

# Green Not (only) for Profit: An Empirical Examination of the Effect of Environmental-Related Standards on Employees' Recruitment<sup>1</sup>

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**Abstract:** Thanks to an original database on French firms we investigate the impact of environmental-related standards on employees' recruitment. Using a bivariate probit model, we show that voluntary environmental-related standards (*i.e.*, ISO 14001 standard, organic labeling, fair trade, etc.) improve the recruitment of professional and non-professional employees. This finding suggests that, beyond environmental considerations, human resources management can drive registration.

**Key words:** environmental-related standards, recruitment.

**JEL codes:** Q50, J20.

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## 1. Introductory remarks and related literature

In a well-known contribution, the Nobel laureate in economics Milton Friedman (1970) argued that 'there is one and only one social responsibility of business – to use its resources and engage in activities designed to increase its profits so long as it stays within the rules of the game'. Nevertheless, the empirical evidence shows that numerous firms exhibit their voluntary social responsibility commitments. This evidence is notably reflected in the sizeable economics literature devoted to the adoption of voluntary environmental-related approaches (Nakamura *et al.*, 2001; Anton *et al.*, 2004; Grolleau *et al.*, 2007). Interestingly, even Friedman conceded that 'it may well be in the long run interest of a corporation that is a major employer in a small community to devote resources to providing amenities to that community or to improving its government. That may *make it easier to attract desirable employees* (emphasis added by the authors), it may reduce the wage bill or lessen losses from pilferage and sabotage or have other worthwhile effects.'

In line with the Porter hypothesis, several scholars have emphasized possible economic and environmental benefits resulting from well-crafted voluntary initiatives (Porter and van Der Linde, 1995; Hart, 1997; Reinhardt, 2000). In a recent survey, Ambec and Lanoie (2008) listed seven channels through which environmental standards may raise the benefits of firms or cut their costs: better access to markets, possibility for differentiation of products, commercialization of pollution-control technology, savings on regulatory, material energy and services, capital, and labor costs. Among economic benefits, a relatively neglected area is *whether and how* environment-related standards improve human resource management. For example, the multinational corporation, Dole Food Co. Inc. reported that 'key benefits [of adopting environmental management systems] include strong employee motivation and loyalty which translates into reduced absenteeism and improved productivity'.<sup>2</sup> In the same vein, Grolleau *et al.* (2007, see also Darnall *et al.*, 2000) showed that ISO 14001 registration among French agrofood firms was mainly driven by the desire to improve human resource management. Among the several dimensions of human resource management likely to be affected by the adoption of environmental-related standards, recruitment is an excellent candidate. The aim of this paper is to investigate for whether recruitment is enhanced when a firm has adopted environmental-related standards. Such an enhancement implies that environmental standards deliver more than environmental benefits and that firms can strategically use them for their ability to generate win-win opportunities.

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<sup>2</sup> Anonymous, 2001, Dole Reports Motivation, Health and Safety, and Productivity Benefits from ISO 14001. ISO Management Systems—*The International Review of ISO 9000 and ISO 14000*, December, 56-58.

Attracting top candidates may be easier for firms known for environmental stewardship compared to non-environmentally friendly firms. Brekke and Nyborg (2008) demonstrated that firms may be able to use their 'green' profile as a screening device to attract more productive workers. McKinsey (1991, quoted by Gladwin, 1993) surveyed 403 senior executives from around the world and found that 68% of them think that 'organizations with a poor environmental record will find it increasingly difficult to recruit and retain high caliber employees'. Improvement of safety conditions through environmental standards is likely to attract employees. Moreover, several authors argue that people prefer working for companies they regard as ethical and responsible, in firms that fit the image they would like to give to themselves (Frank, 2003; Akerlof and Kranton, 2005). For instance, assuming that individual's utility increases with their altruistic behavior, Frank (2003, see also Brekke and Nyborg, 2008) contends that if the wages in two companies are the same, there would be an excess supply of applicants to the socially responsible company. In equilibrium, the less altruistic jobs are expected to offer a compensating wage premium. Therefore, altruistic individuals are likely to accept lower wages, and thus allow the firm to balance the cost of its socially responsible operations. Frank's (2003) survey results show that 88 percent of socially concerned respondents would prefer a job for the American Cancer Society rather than for Camel Cigarettes with an average compensating wage premium of about \$ 24.000 per year.

A related argument can be found in the conceptual framework proposed by Margolis (1982), where individuals have two utility functions, one motivated by egoistic considerations and the other motivated by altruistic considerations. Their behavior depends therefore on the trade-off between these two functions. Environmental standards by their nature call for the altruistic utility function. Indeed, individuals would prefer socially responsible companies to reduce their cognitive dissonance, *i.e.*, attenuate the possible intrinsic conflict between their employees' preferences (such as earning a high wage) and their citizens' preferences (such as clean environment). Moreover, from the firm's viewpoint, the individual's behavior or aspirations in a given domain (for example, protecting the environment) could be an indicator of his behavior in another domain (for example, working harder which in turn increases profitability) (Porter and Kramer, 2006). Consequently, we test whether *ceteris paribus* environmental-related standards improve companies' recruitment.<sup>3</sup>

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<sup>3</sup> One can argue that if the less altruistic jobs are expected to offer a compensating wage premium, while altruistic individuals are likely to accept lower wages, and if the wage reflects this sufficiently, less altruistic jobs with higher wages are indifferent to altruistic jobs with lower wages to the employees. If environmental-related standards improve companies' recruitment process, this can indicate that the wage does not sufficiently adjust to difference in between less altruistic jobs and altruistic jobs. The wage adjustment can be imperfect notably because intrinsic motivations cannot always be translated into monetary tradeoffs (Frey, 1994).

The remainder of this paper is organized as follows. Section 2 presents the data and model specification. The results are provided and discussed in section 3. Section 4 concludes and suggests policy and managerial implications.

## 2. Data and model specification

The data is extracted from the French Organizational Changes and Computerization's (COI) 2006 survey.<sup>4</sup> This survey was created by researchers and statisticians from the National Institute for Statistics and Economic Studies, the Ministry of Labor and the Center for Labor Studies. The original dataset included a representative sample of 13 790 private firms located in France from all industries except agriculture, forestry and fishing. Firms were asked to fill in a self-administrated questionnaire concerning the utilization of information technologies and work organizational practices in 2006, and changes that have occurred since 2003. Firms were also interviewed on the economic goals of organizational change and the economic context in which those decisions were made. The question about recruitment was stated as follows: 'Do you have difficulties in recruiting?' Two categories of employees are distinguished: (1) professional employees other than computer specialists, and (2) non-professional employees. For each category of employees, the surveyed firms had to answer either on a 4-point scale, ranging from 'no difficulties' to 'very high difficulties', or choose 'no recruitment'. Because two variables, namely the average wage and exports (see description below), were not available in the COI database, we merged it with two other French databases, that is, the Annual Statement of Social Data (DADS) and the Annual Enterprise Survey (EAE) to obtain information about wages and export, respectively. The final dataset includes 10 840 observations.

The dependent variables, denoted *PROFESSIONAL EMPLOYEES* and *NON-PROFESSIONAL EMPLOYEES*, are binary variables equal to 1 if the firm has no or weak problems of recruiting professional and non-professional employees, respectively. To test the main hypothesis of the paper, that is, environmental-related standards improve companies' recruitment *ceteris paribus*, we use the variable denoted *STANDARDS*, which is a binary variable equal to 1 if the firm was registered according to one of the following standards, *i.e.*, ISO 14001 standard, organic labeling, fair trade, etc., in 2006.<sup>5</sup>

Several factors that are likely to influence the recruitment serve as control variables. First, the ease of recruitment is likely to vary across sectors. Some sectors are more attractive than others for a variety

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<sup>4</sup> More details about the design and scope of this survey are available on [www.enquetecoi.net](http://www.enquetecoi.net). : Survey COI-TIC 2006-INSEE-CEE/Treatments CEE.

<sup>5</sup> Unfortunately, we cannot distinguish between those standards, since they were put together under the same name in the survey.

of reasons such as better wages and better working conditions compared to a similar position in another sector. Some sectors can also benefit from the fact that job seekers prefer working for companies they regard as corresponding to their values and expectations. The sector effect is tested using the variable *ACTIVITY*.<sup>6</sup> According to the French Nomenclature, we consider 11 sectors: agrifood, consumption goods, cars and equipments, intermediate goods, energy, construction, commercial, transport, financial and real-estate activities, services for firms and services for individuals.

Second, the firm size is likely to influence the recruitment of employees. Among other advantages, bigger firms frequently have more financial resources, more human resources, have access to various recruiting channels and can offer better promotion opportunities or services, resulting in being more attractive to job seekers, compared to smaller firms (Atkinson and Storey, 1994). The effect of firm size, broadly considered, is tested through the variables *SIZE* (number of employees), *GROUP* (belonging to a group) and *NETWORK* (belonging to a business network such as a franchise network).

Third, wages offered by firms (*WAGE*) may have an impact on recruitment. Higher wages are likely to attract more candidates. According to Phelps (1968), when firms are confronted with a difficulty to fulfill jobs they may respond by offering higher wages compared to wages paid elsewhere, in order to encourage potential candidates to choose their company.

Fourth, firms registered for the ISO 9001 standard might experience fewer difficulties in recruiting employees. The ISO 9001 standard can deliver benefits likely to motivate potential employees such as increased participation in decision-making procedures and improved job satisfaction. Consequently, if potential employees are only sensitive to the effects resulting from these organizational improvements and insensitive to the environmental effects, then the adoption of an environmental standard in addition to a quality standard will not improve the recruitment process. This effect is tested using two variables: *ISO9 2003* (registration according to the standard ISO 9001, EAQF, etc. in 2003) and *ISO9 2006* (registration according to the standard ISO 9001, EAQF, etc. in 2006). These variables allow to take into account potential correlation within firms between environmental and organizational issues.

Finally, firms that relocate abroad a part of their business may hold many attractive characteristics for productive job-seekers. For instance, these firms may be bigger, possibly being able to offer both more varied and more prestigious career opportunities. They may be also able to offer the possibility of

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<sup>6</sup> We do not formulate predictions regarding which sectors experience more or less difficulties in recruiting employees. Despite its interest, this issue is beyond the scope of this paper.

working abroad, which may also be attractive for some job-seekers. This effect is tested using the variable *RELOCATION* which captures whether the firm has an office or plant abroad.

Noteworthy, the same unobservable factors may have an impact on both employees' recruitment and the firm's likelihood to register for environmental-related standards. Previous studies (*e.g.*, Arora and Cason, 1995; Nakamura *et al.*, 2001 ; Grolleau *et al.*, 2007; Arimura *et al.*, 2008) show that the firm size, ISO 9001 registration and the main activity of a firm are positively related to participation in environmental-related standards such as ISO 14001. Grolleau and Mzoughi (2005) argue that achieving scale economies by applying the same standard in all production units regardless of the location can drive firms to adopt environmental-related standards. Thus, we apply a bivariate probit model in order to correct for endogeneity (Greene, 2003).<sup>7</sup> The model relies on a simultaneous estimation approach in which the factors that determine a firm's environmental registration are estimated simultaneously with the factors that determine recruitment. The two equations are jointly estimated using maximum likelihood. The variables used in estimation, their definitions and sample statistics are presented in Table 1. No problem of multicollinearity has been detected (Appendix 1).

[Insert Table 1 around here]

Our observed variables,  $Y_1$  and  $Y_2$ , corresponding respectively to environmental-related standards and recruitment are defined by:

$$\begin{aligned} Y_1 &= 1 \quad \text{if } Y_1^* > 0, \\ Y_1 &= 0 \quad \text{otherwise.} \end{aligned} \quad (1)$$

$$\begin{aligned} Y_2 &= 1 \quad \text{if } Y_2^* > 0, \\ Y_2 &= 0 \quad \text{otherwise.} \end{aligned} \quad (2)$$

$Y_1^*$  and  $Y_2^*$  are latent variables influencing the probability of registration with environmental-related standards and employees' recruitment, respectively. We consider the following bivariate probit model:

$$\begin{cases} Y_1^* = \alpha_1 + \beta_1 X_1 + \delta Z_1 + \mu_1 \\ Y_2^* = \alpha_2 + \beta_2 X_2 + \gamma Y_1 + \mu_2 \end{cases} \quad (3)$$

where  $X_1$  is a vector of exogenous variables including a constant firm's characteristics (*ACTIVITY*, *SIZE*, *GROUP*, *NETWORK*, *ISO9 2003*, *ISO9 2006* and *RELOCATION*).  $X_2$  includes the variables *ACTIVITY*, *SIZE*, *GROUP*, *NETWORK*, *WAGE*, *ISO9 2003*, *ISO9 2006* and *RELOCATION*.  $\beta_1$ ,  $\beta_2$ ,  $\delta$  and  $\gamma$  are slope coefficients to be estimated.  $\alpha_1$ ,  $\alpha_2$ ,  $\mu_1$  and  $\mu_2$  are the intercepts and disturbance terms for the two equations, respectively. Finally, the vector of variables  $Z_1$  represents the

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<sup>7</sup> Results from a simple logistic regression are also available from the authors upon request. These results are similar to those obtained with the bivariate probit model. Nevertheless, we preferred not to use a logit model because it is not sufficient to solve the endogeneity issue (Greene, 2003).

instrumental variable which usually guarantees the identification of the model and helps to estimate correlation coefficients (Maddala, 1983). Indeed, in order to identify the bivariate probit, we generally need an additional variable that will explain the probability of environmental-related standards but not relevant to explain recruitment.<sup>8</sup> In this paper, we use the share of exports in total sales (*EXPORT*) as an instrumental variable.<sup>9</sup> Signaling or screening rationales (Spence, 1973) can explain why exportation affects adoption of environmental-related standards. Firms that have distant customers are more likely to prove their environmental commitment through institutional devices like environmentally-related standards because firms' environmental performance is frequently unobservable, especially to customers located in areas which are institutionally, geographically and culturally different. In other words, environmental standards may prove the ability of the supplier to meet environmental expectations of customers and make public unobservable attributes (Grolleau *et al.*, 2007). However, we do not expect *a priori* an effect of exports on employees' recruitment. Moreover, even if a potential effect exists it can be captured by the variable *WAGE*, used as a control variable. Indeed, since the contribution of Bernard and Jensen (1995), some empirical studies showed that average wages in exporting firms are higher than in non-exporting firms from the same industry and region (for a recent review of the literature, see Schank *et al.*, 2007).

Residuals of the equations above follow a normal bivariate distribution with zero means and a covariance matrix that writes, after normalizations to 1 of the diagonal elements, as follows:

$$\begin{pmatrix} \mu_1 \\ \mu_2 \end{pmatrix} \rightarrow N(0, \Sigma), \text{ where } \Sigma = \begin{pmatrix} 1 & \rho_{12} \\ \rho_{12} & 1 \end{pmatrix}$$

In estimating the interrelationship, a bivariate probit model produces '*rho*' from the first portion of the model estimation. When *rho* is statistically different from zero, that is, the probability that a relationship exists between environmental-related standards and recruitment, simultaneous estimation procedures are essential to appropriate estimation.

### 3. Results and discussion

Bivariate probit estimation results are presented in Tables 2 and 3, together with goodness-of-fit measures (Maximum-Likelihood estimation). We also report average treatment effects for the variable *STANDARDS*. The average treatment effect is the average difference between the probability that a firm improves its recruitment when it is registered for an environmental standard and the probability

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<sup>8</sup> Wilde (2001) states that in recursive bivariate probit models, it is sufficient that each equation includes one varying exogenous regressor to achieve identification.

<sup>9</sup> Since the variable *EXPORT* is continuous, it may seem that it is more likely to capture firm size than export *per se*. To check this issue, we tested a model using exports as a dummy variable. The results remained unchanged.

that it improves its recruitment when it is not registered for an environmental standard. Hence, the average treatment effect equals:

$$\frac{1}{N} \sum_{i=1}^N [\Phi(\alpha_2 + X_{2i}\beta_2 + \gamma) - \Phi(\alpha_2 + X_{2i}\beta_2)] \quad (4)$$

[Insert Tables 2 and 3 around here]

In both models *rho* is significantly different from 0. This means that the variable of environmental-related standards is endogenous and it confirms the interest in using the bivariate probit model. Moreover, using a Rivers-Vuong test (not reported) we find that the presence of endogeneity cannot be rejected since the residuals are significant for professional and non-professional employees. Several versions of the model have been estimated to investigate the robustness of results to the omission of some variables. The main results remain unchanged (see Appendix 2).

We first present the estimation results regarding the factors that may influence firms to adopt environmental-related standards. The results are similar for both models, that is, for professional and non-professional employees. As expected, the variables *SIZE*, *ISO9 2003*, *ISO9 2006* and *RELOCATION* are significant. Belonging to a network was found to have a negative impact on environmental-related standards adoption. Belonging to a group positively influences the adoption of environmental-related standards when considering professional employees only. Two sectors, that is, intermediate goods and energy, are more sensitive to the registration of environmental-related standards (not reported). Finally, as expected our instrumental variable is positive and significant for both models.

The main hypothesis of the paper, that is, environmental-related standards have an impact on recruitment, is confirmed for professional and non-professional employees. This result is consistent with that of several studies (*e.g.*, Grolleau *et al.*, 2007) which showed that improvement of human resource management is one of the major drivers of environmental management systems registration. Interestingly, average treatment effects show that the hypothesis is relatively more supported for professional employees than non-professional ones. Firms with environmental-related standards are 25 percent (respectively 22 percent) more likely to improve recruitment of professional employees (respectively non-professional employees) compared to firms without environmental-related standards. This result may indicate that non-professional employees do not pay attention to environmental-related standards as professional employees may do, or are not in a position to express their possible environmental preferences, especially because of the high unemployment rate in France for these kinds of jobs. Moreover, the result for professional staff is consistent with several studies stating that well-educated individuals are more likely to exhibit environmentally friendly preferences (*e.g.*, Torgler and Garcia-Valinas, 2007). This result can indicate to registered firms to more publicize

their environment-related commitment in circles of well-educated people rather than adopting a ‘one-size-fits-all’ approach.

Our analysis provides also information about other determinants of recruitment. The results are similar for both models. The variables *SIZE*, *GROUP*, *NETWORK* and *WAGE* are significant, as expected. In other words, big firms, firms who belong to a group or a network, and firms who offer higher wages have fewer problems in recruiting employees. The variables *ISO9 2003* and *ISO9 2006* are significant when considering professional employees, but their signs are negative. This result can be explained by the divergence between promises and real impacts of adopting an ISO 9001 standard. Several authors (*e.g.*, Lasfargues, 1994) argue that ISO 9001 rarely delivers the expected benefits and the adoption process reduces employees’ autonomy and flexibility, impedes creativity because of formal procedures, is red tape generating and time-consuming and frequently constitutes a source of stress at the workplace, especially at audit times. If job seekers are informed about these presumed real effects of ISO 9001, they may be less interested to apply to firms where the standard is implemented. The variable *RELOCATION* has a significant impact on recruitment of non-professional employees only. This result may be explained by the fact that we do not take into account destinations neither the reasons of relocation. For instance, if a firm relocates a part of its business in order to lower wage rates, which are an often quoted reason for relocating labor-intensive divisions, it might experience a difficulty to attract professional employees. Finally, when considering non-professional employees, the variable *ACTIVITY* (not reported in Tables 2 and 3) is significant for 3 sectors: consumption goods, services for firms and services for individuals. This result can be explained by the fact that usually in those sectors employers use more ‘word-of-mouth’ (that is, informal) recruitment methods – via relatives, friends, current employees and people already known as workers at other firms (*e.g.*, suppliers/competitors) (Goodman *et al.*, 1998). An implication of this result could be that sectors/firms seeking highly professional employees are more likely to benefit from adopting environmental-related standards than the others, notably in terms of facilitated recruitment.

#### **4. Concluding remarks**

Our empirical investigation shows that environmental-related standards can deliver benefits beyond environmental considerations such as contributing to successful recruitment. Policymakers and supporters of voluntary standards can emphasize this benefit in order to encourage firms to adopt these initiatives. This finding suggests new ways of achieving the Porter hypothesis promises. Our main result opens a new door for a refined and broader assessment of the effects of environmental voluntary approaches. A promising issue is to investigate *how* and *the ways by which* environmental-related standards affect other dimensions of human resource management. These various dimensions are likely to interact (*e.g.*, recruitment, employees’ morale) and resulting tradeoffs deserve more academic attention (Frank, 2003). In addition, the effect of environmental-related standards should be further

examined taking into account the temporal dimension, by verifying whether employees 'reward' differently long-term and short-term commitment to environmental issues.

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**Table 1: Definition of variables and sample statistics**

| <b>Variable</b>              | <b>Definition</b>   | <b>Mean</b> | <b>Standard deviation</b> |
|------------------------------|---|-------------|---------------------------|
| <i>Dependent variables</i>   |   |             |                           |
| PROFESSIONAL EMPLOYEES       | Problems in recruitment of professional employees<br>Dummy variable (=1 if no or weak)  | 0.40        | 0.49                      |
| NON PROFESSIONAL EMPLOYEES   | Problems in recruitment of non-professional employees<br>Dummy variable (=1 if no or weak)  | 0.62        | 0.48                      |
| <i>Independent variables</i> |   |             |                           |
| STANDARDS                    | Registered for ISO 14000, organic labeling or fair trade<br>Dummy variable (=1 if registered in 2006)   | 0.17        | 0.38                      |
| ACTIVITY                     | The main activity of the firm<br>11 dummy variables (=1 if agrifood, consumption goods, cars and equipments, intermediate goods, energy, construction, commercial, transport, financial and real-estate activities, services for firms and services for individuals, respectively) <sup>a</sup> |             |                           |
| SIZE                         | SMALL (20 TO 199 employees)   | 0.70        | 0.46                      |
|                              | MEDIUM (200 TO 499 employees)   | 0.15        | 0.35                      |
|                              | BIG (more than 500 employees)   | 0.15        | 0.50                      |
| GROUP                        | Belonging to a group<br>Dummy variable (=1 if yes)  | 0.59        | 0.49                      |
| NETWORK                      | Belonging to a network<br>Dummy variable (=1 if yes)  | 0.83        | 0.37                      |
| WAGE                         | Logarithm of average wage within a firm<br>(Continuous variable)  | 9.67        | 0.45                      |
| ISO9 2003                    | Certified with ISO 9000<br>Dummy variable (=1 if certified in 2003)   | 0.47        | 0.50                      |
| ISO9 2006                    | Certified with ISO 9000<br>Dummy variable (=1 if certified in 2006)   | 0.42        | 0.49                      |
| RELOCATION                   | Relocation abroad of a part of the business<br>Dummy variable (=1 if yes)   | 0.06        | 0.23                      |
| EXPORT                       | The share of exports in total sales (€)<br>(Continuous variable)  | 16555.86    | 121284.33                 |

<sup>a</sup>: Because of the table's length we do not report sample statistics for these variables.

**Table 2: Bivariate probit estimates of the effect of environmental-related standards on recruitment of professional employees**

|  |        | STANDARDS   |         | PROFESSIONAL<br>EMPLOYEES |         |
|--|--------|-------------|---------|---------------------------|---------|
| Variables  |        | Estimate    | z-value | Estimate                  | z-value |
| Intercept  |        | -1.63***    | -17.86  | -2.13***                  | -6.97   |
| STANDARDS  |        | -           | -       | 0.73***                   | 4.71    |
| SIZE   | MEDIUM | 0.20***     | 4.31    | 0.18***                   | 4.54    |
|  | BIG    | 0.55***     | 11.49   | 0.21***                   | 4.18    |
| GROUP  |        | 0.09***     | 2.24    | 0.14***                   | 4.84    |
| NETWORK  |        | -0.31***    | -5.77   | 0.20***                   | 4.90    |
| WAGE   |        | -           | -       | 0.20***                   | 6.12    |
| ISO9 2003  |        | 0.19***     | 2.94    | -0.11*                    | -1.84   |
| ISO9 2006  |        | 0.95***     | 13.61   | -0.17***                  | -2.84   |
| RELOCATION   |        | 0.25***     | 3.94    | 0.08                      | 1.29    |
| EXPORT   |        | 1.17e-06*** | 3.53    | -                         | -       |
| Likelihood ratio   |        |             |         | -9548.55                  |         |
| WaldChi2(36)   |        |             |         | 2280.27                   |         |
| Rho  |        |             |         | -0.37***                  |         |
| Wald test of rho=0 Chi2(1)                                   |        |             |         | 14.07***                  |         |
| Number of observations                                       |        |             |         | 9 348                     |         |
| Number of registered firms                                   |        |             |         | 1 675                     |         |
| Marginal effects of the variable<br><i>STANDARD</i>          |        |             |         | 0.28                      |         |
| Average treatment effects of the<br>variable <i>STANDARD</i> |        |             |         | 0.25***                   |         |

(\*), (\*\*), (\*\*\*) indicate parameter significance at the 10, 5 and 1 per cent level, respectively. The z value is computed as the estimated coefficient divided by its robust-estimated standard error.

**Table 3: Bivariate probit estimates of the effect of environmental-related standards on recruitment of non-professional employees**

| Variables  | STANDARDS   |         | NON-PROFESSIONAL<br>EMPLOYEES |         |      |
|--|-------------|---------|-------------------------------|---------|------|
|  | Estimate    | z-value | Estimate                      | z-value |      |
| Intercept  | -1.58***    | -17.71  | -2.82***                      | -7.43   |      |
| STANDARDS  | -           | -       | 0.82***                       | 2.34    |      |
| SIZE   | MEDIUM      | 0.18*** | 3.69                          | 0.16*** | 2.85 |
|  | BIG         | 0.55*** | 10.98                         | 0.08    | 0.84 |
| GROUP  | 0.05        | 1.19    | 0.13***                       | 3.77    |      |
| NETWORK  | -0.32***    | -5.88   | 0.10*                         | 1.93    |      |
| WAGE   | -           | -       | 0.35***                       | 8.10    |      |
| ISO9 2003  | 0.19***     | 2.90    | -0.10                         | -1.36   |      |
| ISO9 2006  | 0.97***     | 13.49   | -0.15                         | -1.33   |      |
| RELOCATION   | 0.22***     | 3.17    | 0.16*                         | 1.75    |      |
| EXPORT   | 1.04e-06*** | 3.22    | -                             | -       |      |
| Likelihood ratio   |             |         | -7295.09                      |         |      |
| WaldChi2(36)   |             |         | 2202.22                       |         |      |
| Rho  |             |         | -0.45*                        |         |      |
| Wald test of rho=0 Chi2(1)                                   |             |         | 3.26***                       |         |      |
| Number of observations                                       |             |         | 8 503                         |         |      |
| Number of registered firms                                   |             |         | 1 542                         |         |      |
| Marginal effects of the variable<br><i>STANDARD</i>          |             |         | 0.18                          |         |      |
| Average treatment effects of the<br>variable <i>STANDARD</i> |             |         | 0.22***                       |         |      |

(\*), (\*\*), (\*\*\*) indicate parameter significance at the 10, 5 and 1 per cent level, respectively. The z value is computed as the estimated coefficient divided by its robust-estimated standard error.

**Appendix 1: Pearson correlation coefficients** (As for Tables 1, 2 and 3, we do not report results concerning the variable ACTIVITY)

|                                  | PROFESSIONAL<br>EMPLOYEES | NON<br>PROFESSIONAL<br>EMPLOYEES | STANDARDS | SMALL | MEDIUM | BIG  | GROUP | NETWORK | ISO9<br>2003 | ISO9<br>2006 | WAGE | RELOCATION | EXPORT |
|----------------------------------|---------------------------|----------------------------------|-----------|-------|--------|------|-------|---------|--------------|--------------|------|------------|--------|
| PROFESSIONAL<br>EMPLOYEES        | 1.00                      | -                                | -         | -     | -      | -    | -     | -       | -            | -            | -    | -          | -      |
| NON<br>PROFESSIONAL<br>EMPLOYEES | 0.36                      | 1.00                             | -         | -     | -      | -    | -     | -       | -            | -            | -    | -          | -      |
| STANDARDS                        | 0.05                      | 0.06                             | 1.00      | -     | -      | -    | -     | -       | -            | -            | -    | -          | -      |
| SMALL                            | -0.16                     | -0.13                            | -0.25     | 1.00  | -      | -    | -     | -       | -            | -            | -    | -          | -      |
| MEDIUM                           | 0.07                      | 0.07                             | 0.07      | -0.63 | 1.00   | -    | -     | -       | -            | -            | -    | -          | -      |
| BIG                              | 0.13                      | 0.10                             | 0.25      | -0.65 | -0.18  | 1.00 | -     | -       | -            | -            | -    | -          | -      |
| GROUP                            | 0.12                      | 0.08                             | 0.16      | 0.32  | 0.17   | 0.24 | 1.00  | -       | -            | -            | -    | -          | -      |
| NETWORK                          | 0.04                      | 0.02                             | 0.02      | -0.11 | 0.14   | 0.08 | 0.12  | 1.00    | -            | -            | -    | -          | -      |
| ISO9 2003                        | 0.02                      | 0.02                             | 0.35      | -0.29 | 0.13   | 0.23 | 0.24  | 0.13    | 1.00         | -            | -    | -          | -      |
| ISO9 2006                        | 0.02                      | 0.02                             | 0.37      | -0.28 | 0.13   | 0.22 | 0.25  | 0.13    | 0.88         | 1.00         | -    | -          | -      |
| WAGE                             | 0.08                      | 0.08                             | 0.12      | -0.11 | 0.07   | 0.07 | 0.20  | 0.25    | 0.20         | 0.20         | 1.00 | -          | -      |
| RELOCATION                       | 0.04                      | 0.04                             | 0.12      | -0.13 | 0.07   | 0.10 | 0.12  | 0.08    | 0.11         | 0.10         | 0.11 | 1.00       | -      |
| EXPORT                           | 0.07                      | 0.07                             | 0.18      | -0.19 | -0.01  | 0.25 | 0.10  | 0.05    | 0.13         | 0.11         | 0.14 | 0.09       | 1.00   |

## Appendix 2: Check of the robustness of the overall results to the omission of some variables

| Variables                  | Model 1 (omitting SIZE, GROUP and Network) |         |               |         | Model 2 (omitting SIZE, GROUP, Network and ISO9) |         |                   |         | Model 3 (omitting SIZE, GROUP, Network, ISO9 and RELOCATION) |         |               |         |             |         |                   |         |             |        |          |       |             |        |          |       |
|----------------------------|--|---------|---------------|---------|--|---------|-------------------|---------|--|---------|---------------|---------|-------------|---------|-------------------|---------|-------------|--------|----------|-------|-------------|--------|----------|-------|
|                            | STANDARDS                                  |         | PRO EMPLOYEES |         | STANDARDS  |         | NON-PRO EMPLOYEES |         | STANDARDS  |         | PRO EMPLOYEES |         | STANDARDS   |         | NON-PRO EMPLOYEES |         |             |        |          |       |             |        |          |       |
|                            | Estimate                                   | z-value | Estimate      | z-value | Estimate   | z-value | Estimate          | z-value | Estimate   | z-value | Estimate      | z-value | Estimate    | z-value | Estimate          | z-value |             |        |          |       |             |        |          |       |
| Intercept                  | -1.66***                                   | -20.50  | -2.23***      | -7.61   | -1.65***   | -20.71  | -2.80***          | -7.44   | -1.24***   | -16.63  | -2.15***      | -7.84   | -1.21***    | -16.70  | -2.50***          | -7.86   | -1.24***    | -16.59 | -2.18*** | -8.01 | -1.21***    | -16.72 | -2.34*** | -7.58 |
| STANDARDS                  | -  | -       | 1.15***       | 10.31   | -  | -       | 1.15***           | 5.57    | -  | -       | 1.37***       | 10.74   | -           | -       | 1.41***           | 22.13   | -           | -      | 1.39***  | 10.73 | -           | -      | 1.47***  | 30.56 |
| SIZE                       | -  | -       | -             | -       | -  | -       | -                 | -       | -  | -       | -             | -       | -           | -       | -                 | -       | -           | -      | -        | -     | -           | -      | -        | -     |
| GROUP                      | -  | -       | -             | -       | -  | -       | -                 | -       | -  | -       | -             | -       | -           | -       | -                 | -       | -           | -      | -        | -     | -           | -      | -        | -     |
| NETWORK                    | -  | -       | -             | -       | -  | -       | -                 | -       | -  | -       | -             | -       | -           | -       | -                 | -       | -           | -      | -        | -     | -           | -      | -        | -     |
| WAGE                       | -  | -       | 0.24***       | 7.58    | -  | -       | 0.36***           | 8.65    | -  | -       | 0.22***       | 7.55    | -           | -       | 0.31***           | 9.01    | -           | -      | 0.22***  | 7.72  | -           | -      | 0.29***  | 8.78  |
| ISO9 2003                  | 0.26***                                    | 4.22    | -0.09*        | -1.60   | 0.25***  | 3.89    | -0.10             | -1.47   | -  | -       | -             | -       | -           | -       | -                 | -       | -           | -      | -        | -     | -           | -      | -        | -     |
| ISO9 2006                  | 0.94***                                    | 13.71   | -0.21***      | -2.58   | 0.98***  | 13.84   | -0.22***          | -2.29   | -  | -       | -             | -       | -           | -       | -                 | -       | -           | -      | -        | -     | -           | -      | -        | -     |
| RELOCATION                 | 0.32***                                    | 5.09    | 0.08          | 1.38    | 0.28***  | 4.07    | 0.14*             | 1.61    | 0.42   | 6.84    | -0.01         | -0.16   | 0.37***     | 5.68    | -0.01             | -0.08   | -           | -      | -        | -     | -           | -      | -        | -     |
| EXPORT                     | 1.95e-06***                                | 3.87    | -             | -       | 1.72e-06***                                      | 3.53    | -                 | -       | 2.30e-06***  | 3.56    | -             | -       | 2.16e-06*** | 3.25    | -                 | -       | 2.36e-06*** | 3.50   | -        | -     | 2.24e-06*** | 3.27   | -        | -     |
| Likelihood ratio           | -9719.28                                   |         |               |         | -7407.88   |         |                   |         | -10242.38  |         |               |         | -7910.22    |         |                   |         | -10270.96   |        |          |       | -7931.60    |        |          |       |
| WaldChi2(36)               | 2236.70                                    |         |               |         | 2011.09  |         |                   |         | 1607.68  |         |               |         | 2135.67     |         |                   |         | 1519.54     |        |          |       | 2571.26     |        |          |       |
| Rho                        | -0.59***                                   |         |               |         | -0.64***   |         |                   |         | -0.73***   |         |               |         | -0.84***    |         |                   |         | -0.74***    |        |          |       | -0.91***    |        |          |       |
| Wald test of rho=0         | 43.84***                                   |         |               |         | 11.01***   |         |                   |         | 28.74***   |         |               |         | 44.60***    |         |                   |         | 26.50***    |        |          |       | 30.56***    |        |          |       |
| Number of observations     | 9 348                                      |         |               |         | 8 503  |         |                   |         | 9 348  |         |               |         | 8 503       |         |                   |         | 9 348       |        |          |       | 8 503       |        |          |       |
| Number of registered firms | 1 675                                      |         |               |         | 1 542  |         |                   |         | 1 675  |         |               |         | 1 542       |         |                   |         | 1 675       |        |          |       | 1 542       |        |          |       |

(\*), (\*\*), (\*\*\*) indicate parameter significance at the 10, 5 and 1 per cent level, respectively. The z value is computed as the estimated coefficient divided by its robust-estimated standard error.



