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# Testing Gender Productivity Difference with Informal Enterprises Data: A Case Study of Burkina Faso

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## Abstract

In the literature, we have seen results stating that women are less efficient than men in entrepreneurship. In this chapter, we have used data of informal enterprises in Burkina Faso to test gender productivity difference. Our data support the assumption that men's enterprises employ and carry out more income than women's enterprises. Nevertheless, women's enterprises are technically more efficient and stable than men's enterprises. We have also found out that to succeed in entrepreneurship, it is profitable for women to be young. However, men need to get more experiences in order to become efficient in informal entrepreneurship.

**Keywords:** gender, informal enterprises, productivity, Burkina Faso

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## 1. Introduction

In the past, economists focused themselves on identifying factors that have been determining women's participation to labor market [1, 2, 3]. Nowadays, robust responses have been provided to this question. It has been shown that women are less represented among owners of big formal enterprises [4, 5]. Most of them are owners of small and medium-sized enterprises (SME) especially in developing countries (PED) [6]. If presently, the debate on the determinants of women's participation to entrepreneurship seems to be ended, questions on their SMEs' productivity, dynamism, and survival are still topical.

Theoretically, the question of efficiency of enterprises run by women should not be subjected to great debates. Etymologically, economy is defined as the art of managing well a home, that is

to say more precisely the ability to have a more efficient internal organization. Now, it is known that a woman is the right person to manage a home. For example, in Burkina Faso, there is a common saying that goes as: "Paglayiri," meaning "there shall never be a home without a woman." This implies that if the economist's first objective is to avoid wastes, everyone who agrees with this economy's definition says likewise that, a woman would be more efficient than a man in managing economic affairs.

Women have not yet got the opportunity to show their economic know-how because they have long been discriminated on the labor market [2, 7]. Even if now, this discrimination is no more too obvious, there are still certain types of employments that they cannot afford to fill [8]. The importance of female entrepreneurship would then lie in its capacity to reduce discriminations against women on the labor market. Welter et al. [9] show that economic sectors whereby women are owners of private enterprises are sectors hiring more women. However, women's capacity to create and manage dynamic jobs supplying SMEs for their counterparts is often limited by cultural and religious factors [10]. This implies that it will be erroneous to draw conclusions of a woman's performances in entrepreneurship without considering institutional factors' influences. In developing countries, informal institutions prevent women to fully and freely take part in the private and individual process of wealth accumulation [11]. These informal regulations or laws contribute to highlight discrimination against women in wages rate setting and on labor market in general [12, 13]. According to Pressman [14], these same informal institutions keep households run by women in poverty.

Therefore, even if women are predisposed to be more efficient than men in the economic arena, formal or informal institutional norms that have kept women out of the labor market for a long time could in the end damage their economic efficiency. For example, obligation for women to always stay at home to care for children (in some developing countries) would contribute to reduce their motivations to commit themselves to female entrepreneurship [10, 15, 16]. Udry [17] notes that in households run by men, about 6% of the output of the plot of land farmed by women is lost due to a bad distribution of production inputs in their disfavor.

Setting up a business in developing countries has always been difficult. The difficulty in undertaking stems mainly from the market's failure. Access to credit seemed to be the biggest of these constraints. When we look particularly into this difficulty, we realize that women are the most constrained [18–20]. It would then be plausible to justify the weak performances experienced by enterprises run by women through their inability to acquire more physical capital due to credit access' constraints. Fafchamps et al. [21] show that even if credit access' constraints limit women's capacity to increase their investment in physical capital, this does not explain why they are less efficient than those run by men. Other case studies, having been carried out by De Mel et al. [22] in Sri Lanka, Banerjee and Sendhil [15] in India and Karlan and Zinman [23] in the Philippines have also proven that the difference in terms of equipment would not explain alone the difference of productivity observed between women's and men's enterprises.

Lonstreth et al. [24] as well as Brush [25] think that women's enterprises are less profitable than men's because the concern of maximizing profit does not appear in their objective function. They create small informal production units just to busy themselves or to have a little financial and economic freedom. As for Minguez-Vera and Martin [26], they justify women's enterprises' weak

performances by the fact that women take less risk than men when they are enterprises managers. Broadly speaking, Amin [27] points out that labor productivity and the size of women's informal enterprises are by far inferior to those run by men. The output per capita of worker in women's enterprises represents only 76% to the one of men's enterprises. Concerning the size, the author thinks that men's enterprises are 61% bigger than women's enterprises. It even seems that these results can be generalized in the case of formal enterprises. Brush et al. [28] show that women's formal enterprises generate an average income representing only 26% of men's enterprises income. Through a study on 26 transition-state countries' data, Sabarwal and Terrell [29] reach the result stating that women's enterprises are less profitable than men's enterprises.

Even if everything leads to believe that men are more efficient than women in businesses, some reports invite us to relativize these results. First, a woman works less for example in an enterprise and more in housework. In certain parts of the world, institutional constraints hinder them from being more educated compared to men. Second, when we study women's enterprises' productivity compared to men's, it needs to be carried out by using data collected in the same field of activity. Chirwa [8] and Masters and Meier [30] assess that in developing countries, women practice less profitable and less risky economic activities. In any case, we must know that the above constraints will not and cannot justify by themselves the productivity differences observed between women and men in entrepreneurship. According to Amin [27], these factors do not explain more than 30% of the productivity difference observed between them.

Other justifying elements of this productivity difference have also been highlighted. For example, men's enterprises are often family firms bequeathed by parents. As women rarely benefit from inheritance in certain regions of the world, this would explain why their enterprises are less experienced than men's enterprises. Other authors explain women's coming to business not to make profit but for other reasons which vary rapidly from a country to another. Women from poor households engage themselves in economic activities to support their husbands in family expenditure [31, 32]. The fact that some women reach a higher level of education motivates them into practicing entrepreneurship [33, 34]. The deplorable thing is the fact that these latter practice mostly in informal economic activities [35, 39]. For example, in developing countries, average 60% of working women hold an informal job. In Sub-Saharan Africa, 84% of women practicing an economic activity work in a nonagricultural informal sector to 63% for men [40].

According to Nelton [41], women do not seek to maximize profit, they are rather concerned with the quality of their enterprises' output. This helps us to understand why their enterprises grow a little slower than men's [43, 44]. This idea has been seen otherwise by Rosa, et al. [45]. These authors say that women do not seek to increase the size and/or the number of employees of their enterprises, they rather seek to perform their job well. Thus, one should not analyze women's enterprises only in terms of profitability, but one should also and especially consider their efficiency. Brush [25] thinks that women are also efficient as men except that they do not know how to cheat in business. This is especially true as Dollar et al. [46] have shown that countries having a lot of women in their management departments are less corrupt. Johnson and Storey [47] have also shown that women's enterprises are more stable than men's on the long run. Rietz and Henrekson [48] show that even if men's enterprises outsell women's, there would not be any difference between them in terms of profitability.

The test of productivity difference between women's enterprises and men's enterprises is still then topical. Most of the previous studies were mainly limited by using domestic data that have covered several fields of activities. The reproach to these types of data is to have left out the fact that fewer women are often represented in some sectors. Even if we make use of a small sample like Rosa et al. [45] and Holmquist and Sundin [35], we have the advantage of possessing data collected in sectors of activity whereby women and men are frequently seen as owners of enterprises.

We use primary data collected in Ouagadougou to analyze informal enterprises' performances with particular attention to gender. Our data have been collected from very small production units in such a way that their owners are almost poor. Thus, we shall make gender correspond only to sex. The main question we shall try to answer is as follows: After controlling by socioeconomic variables of the owner and by the characteristics of the business environment as well, is it possible to justify SMEs' productivity difference and dynamism through gender?

In Ouagadougou, eight out of ten households get their income from an informal production unit [36]. When we consider the informal sector's actors, we realize that women are well represented. We think that if their activities were not profitable, their number would have decreased with time. According to INSD's statistics, in the informal sector in Ouagadougou, 47.3% of enterprises are set up and managed by women. However, on the level of employees, men were more paid than women. But, this is justified by the fact that men's working hours (60 hours per week) are longer than women's (51 hours per week). The objective of our analysis is consequently to test that women's enterprises are more dynamic and more efficient than men's enterprises. In order to succeed, we will analyze issues of enterprises' growths through Evan's model [37]. To derive these enterprises' technical efficiency scores, we will use the stochastic frontier model by Mayers and Liu [38].

At the end of our analyses, we realized that our data support the assumption stating that women's enterprises grow more rapidly than men's enterprises. In general, we have also noticed that women's enterprises are younger than men's enterprises. In average, women's enterprises technical efficiency is higher than men's enterprises. Nevertheless, men's enterprises employ more workers than women's enterprises.

The remaining of the chapter is segmented as follows. Section II briefly recalls a few empirical results on the determinants of productivity difference between women and men. Section III presents the models of the dynamism analysis and the technical efficiency and the data as well. Section IV analyzes and discusses the results. The last section sums up the analysis's results and makes a few recommendations to ensure the survival of women's enterprises.

## 2. Literature review on gender productivity difference

In literature, all the results seem to corroborate the fact that men's enterprises perform better than women's enterprises both in developing and developed countries. Johnson and Storey [47] show that from 289 enterprises' data in Great Britain, women's enterprises are smaller than men's enterprises. From 400 enterprises' data from three different industrial sectors, Kalleberg

and Leicht [43] show that determinants of survival and success of enterprises in Indiana (USA) were independent from the owner's sex. Other studies having been carried out in developed countries have also shown that women's enterprises produce less incomes and even employ fewer workers than men's enterprises [25, 49]. Even if it is accepted that there is a difference in women's and men's enterprises' output, Kalleberg and Leicht [43] estimate that this productivity difference is overestimated when one uses national data. To reduce this overestimation, these authors recommend the use of data of the same sector of activity.

Certain studies carried out on data collected in developed countries have often supported the assumption that in some cases, women perform better than men. Carter and Cannon [42] have shown that even if women's enterprises focus too much on qualitative aspects in a short term, quantitative performance indicators are also their concern on the long run. Rosa, et al. [45] have reached the results stating that when we consider small-sized enterprises (1–5 employees), we realize that women's enterprises grow faster while for medium enterprises (more than 20 employees), men's enterprises grow faster.

Education is the variable determining the survival of women's enterprises in Africa. Chirwa [8] has got to the result that education improves informal enterprises' profitability. Akouwerabou [50] has obtained an opposite result on a case study of Burkina Faso's informal enterprises. The author justifies the fact that education affects negatively enterprises' growth due to the fact that qualified owners are in the informal and looking for a job in the public service or in big enterprises. On data from Malawi, Chirwa finds out that women's enterprises grow faster than men's enterprises. This result is contrary to McPherson's findings [51] in the case of South Africa. Akouwerabou [50] from Burkina Faso's informal enterprises' data and Chirwa [8] have found a reversed U relation between the informal enterprise's profitability and its experience. This would signify that whether it belongs to a woman or a man, young enterprises grow less rapidly than the old ones.

Even if this seems to vary very quickly from a country to another, in Africa, we notice that on the scale of informal enterprises, women have more access to credit than men have. This is justified by the fact that microfinance is little developed, and it grants more credits to women than men in towns as well as in rural areas. In Malawi, Chirwa [8] finds out that women have more access to credit than men, while in South Africa, Abor and Biekpe [52] have got to an opposite result.

### **3. Methods and data**

In the current analysis, we seek to test the hypothesis according to which men-owned enterprises perform more than women-owned ones. The purpose of the chapter is to show that the outcomes (dynamism and technical efficiency) of men-owned informal enterprises are better than women ones.

#### **3.1. Data**

We use data collected within the framework of education production in informal activities. These data were collected by Western and Center of African Network for Research in

Education<sup>1</sup> and covered four activities branches in Ouagadougou. The informal sector activities covered by this survey are hairdressing salon, motor bike mechanics, sewing, and carpentry. In this study, we used only the data of hairdressing salon and sewing, which are the activities sectors where we meet men-owned and women-owned enterprises.

The survey was carried out in 2010 and related to 300 small production units in Ouagadougou. With the objective to prevent the production units to count in the same area, 60 informal production units were retained in each of the five districts of Ouagadougou. Informal production unit's number per sub-category of activity is retained according to the representativeness of each sub-category activity according to the data collected by INSD in 2001 in the whole of Ouagadougou town [53]. Collected information are related to the employees number (at the activity starting year and in 2010) and their socio demographic characteristics (age, education level, the type of leasing contract established with the landlord, number of lost working days by the unit members due to disease, etc.)

### 3.2. Model

From theoretical view, one can imagine that the efficiency of a microenterprise influences its dynamism and vice versa. Efficiency influences dynamism through the process of self-financing. When the micro enterprise is efficient, this helps it to achieve more cash flow and then more resource that will supply its self-financing. The past results (dynamism) of the enterprise also influence its current capacities through the process of learning by doing. A microenterprise that carried out good performances from the past must be able to do the same now. These relations may be summed up through the following system:

$$\begin{cases} dy_t = f(\text{effi}_{t-s}, x, z) \\ \text{effi}_t = g(dy_{t-1}, x, z), \text{ with } s \geq 2 \end{cases} \quad (1)$$

Where  $dy$  represents the dynamism or the enterprise growth,  $x$  the characteristics of enterprise,  $z$  the characteristics of environment where the enterprise is,  $\text{effi}$  measures the efficiency, and  $t$  the time.

The analysis of system Eq. (1) requires data of at least two periods. But, the data at our disposal are data of one passage. Consequently, we will replace  $\text{effi}_{t-s}$  by some proxies like most of loyal customers in the microenterprise's earnings. The system relations Eq. (1) form a system of sequential equations, and the equations can be estimated individually.

Evans [37] proposed to consider the enterprise growth as a function of its growth rate and its characteristics. The author estimates that the enterprise growth is mainly influenced by its initial size and age. Let  $G$  be the variable measuring the micro enterprise growth, we can write that:

$$G = \frac{S_{t'}}{S_t} = g(S_t, A)h(x, z) \quad (2)$$

<sup>1</sup>Akouwerabou et al., (2010) Microeconomic analysis of the impact of education on the job market in Urban district of Ouagadougou. <http://www.rocure.org/grants/2010/grants2010bf1.pdf>

In the relation Eq. (2),  $S_t$  represents the number of employees of the most recent year and  $S_i$  the number of employees at the enterprise's year of creation. By considering the logarithm of  $G$  and by carrying out a limited development of order two of  $g(\cdot)$  but by supposing that the function  $h(\cdot)$  is of the type  $h(x, z) = e^{Z\beta + \varepsilon}$ , we obtain:

$$\frac{\log(S_t) - \log(S_i)}{d} = \alpha_0 + \alpha_1 \log(S_i) + \alpha_2 [\log(S_i)]^2 + \alpha_3 \log(A) + \alpha_4 [\log(A)]^2 + \alpha_5 \log(S_i) \cdot \log(A) + Z\beta + \varepsilon \quad (3)$$

Where  $d$  is a normalization coefficient that helps to control the effect of enterprises' age difference,  $\varepsilon$  the term of error  $Z = [x; z]$ .

In the current study, we will suppose that  $Z$  contains variables such as education of the owner, the share of unknown customers in the enterprise's earnings, the number of the entrepreneurs' years of experience in its activity area, the number of inactive individuals dependent upon the entrepreneur, and the number of employees having a formal contract in the enterprise.

We suppose that the group of variables (entrepreneur's education, entrepreneur's experience in the domain and the number of employees who have a formal contract) have a positive influence on the dynamism of IPUs. As for the other two variables (share of unknown customers in the IPU's earnings and the number of unemployed supported by the IPU), we expect that they affect negatively the microenterprise's growth. When an entrepreneur of a microenterprise is supporting many inactive, the enterprise earnings are mostly used to satisfy family needs, which lower the capacity of self-financing. As the access to credit of microenterprises is very low, the use of enterprises' earnings to support social expenditure negatively affects enterprise growth. Likewise, when the enterprise has very few loyal customers, its earnings fluctuate more, given that the demand addressed to it is totally unpredictable.

**Table 1** descriptive statistics show that the number of employees varies between 1 and 8, and enterprises hiring the most are men's enterprises. This implies that women's enterprises grow less rapidly than men's with regard to employment. In average, women's enterprises hire five employees per year to six employees for men's enterprises. At the starting of their activities, men's enterprises even start with more employees than women's. However, women's enterprises are mostly younger than men's enterprises. Considering the level of education, we realize that men have slightly gained this capital than women. Even the most experienced entrepreneurs in their field of activities are among men.

Roughly speaking, we can say that we have a sample that is a bit like Chirwa's [8] in terms of human capital variables. In his study about Malawi, the author has got almost the same characteristics between women and men. Like Chirwa, we come to the conclusion that men outnumbered women in our sample. In fact, 66.1% of sewing and hairdressing enterprises managers having been surveyed are men. Women's enterprises' incomes depend more on their network of acquaintances. About 53% of customers of women's enterprises are people who know personally the manager, whereas 65.2% of customers of men's enterprises are unknown. We see here Okten and Osili's [54] findings stating that women's informal enterprises incomes are straightly linked to their relations network.

| Variables                                    | Sample |       |          |       |      | Women |       |          |       |      | Men  |       |          |       |      |
|--|--------|-------|----------|-------|------|-------|-------|----------|-------|------|------|-------|----------|-------|------|
|  | Obs.   | Mean  | Std. Dev | Min   | Max  | Obs.  | Mean  | Std. Dev | Min   | Max  | Obs. | Men   | Std. Dev | Min   | Max  |
| growth (dy)                                  | 215    | .06   | .09      | −0.15 | .60  | 53    | .05   | .06      | −0.06 | .24  | 162  | .06   | .09      | −0.15 | .60  |
| Log (number of employees at startup)         | 215    | .26   | .21      | 0     | .85  | 53    | .25   | .21      | 0     | .60  | 162  | .26   | .21      | 0     | .85  |
| Log (enterprise age)                         | 215    | .63   | .39      | 0     | 3.30 | 53    | .58   | .32      | 0     | 1.18 | 162  | .65   | .42      | 0     | 3.30 |
| Number of unknown customers                  | 215    | 60.74 | 28.09    | 0     | 100  | 53    | 47.08 | 28.88    | 0     | 90   | 162  | 65.22 | 26.41    | 0     | 100  |
| owner education                              | 15     | 8.45  | 4.47     | 1     | 19   | 53    | 8.2   | 2.62     | 3     | 19   | 162  | 8.51  | 4.93     | 1     | 19   |
| Inactive individuals who depend on the owner | 215    | 3.76  | 3.16     | 0     | 0    | 53    | 3.08  | 2.50     | 0     | 10   | 162  | 3.98  | 3.32     | 0     | 20   |
| Employees with a formal contract             | 215    | .08   | .28      | 0     | 1    | 53    | .06   | .23      | 0     | 1    | 162  | .09   | .29      | 0     | 1    |
| Entrepreneur's experience in the sector      | 215    | 10.77 | 6.28     | 0     | 35   | 53    | 8.51  | 4.51     | 0     | 23   | 162  | 11.51 | 6.59     | 0     | 35   |

Source: build by the authors.

**Table 1.** Descriptive statistics of variables used in the growth model.

For the estimation of the technical efficiency scores, we suppose that we have  $N$  firms ( $i = 1, 2, \dots, N$ ), each producing a certain quantity of output  $y_i$  (in logarithm) starting from a vector of input  $x'_i$  and the vector of the exogenous variables  $z'_i = [Z_i : (d\hat{y}_i)]$  exerting an influence on the inefficiency of the firm. Let us suppose that the unobserved border  $y^*$  is given by the relationship:

$$y^* = x'_i\theta + v_i \quad (4)$$

with  $v_i \sim N(0, \sigma_{v_i}^2)$  and independent of  $x'_i$  and  $z'$  and where  $\theta$  is the vector of the unknown parameters to be estimated. The effective output of each firm ( $y$ ) is equal to the potential output ( $y^*$ ) with an error ( $u_i$ ) whose distribution depends on  $z'_i$ . That allows us to write that:

$$y_i = x'_i\theta + v_i - u(z'_i, \delta), \quad \text{where } u_i(z_i, \delta) \geq 0 \quad (5)$$

i.e., the effective production is at most equal to the potential production. In relationship Eq. (5),  $u_i$  and  $v_i$  are independent and  $\delta$  is the vector of parameters of the function of the inefficiency. Conditioning by  $z'_i$  we also suppose that  $u_i$  is independent of  $x_i$ . We then consider thereafter that  $u_i \sim N^+[\mu \exp(z'_i\delta), \gamma_u^2]$ , where  $\gamma_u^2$  is the variance of  $u$ . By taking the natural logarithm, we obtain  $\ln u_i = \ln \mu + z'_i\delta$ . If we integrate this expression into Eq. (5), we then obtain the equation of the stochastic frontier of production that will be estimated:

$$y_i = x'_i\theta + v_i - (\ln \mu + z'_i\delta) \quad (6)$$

By writing  $\Gamma = \gamma_u^2 / (\gamma_u^2 + \sigma_v^2)$ , this report helps us analyze the contribution of the inefficiency to the total variance of enterprise output. This variable helps us determine the share of variability of the dependent variable stemming from technical inefficiency. When  $\Gamma$  is null, this implies that inefficiency does not contribute to explain the output variability.

The explanatory variables in relationship Eq. (6) are the labor ( $l$ ) and the capital ( $k$ ) in the function of production and the number of qualified employees, the number of lost working days by the enterprise through members' ill-health, and the potential risk that the entrepreneur assumes in his field of activity (*risk*). This variable is a binary variable that assigns a value of 1 if the IPU entrepreneur thinks that his field of business is too risky. The binary variable ICT assigns a value of 1 if the IPU possesses and uses a mobile phone. The access to credit is represented by *credit*, which is a dummy variable indicating by the value 1 that the enterprise has access to credit. Binary variables representing activities of hairdressing, and sewing, and the predicted variable of dynamism has also been introduced in the inefficiency equation.

We assume that the efficiency of a microenterprise increases with its number of qualified workers. This prediction is established on the hypotheses that theories of endogenous growth have expressed on the capacity of human capital to increase technical efficiency. However, increased levels of worker disease lead to less efficient enterprises. This hypothesis stems from the fact that the more the workers contract diseases, the less they work, thus leading to a decrease of the enterprise's productivity. Finally, we assume that the more the entrepreneur of

| Variables                     | Sample |       |          |      |      | Women |       |          |      |      | Men  |       |          |      |      |
|-------------------------------|--------|-------|----------|------|------|-------|-------|----------|------|------|------|-------|----------|------|------|
|                               | Obs.   | Mean  | Std. Dev | Min  | Max  | Obs.  | Mean  | Std. Dev | Min  | Max  | Obs. | Men   | Std. Dev | Min  | Max  |
| Log (sales)                   | 215    | 4.78  | .58      | 0    | 5.69 | 53    | 4.68  | .77      | 0    | 5.69 | 162  | 4.82  | .51      | 0    | 5.57 |
| Log (labor)                   | 215    | .48   | .19      | 0    | .90  | 53    | .46   | .19      | 0    | .78  | 162  | .48   | .19      | 0    | .90  |
| Log (capital)                 | 215    | 5.23  | .56      | 3.69 | 6.39 | 53    | 5.29  | .59      | 3.69 | 6.18 | 162  | 5.21  | .54      | 3.69 | 6.39 |
| Illness                       | 215    | 25.28 | 20.43    | 0    | 100  | 53    | 31.30 | 22.19    | 0    | 100  | 162  | 23.31 | 19.49    | 0    | 90   |
| Mobile phone                  | 15     | .94   | .24      | 0    | 1    | 53    | .91   | .29      | 0    | 1    | 162  | .95   | .22      | 0    | 1    |
| Credit                        | 215    | .06   | .24      | 0    | 1    | 53    | .11   | .32      | 0    | 1    | 162  | .04   | .20      | 0    | 1    |
| Hairdressing                  | 215    | .35   | .48      | 0    | 1    | 53    | .85   | .36      | 0    | 1    | 162  | .19   | .39      | 0    | 1    |
| Sewing                        | 215    | .34   | .47      | 0    | 1    | 53    | .15   | .36      | 0    | 1    | 162  | .39   | .49      | 0    | 1    |
| Risk                          | 215    | .39   | .49      | 0    | 1    | 53    | .45   | .50      | 0    | 1    | 162  | .37   | .49      | 0    | 1    |
| Number of qualified employees | 215    | .08   | .28      | 0    | 1    | 53    | .06   | .23      | 0    | 1    | 162  | .09   | .29      | 0    | 1    |

Source: build by the authors.

**Table 2.** Descriptive statistics of variables used in the stochastic frontier model.

the micro-enterprise believes that his business is risky, the more efficient his enterprise is. If the entrepreneur believes that his business is too risky, he will expend more effort to minimize this risk. The efforts of minimization of risk are later converted into profit productivity.

**Table 2** shows us that men's enterprises generate more incomes than women's enterprises. Nevertheless, women's enterprises have got more physical capital than men's enterprises. Women's enterprises are mostly practicing in sewing and their employees contract diseases more than men's employees. A great proportion of women (45%) thinks that doing business in the informal is more risky to 37% of men. Broadly speaking, employees in women's enterprises are more skilled than men's enterprises.

Finally, the relationships that will be estimated are relationship Eq. (3) for the dynamism of the microenterprise and relationship Eq. (6) for the efficiency determinants. These estimations have been carried out with STATA 12.

## 4. Econometric results

In this section, we present and discuss econometric results. In the first section, we discuss results concerning determinants of enterprises' growth. The second subsection presents and discusses determinants of enterprises' technical efficiency.

#### 4.1. Growth of enterprises

By lining up enterprise's growth and labor, we get a reversed u-relation between growth and women's age. Young women's enterprises grow more rapidly. In fact, the results show us that women aged less than 35 years are more dynamic than older women. As for men, starting an enterprise with a high number of employees negatively affects the enterprise's dynamism. However, unlike women, young men's enterprises grow less rapidly than older men. With regard to **Table 3** significant coefficients, we can also say that men aged more than 25 years are capable of setting up and manage well a medium-sized informal enterprise. Men's enterprises giving formal contracts to their employees are also more dynamic.

#### 4.2. Enterprises' technical efficiency

**Table 2** has shown that women's enterprises have got more physical capital than men's enterprises. Based on **Table 4** results, we can affirm that women's enterprises are overequipped. Women's enterprises' level of equipment is higher than the optimal threshold which they needed. Both for women and men, we shall keep in mind that labor contributes more to improving productivity compared to capital. Our assessments show that credit does not affect men's technical efficiency. Nevertheless, it harms women's enterprises' technical efficiency. This

| Variables                       | Sample       |            | Women        |            | Men          |            |
|---------------------------------|--------------|------------|--------------|------------|--------------|------------|
|                                 | Coefficients | std. error | Coefficients | std. error | Coefficients | std. error |
| Log (labor at starting)         | −0.234***    | 0.073      | −0.0839      | 0.130      | −0.434***    | 0.0869     |
| Log (labor at starting) square  | −0.140       | 0.102      | −0.0774      | 0.243      | −0.0575      | 0.112      |
| Log (age)                       | −0.142***    | 0.034      | 0.296***     | 0.0887     | −0.270***    | 0.0412     |
| Log (age) square                | 0.024**      | 0.012      | −0.296***    | 0.0886     | 0.0590***    | 0.0137     |
| Log(Age)* Log (labor at startin | 0.200***     | 0.061      | −0.00546     | 0.136      | 0.377***     | 0.0690     |
| Education_head                  | 0.001        | 0.004      |              |            | 0.00336      | 0.00378    |
| Unknown_customers               | 0.0002       | 0.0002     | 8.83e-05     | 0.000283   | 4.85e-05     | 0.000225   |
| Age*Educ_head                   | −0.0001      | 0.0001     |              |            | −0.000102    | 0.000117   |
| Unemployed                      | 0.003*       | 0.002      | −0.00377     | 0.00324    | 0.00508**    | 0.00220    |
| Experience                      | −0.0001      | 0.001      | 0.00343      | 0.00209    | 0.000270     | 0.00110    |
| Number of formal employees      | 0.0513***    | 0.018      | 0.0371       | 0.0326     | 0.0603***    | 0.0199     |
| Constant                        | 0.142***     | 0.021      | 0.0162       | 0.0268     | 0.223***     | 0.0304     |
| Observations                    | 215          |            | 53           |            | 162          |            |
| R-squared                       | 0.354        |            | 0.462        |            | 0.472        |            |

**Source:** build by author; **Notes:** results of the estimation of growth rate.  
**Legend:** \*\*\*, \*\* and \* imply significance at 1%, 5%, and 10%, respectively.

**Table 3.** Determinants of the informal enterprises growth.

| Variables            | Sample       |                   | Women        |                   | Men          |                   |
|----------------------|--------------|-------------------|--------------|-------------------|--------------|-------------------|
|                      | Coefficients | std. error robust | Coefficients | std. Error robust | Coefficients | std. error robust |
| Production function  |              |                   |              |                   |              |                   |
| log_lab              | 0.295**      | 0.135             | 1.357***     | 2.23e-08          | 0.248***     | 1.39e-08          |
| log_capital          | 0.119**      | 0.0487            | -0.0503***   | 5.45e-09          | 0.0436***    | 6.24e-09          |
| Constant             | 4.479***     | 0.235             | 5.061***     | 1.97e-08          | 5.146***     | 3.87e-08          |
| Efficiency function  |              |                   |              |                   |              |                   |
| illnes               | -0.0122      | 0.00847           | -0.0308**    | 0.0153            | -0.0164***   | 0.00538           |
| m_phone              | 0.812*       | 0.472             | 2.687***     | 0.705             | 0.232        | 0.481             |
| credit               | -0.176       | 0.462             | -0.935*      | 0.542             | -0.0616      | 0.470             |
| coif                 | 0.716*       | 0.414             | 0.241        | 0.360             | 0.123        | 0.224             |
| age                  | -0.0743***   | 0.0270            | -0.118***    | 0.0457            | -0.0251      | 0.0153            |
| risk                 | 0.691**      | 0.308             | -1.007**     | 0.508             | 0.851***     | 0.177             |
| contrat_formel       | -1.489*      | 0.781             | -3.041***    | 0.850             | -0.253       | 0.352             |
| dy                   | -2.504       | 3.141             | 5.771        | 3.931             | -3.256       | 2.600             |
| Constant             | -0.0122      | 0.00847           | 1.803        | 1.731             | 0.255        | 0.777             |
| Function of variance |              |                   |              |                   |              |                   |
| $\Gamma$             | -3.925***    | 0.252             | -35.92***    | 0.115             | -36.14***    | 0.0686            |
| Observation          | 215          |                   | 53           |                   | 162          |                   |

Legend: \*\*\*, \*\* and \* imply significance at 1%, 5% and 10%, respectively.  
Source: build by author.

**Table 4.** Determinants of enterprises productivity and inefficiency.

result is in contradiction with the result of Marlow and Patton [55] who have shown that access to credit improves women's informal enterprises' performances. The fact of managing an enterprise in a very risky field of activity lessens women's technical efficiency. However, doing business in a risky field of activity is profitable to men. When employees in the enterprise lose working hours due to sicknesses, it negatively affects enterprises' productivity irrespective of the owner's gender.

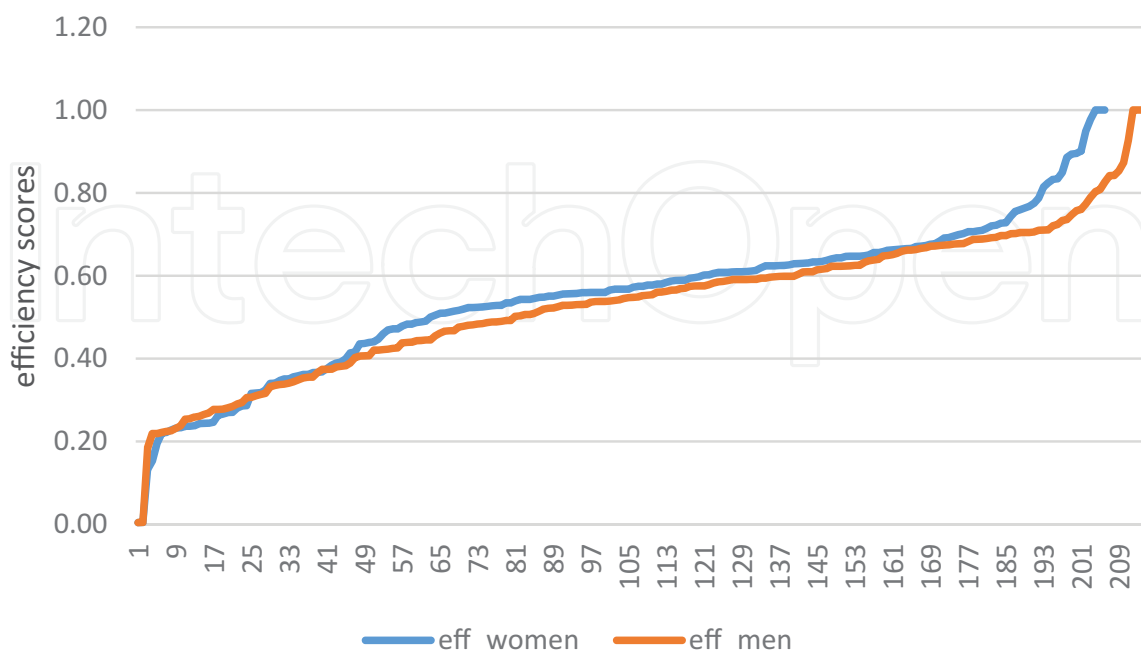
### 4.3. Discussion

In our sample, women's enterprises are not less equipped than men's enterprises contrary to the data of De Mel et al. [22] and Banerjee and Sendhil [15]. Nevertheless, we find out that they are inefficient in choosing the level of production factors. Women overinvest in physical capital with regard to the size of the enterprise. Moreover, contrary to the findings of Wasihun and Paul [20] who estimate that women have less access to credit compared to men, we have found out that women's access rate to credit is higher than men's. During the last 10 years, microfinance has been developed rapidly in developing countries. But, it has been shown that

in Burkina Faso, microfinance institutions grant more credit to women than men [56]. Our data actually corroborate Minguez-Vera and Martin [26] who said that women are less efficient compared to men in risky fields of activities. However, we have found out that labor is more productive in women's enterprises contrary to Chowdhury and Amin result (2011).

Women's access to credit does not help them to increase their enterprises' productivity. Instead of using the credit to facilitate their enterprises' activities, women often tend to use the credit for consumption items. They get into debt on behalf of their enterprises to insure their families' consumption expenses. Then, they use their enterprises' incomes to pay the credit back [57]. This explains why women who have access to credit are less productive.

**Graph 1** shows that in average, women's enterprises are as efficient as men's enterprises. The curve representing women's enterprises level of technical efficiency is even sometimes on top of men's own. This implies that women are as efficient as men in the informal sector [25]. Thus, by limiting oneself to sales analysis, one can say women are less efficient than men (**Table 2**). Authors like Cuba et al. [49] have drawn conclusions from this type of information that women are less efficient than men. But, in fact, even if women get fewer incomes in comparison to men, they are more efficient than men. **Table 1** descriptive statistics have even shown that their enterprises are more stable than men's enterprises. This table's data show that the minimum growth of women's enterprises is  $-.06$ , whereas men's enterprise is  $-.15$ . This implies that enterprises having laid off more employees, since their creations are found among men's enterprises. This result has also been highlighted by Johnson and Storey [47]. From our view point, the fact of women becoming less skillful is deplorable in the enterprise management as they become older.



**Graph 1.** Technical efficiency scores with regard to the gender of the promotor. Source: Build by the authors.

## 5. Conclusion

Women have long been hindered from setting up and managing their own businesses. After several dozens of political and economic years of efforts, some women have got freedom to do business. Today, the new concern of economists is to know if women are less efficient than men. The first analyses have actually got to the findings that men's enterprises are more profitable than women's enterprises [58, 59].

In this chapter, we have used data from informal enterprises to contribute to this debate. Studies that have shown that women are less efficient than men have gone under a lot of criticisms regarding the quality of data they have used. These studies have mostly used data, whereby women and men do business in different fields of activities. The difference of the sector of activity then prevents to clearly see the impact of gender on performances. Others have also sometimes used data, whereby men run formal enterprises, while women are in the informal. We have used data, whereby women and men practice the same activities.

We have found out that it is more profitable for a woman to set up and manage an enterprise while she is young. However, young men succeed less in entrepreneurship. Unlike then to women, men need to get more experiences in their sector of activities before becoming efficient. This allows to justify why in our sample, women's enterprises are younger than men's enterprises (**Table 1**). Women's enterprises employ less workers than men's enterprises and get less income than men's enterprises.

Women's enterprises are however more efficient than men's enterprises. Women's enterprises technical efficiency scores are slightly superior to men's enterprises scores. Moreover, in terms of vulnerability, women's enterprises are more stable than men's enterprises. We have found out that the frequency of redundancy is higher in men's enterprises.

In order to succeed in entrepreneurship, we advise women to start when they are younger. Even if the development of microfinance in developing countries facilitates them the access to credit, it will be profitable that women index the request of credit to their enterprises' needs. In fact, they should not apply for credit given the easy access to credit, but they should rather do it when their enterprises really need it. Therefore, to better understand why the access to credit negatively affects women's enterprises' technical efficiency, it will be profitable to investigate on the determinants of the credit application by entrepreneur women in the informal sector.

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