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Agriculture and Rural Transformation in Burkina Faso
Does Land Rights Matter?

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ABSTRACT

In the search for rural transformation, this paper analyses the effect of agriculture on rural nonfarm entrepreneurship (NFE) highlighting the role of land rights and assesses the impact of rural NFE on households' livelihood focusing on rural Burkina Faso. To achieve these objectives, the study uses two techniques: (i) propensity score matching technique to investigate the nonfarm entrepreneurship impact on farm households' income; (ii) logistic regression to assess the role of agriculture in the development of nonfarm enterprises. Empirical estimates are based on the Living Standards Measurement Study-Integrated Surveys on Agriculture (LSMS-ISA) database of the World Bank. From the results we conclude that rural NFE is pivotal for rural transformation in Burkina Faso given that farm households that engage into NFE enjoy significantly higher per capita income and overall household income. The results allow us in addition to establish that on average, a farmer whose land rights are perfectly secured is more willing to engage into non-farm entrepreneurship activities. Additional determinants of individual engagement into NFE are shocks, livestock size, age of household head, active female household members and land size. Farming experience has no effect on individual engagement into NFE. These findings call for a redefinition of the agricultural policy and programs of the country to explicitly include rural nonfarm entrepreneurship development strategies component. Such component could target pragmatic land lights policy and the enhancement of the capabilities of farm households to be entrepreneurial.

Keywords:
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1. Introduction

Agriculture remains the heartbeat of most Sub-Saharan African (SSA) countries' economies and this trend is unlikely to change in the coming years (Senbet and Simbagavi, 2017). Smallholder agriculture remains the base of life and the source of employment for a disproportionately large share of the population in these countries (Anyamu, 2013). However, rural areas, where agricultural activities take place, still in the quest for structural transformation to reduce poverty through inclusive and sustainable growth and face many other contemporary challenges. Structural transformation of agricultural sector remains one of the first economic imperative of the region (Senbet and Simbagavi, 2017). The sector in this part of the world stills falling behind and even falling apart in terms of productivity compare to other regions and other sectors (McCullough, 2017). Although agriculture will continue to provide jobs for the majority of the African youth whose spectacular growth contributes to maintain the current labor market unbalance (Salami et al. 2010, Anyamu, 2013), the actual youth unemployment crisis calls for the search for additional job creation sources (AfDB, 2017). Rural nonfarm sector has the potential of being job creation and wealth generation pillar (Nagler and Naudé, 2017).

In most African countries, entrepreneurship is increasingly seen as a key to economic growth through the introduction of innovations which adds value. Indeed, economic theory has always pointed out the role of entrepreneurship initiatives in the structural transformation of economies (Cantillion, 1730, Knight, 1921, Schumpeter, 1942). According to Schumpeter (1942), the inventor produces ideas and the entrepreneur "makes things happen". In imperfect markets, entrepreneurs overcome barriers such as poor infrastructure, lack of finance, and skills gaps by providing goods and services (Nelson and Pack, 1999). They create jobs, increase the demand for skilled labor, put goods and services on the market, and contribute to the government's tax base.

Despite its potential role in the economy of the SSA region, entrepreneurship initiatives are emerging hardly particularly in rural areas (Abebe and Adesina, 2017). This trend is maintained and strengthened by African governments' agricultural policies which do not explicitly include nonfarm sector development component. Indeed, programs and projects fighting food insecurity have always targeted agriculture intensification and commercialization through markets development (Bachewe et al., 2018).

Rural entrepreneurship is needed because it can be a catalyst of actual and future job creation for the hundred million of new job seekers in SSA. It can also support higher productivity and innovation (AfDB, 2017). To really trigger and boost farm households engagement into entrepreneurship, this study aims to explore whether farm households practicing farm activities enjoy, to some extent, positive externalities that allow them to engage into NFE focusing on the role of land rights. Indeed, access to secured land might improve the willingness to engage into nonfarm activities through investment and financial inclusion channels. In addition to this objective, the study goes further to assess the impact of rural entrepreneurship on household income. These objectives are pursued in the context of rural Burkina Faso, using the world Bank Living Standards Study Measurement - Integrated Surveys on Agriculture (LSMS-ISA) dataset.

The remaining of the paper is organized as follow: (i) the section 2 describes the agricultural sector in Burkina Faso, (ii) the section 3 deals with the literature review, (iii) the section 4 presents the methodology, (iv) the section 5 discusses the estimates while the section 6 concludes.

2. Literature review and conceptual framework

Before the year 2000, rural non-farm enterprises were neglected and Wiggens (2000) has clearly pointed this alarming embryonic set of idea. After this recognition, many scholars devoted their research to the topic particularly focusing on the decision to take NFE initiatives.

Rural Non-Farm Entrepreneurships (NFE) is a set of nonagricultural activities which constitute at least a part of household income source. According to Henderson (2002), NFE has the potential to transform rural economy by creating additional value and job opportunities. Entrepreneurs are capable of taking market opportunities. They innovate and create enterprises that help transform and create additional value from the existing resources that may change the way of rural societies living (Onuoha, 2007). By doing so, they are risk takers. They create by the way business to add value in different forms (Drucker, 1970). However, there is no deliberate policy aiming to boost NFE activities in most of the developing countries. Also, enterprises in rural areas are small and informal (Nagler and Naudé, 2017). In this part of the world, interventions to drive rural mutations are almost exclusively limited to strategies aiming to improve agricultural productivity. This is easily noticeable through development stakeholders' engagement in support of supply of rural technology, agricultural inputs and extension services (Gebregziabher, 2015). This is to say that entrepreneurship component is missing in policies aiming to drive rural transformation in developing countries. As a result, development stakeholders' rural policies have succeeded in reducing significantly food security and extreme poverty but they failed in transforming rural areas and this calls policymakers to rethink the importance of factors having the potential of driving rural transformation (Proctor, 2014).

Many factors are thought to boost non-farm enterprises development in rural areas. These factors include socio-economic characteristics and enabling environment conditions (Abbe and Adesina, 2017; Naude, 2014a). The technical and natural capacities of business are triggered by the need of achievement (Abebe and Adesina, 2017). Business taking behavior is driven by factors such as age, sex, experience, and asset ownership (Dugassa, 2012). But the success of NFE is strongly related to access to credit, technology promotion, business development services, market access, networking and institutional performance. Studies focusing on the performance of NFE in sub-Saharan Africa are limited. Rijkers et al. (2012) analyzing NEF in Ethiopia concluded that rural NFE are less productive than urban ones. As far as business size is concerned, Mcpherson (1995) finds that business size does not matter in the survival of enterprises in Botswana and Swaziland, but larger enterprises have lower probability to survive in Zimbabwe.

In addition, the decision to undertake entrepreneurship is governed by two types of factors: (i) push i.e necessity and (ii) pull, i.e opportunity factors (Herrington and Kelly, 2012). While pull factors refer to the opportunities of earning additional income, push factors refer to the necessity of surviving. Thus, push factors include factors governing the motivation of the individual to smooth its consumption in the context of risks and incomplete insurance and credit markets (Janvry and Sadoulet, 2006; Dercon, 2009). For instance, if a household member is unemployed after his graduation from university for a certain number of years; he can be pushed into entrepreneurship in order to survive (Babatunde and Qaim, 2010). The Figure 1 below summarizes the factors having the potential of boosting NFE engagement.

To conclude our literature survey we would first say that most of the studies did not include in the analysis the enabling environment factors except Abebe and Adesna (2017). However, this study did not account for push factors (various shocks could push a household member into entrepreneurship initiatives). This paper adds to the one of Abebe and Adesina (2017) by accounting for push factors.

3. Methods and Materials

The study's empirical estimation relies on two methods: (i) propensity score matching technique to assess the effect of NFE on household income and logistic regression to assess the effect of agriculture on non-farm entrepreneurship (NFE).

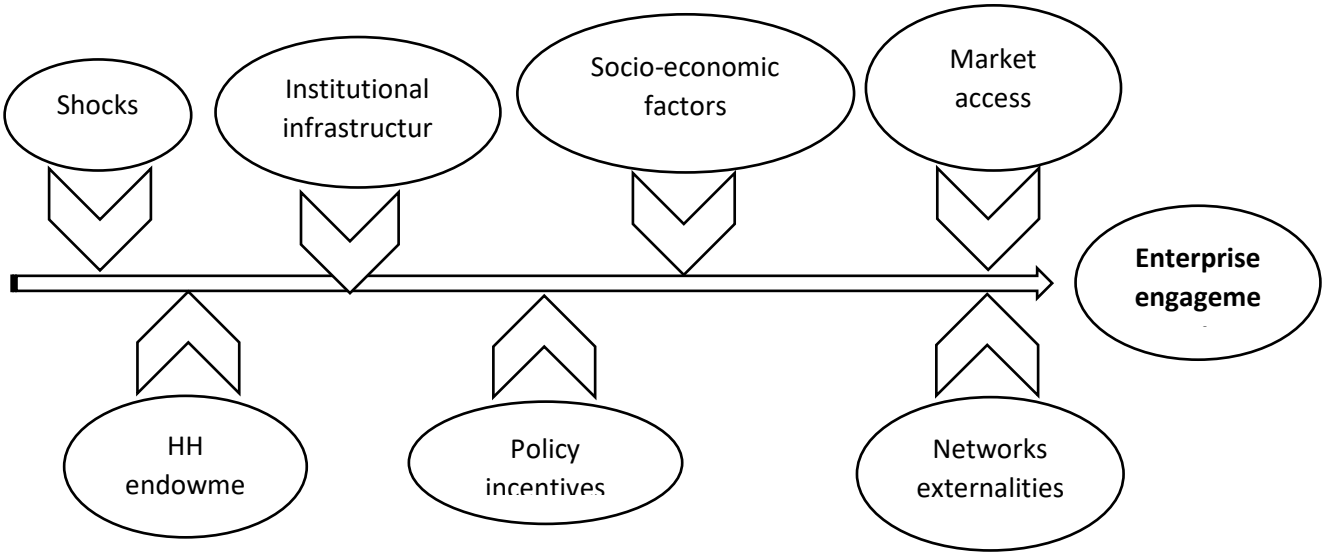

Figure 1: Framework of HH NFE engagement **Source: (A**uthor from literature review)

3.1 Determination of the impact of NFE on households' income

Participation in NFE is not random. The consequence of this is the potential selection bias since farm households that participate into NFE might have some unobservable characteristics that make them different from the non-participants. To deal with it, we use the propensity score matching technique to achieve the first objective relative to assessing the impact of NFE on household income. This technique is well known in agricultural economics literature (Abebaw and Haile, 2013; Abebe and Adesina, 2017) and is considered as the best option in resolving selection bias in addition to randomization and experimental design (Khandeker et al, 2010). The technique consists of matching treated households with untreated households (households that are similar in terms of observables characteristics). The propensity score is defined as:

$$PS_i = p(NFE = 1/X) \quad (1)$$

The impact of NFE is obtained by weighting the difference in income between the treated group and untreated one according to the following equation:

$$ATE = E(Y_1 - Y_0) = \frac{1}{N}\sum_{i \in N}(Y_{1i} - Y_0) \quad (2)$$

where ATE is the average treatment effect of NFE on the treated. Y1 is the outcome of the treated households, that is, the households that participate in rural business activities and Y0 the outcome of untreated households.

One has to note that propensity score matching is only valid under two main assumptions that are:

(i) Conditional Independence Assumption (CIA): this condition holds when after controlling for a set of covariates X the potential outcomes are independent treatment status.

$$(Y_1, Y_0) \perp D/X,$$

with the variable D representing the treatment status. D =1 for the treatment and D=0 for the non-treatment

(ii) Common Support Assumption (CSA): it suggests that for each value of the different covariates X, there is a positive probability of being untreated and treated.

$$0 < P(D = 1/X) < 1$$

3.2 Role of agriculture in farm households' participation in NFE

Households' preference to engage into non-farm enterprise is a discrete choice which takes the value 1 if they engage and 0 if not. They engage in non-agriculture enterprise to maximize their welfare captured through utility, a latent and unobservable variable. The utility of an individual taking a non-farm enterprise can then be expressed using an additive function of an observable component $y_i$and a random component e_i. This is captured through the equation 3 below:

$$U_i = y_i + e_i \ (3)$$

In the equation 3, y_i is the systematic utility which is a function of several predictors that can be formulated as a linear regression function as follow:

$$y_i = X_i\beta \ (4)$$

Finally, assuming that e_i is independently and identically distributed and that the probability of engaging into non-farm enterprise is a discrete choice that depends on a set of observable variables set X, the probability P can be predicted using the logistic regression expressed below:

$$P(E = 1) = \frac{\exp(X\beta)}{1+\exp(X\beta)} \ (5)$$

E is a variable indicating whether the considered individual is engaged in non-agricultural enterprise or not. β is unknown parameters to be estimated using likelihood model.

Following Abebe and Adesina (2017), the decision to engage in non-farm enterprise can be assumed to be function of not only a set of socio-economic variables such as age, sex, experience, household land and livestock ownership, transport and communication infrastructures, but also of an enabling environment such as government support in terms of extension services, credit facilities. In addition we account for push factors such as shocks. The table 1 below gives the expected signs of the potential explanatory variables of our model.

Tables 1: Expected signs of the variables of the model

Variable	Type of variables	Expected sign on non-farm engagement
Socio-economic variables		?
Gender	Dummy	-
Age of household head	Continuous	+
Production experience	Continuous	+
Active male HH member	Continuous	+
Active female HH member	Continuous	+
Household endowment		
Land size	Continuous	-
Livestock size	Continuous	-
Rural support		
Distance to district market	Continuous	-
Access to credit	Dummy	+

Land rights variables		
Land ownership	Dummy	+
Shocks		
Shock (Idiosyn.)	Dummy	+
Shock (Geogr.)	Dummy	+
Shock (Price)	Dummy	+
Shock (other)	Dummy	+

Source: Author from literature review

3.3 Data

The data to be used in this study are the Living Standards Study Measurement- Integrated Surveys on Agriculture (LSMS-ISA) data. This database results from nationally cross-sectional survey conducted by the World Bank with the help of national statistical offices. The survey consists of three main questionnaires: a communal questionnaire, an agricultural questionnaire and household questionnaire. The communal Survey collects community –level information including access to public services, social networks, governance and retail prices. The agricultural questionnaire collects information on crop production, storage and sale, land holding, farming practices, input use and technology adoption, access to and use of government services, infrastructure and natural resources, livestock and fishery. As for household questionnaire, it collects information related to household demographics, migration, education, health and nutrition, food consumption and expenditure, non-food expenditure, employment, non-farm enterprises and further income sources, dwelling conditions, durable assets, and participation in projects and programs. All surveyed households have been geo-referenced. The survey covered 34,264 households among which 8,145 were from urban zone and 27,119 from rural zone. This study focuses on households living in rural area.

4. Results and discussion

4.1 Descriptive statistics

Table 2 presents the descriptive statistics of the data to be used in the empirical estimates. Looking at these statistics one notes that 47% of farm households engage into NFE. They indicate also that the geographic covariate shocks are the most important external shocks to with farm households are exposed. They account for 49.52% of the overall shocks threating the households' activities. Active male member number is superior to active female number according to these data. The average household head age is 46. Households' members have to travel 7 kilometers before having access to district market.

Table 2: Summary of the descriptive statistics of the data

Variable	Mean/ Frequency	Std.Dev.
Entrepreneurship	0.47	0.12
Socio-economic variables		
Gender	0.72	0.44
Age of household head	46.22	15.54
Production experience	3.67	3.06
Active male HH member	1.34	0.77
Active female HH member	1.29	0.83
Household endowment variables		
Land size	0.89	0.67
Livestock size	3.90	2.34
Rural support variables		
Distance to district market	7.34	3.43
Access to credit	0.25	0.43

Variable	Mean/ Frequency	Std.Dev.
Land rights variable		
Land ownership	0.25	0.17
Shocks variables		
Shock (Idiosyn.)	26.82	10.3
Shock (Geogr.)	49.52	7.45
Shock (Price)	23,66	5.17
Shock (other)	2.07	1.15

Source: Author from LSMS-ISA dataset

4.2 Results and discussion

❖ ***Agriculture practice and NFE***

We are firstly interested in this paper in establishing whether operating as a farmer provides some positive externalities that boost the uptake of rural non-farm entrepreneurship. The results of the logistic regression presented in the table 3 below help us to address this objective. When one looks at these results, he can note that we do not have any reason to think that the variable farm experience does explain farm household's participation into non-farm enterprise. Consequently, we can assert from these results that initiative to run NFE of farm households in rural Burkina is govern by factors other than farming activity. Such a result is not surprising since agricultural policy of the country does not include explicit NFE component. Going further in the analysis we note that factors explaining rural NFE include shocks, livestock size, age of household head, active female household members and land size and land ownership.

As one could have expected, there is positive association between the likelihood of enterprise operation and risks (shocks) but the effect diverge regarding the type of shock. Indeed, the idiosyncratic shock reduces the probability of engaging into NFE in rural Burkina by 0.01 while the geographic shock increases it by 0.02. As for price shock, it reduces the probability of participation into NFE by 0.01.

Livestock size increases the probability of rural business initiative. This is so because this type of asset can be used as collateral for getting loans from financial institution for non-farm enterprise engagement. The age of the head of the household reduces the likelihood of NFE. This means that older head of households are more risk averse compare to their counterpart younger household head. The number of active females in the household also drives farm household engagement into NFE. This is the result of the division of labor within rural areas which results in male-dominated farm activities leaving NFE for women. Increase in land size reduces the propensity of undertaking non-farm enterprises. This means that rural farm households tend to specialized in agriculture and do not engage in NFE with the increase of farmland size.

In addition, the results teach us that on average, a farmer whose land rights are perfectly secured is more incited to engage into non-farm activities. This happens likely through financial inclusion and investment channels. Indeed, secured land allows farmers to have access to credit for any other activities. Also, as it is well demonstrated, farmer with secured land is incited to resort to compost, chemical fertilizers and phytosanitary products which translate into better productivity, giving the farmer more degree of freedom to finance off farm activities.

Table 3: Logistic regression results

Variables	coefficients	probability
Entrepreneurship initiative is the dependent variable		

Socio-economic variables		
Gender	0.03	0.44
Age of household head	-0.01***	0.03
Production experience	0.01	0.19
Active male HH member	-0.09	0.17
Active female HH member	0.01**	0.03
Household endowment variables		
Land size	-0.01*	0.07
Livestock size	0.10***	0.00
Land rights variables		
Land ownership	0.05***	0.03
Rural support variables		
Access to credit	0.15	0.43
Distance to district market	-0.18	0.06
Shocks variables		
Shock (Idiosyn.)	-0.01**	0.03
Shock (Geogr.)	0.02**	0.00
Shock (Price)	-0,01*	0.09
Shock (other)	0.02*	0.05

Source: Author estimates, 2018

- ***Households' engagement in NFE and welfare***

Table 4 below summarizes the results the propensity score results. These results reveal that household participation in non-farm activities contributes to per capita income improvement as well as the increase of the overall household income. Indeed, per capita income for farming households participating in business is 49 percent higher compare to the per capita income of non-participant households. In terms of household total income, the participant households have income 47 percent higher compare to the nonparticipants. These results clearly make sense since households that engage into NFE in addition to farming diversify income sources and smooth more the household income. These results confirm the studies by Nagler and Naudé (2017) in six Sub Saharan African countries and Abebe and Adesina (2017) in Ethiopia.

Table 4: Impact of participation in rural NFE

		PSM results	
Outcome variables	**PS-regression**	**Nearest neighbor**	**Kernel**
Household income (log)	0.47 (0.10)	0.62 (0.16)***	0.56 (10)***
Per capita income (log)	0.49 (0.11)	0.61 (0.16)**	0.58 (10)***

Source: Author estimates, 2018

5 Conclusion

In order to identify ways of fuelling rural economic transformation in Burkina Faso, this study has analyzed the impact of non-farm enterprise initiative on household income and has assessed whether households operating in agriculture acquire certain positive externalities that strengthen their likelihood of moving towards rural non-farm enterprises. Relying on the data of the Living Standards Study Measurement- Integrated Surveys on Agriculture (LSMS-ISA) of the World Bank and base on logistic regression and propensity matching score technique, the finding of this paper lead us to conclude on the one hand that participation in agriculture does not have any influence on the likelihood of farm household engagement in NFE and on the other hand, that NFE can help transform rural economy. Because the absence of association between agricultural practice and participation in NFE for a household is mainly the result of the agricultural policy oriented towards agricultural

productivity increase, the findings of this study call for the explicit inclusion of a rural non-farm enterprises development component into agricultural policies and programs. Such component could target the enhancement of the capabilities of farm households to be entrepreneurial. We refer entrepreneurship development as the process of increasing entrepreneurial skills and knowledge through formal training and institution building programs. It should aim to broaden the entrepreneurial base to accelerate business creation. It targets individuals who want to start or develop an activity by focusing on growth potential and innovation.

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