra (1987) show how a generally non-taxable agricultural sector in developing countries can justify the taxation of fertilizer imports, for example; Emran & Stiglitz (2005) have developed a theoretical model that establishes how a non-taxable informal sector does not fundamentally affect tax revenues compared to a non-taxation of goods and services for VAT purposes.

The relationship between the taxation of the informal sector and taxation of the formal sector

The alternative of taxing companies in the formal sector mentioned above must be strengthened by placing much more emphasis on differentiated taxation according to the sectors of activity, thanks to a better application of the principle of fiscal

compliance (Bird & Casanegra, 1992; Bird & Wallace, 2003; Terkper, 2003). This will eventually have a positive impact on the informal sector, which will gradually move towards compliance; a priori, reduced rates of compliance incentives applied to small units in the informal sector could increase the overall complexity of the tax system and encourage small enterprises to remain, or appear to remain, small (Loeprick, 2009). Conversely, strengthening tax enforcement for large but still informal sector units may be appropriate because it can generate tax revenues that exceed the cost of tax collection; for very small IPU, government administrative costs are extremely high with the potential for underlying harassment and abuse. As a result, many developing countries have established relatively high-income tax thresholds to exclude most small and micro enterprises from the traditional levy system, and subject them to preferential tax treatment (Bird & Wallace, 2003; Loeprick, 2009).

According to Keen (2007), small IPUs can be taxed without creating distortions to the existing tax system; thus, the government will be able to collect tax from these IPUs through withholding taxes on business transactions with formal sector companies; Keen (2007) argues that this system of levy can be very effective as it acts perfectly as a tariff on non-compliance.

The introduction of flat-rate taxes in the informal sector

Among the options adopted for taxation of the informal sector is the flat-rate taxation approach, which consists of setting a predetermined amount of tax to be paid by IPUs according to the nature of their activities; indeed, taxation of informal enterprises can be hampered by two factors, namely high compliance costs for small taxpayers and collection costs for the tax administration (Loeprick, 2009). Flat-rate taxation solves these problems by using a simplified indicator of the tax base to estimate the amount of tax collected by collectors.

According to Bird & Wallace (2003), this conception varies from one country to another; the following three variants can be identified:

- Base taxation on the flow of cash used rather than on the accounts for the year (IMF, 2011);

- Use another financial scale as the tax base rather than net profit or net value added; Loeprick (2009) proposes the use of turnover while Tanzi (1993) argues for the use of a tax on gross assets;
- Use a simpler indicator such as shop square footage and the number of employees (Joshi, 2010).

Methodological approach

The empirical model

The ultimate objective of the empirical model is to analyse the effectiveness of the taxation of PIUs by seeking to understand the behavioural responses of taxpayers in the sector to tax mobilisation in Burkina Faso; this intrinsic capacity of the informal sector to mobilise tax revenue for the state is linked to the behaviour of taxpayers concerning taxation (decision to register with the tax service and decision to declare all or part of its turnover). To apprehend the behaviour of informal enterprises concerning the decision to register or not to register their activity and to the determination of the fraction of their turnover that is evaded, and therefore escapes taxation, the empirical model adopted is inspired by the work of Feinstein (1991), Gautier (2001), Diagne & Thiaw (2008); it allows the empirical test of the Principal-Agent model that was presented in the previous section.

The model has two parts. The first deals with the decision to register (license) companies and is described using a Probit model of simultaneous equations. The second part deals with the determination of the rate of turnover declared and is materialised in the form of a Probit -Tobit model of simultaneous equations. Taking these two aspects into account makes it possible to assess the probability of taxpayers in the informal sector to pay tax, and thus to evaluate the effectiveness of the taxation of IPU. Thus, the registration decision can be described using a latent variable y^* unobservable corresponding to the propensity of companies to record their activity, anything equivalent to :

$$\begin{cases} y_{1i} = 1 \text{ si } y_{1i}^* > 0 \\ y_{1i} = 0 \text{ otherwise} \end{cases} \quad (1)$$

With y_{1i} corresponding to a binary variable taking the value 1 when the company is registered and the value 0 otherwise. It is assumed that y^* depends on the characteristic variables of the enterprise such as its size, the level of education of the head of the enterprise, the location of the activity, etc. By designating X_1 the vector of the explanatory variables of the record choice equation, the following equation is obtained:

$$y_{1i}^* = \gamma_1 X_{1i} + \varepsilon_{1i} \quad (2)$$

Where ε_{1i} The term "error term" is an error term according to a reduced centered normal law. One of the key assumptions of the Principal-Agent model is that the probability of the occurrence of control of companies by state agents is taken into account, and this probability is therefore integrated into the equation describing the registration decision. The following specification follows:

$$y_{1i}^* = \beta_1 y_{2i}^* + \gamma_1 X_{1i} + \varepsilon_{1i} \quad (3)$$

With y^* a latent variable representing the subjective probability of control as envisaged by the contractor. This probability is based on the same principle as that associated with the registration decision, i.e. a Probit-type formulation, with y_{2i} a binary variable taking the value 1 if the contractor is controlled and 0 otherwise. ε_{1i} is an error term following a reduced centered normal distribution.

The sequential interplay described in this Principal-Agent model is based on the interaction between the probability of control that the entrepreneur feels and his decision to register or not to register his activity. It follows that registration is also an argument for the control probability function. In summary, the registration model corresponds to the following system of equations:

$$\begin{cases} y_{1i}^* = \beta_1 y_{2i}^* + \gamma_1 X_{1i} + \varepsilon_{1i} \\ y_{2i}^* = \beta_2 y_{1i}^* + \gamma_2 X_{2i} + \varepsilon_{2i} \end{cases} \quad (4)$$

With X_2 a vector of factors explaining the probability of control, which may be the size of the company, the sector of activity or the

value of fixed assets, etc. The coefficients β represent the direct effects between latent variables and parameters γ correspond to the direct effects of exogenous variables on latent variables. Error terms ε_{1i} and ε_{2i} are assumed to be normally distributed variance-covariance matrices Θ .

The method for estimating the parameters follows the procedure described in Judge *et al.*, (1982). In the first instance, y^* and y^* are successively replaced by their expressions in the first and second equation of the system. The following two structural equations are thus obtained:

$$\begin{aligned} y_{1i}^* &= \pi_{11}X_{11} + \pi_{12}X_{2i} + \theta_{1i} \\ y_{2i}^* &= \pi_{21}X_{1i} + \pi_{22}X_{2i} + \theta_{2i} \end{aligned} \quad (5)$$

with:

$$\begin{aligned} \pi_{11} &= \frac{\gamma_1}{1-\beta_1\beta_2}, \quad \pi_{12} = \frac{\beta_1\gamma_2}{1-\beta_1\beta_2} \\ \pi_{21} &= \frac{\beta_2\gamma_1}{1-\beta_1\beta_2}, \quad \pi_{22} = \frac{\gamma_2}{1-\beta_1\beta_2} \\ \theta_{1i} &= \frac{\beta_1\varepsilon_{2i}+\varepsilon_{1i}}{1-\beta_1\beta_2}, \quad \theta_{2i} = \frac{\beta_2\varepsilon_{1i}+\varepsilon_{2i}}{1-\beta_1\beta_2} \end{aligned}$$

Error terms Θ are assumed to be of normal joint distribution with:

$$\begin{aligned} E(\theta_{1i}) &= E(\theta_{2i}) = 0 \\ E(\theta_{1i}^2) &= E(\theta_{2i}^2) = \omega_{11} = \omega_{22} = 1 \\ E(\theta_{1i}, \theta_{2i}) &= \omega_{12} \end{aligned}$$

The parameters of the structural equations can be estimated using Probit regressions and thus provide an estimate of the probabilities associated with recording and monitoring. The probabilities of the four possible events involved in the expression of likelihood correspond to the following entries

$$\begin{aligned} P_{11}(i) &= \text{Prob}(y_{1i} = 1) \text{ et } \text{Prob}(y_{2i} = 1) = \phi_2(\widehat{y_{1i}^*}, \widehat{y_{2i}^*}, \widehat{\rho}) \\ P_{10}(i) &= \text{Prob}(y_{1i} = 1) \text{ et } \text{Prob}(y_{2i} = 0) = \phi_2(\widehat{y_{1i}^*}, -\widehat{y_{2i}^*}, -\widehat{\rho}) \\ P_{01}(i) &= \text{Prob}(y_{1i} = 0) \text{ et } \text{Prob}(y_{2i} = 1) = \phi_2(-\widehat{y_{1i}^*}, \widehat{y_{2i}^*}, -\widehat{\rho}) \\ P_{00}(i) &= \text{Prob}(y_{1i} = 0) \text{ et } \text{Prob}(y_{2i} = 0) = \phi_2(-\widehat{y_{1i}^*}, -\widehat{y_{2i}^*}, -\widehat{\rho}) \end{aligned} \quad (6)$$

Where φ_2 designates the distribution function of the bivariate normal law.

The declaration, before the payment of the tax, corresponds to a particular behaviour. Indeed, the company arbitrates on the fraction of its turnover that it intends to declare to the tax authorities. Thus, based on the specifications described by Feinstein (1991) and by Diagne & Thiaw (2008), the equation relating to the declaration of turnover can be written using a Tobit model:

$$\alpha_i^* = \lambda_1 X_{3i} + \vartheta_{1i} \quad (7)$$

With α^* a latent variable corresponding to the share of turnover not declared and which is a function of a vector of explanatory variables X_3 . ϑ_{1i} means a term of error normally distributed according to the law $N(0, \delta^2)$. Thus, α_i represents the percentage of turnover evaded corresponding to the following Tobit model:

$$\begin{cases} \alpha_i = \alpha_i^* \text{ si } \alpha_i^* > 0 \\ \alpha_i = 0 \text{ si } \alpha_i^* \leq 0 \end{cases} \quad (8)$$

Thus, the probabilities associated with the two possible events, i.e. the partial reporting of turnover and the full reporting of turnover, can be written as follows:

$$Prob(\alpha_i^* > 0) = \frac{1}{\delta_1} \phi \left[\frac{(\alpha_i - \lambda_1 X_{3i})}{\delta_1} \right] \quad (9)$$

$$Prob(\alpha_i^* \leq 0) = 1 - \Phi \left(\frac{\lambda_1 X_{3i}}{\delta_1} \right) \quad (10)$$

With δ_1 the standard deviation of the error ϑ_i , ϕ the probability density function of the Gaussian normal distribution, and Φ the corresponding dispatch function.

The sequential interplay between the State and taxpayers, in other words, the Principal-Agent model, implies that reporting behaviour is simultaneously measured with the probability of detection of fraud by the tax administration. The latter can be apprehended using a Probit specification.

Either D^* This is a latent variable corresponding to the probability of detection of fraud by the tax authority and is expressed as a function of a vector of explanatory variables X_4

$$D_i^* = \lambda_2 X_{4i} + \vartheta_{2i} \quad (11)$$

With ϑ_{2i} an error term normally distributed according to the law $N(0, \delta^2)$; D is a binary variable such as:

$$\begin{cases} D_i = 1 \text{ si } D_i^* > 0 \\ D_i = 0 \text{ si } D_i^* \leq 0 \end{cases} \quad (12)$$

The probability associated with the detection of fraud is then:

$$Prob(D_i^* > 0) = \Phi\left(\frac{\lambda_2 X_{4i}}{\delta_2}\right) \quad (13)$$

The probability of non-detection of the taxpayer's fraudulent behaviour is represented by the following expression:

$$Prob(D_i^* \leq 0) = 1 - \Phi\left(\frac{\lambda_2 X_{4i}}{\delta_2}\right) \quad (14)$$

In summary, it follows that the likelihood function of the declaration-detection system is broken down into two subsets made up of different events; the first subset corresponds to the sub- sample for which no fraud was detected; the second corresponds to the sub-sample of companies for which fraudulent behaviour was detected. In the first case, either there was no fraud or there was a fraud but it escaped the tax authorities.

Thus, for an IPU belonging to the first subgroup, the contribution to the likelihood function is given by: $\mathcal{E}_1 = Prob(absence \text{ de fraude}) + Prob(fraude) + Prob(non \text{ d\'etection})$

$$\mathcal{E}_1 = 1 - \Phi\left(\frac{\lambda_1 X_{3i}}{\delta_1}\right) + \int_0^\infty \frac{1}{\delta_1} \phi\left[\frac{(\alpha_i - \lambda_1 X_{3i})}{\delta_1}\right] \left[1 - \Phi\left(\frac{\lambda_2 X_{4i}}{\delta_2}\right)\right] d\alpha \quad (15)$$

For observations where underreporting has been detected, the contribution to the likelihood function is given by the following expression:

$$\mathcal{E}_2 = Prob(fraude) + Prob(d\acute{e}tection)$$

$$\mathcal{E}_2 = \frac{1}{\delta_1} \phi \left[\frac{(\alpha_i - \lambda_1 X_{3i})}{\delta_1} \right] \left[\phi \left(\frac{\lambda_2 X_{4i}}{\delta_2} \right) \right] \tag{16}$$

From these equations, we deduce the expression of the likelihood function associated with the detection-declaration system; this corresponds to the product of the two above-mentioned likelihoods, either in logarithmic form:

$$\begin{aligned} \log(\mathcal{E}) = & \sum_{i \in 1} \log \left[1 - \phi \left(\frac{\lambda_1 X_{3i}}{\delta_1} \right) + \int_0^\infty \frac{1}{\delta_1} \phi \left[\frac{(\alpha_i - \lambda_1 X_{3i})}{\delta_1} \right] \left[1 - \phi \left(\frac{\lambda_2 X_{4i}}{\delta_2} \right) d\alpha \right] \right] + \\ & \sum_{i \in 2} \log \left[\frac{1}{\delta_1} \phi \left[\frac{(\alpha_i - \lambda_1 X_{3i})}{\delta_1} \right] \left[\phi \left(\frac{\lambda_2 X_{4i}}{\delta_2} \right) \right] \right] \end{aligned} \tag{17}$$

Data

The data used in this paper to approach the empirical model comes mainly from the database on the informal sector in Burkina Faso, developed by a multidisciplinary team of statisticians, tax specialists and economists in the framework of collaborative research between the Maison de l'Entreprise du Burkina Faso and the Direction G n rale des Imp ts.

The regression results of the principal-agent empirical model are as follows

Results of the tax registration model (Model I)

The results of the registration decision are thus presented in the following table:

Table 1. Regressions relating to the decision to register IPUs

enreg					
Variables	Coefficient	z-statistics	Sectors	Coefficient	z-statistics
control	2.233***	(7.132)	Manufacturing	0.0203	(0.270)
tximpci	-0.762***	(-3.147)	IT	1.071**	(2.455)
tximptr	-0.00141	(-0.934)	Commerce	0.193	(0.233)
tximptva	0.000291	(0.130)	Catering	0.409	(0.268)
tximptpp	-0.000196	(-0.849)	Transport	-0.546	(-0.405)
tximpdd	-0.000450	(-0.188)	Construction	0.188	(0.376)
tximpda	0.000772	(0.279)	Real estate	0.0599	(0.627)

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Clients	-0.161	(0.193)
Taille	-0.0341*	(-1.976)
Lca	9.58e-09***	(2.87e-09)
Educ	0.265***	(4.739)
Age	0.0185***	(5.499)
Local	0.173	(0.120)
Sexe	0.171	(0.156)
percimpot	-6.979	(-1.123)
_cons	-2.046	(-1.257)
Athrho		
_cons	-13.24	(344.6)
N	2537	

control					
Variables	Coefficient	z-statistics	Sectors	coefficient	z-statistics
Enreg	1.871***	(3.117)	Manufacturing	0.319	(0.129)
Ca	-3.02e-09	(-2.22e-09)	IT	-0.356	(-0.410)
Taille	0.065***	(6.158)	Commerce	0.213*	(0.110)
Local	0.122*	(1.954)	Catering	-0.283	(-0.136)
			Transport	1.098***	(3.146)
			Construction	0.455	(0.309)
			Real estate	-0.168	(-0.400)
_cons	-1.387***	(-4.108)			
Athrho					
_cons	-13.24	(344.6)			
N	2537				

Notes: *p< 0.10, **p< 0.05, ***p< 0.01

Source: Regression results

The first part of this table corresponds to the results of the business registration equation. The results show that the coefficients of the variables "control", "tximpcsi", "size", "lca", "educ", "age" are significantly different from zero. The results thus obtained reveal the following realities:

- The "control" variable that materialises the tax authorities' tax control has a deterrent effect on the decision to register companies. Indeed, the higher the probability of informal sector enterprises feeling that a control is in place, the higher the probability of their registration.
- The signs of the variables "educ" and "age" indicate that the higher the level of education or the older the head of the IPU, the more willing he is to register his activity with the tax authorities. Indeed, the level of education or experience of the head of the informal enterprise enables him or her to better

understand the importance of taxation in society and, above all, its role in financing public expenditure and reducing inequalities. Consequently, they are quite willing to register to best meet their tax obligations;

- The sign of the variable "lca" reveals that the increase in the UPI's turnover naturally directs it towards the registration services of the tax authorities; indeed, as the informal enterprise grows, it is difficult for it to conceal its activities to pay less tax. Thus, to invite to be severely sanctioned in case of control, they prefer to register themselves without any *a priori* constraint.

The results presented above were also obtained as part of an empirical study on the taxation of the informal sector in Senegal. Indeed, Diagne & Thiaw (2008) found that in Senegal, the experience of the head of the UPI ("age") and his level of education ("educ") had a positive influence on the probability of tax registration; other similar studies on informal sector taxation. The same result is also obtained by Sani (2009) in his study of the impact of informal sector taxation on public resource mobilisation in Sub-Saharan African countries. Thiombiano (2015), analysing the determinants of informal sector taxation in Burkina Faso, shows that the increase in turnover of the informal enterprise ("lca"), the age of the head of the IPU and his level of education have a positive and significant effect on the probability of paying for informal sector assets, thus corroborating our results. Regarding the positive effect of the probability of the occurrence of a control ("control") on the probability of tax registration ("regist"), the empirical literature reveals that such a result depends on the structure of the economies studied; indeed, while this result is consistent with that of Diagne & Thiaw (2008) in the case of Senegal, Gautier (2000) shows that in Madagascar, the probability of control does not influence the choice of IPU's to register with the tax authorities.

Unlike the other control variables, the size variable, measured by the number of employees in the IPU, has a significant negative effect at a rate of 10% on the probability of registration. As for the "percimp" variable, it has a negative but insignificant effect on this probability. However, it is quite surprising that the UPI's perception of the State's tax policy ("percimp") does not

significantly influence the probability of registration. Indeed, good governance has often been cited by taxpayers in Burkina Faso to justify their uncivil behaviour. This result is nevertheless identical to that obtained by Diagne & Thiaw (2008) in the case of Senegal. For these authors, the probability of tax registration of informal sector taxpayers in Senegal is not affected by political governance choices. However, we can link this result to the specificity of the informal sector, which remains characterised by a high degree of illiteracy as highlighted above. This lack of education of taxpayers in the informal sector means that they do not integrate the behaviour of political actors in their decisions to pay taxes.

The sign of the estimated "size" variable is contrary to that expected; it also contrasts with that found in descriptive statistics on correlation studies. However, in the empirical literature, authors such as Morisson *et al.*, (1994), Gautier & Gersowitz (1997) had demonstrated that in the case of DCs, there is a positive relationship between the increase in firm size measured by the number of employees or turnover and tax compliance. Indeed, their work had shown that compliance dominates as the size of enterprises increases, whether they are a priori in the formal or informal sector. In the case of Burkina Faso, it is only the variable "lca" that is in line with the conclusions of these authors. The negative sign of the "size" variable can be explained by the taxpayer's profit expectation calculations: when the number of employees of the UPI increases, its charges become more important, which pushes it not to register, intending to bypass the tax administration.

Concerning the explanatory variables related to the taxation of IPU, not all of the coefficients obtained are expected signs. Moreover, the coefficients of the variables related to the indirect taxation of IPU are not significant, which means that the tax burden on these taxpayers in terms of VAT, customs duties, OPT and excise duties do not influence their probability of tax registration. This result appears quite logical, as informal sector taxpayers do not have good control of the tax chain. When buying goods and services, they always think they are dealing with a price and not a tax because of their low level of education. For these reasons, they cannot integrate these data into their tax registration decisions.

Keen (2007), Paula & Scheinkman (2010), have already shown that in the case of DCs, the simplest and most flexible way of taxing the informal sector is indirect taxation, which is limited to levying tax on all goods and services that informal sector assets buy or sell through value-added tax (VAT), import and export duties. These results in the case of Burkina Faso are therefore not surprising.

Among the direct tax variables of the UPI, only "tximpcsi", which represents the payment of the CSI, has a negative and significant effect at a rate of 1% on the probability of tax registration. This result is consistent with that predicted by the descriptive analysis and indicates that when informal sector assets perceive the ITUC tax rate to be high, this negatively influences their probability of registration. Authors such as Diagne & Thiaw (2008) in the case of Senegal and Nyamapfeni & Wellington (2015) in the case of Zimbabwe have also shown that the UPI tax rate can be a major obstacle negatively affecting the probability of registration. Leal-Ordóñez (2011), based on a study of the informal sector in Mexico, shows that unregistered taxpayers are very likely to evade paying the tax. The variable "tximptr" does not affect the probability of registration as it is not significant. This is explained by the fact that the residence tax is one of the taxes for which the taxpayer remains indifferent. As the tax base of the TR is not related to the company's activity but to its residential environment, the tax authorities generally do not exert pressure to collect this tax.

The results obtained about our variables on taxation of the informal sector already allow us to predict at this level of analysis that taxation of the income of IPU is not favourable to tax mobilisation. The branches of activity were also taken into account and it appears that companies operating in the IT sector are much more likely to register with the tax authorities. As the IT sector is made up of individuals with a certain level of education, this result is quite logical given previous deductions.

The results relating to the probability of control are shown at the bottom of the table above. The estimation results show that the coefficients associated with the probability of registration, size and location of the IPU are positive and significant at the rate of 1%, 1% and 10% respectively. These tests confirm the endogenous nature of

the probability of control; indeed, being registered with the tax authorities is its main argument and positively influences it with a high degree of accuracy. This means that informal enterprises that are known to the tax authorities because of their registration logically have a higher probability of being controlled. Gautier (2000) found the same result on informal sector data in Madagascar. The coefficients of two other variables, size and location, indicate that the tax administration is much more likely to exercise tax auditing over informal sector enterprises that are conspicuous on the ground and whose location is formally identifiable. Gautier (2000), Backini-Yetna (2009) and Thiombiano (2015) have shown, respectively, that in Madagascar, Cameroon and Burkina Faso, IPUs with premises have a high propensity to pay taxes to avoid the occurrence of the tax audit. Regarding the size of the IPU, Diagne & Thiaw (2008) found that in the case of Senegal, this variable does not affect the probability of control, contrary to the result obtained for Burkina Faso. This result can be explained in the case of Burkina Faso by the fact that tax administration officials very often focus on external signs of the taxpayer's wealth (high number of employees, high traffic, etc.) to trigger a tax audit. Still, concerning the audit probability equation, only the coefficients associated with the transport and trade sector are positive and significant. This means that IPUs belonging to these industries are much more likely to be subject to a tax audit than others.

To test the robustness of our results, we now perform regressions on the tax registration model by subtracting variables that are not significant. The results thus obtained are recorded in the following table:

Table 2. *Regressions relating to the decision to register IPUs*

Register					
Variables	Coefficient	z-statistics	Sectors	Coefficient	z-statistics
control	1.221***	(6.102)			
tximpcsi	-0.412***	(4.117)	IT	0.067**	(2.212)
size	-0.0201*	(-1.916)			
lca	0.324***	(2.879)			
Educ	0.265***	(5.073)			
age	0.0115***	(9.019)			
_cons	-2.046	(-1.028)			
Athrho					
_cons	-26.14	(114.6)			
N	2537				
Control					
Variables	Coefficient	z-statistics	Sectors	Coefficient	z-statistics
enreg	4.131***	(5.137)			
size	0.00431***	(9.011)	Commerce	0.312**	(2.410)
local	0.0042**	(2.441)	Transport	0.018*	(1.916)
_cons	-1.387	(0.108)			
Athrho					
_cons	-26.14			(114.6)	
N	2537				

Notes: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Source: Regression results

The results of these regressions did not affect the significance of the coefficients of the registration and control probability models; in this case, the coefficient of the variable "tximpcsi" is always negative and significant at 1%. We then maintain that the current level of taxation on the contribution of the informal sector harms tax registration, which in turn remains positively correlated with the probability of control by the tax administration. This situation is explained by the fact that taxpayers in the informal sector have a very good knowledge of the CSI tax related to their productive activities; the majority of them are not ready to register their activities with the tax authorities because they are not willing to fulfil this tax obligation, which does not allow the state to improve its level of tax collection. The descriptive analysis shows, moreover, that many UPIs in the sample surveyed (46.5%) are not ready to pay tax on their activity. These results show that the direct taxation of UPIs negatively affects tax mobilisation. We now perform the regressions by quartile to determine the behaviour of our variable of interest "tximpcsi" according to the turnover level

brackets; this exercise seems very useful to us because of the heterogeneity of the turnover declared by the IPUs.

Table 3. Regression results by quartiles

	Q1		Q2		Q3		Q4	
control	-44.61	(-0.201)	2.109***	(6.359)	1.991***	(3.227)	2.107**	(5.151)
tximpcsi	-0.499***	(7.231)	-3.894*	(-1.967)	-2.071**	(-2.492)	-2.978**	(-2.164)
customers	0.078	(0.257)	0.128	(0.471)	-0.251	(-0.478)	-0.237	(0.214)
size	0.945	(0.111)	-0.3214*	(-1.994)	0.026	(0.038)	-0.021	(-0.302)
lca	0.039	(0.121)	0.855	(0.696)	0.145	(0.386)	0.271**	(2.508)
educ	0.241	(0.271)	0.115	(0.177)	0.451***	(8.143)	0.174	(0.110)
age	-0.723	(-0.592)	0.028	(0.054)	0.353**	(2.965)	0.072	(0.678)
age ²	0.009	(0.078)	0.064	(0.005)	-0.403**	(-2.876)	-0.062	(0.063)
local	1.341	(0.084)	0.1781	(0.267)	-0.088	(-0.194)	0.130	(0.134)
sex	-0.244	(0.243)	0.104	(0.262)	0.2624	(0.238)	0.363	(0.314)
percimp	-1.684	(0.067)	-7.464	(-0.456)	-6.908	(-1.061)	-6.902	(-1.071)
control								
lca	-0.017	(-0.113)	-0.070	(-0.300)	0.199	(0.223)	-0.115	(0.0846)
size	0.061	(0.543)	0.089**	(2.366)	0.050*	(1.997)	0.0304	(0.0242)
local	0.118	(0.146)	0.0172	(0.136)	-0.044	(0.118)	-0.0134	(-0.106)
N	634		637		637		629	

Notes: *p< 0.10, **p< 0.05, ***p< 0.01; z-statistics values are in brackets.

Source: Regression results

Analysis of regression results of the registration model by quartiles

The results obtained in the different quartiles highlight the sector specificities of the taxation of IPUs on the probability of tax registration. In the regressions carried out for the four quartiles, the variable "tximpcsi" has a negative and significant effect on the probability of tax registration. The magnitudes of this effect are 49.9%, 38.9%, 20.7% and 29.7% respectively for the first, second, third and fourth quartiles. These results mean that if taxpayers in the quartiles consider their tax rate to be high, their probability of tax registration will fall by 49.9%, 38.9%, 20.7% and 29.7% respectively for the first, second, third and fourth quartiles. In terms of interpretation, these results indicate that IPUs with relatively low income (first quartile) are more likely to be non-registered compared to those in the last three quartiles. Regarding the first quartile, in addition to the tax rate, three factors explain this state of affairs in the Burkinabe context. The first is a lack of awareness of tax obligations, the second is the low level of business income earned, which leads IPUs not to register their activities for

fear of paying high taxes, and the third is the cost of registration formalities. Smaller IPU's are generally willing to pay an amount of tax that does not fundamentally alter their level of income. As a corollary to this, the tax registration of these IPU's does not affect their likelihood of being subject to a tax audit. This result is consistent with that of Anuradha, Wilson, & Chistopher (2014). These authors found that in the case of DCs, strengthening tax enforcement of large but still informal sector units is appropriate because it generates tax revenues that exceed the cost of tax collection. Taxation policies for the informal sector should therefore be oriented towards large informal production units. Examination of the results obtained in the third and fourth quartiles supports the previous conclusion. Indeed, the coefficient of the variable "tximpcsi" in both quartiles is negative and significant at the 5% threshold; this indicates that the level of ITUC taxation negatively affects the probability of tax registration among high-income IPU's. This result means that large IPU's are not equally willing to register with the tax authorities and therefore pay tax. Even if the tax rate is invoked by these taxpayers to justify their non-registration, in practice it remains that this behaviour can be explained by the incivility and the prevailing fraud within this category, but also and above all by the fear of being subjected to a tax audit following registration. The results of the second part of the model also suggest that the "registrations" variable has a positive and significant effect on the probability of being subject to a tax audit in both quartiles. For these reasons, these taxpayers prefer to operate in tax secrecy to pay less tax to the detriment of the objective function of the State. This latter interpretation is endorsed by the DGI's investigation reports. During the 2015 fiscal year, these reports show that of the 315 taxpayers in the informal sector surveyed, 281 were reclassified⁸. The illegal membership of taxpayers with very high incomes in the informal sector is the result of individual profit maximisation behaviour to the detriment of the state's budgetary constraints. Cerda & Savaria (2012) reached the same conclusion from a study of the informal sector in Argentina.

Having examined the fixed effects of the explanatory variables, it appears useful to determine the marginal effects to test the predictive power of the tax registration model.

Table 4. *Marginal effects of the tax registration model (For significant variables)*

Register			
Variables	dy/dx	z-statistics	p> z
control(d)	0.392	(1.102)	0.059
tximpcsi(d)	-0.022	(-2.123)	0.065
size	-0.001	(-1.816)	0.034
lca	0.003	(3.519)	0.052
educ	0.011	(1.851)	0.009
age ²	0.001	(2.014)	0.047
Control			
Variables	dy/dx	z-statistics	p> z
recorded(d)	6.94e-17	(2.814)	0.008
size	0.003	(3.071)	0.006
local(d)	0.008	(1.983)	0.005
N	2537		

Notes: (d) dy/dx for discrete change of dummy variable from 0 to 1

Source: Regression results

The calculation of marginal effects makes it possible to predict the tax recording behaviour following a variation in the explanatory variables. Thus, when the ITUC tax rate increases by 1%, the probability of tax registration decreases by 2.2% and vice versa. This result means that informal sector taxpayers are sensitive to changes in tax rates applied to their productive activities. In a similar vein, Ricardo (1995) has shown that in Bolivia, Chile and Brazil, tax reforms in the late 1970s, aimed at increasing rates of tax increase, demotivated taxpayers who were no longer willing to register. They preferred to go underground; this situation forced governments to implement reforms in favour of these taxpayers to limit tax evasion. This result is further corroborated by Katarina (2004), who showed that in Croatia, the underground economy decreased significantly with the lowering of tax rates; for example, the percentage of undeclared taxpayers dropped from 37% in 1980 to 7% in 1990.

The results also indicate for the control variables that the marginal effects of the variables "age²", "lca" are not significant in terms of predicting the probability of tax registration. These results

are partly consistent with those obtained by Nyamafeni & Bonga (2015) in Zimbabwe; their results show that the probability of tax evasion among informal traders increases by 0.00209% and 0.73% when turnover and age increase by 1% respectively. The authors find, however, that in Zimbabwe the predictive effect of education level on the probability of tax registration is quite significant; it is positively estimated at 13.73%. This probability implies that informal sector taxpayers with a high level of education have a 13.73% chance of registering with the tax authorities. The results obtained in the case of Burkina Faso show that this probability is 1.1%. This result is confirmed by other empirical studies that have tested a positive relationship over time between the increase in educational attainment and the probability of tax registration; these are the work of Dubbin & Wilde (1988), Devos (2005), Devos (2008).

Our results also show that the marginal effect of the probability of control on tax registration is very significant; in fact, a 1% increase in the probability of control should lead to a 39.2% increase in the probability of tax registration of IPUs. This result is related to the simulations made by Fortin, Marceau, & Saward (1997) on the Cameroonian informal sector; their research has established that a substantial increase in the level of control within the informal sector should lead to a decrease in tax clandestinity and, by ricochet, lead to an increase in tax revenue and social welfare. According to these authors, this control should be accompanied by an economic policy favourable to the taxpayers in this sector because factors such as the increase in the level of poverty, the absence of a tradition of fiscal conformism and the question of asymmetry of information most often lead IPUs to evade any taxation system.

However, our results on the probability of control equation show that the marginal effect of the probability of tax registration on the probability of control is not significant; indeed, if the tax registration rate increases by 1%, the probability of tax control would only increase by 694- 17%. This suggests that in Burkina Faso, even if IPUs agree to register with the tax authorities, the likelihood that they will not be audited regularly is high. Therefore, that informal sector taxpayers who are regularly

registered with the tax authorities can evade taxation if the tax control function is not fully exercised by the principal (state). This result is confirmed by the tax audit coverage rate of the Directorate General of Taxes; over the period under investigation, this rate was around 12% for taxpayers in the formal sector, and 1.3% for the formal sector (DGI/DSF, 2016). The other variables of the model ("ca", "size") are not equally relevant for predicting the behaviour of the probability of tax audit over time.

Analysis of marginal effects by quartiles

We examine the marginal effects according to the different quartiles to better understand the behaviour of our variable of interest on the probability of recording; the results of the calculations are recorded in the following table:

Table 5. *Marginal effects of quartile*

	Q1		Q2		Q3		Q4	
	recorded (dx/dy)							
control	0.257	(1.981)	0.007	(3.351)	0.004	(2.547)	0.025	(2.324)
tximpci	-0.071	(-4.432)	-0.011	(-2.232)	-0.006	(-1.991)	-0.002	(-1.890)
size	-0.0006	(-2.761)	-0.002	(-1.994)	0.002	(1.938)	-0.021	(-3.305)
lca	0.005	(1.121)	0.006	(4.001)	0.008	(5.432)	0.008	(2.508)
educ	0.005	(1.271)	0.001	(2.717)	0.451	(4.143)	0.023	(2.654)
age ²	0.009	(2.078)	0.006	(3.172)	-0.054	(-1.812)	-0.002	(3.456)
	control(dx/dy)							
enreg	-0.004	(-3.126)	0.003	(4.022)	0.065	(4.202)	0.002	(4.643)
lca	-0.008	(-1.123)	-0.001	(-1.365)	0.004	(0.223)	-0.004	(1.811)
size	-0.001	(2.543)	0.009	(3.152)	0.001	(1.547)	0.012	(6.001)
local	0.004	(1.946)	0.001	(2.409)	-0.003	(3.843)	-0.005	(-3.761)
N	634		637		637		629	

Notes: (d) dy/dx for discrete change of dummy variable from 0 to 1

Source: *Regression results*

The marginal effects of the decrease in the ITUC tax rate on the probability of registration are (-0.071), (-0.011), (-0.006), (-0.002) for the first, second, third and fourth quartile respectively. These results indicate that when the ITUC rate is perceived by taxpayers as high, the tax registration rate decreases by 7.1%, 1.1%, 0.06% and 0.02% respectively in the first, second, third and fourth quartile. These effects indicate that high-income informal sector taxpayers are not very sensitive to changes in the ITUC tax rate. These results are in line with those obtained previously for fixed

effects; indeed, informal sector taxpayers in the last three categories being unwilling to pay a substantial tax on their productive activities, are always willing to develop strategies to circumvent their tax obligations. Tax evasion is very high in these income categories; moreover, the increase in the likelihood of tax inspection does not have a significant effect on the registration decision of these taxpayers. This is because these IPU's prefer to pay a gift to tax auditors, rather than registering with the risk of paying a substantial tax. The probability of control is not significantly influenced by the increase in the size and turnover of the IPU. Finally, we note that the negative effect of the direct taxation of IPU's on the probability of tax registration indicates a behaviour of rational expectations of taxpayers, as the tax rate does not normally intervene in the registration phase. Estimation of the turnover under-reporting model provides better information on the effectiveness of taxation of IPU's in Burkina Faso.

Results of the tax underreporting model (Model II)

A system of Probit-Tobit equations was used to understand the effects of UPI tax variables on the probability of under-reporting turnover to the tax authorities. The results of this regression are presented in the following table:

Table 6. *Estimates of turnover underreporting*

declarca					
Variables	Coefficient	z-statistics	Sectors	Coefficient	z-statistics
detect	1.987***	(13.654)			
control	2.233***	(7.132)	Manufacturing	0.0203	(0.270)
Tximpcsi	0.762***	(11.247)	IT	1.071**	(2.455)
Tximptr	-0.141	(-0.034)	Commerce	0.193***	(18.233)
Tximptra	0.091	(0.130)	Catering	0.409***	(14.268)
Tximptra	-0.001	(-0.849)	Transport	0.546***	(32.405)
Tximpdd	-0.050	(-0.091)	Construction	0.188	(0.376)
Tximpda	0.072	(0.279)	Real estate	0.059	(0.627)
Clients	-0.161	(-0.193)			
Size	-0.034*	(-0.176)			
Lca	9.58e-09***	(3.987)			
Educ	0.265	(0.039)			
Age	0.018	(1.099)			
Local	0.173	(0.120)			
Sex	0.171	(0.156)			
Percimp	-0.079***	(-11.065)			
_cons	-2.046	(-1.257)			

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Athrho

_cons	-13.249	(-0.601)
N	2537	

Variables	Coefficient	z-statistics	Sectors	Coefficient	z-statistics
Declarca	-1.871	(0.157)	Manufacturing	0.031	(0.129)
Lca	-3.02e-09	(0.013)	IT	-0.356**	(-2.501)
Size	0.065***	(8.158)	Commerce	-0.213***	(-8.110)
Local	0.122*	(1.914)	Catering	-0.0283***	(-9.136)
			Transport	-1.098***	(-22.146)
			Construction	-0.455	(0.309)
_cons	-1.387	(-0.108)	Real estate	-0.168	(0.400)
Athrho					
_cons	-11.248	(0.623)			
N	2537				

Notes: *p< 0.10, **p< 0.05, ***p< 0.01

Source: Regression results

The results of these regressions indicate that the variables involving state intervention ("detect" and "control") are positively correlated with the probability of underreporting turnover. Indeed, the coefficients associated with these variables are positive and significant at a rate of 1%. This result suggests that state action does not have a deterrent effect on the propensity of informal sector businesses to under-report their turnover to the tax authorities. Thus, it is difficult to grasp the true tax base of the informal sector despite the periodic control actions carried out by the tax administration agents, anything that reflects the level of incivility in this sector. The same conclusions were reached by Diagne & Thiaw (2008) in Senegal.

Similarly, the direct taxation variable of the informal sector ("tximpcsi") has a positive and significant coefficient at the rate of 1%. This result reflects that when the ITUC tax rate is perceived by informal sector workers as high, the probability of under-reporting turnover also increases. This then means that the tax rate on the contribution of the informal sector constitutes a major obstacle to the reporting of the actual level of turnover of informal sector taxpayers. In other words, informal sector workers, aware of the fact that the ITUC is generally positive on turnover reporting, are willing to declare rather a low turnover to the tax authorities to pay less tax. This result is, however, contrary to that obtained for the informal sector in Senegal. Diagne & Thiaw (2008) found that

when informal entrepreneurs perceive the tax rate as a major obstacle, this does not lead them to exempt part of their turnover from tax scrutiny. This difference in results could be explained by the degree of tax-awareness of taxpayers in the two countries.

The regressions also showed that indirect tax variables are not significant in explaining the probability of underreporting turnover. It follows that these variables do not influence the propensity of informal sector taxpayers to underreport their income to the tax authorities. This result is consistent with that obtained by Keen (2007), Paula & Scheinkman (2010), who concluded in their work on the informal sector in DCs that informal sector taxpayers are insensitive to the indirect taxation of their income. The variable "tximptr" also does not have a significant effect on the probability of under-declaration; such a result is easily conceivable because the level of residence tax is not directly correlated with the income of taxpayers in the Burkinabe tax system.

The estimation results also suggest that the better the perception of tax policy among informal sector workers, the greater their propensity to make a genuine turnover declaration. Indeed, the coefficient associated with the "perceimp" variable is negative and significant.

It is also interesting to note that, except manufacturing, construction and real estate, the estimated coefficients associated with the sectoral dichotomous variables are all positive and significant. The estimated coefficients are significant at 1% for the trade, restaurant and transportation sectors, and at 5% for the computer sector. These results show that under-reporting is the rule among informal enterprises belonging to the computer, trade, catering and transport sectors.

The second part of the table presents the estimation results relating to the propensity of tax authorities to detect cases of underreporting of turnover. These results indicate firstly that the coefficients associated with the variables "declarca" and "lca" are negative but not significant. These results then reflect that the probability of turnover underreporting and the level of income from informal assets have no effect on the probability of detection. This means that IPU's may evolve into tax evasion by underreporting

turnover without the tax authorities being notified. This situation does not allow the tax authorities to apply the right tax to UPI's in Burkina Faso, leading to inefficient direct taxation of taxpayers in this sector. On the other hand, the size of the IPU, as well as its location, evolve positively with the probability of detection; the degree of significance of the estimated coefficients is 1% and 10% respectively for the "size" and "local" variables. This means that when IPUs are large or have identifiable premises, the probability of detection of their hidden turnover is higher. Indeed, the administration very often initiates tax audits based on external signs of the economic importance of the taxpayers. As a result of these controls, the tax authorities have a strong propensity to unmask any reduction in turnover declared by taxpayers. These results corroborate those of Nyamafeni & Bonga (2015) in Zimbabwe and those of Fuest & Riedel (2009) on the informal sector in developing countries. Concerning the results by industry sector, they show estimated coefficients that are almost always negative except for the manufacturing sector. However, only the coefficients relating to the computer, commerce, catering and transport sectors are significant, which shows that these sectors do not favour the probability of detecting turnover hidden by the tax authorities. This result implies that informal sector taxpayers in these sectors may achieve significant turnover while continuing to pay low tax contributions (especially the informal sector contribution), without the tax authorities being able to unmask them. Gautier (2001), who reached the same result in the case of the Malagasy informal sector, concludes that this situation does not encourage IPUs to become formal, which would rather tend to increase the benefit of the informal state, giving them a clear advantage over formal enterprises.

We now run the regressions by quartile to see the behaviour of our variables that were found to be significant according to the brackets of the turnover level. The results of these regressions are presented in the following table:

Table 7. *Regression results by quantiles*

Table 7. Regression results by quintiles								
	Q1		Q2		Q3		Q4	
	Declarca							
detect	0.892	(0.543)	-1.987	(-1.045)	2.675	(0.934)	0.782	(1.432)
control	-2.411*	(-2.321)	-0.209*	(-1.921)	0.892	(0.327)	0.107	(0.251)
tximpcsi	0.043***	(8.230)	0.894*	(1.401)	-1.071	(-0.349)	-6.978	(-0.041)
size	0.095	(0.110)	-0.324*	(-1.174)	0.264	(0.0385)	-0.0201	(-0.032)
lca	0.087	(0.143)	0.498	(0.696)	0.145	(0.386)	0.271**	(2.253)
percimp	-4.847	(-0.332)	-5.231	(-0.765)	-4.108	(0.543)	-4.701	(-0.492)
	Detect							
size	0.061	(0.054)	0.085*	(1.936)	0.054*	(1.997)	0.004**	(2.052)
local	0.683	(0.342)	3.231	(1.961)	0.034**	(2.261)	1.456*	(1.901)
N	634		637		637		629	

Notes: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$; z-statistics values are in brackets.

Source: Regression results

Analysis of regression results of the underreporting of tax income model by quartiles

The results obtained in the different quartiles make it possible to identify the sectoral specificities of the taxation of IPU's on the probability of under-declaration of tax income. In the first two quartiles, the "control" variable has a negative and significant effect at a rate of 10% on the probability of under-declaration of turnover. This result indicates that UPI's with revenues between 0 and 120 million tend to declare all their income to the tax authorities if they anticipate the possibility of a tax audit. In the last two quartiles of taxpayers with revenues between 120 million and 240 million, the likelihood of tax audit does not have a significant effect on the likelihood of underreporting; this result can be explained by the fact that large taxpayers who wrongly rely on the informal sector are unwilling to declare their real income for tax purposes despite the intensity of tax audits. This attitude of these taxpayers is linked to the influence they may have on certain audit agents, particularly in terms of "gifts" distributed to them in order not to reveal their real income to the tax authorities, and therefore to avoid paying the right tax. This brings into question the crucial role of the institutional variable in the taxation of informal sector assets (Alm & Martinez-Vasquez, 2007).

The variable "tximpcsi" is positive and significant at a rate of 1% and 10% respectively for the first and third quartile with a magnitude of (0.043) and (0.894). These results thus make it

possible to say that the current rate of the CSI induces an increase in the probability of under- declaration of turnover within the first two quartiles with high precision for the first. This means that tax policies tending to increase the level of taxation within low-income IPU, encourage fraudulent behaviour by these taxpayers vis-à-vis the tax authorities. As for the IPU in the last two quartiles, the regression results show that the estimator of the variable "tximpci" is not significantly different from 0. This means that within these quartiles, the rate of contribution of the informal sector does not influence the probability of underreporting of turnover. Indeed, IPU with high income are those who are inclined to hand out "gifts" during tax audits to evade taxes. Taxation policies for the informal sector should therefore be oriented towards large informal production units in line with the results obtained¹¹ by Anuradha, Wilson, & Christopher (2014) on the informal sector in DCs.

The "lca" variable has a positive and significant effect at a rate of 5% on the probability of under-reporting at the level of the last quartile of turnover. This can be explained by the fact that the higher the UPI's turnover, the more it conceals the real level of its wealth from the tax authorities. This result reflects the fact that when taxpayers reach a very high level of turnover, especially turnover outside the legal limits for this sector, they prefer to under-declare their income to the tax authorities to pay less tax and not be reclassified in a higher tax regime with many more tax obligations. Moving from the informal to the formal sector of an IPU through the reporting of the actual level of turnover would be based on profit maximisation motives. The additional cost of informality that may result in a ban on access to formal wholesalers increases the likelihood of reporting actual turnover for reclassification. Thus, for these IPU, only the existence of additional costs linked to informality motivates them to opt for formal tax regimes. The illegal membership of high-income taxpayers in the tax regime of the informal sector leads to inefficient taxation of the informal sector by creating unfair competition and distortions in economic activity (Auriol & Walters, 2001). This finding has also been made on estimated data on the Malagasy informal sector (Gautier, 2001).

As for the "percimp" variable, the results show that it is not relevant in explaining the probability of underreporting turnover in the four quartiles. Indeed, it has a negative but not significant sign at the thresholds selected. This result, therefore, indicates that the perception that IPU have of the tax does not influence their probability of declaring their entire turnover. Examination of the "size" variable in the first equation shows that it is only significant in the second quartile (significant at a rate of 10%) with a negative sign. This result suggests that, overall, this variable does not have an effect on the probability of under-reporting within the quartiles. In terms of interpretation, this result reveals that despite the increase in the number of employees in informal enterprises, anything that tends to make them more visible on the ground, these enterprises are not willing to declare all their income for tax purposes. In the second equation, the size variable is positive and significant in the second, third and fourth quartiles, at 10%, 10% and 5% respectively. This means that as the number of employees increases in these quartiles, the probability of the tax authorities detecting any fraud in these quartiles also increases. Indeed, the number of employees working in an IPU is one of the main indicators available to the tax authorities to establish the economic importance of the IPU and to initiate a tax audit to detect fraudulent practices. From a tax point of view, a high number of employees within a company is an outward sign of the company's sound financial health.

To test the predictive power of the turnover underreporting model, we now determine the marginal effects; the result of the estimates is presented in the following table for the overall model.

Table 8. *Marginal effects of the turnover underreporting model (For significant explanatory variables)*

Declarca			
Variables	dy/dx	z-statistics	p> z
detect(d)	0.001	(1.951)	0.071
control(d)	-0.089	(-3.011)	0.008
size	-0.001	(-1.811)	0.044
tximpcsi(d)	0.033	(3.519)	0.062
lca	0.003	(1.881)	0.079
percimp(d)	-0.011	(-1.843)	0.057
Detect			
Variables	Coefficient	z-statistics	p> z
size	-0.052	(-4.031)	0.008
local(d)	0.006	(1.983)	0.065
N	2537		

Notes: (d) dy/dx for discrete change of dummy variable from 0 to 1. z-statistics values are in brackets.

Source: Regression results

The calculation of marginal effects makes it possible to predict the behaviour of the tax underreporting model following a variation in the explanatory variables. Thus, when an IPU is controlled, the rate of under-reporting of its turnover decreases by 8.9%. On the other hand, if the tax rate at the ITUC is perceived as high, this will increase the probability of under-reporting by 3.3% and vice versa. These results indicate that tax auditing is a powerful deterrent for UPIs to declare their real income for tax purposes and that tax evasion among informal sector assets is more likely to be facilitated by an increase in ITUC tax rates.

Furthermore, the results show that when the UPI's turnover level varies by 1%, the probability of underreporting income varies in the same direction by 0.35% and that when the perception of the UPI's governance is good, this probability decreases by 1.1%. These results indicate, on the one hand, that UPIs tend to under-report their income for tax purposes as their income grows, and on the other hand, that the more governments work to improve their perception of governance, the less likely informal sector taxpayers will be to hide their income from the tax authorities.

The second part of the estimate presents the results relating to the marginal effects of the tax authorities' propensity to detect cases of underreporting of turnover. At this level, the results reveal

that the variable "size" (measured by the number of employees) has a positive and significant marginal effect on the probability of detection. If the number of employees in the IPU increases by 1%, the probability of detecting concealed turnover varies in the same direction by 5.2%. This result is in line with the indicators generally used by the tax authorities to detect cases of fraud. Indeed, the continuous increase in the number of employees within a UPI is an indicator that makes it possible to implement the right of investigation with a¹² view to apprehending the real level of turnover of the activity carried out. The marginal effect of location on the probability of detection proved to be rather small. Thus, when the company has premises, the probability of detection of its concealed turnover varies by 0.6%.

Analysis of marginal effects by quartiles

We examine the marginal effects according to the different quartiles to better understand the predictive capacity of the underreporting model; the results of the calculations are recorded in the following table:

Table 9. *Marginal effects of quartile*

	Q1		Q2		Q3		Q4	
	declarca (dx/dy)							
detect(d)	-0.013	(-1.67)	-0.004	(-2.09)	-0.002	(-1.89)	-0.021	(-2.07)
control(d)	-0.033	(-3.21)	-0.040	(-3.39)	-0.004	(-1.92)	-0.001	(-1.844)
tximpcsi	0.041	(1.940)	0.089	(2.004)	0.020	(2.051)	0.008	(1.943)
size	0.004	(1.830)	0.002	(2.174)	0.026	(6.085)	-0.020	(-2.031)
lca	0.066	(3.003)	0.419	(1.946)	0.245	(2.216)	0.171	(3.108)
percimp	-0.145	(-4.03)	-2.133	(-2.67)	-0.108	(-1.91)	-0.206	(-1.049)
	detect(dx/dy)							
size	0.021	(1.951)	0.089	(5.036)	0.050	(3.029)	0.037	(2.052)
local	0.001	(1.852)	0.032	(3.121)	0.003	(1.872)	0.0031	(3.754)
N	634		637		637		629	

Notes: (d) dy/dx for discrete change of dummy variable from 0 to 1. z-statistics values are in brackets.

Source: Regression results

The marginal effects of the decrease in the ITUC tax rate on the probability of underreporting are (0.041), (0.089), (0.020), (0.008) for the first, second, third and fourth quartile respectively. These results indicate that the decrease in the ITUC rate leads to a decrease in the rate of tax under-declaration of 4.1% and 8.9% in

the first and second quartiles; this decrease is only 2% and 0.08% for the second and fourth quartiles respectively. These effects show that IPU's with a low-income level are much more sensitive to a decrease in the amount of the ITUC relative to those with a very high income (with IPU's in the last two quartiles). These results can be explained by the rather uncivilised attitude of these taxpayers who are psychologically unwilling to pay the right tax compared to small IPU's. Indeed, small IPU's are scared to death of the tax authorities, anything that leads them to comply with the payment of taxes (as long as it is not out of their contributive capacity) to avoid any sanction from the tax authorities, which could put a brake on their businesses. Large IPU's fit into the sequential logic described above as taxpayers who are always keen to maximise their objective function to the detriment of the State by under-reporting their sales. This conclusion was reached by Mbaye *et al.*, (2012) in a study of the informal sector in francophone West Africa. According to the results of this study, "large informal enterprises can pay much more than they do, but make extensive use of underreporting and political influence" (Mbaye *et al.*, 2012). The results also show that the marginal effects of the "control" and "percimp" variables on the probability of underreporting are all negative and significant, with magnitudes of (-0.033) and (-0.145) for the first quartile, (-0.040) and (-2.132) for the second quartile, (-0.004) and (-0.108) for the third quartile, (-0.001) and (-0.206) for the last quartile, respectively. The results thus obtained illustrate that, in terms of predictions, the occurrence of a tax audit or the good perception that IPU's have of governance could negatively affect the probability of underreporting turnover in the proportions given above. The strengthening of tax auditing and the effectiveness of government action are real levers that could promote better resource mobilization within IPU's through the reality of declared revenue. About the variables "size" and "lca", the marginal effects obtained from the regressions indicate that a 1% increase in these variables leads to a less than proportional increase in the probability of under-reporting in the different quartiles. The second part of the results indicates that changes in the size of the IPU have a significant marginal effect on the probability of detecting fraud in the different quartiles. Indeed,

when the number of employees in the IPU increases by 1%, the probability of detecting concealed turnover increases by 2.1%, 8.9%, 5%, 3% in the first, second, third and fourth quartiles respectively. The increase in the number of employees within a UPI makes it more visible in the field, providing the tax authorities with an objective indicator to launch a survey to determine its real turnover level. The exercise of this right of enquiry generally makes it possible to detect cases of concealment of turnover, which could explain the results obtained from the regressions.

Conclusion

The objective of this paper is to analyse the effectiveness of taxation applied to informal sector assets in Burkina Faso. It aims to address two major concerns; one relating to the fiscal registration of IPUs, and the other to the determination of the share of turnover under-reported by them.

To apprehend the behaviour of informal enterprises when faced with the decision to register or not to register their activity, and to determine the share of their turnover that is evaded, we rely on the Principal-Agent model inspired by Allingham-Sandmo (1972) and adapted by Feinstein (1991), Gautier (2001) and Diagne & Thiaw (2008). The empirical modelling thus highlighted has two components: the first one apprehends the decision to register businesses in the informal sector and is described thanks to a Probit model of simultaneous equations; the second component concerns the determination of the declared turnover rate and is materialized by a Probit-Tobit model of simultaneous equations. Taking these two components into account makes it possible to determine the probability of informal sector taxpayers paying taxes, and thus to assess the effectiveness of the taxation of IPUs.

The results relating to the probability of registration of UPIs show that only the direct tax variable "tximpcsi" has a negative and significant effect at a rate of 1% on it. When the rate of contribution of the informal sector is perceived by the UPI as an obstacle to tax payment, its probability of registration decreases by 76%. This result is in line with Leal-Ordóñez (2011) and Nyamapfeni & Wellington (2015) who argue that the increase in the tax rate in the informal sector negatively affects the likelihood of these taxpayers

to register with the tax authorities, with the immediate corollary being the possibility of evading payment of tax. This analysis has been refined, however, by following the turnover quartiles used to capture the specificities of each category.

The efficiency of the taxation system applicable to the informal sector should be sought through a lower tax rate for small IPU's and a high tax rate for large IPU's. For the latter, the failure of tax control highlighted by the results should be remedied to enable the tax authorities to identify them and impose them under the appropriate tax regime. This can only be achieved by improving the institutional framework (*Alm & Martinez-Vasquez, 2007*). The results also suggest that indirect taxation policies that can result in significant taxation of purchases of goods and services from IPU's have the advantage of generating high tax revenue for the State.

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6

Determinants of child labour in Cameroon: A bivariate probit model analysis

Siméon Maxime BIKOUE

Introduction

According to estimates by the International Labour Office (2002, 2004)¹, there are over 190 million economically employed children aged 5-17 years in the world. These children are generally involved in agriculture, industry and

¹ In the report resulting from the international labour conference held in Geneva in 2002, the International Labour Office (ILO) called for "a future without child labour" and for the effective abolition of this phenomenon to be achieved. "One of the most pressing imperatives of our time" (ILO, 2002). Early child labour could indeed compromise their physical and mental development and, at the national level, reduce the capacity to accumulate human capital (Anker, 2000; Ravallion, Wodon, 1999). The fight to make it disappear therefore mobilizes international organizations (ILO, UNICEF, World Bank), non-governmental organizations as well as national public authorities (Dumas, & Lambert, 2008). Despite these repeated efforts, child labour persists. Recent estimates show that around 121 million children aged 5 to 14 (a rate of 9.9%) are currently working worldwide (Diallo *et al.*, 2013). The situation in Africa south of the Sahara is particularly worrying because, according to the same source, 21.7% of children of this age group work there.

Ch.6. Determinants of child labour in Cameroon: A bivariate probit model analysis services. In Africa, as in most developing countries, this phenomenon is also very preponderant. Nearly 50 million children aged 5-17 years are economically employed in sub-Saharan Africa, according to ILO estimates in 2006. This early employment of children is to the detriment of their education, For the case of Cameroon for example, we note that among young people (10-17 years), the highest activity rates are observed in regions where Gross Enrolment Ratios (GER) in primary education are the lowest. This is the case, for example, in the Far North region where the activity rate of young people aged 10-17 is around 75.9% and the GER is 92.0%. against a national average of 101.1%. The available statistics also reveal the existence of a probable link between the phenomenon of child labour and poverty, since the highest activity rates of children are observed in regions where poverty incidence rates are the highest.

This situation is believed to be due to the economic crisis of the 1990s that Cameroon experienced and which was severely felt in some social sectors such as education. The volume of resources allocated to this sector has fallen sharply. The dysfunction of the system has contributed to a decrease in school attendance among young people (nearly 45% of these young people do not complete primary education). Moreover, a substantial proportion of those with higher education cannot find a job. In this context, education is no longer able to play for households this role of promoting well-being through employment which was once guaranteed on completion of the studies. Faced with such a situation, households, especially the poorest, adopt a survival strategy by looking for an alternative to the education of their children. One of these alternatives is to require the contributions of children in the economic life of the household through their increasingly extensive involvement in the labour market, mainly in segments that do not require a particular qualification.

As we will see later, the literature provides several arguments to explain child labour. Since the article by Basu & Van (1998), the most commonly cited factor is household poverty. It is in fact considered that households make the decision to have children work only if the family income excluding the children's

Ch.6. Determinants of child labour in Cameroon: A bivariate probit model analysis contribution falls below the subsistence threshold². However, the relationship between poverty and a number of empirical works³: some advocate, on the contrary, that household wealth, when it is measured by their land possession, is one of the main causes of child labour (Bhalorta & Heady, 2003). Following these authors, other factors of household vulnerability, such as parental unemployment, the death of the father and / or mother, or the decline in household income, have been put forward as possible explanations for the problem of child labour. Taking them into account sheds light on the policies to be adopted to reduce the phenomenon. The objective of this article is precisely to highlight the determinants of child labour using data from the third Cameroonian household survey (Ecam III), which was carried out in 2007 by the National Institute of Statistics (INS). We shall examine the influence of various household vulnerability factors, not just income poverty.

According to data from Ecam III, 28.8% of children aged 5 to 17 work in Cameroon. The incidence is also much higher in rural areas than in urban areas (40.7% versus 16.6%). At the same time, the net primary school enrolment rate is estimated at 79.8% in 2007; still a long way from universal education, it has remained unchanged since 2001. Overall, the country's demographic structure is young: more than two in five Cameroonians (41%) are under the age of 15. Therefore, the dependency ratio⁴ stands at 80.1%. In addition, in the second half of the 1980s, the country experienced an economic crisis, the consequences of which are still perceptible⁵ on the standard of living of the populations. According

² These authors qualify this hypothesis as a "luxurious axiom" of poverty, cf. *infra*.

³ See, for example, Canagarajah, & Coulombe (1997), Nielsen (1998), Maitra & Ray (2002). Basu & Tzannatos (2003) quote some other research criticizing the poverty hypothesis.

⁴ The dependency ratio represents the ratio of dependents - the population under the age of 15 or over 64 - and the working-age population - people aged 15 to 64.

⁵ The international financial crisis that occurred in 2007 and 2008 did not help the situation because it had the effect of a sudden drop in demand and therefore in the price of raw materials produced in Cameroon and

Ch.6. Determinants of child labour in Cameroon: A bivariate probit model analysis to the INS (2008), poverty is thus high: out of a population of approximately 17.9 million inhabitants in 2007, 39.9% live below the poverty line, i.e. roughly the same proportion as in 2001 (40.2%), despite the significant debt reductions obtained during this period⁶; rural populations are particularly affected, since they account for 87% of households in poverty in Cameroon.

Non-monetary poverty indicators also point to a worrying situation. According to the report by UCW *Understanding children's work, Cameroon* (2012, p.8), "more than half of the population does not have access to improved sanitation facilities, more than a quarter do not have access to an improved water source and three fifths to electricity". In addition, the occurrence of events with negative consequences on income⁷ combined with poor labour, land or credit markets increases the opportunity cost of children's time, which is likely to increase their participation. at work and, at the same time, reduce the time they spend in school for education.

After summarizing the literature that deals with the determinants of child labour, we describe the econometric model adopted in the article, then specify the data and variables used in the analysis. We finally present the main results of the estimates made.

Literature review

For the past 15 years or so, the issue of the determinants of child labour has been the subject of particular attention by development economists. But it is under the impetus of BASU and VAN (1998) that the theory has developed in recent times. Their analysis focuses on the living conditions of households and the interaction between child labour and that of adults. It is based on a static model of household microeconomics whose main hypothesis, called the "luxury axiom", states that a household

for export, such as oil, wood, rubber, cotton and aluminium (UCW, 2012).

⁶ In fact, during this period Cameroon left the "Heavily Indebted Poor Countries Initiative" program, which had the effect of relaxing the constraints linked to debt service.

⁷ In 2007, there were more than 450,000 children (or 11%) who had lost at least one parent (UCW, 2012).

Ch.6. Determinants of child labour in Cameroon: A bivariate probit model analysis makes its children work if its income, without that of the children, falls below the threshold of household subsistence. Child labour is linked to poverty, which itself equates to insufficient parental income.

This axiom has been the subject of numerous empirical verifications which confirm the impact of poverty on child labour. Blunch & Verner (2000), using a simple probit model, demonstrate a positive and significant relationship between household poverty and child labour in Ghana.

Lachaud (2008) for his part uses a bivariate probit model and demonstrates that household monetary poverty, measured by consumption expenditures per capita, positively influences the work of children aged 5 to 14 in Burkina Faso. He also shows that there is a negative correlation between work and children's school education. Edmonds (2005), in his study based on panel data in Vietnam, suggests that a significant reduction in child labour is possible when the economic status of the household improves and points out that over the period 1993- 1998, nearly 80% of the decrease in child labour stems from the improvement in economic conditions observed in the country.

However, in other studies, the correlation between poverty and child labour is weak, if not absent. Using Peruvian data, Ray (2000) concludes that there is no link because children can combine work and school, regardless of household status. It is the same for Jensen & Nielsen (1997) in Zambia, then Canagarajah & Coulombe (1999) in Ghana, who also do not find a significant relationship between child labour and household poverty. For these authors, poverty is not the first factor that accounts for the phenomenon of child labour.

Although their analytical framework provides a better understanding of the conditions under which children are put into labour, the main criticism levelled at Basu and Van's model is that it does not take into account other factors - apart from household poverty - likely to influence the child labour market. More recent work has used household surveys from several developing countries to try to explain it better. These studies have taken various directions. Some have looked at access to credit and the imperfections of the labour market and land, while others have

Ch.6. Determinants of child labour in Cameroon: A bivariate probit model analysis analysed the effect of negative shocks in the orientation of households.

Access to credit by households plays a key role in children's participation in work. Indeed, when the credit market works, it becomes possible for parents to borrow in order to finance children's education. However, in most developing countries these markets are imperfect. Under these conditions, the difficulty of access to credit encourages parents to make children work. In a study carried out in South Africa, Edmonds (2006) compares the status of children living with an adult eligible for a retirement pension to that of children living with adults who cannot. Receiving a retirement pension is a guaranteed income which can be used as a collateral for a loan. The author observes that children living with an eligible adult, on average, go to school more and work less. These results confirm that the possibility of borrowing against future income (here the retirement pension) allows households to invest in the education of their children. Other authors⁸ obtain similar results and find a significant relationship between child labour, school education and the imperfection of the credit market in various countries.

They point out that in the presence of credit constraints, child labour can become a recourse whenever parents are unable to make an inter-temporal arbitration over their resources. These various studies show that child labour is used by parents as a substitute for borrowing with the consequence of transferring income from the future to the present. It is thus not only a form of self-insurance, but also a safety net that poor households use to guard against imperfections in the credit market.

Another explanatory factor often considered in the literature concerns imperfections in the labour market and the land. Thus, faced with these imperfections, a household with large land in rural areas may prefer to employ their children rather than invest in their children's education. Using Pakistani and Ghanaian data to analyse the 'wealth paradox',⁹ Bhalotra & Heady (2003) find that

⁸Such as for example: Jensen & Nielsen (1997); Baland, & Robinson (2000); Dehejia, & Gatti (2002); Guarcello *et al.*, (2010).

⁹ The term is used to describe the situation of "wealthy" households employing their children.

Ch.6. Determinants of child labour in Cameroon: A bivariate probit model analysis

land-rich households tend to employ their children as long as they cannot rely on an external labour force and that they have difficulty letting their land. As land is an important source of wealth in rural areas, these authors find that children from land-rich rural households are on average less educated and more active than those from landless households. Dumas (2007), in her study on Burkina Faso, shows that land ownership increases child labour when there are moral hazard problems concerning adult workers in the labour market¹⁰. It shows that, for all household categories, there is a U-shaped relationship between children's working time and the amount of cultivable land¹¹.

Recent studies by Boutin (2012) and Dumas (2013) establish a positive relationship between child labour and some market imperfections, respectively in Mali and Madagascar. Boutin (2012) analyses the “wealth paradox” by testing the relationship between land ownership and child domestic labour. Using a logit model, she finds that the demand for child labour within the family increases with land ownership. In addition, the larger the cultivable area, the less likely children are to work outside the family farm. Dumas (2013) concludes that owning land is associated with a decrease in child labour when labour market imperfections diminish. One of the possible measures to fight against child labour would therefore be to promote competition in the labour market.

The shocks to which households are subjected are also factors of vulnerability that encourage children to work (Meka’a & Mbebi, 2015). In fact, in the absence of insurance or reparation mechanisms (access to credit and insurance markets, social security system, etc.), households that are confronted with transitory income shocks or non-monetary shocks tend to withdraw their children from school in order to make them work and thus balance their consumption. Beegle *et al.*, (2006) seek to

¹⁰ Some adult workers take the risk of reducing or degrading their labour supply, as they place themselves in the perspective of employing their children on family farms.

¹¹ In other words, child labour decreases when households own relatively small amounts of cultivable land, but increases as these amounts grow larger.

Ch.6. Determinants of child labour in Cameroon: A bivariate probit model analysis assess the extent to which transitory household income shocks lead to increased child labour, and whether access to credit decreases these effects. Using data from a sample of eight households in Tanzania, the authors manage to show that agricultural shocks¹² lead to a substantial increase in child labour. Moreover, households with assets can use them not only to cope with shocks, but also as a guarantee of access to credit. De Janvry *et al.*, (2006), using data from the Progreso¹³ experience in Mexico, point out that idiosyncratic shocks (unemployment or illness of the head of the family) or covariates (natural disasters) push parents to adopt risk management: they take their children out of school to put them to work. Using the propensity score matching (PSM) methodology on data from Guatemala, Guarcello *et al.*, (2010) seek to know to what extent risk and vulnerability factors such as the rationing of credit and individual or collective shocks influence household decisions about education and thus child labour market. They conclude that the occurrence of these shocks reduces the level of education of children and increases their presence in the labour market.

Similarly, in a study from Tanzania, Bandara *et al.*, (2015) analyse the impact of monetary (agricultural shocks) and non-monetary (parental death) shocks on child labour using a model in which households maximize their utility based on their consumption and children's education level. In particular, they seek to determine whether access to credit and household assets can cope with these shocks. This study shows that agricultural shocks have a significant impact on child labour and that access to credit works effectively as a solution.

The econometric model

We build a model¹⁴ that materializes the choice of putting a child to work and / or sending him to school. Thus, to describe the

¹² For example, accidental crop losses or natural disasters (leading to lower income).

¹³ Progreso is a fund transfer programme that conditions children's school education and regular health monitoring.

¹⁴ To assess the determinants of child labour, the literature highlights several types of econometric models. The most common are: multinomial logistic, sequential (sequential multinomial logit or

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economic activity of the child taking into account his education, we must then specify two dependent variables: (W_i^*, S_i^*) which are continuous latent variables assumed to come from a normal distribution. As these variables are unobservable, we define two qualitative binary variables (W_i, S_i) (H which are the manifestation of (W_i^*, S_i^*)). Formally, the decision to put a child to work is described by the following model:

$$W_i^* = X_{1i}\beta_1 + \varepsilon_{1i} \quad (1)$$

W_i^* is the net benefit expected by the family by sending a child to work and X_{1i} is a vector that defines the characteristics of the child, the family, the community that determine W_i^* , ε_{1i} is the reduced centred error term. However, W_i^* is not observable, and what we observe is the following binary variable:

$$W_i = \begin{cases} 1 & \text{if the child works } (W_i^* > 0) \\ 0 & \text{sinon} \end{cases} \quad (2)$$

Similarly, the decision to put a child in school is described by the following latent variable:

$$S_i^* = X_{2i}\beta_2 + \varepsilon_{2i} \quad (3)$$

S_i^* is the net benefit obtained by parents when they send their children to school, X_{2i} , represents the characteristics of the child,

hierarchical multinomial logit) and bivariate probit models. Each of the models has advantages and disadvantages. In fact, the choice of the estimation method depends both on the data and on the objective of the analysis sought. Because of its relevance and the advantages it offers compared to other models, the approach adopted in the context of this document is estimation by the bivariate probit. Indeed, this model makes it possible to take into account the interdependence between the two choices at the same time that it allows to test the probability for a child to work and / or to go to school. The model has two dependent variables and enables to estimate the probability for a child to work and / or to go to school. These two variables are: participation in economic activity and school attendance.

Ch.6. Determinants of child labour in Cameroon: A bivariate probit model analysis the characteristics of the family through those of the head of household.

ε_{2i} represents the error terms which have zero mean and constant variance.

Unfortunately, S_i^* is unobservable. What we can observe is the following binary variable:

$$S_i = \begin{cases} 1 & \text{if the child goes to school } (S_i^* > 0) \\ 0 & \text{otherwise} \end{cases} \quad (4)$$

With $E(\varepsilon_{1i}) = E(\varepsilon_{2i}) = 0$

The random terms, follow a bivariate normal distribution with the variances normalized to 1 as in the univariate probit, that is,

$$V(\varepsilon_{1i}) = V(\varepsilon_{2i}) = 1 \quad \text{and} \quad \text{cov}(\varepsilon_{1i}, \varepsilon_{2i}) = \rho ; \quad \rho \in [-1, +1]$$

The normal cumulative function with two variables is written:

$$P(\Sigma_1 < a, \Sigma_2 < b) = \int_{-\infty}^a \cdot \int_{-\infty}^b \varphi_2(\varepsilon_1, \varepsilon_2, \rho) d\varepsilon_1 d\varepsilon_2 = \Phi_2(a, b, \rho)$$

where $\varphi_2(\varepsilon_1, \varepsilon_2, \rho)$ is the density of the bivariate normal and $\Phi_2(a, b, \rho)$ is the distribution function of the same law.

with: $\varphi_2(\varepsilon_1, \varepsilon_2, \rho) = \frac{1}{2\pi\sqrt{1-\rho^2}} e^{\frac{-(\varepsilon_1^2 + \varepsilon_2^2 - 2\rho\varepsilon_1\varepsilon_2)}{2(1-\rho^2)}}$ which designates the correlation coefficient between the residuals of the two equations.

We have four possible observation regimes $(W_i, S_i) \in \{(1,1); (1,0); (0,1); (0,0)\}$.

The four possible combinations of (W_i, S_i) and the probabilities associated with each observation are given by:

- children participate in the labour force and go to school, $W_i = 1$ et $S_i = 1$

$$P(W_i = 1, S_i = 1) = P(W_i^* > 0; S_i^* > 0) = \Phi_2(X_1, \beta_2, X_2, \beta_2, \rho)$$

- children participate in the workforce and do not go to school, $W_i = 1$ et $S_i = 0$

$$\begin{aligned}
 P(W_i = 1, S_i = 0) &= P(W_i^* > 0; S_i^* \leq 0) \\
 &= \Phi_2(X_1, \beta_2, -X_2, \beta_2, -\rho)
 \end{aligned}$$

- children do not work, but they go to school, $W_i = 0$ et $S_i = 1$

$$\begin{aligned}
 P(W_i = 0, S_i = 1) &= P(W_i^* \leq 0; S_i^* > 0) \\
 &= \Phi_2(-X_1, \beta_2, X_2, \beta_2, -\rho)
 \end{aligned}$$

- children do not work nor go to school, $W_i = 0$ et $S_i = 0$

$$\begin{aligned}
 P(W_i = 0, S_i = 0) &= P(W_i^* \leq 0; S_i^* \leq 0) \\
 &= \Phi_2(-X_1, \beta_2, -X_2, \beta_2, \rho)
 \end{aligned}$$

In order to determine the parameters (β_1, β_2, ρ) of the model, we maximize the likelihood function or the likelihood function defined respectively by:

$$L(\beta_1, \beta_2, \rho) = \prod_{i=1}^n P(W_i, S_i) \cdot 1nL(\beta_1, \beta_2, \rho) = \sum_{i=1}^n 1nP(W_i, S_i)$$

X_{1i} and X_{2i} , are row vectors of explanatory variables which respectively determine the propensities to work and to go to school. β_1 and β_2 represent the column vectors of the parameters associated with the two equations. They are therefore solutions to the problem of maximizing the log likelihood of the model:

$$(\beta_1, \beta_2, \rho) = \underset{\beta_1, \beta_2, \rho}{\operatorname{Argmax}} 1nL(\beta_1, \beta_2, \rho)$$

The likelihood function of the bivariate probit presented in this model has a more complex shape and is difficult to estimate. However, some statistical software (Gauss, SAS, STATA ...) provide a maximization algorithm and the cumulative function of the bivariate normal distribution, it is relatively easy to determine the maximum likelihood estimator corresponding to the model. In addition, several marginal effects can be calculated. The bivariate probit estimates are obtained by maximum likelihood in full information. On a practical level, this involves estimating reduced

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equations of the determinants of work and access to education for
children aged 5 to 17. The econometric estimates under the STATA
software are presented in table n°2

Data

Among children aged 5-17 years (around six million), 48.9% do nothing but go to school and 28.7% study while working simultaneously (see Table 1). Likewise, 12.3% do nothing but work and 10.1% neither attend school nor work. However, the proportion of children who work only increases with age.

Analysis by gender reveals a disparity between boys and girls. The percentage of girls who do nothing but work is higher than that of boys (14.3% against 10.3%). For those who do not attend school and do not work, the same trend is observed (11.9% against 8.3%). In addition, 31% of boys combine school and work against 26% of girls.

According to the survey region, more than 70% of children in Yaoundé, Douala and the South have studies as their sole occupation. Depending on the area of residence, 75.4% of children in urban areas against 37.3% in rural areas do nothing but go to school.

Table 1. *Type of activity of children by sex, age group, survey region and place of residence*

	Total children	Do nothing but work		Do nothing but go to school		Work and go to school		Neither go to school nor work	
		Number	%	Number	%	Number	%	Number	%
		Both sexes							
5-9	2 542 891	155 297	6,1	1 485 733	58,4	468 128	18,4	433 733	17,1
10-14	2 196 488	245 003	11,2	992 958	45,2	874 442	39,8	84 085	3,8
15-17	1 213 647	330 312	27,2	433 833	35,8	366 691	30,2	82 811	6,8
Boys									
5-9	1 254 205	67 727	5,4	756 282	60,3	235 045	18,7	195 151	15,6
10-14	1 144 409	105 154	9,2	530 263	46,3	478 880	41,9	30 112	2,6
15-17	612 448	138 527	22,6	228 501	37,3	220 154	36,0	25 266	4,1
Boys together	3 011 062	311 408	10,3	1 515 046	50,3	934 079	31,0	250 529	8,3
Girls									
5-9	1 22 686	87 570	6,8	729 451	56,6	233 083	18,1	238 585	18,5
10-14	1 052 079	139 849	13,3	462 695	44,0	395 562	37,6	53 973	5,1
15-17	601 199	191 785	31,9	205 332	34,2	146 537	24,4	57 545	9,6
Girls together	2 941 964	419 204	14,3	1 397 478	47,5	775 182	26,4	350 100	11,9
Investigation region									
Douala	445 308	19 447	4,4	380 069	85,4	25 286	5,7	20 506	4,6
Yaoundé	469 200	13 892	3,0	402 801	85,9	28 635	6,1	23 872	5,1

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Adamawa	329 998	87 775	26.6	9 412	28.5	113 603	34.4	34 500	10.5
Centre	435 853	23 172	5.3	256 262	58.8	137 315	31.5	19 104	4.4
Est	281 453	57 345	20.4	81 825	29.1	116 856	41.5	25 427	9.0
Far North	1 172 376	281 927	24.1	322 921	27.5	286 967	24.5	280 561	23.9
Littoral	195 735	12 666	6.5	103 659	53.0	73 391	37.5	6 019	3.1
North	609 175	110 000	18.1	163 248	26.8	215 376	35.4	120 551	19.8
North-West	648 507	51 795	8.0	376 505	58.1	186 816	28.8	33 391	5.2
West	724 968	37 744	5.2	294 388	40.6	376 170	51.9	16 666	2.3
South	222 637	9 197	4.1	157 483	70.7	48 806	21.9	7 151	3.2
South-West	417 816	25 652	6.1	279 243	66.8	100 040	23.9	12 881	3.1
Residence area									
Urban	1 816 738	91 669	5.1	1 369 282	75.4	233 004	12.8	122 783	6.8
Rural	4 136 288	638 943	15.5	1 543 242	37.3	1 476 257	35.7	477 846	11.6
Together	5 953 026	730 612	12.3	2 912 524	48.9	1 709 261	28.7	600 629	10.1

Source: ECAM3, INS.

The explanatory variables

Based on previous studies (Diallo, 2001, 2008; Adjiwanou *et al.*, 2005; Boyden, 1992; Tsala *et al.*, 2005), available data and in the light of Cameroonian sociological realities, several factors likely to explain the child labour have been identified. These factors can be grouped into three broad categories: the characteristics of the child, the characteristics of the head of the family and the family environment.

Characteristics specific to the child

They include the child's age, sex, kinship with the head of the family, whether or not they have attended kindergarten, school level, whether the child is fatherless or not, orphan of mother or not, orphan of both parents or not and the nationality of the child.

The age of the child: according to ILO Conventions No. 138 and No. 182, and the resolution concerning statistics on child labour, the age range retained for the measurement of child labour is "5-17 years". Age can influence children's propensity to work and stay in the workforce at the expense of school. Before 15 years of age, the child is still very immature and therefore psychologically fragile, very easily influenced by his parents and his family circle. Thus, the choices that are made for him or that he makes on his own concerning his school education or professional life are very often irreversible and can leave more pronounced stigmas than beyond the age of 15. In addition, as school wastage increases with age, the risk of children's refuge in the professional world varies with their

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age. It should be noted that the older the child, the more he is called upon to participate in the economic life of the household.

Gender: Previous studies of child labour show that there is gender discrimination in the decision to put children to work. Indeed, it appears that "girls work more than boys, and at all ages, and do not perform the same tasks" (Poirier *et al.*, 1996). In African and Cameroonian societies, in particular, the young girl is seen above all in her role of future wife and mother. This is why she is much more constrained to domestic, rural, and even commercial and other work than the young boy. In addition, in a context of declining income or the impoverishment of parents, the girl is very often disadvantaged in terms of school attendance in favour of work.

Family relationship: participation in work also varies depending on the child's family relationship with the head of the household. "The chief's children work less than other children" (Boyden, 1992). Likewise, depending on whether the child has a biological link with the head of the household or not, with the wife or not, whether he is adopted or entrusted, his risks of exercising a job at the expense of the school attendance decrease or increase.

Level of education: Raising a child's educational attainment can reduce the child's risk of working early given the workload required by school activities. These children will have little time to participate in subsistence activities (Marcoux, 1993).

The survival of the parents (child. Orphan of father and / or mother): the death of at least one of the parents makes the situation of the child very precarious. This situation is likely to jeopardize his school education or his hope of school survival, thus predisposing him to seize any employment opportunity in order to survive.

Nationality: compared to natives, the offspring of immigrants or foreigners, especially those who have themselves been working children, are more likely to find themselves early in the world of employment at the expense of school attendance.

Characteristics of the head of the family

The characteristics of the head of the family include gender, marital status, level of education, religion, the presence or absence of a disability in the head of the family, and socio-economic group.

Gender of head of the family: Depending on whether the head of the family is male or female, the chances of a child going to school may increase or decrease.

Marital status: polygamous households are more conducive to child labour (Poirier *et al.*, 1996), The same authors show that the instability of the union and especially its breakdown can influence the choices in terms of education or employment of children.

Level of education: In households where the head has a high level of education, the children who live there are more likely to go to school at the expense of work. In addition, increasing the level of education of the head of the family, particularly in rural areas, may be accompanied by the modernization of activities (for example, the modernization of agriculture that requires less labour) or their reorientation towards sectors requiring less child labour.

Religion: the perception of the place and role of the modern school in relation to that of the traditional school (informal and empirical learning) and the Koranic school depends, among other things, on religion. Indeed, depending on whether the head of the family is Christian, Muslim or animist, he or she may attach more or less importance to one or the other type of school.

Disability: the disabled situation of a head of the family can constitute a real obstacle to the education of his offspring, especially when the disability is combined with poverty.

Socio-economic status: The likelihood of a child being in the labour market decreases as the socio-economic status of the household improves (Tsala *et al.*, 2005). Depending on the socio-economic group of the head of the family, the risk of working for their offspring at the expense of the school may vary. In addition, the fact that the father and especially the mother of the child is an employer can affect the choices regarding the education or employment of the children.

Family environment

These are essentially the characteristics of the household grouping together the following variables the size of the household combined with the number of children aged 0-4 and those aged 5-14, the standard of living of the household (very poor, poor, average, rich and very rich), the possession of some sustainable

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communicational goods in particular television, the radio, etc., the place of residence (urban, semi-urban and rural) and the area of investigation.

Household size: The cost of having a large number of children can influence the decision to make them all work or not. In addition, *"the strategic models maintain that an individual's behaviour should be strongly influenced by the number of his brothers and sisters as well as the attitudes of the latter"* (Diallo, 2001 and 2008). Thus, the fact that there are working children in the household increases the chances that others will also be workers, all other things being equal. The presence of children aged 0-4 in the household can compromise the chances of attending school for children aged 5-17, especially girls called upon to play the role of babysitter.

*Standard of living*¹⁵: the costs of education (direct costs in terms of tuition, books, uniforms, transport and snacks and indirect or opportunities related to the renunciation of child labour) can influence the decision of parents, especially the poorest to send their offspring to school or to the labour market. As poor households are more vulnerable, one of their survival strategies is to get their children to work in order to contribute to the household income.

Possession of some goods: the existence of television, in short communicational equipment in the household, by allowing household members to learn about current affairs, issues or challenges nowadays, can be a decisive factor of awareness raising in the fight against child labour (Adjiwanou, 2005).

Place of residence: the place of residence in which the household is located is a factor that can influence child labour. *"In the city, most children devote themselves to studies. In the village, on the other hand, many children are at work"* (Canagarajah & Coulombe, 1998; Nielsen, 1998). We are tempted to believe that the phenomenon is essentially rural. However, we generally observe that depending

¹⁵ It should be noted that the standard of living of households was estimated by final consumption expenditure per capita. However, some variables in the model, including human capital, possession of assets and work status, determine the standard of living of the household. This could be a source of endogeneity in the estimated model.

Ch.6. Determinants of child labour in Cameroon: A bivariate probit model analysis on the child's place of residence, his chances of going to school or the risk he runs of working may vary according to the level and the living conditions of this environment. Indeed, the absence or the remoteness of schools in certain rural areas can have a disadvantageous effect on the school attendance of the children residing there and therefore on their propensity to work.

From the above developments, several working hypotheses emerge, namely:

Child labour is the result of the trade-off between investing available resources in the human capital of their children and investing in physical capital.

The employment of children is negatively correlated with the standard of living of the household;

Children's activity is linked to their position in society; this socially constructed position that makes them social cadets. Thus, children in a household without at least one biological parent, illiterates, orphans, children of a certain age, children from certain backgrounds or regions, children living in a household where the head is not educated for example, are more exposed to work than others.

Results and discussions

The results obtained from the econometric estimates are summarized in Table 2 below. It can be seen that the coefficient indicating the correlation between the residuals of the two dependent variables of the model is statistically significant. This confirms the choice of the bivariate probit model. It should be remembered that the model we used seeks to explain the propensity to participate in the workforce and / or to go to school. The correlation coefficient is significantly negative in this estimate. This reflects the existence of a negative relationship between school attendance and child labour. The interpretation would be that unobserved factors that increase the likelihood of going to school decrease those of working.

Table 2. *Results of the estimations of the bivariate probit model*

<i>Dependent variables</i>	Child labour		Marginal effects	School attendance		Marginal effects
<i>Explanatory variables</i>	Coeff	Z	Pr(W=1)	Coeff	Z	Pr(S=1)
Characteristics Specific to the Child						
Gender						
Girl	0.01946	0.8	0.0065916	-0.254424	-6.63*	-0.0163073*
Boy	Ref			Ref		
Family relationship with the head of the family	Ref					
Child of the head of household	0.037156	1.25	0.0125253	0.251314	5.85*	0.0176999*
Child entrusted	Ref			Ref		
Child's age						
Age	0.310122	10.89*	0.1050312*	0.159239	2.68**	0.0100531*
Age squared divided by 100	-	-5.26*	-0.2195511*	-1.99617	-9.06*	-0.1260129*
Nationality	0.648262					
Cameroonian	-	-1.48	-0.076555	0.563841	2.85*	0.0597403*
Foreigner	0.214275			Ref		
Educational level	Ref					
Primary	0.081957	1.53	0.0276148	0.586619	5.54*	0.0430411*
1st cycle secondary	-	3.7*	0.0808351*	1.944935	15.85*	0.0758603*
2nd cycle Secondary and above	0.248099	5.48*	0.1487535*	3.107851	15.32*	0.0345675*
Without level	-			Ref		
The child attended kindergarten	0.522239					
Yes	Ref					
No	-	-4.9*	0.0516901*	0.079047	1.51	0.004911
The child is an orphan of mother or father	0.154237			Ref		
Motherless	Ref					
Fatherless	0.046035	0.61	0.0157823	-0.019802	-0.17	-0.0012729
Fatherless and motherless	0.144541	2.87*	0.0505376*	-0.118507	-1.73***	-0.0230239
Is not an orphan	0.301952	2.77'	0.1097243'	-0.280886	-2.24**	-
The Family Environment	Ref			Ref		0.0230239***
Quality of life						
Very poor (Q1)	0.168792	2.99*	0.0590097*	-0.123747	-1.43	-0.0085083
Poor (Q2)	0.122315	2.52**	0.0440303**	-0.072798	-1.24	-0.0061387
Medium (Q3)	0.048057	1.06	0.0163908	-0.072798	-1.1	-0.004769
Rich (Q4)	0.041487	0.95	0.0141405	-0.052121	-0.83	-0.0033822
Very rich (Q5)	Ref			Ref		
Survey region						
Douala	-	-0.16	-0.0046347	-0.031617	-0.3	-0.0020492
Adamawa	0.013732	6.84*	0.2081386*	0.156872	1.37	0.0086641
Centre	0.556249	4.75*	0.1359863*	0.137873	1.24	0.0077828
East	0.373121	12.06*	0.3602273*	0.070639	0.66	0.0042017
Far North	0.947408	5.86*	0.1613397*	0.126802	1.25	0.0073017
Littoral	0.441796	8.96*	0.2664819*	0.287799	2.32**	0.0142182*
North	0.703679	7.33*	0.2173733*	0.327204	2.89*	0.0158165*
North West	0.580994	2.13*	0.0539261**	0.085958	0.89	0.0051105
West	0.154515	13.51*	0.3533405*	0.290908	2.94*	0.015155*
South	0.943214	1.75***	0.0502511***	-0.174981	-1.63	-0.0128008

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South West	0.143504	-1.64	--	0.120888	1.17	0.0069433
Yaoundé	-		0.0405009***	Ref		
<i>Place of residence</i>	0.123298					
Ref						
Semi-urban	0.220482	5.84*	0.0778066*	0.192078	3.14*	0.0106272*

<i>Dependent variables</i>	Child labour		Marginal effects	School attendance		Marginal effects
<i>Explanatory variables</i>	Coeff	Z	Pr(W=1)	Coeff	Z	Pr(S=1)
Rural	0.483054	13.78*	0.1699741*	0.211884	3.92*	0.0124965*
Urban	Ref			Ref		
<i>Household size</i>						
Size	-0.025043	-341	-0.0084814*	0.49463	-4.23*	0.0031227*
<i>Number of children aged 0-4</i>						
Baby	-0.033292	-1.56	-0.0112753	-0.083816	-2.94*	-0.0052915*
Baby squared	0.016035	3.91*	0.0054306*	-0.007231	-2.97*	-0.0004565*
<i>Number of children aged 5-14</i>						
Child	0.072922	3.7*	0.0246968*	0.049152	2.13**	0.0031031**
Squared child	-0.006184	-2.86*	0.0020945*	-0.00645	-3.93*	-0.0004072*
<i>Presence of a television set</i>						
Yes	-0.0968	-2.91*	-0.0327102*	-0.017021	-0.32	-0.0010758
No	Ref			Ref		
<i>Characteristics of the Head of the family</i>						
<i>Age of head of the family</i>						
Age	0.000624	0.52	0.0002134	0.003449	1.94***	0.0002177***
<i>Gender of the head of the family</i>						
Female	0.045169	1.17	0.0153829	0.039604	0.66	0.0024593
Male	Ref			Ref		
<i>Marital status of the head of the household</i>						
Single	-0.048782	-0.83	-0.0163216	-0.086399	-1.05	-0.005854
Polygamous	0.045237	1.22	0.0154496	-0.107338	-1.8***	0.0072583***
Widower / widow	-0.113849	-2.01***	-0.0375846**	-0.005051	-0.06	-0.00032
Separated / Divorced	-0.091556	-1.28	-0.0302305	0.037519	0.32	0.0022909
free Union	-0.125762	-1.74**	-0.0411142**	-0.072797	-0.67	-0.0049024
Monogamous	Ref			Ref		
<i>Head of family's education level</i>						
<i>Number of years of study</i>	-0.011847	-2.86*	-0.0040122*	0.015979	2.36**	0.0010088**
<i>Religion of the head of the family</i>						
Christian	-0.234097	-4.76*	0.0816057*	0.022373	0.27	0.0014271
Muslim	-0.571984	-10.35*	-0.1716098*	-0.248932	2.81*	-0.0182435**
Animist / other	Ref			Ref		
<i>Victim of a disability</i>						
Yes	-0.060232	-1.19	-0.0200813	0.047645	0.56	0.0028887
No	Ref			Ref		
<i>Socio-Economic Group of the head of the family</i>						
Public sector	-0.23958	5.06*	-0.076828*	0.165668	1.98**	0.0093384**

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Formal private sector	-0.173808	-3.14*	-0.0562285*	-0.038673	-0.49	-0.00252
Inactive	-0617358	-11.03*	-0.1833924*	0.253377	2.92*	0.0129649*
Farmer	0.383642	11.42*	0.1327933*	-0.061988	-1.19	-0.0039735
Unemployed	-0.550206	-4.25*	-0.1539089*	0.027521	0.2	0.0016937
Informal private sector	Ref		Ref			
Constant						
Constant	-3.134446	-13.87*		0.579041	1.57	
Rho			-03363324*			
Number of observations			15105			
Log likelihood			-9603.3572			
Prob>Chi²			0.0000000			

Note: * = significant at 1%; ** = significant at 5%; *** = significant at 10%

Ref = reference modality

Source: ECAM3, INS

Explanatory factors of child labour

All things being equal, the propensity to work for children increases with age, decreases with education level and whether the child has attended nursery school or not.

Analysis of the characteristics of children indicates that their propensity to be part of the economically employed population increases with age. This can be explained by the fact that in the context of sub-Saharan Africa in general and Cameroon in particular, the work carried out by children is generally manual and physical tasks, which partly justifies that the older the child grows, the fitter he is to work. The negative value of the coefficient related to the squared age indicates that the probability of participating in economic activities increases sharply with age in the early years, then increases less and less, and then decreases.

Analysis according to the child's educational level reveals that, compared to children without an educational level, those with at least lower secondary education are less likely to find themselves in the labour market. It is the same for those who have attended nursery school. We can thus note that in Cameroon, early school attendance and raising the level of education seem to curb attempts to knock early on the doors of employment.

Regarding the survival of parents, it influences the early entry of children into the labour market. Indeed, fatherless children and orphans of both parents have a greater propensity to work; whereas the fact that a child is motherless has no significant influence on its entry into labour. This result shows the preponderant role played by the father in the supervision of the

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child, especially in the financial support. We note that there is no discrimination based on sex, nationality and family relationship with the head of the family.

In terms of the family environment, as one might expect, child labour increases with declining standards of living. Both the poor and the very poor have a greater propensity to send their children to work compared to the very rich. However, the data does not show any discrimination in the phenomenon between children living in middle-income households and the rich and those living in households considered to be very rich. Accordingly, this result somewhat questions the traditional assumption that poverty is the main cause of child labour. The regions with the highest poverty rates (Far North, North, Adamawa and East) all fall into the category of regions with a high propensity for the mobilization of working children. However, there are regions with lower poverty rates such as the Centre, the Littoral, the North-West and the West. These results, in addition to household poverty, the socioeconomic and cultural environment of some regions may account for the motivations for putting children to work early. The analysis of the place of residence is also consistent with these results. Indeed, for a given standard of living and socioeconomic categories, the geographical location influences the activity of the offspring. Thus, children in rural areas and those in small towns are more likely to work than those in large towns, all other things being equal.

The composition of the household influences the participation of children in economic activities and highlights a certain constraint on their school education. In this sense, the larger the household, the less child labour will be required. In other words, the economy of scale factor would lead to the substitution of some household members for economic activities, thus providing the household with substantial means of subsistence. Thus, the entry of children into the labour market will occur much later. Furthermore, there is a ripple effect in households in that the pre-existence of children aged 5-14 in the household favours the work of other children as well as their school education. These results are similar to those of Diallo (2008) in the case of Côte d'Ivoire and Mali.

Possession of some communication goods including a television set is negatively associated with child labour. In other words, households with a television set are less likely to employ their children. These goods testify both to the standard of living of the household, but also to their capacity of households to be informed and to adapt to the new lifestyles which these means of communication are transmitting.

The head of the family is generally the main provider of funds for the household but also the decision-making hub. It is therefore logical that the characteristics of the latter can influence the behaviour of household members, including the economic activity of children. The level of education of the head of the family is found to be an important factor in understanding children's participation in the labour force. The results show that the higher the level of education of the head of the family, the more the offspring are spared from work. The hypothesis concerning the effect of the education of the head of the family on child labour is confirmed and broadly matches the results of Diallo (2001) and Grootaert (1998). Improving the level of education also leads to a reorientation of activities towards sectors employing less children, and facilitates access to financial markets, a possible source of financing for children's education; it thus improves their well-being.

The socioeconomic group (GSE) of the head of the family negatively influences the employment of children with the exception of farmers. While the propensity of children to be part of the economically employed population increases for children in households whose main source of income is agriculture, it decreases among those belonging to households headed by the public sector, the formal private sector or else is inactive or unemployed. Since the country's economy is largely based on non-mechanized agriculture, family labour is most often required. As noted in the other chapters, almost all (85.2%) of the children carrying out work to be abolished are in agriculture / fishing / forestry / hunting sector. In addition, since households in this sector are the poorest, failing to acquire adequate and modernized tools for their agro-pastoral activities and other household work,

Ch.6. Determinants of child labour in Cameroon: A bivariate probit model analysis they would make do with child labour which is generally available.

Explanatory factors for school attendance

The results on school attendance are consistent with previous studies. Indeed, all other things being equal, children's school attendance increases with age. However, this trend takes the form of an inverted U due to the negative sign of the variable age squared divided by 100. This could be explained by the not insignificant rates of "school wastage". Indeed, it emerges from the main report of ECAM3 that the repetition rate is 10.1% at the national level; 40% of children enrolled in primary education are lagging behind in school; nearly 23% of those over 5 have never attended school; Finally, there is a significant proportion of school dropouts.

Even if girls are less likely to go to school than the disappointed, it should be noted that the existence of a biological relationship with the head of the family increases the probability of schooling. Parents would therefore ensure that their own children are better educated than those in care. This result is reinforced by the fact that children who are fatherless or motherless are less likely to attend school than those whose two parents are still alive. To a lesser extent, fatherless children also have a very reduced chance of being in school.

The North, the Littoral and the West are the most favourable regions to the education of children. The West and the Littoral being mainly agricultural regions, children manage to reconcile school and work to be abolished. We also notice that in large cities - although it is less likely for children to exercise economic activity - the probability of being in school is lower than in small towns and rural areas. The rural environment, compared to the urban environment, would therefore have no detrimental effect on children's school education. Thus, the field work that children in rural areas perform do not distract them from their studies. This suggests a socialization of economic activity. In this environment, the child is born and grows up while seeing his parents do a number of jobs.

The probability of being in school increases with the *size of the household*. This suggests that the logic of the 1960s when children were wealth has been reversed. Nowadays, parents (mostly farmers) no longer have children just for the sake of benefiting from their aid in field work, but they also think about their education.

To a lesser extent, *polygamous households* were not a favourable environment to the education of children. One explanation would lie in the fact that polygamy is less and less the prerogative of well-off families, but rather that of the poor, the low income they earn does not always allow all children to go to school.

Households whose head works in the public sector are as favourable to the education of children as those whose head is inactive. This last result seems paradoxical insofar as it is necessary to spend money to send a child to school. These households led by inactive heads may receive transfers from "other parents" to cover the children's school education expenses. The households of the inactive would therefore use the income from the transfers received not only for current consumption, but also for the education of children.

In short, econometric analyses show that the probability of working is high when the child is uneducated, fatherless or orphan of both parents, and the head of the family in which he lives is uneducated, works in the agricultural sector, his standard of living is low and he lives in rural areas. This research of factors globally confirms the expected effects on the choice of children's activities. One of the reasons for putting children into labour is the characteristics of the child and those of the household to which he belongs. However, household poverty is not the only key factor explaining the involvement of children in work. It seems that the cultural diversity, the socio-economic context and the traditional organization specific to some regions constitute another important set of motivations for choosing early child labour.

Conclusion and recommendations

Child labour is a phenomenon which marks by its nature, its extent and its complexity. In Cameroon, as in many developing countries, working children contribute to household income. In

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this context, promoting the education of children and finding an alternative source of income for the family is a prerequisite for the effective elimination of child labour. The main objectives of this study were to take stock of the situation of child labour in Cameroon, to establish the link with poverty and education and to highlight the determinants of this phenomenon.

For a total of around 6 million children aged 5-17 years, almost four in ten children are economically employed. This percentage is roughly the same for both girls and boys. However, significant disparities are observed depending on the place of residence, the region of the survey and the age of the child. It is much more in rural areas that children find themselves economically occupied. In fact, there are 51.1% of economically employed children in rural areas against 17.9% in urban areas. Thus, most of the employed children are in the primary activities of the rural world, notably agriculture, fishing, forestry and hunting (85.2%). Most economically employed children are unpaid. In fact, around 8 out of 10 employed children perform unpaid work as family workers. Regarding age, we note that the entry of children into the labour market increases with age, regardless of gender or region of survey.

Besides economic activities, children also participate a lot in household chores. Cleaning kitchen and household utensils, washing clothes, and collecting water and wood are the main household chores children do.

In Cameroon, the legislation in force does not prohibit all forms of child labour, whether economic or non-economic, but it does combat certain types of activity carried out by children. It is this work which is designated by the term "child labour to be abolished". Some forms of this work are considered dangerous.

Among children, 27.9% are involved in work to abolish and 4.4% in hazardous work. The work to be abolished and hazardous work do not seem to be linked to sex. On the other hand, the phenomenon has strong specificities depending on the place of residence and the age of the child.

The rural environment is the place where the probability for a child to be economically occupied or even to be forced into a job to be abolished is very low, while the urban environment is where a

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child has more possibilities of being forced to do so. dangerous work. With regard to age, the involvement of children in hazardous work increases with age while it decreases with age for jobs to be abolished.

The work to be abolished has a consequence on the school education and the health of the children, because by forcing the boy or the girl to work, the social environment pushes them to abandon their child personality, with the impulses, the interests and the specific problems to their age. This involvement often deprives them of their most absolute rights, in particular the right to school education and the right to health. The early activity of children and more particularly the work to be abolished have a negative impact on their school attendance as well as on their health. when this work is dangerous.

With the exception of the cities of Douala and Yaoundé, children who live in poor households are more inclined to work to be abolished. However, it is necessary to explore beyond poverty to explain the employment of children.

The search for explanatory factors globally confirms the expected effects on children's choice of activities. Child labour is explained by the characteristics of the child (level of education, age and survival of the parents), those of the household to which he belongs (size, presence of children under 5 years of age, the standard of living, place of residence, survey region) and those of the head of the family (level of education, religion and socio-economic group).

Thus, the overall environment of children influences their integration into socioeconomic activities to the detriment of school attendance. In addition to these factors, cultural diversity, the socio-economic context and the traditional organization specific to some regions would constitute another set of motivations for the choice of child labour.

Following the previous analyses, there is reason to believe that the issue of child labour is more global and necessarily falls within a policy of economic and social development. Moreover, given the fact that this work is first of its kind and that it does not integrate some aspects of child labour, it is necessary that specific investigations be carried out on the worst forms of child labour

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