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# PRODUCTIVITY PERFORMANCE IN THE MANUFACTURING SECTOR OF CAMEROON: HOW DOES FAMILY AND NON-FAMILY FIRMS PERFORM[1]?

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***ABSTRACT-****This research provides insights on factors affecting performance of family firms in comparison with the non-family firms making use of data from Cameroon. We estimated total factor productivity via a Cobb–Douglas production function while accounting for the correlation between input levels and productivity. As concerns the management and control of firms, family members are heavily involved in family firms than those of non-family firms which are mostly managed externally. It is observed that non family firms employ more labour and invests more in capital compared to family owned and managed firms. Based on the two-staged least-squares technique, results show that family firms and even those managed by families are, on average less productive than externally managed family firms and non-family owned firms after controlling for sector as well as other characteristics. The findings are important for both policy makers and practitioners.*

*Cette étude donnée les informations sur les facteurs influençant des entreprises familiale par-apport a ceux des entreprises non familiale en utilisant des données issue du Cameroun. Nous avons estimé le facteur productivité total a travers la fonction de production Cobb- Douglas, cependant en vérifiant la corrélation entre le niveau d'entrent et la productivité. En ce qui concerne le contrôle et la gestion des entrepris, les membres de la famille sont plus grandement implique que ceux de non familiales qui est la plus par gérer par l'extérieure. Il a été observe que les entrepris non familiales emploie plus du travailleurs et investir plus du capital que ceux appartenant a des familiales. Le résultat du Technique de Double Moindre Carrée Ordinaire montrent que les entrepris familiale et surtout ceux gérer par les membres du familiale en moyenne sont moins productif par apport a ceux gérer extérieurement et des entrepris non familiale après avoirs contrôle pour le secteur ainsi que d'autres caractéristiques. Le résultat est important pour les décideurs et des praticiens.*

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***Keywords:*** *Productivity Performance, Manufacturing Sector, Family, Non-family, Firm, Cameroon*

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## INTRODUCTION

The economic landscape of most nations remains dominated by family firms[2] (Heck and Stafford, 2001; Klein, 2000; Dun et al., 2007 Weiping et al., 2010). An analysis of Cameroon's growth factors reveals that its economy depends more than 50 per cent on Household and Sole Proprietor Businesses which constitute a sector comprising mostly informal units (notably agriculture and trade) with no guarantee of sustainable growth. Most of these are family businesses characterized by the concentration of capital in the hands of one person, with family members of the proprietor involved in the management of the company coupled with low financing by bank loans.

The prevalence of family businesses in most economies has called for numerous research and debates in the broad family business literature. Existing research compare and contrasts the performance implications between family and non-family firms and also investigates how the specific characteristics of family business affect firm performance, especially those related to governance structure (see Weiping et al., 2010 for details). To date only a few studies compare productive efficiency[3] as the new theories predict (some exceptions are Hill and Snell, 1989; McConaughy et al. 1998), that compare partial measure of productivity, as well as Barth et al., 2005; Barbera and Moores, 2011; Galve-Górriz and Salas-Fumás (2011) that compare measures of total factor productivity, TFP).

Recent theory predicts that changes in productive efficiency is translated into differences in measures of financial performance, and thus the use of productive efficiency or the use of financial measures to test the effect of ownership in performance is irrelevant. If this is the case, then differences in financial performance of firms will reflect the interaction between differences in production efficiency. In fact, in competitive markets (where firms earn a return equal to the cost of capital), the only way over-constrained firms can survive is if they have higher productive efficiency (Galve-Górriz and Salas-Fumás, 2011). Lastly, in as much as productivity is related to financial performance of firms and productivity growth can raise incomes and reduce poverty and unemployment via increased economic growth[4], it becomes imperative to compare productivity performance of family firms relative to non-family firms.

The literature provides strong evidence that growth reduces poverty (Tabi and Njong, 2012) and the role of productivity in firm performance is of fundamental importance to this aspect. For instance, approximately 90% of the increase in real per capita output is attributable to the growth of efficiency in the US economy (Solow, 1957; Palia and Lichtenberg, 1999), and Easterly and Levine (2001) also document that long-term growth of countries is largely driven by productivity growth. Thus, a firm can increase its growth and competitiveness through improvement in their productivity, and this situation leads to the development of a country. In competitive environments, firm's long-run survival seems impossible without increasing productivity (Crew et al., 1971; Jovanovic, 1982).

This study has estimated firm's production function and efficiency and further examined the effect of family ownership and other controls on productivity performance. The paper is organised as follows. In the next section, we discuss existing studies on firm's productivity, with specific respect to the family firms. In section 3, the data set and the econometric models including the variables included in the analysis are discussed. Here also the results are presented while Section 4 concludes.

## OVERVIEW OF THE LITERATURE

Empirical studies comparing the productivity performance of family-owned, owner-managed, and non-family-owned firms are rather sparse and the few that exist produce inconclusive findings.

[2] In the Cameroon context, Tchankam (2000) defined family business as a type of enterprise where members of the same family control activities or work and actively participate in the management, and maintain a strong relationship between the family and the enterprise. Such enterprises possess unique characteristics, as compared to those with non-family characteristics, since it relies much on family members and kinsmen that influence the vision, perception and values that determine the structure and functioning of the enterprise.

[3] Productivity or production efficiency is typically defined as the ratio of output (i.e. production of goods and services in monetary terms) to input (labor and capital used in production). Following Palia and Lichtenberg (1999), we apply total factor productivity (TFP) as the measure of firm productivity. Because TFP simultaneously accounts for both labor productivity and output contributions of non-labor inputs, it is considered to be an effective measure of production efficiency. TFP is defined as output per unit of total input, where total input is a weighted sum of the individual inputs.

[4] Solow (1957) finds that around 90 per cent of improvement in real per capita output, in the US economy, is due to the efficiency growth. Easterly and Levine (2001) document that long-term growth of countries is largely driven by productivity growth

Galve-Gorriz and Fumas (1996) have studied family owned firms in Spain. They used both productivity and profitability as measures of firm performance. They found that on an average, family firms have higher productivity than non-family-owned firms, but they did not find any difference in profitability. In a study by McConaughy et al. (1998), founding family-controlled firms turned out to be more efficient and valuable than firms without founding family control. Unlike Galve-Gorriz and Fumas (1996), McConaughy et al. (1998), and Kirchhoff and Kirchhoff (1987), Hill and Snell (1989) that use partial measure of productivity, others have used total factor productivity as well.

Wall (1998) has analysed the impact of family ownership on productivity among private firms in Western New York. He found that family firms are less productive than non-family firms after controlling for industry, labour input, and firm age. The productive gap was estimated to be approximately 18%. Bosworth and Loundes (2002) focused on the interaction of ‘‘discretionary’’ investments, innovation, productivity, and profitability, and concluded that family firms are incidentally found to be significantly less productive than non-family firms amongst Australian firms. Barth et al. (2005) analyze the productivity of Norwegian small and medium-sized firms, and somewhat surprisingly conclude that family-owned firms are less productive than non-family firms. Contrarily, Galve-Górriz and Salas-Fumás (1996, 2011) in their estimations assuming that the production technologies are the same for the two forms of ownership did not find any significant difference in productivity between family and non family firms amongst Spanish firms. Another estimation that allowed for differences in all the coefficients of the production function of family and non-family firms (i.e., it is assumed that labour and capital output contributions for both types of firm are heterogenous). In that case, the estimated coefficients of the cross-effect variables are all statistically significant, so the null hypothesis of equal production technology is rejected. This result contrasts with that of Martikainen et al (2009) who do not reject the null hypothesis of similar technology for family and non-family firms with data from US firms. However, in both studies family firms are found to be more efficient in production than non-family firms are.

In a similar study still based on a Cobb–Douglas framework, Barbera and Moores (2011) provide empirical evidence that family labour and capital indeed yield diverse output contributions compared with their non-family counterparts. In particular, family labour output contributions are significantly higher, and family capital output contributions significantly lower. Interestingly, differences in total factor productivity between family and non-family firms disappear when they allowed for heterogeneous output contributions of family production inputs. The findings led them to conclude that the assumption of homogeneous labour and capital between family and non-family firms is inappropriate when estimating the production function.

Therefore, in studies analysing family involvement both the assumptions for unequal factor elasticities or homogenous inputs contribution could still lead to a better understanding of the differences in production strategy, planning, and other important productivity drivers between family and non-family firms. The main contribution of this study is to empirically assess within the production function framework of microeconomics whether family ownership structure improves the production efficiency of firms in Cameroon. Secondly, studies that used the Cobb–Douglas production to examine the differences in the production efficiency between family and non-family firms measure the productive efficiency of each firm in the sample in terms of Solow’s Total Factor Productivity (TFP), inferred for each firm in a straightforward manner via a linear regression model obtained from the estimated production function. In this study, follow an econometric estimation of TFP, estimated as the residual term of the production function. A sub contribution to the literature is based on the argument that if differences in firms’ productive efficiency would directly translate to differences in development indicators like rising profits, income generation, job creation, poverty reduction and economic growth, then the use of these indicators to test the firm ownership-performance nexus would be irrelevant.

## METHODOLOGY AND DATA SETTING

### Data Setting

We use data from surveys collected by the World Bank consisting of a sample of non-agricultural manufacturing firms involved in formal sector activities. Data contain information to analyze firm behaviour and performance engaged in non-agricultural private. The data were collected in two waves of a total of 172 firms surveyed in 2006 and 363 firms in 2009 respectively. Thus, the surveys have a panel structure and was conducted on firms located in the major industrial regions in Cameroon which consist of Littoral (Douala), Centre

(Yaoundé), West (Bafoussam), which represents approximately 92 percent of the total number firms in the country.

Table 1 show the number of firms that are included in the analyses. The data cover some of the major two-digit manufacturing industries according to the International Standard Industrial Classification (ISIC). The distribution of family firms in broad ISIC industry divisions is done and is devoted to the panel sample for 2006 and 2009 of which both family and nonfamily firms are almost equally distributed. For this analysis some industries like Textiles and garments are combined based on similarities in the type of activity and factor intensity to achieve a large number of observations. Generally, family firms are more prevalent in textiles and garments, retail and wholesale trade, hotels and other manufacturing activities. Many family firms can also be found in chemical and pharmaceuticals, construction and transport. The group "other Manufacturing" is a residual category that includes all firms that are outside the major industry groups.

**TABLE 1: NUMBER AND PERCENT OF FAMILY AND NON-FAMILY FIRMS BY ISIC DIVISION (PANEL SAMPLE)**

| Sector | Family firms | Nonfamily firms | % of Family firms in Sector | Total |
|---|---|---|---|---|
| Food | 19 | 42 | 31 | 61 |
| Textiles and Garments | 12 | 5 | 71 | 17 |
| Retail and Wholesale trade | 102 | 50 | 67 | 152 |
| Chemicals and Pharmaceuticals | 4 | 11 | 27 | 15 |
| Non-metallic and plastic materials | 1 | 7 | 13 | 8 |
| Metallic and machinery products | 4 | 14 | 22 | 18 |
| Construction, transport and others | 7 | 7 | 50 | 14 |
| Hotels | 29 | 8 | 78 | 37 |
| Other manufacturing | 34 | 80 | 30 | 114 |
| Electronics | 2 | 0 | 100 | 2 |
| Other services | 48 | 49 | 49 | 97 |
| Total | 262 | 273 | 95.9 | 535 |

*Source: Authors' calculation*

Table 2 reports the descriptive statistics for the main variables for our sample broken down by ownership type (family and non-family firms) and by management regime (owner management, outside management). It displays means of different measures of variables for production and productivity models.

In this paper information on ownership (whether the firm is family-owned or not) and on owner-management is based on response to specific question on ownership and management included in the survey[5]. It reports average values of a number of variables for the two waves of the survey, 2006-2009 among the others TFP estimated with Levinsohn and Petrin approach referred to as TFP_LP as well as with the fixed effect and pooled ordinary least square (OLS) regression methods, designated as TFP_FE or TFP_OLS (where value added which is difference between the firm's value of output (sales) and the sum of its expenses on raw materials, energy and electricity (i.e. intermediary inputs) is regressed on capital and labour.

[5] We define family firms as those controlled or owned by an individual or a family. Our information on owner-management is based on response to the following question: "Which of the following best describes the largest owner's involvement in decision making in this firms"?. If the response is that: Makes most decisions on his/her own, then we consider it as owner-managed, or outside management if the following are the responses: (1) Makes decisions in consultation with other owners? (2) Delegates most decisions to other partners' owners? (3) Has appointed a manager(s) who make decision (4) A board of directors or committee makes the decision.

**TABLE 2: FIRMS' CHARACTERISTICS BY OWNERSHIP AND MANAGEMENT TYPE (MEAN VALUES)**

| Variable | Ownership | | Management regime | |
|---|---|---|---|---|
| | Family Firms | Non family Firms | Owner managed family firms | External management in family firms |
| Log Value added/output | 17.34 | 19.34 | 17.19 | 19.23 |
| Log TFP_LP | 14.22 | 15.31 | 14.28 | 14.16 |
| Log TFP_FE | -1.7 | 0.72 | -1.58 | -1.95 |
| Log TFP_OLS | -0.28 | 0.11 | -0.26 | -0.28 |
| Log Capital | 14.41 | 16.89 | 14.72 | 16.16 |
| Log Labour/employment | 2.31 | 3.78 | 2.53 | 3.44 |
| Firm size | 1.42 | 2.05 | 1.46 | 1.35 |
| Age of firm | 14.31 | 19.3 | 15.2 | 17.6 |
| Export status indicating the degree of openness or outward orientation of the firm | 0.021 | 0.124 | 0.018 | 0.098 |
| Access to credit line | 0.21 | 0.52 | 0.21 | 0.44 |
| Business environment obstacle: tax administration | 2.72 | 2.96 | 2.82 | 2.86 |
| Business environment obstacle: tax rates | 2.33 | 2.78 | 2.28 | 2.69 |
| Business environment obstacle: competition from informal sector | 2.98 | 2.57 | 3.04 | 2.66 |

Source: Authors' calculation

The TFP and the distribution of our sample are reported on the basis of some firm characteristics, such as the export status of a firm, access to credit and some business environment obstacles such as tax rates and tax administration and competition between these firms and those in the informal sector. Business environment obstacles coded from 0 to 4 indicating that a particular variable is not an obstacle; minor obstacle; moderate obstacle, major obstacle and lastly severe obstacle to the current operation of a firm can also have an influence on firm performance. On average tax administration, access to finance and competition faced from informal firms stand close to 3 for all firms meaning these variables were considered as moderate barriers to most of the firms.

Finally, observing from Table 2, it is evident that non family firms have barely existed for long, 17 years compared to 14 years for family firms and latter are mostly small firms or medium sized firms. Firm size is defined according to the number of workers: small, medium and large assuming the value of 1, 2 and 3 respectively. Family firms have lower exporting capacity (2%) of sales compared to 12% for non-family. As concerns management and control of firms, generally, family members or major shareholders are heavily involved in family firms than those of non-family firms which are mostly managed externally. As concerns the key conventional input variables of labour and capital that affects firm level output, it is observed that non family firms employed more labour and invest more in capital compared to family owned and managed firms.

We do not find relevant differences in the distribution of firms according to the TFP. However, the OLS and fixed-effects estimates differ quite substantially from the Levinsohn and Petrin estimates where family farms in both management regimes experienced negative productivity as opposed to non-family firms. Nevertheless, all estimates are positive based on the Levinsohn and Petrin method. The TFP estimates based on fixed-effects regression and Petrin and Levinsohn method are highly correlated (correlation of 0.83) just like the TFP_OLS and TFP_LP (0.84) but the correlation between TFP_OLS and TFP_FE is lower (0.42). Gatti and Love (2008) use the same methodology obtained a correlation of 0.94 between the pooled OLS estimate and the TFP_LP.

**Estimation Strategy and Results**

The main aim of this paper was to investigate the productivity performance of family firms versus non-family firms and relate ownership and other controls on productivity performance. We estimate firm productivity from the production based on the firm data from 2006–2009 periods, and later determine their correlates distinguishing between family-owned and family managed firms.

**Production Function and Productivity Estimates**

Productivity is typically defined as the ratio of output (i.e. production of goods and services in monetary terms) to input (labour and capital used in production). We measure total factor productivity (TFP) as the measure of firm productivity. Because TFP simultaneously accounts for both labour productivity and output contributions of non-labour inputs, it is considered to be an effective measure of production efficiency. Firm productivity is an unobservable firm characteristic. TFP is defined as output per unit of total input, where total input is a weighted sum of the individual inputs. Thus, TFP can be expressed as:

$$\gamma T = \frac{Y}{f(L,L)'} \quad \text{.....(1)}$$

Where $\gamma$T denotes TFP, $Y$ denotes output, $f(\cdot)$ denotes total input, $L$ denotes labour input, and $K$ denotes capital input. We assume a geometrically weighted sum of inputs, or that the sum of inputs is determined by the Cobb–Douglas production function, $f(L, K) = L^{\alpha}K^{\beta,}$ where $\alpha$ and $\beta$ are the output elasticities of labour and capital or their share in output, respectively. Substituting the Cobb–Douglas production function in Eq. (1) and rearranging the terms yields the following production function

$$Y = \gamma T L^{\alpha} K^{\beta} \quad \text{.....(2)}$$

The production function given by Eq. (2) can be linearized by taking logarithms and this gives the following:

$$In(Y) = \alpha In(L) + \beta In(K) + In(\gamma T) \quad \text{.....(3)}$$

From equation (3), we find that estimates of productivity can be determined as the difference between actual output and output estimated by a production function using actual output and input quantities. Thus, the productivity estimates can be obtained from a regression of the production function given as:

$$InY_i = \delta + \alpha_l InL_i + \beta_k InK_i + \varepsilon_i \quad \text{.....(4)}$$

Where $\varepsilon_i$ is the error term and the rest of the variables remain as defined previously. In this model, TFP, the estimated residual, is obtained as the difference between actual and predicted output, or $\hat{\varepsilon}_i = InY_i - In\hat{Y}_i$. The simplest model can be estimated by pooled OLS or fixed effect regression. However, econometric issues arise. A key issue in the estimation of production functions is the correlation between unobservable productivity shocks and input levels. Profit-maximizing firms respond to positive productivity shocks by expanding output, which requires additional inputs. Negative shocks lead firms to pare back output, decreasing their input usage. When true, ordinary least squares (OLS) estimates of production functions are biased and, by implication, lead to biased estimates of productivity, often the relevant quantity for the estimation question (Petrin et al., 2004). Olley and Pakes (1996) (OP) developed an estimator that uses investment as a proxy for these unobservable shocks.

But Levinsohn and Petrin (2003) (LP) point to the evidence from firm-level datasets that suggest investment is very lumpy (that is, there are substantial adjustments costs). If this is true, the investment proxy may not smoothly respond to the productivity shock, violating the consistency condition. LP shows the conditions under which intermediate inputs can also solve this simultaneity problem. Remarkably, in most applications, these inputs are not used beyond subtracting them from the gross-output number to get value added, so the approach comes at no additional cost in data or computation. LP discusses the theoretical benefits of extending the proxy choice set in this direction and provide substantial empirical evidence that these benefits are important (Petrin et al, 2004)

We start by using pooled OLS and or fixed-effects regression and later we use the approach proposed by Petrin and Levinsohn that addresses the simultaneity problem. We follow the Levinsohn and Petrin (2003) procedure to obtain alternative estimates of TFP using raw material inputs and expenditure on electricity as an intermediate input variable or proxy variables in LP model. To estimate the LP model, we need to have a panel with at least two years of data which best fits our data set.

The various regression estimates are presented in Table 4 and estimated with precision, with an $R^2$ of about 0.7. While our OLS and fixed-effects estimates appear reasonable, they are likely to be biased because of potential correlation between input choices and the unobserved productivity shock as firms may alter their mix

of inputs in response to a productivity shock. This implies that the error and the regressors in Equation (4) might be correlated and that coefficient estimates obtained might be biased. A number of solutions have been proposed in the literature to overcome this problem. These include using firm-level fixed effects, which would deal with time-invariant individual effects and instrumental variable strategies for input choices. As previously mentioned there are recent contributions by Olley and Pakes (1996) and Levinsohn and Petrin (2003) of which the latter appear good as it presents practical dif**ficu**lties of applying the OP method[6].

**TABLE 3: ESTIMATES OF TOTAL FACTOR PRODUCTIVITY**

| **Variable** | **(1) OLS estimate** | **(2) OLS estimate** | **(3) Random-effect estimate** | **(4) Fixed-effect estimate** | **(5) LP estimate** |
|---|---|---|---|---|---|
| Log Capital | 0.226 (3.39)*** | 0.226 (3.45)*** | 0.238 (3.59)*** | 0.033 (0.24) | 0.072 (0.25) |
| Log Labour/employment | 1.06 (8.34)*** | 1.07 (8.61)*** | 0.997 (7.72)*** | -0.449 (-0.97) | 0.760 (4.51)*** |
| Industry dummy | Yes | No | n/a | n/a | n/a |
| Year dummy | -0.067 (-0.26) | No | n/a | n/a | n/a |
| Constant | 11.22 (13.90)*** | 11.23 (14.10)*** | 11.31 (13.91)*** | 20.39 | n/a |
| Observations | 118 | 118 | 118 | n/a | n/a |
| $R^2$ | 0.72 | 0.71 | 0.73 | n/a | n/a |
| *BPLM test p* | n/a | n/a | 0.439 | n/a | n/a |
| Wald test of constant returns to scale, p value | | | | | 0.635 |

*Notes: Dependent variable is Value Added in all regressions. Capital is measured by fixed assets, employment is measured by number of workers; Models (1)–(2) are estimated by OLS, Model (3-4) is estimated by random and fixed-effects regression and model (5) by Levinsohn–Petrin (2003) method. Robust t statistics in brackets, *, ** and *** indicate significance at 10%, 5% and 1%, respectively.*

[6] The LP estimation is performed with a two-step procedure. The first stage can be estimated by OLS with the polynomial expansion of the function capturing unobservable shock, or by a non-parametric method. The second stage is estimated by the method of moments and is used to extract the coefficients on capital and materials. The errors are bootstrapped. The procedure is implemented in Stata, as 'levpet' command, which is described in Petrin, Poi and Levinsohn (2004).

In table 4, we compare parameter estimates from OLS, fixed-effects regression, and the LP estimator. We use the Breush and Pagan lagrange multiplier test to verify if a random effects model is appropriate, which tests the null hypothesis that there are no random effects. Listed in Table 4, with a p-value of about 0.44, we accept the null hypothesis and conclude there are no random effects. For the parameters on the freely variable inputs, labour, the OLS estimates exceed fixed-effects and the LP estimates, confirming both the theoretical and empirical results discussed in Levinsohn and Petrin (2003). OLS produces an estimate in the range of 1, while the LP method returns an estimate of about 0.7. Whether the OLS coefficient on capital will be biased upward or downward depends on the degree of correlation among the inputs and the productivity shocks. In this paper, the OLS estimate is greater than the LP estimate. The fixed-effects estimates differ quite substantially from both the OLS and LP estimates. One explanation is that the magnitude of each firm's productivity shock varies over time and is not a constant fixed effect (Petrin et al. 2004). As observed, the estimate on capital is insignificant in both fixed-effects and LP estimate. Finally, we also report the Wald test of constant returns to scale; it is simply a test that the sum of the coefficients equals one. In this case, the null hypothesis is accepted that there are constant returns to scale for the firms.

Thus, when estimating production functions, we must account for the correlation between input levels and productivity. Profit-maximizing firms respond to increases in productivity by increasing their usage of factor inputs. Methods that ignore this endogeneity, such as OLS and the fixed-effects estimator, will provide inconsistent estimates of the parameters of the production function. However, we should also note that some studies (e.g. Gatti and Love, 2008) highlighted that OLS and 2SLS TFP estimates do not differ substantially. This is in line with our findings, as our results are robust to using different TFP measures.

**Ownership Structure and Productivity**

An analysis of the relationship between firm ownership or management and firm productivity could simply be done based on a simple summary statistics comparing family and non-family firms as indicated in Table 3. However, it does not, of course, allow us to isolate the possible effects on productivity of other covariates. In order to disentangle the effect of ownership and governance structure in terms of management from other factors on firm productivity, there is need to run an econometric analysis. To investigate whether family firms and those managed by a member of the owner family are more or less productive than family firms run by professional managers or non-family owned firms, we estimate a TPF equation of the form:

$$\tau = \delta_0 + \delta_1 FAM_{it} + \sum_{i=1}^{k} \delta_i X_{it} + \sum_{j=1}^{n-1} \omega_j IND_{it} + YDUM + \varepsilon_{it} \quad \text{.....(5)}$$

where the firm TFP (in logarithm) was estimated by using Levinsohn and Petrin approach, FAM is a binary variable taking the value one if the firm is run by a member of the owner family and or is a family firm and zero otherwise, *X* a vector of firm-level variables highlighted by previous literature as important drivers of TFP and IN*D* a set of sector dummies, grouping firms according to sector of activity, and YDUM is a dummy variable indicating the fiscal year. Our parameter of interest $\delta_{1,}$ measures whether firms managed by a member of the owner family or a family owned firm are more or less productive than non-family-managed or non family owned firms.

Firms characteristics include: firm size (coded from 1 to 3 indicating number of employment size), firm's age, firms export status, and other variables that condition the business environment such as tax administration and tax rates, access to finance and competition with informal firms.

Business environment may also influence firm performance differently be it family or non-family. Collier (2000) argues that the poor business environment leads to misallocation of resources and high transactions costs in Africa, affecting particularly manufacturing firms. The business environment business environment, sometimes also referred to as the investment climate (e.g. Stern, 2002), is captured by measures such as access to credit, regulatory and institutional environment and infrastructure, etc. There are comparatively few papers (Gatti and Love, 2008; Fernandes, 2008) which focus on the relationship between the business environment and productivity. The idea that the business environment could impact on output and productivity is primarily based on the capacity of these factors to create incentives to invest. According to the 2009 World Bank

enterprise report practices of the informal sector, tax administration, access to finance and electricity are the most serious constraints to investment in Cameroon. It would be necessary to consider how these policies affect productivity.

Equation [5] is estimated by standard ordinary least squares and by instrumental variable regression. Econometric problems are associated with the OLS estimation. For instance, higher production efficiency of family firms may provide incentives for families to maintain their ownership and control and thus the analysis potentially suffers from an endogeneity problem. To address this issue, we estimate a two stage least square equation model in which the logs of family labour and family capital are used as instruments for the endogenous regressor (FAM) (see, e.g. Martikainen et al 2009).

**TABLE 4: OWNERSHIP-MANAGEMENT IN FAMILY FIRMS AND PRODUCTIVITY BASED ON TFP_LP ESTIMATE**

| **Dependent Variable** | **(1)** | **(2)** | **(3)** | **(4)** | **(5)** | **(6)** |
|---|---|---|---|---|---|---|
| **Estimation** | **OLS** | | **IV** | **First stage** | **IV** | **First stage** |
| Owner-managed | n/a | -0.473 (1.18) | n/a | n/a | -1.28 (1.65)* | n/a |
| Family ownership | -0.553 (1.99)* | n/a | -0.458 (1.72)* | n/a | n/a | n/a |
| Firm age | 0.081 (3.34)*** | 0.088 (3.59)*** | 0.082 (3.57)*** | -0.001 (0.42) | 0.091 (3.85)*** | 0.007 (1.37) |
| Firm age squared | -0.001 (1.76)* | -0.001 (1.97)* | -0.001 (1.89)* | 0.000 (0.64) | -0.001 (2.23)** | -0.0001 (1.60) |
| Export status | 1.21 (2.72)** | 1.3 (2.91)** | 1.22 (2.92)** | -0.019 (0.71) | 1.26 (2.94)** | 0.019 (0.20) |
| Access to credit | 0.667 (2.81)** | 0.736 (3.11)*** | 0.688 (3.06)*** | -0.015 (1.03) | 0.641 (2.65)** | -0.045 (0.89 |
| Tax administration | -0.316 (2.56)** | -0.322 (2.57)** | -0.317 (2.72)** | 0.006 (0.84) | -0.315 (2.61)** | 0.023 (0.09) |
| Tax rates | 0.265 (2.43)** | 0.292 (2.66)** | 0.200 (2.61)** | 0.008 (1.29) | 0.292 (2.76)** | 0.021 (0.89) |
| Competition with informal firms | 0.178 (2.21)** | 0.164 (2.03)** | 0.174 (2.29)** | -0.001 (0.15) | 0.176 (2.24)** | 0.0004 (0.03) |
| Year dummy | Yes | Yes | Yes | Yes | Yes | Yes |
| Year dummy | Yes | Yes | Yes | Yes | Yes | Yes |
| Family capital | n/a | n/a | n/a | 0.074 (29.90)*** | n/a | 0.021 (1.94)** |
| Family labour | n/a | n/a | n/a | -0.040 (3.13)** | n/a | 0.008 (0.20) |
| Constant | 13.01 (24.06)*** | 12.77 (23.97)*** | n/a | -0.018 (0.53) | 12.78 (24.88)*** | -0.140 (1.18) |
| Observations | 113 | 113 | 113 | 113 | 113 | 113 |
| $R^2$ | 0.52 | 0.50 | 0.51 | 0.97 | 0.53 | 0.48 |
| *Underidentification test (Anderson canon. corr. LM statistic, p-value)* | | | | 0.000 | n/a | 0.000 |
| *Overid., p-value* | n/a | n/a | 0.795 | n/a | 0.688 | n/a |

*Notes: Anderson canonical correlations Likelihood Ratio test for underidentification checks the condition which must be satisfied by any set of admissible instrumentss, namely the "strength" of their correlation with the endogenous variables; Overid P-value' is a P-value for the test of over-identifying restrictions. Robust t statistics in brackets, *, ** and *** indicate significance at 10%, 5% and 1%, respectively.*

Table 5 above reports the empirical OLS and 2SLS estimates from the TFP equation on all the firms. The concern remains that the association between family ownership and productivity that is estimated by OLS might be biased by endogeneity or omitted unobservables. Families might decide to own and control their businesses if they find them becoming more productive and vice versa (which in our context would imply a bias to the coefficient on FAM as estimated with OLS). However, both estimates produce quite similar results. Nevertheless, our interpretations are based on the 2SLS regressions.

The two first stage regressions indicate that family inputs are good predictors of ownership structure and are thus good candidate instruments. This is also supported by the Anderson canonical correlations Likelihood Ratio test with ρ- values of 0.00. However, for the exclusion restriction to hold, the instruments should not affect productivity through channels other than family ownership or management. The test of over-identifying restrictions cannot reject the hypothesis of zero correlation between the instruments and the error in the main regression (*P*-value of 0.68 to 0.79).

Ownership characteristics - individual proprietor or family ownership remain our primary objective of this study. We aim to clarify the relationship between family firm and firm performance in Cameroon by classifying the family firms based on the characteristics of the management and ownership. Motivated by a lack of consensus in the current literature, the objective of this paper was to reveal whether family firms are more or less productive than non-family firms. Using dummy variable for family ownership or management, we found that family-owned and managed firms are, on average less productive than non-family firms or family firms managed by outsiders but when we control for firm size (results not reported) the coefficient on ownership structure became insignificant maintaining the negative signs. However, coefficient on firm size was not significant. The results do not change when we consider total factor productivity based on the fixed-effects regression. Similar studies that family firms are less productive than non-family firms are (Barth et al., 2005; Bosworth and Loundes, 2002; Wall, 1998).

Finally, regarding the control variables, Age and age squared have positive and negatively significant coefficients, an indication that young firms have higher productivity growth relative to old firms (see for instance, Ayyagari et al 2011).

In this study, we also examined the relationship between business environment obstacles and production efficiency level of firms. We find that the tax administration constitute bottlenecks in running businesses despite the fact that tax rates themselves do not represent a barrier to firm productivity. The availability of credit observed through access to finance would firms to increase the investments in modern capital, human capital of workers and technological innovation, thereby creating a positive impact on productivity. It is important to note that credit is strongly and positively associated with productivity across firms. In particular, one might argue that exporters and firms in the formal sector that compete with informal firms both have higher know-how (and thus are more productive).

## CONCLUSION AND RECOMMENDATIONS

This study has made use of quantitative data from the World Bank enterprise survey and specifically, we have examined whether family relative to non-family ownership is related to differences in production technologies and/or in production efficiency of firms. This type of analysis have important policy implications, as the role of productivity in firm performance is of fundamental importance.

Despite numerous investigations into the effect of firm ownership on performance, very little analysis has focused specifically on the productivity of firms. The few studies that tackled the issue failed, unfortunately, to estimate TFP and relied on productive efficiency of firms in terms of Solow's Total Factor Productivity. We estimated total factor productivity via a Cobb–Douglas production function while accounting for the correlation between input levels and productivity. Profit-maximizing firms respond to increases in productivity by increasing their usage of factor inputs. Methods that ignore this endogeneity, such as OLS and the fixed-effects estimator, will provide inconsistent estimates of the parameters of the production function.

Using TFP as a measure of firm performance, the study compares the influence of family ownership and management regime relative to firms run by outside managers and non-family owned firms. As concerns management and control of firms, generally, family members are heavily involved in family firms than those of non-family firms which are mostly managed externally. As concerns the key conventional input variables of labour and capital that affects firm level output, it is observed that non family firms employed more labour and invest more in capital compared to family owned and managed firms. We do not find relevant differences in the distribution of firms according to the TFP.

It should be noted that the higher production efficiency of family firms may provide incentives for families to maintain their ownership and management, and thus our analysis may potentially suffer from an endogeneity problem. Using the two-staged least-squares technique, the econometric analysis shows that family firms and even those managed families are, on average less productive than family managed and non-family

owned firms after controlling for sector as well as other characteristics, such as age, export status, access to credit and some business environment obstacles (competition, tax rates and tax administration). We also find that generally, TFP gap could occur as a result of differences in availability of credit opportunities and ability to export suggesting that these factors contributes positively to productivity. Furthermore, younger firms are found to be more productive than old firms and whereas competition and tax rates do not deter productivity, bottlenecks in tax administration could seriously hamper firm efficiency.

From the above findings, we recommend the Cameroon government to provide support to family owned firms so that they can easily operate and generate self-employment. Training on firm management be extended to family businesses. This could be a powerful tool to raise productivity and thus firm growth. Such policy measures should be devised in a way that can help entrepreneurs in their educational training alongside the provision of technical and managerial facilities. Entrepreneurship education should be part of the curricula in Higher Education and how the sphere of family business should be taught in higher education should be of concerned to policy makers and academia. Family entrepreneurship should be perceived as a career opportunity by university students. Government should support firms to overcome obstacles that restrict firms' productivity growth. Firms' growth in terms of employment and poverty reduction via income generation can yield better outcome if these small units are provided with basic infrastructural support in terms of finance, simplification of tax administrative procedures and technical or commercial support.

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