



Munich Personal RePEc Archive

**Public policies promoting the informal  
economy: effects on incomes,  
employment and growth in Burkina Faso**

Traoré, Jean Abel and Ouedraogo, Idrissa Mohamed

Université Ouaga II

1 December 2015

Online at <https://mpra.ub.uni-muenchen.de/74760/>  
MPRA Paper No. 74760, posted 28 Oct 2016 16:37 UTC

# Public policies promoting the informal economy: effects on incomes, employment and growth in Burkina Faso

December 2015

Jean Abel Traoré\* and Idrissa Mohamed Ouedraogo†

## Abstract:

Since the 1990s, Burkina Faso has intensified the implementation of supporting policies to enhance the access to capital and liquidity in the informal economy. This paper analyzes the effects of these policies on incomes, employment and economic growth by taking into account the interactions between the informal sector, the formal sector and the agricultural sector. For that purpose, policy shocks are simulated through the Partnership for Economic Policy Network's static computable general equilibrium model which is adapted to the structure of a 2008-based social accounting matrix developed by the International Food Policy Research Institute. Our results highlight mixed effects including a paradoxical contraction of the informal sector, the formal sector and economic growth as well as an improvement of the informal households and the farmers' incomes.

**JEL Classification:** E26, E16, H81, O17

**Keywords:** Informal economy, Public Policies, CGE model

---

\* Research Fellow, United Nations Economic Commission for Africa (UNECA) and PhD candidate, University Ouaga II, Laboratory of Economic Policy Analysis, Burkina Faso. [traorejeanabel@yahoo.fr](mailto:traorejeanabel@yahoo.fr)

† Professor of Economics, University Ouaga II, Director of the Laboratory of Economic Policy Analysis, Burkina Faso. [idriss\\_mo@yahoo.fr](mailto:idriss_mo@yahoo.fr). The authors acknowledge the support from the Macroeconomic Policy Division of the Economic Commission for Africa. They also thank Lacina Balma and Boureima Sawadogo for their useful comments

## 1. Introduction

This paper aims to shed light on the effects on incomes, employment and growth of public policies overcoming capital and liquidity constraints faced by the informal economy in Burkina Faso. Specifically it evaluates the direct effects of these public policies on the informal economy outcomes, and the indirect effects on the formal sector, the agricultural sector as well as the economic growth. Policy interventions are simulated using the PEP standard single-country and static Computable General Equilibrium (CGE) model adapted to the structure of the Social Accounting Matrix (SAM-2008) developed by the IFPRI for Burkina Faso. The results provide evidence that enhancing the informal sector's access to capital and mitigating liquidity constraints through public transfers for informal households lead mainly to negative spillovers on the informal and formal sectors, on the salaried workers' incomes as well as the GDP.

The informal economy<sup>1</sup> in Africa has been considered for a long time as a range of marginal activities doomed to disappear with an improving economic development (Schneider and Enste, 2000). But during this last decade, the informal economy placed itself as a potential source of incomes by providing after the agricultural sector the most number of jobs. In fact, according to the International Labour Organization (ILO) the informal economy represents 42% of the GDP and occupies about 70% of the non-farming workforce of Sub-Saharan countries<sup>2</sup>. In Burkina Faso, the informal economy employs 74% of the non-farming workforce and contributes to about 25% of the GDP (National Office of Statistics of Burkina).

However, the main actors of the informal economy are paradoxically among the most precarious and vulnerable. In fact, most of the informal actors are deprived from social protection, faced with weak skills and credit constraints which undermine their productivity (Traoré, 2013; Benjamin and Mbaye, 2012). Furthermore, relatively low levels of women's education and social norms often limit women to unpaid domestic cleaning work and small income-generating activities at home or on streets from which they derive the most precarious incomes (Traoré, 2013; Kuepie, Nordman and Roubaud, 2009; Chen, 2001). So the informal economy is a concern for Governments of Africa interested in alleviating poverty and inequities.

Despite its magnitude the informal economy contributes very weakly to the domestic direct tax revenues. According to a recent study carried out in the Francophone West African countries, the informal activities provide only 3% of the national direct tax effort (Benjamin and Mbaye, 2012). Therefore, promoting informal activities to raise their productivity by

---

<sup>1</sup> The definition of the informal economy has been the subject of several debates (ILO, 1972; Hart, 1973; Weeks, 1975; Sethuraman, 1981; Tokman, 1987; Lautier, 1994; International Labour Conference consensus, 2002). But nowadays there is a kind of consensus on its definition. The informal economy encompasses two dimensions: the enterprise-based dimension and the employment-based dimension. The enterprise-based dimension refers to all the non-farming firms which don't comply with the administrative and fiscal rules required by the legislation (registration, written accounting ...). This dimension is captured by the term "informal sector". The employment-based dimension refers to all (non-farming) jobs deprived from social protection, work contract and social dialogue. This dimension is captured by the term "informal employment". Through the both dimensions, there is the notion of "continuum" opposed to the dichotomy notion. In fact, some firms and jobs comply with some of the rules but escape to the others. So there are different degrees of informality towards formality which required the compliance with all the legislative rules

<sup>2</sup> International Labour Organization (ILO) : 12th African Regional Meeting on *Empowering Africa's peoples with decent work* ; Johannesburg, South Africa, October 11-14 2011

facilitating their formalization represent an opportunity for Governments to broaden tax base necessary to mobilize more domestic resources for development outcomes.

Another relevant issue related to the informal economy is found in its tendency to threaten the structural transformation of African countries. According to the ERA<sup>3</sup> (2014) : *“In Africa, resources have often moved from higher to lower productivity sectors, particularly to the informal sector, reversing structural transformation and slowing productivity growth”*. The ERA<sup>4</sup> (2015) highlighted the large involvement of the informal sector in trade and services - identified as engines of structural transformation- and stressed the need of appropriate policies to harness the potential of the informal sector in Africa by expanding social protection systems, fiscal and credit incentives, skill development programmes, technology transfer and infrastructure investment.

In line with these recommendations, many African countries (Senegal, Ghana, Ivory Coast, Burkina Faso, etc.) are implementing a range of policies to enhance the productivity of the informal economy. In Burkina Faso, the Government established public structures since 1998 to support the informal firms at technical and financial levels. These structures provide vocational trainings to improve managerial abilities and credit at low rates along with cash transfers, in order to mitigate capital and liquidity constraints.

However, some studies provided evidence that subsidized credit or vocational trainings to promote the informal sector productivity could be inefficient or harmful for the informal sector itself, for the formal sector, the agricultural sector as well as the economic growth subject to some conditions (Arvin-Rad, Basu and Willumsen, 2010; Alia et al, 2009; Banerji and Sanjay, 2007; Roy, 2006). These conditions pertain mainly to the linkages between the informal and formal economies, such as competition or cooperation, imperfect substitution between the informal-based products and formal-based products and the saturation of market.

So it is important to know in the context of Burkina Faso: what is the impact of the policies enhancing the access to capital and liquidity for the informal economy on itself, on the formal sector and the agricultural sector? Did these policies induce positive spillovers on incomes, jobs and economic growth? In Burkina Faso, most of studies have addressed the determinants and structure of the informal economy, its linkages with the formal economy and the barriers to formalization (Traoré, 2013; Grimm et al, 2012; Ouédraogo et al, 2011; Böhme and Thiele, 2011; Grimm and Günther, 2005; Zerbo, 2001; Ouédraogo, 1996). However research to evaluate the effects of policies supporting the informal economy is almost non-existent. Thus the added value of this research is to fill this gap in order to enlighten the policy makers.

Several econometric analyses, for instance, propensity-score matching and randomization have been used to evaluate the impact of micro-lending and vocational training programs serving the informal enterprises on earnings, employment, and inequalities in the context of

---

<sup>3</sup> ECA (United Nations Economic Commission for Africa) and AUC (African Union Commission). 2014. “Economic Report on Africa 2014: Dynamic Industrial Policy in Africa: Innovative Institutions, Effective Processes and Flexible Mechanisms.” ECA, Addis Ababa.

<sup>4</sup> ECA (United Nations Economic Commission for Africa) and AUC (African Union Commission). 2015. “Economic Report on Africa 2015: Industrializing through Trade.” ECA, Addis Ababa.

countries like Madagascar and Cameroon (Nguimkeu, 2014; Mano et al. 2012; Berge et al. 2011; Glaub et al. 2011; Gubert and Roubaud, 2011). These studies in general found positive effects (often limited) of such programs on earnings and employment within the informal economy along with a reducing inequality. But the main limit of the microeconomic analyses is found in its failure to capture the indirect effects on the formal and agricultural sectors as well as on economic growth. Given the strong informal-formal linkages which could reverse the benefits of the scaling-up programs, a CGE model is well suited to highlight the transmission channels and capture the indirect effects.

In fact, this approach has been used by recent research addressing the informal economy. For instance, Erero et al (2014) and Erero et al. (2013) used a multi-sectoral computable general equilibrium model adapted to the economy of the Democratic Republic of Congo (DRC) to analyze the effects of reducing tariffs and wage subsidies for lower-skilled formal workers. Davies et al. (2011) also used a CGE model included the economy wide linkages between the formal and informal economies, to address the effects of trade liberalization in South Africa.

However, recent studies using a CGE model to analyze the effects of a policy shock on the informal economy are scarce, especially in the African context. Indeed, one of the most recent one is the study by Alia, Ndjana, and Nghogue (2009) which assessed the impact of the increase in the informal households' investment under the program "Integrated Support Program for Actors of the Informal Sector" in Cameroon. However, in their model the value added of the sectors (formal and informal) are combinations of capital and labor according to a Cobb Douglas function which constrained the value of the elasticity of substitution between capital and labor to 1. The capital is sectoral specific and only one category of labor is considered so ignoring the quality aspect of labor.

Our model is more flexible and realistic because all the sectors (informal, formal and agricultural) combine unskilled labor, skilled labor and capital through a CES production technology. Moreover, the households are assumed to have a Stone-Geary utility function which includes a minimum level of consumption for each commodity and avoid zero cross-price elasticities between all pairs of goods, and a unit income-elasticity for all goods. Policy experiments deal with a 10% in the demand for productive capital in the informal sector and a 10% increase in the Government's transfers to the informal households.

The remainder of the paper is structured as follows. Section 2 provides a relevant literature review. Section 3 addresses the main points of the CGE model whereas the following section presents the SAM-2008 used in our empirical analysis. Section 5 summarizes the motivations of the policy experiments and Section 6 presents the results along with the related discussion. The last section concludes with policy recommendations.

## **2. Literature Review**

Inspired by the Harris-Todaro model (1970), many authors have incorporated the duality in the analysis of the urban labor market considering the informal sector as the lower urban segment able to absorb all or almost the surplus of labor at competitive low wage rates (Fields, 1975; Chandra et Khan, 1993; Gupta, 1993; Marjit, 2003; Marjit et al, 2007;

Bhattacharya, 2011). Given its importance in the economies of developing countries, the informal sector occupied early a prominent place in development policies. Since 1975, authors such as Weeks (1975) advocated subsidy policies of capital and prices to boost this sector. Follow-up these recommendations, other researchers (Ghosh and Sarkar, 1989; Chaudhuri, 1989; Gupta, 1993; Chaudhuri, 2000) studied the effects on employment and incomes of different subsidy policies to the benefit of informal sector.

These studies can be classified in two major groups according to the assumed informal-formal relationship. The first class of studies assumed that the informal sector produces only intermediate goods for the formal sector. In other words, the formal sector sub-contracts intermediate stages of production to the informal sector. The second class of papers allowed competition between formal and informal sectors. For instance, the informal sector uses output of the formal sector as intermediate input to produce also finished goods consumed by the households.

### ***Informal sector as a producer of intermediate goods for the formal sector***

Based on the sub-contracting informal-formal linkages, Sarkar and Ghosh (1989), Chaudhuri (1989) provided evidence that subsidizing the interest rates for the informal firms to easier access to credit tends to reduce production and employment in the formal industrial sector while it expands the informal sector. But in their models the urban informal sector is supposed to be able to absorb all the labor coming from the rural areas. Contrariwise, Gupta (1993) included in its analysis the existence of an urban unemployment even in the presence of the informal sector and found nuanced results. He concluded that an increase of capital subsidy for informal firms leads to a growth of the wage rate and a decrease in output prices within this sector by reducing employment (so rising unemployment) in the urban area consisting of formal and informal sectors.

Contrary, a price subsidy for the informal firms output tends to reduce the wage rate but to enhance the output price within this sector by rising employment in the urban sector. In order to compare these two types of policy Gupta (1993) used the definition of social welfare by Sen (1974), to show that an output price subsidy granted to the informal sector rises the social welfare while a capital subsidy policy shrinks it. Gupta (1993) went further in his analysis by exploring the effects of subsidy policies in favor of the formal sector and the rural<sup>5</sup> sector. Then he demonstrated that subsidizing wages paid by the formal firms tend to lower the output price and the wage rate in the informal sector, but to increase employment in the urban area. As for the rural sector, prices or wages subsidies implies an increase in the price of output and the wage rate in the informal sector but a fall in employment in the urban area.

Nevertheless, Chaudhuri (2000) highlighted the main limit of the model used by Gupta (1993). Indeed this model ignored the role of the aggregate demand in determining the level of production and employment in the manufacturing and rural sectors. Thus, by including the principle of demand, Chaudhuri (2000) confirmed the findings of Gupta (1993) relative to the effects of capital subsidy granted to informal firms on the informal sector itself: increase in

---

<sup>5</sup> The rural sector represents agricultural activities in the rural area

wage rate and decrease in output price. But he found that this policy also implied a growth of production and employment in the urban formal sector and the rural sector which is contrary to Gupta (1993) conclusions.

Furthermore, according to Chaudhuri (2000), a price or wage subsidy in favor of the rural sector raises the aggregate income of rural workers which tends to stimulate demand for products in all sectors. Stimulated demand results in a growth of production and employment throughout all the sectors (rural, informal and formal). By the same aggregate demand mechanism, policy promoting formal manufacturing sector induces positive spillovers on all the economy.

Rather than analyzing the effects of policies that change the relative costs of production (capital, price and wage subsidies) of informal firms, other authors have studied the effects of policies that affect their productivity. For instance, according to Arvin-Rad, Basu and Willumsen (2010) a positive technological shock on the informal sector represents any policy such as vocational and entrepreneurship trainings, or access to capital or a new production technology leading to the improvement of workers' productivity in this sector. In their general equilibrium model based on four sectors - the rural, the urban informal, the urban domestic formal and the foreign capital-owned sectors -, the increase in informal firms' productivity is captured by reducing the input-output coefficients in the informal sector.

Thus they demonstrated a positive technological shock on informal sector tends to raise incomes without altering the output price and the return to domestic capital within this sector. Other interesting findings depend on the relative factor intensities of the two urban formal sectors (domestic and capital-owned multinational) relative to the rural sector. Assuming that those sectors are both relatively more capital intensive in the informal employment adjusted gross sense than the rural sector, then the enhancement of informal workers' productivity results in a contraction of the output of the informal sector and the domestic formal sector but an increase in the rural sector output if and only if the elasticity of substitution between labor and capital in the informal sector is greater than unity. The output of the foreign capital-owned sector remains constant.

Subject to the same conditions, employment shrinks in the informal and the domestic formal sectors while it rises in the rural sector. Employment remains unchanged in the foreign capital-owned sector. Besides, the authors provided evidence that a credit subsidy to the informal sector results in the similar effects on production and employment. So they pointed out the conditions under which technological improvement in the informal sector can be damaging to the informal sector itself and the other sectors of the economy. However some surveys and stylized facts confirmed that in Africa consumers faced with finished goods produced by the formal and informal sectors (1-2-3 Surveys, 2000; Benjamin and Mbaye, 2012). The informal sector also uses part of the formal sector output as intermediate input and the two sectors are usually in competition.

### *Competition between the informal sector and the formal sector*

Therefore, taking into account the possibility of competition between formal and informal sectors, Roy (2006) demonstrated that subsidies granted to the informal sector would be ineffective in growing the incomes within that sector subject to certain conditions such as imperfect substitution between informal products and formal goods and the market saturation. Indeed assuming imperfect substitution between the informal-based goods and the formal-based goods, Kelley (1994) provided evidence that strategies designed to promote the informal sector lead to a reduction of the aggregate output and the incomes of informal producers in the context of Peru.

Sanjay and Banerji (2007) use also an analytical framework based on competition between formal and informal but in which the informal sector is supposed to produce quality goods less than those in the formal sector. The formal sector has a low cost of capital but facing the high cost of labor due to the minimum wage. In contrast, informal firms face the high cost of capital due to credit rationing, but has the low cost of labor due to wage flexibility.

In other words, the formal sector has a comparative advantage in the production of high quality goods intensive in capital while the informal sector has the advantage in the production of low quality goods and intensive in labor. Within this framework, Sanjay and Banerji (2007) proved that financial support policies as microfinance to reduce the interest rate for the informal firms improve the advantage of those firms in the production of relatively low-quality goods. Therefore, the production and the share of the informal sector market expand at the expense of the formal sector which shrinks.

Adopting the same idea, Cogneau, Razindrakoto and Roubaud, (1996) included quality dualism in a CGE model applied in the context of Cameroon. In their model in case of a falling income, the consumption of formal goods decreases more than that of the informal sector goods. So the income-elasticity of informal products is lower than that of formal products. The authors did not study the effects of shock on informal sector but they found that informal sector and formal sector are in general counter-cyclical in Cameroon. Contraction of the formal sector releases labor which finds refuge in the informal sector and also favors the consumption of less quality informal-based goods.

This increase in the demand for informal-based goods stimulates the production and employment so that the incomes of informal actors remain less sensitive to the reducing pressure of the labor surplus released by the formal sector. They concluded that a sustainable growth strategy must be based on policies that could accelerate productivity in the informal sector, and thus improve the quality of work and quality of its products.

This policy recommendation found a strong support from the analysis of Montaud (2000) based on two approaches of the informal sector in the context of Equator. The first approach treats the informal sector as subsistence activities and restricted operating in a kind of marginality, as failing to fit into the rest of the economy. The second approach considers a wide sector size perfectly inserted into the economy operating in a competitive logic with the



formal sector. Based on the first approach, an enhancement of informal firms' capital stock improves its output and the incomes of its workers. The rise of incomes implies an increase in the consumption of formal and rural-based goods thus stimulates the production and employment in these sectors. Finally subsistence activities decline but the incomes and employment improve in all the economy. Within the same framework an improvement of labor productivity in the informal sector generates similar results with a greater magnitude.

Follow-up this study, Alia, Ndjana, and Nghogue (2009) evaluate through a CGE model the impact of the rise of the informal households investment through the program "Integrated Support Program for Actors of the Informal Sector" in Cameroon and they found nuanced results. According to their findings, 26% increase in informal actors' investment lead to a rise of the production and the demand for labor by 0.43% within the informal sector. The incomes also increase by 0.15% and thus stimulate the demand of informal-based goods by 0.1%. But this good performance in the informal sector is followed by a weak contraction of the formal sector due to an eviction effect. The reduction of output and incomes in the formal sector generates unfortunately a decrease in the Government receipts by 0.31%. In fact public receipts are mainly based on taxes on the formal sector activities.

All these studies cited above whether theoretical or empirical shed light on the positive and paradoxical effects of policies promoting the informal economy. But their main limit is the lack of the labor quality aspects in their framework. However there are strong proofs that the skills determine the sector in which one can find job. Skilled people in general prefer employment in the formal sector which usually provides the highest incomes associated with social protection. But structural issues in Africa constraint the formal sector to provide jobs for all the qualified labor. So the "remaining" qualified labor is absorbed by the informal sector. However, the informal sector values education because the skilled salaried workers are relatively better paid than the unskilled one (Traoré, 2013).

Considering labor quality issues could lead to nuanced results when implementing policies to promote the informal sector. For instance, there is strong evidence that the elasticity of substitution between unskilled labor and physical capital is higher than physical capital and skilled labor within the informal sector (Amaral and Quintin, 2006). In fact for informal firms faced with credit constraints but taking advantage on wages flexibility, unskilled labor may be a better substitute for physical capital than skilled labor. And thanks to the previous literature review, one knows how important the effects of policies beneficial to the informal economy are sensitive to the degree of substitutability between labor and capital.

Zerbo (2006) included labor quality issues combined with social protection issues in his analysis of urban labor market in Sub-Saharan Africa, but he did not focus on policies supporting the informal sector. More recent studies also considered labor quality aspects in their general equilibrium model analysis but they focused on policy experiments related to minimum wage, wage subsidy for lower-skilled formal workers, unemployment benefits, tax policies and trade liberalization (Charlot et al, 2015; Bosch and Esteban-Pretel, 2015; Erero et al, 2014; Erero et al, 2013; Meghir et al, 2012; Davies et al, 2011).

So even if our study does not address the informal workers' productivity, it incorporates a better realistic feature of the informal sector and the informal-formal linkage in Burkina Faso's context. In fact our model considered an informal sector combining unskilled labor, skilled labor and capital through a two levels CES production technology like the other sectors. The elasticity of substitution between capital and the composite labor is assumed to be higher than 1 and the elasticity of substitution between the different types of labor less than one. Furthermore, competition and cooperation between the formal and informal sectors are taken into account depending on the branch activity. Finally, the "hidden" informal employment (employment deprived from social protection) in the formal sector is addressed in our analysis.

### **3. The Model**

In this paper, the theoretical framework is an adaptation of the PEP standard single-country and static CGE model: PEP-1-1, (Version 2.1). This CGE model is based on the structure of the SAM-2008 developed by the IFPRI for Burkina Faso. The model<sup>6</sup> can be summarized into four blocks of interdependent equations: i) Supply; ii) Demand; iii) Income distribution; iv) Equilibrium and closure

#### **3.1. Supply**

The local production technology is represented by a nested function with several levels. At the top level, sectoral production (informal, formal and agricultural sectors) combines value added and total intermediate consumption in fixed shares following a Leontief input-output function. At the second level, each industry's value added consists of composite labor and capital, following a constant elasticity of substitution (CES) specification. Finally, at the bottom level on the value added side, the various categories of labor are imperfect substitutes in aggregate labor according to a constant elasticity of substitution (CES) technology.

#### **3.2 Demand**

Based on the Armington assumption, composite products demanded on the domestic market are a combination of local and imported products according to a constant elasticity of substitution (CES). Output demand for intermediate consumption for each good is a fixed proportion of the aggregate input consumption by economic sectors. Demand of each goods and service for investment purposes is a fixed value share of total investment. Inventory changes are assumed to be exogenous.

#### **3.3 Income distribution**

Household incomes come from labor earnings, capital earnings and transfers received from other agents included the Government. Each household category receives a fixed share of the earnings of each type of labor. Likewise, total capital income is distributed between agents, including households, in fixed shares. Government's incomes include tax receipts on

---

<sup>6</sup> The details of the model are provided in Appendix

households' incomes, tax revenues on economic activities, capital remuneration, and official development assistance (bilateral and multilateral aid) from abroad.

### **3.4 Equilibrium and closure**

Following the neoclassic perfect competitive market, equilibrium between the supply and demand of each commodity on the domestic market must be verified. Also, the total demand for each factor (labor and capital) must equal available supply (exogenous). Likewise, total investment expenditure must be equal to the sum of agents' savings.

The closure of the model is based on the neoclassic rule. That means total investment is endogenous and driven by total savings which is a function of the full employment of resources income. Income distribution is then determined only from the supply side. Once the full-employment income is determined, consumption is derived then saving and finally investment. The exchange rate is defined as the numeraire, with government expenditures and the current account balance fixed. Capital is mobile between industries.

## **4. Data and calibration**

### **4.1 Data**

The SAM-2008<sup>7</sup> for Burkina Faso represents economic interactions through six (06) groups of accounts: i) 28 accounts production activities; ii) 28 accounts for commodities (each activity produces a single good or service and each commodity is produced by a single activity); iii) 7 factors of production (6 types of labor and a single class of capital); iv) 8 categories of households depending on the activity of the household head (3 salaried, 3 agricultural and 2 non-agricultural); v) 2 other institutional agents: the Government and the Rest of the World; vi) 1 savings-investment account.

Based on the objectives of our study, the 28 branches of production were grouped into five branches: Agriculture; Formal industry; Informal industry; Formal service; Informal service. The agriculture industry includes the agro-forestry-pastoral production. The distinction between informal and formal firms is based on the National Office of Statistics (in Burkina Faso) operational definition of the informal sector<sup>8</sup>. Based on the SAM-2008, we illustrate through the following graphs, the share of informal activities in the total value added, in the total demand for capital, as well as the total employment and their linkage with the formal sector.

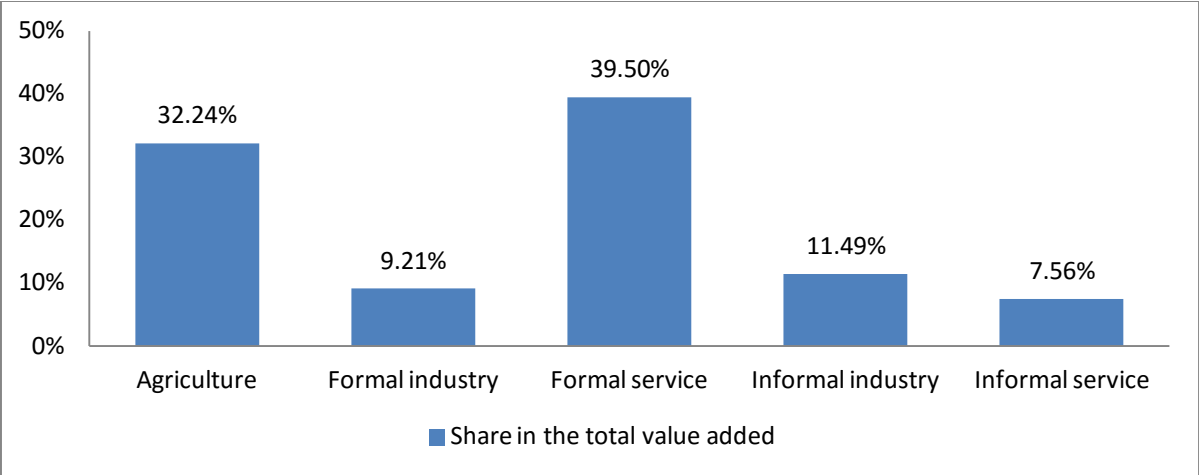
According to Graph 1 below, in 2008, the economy of Burkina Faso was driven by highly productive formal services (as modern trade; modern transport; post and telecommunications and financial services) followed by the agricultural sector. The formal industries were embryonic whereas the contribution of the informal sector (industries and services) was about 19.05% of the value added which is not negligible.

---

<sup>7</sup> A detailed description of the SAM is provided in Appendix

<sup>8</sup> According to the National Office of Statistics in Burkina Faso, the informal sector refers to all the units of production without a fiscal identification number and/or which do not keep written books

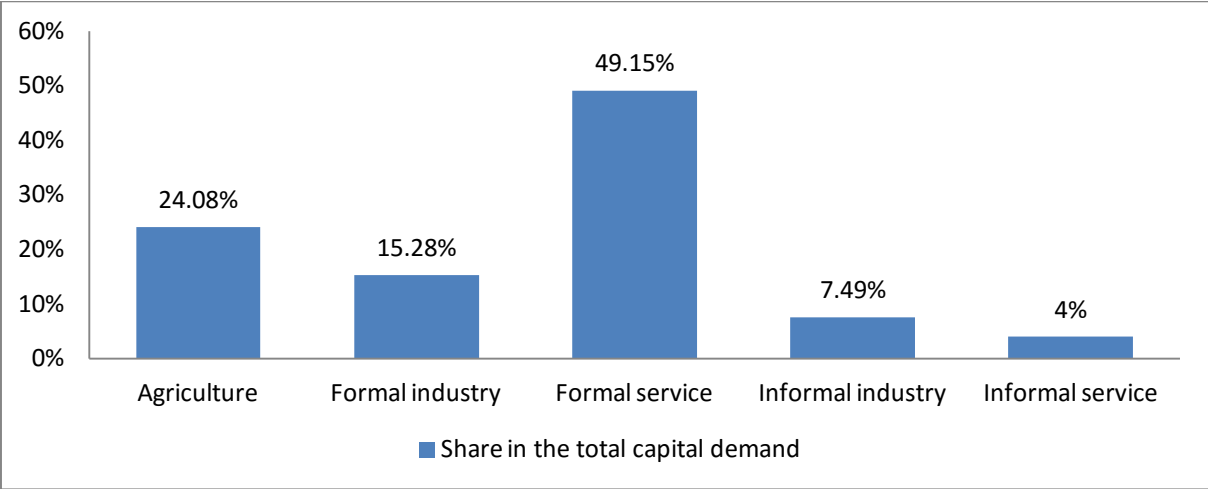
**Graph 1: Repartition of the total value added per sector**



Source: SAM-2008 for Burkina Faso

Concerning the demand for capital, the formal sector used about 64.43% of the total productive capital followed by the agriculture sector (24.08%) whereas the informal sector had access to only 11.49% (Graph 2). So the informal sector seems to be constrained by the capital side.

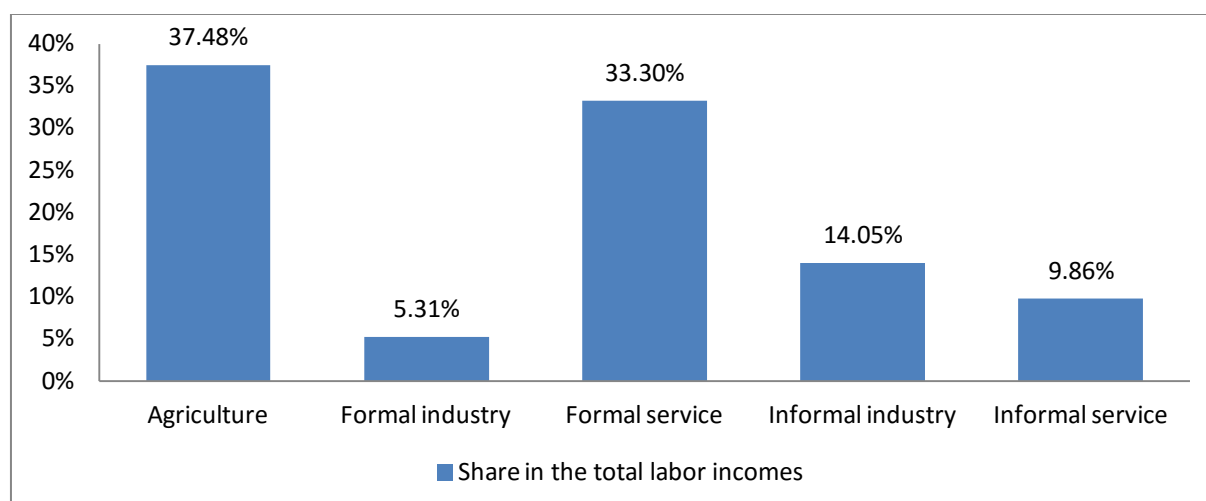
**Graph 2: Repartition of the aggregate demand for capital per sector**



Source: SAM-2008 for Burkina Faso

According to Graph 3 (below), 37.48% of the total labor income was provided by the agricultural sector whereas the formal services account for 33.30%. The informal sector contributed substantively to 23.91% of the total labor incomes.

**Graph 3: Repartition of the aggregate labor income per sector**



Source: SAM-2008 for Burkina Faso

Concerning the linkage between the formal and informal sectors, about 49.06% of the total intermediate consumption of the informal industries was provided by the formal sector (formal industry and service). Likewise, the informal services acquired about 70.86% of its total intermediate consumption from the formal sector. So the production in the informal sector is strongly dependant on the formal sector output. However, the informal industries represented only 2.44% of the total intermediate consumption of the formal industries where as informal services provided up to 16.53%. About 22.91% of the formal services total intermediate consumption stemmed from the informal sector. So, the production in the formal sector is relatively less relying on the informal sector output.

## 4.2 The Calibration

The calibration is about the determination of numerical values of the parameters and coefficients so as to reconstitute the equilibrium situation of the SAM. Some of the parameters as elasticities of substitution are fixed according to the literature and others are computed based on the values provided by the SAM. Based on the literature of CGE model applied for Burkina Faso economy (Sawadogo et al, 2015; Balma et al, 2010) we summarized the values of some parameters in Table 1 below.

**Table 1: Initial values of some parameters**

| Elasticities   |   |  |   |                             |                  |
|--|---|--|---|-----------------------------|------------------|
| Elasticity of substitution between capital and composite labor in sector $j$ | Elasticity of substitution between types of labor in sector $j$ | Elasticity of transformation between exports and local sales | Elasticity of substitution between local supply and imports | Household Income elasticity | Frisch parameter |
| 1.5  | 0.8   | 2  | 2   | 1.05                        | -1.5             |

| <b>Prices</b>                    |                                 |                                     |                             |                                      |                             |
|----------------------------------|---------------------------------|-------------------------------------|-----------------------------|--------------------------------------|-----------------------------|
| Price of the local commodity $i$ | Price of exported commodity $i$ | World price of imported product $i$ | Wage rate of type $l$ labor | Rental rate of capital in sector $j$ | Price elasticity of indexed |
| 1                                | 1                               | 1                                   | 1                           | 1                                    | 1                           |

$i, j$ : formal industry; formal services; informal industry; informal services; agriculture

$l$ : rural formal; formal unskilled; formal skilled; rural informal; informal unskilled; formal skilled

## 5. Policy experiments

Since the 1990s, Burkina Faso has been implementing a number of specific programs to promote employment creation through the financing and vocational trainings for microenterprises. Among the major employment programs are the Informal Sector Support Fund (FASI), the Employment Creation Support Fund (FAPE), the Youth Initiatives Support Fund (FAIJ) and the Vocational Training and Learning Support Fund (FAFPA).

Created in 1998, the primarily objective of FASI is to improve access to credit for the informal sector. The Fund provides credit (up to 1.5 million FCFA) with interest rate between 8% to 13% depending on the projects size and its area of activities. The interest rates and guaranties requirement are lower than the requirements of the microfinance institutions and the commercial banks. Practically, the program is assigned to grant 700 million FCFA credit per year to finance 1500 microenterprises. But in fact, this target is not always reached. For instance, in 2010, the most recent data<sup>9</sup>, the Fund provided loans in the amount of 532 501 000 FCFA to 1244 enterprises which generated 256 new jobs and consolidated 2922 jobs.

The FAIJ (created in 2007) objective is to reduce poverty, unemployment and underemployment of youth in urban and rural areas. It lends loans up to 2 million FCFA with interest rate between 2% to 4% followed by entrepreneurship trainings. Specifically, the program is aimed to reach 5000 Young per year. In 2010, the Fund financed 1297 projects for an amount of 1 273 964 000 FCFA which created about 5904 new jobs for Young.

So FASI and FAIJ granted 1 806 465 000 FCFA to the informal actors in 2010. However this amount represents only 1% of the value of the demand for capital in the informal sector according to the SAM-2008. Aware of this insignificance, the Government announced in 2014 the opening of a special fund to grant up to 10 billion FCFA credit for the informal firms and women entrepreneurship. Based on the latter facts, we simulate a rise of 10% of the demand for capital in the informal sector which is equivalent to about 14.5 billion FCFA according to the SAM-2008. The process to get the fund or credit is not analyzed. The interest is focused on the final objective of the micro-lending program which is the increase in the demand for capital (investment) in the informal sector. In the same line, our second policy experiment is a 10% increase in the Government's transfers to the informal households (the own account workers and the informal sector salaried workers).

<sup>9</sup> Observatoire National de L'Emploi et de la Formation Professionnelle (2011). *Annuaire statistique du marché de l'emploi-2010*. Document d'analyse, Ministère de la Jeunesse de la Formation Professionnelle et de l'Emploi, Burkina Faso

## 6. Results

### 6.1. Simulation 1: 10% increase in the demand for capital in the informal sector

#### *Impact on employment, incomes and production within the informal sector*

A 10% increase in the demand for capital by the informal sector induces an increase in the demand for all the various types of labor. However, the increase in the formal and qualified labor demand is higher than that of the informal and unskilled labor (see Table 1 below). For instance, the demand for rural formal labor, for urban formal skilled labor, and for the urban informal skilled labor expand more than 1% whereas the ones for rural informal and urban informal unskilled labor raise only by 0.65% and 0.82%. Furthermore, the overall enhancement of the demand for composite labor tends to reduce the wages following the flexibility of wages in the informal sector (and in the model). All the wages of the different category of labor decrease by at least 0.14% except the wage of the rural informal labor and the urban informal unskilled which get the lowest increases in demand.

**Table 2: Impact on employment and wages in the informal sector**

| Demand for categories of labor | Change (%) | Wages of categories of labor | Change (%) |
|--------------------------------|------------|------------------------------|------------|
| Rural formal labor             | 1.06       | Rural formal labor           | -0.14      |
| Urban formal unskilled         | 1.11       | Urban formal unskilled       | -0.17      |
| Urban formal skilled           | 1.11       | Urban formal skilled         | -0.17      |
| Rural informal                 | 0.65       | Rural informal               | 0.12       |
| Urban informal unskilled       | 0.82       | Urban informal unskilled     | 0.007      |
| Urban informal skilled         | 1.08       | Urban informal skilled       | -0.15      |

It is worth to highlight that the composite informal labor (rural, unskilled and skilled) accounts for about 91% of the total labor used by the informal industry and about 98% of that of the informal services sector. So the informal labor is most confined in the informal sector. Moreover about 88% of the total labor incomes of the farmers come from their supply of informal employment mostly from the rural informal labor (72.8%). Likewise about 58% of the total labor incomes of the own account workers comes from their supply of informal employment mostly from the rural informal labor (50.34%).

So the combined improvement of the demand for rural informal labor and its associated wage lead to an upward pressure on the farmers' labor incomes which increase marginally by 0.063%. But the own account workers' total labor incomes decrease by 0.068%. However, following the new inflow of capital in the informal sector, the households' capital incomes rise despite the lowering of the rental rate and offset the fall of labor incomes for the own account workers. Finally the aggregate income enhances for the farmers and the own account workers by 0.146% and 0.144%.

**Table 3: Impact on the incomes in the informal sector**

| Households                 | Labor incomes<br>Change (%) | Capital incomes<br>Change (%) | Total Income<br>Change (%) |
|----------------------------|-----------------------------|-------------------------------|----------------------------|
| The Farmers                | 0.063                       | 0.286                         | 0.146                      |
| The own account<br>workers | -0.068                      | 0.286                         | 0.144                      |

These two categories of households are the largest consumers of the informal sector output. According to the SAM-2008, about 65% of the informal sector output is consumed by the farmers whereas the own account workers consume about 12.37%. But when their incomes improve these households reduce their demand for the informal goods and services in favor of the formal sector products. Indeed, the demand for the informal sector output declines by 0.91% for the farmers and by 0.97% for the own account workers. Despite the rise of its price, the demand for the formal goods and services increases by 0.25% for the farmers and by 0.2% for the own account workers. These results are in line with the findings of Bohme and Thiele (2011) in the case of six West African capitals.

Moreover, due to the increase in its price, the demand of informal sector's output for intermediate goods and for investment purposes drop by 0.41% and 1.82% respectively. Thus the supply of the informal goods and services follow the decline of their domestic demand according to the equilibrium constraint. The aggregate productions of the informal industry and the informal services fall down respectively by 0.53% and 0.22% implying also a decrease in the total intermediate consumption and the value added of the informal sector. In fact, the value added of the informal sector declines by 0.75%. So an increase in the informal sector's stock of capital results in a paradoxical contraction of its total production and its value added.

#### ***Impact on employment, incomes and production within the formal sector***

As it is illustrated in the Section 4 the largest share of the total intermediate consumption of the informal sector is provided by the formal sector. So a reduction of the informal sector output leads to a decrease in its demand for the formal sector output as intermediate goods by 1.5%. Even if the agricultural sector's demand for the formal sector output as intermediate goods rises by 0.3% the overall demand for the formal sector output as intermediate goods falls down by 0.32%. Likewise, the total demand of the formal sector's production for investment purposes declines by 0.078%. So the domestic demand for the formal sector output reduces by 0.16% even if the aggregate household consumption demand for formal goods and services increases by 0.106%. According to the equilibrium constraint the supply of the formal sector output also declines by 0.16%.

Obviously the reduction of the supply generates a downward pressure on the value added and the aggregate intermediate consumption which decline proportionally by 0.16%. Following the cut of the formal sector value added, the demand for all types of labor also decreases along with the associated wages whereas the demand for capital remained unchanged. The demands for rural informal labor and for urban informal unskilled fall down by 0.53% and



0.35% respectively. Nevertheless the lessening is weaker for the demands for formal and qualified labor (see Table 4 below).

**Table 4: Impact on employment in the formal sector**

| Labor types | Rural formal labor | Urban formal unskilled | Urban formal skilled | Rural informal | Urban informal unskilled | Urban informal skilled |
|-------------|--------------------|------------------------|----------------------|----------------|--------------------------|------------------------|
| Change (%)  | -0.12              | -0.074                 | -0.071               | -0.53          | -0.35                    | -0.09                  |

The formal labor (rural, skilled and unskilled) represents 81.83% of the aggregate labor demand used by the formal industry and 66.08% of the one of the formal services. So the formal employment is most confined in the formal sector. Furthermore, about 75% of the public salaried households' incomes labor stem from the supply of the formal labor (rural, skilled and unskilled). Likewise about 77% of the formal private salaried households' incomes labor stem from the formal labor (rural, skilled and unskilled). About 50% of the informal private salaried households' labor incomes come from the formal labor (rural, skilled and unskilled).

So the reduction of the labor demand and the wages in the formal sector affects more severely the former categories of households. Indeed, the public salaried households' incomes labor decreases by 0.15% and the formal private salaried households' incomes labor falls down by 0.14% (see Table 5).

But the injection of new capital through the informal sector tends to increase the capital incomes of all the households. This rising of capital incomes offsets the decline of the labor incomes but finally the total income of the public salaried households, the formal private salaried households and the informal private salaried households shrink weakly by 0.02%, 0.081% and 0.08%.

Following the decrease of their incomes, these households reduce their consumption of goods and services. The formal-based goods and services represent about 64% of the total consumption of the public salaried households and 67% of the one of the formal private salaried households. Their consumption of both formal and informal products decreases which tend to reinforce the reduction of the supplies of the concerned sectors.

**Table 5: Impact on incomes in the formal sector**

| Households                               | Labor incomes Change (%) | Capital incomes Change (%) | Total Income Change (%) |
|--|--------------------------|----------------------------|-------------------------|
| The public salaried households           | -0.15                    | 0.286                      | -0.02                   |
| The formal private salaried households   | -0.145                   | 0.286                      | -0.08                   |
| The informal private salaried households | -0.135                   | 0.286                      | -0.081                  |

### ***Impact on employment, incomes and production within the agricultural sector***

The farmers are the largest consumers of agricultural products. They consume about 83.65% of the total consumption of agricultural products. The own account workers consume only 5.6% of the total consumption of agricultural products more than the salaried public households who consume 4.41%. With their rising incomes combined with the decrease in the agricultural output price, the farmers and the own account workers tend to increase their demand for agricultural products. So the total demand by households for agricultural products enhance by 0.21% even if some households as the formal private salaried households reduce their demand due to the decrease of their incomes.

Due to the contraction of the formal and informal sectors the overall demand of agricultural output as intermediate goods falls down by 0.19% but the aggregate domestic demand of the agricultural goods still increases by 0.15%. This increase implies also a proportional increase in the supply and the value added of the agricultural sector by 0.15%. With the increase of the value added, the demand for capital remains constant whereas the demand for labor offered a mixed picture (see Table 6).

Indeed, the demand for rural formal labor falls down by 0.012% whereas the demands for urban formal unskilled labor and urban formal skilled rise by 0.012% and 0.013% respectively. The rural informal labor which represents 65.4% of the total labor demand in the agricultural sector registers the biggest decrease in its demand around 0.21%. The demand for urban informal unskilled labor accounting for about 18.92% of the total labor demand in the agricultural sector also declines by 0.13%.

In fact the rural informal labor and the urban informal unskilled labor are most confined in the agricultural and informal sectors. While the demand of these two types of labor decline in the agricultural sector, their demands increase in the informal sector. Knowing that the demand for all types of labor shrinks in the formal sector, one can assume that the rural informal labor and the urban informal unskilled labor move from the agricultural sector to the informal sector.

**Table 6: Impact on employment in the agricultural sector**

| Labor types | Rural formal labor | Urban formal unskilled | Urban formal skilled | Rural informal | Urban informal unskilled | Urban informal skilled |
|-------------|--------------------|------------------------|----------------------|----------------|--------------------------|------------------------|
| Change (%)  | -0.012             | 0.012                  | 0.013                | -0.21          | -0.13                    | 0.0003                 |

The farmers account for 99.69% of the total rural informal labor and 50.03% of the total urban informal unskilled labor. So the weak decrease in the demand of these categories of labor in the agricultural sector may imply a contraction of the labor incomes of the farmers. But as it was shown above the farmers' earnings also come from the informal sector where the demand for labor and the wages are improving. Finally the total income of the farmers increases.

As a summary at the sectoral level, the informal and formal sectors contract whereas the agricultural sector expands. Employment tends to move from the formal sector to the informal sector mainly. These findings are in line with the conclusion of Arvin-Rad et al (2010) which argues that a credit subsidy to the informal sector leads to a decrease in the output of the informal sector and the domestic urban sector while the rural sector expands if and only the elasticity of substitution between the labor and capital is greater than unity in the informal sector.

### ***Impact on tax revenues and the GDP***

According to the SAM, the formal industry and the formal services mobilized respectively 83.3% and 7.35% of the total taxes on products. The informal industry and the informal services represent only 7.25% and 1.28% of the total taxes on products. The contribution of the agricultural sector is almost insignificant, only 0.83%. Concerning the taxes and duties on imports, the formal sector (industry and services) accounts for about 94% whereas the agricultural sector mobilized only 6%. In our model the informal firms do not import goods and services due their lack of compliance with the legal and administrative rules.

With the contraction of the formal sector, the contributions of the formal industry and the formal services to the total taxes on products decrease by 0.031% and 0.058% respectively. Despite the reduction of the informal sector output, the shares of the informal industry and the informal services to the total taxes on products increase by 0.3% and 0.7%. The agricultural sector's share declines by 0.015%. Finally, the total Government revenues from taxes on products remains almost unchanged (a rise by 0.00015%). The total Government's revenues from taxes and duties on imports decrease marginally by 0.0025%. According to the variations of their imports, the share of the total taxes and duties on imports mobilized by the formal industry rises slightly by 0.0085% whereas the shares of the formal services and the agricultural sector declines by 0.01% and 0.175% respectively.

Besides, the salaried households (public, formal and informal private sectors) provide about 83.7% of the total Government's revenue from household income taxes. The contribution of the farmers accounts for about 11.67% whereas the one of the own account workers is only around 1.1%. After the policy shock on the informal sector, the contributions of the salaried households decrease according to the decline of their incomes. At the opposite, the contributions of the farmers and the own account workers increase by 0.146% and 0.144% respectively. But as the former categories of households are not the largest providers, the total Government's revenue from household income taxes shrink by 0.037%. Even if the overall Government's revenue from taxes decreases its revenues from capital and external transfers tend to increase its overall receipts and reduce its deficit (Table 7).

**Table 7: Impact on Government's incomes**

| Taxes revenues                    | Change (%) | Government incomes         | Change (%) |
|-----------------------------------|------------|----------------------------|------------|
| Total taxes on products           | 0.00015    | Government capital income  | 0.286      |
| Total taxes and duties on imports | 0.0025     | Government transfer income | 0.081      |
| Total income taxes                | -0.037     | Total Government income    | 0.024      |

Following the contraction of the formal and informal sectors, the real GDP at basic prices decreases by 0.048% but the real GDP at market price rises weakly by 0.015%.

**6.2. Simulation 2: 10% increase in the public transfers to the informal households**

The informal households encompass the own account workers and the informal private salaried households. The increase in the public transfers tends to enhance the total incomes of the own account workers and the informal private salaried households by 0.15% and 0.12% respectively. The increase in total incomes implies the rise of their total consumption of goods and services and their savings. But this enhancement is not sufficient enough to pull up the aggregate demand for goods and services especially as the consumption of other households is declining. In fact the informal households account for about 15.91% of the aggregate demand for goods and services.

Beyond the improvement of incomes for only the informal households, the increase in the public transfers causes an eviction effect on the public investment spending while degrading the Government’s budget deficit. Indeed the final demand of formal goods, informal goods and informal services for public investment purposes decreases by 0.025%; 0.05% and 0.052% respectively. Only the demand of formal services for public investment purposes enhances by 0.053%. So the decrease of the public investment spending tends to pull down the domestic demand and the supply of the formal industry and the informal sector (industry and services). This results in the drop in their intermediate consumptions, their final demand for private investment purposes which affect negatively on domestic demands, productions and valued added of the agricultural sector and the formal services sector (Table 8).

The decreasing value added of all the sectors remains the distribution of the capital unchanged. But the demand of types of labor rises in all the sectors except in the formal services sector. That results in the decrease in wages and labor incomes for all categories of households (Table 9). The public transfers offsets the drop of labor incomes for the informal households only whereas the total incomes of the formal households shrinks then pulling down the aggregate consumption of goods and services as well as the domestic demand (Table 10).

The households’ incomes taxes follow the variation of their total incomes but at the end the total Government’s revenue from household income taxes remains constant. Moreover with the contraction of all the sectors the total government revenue from taxes on products and imports declines by 0.023%. Finally the real GDP at basic prices decreases by 0.09% along with the real GDP at market price by 0.088%.

**Table 8: Impact on value added per sector**

| Value added | Agriculture | Formal Industry | Informal Industry | Formal Services | Informal Services |
|-------------|-------------|-----------------|-------------------|-----------------|-------------------|
| Change (%)  | -0.17       | -0.13           | -0.08             | -0.009          | -0.101            |

**Table 9: Impact on employment and wages in all the sectors**

| Labor demand Change (%)  | Agriculture | Formal Industries | Informal Industries | Formal Services | Informal Services | Wages Change (%) |
|--------------------------|-------------|-------------------|---------------------|-----------------|-------------------|------------------|
| Rural formal labor       | 0.02        | 0.054             | 0.057               | -0.018          | 0.05              | -0.065           |
| Urban formal unskilled   | 0.02        | 0.0547            | 0.057               | -0.017          | 0.05              | -0.066           |
| Urban formal skilled     | 0.025       | 0.059             | 0.062               | -0.013          | 0.055             | -0.072           |
| Rural informal           | -0.015      | 0.019             | 0.022               | -0.053          | 0.015             | -0.022           |
| Urban informal unskilled | 0.0028      | 0.037             | 0.04                | -0.03           | 0.033             | -0.044           |
| Urban informal skilled   | 0.024       | 0.058             | 0.061               | -0.013          | 0.054             | -0.071           |

**Table 10: Impact on households incomes**

| Households                               | Labor incomes Change (%) | Capital incomes Change (%) | Total Income Change (%) |
|--|--------------------------|----------------------------|-------------------------|
| The public salaried households           | -0.068                   | -0.052                     | -0.0586                 |
| The formal private salaried households   | -0.067                   | -0.052                     | -0.0589                 |
| The informal private salaried households | -0.065                   | -0.052                     | 0.12                    |
| The Farmers                              | -0.031                   | -0.052                     | -0.0362                 |
| The own account workers                  | -0.055                   | -0.052                     | 0.15                    |

## 7. Conclusion

This study, based on the PEP standard single-country and static CGE model adapted to the structure of the Social Accounting Matrix (SAM-2008) developed by the IFPRI for Burkina Faso, shed light on the direct and indirect effects of public policies improving access to capital and liquidity for the informal economy. The first policy scenario deals with a 10% increase in the demand for capital in the informal sector while the second one is the same increase in the public transfers toward the informal households.

The paper provides evidence that the first policy shock leads to a paradoxical and negative effect on the informal sector's output which decreases. The indirect effects are materialized by the decline in the formal sector's output whereas the one of the agricultural sector expands. The contraction of the formal sector causes a release of all categories of labor which find refuge mostly in the informal sector where the aggregate demand for labor increases. The total

incomes of the farmers and the own account workers, mostly confined in the informal and agricultural sectors, improve. However the public salaried households, the formal private salaried households and the informal private salaried households, mostly confined in the formal sector, witness their total incomes falling down.

With their improving incomes the farmers and the own account workers, the largest consumers of the informal sector's output, increase their consumption of formal-based goods and services at the expense of the informal-based ones. This change of preference is mainly the origin of the informal sector's contraction. The contraction of the formal sector is imputable to the decrease in the informal sector's demand for the formal sector's output as intermediate consumption. This contraction is reinforced by the decline of the consumption of the public and private salaried workers, the largest consumers of formal-based goods and services. Following the decline of the formal sector and some household incomes, the total Government revenues from taxes on products remains almost unchanged whereas its total revenue from household income taxes shrinks. Finally, the real GDP at basic prices drops by 0.048% but the real GDP at market price rises weakly by 0.015%.

The second policy experiment benefited only the own account workers and the informal private salaried households whom total incomes enhance marginally. But as the public transfers are funded by the Government it causes an eviction effect on the public investment spending which pulls down the domestic demand and the supply of the formal industry and the informal sector (industry and services). It results negative spillovers in terms of a decrease in outputs in all the sectors and a degradation of incomes for the public salaried households, the formal private salaried households and the farmers. Following the contraction of the sectoral productions and the incomes, the total Government revenue from taxes also decreases. Finally, the real GDP at basic prices falls down by 0.09% along with the real GDP at market price by 0.088%.

Enlightened by these findings, we advise the policymakers to go beyond credit and cash incentives for the informal economy if the objective is to propel the economic growth in Burkina Faso. Relaxing liquidity constraints faced by the informal economy would surely improve marginally the incomes of some households (farmers and own account workers). But it will not generate significant and positive spillovers for the entire economy. So intuitively, the Government may jointly implement policies focusing on highly productive sectors as the formal industry and services able to boost growth, tax revenue mobilization and reduce the budget deficit.

Beyond the limitations of our model such as the flexibility of wages in the formal sector, the lack of unemployment, the old reference year of the SAM as well as the sensitivity to the initial values of the elasticities, this study did not address the effects of enhancing the productivity of the informal sector workers through vocational trainings for example. Knowing the productivity gap between the formal and informal sectors, future research may investigate whether enhancing the informal sector's productivity would generate positive spillovers on growth, incomes and employment.

## References

- Agénor et al, 2003. *The Mini-Integrated Macroeconomic Model for Poverty Analysis*. The World Bank, Washington DC 20433
- Alia, D., Ndjana, W. and Nghogue, E. (2009). Evaluation of the effects of economic policies on informal sector performance and poverty in Cameroon: a Computable General Equilibrium model analysis. MPRA Paper No. 30339
- Amaral, Pedro, & Quintin, Erwan (2006). The implications of capital-skill complementarity in economies with large informal sectors. *Journal of Monetary Economics*, 53, 1541–1553.
- Annabi N., Cockburn J. et Decaluwé B (2003). "Formes Fonctionnelles et Paramétrisation dans les MCEG", CREFA, Université de Laval, Canada
- Arvin-Rad, H., Basu, A.K., Willumsen, M (2010). Economic reform, informal–formal sector linkages and intervention in the informal sector in developing countries: A paradox. *International Review of Economics and Finance* 19 (2010) 662–670
- Balma L., Cockburn J., Fofana I., Kaboré S. and Tiberti L. (2010). Simulation des Effets de la Crise Economique et des Politiques de Réponse sur les Enfants en Afrique de l'Ouest et du Centre: Le Cas du Burkina Faso. Innocenti Working Paper, IWP-2010-03
- Banerji A., Jain S. (2007). Quality Dualism. *Journal of Development Economics* 84 (2007) 234–250
- Behar A. (2010). Would Cheaper Capital Replace Labour? *South African Journal of Economics* Vol. 78:2 June 2010
- Benjamin N, Mbaye A, Diop I.T (2012). *The Informal Sector in Francophone Africa: Firm Size, Productivity, and Institutions*. World Bank Publications
- Berge, Oppedal L. I., Bjorvatn K., Tungodden B (2011) "Human and financial capital for microenterprise development: Evidence from a field and lab experiment", *NHH Discussion Paper Sam 1, 2011*.
- Bibi S., Cockburn J., Fofana I. and Tiberti L. (2010). Impacts of the Global Crisis and Policy Responses on Child Well-Being: A Macro-Micro Simulation Framework. Innocenti Working Paper, IWP-2010-06
- Böhme M.H and Thiele R. (2014). Informal–Formal Linkages and Informal Enterprise Performance in Urban West Africa. *European Journal of Development Research* 26, 473-489
- Bosch M. and Esteban-Pretel J. 2015. The labor market effects of introducing unemployment benefits in an economy with high informality. *European Economic Review*, Elsevier, vol. 75(C), pages 1-17.
- Chandra V. and Khan M (1993). Foreign investment in the presence of an informal sector. *Economica*, 60, 79–103.
- Charlot O., Malherb F. and Terra C. (2015). Informality in developing economies: Regulation and fiscal policies. *Journal of Economic Dynamics & Control* 51(2015)1–27

- Chaudhuri, D.T. (1989). A theoretical analysis of the informal sector. *World Development*, 17, 351–355.
- Chen M. A. (2001). Women and informality: A global picture, the global movement. *SAIS Review*, 21(1), 71-82.
- Davies, R. and Thurlow, J. (2011) Formal-Informal Economy Linkages and Unemployment in South Africa. *South African Journal of Economics*. Vol. 78(4):437-459.
- Decaluwé B. et al. (2013). PEP-1-1: The PEP Standard Single-country, Static CGE model. PEP Network
- Erero et al. (2014). Effects of Reducing Tariffs in the Democratic Republic of Congo (DRC): A CGE Analysis. *Economic Research Southern Africa working paper 467*
- Fields G. (1975). Rural–urban migration, urban unemployment and underemployment, and job search activity in LDCs. *Journal of Development Economics*, 2,165–187.
- Fiess N.M, Fugazza M and Maloney WF (2010). Informal Self-Employment and Macroeconomic Fluctuations. *Journal of Development Economics*. 91: 211–226.
- Gebreselasie T.G. (2008). Sectoral Elasticity of Substitution and Returns to Scale in South Africa. *South African Journal of Economics*, Vol. 76:S2 August 2008
- Glaub, Matthias and Frese M (2011). A critical review of the effects of entrepreneurship training in developing countries. *Enterprise development and microfinance* 22(4): 335-53.
- Grimm M., Knorringa P. and Lay J. (2012). Constrained Gazelles: High Potentials in West Africa’s Informal Economy. *World Development* Vol. 40, No. 7, pp. 1352–1368, 2012
- Harris, J.R., Todaro, M.P (1970). Migration, unemployment and development; a two-sector analysis. *The American Economic Review* 60, 126–142.
- Hart K (1972). Informal Income Opportunities and Urban Employment in Ghana. *Journal of Modern African Studies*, vol. II.
- International Labour Organization (1972). Employment, Incomes and Equality. A Strategy for Increasing Productive Employment in Kenya. ILO, Geneva.
- INSD (2003). Le Secteur Informel dans L’agglomération de Ouagadougou : Performances, Insertion, Perspectives. Premiers Résultats de la Phase 2 de L’enquête 1-2-3. Version provisoire. Institut National de la Statistique et de la Démographie. Ouagadougou, Burkina Faso.
- Kelley B (1994). The Informal Sector and the Macroeconomy: A Computable General Equilibrium Approach for Peru. *World Development*. Vol. 22, No. 9, pp. 1393-141 I
- Kuepie M, Nordman C.J and Roubaud F (2009). Education and Earnings in Urban West Africa. *Journal of Comparative Economics*. 37(3): 491-515
- Mano, Yukichi, Iddrisu A., Yoshino Y. and Sonobe T 2012. How Can Micro and Small Enterprises in Sub-Saharan Africa Become More Productive? The Impacts of Experimental Basic Managerial Training. *World Development*, 40(3): 458-68.



Marjit, S (2003). Economic reform and informal wage-A general equilibrium analysis. *Journal of Development Economics*, 72, 371–378

Marjit S., Kar S. and Beladi H. (2007). Trade reform and informal wages. *Review of Development Economics*, 11, 313–320.

McKenzie D. and Woodruff C. (2012). What are we learning from business training and entrepreneurship evaluations around the developing world? World Bank *Policy Research Working Paper* No. 6202.

Meghir C., Narita, R. and Robin, J.M. (2012). Wages and Informality in Developing Countries. NBER Working Paper 18347.

Montaud J-M (2000). Deux approches macroéconomiques du secteur informel en Equateur, Centre d'économie du développement, Université Montesquieu- Bordeaux IV- France.

Observatoire National de L'Emploi et de la Formation Professionnelle (2011). *Annuaire statistique du marché de l'emploi-2010*. Document d'analyse, Ministère de la Jeunesse de la Formation Professionnelle et de l'Emploi, Burkina Faso

Ouédraogo et al (2011). Les barrières institutionnelles à la formalisation des unités de production informelles dans les principales agglomérations des Etats membres de l'UEMOA. AFRISTAT, ISS, DIAL, IFW and GIGA

Ouédraogo M.I (1996). The Urban Informal Sector in Burkina Faso. Ph.D Thesis, University of Tennessee, Knoxville, USA

Rankin N, Sandefur J and Teal F (2010). Learning and Earning in Africa: Where Are the Returns to Education High? *CSAE WPS/2010-02*. Centre for the Study of African Economies, University of Oxford.

Roubaud F., Razafindrakoto M. and Cogneau D (1996). Le secteur informel urbain et l'ajustement au Cameroun, *Revue d'économie du développement*, Presses Universitaires de France

Roubaud F., and Gubert F (2011). The Impact of Microfinance Loans on Small Informal Enterprises in Madagascar. A Panel Data Analysis. AFRISTAT, ISS, DIAL, IFW and GIGA

Roy M (2006). Effect of subsidy and entry into the informal sector with inter-linkage. *International Review of Economics and Finance* 15 (2006) 383–397

Sawadogo et al (2015). Impact de l'expansion économique et commerciale de la Chine sur la croissance et l'emploi au Burkina Faso : une analyse en équilibre général calculable. Poverty and Economic Policy (PEP) Research Network

Schneider F and Enste D.H (2000). Shadow Economies: Size, Causes and Consequences. *Journal of Economic Literature*. 38

UNECA (2007). *Etude sur la mesure du secteur informel et de l'emploi informel en Afrique*. United Nations, Economic and Social Council

Weeks J. (1975). Policies for expanding employment in the informal urban sector of developing countries, *International Labour Review* 3.

Zerbo A (2001). Les Economies Urbaines Subsahariennes et le Problème de la Mobilisation de Ressources via le Secteur Informel. *Document de Travail n°62*. Centre d'économie de développement, Université Montesquieu - Bordeaux IV.

## Appendix

### The CGE model

All sectors:  $i$ ; All commodities:  $j, ij$ ; Labor categories:  $l$ ; All agents:  $ag, agj$ ; Households categories:  $h, hj$ ; Non government agent:  $agn$ ; domestic agents:  $agd$

#### Production

$$VA_j = v_j XS_j \quad (1)$$

$$CI_j = io_j XS_j \quad (2)$$

$$VA_j = B_j^{VA} \left[ \beta_j^{VA} LDC_j^{-\rho_j^{VA}} + (1 - \beta_j^{VA}) KD_j^{-\rho_j^{VA}} \right]^{\frac{1}{\rho_j^{VA}}} \quad (3)$$

$$LDC_j = B_j^{LD} \left[ \sum_l \beta_{l,j}^{LD} LD_{l,j}^{-\rho_j^{LD}} \right]^{\frac{1}{\rho_j^{LD}}} \quad (4)$$

$$LD_{l,j} = \left[ \frac{\beta_{l,j}^{LD} WC_j}{W_{l,j}} \right]^{\sigma_j^{LD}} (B_j^{LD})^{\sigma_j^{LD}-1} LDC_j \quad (5)$$

$$D_{i,j} = aij_{i,j} CI_j \quad (6)$$

#### Incomes and savings

$$YH_h = YHL_h + YHK_h + YHTR_h \quad (7)$$

$$YHL_h = \sum_l \lambda_{h,l}^{WL} \left( W_l \sum_j LD_{l,j} \right) \quad (8)$$

$$YHK_h = \lambda_h^{RK} \sum_j R_j KD_j \quad (9)$$

$$YHTR_h = \sum_{ag} TR_{h,ag} \quad (10)$$

$$YDH_h = YH_h - TDH_h \quad (11)$$

$$CTH_h = YDH_h - SH_h - \sum_{agn} TR_{agn,h} \quad (12)$$

$$SH_h = s_h YDH_h \quad (13)$$

#### Government

$$YG = YGK + TDHT + TICT + TIMT + YGTR \quad (14)$$

$$YGK = \lambda_G^{RK} \sum_j R_j KD_j \quad (15)$$

$$TDHT = \sum_h TDH_h \quad (16)$$

$$TICT = \sum_i TICT_i \quad (17)$$

$$TIMT = \sum_i TIMT_i \quad (18)$$

$$TDH = ttdh_h YH_h \quad (19)$$

$$TIMT_i = ttim_i PWM_i e IM_i \quad (20)$$

$$SG = YG - \sum_{agnng} TR_{agnng, gvt} - G \quad (21)$$

### Rest of the world

$$YROW = e \left( \sum_i PWM_i \times IM_i \right) \quad (22)$$

$$SROW = YROW - \sum_i PWX_i \times EX_i - \sum_{agd} TR_{agd, row} \quad (23)$$

$$SROW = -CAB \quad (24)$$

### Transfers

$$TR_{agnng, h} = Pixcon^n TR_{agnng, h}^0 \quad (25)$$

$$TR_{agnng, gvt} = Pixcon^n TR_{agnng, gvt}^0 \quad (26)$$

$$TR_{agd, row} = Pixcon^n TR_{agd, row}^0 \quad (27)$$

### Demand

$$PC_i C_{i, h} = PC_i C_{i, h}^{Min} + \gamma_{i, h}^{LES} \left( CTH_h - \sum_{ij} PC_{ij} C_{ij, h}^{Min} \right) \quad (28)$$

$$GFCF = IT - \sum_i PC_i VSTK_i \quad (29)$$

$$PC_i INV_i = \gamma_i^{INV} GFCF \quad (30)$$

$$PC_i INVPT_i = \gamma_i^{INVPT} INVPT \quad (31)$$

$$PC_i INVG_i = \gamma_i^{INVG} INVG \quad (32)$$

$$PC_i CG_i = \gamma_i^{GVT} G \quad (33)$$

$$DIT_i = \sum_j DI_{i, j} \quad (34)$$

### Supply and international trade

$$XS_{j, i} = B_{j, i}^X \left[ \beta_{j, i}^X EX_{j, i}^{\rho_{j, i}^X} + (1 - \beta_{j, i}^X) DS_{j, i}^{\rho_{j, i}^X} \right]^{\frac{1}{\rho_{j, i}^X}} \quad (35)$$

$$EX_{j, i} = \left[ \frac{1 - \beta_{j, i}^X}{\beta_{j, i}^X} \frac{PE_i}{PL_i} \right]^{\sigma_{j, i}^X} DS_{j, i} \quad (36)$$

$$Q_i = B_i^M \left[ \beta_i^M IM_i^{-\rho_i^M} + (1 - \beta_i^M) DD_i^{-\rho_i^M} \right]^{\frac{-1}{\rho_i^M}} \quad (37)$$

$$IM_i = \left[ \frac{\beta_i^M}{1 - \beta_i^M} \frac{PD_i}{PM_i} \right]^{\sigma_i^M} DD_i \quad (38)$$

### Prices

$$PP_j = \frac{PVA_j VA_j + PCI_j CI_j}{XS_j} \quad (40)$$

$$PCI_i = \frac{\sum_i PC_i DI_{i,j}}{CI_j} \quad (41)$$

$$PVA_j = \frac{WC_j LDC_j + R_j KD_j}{VA_j} \quad (42)$$

$$P_{j,i} = \frac{PE_i EX_{j,i} + PL_i DS_{j,i}}{XS_{j,i}} \quad (43)$$

$$PD_i = (1 + tti_c) PL_i \quad (44)$$

$$PM_i = (1 + tti_c)(1 + tti_m) e PWM_i \quad (45)$$

$$PC_i = \frac{PM_i IM_i + PD_i DD_i}{Q_i} \quad (46)$$

$$PIXCON = \frac{\sum_i PC_i \sum_h C_{i,h}^O}{\sum_{ij} PC_i^O \sum_h C_{ij,h}^O} \quad (47)$$

$$PIXINV = \prod_i \left( \frac{PC_i}{PC_i^O} \right)^{\gamma_i^{INV}} \quad (48)$$

$$PIXGVT = \prod_i \left( \frac{PC_i}{PC_i^O} \right)^{\gamma_i^{GVT}} \quad (49)$$

$$PIXGDP = \sqrt{\frac{\sum_j PVA_j VA_j^O \sum_j PVA_j VA_j}{\sum_j PVA_j^O VA_j^O \sum_j PVA_j^O VA_j}} \quad (50)$$

### Equilibrium

$$Q_i = \sum_h C_{i,h} + CG_i + INV_i + VSTK_i + DIT_i \quad (51)$$

$$LS(l) = \sum_j LD_{l,j} \quad (52)$$

$$KS = \sum_j KD_j \quad (53)$$

$$IT = \sum_h SH_h + SG + SROW \quad (54)$$

### **Gross Domestic Product**

$$GDP^{BP} = \sum_j PVA_j VA_j \quad (55)$$

$$GDP^{MP} = GDP^{BP} + TICT + TIMT \quad (56)$$

### **Real (volume) variables**

$$CTH_h^{REAL} = \frac{CTH_h}{PIXCON} \quad (57)$$

$$G^{REAL} = \frac{G}{PIXGVT} \quad (58)$$

$$GDP^{BP-REAL} = \frac{GDP^{BP}}{PIXGDP} \quad (59)$$

$$GDP^{MP-REAL} = \frac{GDP^{MP}}{PIXGDP} \quad (60)$$

$$GFCF^{REAL} = \frac{GFCF}{PIXINV} \quad (61)$$

### **Volume variables**

$C_{i,h}$  : Consumption of commodity  $i$  by type  $h$  households

$C_{i,h}^{MIN}$  : Minimum consumption of commodity  $i$  by type  $h$  households

$CG_i$  : Public consumption of commodity  $i$

$CI_j$  : Total intermediate consumption of industry  $j$

$CTH_h^{REAL}$  : Real consumption expenditures of household  $h$

$DD_i$  : Domestic demand for commodity  $i$  produced locally

$DI_{i,j}$  : Intermediate consumption of commodity  $i$  by industry  $j$

$DIT_i$  : Total intermediate demand for commodity  $i$

$DS_{j,i}$  : Supply of commodity  $i$  by sector  $j$  to the domestic market

$EX_{j,i}$  : Quantity of product  $i$  exported by sector  $j$

$EXD_i$  : World demand for exports of product  $i$

$G^{REAL}$  : Real government expenditures

$GDP^{BP-REAL}$  : Real GDP at basic prices

$GDP^{MP-REAL}$  : Real GDP at market prices

$GFCF^{REAL}$  : Real gross fixed capital formation

$IM_i$  : Quantity of product  $i$  imported

$INV_i$  : Final demand of commodity  $i$  for investment purposes

$INVP_i$  : Final demand of commodity  $i$  for private investment purposes

$INVG_i$  : Final demand of commodity  $i$  for public investment purposes

$KD_j$  : Demand for capital by industry  $j$

$KS$  : Supply of capital

$LD_{l,j}$  : Demand for type  $l$  labor by industry  $j$

$LDC_j$  : Industry  $j$  demand for composite labor

$LS(l)$  : Supply of type  $l$  labor

$Q_i$  : Quantity demanded of composite commodity  $i$

$VA_j$  : Value added of industry  $j$

$VSTK_i$  : Inventory change of commodity  $i$

$XS_{j,i}$  : Industry  $j$  production of commodity  $i$

### **Price Variables**

$e$  : Exchange rate; price of foreign currency in terms of local currency

$P_{j,i}$  : Basic price of industry  $j$ 's production of commodity  $i$

$PC_i$  : Purchaser price of composite commodity  $i$  (including all taxes and margins)

$PCI_j$  : Intermediate consumption price index of industry  $j$

$PD_i$  : Price of local product  $i$  sold on the domestic market (including all taxes and margins)

$PE_i$  : Price received for exported commodity  $i$  (excluding export taxes)

$PE_i^{FOB}$  : FOB price of exported commodity  $i$  (in local currency)

$PIXCON$  : Consumer price index

$PIXGDP$  : GDP deflator

$PIXGVT$  : Public expenditures price index

$PIXIVN$  : Investment price index

$PL_i$  : Price of local product  $i$  (excluding all taxes on products)

$PM_i$  : Price of imported product  $i$  (including all taxes and tariffs)

$PP_i$  : Industry  $j$  unit cost

$PT_j$  : Basic price of industry  $j$ 's output

$PVA_i$  : Price of industry  $j$  value added

$PWM_i$  : World price of imported product  $i$  (expressed in foreign currency)

$PWX_i$  : World price of exported product  $i$  (expressed in foreign currency)

$R_j$  : Rental rate of capital in industry  $j$

$W_l$  : Wage rate of type  $l$  labor

$WC_j$  : Wage rate of industry  $j$  composite labor

### ***Nominal (Value) Variables***

$CAB$  : Current account balance

$CTH_h$  : Consumption budget of type  $h$  households

$G$  : Current government expenditures on goods and services

$GDP^{BP}$  : GDP at basic prices

$GDP^{MP}$  : GDP at market prices

$GFCF$  : Gross fixed capital formation

$IT$  : Total investment expenditures

$SG$  : Government savings

$SH_h$  : Savings of type  $h$  households

$SROW$  : Rest-of-the-world savings

$TDH_h$  : Income taxes of type  $h$  households

$TDHT$  : Total government revenue from household income taxes

$TIC_i$  : Government revenue from indirect taxes on product  $i$



$TICT$  : Total government receipts of indirect taxes on commodities

$TIM_i$  : Government revenue from import duties on product  $i$

$TIMT$  : Total government revenue from import duties

$TR_{ag,agj}$  : Transfers from agent  $agj$  to agent  $ag$

$YDH_h$  : Disposable income of type  $h$  households

$YG$  : Total government income

$YGK$  : Government capital income

$YGTR$  : Government transfer income

$YH_h$  : Total income of type  $h$  households

$YHK_h$  : Capital income of type  $h$  households

$YHL_h$  : Labor income of type  $h$  households

$YHTR_h$  : Transfer income of type  $h$  households

$YGTR$  : Rest of the World income

### **Parameters**

$s_h$  : Slope (type  $h$  household savings)

$tt dh_h$  : Marginal income tax rate of type  $h$  households

$tt ic_i$  : Tax rate on commodity  $i$

$tt im_i$  : Rate of taxes and duties on imports of commodity  $i$

$aij_{i,j}$  : Input-output coefficient

$B^{LD}_j$  : Scale parameter (CES – composite labor)

$B^M_i$  : Scale parameter (CES – composite commodity)

$B^{VA}_j$  : Scale parameter (CES – value added)

$B^X_{j,i}$  : Scale parameter (CET – exports and local sales)

$\beta^{LD}_{i,j}$  : Share parameter (CES – composite labor)

$\beta^M_i$  : Share parameter (CES – composite commodity)

$\beta^{VA}_i$  : Share parameter (CES – value added)

$\beta^X_{j,i}$  : Share parameter (CET – exports and local sales)

$\eta$  : Price elasticity of indexed transfers and parameters

$\gamma_i^{GVT}$  : Share of commodity  $i$  in total current public expenditures on goods and services

$\gamma_i^{INV}$  : Share of commodity  $i$  in total investment expenditures

$\gamma_i^{INVP}$  : Share of commodity  $i$  in total private investment expenditures

$\gamma_i^{GVT}$  : Share of commodity  $i$  in total public investment expenditures

$\gamma_{i,h}^{LES}$  : Marginal share of commodity  $i$  in type  $h$  household consumption budget

$io_j$  : Coefficient (Leontief – intermediate consumption)

$\lambda_{ag}^{RK}$  : Share of capital income received by agent  $ag$

$\lambda_{ag,agj}^{TR}$  : Share parameter (transfer functions)

$\lambda_{l,h}^{WL}$  : Share of type  $l$  labor income received by type  $h$  households

$\rho_j^{LD}$  : Elasticity parameter (CES – composite labor);

$\rho_i^M$  : Elasticity parameter (CES – composite commodity);

$\rho_j^{VA}$  : Elasticity parameter (CES – value added);

$\rho_{j,i}^X$  : Elasticity parameter (CET – exports and local sales);

$\sigma_j^{LD}$  : Elasticity of substitution (CES – composite labor);

$\sigma_i^M$  : Elasticity of substitution (CES – composite commodity);

$\sigma_j^{VA}$  : Elasticity of transformation (CES – value added);

$\sigma_{j,i}^X$  : Elasticity of transformation (CET – exports and local sales);

$\sigma_{i,h}^Y$  : Income elasticity (LES- households' consumption)

$\upsilon_j$  : Coefficient (Leontief – value added)

### ***Exogenous variables***

$C_{i,h}^{MIN}$  : Minimum consumption of commodity  $i$  by type  $h$  households

$CAB$  : Current account balance

$e$  : Exchange rate; price of foreign currency in terms of local currency

$G$  : Current government expenditures on goods and services

$TR_{h,gvt}$  : Transfers from Government to household  $h$

$KD_j$  : Demand for capital by industry  $j$

$KS$  : Supply of capital

$LS(l)$  : Supply of type  $l$  labor

$PWM_i$  : World price of imported product  $i$  (expressed in foreign currency)

$PWX_i$  : World price of exported product  $i$  (expressed in foreign currency)

$s_h$  : Slope (type  $h$  household savings)

$ttdh_h$  : Marginal income tax rate of type  $h$  households

$ttic_i$  : Tax rate on commodity  $i$

$ttim_i$  : Rate of taxes and duties on imports of commodity  $i$

$VSTK_i$  : Inventory change of commodity  $i$

### Description of SAM/2008 for Burkina Faso

| Groups of Accounts                    | Description  |
|---------------------------------------|--|
| <b>Activities/Commodities</b>         |  |
| Agriculture (9)                       | Cereals; Fruits and vegetables; Cotton; Other cash crops; Cattle; Other farms; Livestock products; Forest; and Fish  |
| Formal Industries (6)                 | Extractive industry (Mining); Modern drink and tobacco; Textiles; Electricity; Gas and water; Other modern manufacturing; Modern construction  |
| Informal Industries (2)               | Informal manufacturing industries; Informal building firms   |
| Formal Services (8)                   | Modern trade; Modern transport; Post and Telecommunications; Financial services; Hotel; Other modern commercial services; Non-commercial private and parastatal services; and non-commercial public services |
| Informal Services (3)                 | Informal trade; Informal transport; Other informal market services   |
| <b>Factors of production (Inputs)</b> |  |
| Labor (6)                             | Rural formal; Urban formal skilled; Urban formal unskilled; Rural informal; Urban informal skilled; and Urban informal unskilled   |
| Capital (1)                           | Capital  |
| <b>Institutions</b>                   |  |
| Households (8)                        | Public sector salaried; Formal private sector salaried; Informal sector salaried; Own account workers or Non-agricultural employers; Farmers; and Inactive   |
| Others (2)                            | Government and Rest of the World   |