Economics Bulletin

Volume 39, Issue 2

Peer Effect and Environmental Responsibility of Enterprises in a Sub-Saharan African Country

Ariel H. Fambeu
LETA, University of Douala

Abstract

The aim of this study is to evaluate the role of peer effects on the behavior of enterprises towards their environment. We use the approach of Instrumental variables (IV) to identify and estimate peer effects in industrial sector in Cameroon. This approach allows us to identify a mimetic behavior of enterprises in environmental protection when the reference group is the sector of activity. Thus, the impact of a policy of fight against environmental degradation is higher when the peer effect is taken into account in the sector of activity of the enterprise.

Citation: Ariel H. Fambeu, (2019) "Peer Effect and Environmental Responsibility of Enterprises in a Sub-Saharan African Country", *Economics Bulletin*, Volume 39, Issue 2, pages 1084-1094
Contact: Ariel H. Fambeu - afambeu@yahoo.fr.
Submitted: April 10, 2019. **Published:** May 15, 2019.

1. Introduction

Nowadays, the global environmental impact of enterprises is well described, particularly those of the industrial sector which are considered to be the main polluters. That is the major reason why they have to invest more in the environment and carry out a more active policy in the management of environmental issues. Thus, for more than two decades, enterprises have been deploying resources so as to be or appear responsible socially and environmentally. In 2005, among 16 large industrial countries, 33% of the biggest 100 enterprises publishing a report on their sustainable development policy or their social and environmental responsibility, as against 23% in 2002. In 2010, by excluding information contained in the annual reports of activities, it is henceforth 95% (as against 64% in 2005) of the 250 larger American enterprises and 64% (as against 41% in 2005) of the 100 larger enterprises in industrialised countries who communicated on their social and environmental responsibilities (KPMG, 2011). The taking into account of environmental risks and the number of accidents such as that of Bhopal[1] in India, can determine the level of communication and the type of information spread (Patten and Trompetter 2003). The environmental responsibility of the enterprise enables it to do more than the respect of regulatory constraints through voluntary actions aimed at for example protecting the environment and investing in equipment that reduces the emission of CO2. According to The European Commission (2001), the environmental dimension of the enterprise refers to: the incorporation in the conception, production and distribution of products practices relative to the prevention and control of pollution; the protection of water resources; the conservation of biodiversity; the management of waste; the management of local pollution or the management of the environmental impact of transport.

A considerable attention was given in literature since the 1960s to the determinants of the strategies of social and environmental responsibility and their impact on the performance of enterprises. One important problem of this literature is the compatibility between environmental performance and financial performance. On the basis of a linear relationship between these two performances, the debate opposes the defenders of the idea that the enterprise should have no other objective but the maximisation of the profit of shareholders (Levitt, 1958; Friedman, 1962, 1970) and those who think that the enterprise should have responsibilities vis-à-vis its environment (Freeman, 1984; Bénabou et Tirole, 2010; Deng et al, 2013; Lins et al, 2015; Albuquerque et al, 2015; Flammer, 2015). Di Maggio and Powell (1983) have already mentioned the good environmental practices of pioneering enterprises in this area are often limited by others and a mimetic isomorphism phenomenon is observed, one important limit of these studies is from the fact that they ignore the effect of social norms on environmental engagements (or at least do not measure it). Thus, the environmental responsibility of peers of an enterprise can incite this enterprise to adopt such behaviour. This effect of imitation or conformity also known as peer effect, can therefore contribute to the propagation of the behaviour of environmental responsibility in a region or a given activity. In fact, enterprises would not like to exclude themselves from the responsible behavior of their peers else stakeholders will have a bad image of them and thus reduce their performance.

In this study, we endeavour to respond to the following question: does the environmental behaviour of an enterprise depend on that of its peers? The objective of this study is therefore to analyse the effect of peers on the environmental behaviour of an enterprise in a sub-Saharan country. In a developing economy such as Cameroon dominated by Small and medium sized enterprises (SME), environmental impact cannot be neglected. Despite positive impacts of the industrial sector economically and socially, its contribution to the protection of the environment is questionable, or on the contrary at the level of its participation in its degradation. In fact, the different rejections of industries contribute in the degradation of the environment on which they depend for their raw materials. Moreover, the protection of the environment concerns only very few industrial firms in Cameroon. Since about 23.8% of industrial enterprises only have standard installations for the protection of the environment. In addition, in 2008, 18% carried out a study with the aim of protecting the environment and 15% have structures in charge of the protection of the environment (NIS, 2009). According to the sub-sector of activity, 44.4% of the enterprises of the sub-sector of extractive industries have installations for the protection of the environment followed by the food industry (33.0%); other manufacturing industries (26.0%); electricity, Gas and water (19.0%) and construction (12.7%). It is therefore necessary to evaluate the role of peers in environmental engagement of an industrial firm by controlling the traditional individual effects mentioned in literature.

[1] The disaster of Bhopal, of the night of 3 December 1984, is the most important industrial disaster till date. The explosion of a Union Carbide factory (Dow Chemical maintenance) ejected 40 tonnes of pesticides into the atmosphere of the town, causing the death of about 20 000 people.

The rest of the article is presented as follows: in the first part we discuss the difficulties around the identification and the estimation of the peer effects. Then we continue with the methodology used in the third section. The fourth section discusses the results of the estimation of the peer effect. Finally, we conclude in section 5.

2. The Identification of the Peer effects

The problem of identification comes from the difficulty of separating on one hand, the effects of social interaction of correlated effects, and on the other hand, endogenous effects of contextual effects even in the absence of correlated effects. This second form of the problem was named the reflexion problem and formally studied by Manski (1993). The difficulties linked to the identification of these effects appear because individuals affect each other mutually and simultaneously with those of their reference group which renders identification impossible. These identification problems were raised by Manski (1993) and discussed amongst others by Bramoullé et al. (2009) and Blume et al. (2010).

In one of the fundamental studies in literature on social interactions, Manski (1993) outlined three types of effects which can explain the reasons why persons belonging to the same group have similar behaviours. In his article, he proposes a static model in which he models the individual choice as a function of the behaviour of the reference group. The three effects are as follows: *The endogenous peer effect* that corresponds to the effect of the (average) behaviour of the reference group on the choice of an enterprise. A positive endogenous effect signifies that everything being equal that average environmental engagement in a group tends to positively affect the environmental engagement in an enterprise in this same group. This effect can be caused by the effects of imitation or social conformity or by the search of a competitive advantage. The endogenous effect is the only phenomenon explaining the presence of a social multiplier. *The contextual* peer effect occurs when the (average) exogenous characteristics of peers have an impact on the behaviour of an enterprise. It can be for example the effect of average life span of enterprises in a group, as well as the average size or the average sex of the managers, their average age etc. Contrary to environmental engagements of entreprises, their characteristics are exogenous and do not lead to the multiplier effect. A positive contextual effect signifies that the level of environmental engagement of an enterprise varies in the same direction as the socio-economic index of the group in which they belong. *The correlated effects* are difficult to measure and they appear in the presence of similar unobserved characteristics that enterprises of the same group share. Correlated effects can emerge even without casual links. Correlated effects can exist for two main reasons. First, due to the auto-selection in the group, enterprises having similar characteristics can have the tendency of locating in the same regions. Secondly, there can be effects of common shocks to groups (or unobserved characteristics). For example, it can be easier to adopt a responsible environmental behaviour in some regions because of inter-regional differences between the levels of pressure among stakeholders (customers, media, activists, NGO, etc) or culture. Therefore correlated effects are not related to peer effects and do not generate the social multiplier.

Contextual and endogenous effects are considered as social phenomenon and are attractive in terms of public policy. However, the distinction of these effects raises a real challenge that has been at the centre of debates on public policy for several years.

The three effects of peers are presented in a structural model that is linear-in-mean that we will try to estimate:

$$y_{ri} = \alpha_r + \gamma x_{ri} + \beta \bar{y}_{r-i} + \delta \bar{x}_{r-i} + \epsilon_{ri} \qquad (1)$$

Where y_{ri} measures the level of environmental engagement of the enterprise *i* of the group *r*, x_{ri} is the vector formed from these individual characteristics and $\bar{x}_{r-i}$ the vector formed from the average characteristics of peers. The level of average environmental engagement of the group *r* is given by the variable[2] $\bar{y}_{r-i}$. α_r is the parameter that captivates the effect of the unobserved characteristics that are common to all enterprises of the same group (fixed group effect or correlated effect). These effects are potentially correlated with the characteristics of the firm and the observable characteristics of the group. Finally, ϵ_{ri} is a random term that captures all the other unobservable factors that determine environmental engagement of the firm *i* of group r. It is useful to pose the hypothesis that, knowing the fixed effect of the group, the explanatory variables of the model are strictly independent of this term ($E(\epsilon_{ri}|x_r, \alpha_r) = 0$). The parameter γ represents the effect of the characteristics of

[2] *r-i* indicates that the enterprise considered is excluded from its group of reference *r*

enterprises. The parameter β represents the endogenous peer effect. It is of standard to assume that in absolute value, β be less than 1, *i.e.*, $|\beta| < 1$.

Peer effects were used in several domains such as agriculture (Foster et Rosenzweig, 1995), criminality (Glaeser et al, 1996 ; Falk and Fischbacher, 2002), the labour market (Bandiera et al, 2005 ; Falk and Ichino, 2006 ; Grodner et al, 2010), expenditure decisions of households (Cai et al, 2009 ; Kaustia and Knüpfer, 2012 ; Georgarakos et al, 2014), obesity (Trogdon et al. 2008 ; Yang and Huang, 2013 ; Peng Nie et al, 2014), educational success (Ammermueller and Pischke, 2009 ; Brodaty, 2010 ; Boucher et al, 2010), adoption and use of internet (Agarwal et al, 2009 ; Fambeu and Bakehe, 2015), taxation fraud (Fortin et al, 2007 ; Bellemare et al, 2012), the type of investment of an enterprise (Foucault and Fresard, 2014 ; Servaes and Tamayo, 2014 ; Kaustia and Rantala, 2015) and informality (Fambeu, 2018).

3. Methodology

3.1. Data

Our empirical analysis is based on the data of industrial enterprises from the General Survey of Enterprises (GSE) carried out during the period of August to November 2009 by the National Institute of Statistics (NIS), based on the following classification i) very small enterprises (VSE), ii) small enterprises (SE), iii) medium enterprises (ME) and iv) large enterprises (LE) according to the importance of turnover and the number of workers employed. 11 685 active industrial enterprises (that is 12.43% of all the enterprises, with 86.5% in the tertiary sector and 1.07% in the primary sector) were surveyed, among which 6 906 are in the towns of Douala and Yaoundé representing 59% for the two major metropolis of the country. These two agglomerations have a high concentration of ME and LE: 80.6% and 78.5% respectively. Then, as concerns the structured questionnaire, the NIS retained 1008 industrial enterprises after screening the data base of the sample (that is 12.55% of enterprises screened), thus ensuring the representativeness of the industrial sector. These structures questionnaires contain information on the turnover, number of employees, the value added, exports, the age of the enterprise, the business environment, investments (R&D, etc), technological innovations, ISO certification, the training of personnel, the use of ICT, etc. In conformity to the nomenclature of activities in Cameroon (NACAM), the industrial sector is sub-divided into 5 sub-sector: extractive (made up of 2 branches), food industries (7 branches), the other manufacturing industries (14 branches). This nomenclature of Cameroon is an adaptation of the nomenclature of activities of member states of AFRISTAT (NAEMA) inspired from a typical international classification of all the branches of economic activities (CITI rév. 3.1).

Even though our sample (1008 enterprises) is representative of the industrial sector, there is no perfect representation of VSE and the sub-sector of activity – ''other manufacturing industries''. In fact, as shown by table 1 (in appendix), VSE remain the enterprises that are most represented in the sample, but with smaller proportion because of the screening phase that eliminated about 95% of them. Consequently, because of the over representation of VSE in the other manufacturing industries (table 3 in appendix), its elimination automatically leads to the reduction of the weight of this sub-sector (table 2 in appendix). However, this sub-sector still remains strongly represented in the sample (table 2 and 4 in appendix) as it is the case in the main sample.

3.2. Estimation of the model

In this section, we estimate a linear-in-means model by restrictions of exclusion. This approach involves imposing restrictions of exclusion on the contextual effects to identify the endogenous effect. Evans et al, (1992) were among the first to adopt this approach. The method is described in detail in Graham and Hahn (2005). Several authors repeated this approach mainly because of its simplicity and the fact that the contextual variables can serve as instruments (especially Gaviria and Raphael, 2001 ; Trogdon et al, 2008 ; Agarwal et al, 2009 ; Bellemare et al, 2012; Fambeu and Bakehe, 2015). Let's recall that the basis of the model that we are trying to estimate is as follows:

$$y_{ri} = \gamma x_{ri} + \beta \bar{y}_{r-i} + \delta \bar{x}_{r-i} + \mu_{ri} \quad (2)$$

$$\mu_{ri} = \alpha_r + \epsilon_{ri} \quad (3)$$

Where $\bar{y}_{r-i}$ and $\bar{x}_{r-i}$ correspond to the means of the variables in the group *r* excluding the enterprise *i*. Let's recall that $\bar{y}_{r-i}$ is an endogenous variable, that is it is correlated with μ_{ri}. The method of estimation consist of using $\bar{x}_{r-i}$ as instrument for $\bar{y}_{r-i}$. This instrument has to be correlated with the endogenous variable, but not

with the error term. The absence of correlation with the error term supposes that $\delta = 0$ (*that is* there is no contextual effect: restriction of exclusion in the structural model). Under this hypothesis, $\bar{x}_{r-i}$ will be a valid instrument for $\bar{y}_{r-i}$. The condition of correlation with the endogenous variable will be met in the case of $\bar{x}_{r-i}$ if $\gamma \neq 0$ (*that is,* if there is the presence of individual effects). The addition of a fixed effect (α_r) to each group in the model offers a partial solution to the endogeneity of the error term ϵ_{ri}. This problem arises when the sharing of enterprises between the different groups is not the result of a random process. It is possible to capture auto selection of enterprises in the different groups by adding a fixed effect per group to the model (De Melo, 2011).

This model raises two important problems. First, subtracting the fixed effects (α_r) from the model would imply equally subtracting all the effects that are specific to the group that is the endogenous and contextual effects. Secondly, as explained above the problem of reflexion makes the variables of $\varepsilon_{gi}$to be directly linked to the variables of $\bar{y}_{r-i}$, this prevents the estimation of the endogenous effect even in the absence of correlated effects. The model of Bramoullé et al., (2009) however raises the hypothesis that the enterprise is excluded from the reference group, this overcomes these two problems. Thus, the parameters obtained by a Two Stage Least Square (2SLS) are asymptotically convergent (Bramoullé et al., 2009).

The estimation of the model using 2SLS is possible only after some transformations. First, the estimation of a fixed effect for each group causes a problem of incidental parameters. This problem emanates from the fact that the number of parameters to be estimated is an increasing monotonous function of the number of groups included in the data used[3]. Bramoullé et al., (2009) suggest the pre-multiplication of the variables of the model by $(I - G)$. This transformation eliminates the fixed effects of the equation, which has no prejudice since it does not bring any additional clarifications to the interpretation of peer effects in the model. The variables are thus expressed in deviation with respect to their mean among all enterprises of a group *r*[4].

In matrix notation, equation (2) to which is applied a local transformation in difference with respect the average becomes:

$$(I - G)y_r = \alpha(I - G)Gy_r + \gamma(I - G)Gx_r + \beta(I - G)x_r + (I - G)\varepsilon_r \qquad (3)$$

Where y_r is a vector *(N× 1)* of y_i and x_r is a vector *(N× K)* of explanatory variables x_i.

G is a matrix of social interaction that is used to weight the influence of the level of informality of peers on the level of informality of the enterprise. The matrix G is defined as follows:

$G=Diag(w_{m_1},\ldots,w_{m_R})$, matrix *(N× N)* of the form : $\begin{pmatrix} w_{m_1} & 0 \\ 0 & w_{m_2} \end{pmatrix}$, we assume that the enterprise is influenced by the level of informality of each of these peers, this makes all the elements out of diagonal of G to be equal to $\frac{1}{m_r - 1}$. Since the enterprise is excluded from its group, the elements on the diagonal are equal to zero. Thus each block $w_{m_r} = \begin{pmatrix} 0 & \frac{1}{m_r-1} \\ \frac{1}{m_r-1} & 0 \end{pmatrix}$, $r=1,\ldots,R$. I is the identity matrix ($m_r \times m_r$).

Equation (3) is estimated by the least square in two stages using the following instruments: $S = [(I - G)X, (I - G)GX, (I - G)G^2X]$. These instruments are natural to the model since in a group everyone is related to one another. These instruments are thus validated for $(I - G)Gy_r$ (Bramoullé et al., 2009). The matrix of regressors is $X = [(I - G)x, (I - G)Gx, (I - G)Gy]$.

Given that more than one individual characteristic is used, the model is under identified since there are more instruments (S) than variables (X). In this case, the parameters are obtained by the estimator:

$$\hat{\alpha}^{2SLS} = [X'S(S'S)^{-1}S'X]^{-1}X'S(S'S)^{-1}S'\tilde{y}$$

[3] The sample used in this article is made up of 12 regions and 11 sub sectors and thus with as many fixed effects to be estimated in addition to the parameters associated to the other variables of the model.

[4] Let's note however that the parameters identified with a global deviation effect are equally identified with a local deviation approach ("*within* model"). This approach is called "*local approach*" given that the mean is carried out on the "*j*" individuals and not on the "*i*" individuals (*j* given the neighbour of *i*).

3.3. The measurement of variables

In our model, we have an explanatory variable that is the environmental responsibility (ER) of the enterprise, measured with the help of three questions linked to the environmental protection and prevention of catastrophes and a question related at the ISO certification with answer ''Yes'' or ''No''. In fact, the 14001 ISO testifies that the enterprise possesses of quality environmental management. More precisely, enterprises which have the 14001 ISO norms minimise the perverse effects of their activities on the environment and pursue a constant improvement of their environmental performance. Cameroon is part of countries which participate fully in the elaboration of these norms. The questions are as follows: Does your enterprise have a standard installation for the protection of the environment? Have you carried out studies with the aim of protecting the environment from the negative effects of your activities in 2008? Does your enterprise have a structure in charge of the environment? And finally does your enterprise have an ISO certification?

Thus, ER = 0 if « No » to all these questions; ER = 1 if « Yes » to one of these questions; ER = 2 if ''Yes'' to two of these questions; ER = 3 if ''Yes'' to three of these questions; ER =4 if ''Yes'' to all these questions. The other variables (explanatory variables) and their descriptive statistics are presented in detail in table 5.

A pertinent question in the study of the effects of social interaction is the definition of the reference groups. The data from NIS offer several interesting possibilities of their definitions. Since there is no rigorous method of definition (at least having subjective information on the peers of each enterprise, which is not the case here), it is important to consider several alternatives and compare the results. We take two factors into account: the spatial distance between enterprises (or geographic, demarcated by 12 zones of survey of the NIS) and the type of activity of the enterprise (identifies in conformity to the nomenclature of activities in Cameroon (NACAM) into 5 sub-sectors as mentioned previously).

4. The results

Table 6 (in appendix) shows the results of two models. In model 1, we use geographical proximity to estimate the peer effects whereas it is the sector of activity that is used in model 2 as reference group. The Sargan test leads us not to reject the hypothesis of instrument validity and over-identification restriction for the two models (p-value sufficiently high). This Sargan test shows that the instruments chosen are correlated with the residues of the structural model. Indeed, these exclusion restrictions are made on the contextual variables which serve as instruments to identify these models. The Wald test suggests that the contextual effects are mostly individual and all non significant for our model. Moreover, since the statistics of the Stock and Yogo[5] test are largely more than the critical value (at a rate of 5%), we reject the null hypothesis that the instruments are weak (*i.e* can correlate with the left endogenous variable). These tests confirm the pertinence of the instruments retained (valid and powerful instruments) and serve as statistical support of exclusion restrictions imposed at the beginning. In other words, the restrictions exclusion which has served the instruments leads to a good identification of our linear-in-mean model.

The results show that several individual effects significantly influence environmental responsibility of the enterprise. The level of adoption of ICT, longevity, the size, research and development, international affiliations (IDE), legal status (in favour of public limited campanies) and the nationality of the manager (in favour of European who are not French) positively affects the behaviour of the enterprise towards the environment, whereas the level of education of the manager affects it negatively. If this negative result of the level of education seems surprising, it is because it is often forgotten that managers are after all simple citizens whose attitudes and behaviours are analysed based on their values and beliefs which are not necessarily related to their level of education. In fact, ''the ethics of managers can be considered as the manner in which managers try to construct a conduct (behaviour) in a professional situation'' (Hirèche, 2004, p.1). The managers of enterprises always endeavour to manage their enterprises in coherence with their ethical motivations (Huybrechts et al, 2006). Consequently, the ethic of the leaders plays an important role in the integration of the ecological dimension in a polluting firm (Bansal and Roth, 2000; Gonzales-Benito and Gonzales-Benito, 2005). According to Hood and Bubna-Litic (2000) there are managers characterised by a reformist environmentalism who use economic rationality and those who are characterised by a radical environmentalism aimed at preserving nature. Therefore

[5] See Stock and Yogo (2005)

managers who are more educated have a higher level of economic rationality and consequently adopt a less responsible behaviour vis-à-vis the environment.

As concerns the endogenous peer effect, it is noticed that it is positive and significant only if we chose the sub-sector of the activity of the enterprise as reference group. A shock that incites an enterprise to adopt a responsible environmental behaviour in the absence of peer effect (direct effect), will incite others to adopt such a behaviour in the presence of peer effects (direct plus indirect effect). In the light of the neo-institutional theory, corporate social responsibility can therefore be treated as a mimetic and normative process that leads to the elaboration of norms, referential, labels that will be propagated voluntarily or willingly. Thus, according to Di Maggio and Powell (1983), there exist three forms of institutional pressure that enable us to explain the institutional isomorphism of organisations: coercive isomorphism (rules, laws, sanctions) where legitimacy is legal, normative isomorphism (certification, norms, etc.) where legitimacy is moral and mimetic isomorphism (belief and logic of shared action) where legitimacy is culturally accepted. Consequently, organisations in a context of risk of loss of reputation and uncertainty and having the will to sustainably defend their objective and maintain their legitimacy and reputation, conform to these practices recognised as pertinent and appropriate with respect to the expectations of stakeholders (institutional actors). Good environmental practices of pioneering enterprises in this domain are often imitated by other and a phenomenon of mimetic isomorphism is noticed (Di Maggio et Powell 1983).

5. Conclusion

Environmental problems have become one of the most important challenges of the contemporary world. In fact, environmental nuisances went beyond national boundaries to become a global problem threatening the survival of future generations. In the presence of this major challenge, industrial enterprises are the most likely to alter the biosphere. After a period of total indifference to ecological problems, industrialists have started to introduce more and more environmental practices even though they remain weak in enterprises of developing countries and particularly in Cameroon, in comparison to those of enterprises in industrialised countries.

The main objective of this study was to estimate the effects of endogenous peers on environmental responsibility of the enterprise. The endogenous peer effect measures the impact of environmental behaviour of peers of an enterprise on its own behaviour with respect to the environment. This effect can come from a mimetic isomorphic phenomenon (or social conformism), or from a market behaviour that incites irresponsible enterprises to become responsible so as to remain competitive. The endogenous peer effect can be at the origin of a social multiplier. It amplifies the direct impact of a shock that stimulates or on the contrary discourages environmental engagement of enterprises. The social multiplier is therefore important in the evaluation of policies aimed at fighting against the degradation of the environment.

In order to attain our objective, we estimated a linear-in-means model with restrictions of exclusion using the method of instrumental variables. We used the data of industrial enterprises in Cameroon. The results show several significant individual effects (adoption of ICT, longevity, size, international affiliation, legal status (in favour of public limited companies) the nationality and level of education of the manger (in favour of non French Europeans and less educated persons). As concerns the endogenous effect, our results show the influence of peers only when the reference group of the enterprise is its sector of activity. The good reference group will then be the sector of activity and not geographical proximity of enterprises. Thus, a shock that incites an enterprise to adopt a responsible environmental behaviour in the absence of peer effect (direct effect), will incite others to adopt such a behaviour in the presence of peer effects (direct plus indirect effect). Therefore, the impact of a policy of fight against environmental degradation is more than five times higher when peer effects are taken into account in the sector of activity of the enterprise.

References

Agarwal, R., A. Animesh and K. Prasad (2009), "Social Interactions and the Digital Divide: Explaining Regional Variations in Internet Use", *Information System Research*, 277-294.

Albuquerque, R. A., A. Durnev and Y. Koskinen (2015), "Corporate social responsibility and firm risk: Theory and empirical evidence", *Working Paper* available at SSRN.

Ammermueller, A. and J.-S. Pischke (2009), "Peer Effects in European Primary Schools: Evidence from the Progress in International Reading Literacy Study", *Journal of Labor Economics* 27 (3), 315-348.

Bandiera, O., I. Barankay and I. Rasul (2005), "Social Preferences and the Response to Incentives: Evidence from Personal Data", *Quarterly Journal of Economics* 120(3), 917–963.

Bansal, P. and K. Roth (2000), "Why companies go green: A model of ecological responsiveness", *Academy of Management Journal* 43(4), 717-748.

Bellemare, C., B. Fortin, N. Joubert and S. Marchand (2012), "Effets de pairs et fraude sociale : une analyse économétrique sur données françaises", Cahier Scientifique CIRANO, s-33.

Bénabou, R. and J. Tirole (2010), "Individual and corporatesocial responsibility", *Economica* 77, 1-19.

Blume, L. E., W. A. Brock, S. N. Durlauf and Y. M. Ioannides (2010), 'Identification of social interactions', *Economics Series* 260, Institute for Advanced Studies.

Boucher, V., Y. Bramoulle, H. Djebbari and B. Fortin (2010), "Do peers affect student achievement? Evidence from canada using group size variation", Cahiers de recherche, CIRPEE.

Bramoullé, Y., H. Djebbari and B. Fortin (2009), "Identification of Peer Effects Through Social Networks", *Journal of Econometrics*, 150(1), 41–55.

Brodaty, T. (2010), "Les effets de pairs dans l'éducation : une revue de littérature", *Revue d'économie politique* 120(5), 739–757.

Cai, H., Y. Chen and H. Fang (2009), "Observational Learning: Evidence From a Randomized Natural Field Experiment", *American Economic Review*, 99 (3), 864–882.

Commission européenne (2011), A renewed EU strategy 2011-14 for corporate social responsibility, Communication From the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions, Com. 681 final, 6.

De Melo, G. (2011), "Peer effects identified through social networks. Evidence from Uruguayan schools", Department of Economics University of Siena 627, Department of Economics, University of Siena.

Deng, X., J. K. Kang and B. S. Low (2013), "Corporate social responsibility and stakeholder value maximization: Evidence from mergers", *Journal of Financial Economics* 110, 87-109.

DiMaggio, P. J. and W. W. Powell (1983), "The iron cage revisited: Institutional isomorphism and collective rationality in organizational fields", *American Sociological Review* 48(2), 147-160.

Evans, W. N., W. E. Oates and R. M. Schwab (1992), "Measuring Peer Group Effects: A Study of Teenage Behavior", *Journal of Political Economy* 100, 966–91.

Falk, A., and U. Fischbacher (2002), ""Crime" in the lab-detecting social interaction", *European Economic Review* 46(4-5), 859 – 869.

Falk, A. and A. Ichino (2006), "Clean Evidence on Peer Effects", *Journal of Labor Economics*, 24(1), 39–57.

Fambeu A.H. (2018), "L'entourage influence-t-il le comportement informel des entreprises au Cameroun? ", *African Development Review* 30(4), 478–489.

Fambeu, A. H. and N. P. Bakehe (2015), "Interaction sociale et Usages de l'internet au Cameroun", *l'Actualité Economique/Revue d'Analyse Economique*, 91(4), 421-460.

Flammer, C. (2015), "Does corporate social responsibility lead to superior financial performance? A regression discontinuity approach", *Management Science*, 1–20, ISSN 1526-5501

Fortin, B., G. Lacroix and M.-C. Villeval (2007), "Tax Evasion and Social Interactions", *Journal of Public Economics* 91, 2089–2112.

Foster, A. D. and M. R. Rosenzweig (1995), "Learning by Doing and Learning From Others: Human Capital and Technical Change in Agriculture", *Journal of Political Economy* 103 (6), 1176–1209.

Foucault, T., and L. Fresard (2014), "Learning from peer firms' stock prices and corporate investment", *Journal of Financial Economics* 111, 554-577.

Freeman, R. E. (1984), Strategic Management: a Stakeholder Approach, Boston: Pitman.

Friedman, M. and B. Jaggi (1982), "Pollution disclosures, pollution performance and economic performance", *Omega, The International Journal of Management Science*, 10, 192-212.

Friedman, M. (1970), The Social Responsibility of Business is to Increase its Profits, New York Time Magazine, 13 Sept., 122-126.

Gaviria, A. and S. Raphaël (2001), "School-based peer effects and juvenile behavior", The *Review of Economies Statistics* 83, 257-268.

Georgarakos, D., M. Heliassos and G. Pasini (2014), "Household Debt and Social Interactions", *Review of Financial Studies* 27, 1404-1433.

Glaeser, E. L., B. Sacerdote and J. A. Scheinkman, (1996), "Crime and Social Interactions", *The Quarterly Journal of Economics*, 111, 507–48.

Gonzales-Benito, J. and O. Gonzales-Benito (2005), "A study of the motivations for the environmental transformation of companies", *Industrial Marketing Management* 34, 462-475.

Graham, B. S. and J. Hahn (2005), "Identification and Estimation of the Linear-in-means Model of Social Interactions" *Economics Letters*, 88, 1–6.

Grodner, A., T. J. Kniesner and J. A. Bishop (2010), "Social Interactions in the Labor Market", *Foundations and Trends in Microeconomics* 6(4), 265–366.

Hirèche, L. (2004), "L'influence de l'éthique des managers sur le comportement au travail et la performance organisationnelle : esquisse d'un modèle conceptuel ", AGRH 2004.

Hood, P. and D. Bubna-Litic (2000), "Drivers of environmental change in organizations", Faculty of Business School of Management, University to technology, Sydney, Working Paper.

Huybrechts, B., S. Mertens and V. Xhauflair (2006), "Les interactions entre l'économie sociale et la responsabilité sociale de l'entreprise", *Revue Internationale de Gestion*, Eté, 31(2), 65-74.

INS/RGE, (2009), Institut National de la Statistique. « Recensement Général des Entreprises », 2009, Cameroun.

Jo, H. and M.A. Harjoto (2011), "Corporate governance and firm value: The impact of corporate social responsibility", *Journal of Business Ethics* 103, 351-383.

Kaustia, M. and S. Knüpfer (2012), "Peer Performance and Stock Market Entry", *Journal of Financial Economics* 104 (2), 321–338.

Kaustia, M., and V. Rantala (2015), "Social learning and corporate peer effects", *Journal of Financial Economics* 117(3), 653–669.

KPMG (2011), KPMG International Survey of Corporate Responsibility Reporting, Available at http://www.kpmg.com/PT/pt/IssuesAndInsights/Documents/corporate-responsibility 2011.

Levitt, T. (1958), "The Dangers of Social Responsibility", *Harvard Business Review* 36, 41- 51.

Lins, K., H. Servaes and A. Tamayo (2015), "Social capital, trust, and firm performance during the financial crisis", ECGI *Finance Working Paper* No. 446/2015.

Manski, C. (1993), "Identification and Endogenous Social Effects: the Reflection Problem", *Review of Economic Studies* 60, 531-542.

Patten, D.M. and G. Trompeter (2003), "Corporate reponses to political costs: an examination of the relation between environmental disclosure and earnings management", Jo*urnal of Accounting and Public Policy* 22, 83-94.

Peng, N., A. Sousa-Poza and X. He (2014), "Peer Effects on Childhood and Adolescent Obesity in China", IZA *Discussion Paper* No. 8528.

Servaes, H., and A. Tamayo (2014), "How do industry peers respond to control threats", *Management Science* 60, 380-399.

Stock, J. H. and M. Yogo (2005), "Testing for weak instruments in linear IV regression", In Identification and Inference for Econometric Models: Essays in Honor of Thomas Rothenberg, ed. D. W. K. Andrews and J. H. Stock, 80–108. New York: Cambridge University Press.

Trogdon, J. G., J. Nonnemaker and J. Pais (2008), "Peer effects in adolescent overweight", *Journal of Health Economics* 27(5), 1388 – 1399

Yang, M. and R. Huang (2013), "exposure to obesity and weight gain among adolescents", *Eastern Economic Journal* 40(1), 96-118.

Appendix

Table 1: Structure of main sample and sample according to the size

	Main sample		Sample	
	N	%	N	%
VSE	9858	84.36	513	50.89
SE	858	7.34	205	20.34
ME	740	6.33	197	19.54
LE	229	1.97	93	9.23
Total	**11685**	**100**	**1008**	**100**

Source : author

Table 2: Structure of main sample and sample according to the sub-sector of activity

	Main sample		Sample	
	N	%	N	%
Extraction	25	0.21	14	1.39
Food industry	695	5.95	210	20.83
Others manufacturing industries	10227	87.52	443	43.95
Electricity, Gas and water	74	0.63	48	4.76
Construction	664	5.68	293	29.07
Total	**11685**	**100**	**1008**	**100**

Source : author

Table 3: Proportion of enterprises according to the sub-sector of activity (main sample) (%)

	Sub-sector of activity					
	Extraction	Food industry	Others manufacturing industries	Electricity, Gas and water	Construction	Total
VSE	0.05 (5)	3.57 (352)	93.55 (9222)	0.21 (21)	2.62 (258)	100.00 (9858)
SE	0.58 (5)	14.57 (125)	59.79 (513)	1.28 (11)	23.78 (204)	100.00 (858)
ME	0.68 (5)	20.81 (154)	50.41 (373)	3.92 (29)	24.19 (179)	100.00 (740)
LE	4.37 (10)	27.95 (64)	51.97 (119)	5.68 (13)	10.04 (23)	100.00 (229)
Total	**0.21 (25)**	**5.95 (695)**	**87.52 (10227)**	**0.63 (74)**	**5.68 (664)**	**100.00 (11685)**

Source : author; number of observation in parentheses

Table 4: Proportion of enterprises according to the sub-sector of activity (Sample) (%)

	Sub-sector of activity					
	Extraction	Food industry	Others manufacturing industries	Electricity, Gas and water	Construction	Total
VSE	1.17 (6)	13.45 (69)	43.86 (225)	4.48 (23)	37.04 (190)	100.00 (513)
SE	0.98 (2)	26.34 (54)	40.49 (83)	5.85 (12)	26.34 (54)	100.00 (205)
ME	1.52 (3)	31.47 (62)	42.13 (83)	5.08 (10)	19.80 (39)	100.00 (197)
LE	3.23 (3)	26.88 (25)	55.91 (52)	3.23 (3)	10.75 (10)	100.00 (93)
Total	**1.39 (14)**	**20.83 (210)**	**43.95 (443)**	**4.76 (48)**	**29.07 (293)**	**100.00 (1008)**

Source : author; number of observation in parentheses

Table 5: Description of variables and descriptive statistics

Variables	Definition	Mean	Std.Dev.	Min	Max
ER	ER = 0 if the enterprise does not adopt any measure to protect the environment ; 1 if she adopts a measure; 2 if two measures; 3 if three measures ; 4 if four measures	0.72	1.15	0	4
Characteristics of the enterprise					
ICT	Three types of ICT are potentially adopted by enterprises: a functional computer, an intranet network, an internet connection and the practice of the business operations online. Thus, we construct an ICT variable with 5 modalities : 0 if no ICT ; 1 if one ICT ; 2 if two ICT ; 3 if three ICT ; 4 if four ICT	2.40	1.32	0	4
AGE	Age of the enterprise : 0-4 = 1 (reference group); 5-9 =2; 10-14 = 3; 15 and + = 4	2.18	0.84	1	3
SIZE	Number of permanent employees : 0-9 = 1 (reference group); 10-19 = 2 ; 20-99 = 3 ; 100 and + = 4	1.87	1.03	1	4
SALARY	Log of average salary of permanent employees	6.95	1.23	2.02	11.99
RD	RD = 1 if the enterprise has invested in R&D or has made experimnetal R&D in the enterprise and 0 if not	0.08	0.27	0	1
GROUP	1 if the enterprise belongs to a group ; 0 if not	0.14	0.35	0	1
FDI	1 if the enterprise is a foreign affiliate e ; 0 if not	0.06	0.25	0	1
SPP	Sole proprietorship/partnership = 1 or Private limited company =1 et 0 if not	0.28	0.45	0	1
PLC	Public limited company = 1 and 0 if not	0.16	0.37	0	1
EXPORT	1 if the enterprise produces mainly for exports ; 0 if not	0.06	0.24	0	1
Characteristics of the manager					
MAN	1 if the manager is a man and 0 if not	0.93	0.26	0	1
EDUC	0 if the manager has no level of education ; 1 if the highest level of education of the manager is primary school ; 2 if the highest level of education of the manager is secondary school ; 3 if the highest level of education of the manager is at least 'A' level	1.43	1.34	0	3
CAMEROON	Cameroon=1 if the manager is Cameroonian and 0 if not	0.78	0.41	0	1
FRANCE	France=1 if the manager is French and 0 if not	0.04	0.20	0	1
EURHORSFCE	1 if the manager is European excluding French and 0 if not	0.03	0.17	0	1
Competition					
HHI	$hhi = \sum_{i=1}^{N}(MS)^2 * 10000$ It is the Herfindahl-Hirschmann concentration index measuring domestic competition. This index is determined by the sum of the squares of markets shares (MS) of enterprises in a sector of activity.	2003.87	1051.99	646.78	4791.51

Source : author

Table 6: Estimation of the linear-in-means model with restriction of exclusion by the method of instrumental variables

	Model 1 (reference group : spatial)	Model 2 (reference group : type of activity)
Endogenous effects	.023321 (.02592)	.811396*** (.367657)
Individual effects		
Caracteristics of enterprise		
ICT	.125118***	.154626***

	(.037073)	(.039896)
AGE	.11408*	.142949**
	(.056089)	(.057536)
SIZE	.193867***	.154399***
	(.055132)	(.054587)
SALARY	.011372	-.020183
	(.065018)	(.047832)
RD	.379647*	.567601***
	(.216446)	(.183331)
GROUP	.193161	.149521
	(.200923)	(.139816)
FDI	.644779**	.692189***
	(.258193)	(.232996)
SPP	-.058316	-.151493
	(.112737)	(.103473)
PLC	.360575**	.365737***
	(.151837)	(.124098)
EXPORT	.079477	.3946266
	(.160459)	(.3424643)
Caracteristics of managers		
MAN	-.131654	-.054508
	(.2046)	(.156568)
EDUC	-.119831***	-.132169***
	(.039838)	(.038998)
CAMEROON	.198837	.15213
	(.179204)	(.15965)
FRANCE	.147465	.138209
	(.259073)	(.2356)
EUROHORSFRCE	.556968*	.427433*
	(.273245)	(.29040)2
Competition		
HHI	.000035	-.000082
	(.000043)	(.000056)
_cons	-.353775	-.426584
	(.418108)	(.407127)
N	1002	1002
Endogeneity test		
Chi-sq(1) P-val	0.0111	0.0000
Sargan test		
Chi-sq(14) P-val	0.4913	0.2431
Stock et Yogo test		
Cragg-Donald Wald F statistic:	7.1e+04	1.4e+04
Critical values (5%) :	20.90	20.90

*** Significant at 0.01 level; ** significant at 0.05 level * significant at 0.10; standard errors in parentheses