Les entreprises formelles sont-elles plus productives que les entreprises informelles? une étude auprès de microentreprises au Maroc

Are formal firms more productive than informal ones? a study among microenterprises in Morocco

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Abstract

This paper aims to study the behaviour of formality of 390 microenterprises (ME) and its impact, based on data from a survey that was conducted in the city of Casablanca. We explain, on one hand, the choice of the level of formality using an Ordered Probit model. On the other hand, we analyse the effect of registration and other factors on productivity, using the Stochastic Frontier Approach which considers the risk of self-selection.

The results from the first model emphasize the effect of the entrepreneur's demographic and socio-economic characteristics as well as those related to the ME and its environment.

The Stochastic Frontier Approach allowed us to verify the existence of a differentiated efficiency bared on the level of formality. It also appears that the education level of the owner, gender and age of the employees, the main reason for business creation and its size, impact productivity.

Keywords

Formality, informal sector, productivity, efficiency, microenterprises, Stochastic frontier analysis.

Introduction: context and objective of the study

❖ Context

Before the modernization of economies and the emergence of the sovereign role of States, the informal economy was a rule and not an exception. Today, the informal sector exists in all countries (with different degrees of importance); its magnitude is more evident in developing economies.

The study of the informal sector is useful to identify its importance and specificities, as well as to analyse its actors' behaviour. It is also important to understand its links with the formal sector and the conditions for its formalization.

In Morocco, the strong demographic growth since the 60's and the rural exodus led to a very important urbanization[1]. The share of the urban population has thus increased from 29.1% in 1960 to 60.3% now. Since economic growth has not been able to absorb all entrants into the labour market (especially in 1999, the urban unemployment rate was 22% against 5.4% in rural areas), the country witnessed a progressive development of informal activities.

Policies implemented as part of the structural adjustment plan that was adopted between 1983 and 1992 and agreed upon with the International Monetary Fund (IMF) and the World Bank (WB), helped restore the main global balances (reduction of budget deficits and the balance of payments, as well as the pace of inflation). However, they did not put the country on paths of sufficient growth: the rates achieved were around 4% on average, but the rate required for countries at the same level of development is around 7% (3% to absorb the flow of newcomers into the labour market, 2% to absorb the stock of unemployed and disguised unemployed (poverty) and 2% to account for normal productivity gains). These conditions have increased the propensity for self-employment, often synonymous with informal activities. According to the results of the National Survey on the Informal Sector, carried out by the HCP, the number of Informal Production Units (IPU) reached 1.68 million in 2013 instead of 1.55 in 2007. This number was 1.02 million in 1999, which translates to nearly 40,000 and 19,000 new units created annually during the periods 1999-2007 and 2007-2013.

The informal sector is often perceived as an "area of freedom" in which IPU escape formalizing the activity, making competition less equitable (Tanzi, 2002). This vision implies that IPU have advantages over formal units. However, De Soto (1994) explains that operating in the informal

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[1] The growth rates of the total and urban population increased from 2.5% and 4.3% between the 60's and 70's to 2.6% and 4.4% between the 70's and 80's. See the website of the Haut- Commissariat au Plan (HCP), the institution in charge of official statistics in Morocco. www.hcp.ma

sector is always associated with an additional cost. In other words, IPU require additional costs so that they become invisible, including the payment of briberies to the government agents, less recourse to bank funding and the obligation to keep a small size.

One of the most associated specificities with informal work is low productivity. A large size of the informal economy will have a negative impact on total factor productivity. Several studies have shown that informal firms are less productive compared to formal units (Perry et al., 2007, Taymaz 2009, De Vries 2010, Báez-Morales 2015). This productivity gap has been estimated at 30% in 7 countries in Latin America and the Caribbean and 30% to 40% in Turkey (McKinsey Global Institute, 2003). However, these estimates ignore the risk of self- selection among the sample of studied firms. In other words, the most productive units could be those oriented towards the formal sector, because they will be able to support the costs of formalization[2]. As a result, they will benefit, for example, from access to formal funding, social security, public procurement, and government support programs.

> ❖ **Informal sector in Morocco: an overview of the characteristics of enterprises and entrepreneurs**

Morocco, like other countries at the same level of development, is characterized by a large share of enterprises operating in the informal sector. The results of the National Survey on the Informal Sector conducted in 2013-2014 conducted among 10 085 units, show that informal enterprises employ 36% of the non-agricultural labour force, but contribute only 12% in GDP.

With less than 9% of women, IPU management is poorly feminised, except for those in home-based activities, where the proportion of women is 60% respectively. As for the level of education of entrepreneurs who run informal businesses, the majority have a very low level. More than two thirds attended pre-school or primary education, 28.4% secondary education and 3.3% higher education. 83% of the creations of informal businesses in Morocco are the result of an individual initiative, while the rest is the result of a family and other group action. Before starting their businesses, 75% of informal entrepreneurs were employed, 12% students, 8.3% unemployed and 3% housewives. Of those who already had a professional activity, 90% worked in the informal sector as employees or self-employed.

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[2] The work of Van Biesebroeck (2005) and Wagner (2007) focused on the relationship between export and productivity. On one hand, the authors mention that opening to the international market allows companies to acquire knowledge about new production methods, and thus to optimize their process to become more productive. On the other hand, they discuss the possibility of self-selection, where exporting firms are simply those with the best productive performance.

To obtain their supplies, informal enterprises self-supply 71% of their needs and 18% of the formal sector, 7% of households and 1.4% of the public sector. To sell their products, households constituted 80% of the main IPU customers. With 103.346 billion MAD of production, the added value created by the informal sector represents, in 2013, 12.6% of the national added value. In terms of employment, the IPUs employed 2.4 million people and distributed MAD 11.4 billion in wages corresponding to nearly 4% of national wage compensation. In 2013, at the origin of the production of 185 billion MAD of goods and services, with an average annual increase of 7.9% since 2007, largely achieved by trade activities. On the fiscal side, more than 80% of all informal units report that they do not comply with their tax obligations.

❖ **Objective of the study**

In this paper, we aim to understand the impact of informality on the performance of Microenterprises (ME). We assume that ME are less productive than formal ones. For this, we first analyse the determinants of the decision to work in the formal sector in the city of Casablanca. The choice of the latter is justified by the large number of IPU that operate there. We also measure the gap in productivity between formal, semi-formal and informal production units and study its causes. This step considers the problem of self-selection insofar as we use to the instrumentation of the variable related to the degree of formality.

The study is the first empirical attempt to understand to what extent the productive performance of Moroccan ME can be impacted by the formal behaviour of these units. The originality of this work stems from the data we use, which covers several aspects, including the entrepreneur's demographic and socio-economic characteristics as well as those related to the ME and its environment.

Referring to different epistemological paradigms, we inscribe our research work within the framework of positivism because we intend to observe the reality of the field from the outside. We will proceed by a hypothetico-deductive quantitative approach through direct questioning of a representative sample of the population.

The rest of the paper is structured into five sections. In the second section, we present the results of the empirical studies focused on the analysis of the decision to formalize the activity and the ME productivity. The third section describes the survey and the characteristics of the surveyed firms. The fourth section presents the models analysing the propensity to work in the formal sector (Ordered Probit) and the explanation of productivity gap (Stochastic Frontier Analysis). We develop the selected specifications and emphasize the method adopted to overcome the problem of

endogeneity in the efficiency model. The fifth section discusses the results of the estimates. The last section is dedicated to the conclusion.

1. Determinants of formality choice and productivity gap: lessons from empirical studies

1.1. Determinants of formality choice

In the studies that examined the explanatory factors for the decision of formalizing the activity, several variables are involved. On one hand, we have the demographic and socio- economic characteristics of the entrepreneur, on other hand the characteristics of the enterprise and its environment[3].

McKenzie and Sakho (2007) consider that gender has no effect on the registration of activity in Bolivia. While in Morocco, Mourji (1998) proves that men have higher propensity to declare their activities comparing to women. This behaviour was justified by the flexibility of informal work that allows women to generate income, as well as to provide them with time to take care of the various household tasks.

McKenzie and Sakho (2007) and McCulloch & al (2010) found a positive relationship between age and obtaining a tax ID number. Younger entrepreneurs tend to work in the informal sector, as they grow older, they move into the formal sector, due to their experience and the prospects for the development of their unit.

According to Gautier (2000), Taymaz (2009) and Nesma (2014), the higher the education level of the owner or manager of the micro-firm, the higher the propensity to report the activity. This variable acts as a proxy for the entrepreneur's managerial skills, which facilitate the completion of registration procedures. The explanation of this behaviour is consistent with the idea of self-selection among the most educated owners.

The region where the entrepreneur was born may be a relevant variable in explaining the decision to formalize. In Turkish urban areas, Taymaz (2009) noted that rural homeowners tend to work in the informal sector. Limited access to social networks in their environment, which facilitate access to information on registration procedures, could justify this result.

Regarding the characteristics of the company and its environment, Levenson and Malloney (1999), Gautier (2000) and Fu & al (2018) explain that informality is a phenomenon that follows a life cycle. Young companies tend to operate in the informal sector, and as their seniority increases, they

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[3] In this paragraph, we present the results of the empirical studies and give the explanations provided by the authors. However, some authors do not detail the expected theoretical effects and do not always explain the economic reasons for their results.

will be more likely to declare their activities.

The size of the business, measured by the stock of capital, influences the demand of a tax ID number (McKenzie and Sakho, 2010). This result is confirmed by Fu & al (2018) in Ghana.

In the Egyptian context, Nesma (2014) finds that the probability of declaring activity, all other things being equal, increases in areas where companies have minimal infrastructure such as water, electricity, and roads.

According to Gautier (2000), the provision of a fixed location has a positive effect on the probability of being registered with the authorities. This result can be justified by the high visibility of the enterprise owning professional premises.

In Bolivia, McKenzie, and Sakho (2007) observed that the distance between the tax administration and the location of the Production Unit (PU) has a significant and negative impact on obtaining a tax ID number. This variable illustrates the different formalization costs that may discourage firms from formalizing.

1.2. Determinants of the productivity gap

Taymaz (2009) and De Vries (2010) found that ME led by educated entrepreneurs were more productive compared to those managed by less educated entrepreneurs. This result is explained by the role of the owners' level of education in optimizing the management of the company.

According to De Vries (2010), the fact that the entrepreneur did not find a job before the creation of the PU has a negative influence on its efficiency. Nesma (2014) finds that when entrepreneurs' experience increases in the field in which their companies operate, their companies' productivity improves.

The characteristics of employees seem to impact the firm's productivity behaviour. According to Peterson & al (2006), women have low productivity compared to men. The authors explain this result by the lack of physical strength and the vulnerability of women's health reflected in the number of days of illness. Becker (1985) also adds that periods of severe family constraints for women (meal preparation, childcare, etc.) negatively affect their productivity. Firms with a high proportion of young employees are less productive than those with older employees (Taymaz, 2009). The age of the employees, being a proxy of their experience, favours the optimization of the production process.

De Vries (2010) suggests that the company's seniority is positively correlated with its productive efficiency through learning-by-doing and shows the existence of a threshold effect at which ME productivity begins to decline.

As for the size of the company, Chapelle and Plane (2005) find that it increases production performance. According to the authors, the low turnover rate of human resources in large firms makes it possible to build a skills base built on the skills developed by employees.

Doms & al (2004) and De Vries (2010) confirm the role of technology in improving productivity in Brazilian retail enterprises.

The following is a description of the survey that collected the data and describes the sample population.

2. Study data and lessons from univariate statistics

The data we use to answer the questions of this study come from a survey carried out in April 2015. We have targeted the city of Casablanca insofar as the spectrum of the companies there exerts, is sufficiently broad and representative. The survey is administered by students from Hassan II-University of Casablanca.

The sample covers 390 ME[4] divided into three categories according to their degree of formality: 103 ME formal, 101 ME semi-formal and 186 ME informal[5]. To choose which units to investigate, we conducted random sampling without a frame. This work was done in two stages: the first step was to define the neighbourhoods to be targeted from the city map. We investigated units that have professional office and those that do not[6]. In the second step, we listed the ME that operate in each neighbourhood and then we randomly select the units to investigate.

The interviews were conducted face-to-face with either the owner (or one of the partners) or the manager at the place where the activity was carried out. The pilot survey covered about 30 ME and allowed some questions to be reformulated to avoid ambiguity. We were able to define modalities for open-ended questions and enrich those for closed-ended questions.

During the survey we noted that the shares of women and industrial and craft ME were under-represented. To address this issue, we have used adjustments to make these categories more representative.

The questionnaire consists of five sections. The first concerns the location of the ME and the characteristics of the entrepreneur and employees. The second section provides information on the

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[4] We use the worker-based criteria and we defined ME as entities with less than ten workers. In Morocco, the definition of enterprises categories (Very Small, Small, and Medium-sized Enterprises) dates from 2002 and is no longer relevant. Today, national organizations (banks, ministries, etc.) adopt different definitions to categorize their target.

[5] We have defined four procedures for formalization: having a business license, registration in the commercial register, obtaining a tax identifier and affiliation to the National Social Security Fund (NSSF). (See Section 4 and Appendix 1)

[6] They work at home, in improvised or fixed sites on public roads or they are street vendors.

process of creating and formalizing the ME. Section three deals with the access of ME to funding during the activity. In the fourth section, we collected data on existing taxation and on the taxation of ME. The last section is reserved for the activity of the ME and its impact on the entrepreneur's standard of living.

Table 1: Description of the sample population

Acronym	Variable definition	Average / Proportion			
		Formal ME N=185	Semi-formal ME N=101	Informal ME N=103	Sample N=390
Production variables					
VA*	Added value	97214.45	211679.7	662666	276195.2
K*	Capital measured at replacement cost	151725.5	402932.7	990454.4	438292.2
NBHRS[7]*	Number of hours worked	6128.387	9859.604	10035.81	8126.6
NBTRAV[8]*	Number of employees	2.47	2.9	4.02	3
PDTRAV*	Labour productivity (value added / number of hours worked)	19.14	28.2	74.76	36.2
PINTRINF*	Share of goods from the informal sector in total ME inputs	59.7	37.2	15.63	42.2
Characteristics of the owner					
GENRPRM	1 if the owner is a man, 0 otherwise.	0.650	0.762	0.786	0.71
AGEPR*	Age	39.8	42	44.2	41.5
NIVEDUC*	Number of successful years in school	6.6	8.05	10.66	8.04
NAISSPR	1 if the owner grew up in Casablanca, 0 otherwise.	0.833	0.841	0.98	0.874
RAISEMPL	1 if the owner did not find a job before the ME was created, 0 otherwise.	0.3925	0.178	0.1068	0.2615
RAISRENT	1 if the owner has created the ME because the activity is profitable, 0 otherwise.	0.193	0.376	0.41	0.3
RAISINDEP	1 if the owner has created the ME because he is looking for independence, 0 otherwise.	0.414	0.445	0.485	0.44

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[7] This is the number of hours worked by the owner(s), employees, and apprentices in a calendar year.

[8] Owner (or associated owners), employees and apprentices.

SACCOMP ***	Score assessing the relevance of the support source at the time of the creation of the ME, with 1 if none, 2 if family and friends and 3 if an experienced entrepreneur.	0.553	0.732	1	0.718
DIFFPROC ***	Score assessing the difficulty of the procedures according to the owner, with 1 if easy, 2 if moderate and 3 if difficult.	2.48	2.18	1.88	20.24
Characteristics of the ME and its environment					
LOCAL	1 if the activity is carried out in a professional location, 0 otherwise.	0.462	0.96	0.99	0.731
AGEME***	Seniority of the ME	8.57	13.4	15.5	11.65
ORDINET	1 if the ME has at least one computer connected to the Internet, 0 otherwise.	0.102	0.168	0.436	0.207
INDUSTRIE	1 if the ME is in industry or craft, 0 otherwise.	0.150	0.109	0.145	0.138
COMMERCE	1 if the ME is in business, 0 otherwise.	0.645	0.534	0.466	0.569
SERVICES	1 if the ME provides a service, 0 otherwise.	0.204	0.356	0.388	0.2923
DISTADMF 9NS	Distance between the ME and the tax administration.	5.68	5.37	5.24	5.48
Characteristics of the employees					
PSALFEM NS	Share of female employees (including the owner)	33.6%	23.5 %	27.6 %	29.4%
PSALAGE30*	Share of employees up to 30 years of age (including the owner)	40.8%	46.4 %	48.8 %	44.4%
PRIMES	1 if the ME pays bonuses to employees, 0 otherwise.	0.227	0.287	0.53	0.34

Notes: The added value and capital are in MAD. The Kruskal-Wallis rank test is used to test differences between sub-samples when the variable is quantitative. ***, ** and * mean respectively that the coefficients are significant at the 1%, 5% and 10% threshold. NS indicates that the coefficient is not significant.

Source: Authors' calculations based on survey data.

Compared to informal units, we note that on average semi-formal and formal ME achieve higher added value, use more capital and labour factors and employ more labour (see Table 1).

In the absence of a control of the characteristics of the firm and its owner, the formal units seem to be more productive compared to the unregistered ones (74.76 MAD per hour against 28.2 MAD per

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[9] Distances were calculated as the crow flies using the Google Maps service.

hour for semi-formal and 19.14 MAD per hour for formal units).

Analysis of owner characteristics shows that older and educated people are more likely to report their activities (For example, in our sample, informal ME are managed by owners who are on average 39.8 years old, while this age is 42 years old for microentrepreneurs who manage semi-formal ME, and 44.2 years old for those who lead formal ME).

Entrepreneurs who have initiated at least one formalization procedure are those who received the most support at the time of creation (0.55; 0.73 and 1 respectively for informal, semi- formal and formal ME). According to the evaluation of the entrepreneurs surveyed, the units registered with the authorities consider that the procedures are less complicated compared to IPU.

The results also show that the declaration of the ME's activity could be based on its seniority and its availability of a professional premises. For example, on average, formal, semi-formal and informal firms have 15.5, 13.4 and 8.5 years of seniority, respectively.

The share of female employees in the total number of workers is around 27.6% in formal units, while this percentage is 23.5% in units that have initiated part of the procedures and 33.6% in IPU.

3. Presentation of Ordered Probit and Stochastic Frontier Approach

In the first stage of this work, we analyse the determinants of the degree of formality. To do this, we use the ordered Probit model estimated by the maximum likelihood method.

Our variable explained Y^*_i is a latent variable representing the probability of formalizing the activity, such as:

$$Y^*_i = \alpha_i X_i + E_i \qquad (1)$$

Where,

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\begin{cases}
Y_i = 1 & \text{if} & Y^*_i \leq \mu 1 \\
Y_i = 2 & \text{if} & \mu 1 < Y^*_i \leq \mu 2 \\
Y_i = 3 & \text{if} & Y^*_i > \mu 2
\end{cases}
$$

Where $Y_i = 1$ if the ME is not declared to the local authorities, $Y_i = 2$ if it has completed part of the procedures and $Y_i = 3$ if it has completed all the registration formalities. μ_1 and μ_2 define the boundaries of the intervals.

X_i are the demographics and socio-economic characteristics of the contractor as well as the characteristics of the ME and its environment.

The estimated model is written as follows:

FORMALITEi   =   α1 GENRPRi +   α2 AGEPRi+   α3 NIVEDUCi +   α4 RAISEMPLi+

α5RAISRENTi+ α6 RAISINDEPi+ α7 NAISSPRi+ α8 INDUSTRIEi   + α9 COMMERCEi +

α10 SERVICESi   + α11 LOCALi   + α12 AGEMEi   + α13 NBEMPLi   + α14

SACCOMPi   +

α15 DIFFPROCi+ α16 DISTADMFi+ α17 PINTRINFi   **(2)**

The second step of the analysis consists of verifying the existence of an efficiency gap according to the degree of formality and understanding the determinants of productivity. We refer to the concept of the production frontier, which is defined as the maximum output a PU can achieve from a given quantity of inputs. The deviation from this frontier reflects technical inefficiency. This can be estimated either deterministically using Data Envelopment Analysis (DEA), or with the help of Stochastic Frontier Analysis (SFA) when we consider measurement errors.

In this work, we apply the second method to the image of Battese and Coelli (1995) derived from the work of Aigner & al (1977), Battese and Corra (1977) and Meeusen and Van den Broek (1977). The model specification relates a production function (the frontier) and an error term, in the following form:

$$Q_i = \exp(\beta_i' X_i + e_i) \qquad \textbf{(3)}$$

$$Q_i = \exp(\beta_i' X_i + v_i - u_i) \qquad \textbf{(4)}$$

Where Q_i, X_i and β_i respectively represent the output of the firm, the vector of the inputs and the vector of the associated parameters. e_i is an error term containing two components v_i and u_i. The first is independently and symmetrically distributed (with $v_i \sim N(0, \sigma^2 v)$) and captures the random variation from one ME to another. The second component is technical inefficiency, which is the deviation of production from the border. The efficiency score varies from 0 (completely inefficient) to 1 (fully efficient). It is assumed to be non-negative and defined by the following equation:

$$u_i = \theta' Z_i + w_i \qquad \textbf{(5)}$$

Z_i represents the vector of the characteristics of the entrepreneur, the ME and the employees. It is the vector of the associated parameters. w_i is defined by the truncation of the normal distribution, from a mean 0 and a variance $\sigma^2 w$, to the point $-\theta' Z_i$ (with $w_i \geq -\theta' Z_i$). The level of technical efficiency of the ME i is defined as:

$$ET_i = \exp(-u_i) = \exp(-\theta' Z_i - w_i) \qquad \textbf{(6)}$$

The stochastic frontier analysis model is estimated using the maximum likelihood method. We consider that the production frontier component takes the form of a Cobb-Douglas production

function[10]:

$$Log\ (VA_i) = \beta_0 + \beta_1\ Log\ (K_i) + \beta_2\ Log\ (NBHRS_i) + v_i - u_i \qquad (7)$$

We specify the inefficiency component as follows:

$u_i = \theta_1\ FORMALITE_i + \theta_2\ PSALAGE30_i + \theta_3\ PSALFEM_i + \theta_4\ NIVEDUC_i + \theta_5\ AGEME_i + \theta_6$ $NBEMPL_i + \theta_7 RAISEMPL_i + \theta_8\ RAISRENT_i + \theta_9\ RAISINDEP_i + \theta_{10}\ ORDI\_NET_i + w_i$

(8)

To overcome the problem of self-selection of the most efficient (productive) ME towards formal education, we use the variable "FORMALITE" as another variable that represents the share of goods from the informal sector in the total inputs of the ME. This choice is motivated by De Vries's suggestion on the importance of using an instrumental variable that provides information on the company's supply chain. By positioning themselves ex-ante, the entrepreneur decides whether or not to focus on the formal sector based on their relationships with third parties upstream and downstream. In other words, before starting a business, the owner will identify his customers, suppliers and the registration status that allows him to maximize his profit. For example, Derb Ghalef's traders[11] buy most products from informal suppliers, and then sell them to individuals who do not require invoices or fiscal receipts.

The estimated ordered probit model is as follows:

$$FORMALITE_i = \lambda_1\ PINTRINF + \varepsilon_i \qquad (9)$$

The predicted values of this estimate are incorporated into equation (8), which will test the actual effect of the formality on the productivity of the PUs.

4. Results Discussion

Table 2 : Ordered Probit estimation

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[10] In a preliminary step, we compared the results of the Cobb-Douglas and Translog production functions, based on the generalized likelihood ratio test. The use of the test consists in calculating the statistic (χ^2) which follows a distribution of Chi-2, of a degree of freedom equal to the difference in the number of parameters of the two hypotheses, with:
$\chi^2 = -2[Log\ likelihood(H0) - Log\ likelihood(H1)].$
Assumptions H0 and H1 are respectively associated with the primacy of the Cobb-Douglas and Translog functions. (See appendix 2)

[11] A popular market in Casablanca known for the trade in electronic devices (smartphones, computers, TVs, etc.) where a very large number of operators have never initiated formalization procedures.

Dependent	(1)					(2)				
Variable=FORMALITE	β	T-stat	Marginal Effects			β	T-stat	Marginal Effects		
			Y=1	Y=2	Y=3			Y=1	Y=2	Y=3
GENRPRM	0.42	2.44**	-0.164	0.1	0.064	-	-	-	-	-
AGEPR	0.014	2.06**	-0.005	0.003	0.002	-	-	-	-	-
NIVEDUC	0.069	3.96***	-0.027	0.016	0.012	-	-	-	-	-
NAISSPR	0.145	0.77^{NS}	-0.057	0.034	0.023	-	-	-	-	-
RAISEMPL	-0.342	-1.72*	0.134	-0.081	-0.053	-	-	-	-	-
RAISRENT	-0.005	-0.03 ^{NS}	0.002	-0.001	-0.001	-	-	-	-	-
RAISINDEP	Ref.	Ref.	Ref.	Ref.	Ref.	-	-	-	-	-
INDUSTRIE	-0.45	-1.98**	0.174	-0.112	-0.062	-	-	-	-	-
COMMERCE	Ref.	Ref.	Ref.	Ref.	Ref.	-	-	-	-	-
SERVICES	0.19	1.21 ^{NS}	-0.076	0.042	0.035	-	-	-	-	-
LOCAL	1.89	6.92***	-0.596	0.386	0.211	-	-	-	-	-
AGEME	0.022	3.73***	-0.009	0.005	0.004	-	-	-	-	-
SACCOMP	0.278	3.20***	-0.110	0.063	0.047	-	-	-	-	-
NBTRAV	0.108	2.10**	-0.043	0.024	0.018	-	-	-	-	-
DIFFPROC	-0.43	-4.25***	0.171	-0.097	-0.074	-	-	-	-	-
DISTADMF	-0.015	-0.79 ^{NS}	0.006	-0.003	-0.003	-	-	-	-	-
PINTRINF	-0.009	-5.70***	0.004	-0.002	-0.001	-0.011	-8.48***	0.004	-0.001	-0.003

μ1 = -3.5 ; μ2 = -2.27	μ1 = -0.23 ; μ2 = 0.55
Wald chi2(15) = 190.76	Wald chi2(1) = 71.84
Prob > chi2 = 0.0000	Prob > chi2 = 0.0000
Pseudo R2 = 0.3709	Pseudo R2 = 0.0865
Observations = 390	Observations = 390

***, ** and * mean respectively that the

coefficients are significant at the 1%, 5% and

10% threshold.

^{NS} indicates that the coefficient is not significant.

Source: Authors' calculations based on survey data.

To solve the problem of collinearity, we applied the test of Belsley & al (1980). According to the authors, if the value of the conditioning index of the matrix of independent variables exceeds 30, a collinearity problem arises. The test performed on the estimate (1) gives a value of 13.17[12]. To obtain robust standard deviations, we have corrected the heteroskedasticity. Wald's statistics are significant at the 1% threshold, which attests to the good explanatory power of the model.

The results of the estimate (1) show that men are less likely (0.164%) to engage in informal activities than women. This behaviour corroborates the findings of Mourji (1998). Indeed, the exercise of informal activities by women is justified, on the one hand, by the desire to generate an additional income to improve the well-being of the household. This will strengthen their position in decision-making. On the other hand, the practice of these activities is often done at home (such as sewing, embroidery, baking cakes or ready meals etc.), which guarantees the woman a flexibility of time to take care of the different household tasks.

As for the age of the ME owner, we note that older individuals have a higher propensity to report their activities to public authorities than younger individuals. This variable is used as a proxy to capture the effect of work experience.

Generally, when owners have modest experience in the field in which they plan to invest, they tend to work in the informal sector to avoid the costs of formalization in case of failure. The acquisition of experience, combined with the prospects for the development of the activity, increases the probability of owners becoming formalized.

The NIVEDUC variable seems to have a positive and significant effect on the declaration of activity. When the number of successful years the entrepreneur has spent in school increases, the propensity to formalize also increases, all other things being equal. This is consistent with the findings of McKenzie and Sakho (2007) and McCulloch et al (2010). A high level of education could improve the owner's managerial skills, allowing him to better perceive the value of registration in the development of the ME and to initiate administrative procedures.

Growing up in Casablanca does not seem to have a significant effect on the dependent variable. This contradicts the suggestion of Taymaz (2009) in the Turkish context, which states that access to social networks would allow the owner to learn about the formalization process and its benefits. In this study, the effect of this variable appears neutral, which can be explained by several factors. On the one hand, entrepreneurs from outside Casablanca are often in contact with others who have been living in the city for some time. The latter constitute a social network to learn about formalization procedures. On the other hand, the surveyed owners, who are not from Casablanca,

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[12] See Appendix (3) for more details on the results of the correlation matrix.

may also have worked in other enterprises before deciding to set up their own business. The experience acquired as an employee could encourage them to become more formal.

The analysis of the main reason for setting up the company shows that entrepreneurs who have not found a job as employees have a 0.134% probability of working in the informal sector compared to those who aim to be self-employed. We can consider this variable as a proxy for the entrepreneur's qualifications since informal activities are often considered as alternatives to formal employment that requires a specific profile.

All other things being equal, the availability of a professional premises increases the propensity to register the activity (0.386% for semi-formal units and 0.211% for formal ones). We justify this relationship by the degree of visibility of the ME when it has a fixed location. To avoid problems of control by the authorities, the declaration of activity seems to be an optimal solution for this category of micro-firms. This result confirms the result of Gautier (2000) result in Madagascar[13]. Industrial and artisanal ME are more likely not to initiate the formalization process than those working in trade.

Young enterprises tend to operate in the informal sector, and the older they become, the more formal they become (Levenson and Malloney, 1999; Gautier 2000).

The size of the firm, measured by the number of workers, has a significant and positive impact on the probability of working in the formal sector. Indeed, a high number of workers gives an idea about the enterprise wealth, which will reduce its chances of escaping control by the authorities. Informal ME are obliged to keep their size below a certain threshold to remain invisible. In this case, several strategies can be considered, including the creation of geographically dispersed PUs attached to the parent unit.

Support at the time of activity creation increases the likelihood that the ME will become formalized. The availability of information on formalization procedures, their popularization, and the support of enterprises in administrative procedures allow entrepreneurs to reduce transaction costs, which encourages newly created firms to register with the authorities (Khamis, 2014). This finding is consistent with the conclusion we can draw from the effect of the variable DIFFPROC. The latter illustrates entrepreneurs' perception of the complexity of the formalization steps. We note that IPU owners believe that procedures are more difficult compared to the heads of formal units (Nesma, 2014).

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[13] One of the questions asked during the survey allowed us to collect data on the controls that have taken place since the company's inception, and over the past 12 months. When included in our regressions, this variable has a positive effect on the propensity of microentrepreneurs to report their activities. However, we exclude it from our regressions since it could lead to a problem of endogeneity. Indeed, it is the registered ME that are generally subject to controls.

The distance of the ME from the city centre does not significantly affect the probability of recording. This result seems logical, because in Casablanca, informal activities are scattered in the centre and on the outskirts of the city.

Estimates (1) and (2) show that the share of informal inputs in commodities and/or raw materials in total purchases is positively associated with the probability of reporting the activity[14]. Indeed, the informal sector is a self-sustaining ecosystem, ultimately selling most of its production to households that do not require invoices.

Table 3 : Stochastic Frontier estimation

Dependent Variable=LOG_VA	(1)		(2)		(3)	
	β	T-stat	β	T-stat	β	T-stat
Production Frontier						
LOG_K	0.188	6.92***	0.177	5.88***	0.185	6.82***
LOG_NBHRS	0.353	4.03***	0.383	4.63***	0.353	3.95***
INDUSTRIE	-	-	-	-	-0.087	-0.63 NS
COMMERCE	-	-	-	-	Ref.	Ref.
SERVICES	-	-	-	-	0.083	0.67 NS
CONSTANTE	6.77	9.76***	6.66	9.63***	6.79	9.66***
Efficiency model						
FORMALITE	-0.466	-1.82*	-0.431	-1.70*	-0.48	-1.84*
PSALFEM	0.0078	2.27**	0.009	2.13**	0.008	2.34**
PSALAGE30	0.01	2.15**	0.0087	1.32 NS	0.011	2.26**
NIVEDUC	-0.1	-2.90***	-0.096	-2.37**	-0.105	-2.98***
RAISEMPL	-0.995	-3.16***	-1.31	-3.03***	-0.989	-3.11***
RAISRENT	-1.27	-2.32**	-1.55	-3.58***	-1.28	-2.35**
RAISINDEP	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
AGEME	0.007	0.22 NS	0.004	0.15 NS	0.006	0.21 NS
NBEMPL	-0.872	-3.30***	-1.18	-2.21**	-0.867	-3.48***
ORDI_NET	-1.19	-0.93 NS	-0.104	-0.16 NS	-0.98	-0.87 NS
PRIMES	-	-	-1.01	-1.26 NS	-	-
CONSTANTE	0.53	0.48 NS	1.61	0.89 NS	0.47	0.44 NS
	Wald chi2(2) = 113.33 Prob > chi2 = 0.0000 Log Likelihood= - 506.3 Observations = 390		Wald chi2(2) =87.37 Prob > chi2 = 0.0000 Log Likelihood= - 389.3 Observations =308		Wald chi2(4) =118.94 Prob > chi2 = 0.0000 Log Likelihood=- 505.61 Observations =390	

***, ** and * mean respectively that the

coefficients are significant at the 1%, 5% and

10% threshold.

NS indicates that the coefficient is not significant.

Source: Authors' calculations based on survey data.

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[14] See Section 4.

Estimates (1) and (3) in Table 3 show that the elasticity of labour productivity is almost twice its elasticity of capital productivity. A capital increase of 1% leads to an increase in production of 0.188%. While a 1% increase in the number of hours worked results in an increase in output of 0.353%.

The sum of the elasticities of the factors "Capital" and "Labour" is less than 1, which indicates that returns to scale are decreasing. The existence of these implies that the ME will not benefit from economies of scale[15].

In the efficiency model, a positive sign of the explanatory variable means that it has a negative impact on the firm's efficiency and vice versa.

The results from the estimation of the efficiency model (estimation 1) show that the average efficiency score for all surveyed units is 0.721. This value is important but is still insufficient to achieve the highest possible productivity. A more efficient use of inputs can improve productivity. The completion of the procedures for having a legal and social existence is accompanied by an increase in productivity. The average scores for informal, semi-formal and formal ME are 0.629, 0.672 and 0.837, respectively. We note that the difference in efficiency is relatively small (0.043) between IPU and semi-formal units compared to the couple of Semi-formal - formal ME (0.165) (See figure 1).

The differences in productivity between the three types of firms can be explained for several reasons. In Morocco, as is the case in several developing countries, registered units can benefit from both access to bank financing at reduced rates and grace periods. They will also benefit from access to public markets and public goods (judicial system, medical coverage, support through training workshops, etc.). At the tax level, they have the right to recover VAT. Formal sector entrepreneurs can broaden their customer base by invoicing and advertising their goods and services.

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[15] In other estimates, we have tried to homogenize the number of hours worked by entrepreneurs, employees, and apprentices. We assumed that the work of an employee or entrepreneur is worth twice as much as the work done by a caregiver or apprentice. The border coefficients remain stable (See appendix 4).

Figure 1 : Technical efficiency of informal, semi-formal and formal ME
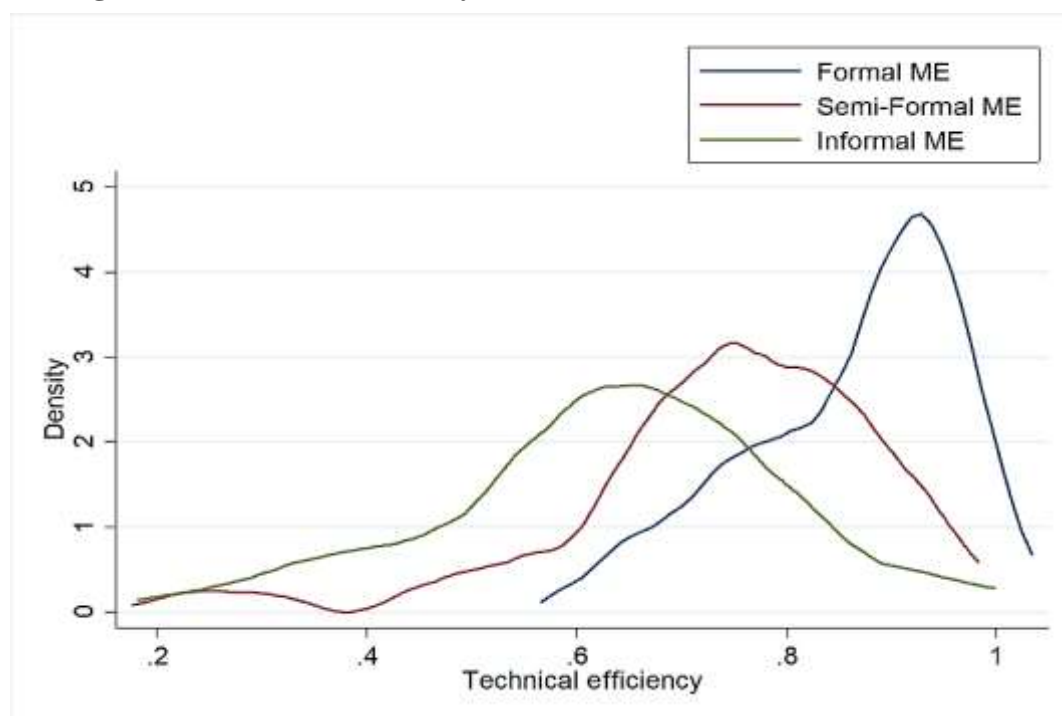
Source : Authors' calculations

The increase in the proportion of women in the workforce has a negative and significant impact on productivity. This finding supports the conclusions of Becker (1985) and Petersen & al (2006). When the share of young people (under 31 years of age) increases, efficiency decreases. The experience of the staff allows us to refine specialization and therefore contributes to improving productivity. This result is shared by Taymaz (2009).

A high level of education will increase efficiency. Education is seen as a factor in developing and refining the entrepreneur's management skills (Taymaz, 2009; De Vries, 2010).

To analyse the effect of motivation on entrepreneurs' efficiency behaviour, we included the reasons for the creation of the ME in the estimates. The latter show that, compared to entrepreneurs seeking independence, those who did not find a job before the creation of their firm are the most productive. This result is explained by the fear of failure among these individuals if they are unable to succeed in their project. Launching a project for reasons of profitability is a variable that acts positively and significantly increases the efficiency of the UP, all other things being equal.

The seniority of the ME does not seem significant in the efficiency model. The ambiguity of the variable is attributed to two neutralizing effects. In one category of enterprises, seniority is reflected in archaic techniques and management methods. While in another, a firm that has been in existence for some time, could be more efficient thanks to learning-by-doing.

The increase in the number of workers leads to an increase in productivity (Chapelle and Plane,2005).

Contrary to the conclusion of Doms et al (2004), the use of a computer connected to the Internet has no effect on productivity improvement. In Morocco, the use of computer equipment in the firm's activity such as stock management or advertising is still very limited. The estimate (2, Table 3) shows that the granting of bonuses has no impact on productivity growth.

Conclusion and limitations of the study

In developing countries, the informal sector plays an important role in creating value added. Several studies have shown that informal activities are often characterized by low productivity, which could have negative effects on total factor productivity. Public policies that target the formalization of the informal sector should consider both the factors that encourage activity registration and those that impact productivity.

Using data on a sample of 390 Microenterprises (ME) from the city of Casablanca, this paper suggests an answer to two questions. The first analyses the determinants of ME choice to declare their activities, using an ordered Probit model. The second question verifies the existence of differences in productivities between informal, semi-formal and formal units, as well as to study their causes using the stochastic frontier approach[16]. The risk of ME's self- selection was addressed through an instrumental variable indicating the share of informal inputs in the total inputs of the ME. This choice is motivated by the suggestion of De Vries (2010).

The results from the first model focus on the effect of demographics and socio-economic characteristics of the entrepreneur on one hand, as well as the impact of the characteristics of the ME and their environment on the other hand.

The stochastic frontier approach concluded that the elasticity of productivity over hours worked is greater than the one for capital. We also noted the existence of decreasing returns to scale which implies the absence of economies of scale. The hypothesis of the productivity gap between the formal, semi-formal and informal units has been verified. It also appears that the level of education of the owner and the characteristics of the staff, in terms of gender and professional experience, have a significant impact on productivity. The sample data shows that even within units with less than ten workers, we can observe heterogeneity of efficiency due to the variation in the size of the ME.

The improvement of productivity after formalization of companies is often due to better integration in the financial sphere (access to bank credit or loan of honour ...), economic (Government's support programs for technical assistance, vocational training ...), digital (access to new technologies ...) and social (medical coverage and retirement ...).

Since September 2015, Morocco has put in place a new law dedicated to individuals who work

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[16] We consider an ME is informal if it is not declared to the authorities, semi-formal if it has completed only a part of the procedures and formal if it has completed all the registration formalities.

individually. The main objective of this status is to promote the formalization of self- employed employees through an administrative procedure of simplified creation and dissolution, a specific tax regime and an adapted social coverage[17].

Despite the efforts and ambitious measures implemented by the public authorities, the Informal sector remains a structural and resilient component of the national economy; it induces multiple economic and social risks:

- Generator of precariousness in employment and business and quality of life of population.

- Challenging the processes of good governance in social and economic affairs.

- Control approaches of informal activities often lead to dilemmas in which security and social issues are intertwined, which freeze public interventions.

The analysis conducted in this study could be further developed if we had a larger sample that focused on different activity sectors and regions of Morocco to highlight the effect of regional economic development dynamics. These results can also be developed by adopting a panel analysis, which integrates the temporal dimension to capture microenterprise behavioural evolution over time.

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[17] See www.ae.gov.ma

Bibliographical references

Aigner, D., Lovell, C. K., and Schmidt, P. (1977) « *Formulation and estimation of stochastic frontier production function models* », Journal of Econometrics, 6(1), 21-37.

Báez-Morales, A. (2015), « *Differences in efficiency between Formal and Informal Micro Firms in Mexico* », IREA–Working Papers, 2015, IR16/015.

Battese, G. E., and Coelli, T. J. (1995), « *A model for technical inefficiency effects in a stochastic frontier production function for panel data* », Empirical economics, 20(2), 325-332.

Battese, G. E., and Corra, G. S. (1977), « *Estimation of a production frontier model: with application to the pastoral zone of Eastern Australia* », Australian journal of agricultural economics, 21(3), 169-179.

Becker, Gary S. (1985), « *Human Capital, Effort, and the Sexual Division of Labor* », Journal of Labor Economics 3 (1), 33-58.

Belsley D.A., Kuh E. and Welsch R.E. (1980), « *Regression Diagnostics. Identifying Influential Data and Sources of Collinearity* », New Jersey, John Wiley & Sons.

Chapelle, K., et Plane, P. (2005), « *Technical efficiency measurement within the manufacturing sector in Côte d'Ivoire: A stochastic frontier approach* », Journal of Development Studies, 41(7), 1303-1324.

De Soto H. (1994), « *L'autre sentier, la révolution de l'informel dans le tiers monde* », Edition : La Découverte.

De Vries, G. J. (2010), « *Small retailers in Brazil: Are formal firms really more productive?* » The Journal of Development Studies, 46(8), 1345-1366.

Doms, M. E., Jarmin, R. S., and Klimek, S. D. (2004), « *Information technology investment and firm performance in US retail trade* », Economics of Innovation and New Technology, 13(7), 595-613.

Fu, X., Mohnen, P., and Zanello, G. (2018),«*Innovation and Productivity in Formal and Informal Firms in Ghana*», Technological Forecasting & Social Change, 131, 315-325.

Gautier J.F. (2000), « *L'informel est-il une forme de fraude fiscale ? Une analyse micro-économétrique de la fraude fiscale des micro-entreprises à Madagascar* », Document de travail N° 007/2000, DIAL.

HCP (2007), « *Enquête nationale sur le secteur informel* ». Rapport de synthèse, Haut-Commissariat au Plan.

Khamis, M. (2014), « *Formalization of jobs and firms in emerging market economies through registration reform* », IZA World of Labor.

Levenson, A.R., and Maloney, W.F. (1999), « *The Informal Sector, and Micro-firm Dynamics, Institutional Participation* », World Bank : Policy research working paper.

McCulloch, N., Schulze, G. G., et Voss, J. (2010), « *What Determines Firms' Decisions to Formalize? Evidence from Rural Indonesia* », Discussion Paper Series N°13, University of Freiburg.

McKinsey Global Institute (2003), « *Turkey: Making the Productivity and Growth Breakthrough* », New York: McKinsey.

McKenzie, D.J. and Sakho, S. (2007), « *Does it pay firms to register for taxes? The impact of formality on firm profitability* », IZA working paper, No. 3179, Bonn, Germany.

Meeusen, W., and Van den Broeck, J. (1977), « *Efficiency estimation from Cobb-Douglas production functions with composed error* », International economic review, 435-444.

Mourji F. (1998), « *Le développement des microentreprises en question* », Casablanca : Edition REMALD.

Nesma, A. (2014),« *L'informalité des micro-et petites entreprises en Égypte: une analyse transversale* », Mondes en développement, (2), 87-100.

Perry, G.E., Maloney, W.F., Arias, O.S., Fajnzylber, R., Mason, A.D. and Saavedra- Chanduvi, J., (2007), « *Informality: Exit and Exclusion* **»**, Washington DC, World Bank Publications.

Petersen, T., Snartland, V., and Milgrom, E. M. M. (2007), « *Are female workers less productive than male workers?* », Research in Social Stratification and Mobility, 25(1), 13-37.

Tanzi, V. (2002),« *The shadow economy, its causes and its consequences* ». International Seminar on the Shadow Economy Index in Brazil.

Taymaz E. (2009), « *Informality and Productivity Differentials between Formal and Informal Firms in Turkey* », Background Paper prepared for Country Economic Memorandum (CEM) – Informality: Causes, Consequences, Policies.

Van Biesebroeck, J. (2005), « *Exporting raises productivity in sub-Saharan African manufacturing firms* », Journal of International economics, 67(2), 373-391.

Wagner, J. (2007), « *Exports and productivity: A survey of the evidence from firm-level data* », The World Economy, 30(1), 60-82.

Appendices

Appendix 1 : the steps involved in setting up a business in Morocco

- *Step 1: Request for negative certificate*

This is an administrative certificate of the availability of the trade name chosen by the company. The latter can make a one-year reservation to complete the formalization procedures. The certificate is issued by the Moroccan Office of Industrial and Commercial Property.

- *Step 2: Registration of creative acts*

It is a matter of filing the acts of creation with the regional tax administration. This registration will allow you to have a precise date of creation.

- *Step 3: Registration for the business tax (PATENT)*

The entrepreneur (or the company's legal representative) asks the regional tax office to assign him a business tax identification number.

- *Step 4: Registration in the Trade Register*

To have legal personality, an application should be filed by the company director (or manager) with the commercial court.

- *Step 5: Assigning the tax ID*

The purpose is to give the company a unique tax identification number.

Step 6: Affiliation to the National Social Security Fund

The company obtains a NSSF membership number.

- *Step 7: Publication*

To make the creation of the company official, a publication is required in the Official Bulletin and the Journal of Legal Announcement.

Appendix 2 :

Table 4 : tests to select the most appropriate production function

	Log Likelihood	χ^2
H0 : The Cobb-Douglas function is the most suitable for estimating the production frontier.	-529,15	-6,65 (Rejection of H1 assumption)
H1 : Translog's function is the most suitable for estimating the	-524,5	

production frontier		

Appendix 3 :

Table 5 : Correlation Matrix

Variables	GENRPRM	AGEPR	NIVEDUC	NAISSPR	RAISEMPL	RAISRENT	RAISINDEP	INDUSTRIE	COMMERCE
GENRPRM	1								
AGEPR	-0.065	1							
NIVEDUC	0.013	-0.366	1						
NAISSPR	-0.033	-0.075	0.299	1					
RAISEMPL	0.026	-0.155	-0.112	-0.074	1				
RAISRENT	0.000	0.1751	0.025	-0.024	-0.387	1			
RAISINDEP	-0.023	-0.023	0.076	0.087	-0.529	-0.578	1		
INDUSTRIE	-0.010	0.010	0.0167	-0.094	-0.07	-0.017	0.077	1	
COMMERCE	0.071	-0.001	-0.138	-0.064	0.141	0.011	-0.135	-0.461	1
SERVICES	-0.069	-0.007	0.138	0.142	-0.100	0.001	0.088	-0.258	-0.739
LOCAL	0.117	0.138	0.242	0.136	-0.362	0.167	0.167	0.042	-0.236
AGEME	0.068	0.423	-0.07	0.034	-0.118	0.146	-0.030	0.131	-0.027
SACCOMP	-0.009	-0.174	0.3	0.127	-0.045	0.089	-0.042	0.048	-0.073
NBEMPL	0.041	0.182	0.187	0.111	-0.248	0.155	0.077	0.19	-0.258
DIFFPROC	0.056	0.002	-0.17	-0.052	0.197	-0.209	0.019	-0.134	0.171
DISTADMF	0.032	-0.062	-0.036	-0.035	0.096	-0.031	-0.056	0.043	-0.214

PINTRINF	-0.091	-0.037	-0.222	-0.064	0.067	-0.075	0.009	0.075	0.043

Variables	SERVICES	LOCAL	AGEME	SACCOMP	NBEMPL	DIFFPROC	DISTADMF	PINTRINF
GENRPRM								
AGEPR								
NIVEDUC								
NAISSPR								
RAISEMPL								
RAISRENT								
RAISINDEP								
INDUSTRIE								
COMMERCE								
SERVICES	1							
LOCAL	0.043	1						
AGEME	-0.07	0.166	1					
SACCOMP	0.043	0.089	-0.089	1				
NBEMPL	0.136	0.317	0.15	0.06	1			
DIFFPROC	-0.084	-0.173	-0.049	-0.133	-0.168	1		
DISTADMF	0.2	0.043	-0.205	-0.021	0.031	-0.00	1	
PINTRINF	-0.103	-0.224	-0.044	-0.169	-0.151	0.189	-0.025	1

Appendix 4 :

Table 6 : Estimation of stochastic production frontier considering the heterogeneity of productivity of employees, entrepreneurs and apprentices

Dependent Variable=LOG_VA	β	T-stat
Production Frontier		
LOG_K	0.188	6.92***
LOG_NBHRS'	0.353	4.03***
CONSTANTE	6.77	9.76***
Efficiency Model		
$\widehat{FORMALITE}$	-0.466	-1.82*
PSALFEM	0.0079	2.27**
PSALAGE30	0.01	2.15**
NIVEDUC	-0.1	-2.90***
RAISEMPL	-0.996	-3.16***
RAISRENT	-1.26	-2.32**
RAISINDEP	Ref.	Ref.
AGEME	0.007	0.22 [NS]
NBEMPL	-0.872	-3.30***
ORDI_NET	-1.19	-0.93 [NS]
PRIMES	-	-
CONSTANTE	0.53	0.48 [NS]

Wald chi2(2) = 113.33
Prob > chi2 = 0.0000
Log Likelihood = -506.3
Observations = 390

***, ** and * mean respectively that the

coefficients.

are significant at the 1%, 5% and 10%

threshold.

NS indicates that the coefficient is not

significant.

Source: Authors' calculations based on

survey data.