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**THE PRICE OF UNSUSTAINABILITY: AN EXPERIMENT WITH  
PROFESSIONAL PRIVATE EQUITY INVESTORS**

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# THE PRICE OF UNSUSTAINABILITY: AN EXPERIMENT WITH PROFESSIONAL PRIVATE EQUITY INVESTORS

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## ABSTRACT

This paper sheds light on the impact sustainable and unsustainable corporate practices have on equity financing. We present a unique framed field experiment in which professional private equity investors competed in closed auctions to acquire fictive firms. We hence observe that corporate non-financial performance impacts firm valuation and investment decision and we quantify to which extent. Main result is an asymmetric effect, entrepreneurs having more to lose from unsustainable practices than to gain from sustainable ones. Our findings are discussed in terms of practical implications for both investors and firm managers.

**KEYWORDS:** Corporate Sustainability; Equity Financing; Field Experiment; Firm Valuation; Private Equity.

**JEL codes:** L26, G32, M14, C93, D44.

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## 1. INTRODUCTION

The academic community has acknowledged that the past half-century wide gains in global economic development and human wealth creation has been achieved at the cost of environmental degradation, jeopardizing the sustainability of our economic systems (the Millennium Ecosystem Assessment, 2005; Dean and McMullen, 2007). In search for green growth foundations, an expanding body of literature investigates the role sustainable entrepreneurship can play (Cohen and Winn, 2007; Dean and McMullen, 2007; Zahra et al., 2009). Hall et al. (2010) review this academic field and underline research paths left open, such as the conditions under which entrepreneurs can pursue sustainable ventures, or the limits to entrepreneurs' potential for creating sustainable economies. Our paper contributes to this literature by shedding light on the impact both sustainable and unsustainable corporate practices have on private equity financing. We indeed ask whether investors support sustainable entrepreneurs by preferentially providing them with the equity needed to ensure their growth.

Most research focused on developing the 'business cases' for sustainable development (Parrish, 2010), that is motivating and legitimating firms' sustainable orientations by potential profit making. Indeed, the impact of corporate social performance on economic performance has been largely studied in the business and economic literature (e.g. Margolis and Walsh, 2003; Orlitzky et al., 2003; Crifo and Ponssard, 2010). In the most extensive literature meta-analysis up-to-date, Margolis et al. (2009) conclude on the existence of a small, positive and significant relationship between firm financial and social performance. However, drivers and causality of this relationship are ambiguous and not well understood (Horváthová, 2010; Surroca et al., 2010). This paper argues that the equity market reaction to corporate sustainable orientations is likely to

be profit-oriented. Therefore, understanding how corporate social performance is perceived by investors in terms of value creation is not trivial for academics and remains core for entrepreneurs, including for sustainability entrepreneurs as defined by Parrish (2010)<sup>1</sup>.

Hereby we take the standpoint of focusing specifically on how sustainable (or socially responsible) and unsustainable (or socially irresponsible) practices can respectively create and destroy firm value, that is create or destroy profits for the firm shareholders. More specifically, we aim at providing entrepreneurs with a quantified measure of whether their efforts to manage the “triple bottom line, that is balancing economic health, social equity and environmental resilience” (see Kuckertz and Wagner, 2009) is rewarded by investors in terms of firm value and investment attractiveness. The literature highlights that entrepreneur’s engagement in sustainable practices may be profit-motivated, morally motivated or ethically grounded (see e.g. Bryant, 2009; Harris et al., 2009). Here, whatever their original motivations, we explore how entrepreneurs may have a strong rationale for wanting to know whether engaging their firm on a sustainable path will create or destroy its market value and whether it will ease or not their access to equity.

Firm value aggregates a large quantity of information on the company’s past, current and future cash flows and assets, both tangible and intangible. Many factors, often not directly available to researchers<sup>2</sup>, interweave in real life to build firm value, making it difficult to isolate the sole contribution of extra-financial performance in standard empirical analysis. A first research path consists in analyzing listed firms, whose values publicly result from stock market consensus. In

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<sup>1</sup> Parrish (2010) opposes conventional entrepreneurs to sustainability entrepreneurs. The former « view enterprises as a means of profiting from the exploitation of resources, with the underlying logic of using resources for one's own advantage to generate maximum financial returns in the shortest time possible ».The latter « view enterprises as a means of perpetuating resources, with the underlying logic of using human and natural resources in a way that enhances and maintains the quality of their functioning for the longest time possible ».

<sup>2</sup> Examples of such factors include expected cash flows, management quality and intangible assets.

this line, the socially responsible investment literature (see Renneboog et al., 2008 for a review) provides interesting insights using event studies (Takeda and Tomozawa, 2008) and empirical comparisons of socially responsible to conventional portfolio performance (Van de Velde et al., 2005; Galema et al., 2008).

However, the backbone of our economies consists in non-listed firms<sup>3</sup>, for which no public price is available. The novelty of our approach is to provide an original analysis based on experimental economics, allowing us to quantify the contribution of sustainable practices to the value of non-listed firms. The experimental setting we rely on enables us to simplify the investing environment and control the information that grounds firm-value to focus on sustainability impact. The robustness of our methodology is grounded in the firm valuation expertise of the participants in our experiment.

Indeed, our experiment involves professional Private Equity investors (including both venture capital and buyouts specialists). Our motivation to recruit these specific investors was threefold. First, their business is to value and invest in unlisted firms, in particular small and medium size enterprises. On a theoretical level, they have been identified as highly efficient at maximizing shareholders' value by reducing information asymmetry (Jensen, 1986, 1989), monitoring the companies they select (Holmstrom and Tirole, 1997) and evaluating them better than a standard financial institution would (Ueda, 2004). Second, several authors pointed out that they already include in their valuation and investment decision non-financial criteria identified as core for business in the long run, such as the quality of management (Muzyka et al., 1996) or governance

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<sup>3</sup> Unlisted firms have been shown to differ from public corporations, for instance in terms of capital structure (Romano et al., 2001) and shareholders protection (Loderer and Waelchli, 2010). They also undergo different legislation on extra-financial performance disclosure than public corporations. They encompass the large body of small-and-medium size enterprises (SMEs), which are the largest GDP contributor and employer in Europe (Ecorys, 2011), and differ in their CSR from public corporations (Jenkins, 2004; Lepoutre and Heene; 2006).

(Kaplan and Strömberg, 2009; Wright et al., 2009), in particular for family firms (Dawson, 2009). Third, many entrepreneurs turn to Private Equity investors to get access to capital. Analyzing whether sustainable and unsustainable practices matter for those key investors in terms of firm valuation and investment decision is therefore a core issue in itself for entrepreneurs.

Hence we present a framed field experiment with Private Equity investors and infer from their expertise explicit measures of over and underperformance in terms of sustainable practices. We formalize sustainable practices as corporate social responsibility and decompose it into its three main pillars: Environment, Social and Governance (ESG) factors. Along each *factor*, we consider that the firm can implement either sustainable or unsustainable practices (*sign*, either positive or negative for society). Finally, we distinguish policies that are core for the business and mobilize resources (*hard*) from policies which are peripheral (*soft*), following a dichotomy suggested by Hannan and Freeman (1984) and Nicholls-Nixon et al. (2000). Our experimental design thus enables a focus on these three dimensions of corporate practices: *factor* (ESG), *sign* (positive, i.e. sustainable, or negative, i.e. unsustainable) and *quality* (soft or hard).

Thirty three investors were involved in first-price sealed-bid auctions with embarrassment cost, a mechanism we formalize to demonstrate that it enables price revelation. Investors competed to acquire fictive firms based on case studies carefully built to ensure realism and credential context. Investors were provided with accounting and financial information, together with non-financial information as the experiment progressed. We intentionally manipulated the non-financial details in order to obtain investors' valuation revision for each factor, sign and quality independently.

Our results on 330 observations highlight that non-financial performance matters for equity financing. We control for investor heterogeneity and observe that firm valuations and investment

decisions are both impacted by the factor (ESG), sign (sustainable or unsustainable) and quality (hard or soft) of corporate practices, and we quantify to which extent. Main finding is the existence of an asymmetrical effect of non-financial performance, entrepreneurs having more to lose from unsustainable practices than to gain from sustainable ones. We conclude that unsustainable corporate policies might both prevent equity financing and increase its cost, sustainability thus consisting in a defensive strategy to protect firm value and equity access.

The remainder of this paper is organized as follows. Section 2 details the experimental design, procedures used and the incentive mechanism of the first-price auction with embarrassment cost. Results are presented in Section 3 and their practical implications for investors and entrepreneurs are discussed in Section 4. Section 5 concludes by suggesting potential research extensions.

## 2. EXPERIMENTAL DESIGN AND PROCEDURES

We first present our experiment design in section 2.1 before detailing procedures in section 2.2. The experiment was built and conducted in partnership with professional associations<sup>4</sup> in order to ensure realism, credent context and participants' involvement. It is designed to quantitatively measure investors' pricing of corporate sustainability based on first-price sealed-bid auctions with embarrassment cost. We discuss the choice of this auction mechanism and prove that it is incentive compatible in section 2.3.

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<sup>4</sup> The Sustainable Club of the French Private Equity Association provided financial, technical and logistic support to build the case studies, recruit participants and run the experimental sessions. We affirm that our research was conducted in full independence and that our professional partners neither interfered in our study nor in our results.

## 2.1 Design

The design encompasses four treatments based on three fictive case studies carefully built with professional Private Equity investors. Each treatment uses two case studies and evaluates a different set of extra-financial performance in terms of *factor*, *sign*, and *quality*.

*Factor* deals with the focus of the policy, which can target any of the multiple actions encompassed in corporate social responsibility, from waste reduction to proactive human resources. Following business and academic practices in use<sup>5</sup>, we categorize corporate policies within the three pillars of corporate social responsibility: Environment (E), Social (S) and Governance (G). *Sign* can be positive (+) or negative (-), meaning that the firm respectively overperforms (sustainable practices) or underperforms (unsustainable practices) its industry non-financial performance standards on a given factor. Finally, the corporate practice can either be core for the firm business (“hard practice”) or peripheral (“soft practice”), defined by the bearing on firm resource mobilization (Hannan and Freeman, 1984; Nicholls-Nixon et al., 2000). We qualify this property as the corporate practice *quality* and refer to it as “hard” (++) or “soft” (+ or -).

Each of the three case studies corresponds to a fictive firm that needs Private Equity financing. Various industries, firm sizes and financial performances (investment attractiveness) are used across cases. Table 1 summarizes the characteristics of the case studies, which are detailed in Appendix A. Each case study uses two different *factors* with different *signs*. For each factor and sign (for instance: sustainable environmental policy), we always evaluate the effects on investors’

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<sup>5</sup> For business and market practices in use, the reader can refer to the United Nations Principles for Responsible Investing (<http://www.unpri.org>), US SIF (<http://ussif.org/>) and EUROSIF (<http://www.eurosif.org/>); for academic literature reviews on corporate social responsibility and socially responsible investments to Crifo and Ponsard (2010), Reinhardt et al. (2008), Renneboog et al. (2008).

decisions of successively a soft practice (e.g. energy saving at the holding building level) and a hard practice (e.g. change in the production process to reduce toxic waste). We thus measure the effects of a soft practice, a hard practice, and the total cumulative impact of both, which we assimilate to the effect of a global policy.

*(Insert Table 1 about here)*

Treatments combine case studies in order to independently test investor decisions when confronted to various extra-financial performance levels. Treatments 1, 2 and 3 test all combinations of *factors* and *signs*. Treatment 4 ensures that the sequence of information *sign* (learning first about the firm's sustainable practices and then about its unsustainable ones; or the reverse way) does not impact investors' decisions. Figure 1 displays the experiment design and details the information evaluated by participants in each treatment.

*(Insert Figure 1 about here)*

## 2.2 Procedures

Participants were recruited by professional association emailing and directly registered online. We run one session per treatment (hence four sessions) with 6 to 11 participants. Treatments 1 to 3 were conducted in the French Private Equity Association office; treatment 4 was conducted via an internet website for participants who could not attend the previous sessions. The 33 participants were all professional Private Equity investors (their profile is detailed in section 3.1).

In each session, the sequence of events was as follows. First, participants signed an agreement form that ensured anonymity and confidentiality. They were explained the rules of the experiment (available in Appendix C). They were given the first case study, similar in its format and content to a real business deal offer. Data provided encompassed business description, history, key market indicators, accounting data, business-plan with expected future cash-flows, comparable transactions and multiples, and a firm price benchmark based on different weighted average cost of capital. After analyzing this information, investors wrote down their firm valuation and whether they wanted to invest or not in it.

Once all investors in the session had done so, new extra-financial information was progressively given to them, as would occur in an auditing process. They sequentially received four new pieces of extra-financial information of different *sign*, *quality* and, *factors* (see Figure 1, steps 1 to 5). For each new piece of information, participants could either revise their firm valuation and investment decision or not. Altogether, each investor thus valued five times the first case study. Our interest lays in the change of decisions between the first valuation (our baseline) and the four decisions that follow. Investors could also write comments on their decisions, providing us with qualitative data.

Once the first case study was completed, the second case study was given to the investors and the same rules applied (steps 6 to 10). We thus gathered 330 observations (330 firm valuations and 330 investment decisions) as well as detailed qualitative data. Once the second case study was completed, participants fulfilled a short questionnaire eliciting their socio-economic characteristics, understanding, strategy, ESG training, beliefs on ESG factors as well as intrinsic preferences such as risk aversion (full questionnaire is available in Appendix D). On average, sessions lasted about 90 minutes.

### *2.3 Incentive Mechanism*

The experimental design is based on first-price sealed-bid auctions with embarrassment cost. We here discuss the efficiency of this mechanism at revealing investors' true firm valuation. In a first-price sealed-bid auction, each investor independently submits a single bid without seeing others' bids. The firm is sold to the bidder who makes the highest bid (the winner), who pays her bid. First-price sealed-bid auctions with a limited amount of bidders ("controlled sales") are a widespread bidding process among Private Equity investors (Boone et al., 2009, Fidrmuc et al., 2012). Deal values usually stay private information and research on the topic thus often resorts to survey data (Hsu, 2004). First-price sealed-bid auctions have been well documented both theoretically (Klemperer, 2004, p.12) and experimentally (for a survey see Kagel, 1995). Two downsides of our experimental auction need offsetting: obviously, there is no actual firm to acquire in our experiment; and conversely, participants would not be asked to spend large amounts of cash. The auction game is therefore built to psychologically trigger participants' price revelation.

First, to ensure saliency, we use a twofold incentive: (i) a monetary incentive, as the winner can earn a prize equivalent to 120€ (which consisted in three bottles of Champagne from a French luxury brand); and (ii), a reputational incentive, as the auction winner is announced publicly. Second, to offset the absence of monetary cost for the auction winner, we rely on the embarrassment of winning with too high a bid that was identified by Klemperer (2002). Beyond cash flow waste, winning with too high a bid causes embarrassment cost as it suggests incompetence. We spur further this embarrassment cost in a threefold way: (i) our case studies provide investors with a common price range for the firm valuation (depending on their choice of Weighted Average Cost of Capital; see Appendix A), which they can use as a benchmark; (ii) the

winner's firm valuation is made public, so that all participants know if the winning bid is too high; and (iii), we introduce a penalty in the first-price sealed bid auction. Indeed, if the winner's bid is too high, we openly state that she made a "bad deal" and she loses her prize. A winning bid is defined as "too high" if it exceeds 10 percent of the market consensus, calculated as the median of all valuations<sup>6</sup>.

Drawing on Klemperer (2004, p. 68), we formalize the first-price sealed-bid auction with embarrassment cost and demonstrate that this mechanism enables the revelation of investors' true firm valuation. We consider  $n$  risk-neutral investors<sup>7</sup> whose firm valuations  $v_i$  are independently drawn from the uniform distribution on  $[0,1]$ , with distribution function denoted by  $F(v)$  and density function denoted by  $f(v)$ . With a uniform distribution on  $[\underline{v}; \bar{v}]$  we have  $F(v) = (v - \underline{v})/(\bar{v} - \underline{v})$ ,  $f(v) = 1/(\bar{v} - \underline{v})$ .

Investor  $i$ 's utility  $u_i$  from winning the auction with bid  $b_i$  equals:

$$u_i = v_i - b_i - k(b_i - m(b_j)) \quad (1)$$

where  $v_i$  denotes her true firm valuation,  $m(b_j)$  the median of all  $j$  bids, and the term proportional to parameter  $k$  reflects the embarrassment of winning with too high a bid, that is disutility for a

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<sup>6</sup> The choice of the median is based on perceptions within the sector as well as the 10 percent interval that corresponds to the estimated bargaining on the real market.

<sup>7</sup> Klemperer (2004, p.19) notes that in first-price auction, risk-aversion makes bidders bid more aggressively. Risk aversion in first-price auction has received major attention by the experimental community: for a recent contribution showing the limits of over-bidding, see Neugebauer and Perote (2008). In our experiment, participants appear fairly risk-neutral (see section 3.1 and Appendix B, figure B.3).

winner to lose the monetary prize and to be known to make a bad deal. A non-winner's utility is zero<sup>8</sup>.

We are going to determine the players' expected payments and the equilibrium bidding strategies. Let denote by  $b(\tilde{v})$  the bidding strategy that player  $i$  is supposed to follow in the equilibrium of the game induced by the incentives mechanism ( $\tilde{v}$  denotes the corresponding type of player  $i$ ). We denote by  $EU_i$  bidder  $i$ 's expected utility from behaving as type  $\tilde{v}$  given her opponents. The expected payment of a bidder of type  $\tilde{v}$  is defined as the probability of winning the auction in the equilibrium ( $p_i(\tilde{v})$ ), times the expectation of  $u_i$  conditional on the remaining  $(n-1)$  values being below  $\tilde{v}$ :  $EU_i = p_i(\tilde{v}) \times E(u_i | v_j < \tilde{v}, \forall j \neq i)$ .

In any mechanism which always gives the object to the highest-value bidder in equilibrium, the probability of winning the auction is simply  $p_i(\tilde{v}) = (F(\tilde{v}))^{n-1}$ , with  $F(\cdot)$  the distribution function, since a bidder's probability of winning is the probability that all the other  $(n-1)$  bidders have lower values than she does. With a uniform distribution on  $[0,1]$ , we have  $F(\tilde{v}) = \tilde{v}$ , therefore  $p_i(\tilde{v}) = \tilde{v}^{n-1}$ .  $EU_i$  then writes:

$$EU_i = \tilde{v}^{n-1} \left( v_i - b(\tilde{v}) - k \left( b(\tilde{v}) - E[m(b_j) | v_j < \tilde{v}, \forall j \neq i] \right) \right) \quad (2)$$

Bidder  $i$ 's optimal bidding choice of  $\tilde{v}$  satisfies  $\partial EU_i / \partial \tilde{v} = 0$  that is:

$$\begin{aligned} & (n-1)\tilde{v}^{n-2} \left( v_i - b(\tilde{v}) - k \left( b(\tilde{v}) - E[m(b_j) | v_j < \tilde{v}, \forall j \neq i] \right) \right) \\ & + \tilde{v}^{n-1} \left( -b'(\tilde{v}) - k \left( b'(\tilde{v}) - \partial / \partial \tilde{v} E[m(b_j) | v_j < \tilde{v}, \forall j \neq i] \right) \right) = 0 \end{aligned} \quad (3)$$

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<sup>8</sup> In the basic analysis of optimal auctions, revenue equivalence and marginal revenues apply (see Klemperer, 2004). In a framework in which the object always goes to the buyer with the highest value and bidders with lowest values expect zero surplus, any mechanism that allocates a unit among the bidders yields the same expected revenue.

To simplify our computations and obtain analytical results, we assume following Klemperer (2004, p.215) that there is a linear equilibrium so that:  $b(v)=\beta \times v$ . We are searching for the equilibrium bidding strategy  $b(v)$ , which in a linear equilibrium amounts to determining the equilibrium value of  $\beta$ . Equilibrium bidding strategies are symmetric Nash equilibrium in which a bidder with value  $v$  chooses the bid  $b(v)$ . Consider that player  $i$  with value  $v$  deviates and chooses the bid  $\tilde{b}$ , and let  $\tilde{v}$  be the type of bidder she would just tie with, that is :  $b(\tilde{v}) = \tilde{b}$ . Mimicking  $\tilde{v}$  would beat all the other  $(n-1)$  bidders with probability  $(F(\tilde{v}))^{n-1}$  and yield expected surplus to player  $i$   $EU(v, \tilde{v}) \times (F(\tilde{v}))^{n-1}$ . Choosing the best bid to make is thus equivalent to choosing the best  $\tilde{v}$  to mimic which is computed as the first-order condition  $\partial EU_i / \partial \tilde{v} = 0$ . In turn, for the bidding function  $b(v)$  to be an equilibrium,  $i$ 's best response to all others bidding according to this function must be to do likewise, that is, her optimal choice of  $\tilde{b}$  is  $b(v)$  and of  $\tilde{v}$  is  $v$ . We thus have  $\tilde{v} = v_i$  in our (symmetric Nash) equilibrium.

Conditional on  $v_i$  being the highest value, the other  $n-1$  values are uniformly distributed on  $[0, v_i]$  so, using the property of the uniform distribution, the expected value of the median of these (which is what  $i$  would expect to pay conditional on winning) is  $v_i/2$ :

$$E[m(b_j) | v_j < v_i, \forall j \neq i] = v_i / 2 \quad (4)$$

Using  $b(v) = \beta \times v$  and  $\tilde{v} = v_i$  and substituting for equation (4) into equation (3), we get:

$$(n-1)v_i^{n-2} \left( v_i - \beta v_i - k \left( \beta v_i - \frac{v_i}{2} \right) \right) + v_i^{n-1} \left( -\beta - k \left( \beta - \frac{1}{2} \right) \right) = 0 \quad (5)$$

That is we obtain the following equilibrium bidding strategy  $b(v_i) = \beta \times v_i$  with:

$$\beta = \left( \frac{n-1}{n} + \frac{k}{2} \right) / (1+k) \quad (6)$$

And bidder  $i$ 's unconditional expected utility is given by

$$EU_i = v_i^{n-1} [v_i - \beta v_i - k[\beta v_i - v_i / 2]] = v_i^n / n \quad (7)$$

The result of this simple first-price auction with embarrassment cost shows that  $EU_i$  is independent of  $k$ . Since the highest type wins, the lowest type makes zero surplus. For all  $k$ , the other conditions for revenue equivalence are satisfied and the bidders are equally well off.

What matters for the experiment is that when the embarrassment cost ( $k$ ) increases, the equilibrium bidding strategy ( $b(v_i)$ ) converges toward the median valuation ( $v_i/2$ ). In other words, the risk of winning the auction with too high a bid depresses investors' firm valuations towards the market consensus. Assuming the reputational and monetary incentives we implemented are salient, the embarrassment cost is very high in the experimental auction. Therefore our first-price sealed-bid auction design enables the revelation of investors' real firm valuation.

### 3. RESULTS

We first present participants' main characteristics in section 3.1, then results on the impact of corporate extra-financial performance on investors' firm valuation in section 3.2, before analyzing the impact on investment decisions in section 3.3. Table 2 summarizes descriptive statistics on experimental results. Full descriptive statistics, detailed by treatment and firm, can be found in Appendix E (Table E.1).

*(Insert Table 2 about here)*

### *3.1 Participants' profile*

Following our questionnaire's answers, participants in our experiment are professional and experienced Private Equity investors (39 years old in average). They work in different segments of Private Equity (venture and seed capital 33%, growth capital 24% and leveraged buyouts 52%<sup>9</sup>) and at different posts (chairman 21%, partner 21%, investment director 12%, investment manager 40% and specialists of socially responsible investments 6%). 73% are men and 48% have received some kind of training on the management of ESG issues. Results of a simple lottery (see question 10 in Appendix D) allows us to estimate participants' risk aversion. Compared to usual experimental participants (Holt and Laury 2002), they appear fairly risk-neutral and less risk-averse than usual experimental participants (see figure B.3. in Appendix B). Detailed participant descriptive statistics can be found in Appendix B. In the following analysis, we control for investor heterogeneity using these variables.

### *3.2 Results on Firm Valuation*

A first element worth noting is the consistency of firm valuation between sessions, which supports the expertise of our participants, the efficiency of the auction mechanism and the robustness of our results. Between sessions, Firm A base mean valuation was 151.8 M€ with a 35.2M€ standard error (that is 23%); 37.8M€ with a 6.9 M€ standard error (18%) for firm B; and

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<sup>9</sup> Some participants worked in two segments, explaining why total exceeds 100%.

514.8M€ with a 114.3M€ standard error for firm C (23%) (see Table 2). 70% of the winners received their prize for firm A and 50% for firm B and C, meaning most winning valuations were within 10% of the median valuation. Also supporting results consistency, we can note that most valuations (respectively 67%, 100% and 63% valuations for firms A, B and C) were within the firm valuation range we had provided in the case studies (see Appendix A).

For the remainder of the analysis, we focus on the relative change in investors' firm valuation between information steps (in %) rather than the absolute firm valuation (in M€). The heterogeneity of investors' valuations in Step 1, that is based on sole financial data, is therefore controlled for in the analysis. Table 3 presents the mean of the relative change in investors' firm valuation depending on *factor*, *sign* and *quality*. Statistical significance of the observed changes is assessed by the p-values yielded by the non-parametric Wilcoxon signed-rank test, which compares the mean of the relative valuation change to zero. Figure 2 summarizes these data.

*(Insert Figure 2 about here)*

*(Insert Table 3 about here)*

Descriptive statistics (Table 2) and the results of the Wilcoxon signed-rank tests on the mean changes in firm valuation (Table 3) indicate that sustainable and unsustainable practices all impact firm valuation whatever their factor, sign and quality.<sup>10</sup> Unsustainable environmental, social and governance policies (cumulating soft and hard practices) appear to significantly decrease investors' firm valuation by respectively 11.6%, 10.5% and 15.3% (all p-values <0.01); whereas sustainable ones only increase it by 5.0%, 5.5% and 2.0% (all p-values < 0.05) (Table 3).

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<sup>10</sup> Only the impact of positive hard governance practice is not significant at the level of 10%.

Most of the unsustainable policy effect appears driven by hard (that is core for the business) practices.

However, heterogeneity in investors' socio-economic characteristics, experience and preferences may affect their decisions and bias those results. To control for this heterogeneity and for the repetition of valuations for each investor, we use panel regression models and econometrically analyze the effects of sustainable corporate policy (Table 4) and unsustainable corporate policy (Table 5) on firm valuation change depending on factor and quality. In both tables, models 1 and 2 are GLS models with random effects in which investors' age, gender, specialty (venture capital; buyouts; expansion capital; socially responsible investments), and training on ESG issues management are controlled for. We also control for the order in which the case studies were given as well as whether the session was run on the internet or not. Models 1' and 2' are panel regression models with fixed effects, hence directly controlling for investors' heterogeneity, and are used as robustness check. Models 1 and 1' explain the firm valuation change between rounds 1 – 3, 3 – 5, 6 – 8 and 8 – 10 and test the effects of corporate policy Factor (ESG). They thus provide estimates of the cumulative effect of hard and soft practices on a given factor. Models 2 and 2' explain the firm valuation change between each round and estimate the crossed effects of Factor and Quality. They thus distinguish the effects of soft and hard practices for any given Factor. As a robustness check, table E.2. in Appendix E provides other estimations using crossed effects of Sign, Factor and Quality.

*(Insert Table 4 about here)*

*(Insert Table 5 about here)*

Let us first focus on the effects of sustainable practices on firm valuation change (Table 4). Sustainable environmental and social policies (cumulating soft and hard practices) led to a significant increase in firm value of respectively 4.7% and 5.4% in Model 1; 4.6% and 5.9% in Model 1' (all p-values<0.01). Positive Governance has no significant impact in our data. We now distinguish core from peripheral practices (Models 2 and 2', Table 4). Once sustainable policies are separated into soft and hard practices, the effects that remain significant are the effect of hard environmental practice (3.2% and 3.1% in Model 2 and 2', p-value<0.01) and the effect of soft positive social practice (3.8% in Model 2 and 4.1% in Model 2', p-value<0.01). In all random-effect models, investors' intrinsic characteristics do not have significant effects on firm valuation change.

Let us now focus on the effects of unsustainable practices on firm valuation change (Table 5). Unsustainable environment, social and governance policies (cumulating soft and hard practices) respectively decrease firm value by -11.2%, -10.6% and -15.1% in Model 1; and -11.7%, -10.7% and -14.6% in Model 1' (Table 5; all p-values<0.01). When we separate the effects of soft and hard practices (Models 2 and 2'), we find that both significantly reduce firm value, but hard practices have a significant larger impact (tests of equality between coefficients for each Factor: p-value<0.05). Soft unsustainable practices decrease firm value by -3.5% (p-value<0.05), -3.1% (p-value<0.10), and -5.7% (p-value<0.01) for respectively environment, social and governance issues in Model 2 (-3.8%, -3.1% and -5.3% in Model 2'), whereas hard unsustainable practices

respectively lead to a -8.2%, -8.0% and -9.9% decrease in Model 2 (all p-values<0.01; decrease of -8.5%, -8.1% and -9.6% in Model 2').

Three investors' intrinsic characteristics appear to impact their change in firm valuation when they learn about unsustainable practices: gender, Private Equity segment and specialization in socially responsible investments. Change in firm valuation is less important for women than for men (+3.6%, model 1, p-value<0.05). A close look at data reveals that they do not increase their firm valuation when they learn about unsustainable practices, but rather have a smaller reaction than men. Growth expansion investors penalize more strongly firm value than investors specialized in venture capital or buyouts (-3.5%, model 1, p-value<0.10). Finally, the two socially responsible investments specialists of our sample also have a stronger reaction (-11.4%, model 1 p-value<0.01).

To summarize, results show that unsustainable corporate policies significantly decrease firm value whereas sustainable ones significantly increase it (except for governance), yet with a lesser magnitude.

### *3.3 Results on investors' investment decisions*

Let us now focus on the impact of corporate policies on investment decisions. Table 2 presents the mean change in investment decision depending on corporate practice factor, sign and quality, that is the share of investors (in %) who revise their previous decision and either stop or start investing in the firm when they learn about its sustainability performance. As for mean change in firm valuation, statistical significance of the observed changes is assessed by the p-values yielded by the non-parametric Wilcoxon signed-rank test.

In our experiment, unsustainable policies (cumulating both soft and hard practices) reduce the investment likelihood by respectively -29.2%, -50.0% and -30.8% for environment, social and governance issues (p-values<0.01, Table 2). Most of the effects seem driven by hard practices, governance put apart. For all factors, soft practices do not stand out as sufficient to influence the decision to invest. Sustainable policies do not appear to significantly increase the investment decision, except for environment (+10.4%, p-value<0.10; Table 2).

As for firm valuation, the decision to invest or not in a firm depends on investors' heterogeneity in terms of preferences and style. To explain investment decision while controlling for this heterogeneity, we use random-effect logistic model (Model 3) in Table 6 (a fixed-effect model 3' is tested as a robustness test and presented in table E.3 in Appendix E). Controls in Model 3 are similar to those used to explain the relative change in firm valuation in Tables 4 and 5. As estimates cannot be directly interpreted, predictive margins are calculated. They provide the predicted probabilities of deciding to invest knowing the Factor and Quality of the corporate practice, assuming the random effect is zero (i.e. for an average investor).

*(Insert Table 6 about here)*

Results confirm that only unsustainable practices significantly change the investment decision. They also confirm that only hard unsustainable practices matter in this regard for environmental and social issues (both p-value<0.01). Governance stands out, both soft (p-value<0.10) and hard (p-value<0.01) unsustainable practices reducing the investment decision (p-value<0.01). Predictive margins also highlight that, among the ESG factors, governance has the largest impact on the investment decision in terms of magnitude.

## 4. DISCUSSION

Experimental findings show that corporate sustainability impacts Private Equity investors' firm valuation and investment decision. However, sustainable and unsustainable policies asymmetrically affect Private Equity financing, entrepreneurs having more to lose from the latter than to gain from the former. We also observe that investors care for the content of the corporate sustainability policy: Environmental, Social and Governance issues do not equally matter, Governance appearing specific. The quality of the corporate practice (whether it is core (hard) or peripheral (soft) for the firm) also matters.

Our results are consistent with earlier studies (on listed firms) showing that companies with better ESG performance tend to face significant lower capital constraints. El Ghouli et al. (2011) show for instance that investment in responsible employee relations and environmental policies contributes substantially to reducing firms' cost of equity, whereas participation in "sin" industries (tobacco and nuclear power) increases firms' cost of equity.

We discuss in this section the consequences of our results for investors and entrepreneurs, taking into account qualitative data. Indeed, many participants (20 out of 33) wrote down the justifications of their valuations and investment decisions, shedding light on their understanding and use of the ESG criteria in Private Equity.

### *4.1 Sustainability and Private Equity investors*

A first element worth noticing is that most investors integrated the extra-financial information in standard financial tools. For instance, they estimated the cost of upgrading poor environmental

management systems and impacted that cost in the firm business plan and future cash flows. Cost estimations were often approximated, investors indicating they would require additional auditing to confirm their valuation. Poor extra-financial performance thus enabled them to lower the firm price during the acquisition stage. However, numerous comments indicated that they expected to be able to generate profits by improving this poor extra-financial performance. Conversely, sustainable practices already implemented were not expected to create additional value. As put by a participant, they were “*considered intrinsic to quality management and expected by the board*”.

Investors’ qualitative comments also pointed out that our estimation of unsustainability impact on investment decisions (about -30%) is likely biased upward by our experimental design. Indeed, most investors would not actually have rejected the investment (as they did in the experiment, as they had no alternative), but would have rather asked for complementary audits and due diligences in a real investment. Whereas the high rejection rates we observed might be overestimated, unsustainable practices appear likely to increase Private Equity investors demands in terms of due diligences and eventually shareholders’ pact.

Our results also highlight that the content of the corporate sustainability policy matters for investors, both in terms of quality and factor. The importance of the environment and social practice quality (soft or hard) appears in line with the pointed-out financial and quantitative approach of extra-financial performance by Private Equity investors. Indeed, hard practices in our experiment were designed to be core to the firm business, bearing on resource mobilization, hence having stronger accounting impact. Among the ESG factors, governance stands out as having strong effects on firm valuation and investment decision when negative (for both soft and hard practice), and none when positive. Governance is indeed a specific issue in the Private Equity industry. As significant shareholders, Private Equity investors are usually deeply involved

in the firm governance, when they do not have complete control of the board. Kaplan and Strömberg (2009) also identify governance engineering as a major strength of the industry. Whereas good governance might not be paid for during the acquisition stage because it is expected, a firm poorly governed might be a risk well understood and to which investors strongly react.

For the Private Equity industry, the ability to properly evaluate the extra-financial performance of a target firm could thus constitute a negotiation tool in acquisition stages to lower its cost, thus increasing the investment profitability. Also, it could enable Private Equity investors to create value in the companies they already hold in portfolio. However, succeeding in doing so requires a specific human capital on corporate social responsibility management, which the industry might likely still be in lack of.

#### *4.2 Sustainability and Entrepreneurs*

Let us now consider consequences for entrepreneurs. Our results imply that unsustainable practices are likely to prevent access to Private Equity financing, particularly when they represent sufficient a risk to threaten the core business. For instance, food-safety issues due to poor environmental management in our catering case-study (firm A) decreased investment decisions by about 30%. As previously discussed, in real investments, this rejection rate might be overestimated. However, poor management of environmental and social issues would likely increase investors' demands in terms of audits and dues diligences, which are costly.

Core business issues put apart, unsustainable firms are likely to get financed as much as sustainable ones. However, low extra-financial performance appears to be used to lower the firm

valuation, meaning it increases the cost of equity capital for entrepreneurs and destroys their shareholders' value. Improving environmental, social and governance practices could thus allow entrepreneurs to protect their firm price and access to Private Equity capital. Environmental and social performance might even be paid for by investors when it strengthens the firm attractiveness.

Let us finally note that the quantification approach used by investors implies the need for entrepreneurs to implement indicators to assess and monitor environmental, social and governance performance. Indeed, considering Private Equity investors' growing concern for extra-financial performance (Crifo and Forget, 2012), it appears likely that such quantified information will be increasingly required. To be paid for, sustainability will hence likely need to be accurately and quantitatively demonstrated.

## 5. CONCLUSION

This paper tackled the core question of the impact of corporate sustainable and unsustainable practices on Private Equity financing. We find that entrepreneurs who engage their company on a sustainable path might not be more attractive for Private Equity investors than the others. However, we provide evidence that entrepreneurs who do not manage environmental, social and governance issues are likely to suffer limited access to Private Equity, with a higher cost of capital, hence penalizing their shareholders by destroying firm value. Indeed, when investors' heterogeneity is controlled for, our results unveil that unsustainable policies decrease firm price by respectively 11%, 10% and 15% for environmental, social, and governance issues.

Several research paths are opened by our results and we here shed light on three of them. A first path arises from our experiment focus on deal pricing, discarding issues about control rights. As several experiment participants highlighted, unsustainable practices might lead to reinforced due diligences rather than price change. The issue of the impact of corporate sustainability on control rights in Private Equity financing negotiations is left open to investigate and is likely to be of broad interest for entrepreneurs.

Another research avenue is triggered by the asymmetry we highlighted in the pricing of sustainable and unsustainable policies. Indeed, it remains unclear whether investors strategically overweighed unsustainability to lower firm price in acquisition stages, or whether they actually overvalued extra-financial risks (potential losses) over opportunities (potential gains). Whereas the former could be explained by negotiation strategy and empirically tested by observing exit stages, the latter would rather relate to behavioral finance concepts, such as prospect theory (Kahneman and Tversky 1979).

Finally, a research path is drawn by our focus on the Greening Goliaths rather than the Emerging Davids identified by Hockerts and Wustenhagen (2010), that is firms engaging in incremental environmental or social process innovation (such as through corporate social responsibility initiatives) rather than new sustainable entrepreneurship. Investigating how Emerging Davids would be evaluated by venture and seed capitalist compared to Greening Goliaths appears as a promising research extension to the sustainable entrepreneurship literature.

From a wider perspective, equity financing remains a core limit of entrepreneurs who wish to pursue sustainable ventures. Venture capital likely has a key role to play in such entrepreneurship, yet its extent is a question left open. Research is still needed to analyze how to

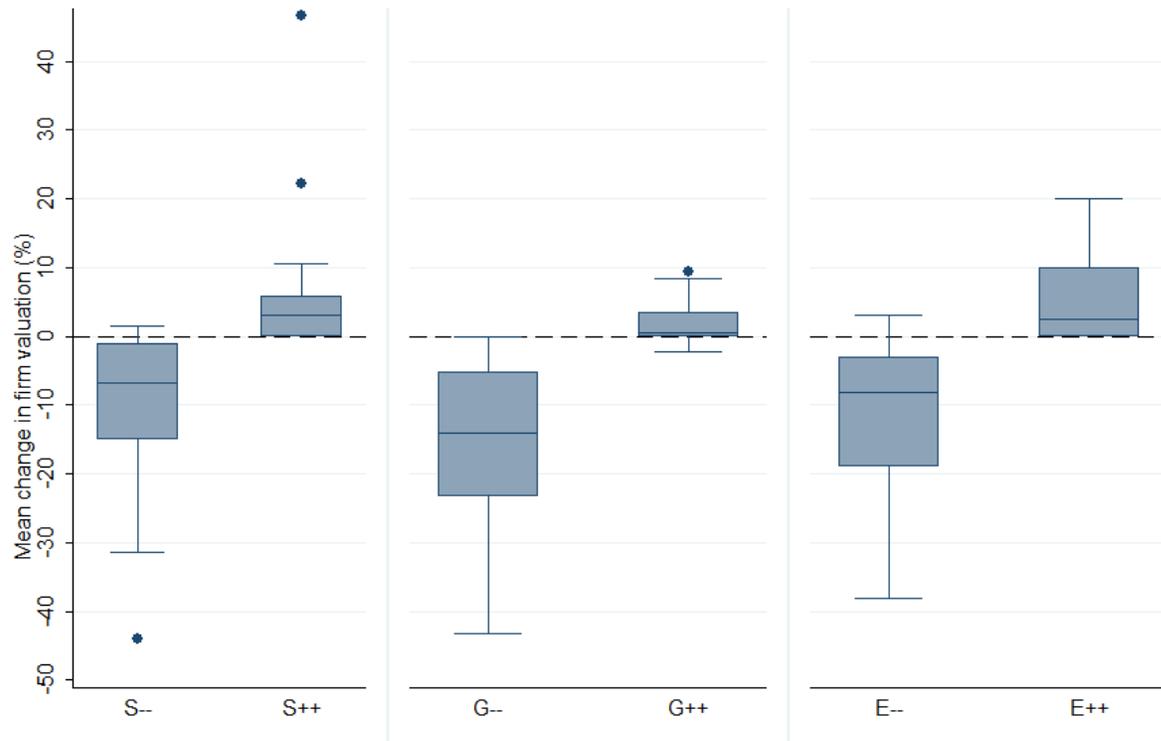
raise the equity needed and what are the best organizational structures to finance green growth and support Emerging Davids.

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<i>Information step</i>	<b>Treatment 1</b> (11 participants)	<b>Treatment 2</b> (7 participants)	<b>Treatment 3</b> (9 participants)	<b>Treatment 4</b> (6 participants)
<i>Step 1</i>	<b>Firm A</b>	<b>Firm C</b>	<b>Firm B</b>	<b>Firm A</b>
<i>Step 2</i>	S +	G +	E +	E -
<i>Step 3</i>	S ++	G ++	E ++	E --
<i>Step 4</i>	E -	S -	G -	S +
<i>Step 5</i>	E --	S --	G --	S ++
<i>Step 6</i>	<b>Firm B</b>	<b>Firm A</b>	<b>Firm C</b>	<b>Firm B</b>
<i>Step 7</i>	E +	S +	G +	G -
<i>Step 8</i>	E ++	S ++	G ++	G --
<i>Step 9</i>	G -	E -	S -	E +
<i>Step 10</i>	G --	E --	S --	E ++

**Fig.1.** Experiment design. Four treatments were tested. Two case studies were done by treatment, using information on Environmental (E), Social (S) or Governance (G). Information is either positive (+) or negative (-), and either soft (+ and -) or hard (++ and --). Each participant underwent the 10 steps of information of a single treatment.



**Fig.2.** Mean impact (%) of corporate sustainable (Positive “++”) and unsustainable (Negative “- -”) practices on investors’ firm valuation depending on the policy Factor: Social (left), Governance (middle) and Environment (right)

**Table 1**

Characteristics of the three case studies used in the experiment

Case Study	Sector	Number of Employees	Factor	Sign	Quality	Policy
Firm A	Catering	1600	Social	+	soft	Employee training & career development
					hard	Working conditions & remuneration
			Environment	-	soft	Environmental footprint monitoring
					hard	Environmental performance of supply chain
Firm B	Packaging	227	Environment	+	soft	Environmental footprint monitoring
					hard	Eco-design
			Governance	-	soft	Organization of authority delegation
					hard	Organization of board of directors
Firm C	Electronic Components	2608	Governance	+	soft	Organization of authority delegation
					hard	Organization of board of directors
			Social	-	soft	Employee training & career development
					hard	Working conditions & remuneration

**Table 2**Descriptive statistics on experimental results <sup>a</sup>

Firm	Corporate practice			Valuation (M€)				Investment decision (%)	
	factor	Sign & quality	Obs.	Mean <sup>b</sup>	Median.	Min.	Max.	Mean <sup>b</sup>	
A	<i>Base</i>		24	151.8 (35.2)	160.0	81	242	0.75	(0.44)
	Social	+	24	151.1 (35.2)	160.0	81	220	0.75	(0.44)
		++	24	152.2 (35.6)	162.5	81	220	0.71	(0.46)
	Env	-	24	150.0 (34.7)	160.0	81	220	0.75	(0.44)
--		24	137.5 (27.4)	137.5	81	180	0.46	(0.51)	
B	<i>Base</i>		26	37.8 (6.8)	38.2	20	50	0.65	(0.49)
	Env.	+	26	36.6 (8.3)	37.9	15	50	0.69	(0.47)
		++	26	37.9 (9.4)	39.3	15	58	0.81	(0.40)
	Gov.	-	26	37.3 (8.0)	37.5	20	56	0.61	(0.50)
--		26	33.8 (8.9)	33.0	15	50	0.46	(0.51)	
C	<i>Base</i>		16	514.8 (114.3)	500.0	280	747	0.94	(0.25)
	Gov.	+	16	522.8 (119.3)	505.0	280	747	0.94	(0.25)
		++	16	526.7 (124.7)	506.5	280	750	1.00	(0.00)
	Social	-	16	508.2 (114.7)	497.5	280	740	0.88	(0.34)
--		16	467.5 (117.3)	450.0	275	700	0.50	(0.52)	

<sup>a</sup> Provided by firm case study (A, B or C) and by corporate practice Factor (Environment, Social or Governance), Sign and Quality (+ = sustainable soft practice; ++ = sustainable hard practice; - = unsustainable soft practice; -- = unsustainable hard practice). Base (italic figures) is the first investment round, in which investors' decisions are taken based on sole financial data.

<sup>b</sup> Figures in brackets are standard errors.

**Table 3**Experimental effects of corporate policies on the mean changes in firm valuation and investment decision <sup>a</sup>

Factor	Sign <sup>b</sup>	Quality	# obs.	Mean change in firm valuation (%) <sup>c</sup>	Mean change in investment decision (%) <sup>c</sup>
<b>Environment</b>	<i>Negative</i>		24	-11.57 ***	-29.17 ***
		Soft -	24	-3.36 *	0.00
		Hard --	24	-8.08 ***	-29.17 ***
	<i>Positive</i>		26	4.95 ***	11.54 *
		Soft +	26	1.69 **	0.00
		Hard ++	26	3.20 ***	11.54 *
<b>Social</b>	<i>Negative</i>		16	-10.47 **	-50.00 ***
		Soft -	16	-2.98 **	-12.50
		Hard --	16	-7.95 **	-37.50 **
	<i>Positive</i>		24	5.49 ***	-4.17
		Soft +	24	3.95 **	-4.17
		Hard ++	24	1.48 **	0.00
<b>Governance</b>	<i>Negative</i>		26	-15.26 ***	-30.77 **
		Soft -	26	-5.80 ***	-15.39
		Hard --	26	-10.07 ***	-15.39
	<i>Positive</i>		16	2.03 **	6.03
		Soft +	16	1.43 **	0.00
		Hard ++	16	0.60	6.03

<sup>a</sup> Mean relative change in respectively firm valuation and investment decision when investors learn about corporate extra-financial performance, depending on the corporate practice Factor (Environment, Social or Governance), Sign (Negative, i.e. unsustainable; or Positive, i.e. sustainable) and Quality (hard or soft practice).

<sup>b</sup> The mean change in firm valuation and investment decision calculated by Sign (italic) represents the cumulative effect of both the soft and hard practices, that is the effect of a global sustainable or unsustainable policy.

<sup>c</sup> Statistical significance is given by Wilcoxon signed-rank test (H0: Mean of change = 0): \*\*\* p<0.001; \*\* p<0.005 \* p<0.010

**Table 4**Effects of corporate sustainable policies on the change in firm valuation <sup>a</sup>

	Model 1 <sup>b</sup>		Model 1' <sup>d</sup>		Model 2 <sup>c</sup>		Model 2' <sup>d</sup>	
Env	4.74 ***	(1.21)	4.59 ***	(1.26)				
Soc	5.38 ***	(1.25)	5.85 ***	(1.31)				
Pos	2.48	(1.48)	2.01	(1.57)				
Env x soft					1.66 *	(0.98)	1.57	(1.01)
Env x hard					3.18 ***	(0.98)	3.08 ***	(1.01)
Soc x soft					3.73 ***	(1.02)	4.05 ***	(1.05)
Soc x hard					1.30	(1.01)	1.61	(1.05)
Gov x soft					1.79	(1.19)	1.47	(1.24)
Gov x hard					0.97	(1.19)	0.65	(1.24)
Case study order	0.53	(0.92)	0.56	(0.95)	-0.45	(0.62)	0.20	(0.63)
Internet session	0.42	(1.35)			0.35	(0.90)		
Investor age	0.02	(0.05)			0.01	(0.03)		
Investor gender	-0.76	(1.09)			-0.47	(0.72)		
Venture capital	0.31	(1.78)			0.20	(1.18)		
Buyout	0.54	(1.53)			0.35	(1.01)		
Expansion capital	-0.24	(1.47)			-0.17	(0.98)		
SRI	5.40	(2.67)			3.69	(1.77)		
ESG training	-0.47	(0.95)			-0.30	(0.63)		
Obs.	132		132		198		198	
Nb. investors	33		33		33		33	
Wald chi2	39.11 ***				31.99 ***			
F-test			6.88 ***				3.00 ***	
R <sup>2</sup> (within)	0.22		0.22		0.12		0.12	

<sup>a</sup> We only test here the effects of policies of Positive Sign. Model 1 and 1' use the change in firm valuation (%) between rounds 1, 3 and 5. Model 2 and 2' use all rounds. Sustainable corporate policy effects are decomposed into factor (Env., Social or Gov.) and quality (soft or hard). Figures in brackets are standard errors. \* p-value < 10%; \*\* p-value < 5%; \*\*\* p-value < 1

<sup>b</sup> Model 1 is a GLS model with random effects. Global effects (soft and hard practices cumulated) are estimated.

<sup>c</sup> Model 2 is a GLS model with random effects. Effects of hard and soft practices are distinguished.

<sup>d</sup> Model 1' and 2' are panel regression models with fixed effects.

**Table 5**Effects of corporate unsustainable policies on the change in firm valuation <sup>a</sup>

	Model 1 <sup>b</sup>		Model 1' <sup>d</sup>		Model 2 <sup>c</sup>		Model 2' <sup>d</sup>	
Env	-11.20 ***	(1.80)	-11.65 ***	(1.83)				
Soc	-10.56 ***	(2.11)	-10.66 ***	(2.17)				
Gov	-15.09 ***	(1.72)	-14.61 ***	(1.75)				
Env x soft					-3.47 **	(1.48)	-3.79 **	(1.49)
Env x hard					-8.19 ***	(1.48)	-8.51 ***	(1.49)
Soc x soft					-3.06 *	(1.73)	-3.11 *	(1.77)
Soc x hard					-8.04 ***	(1.73)	-8.08 ***	(1.77)
Gov x soft					-5.64 ***	(1.43)	-5.32 ***	(1.44)
Gov x hard					-9.91 ***	(1.43)	-9.59 ***	(1.44)
Case study order	0.13	(1.32)	0.00	(1.31)	0.09	(0.90)	-0.03	(0.90)
Internet session	-2.17	(1.94)			-1.47	(1.39)		
Investor age	0.13 *	(0.07)			0.09 *	(0.05)		
Investor gender	3.56 **	(1.56)			2.47 **	(1.12)		
Venture capital	-2.95	(2.56)			-2.26	(1.83)		
Buyout	-2.25	(2.19)			-1.73	(1.57)		
Expansion capital	-3.49 *	(2.12)			-2.56 *	(1.51)		
SRI	-11.36 ***	(3.83)			-8.74 ***	(2.74)		
ESG training	0.26	(1.36)			0.26	(0.97)		
Obs.	132		132		198		198	
Nb. investors	33		33		33		33	
Wald chi2	128.81 ***				101.25 ***			
F-test			24,95 ***				10.21 ***	
R <sup>2</sup> (within)	0.51		0.51		0.31		0.31	

<sup>a</sup> We only test here the effects of policies of Negative Sign. Model 1 and 1' use the change in firm valuation (%) between rounds 1, 3 and 5. Model 2 and 2' use all rounds. Unsustainable corporate policy effects are decomposed into factor (Env., Social or Gov.) and quality (soft or hard). Figures in brackets are standard errors. \* p-value < 10%; \*\* p-value < 5%; \*\*\* p-value < 1

<sup>b</sup> Model 1 is a GLS model with random effects. Global effects (soft and hard practices cumulated) are estimated.

<sup>c</sup> Model 2 is a GLS model with random effects. Effects of hard and soft practices are distinguished.

<sup>d</sup> Model 1' and 2' are panel regression models with fixed effects.

**Table 6**Effects of corporate sustainability policies on investment decision <sup>a</sup>

	Sustainable practices				Unsustainable practices			
	Model 1 <sup>b</sup>		Predictive Margins		Model 1 <sup>b</sup>		Predictive Margins	
Env x soft	-0.76	(0.87)	0.74	***	0.37	(0.75)	0.86	***
Env x hard	0.86	(0.95)	0.87	***	-1.84 ***	(0.66)	0.50	***
Soc x soft	-0.27	(0.83)	0.79	***	0.77	(1.02)	0.90	***
Soc x hard	-0.26	(0.83)	0.79	***	-2.26 ***	(0.81)	0.41	***
Gov x soft	2.06	(1.35)	0.94	***	-1.25 *	(1.67)	0.61	***
Gov x hard <sup>d</sup>	21.85	(15270)	1.00	***	-2.27 ***	(0.69)	0.41	***
Case study order	-0.12	(0.59)			0.44 *	(0.43)		
internet session	-4.49 **	(1.28)			-1.52	(1.17)		
investor age	-0.11	(0.09)			0.00	(0.04)		
investor gender	0.66	(1.74)			-1.07	(0.94)		
venture capital	-2.70	(2.48)			-1.16	(1.48)		
buyout	-4.92 **	(2.37)			-2.37 *	(1.30)		
expansion capital	-2.46	(1.94)			-1.14	(1.25)		
SRI	-5.27	(3.42)			-2.53	(2.21)		
ESG training	2.55	(1.54)			0.30	(0.80)		
Obs.	198				198			
Nb. investors	33				33			
Wald chi2	11.77				23.17 *			
log_likelihood	-61.53				-96.89			

<sup>a</sup> Effects of sustainable (Sign = positive) and unsustainable (Sign = negative) corporate policies on the investment decision (0 = don't invest; 1 = invest) depending on their Factor (Env., Social or Gov.) and Quality (soft or hard). \* p-value < 10%; \*\* p-value < 5%; \*\*\* p-value < 1

<sup>b</sup> Model 3 is a random effects logistic regression.

<sup>c</sup> Predictive margins are the predicted probability of deciding to invest knowing the Sign, Factor, and Quality, assuming the random effect is zero (i.e. that it is an average investor).

<sup>d</sup> All observations = 1 when Factor = Governance, Sign = Positive and Quality = Hard

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## APPENDIX A - Case studies used in the experiment<sup>11</sup>

### CASE STUDY OF FIRM A

#### Business summary

Firm A is a restaurant chain that employs over 1600 workers. All chain concepts, products and marketing tools apply to all restaurant units, empowering Firm A with a strong and visible brand image.

Along 17 other French restaurant chains, Firm A belongs to a restaurant sample group. Firm A stands as n°1 in terms of turnover growth in 2008, 2009 and 2010. It over-performed the market throughout the crisis, increased its turnover by +1.9% from 2008 to 2007 (market -1.8%) and only suffered a -0.2% loss from 2009 to 2008 when the market underwent -6.1%.

The average meal cost is lower than in its restaurant chain competitors. Moreover, the VAT reduction was passed on the average meal cost (- 3.5% from 2009 to 2010), in line with the special agreement for the restaurant industry (« Contrat d'avenir de la restauration »). The « fish and seafood » product benefits from a positive image in terms of nutritional quality. Those elements provide Firm A with a popularly-positioned price/product ratio, half-way between rapid and basic lunch catering and evening or weekend family dinner.

Three categories of establishments exist: downtown restaurants; mall restaurants, and « solo » restaurants, a growing category with a strong visual impact. On November 30, 2010, Firm A counts 74 establishments (12 in Paris, 26 en Paris region, 36 in other French regions). 9 openings are forecasted in 2011 and 8 in 2012. Full growth potential is estimated at 150 establishments in France.

For several years, Firm A has been engaged in an aggressive marketing policy (budget of 2% of turnover). Finally, Firm A had been managed by a high-quality top team for the past five years.

#### Financial Information

Business plan	2011	2012	2013	2014	2015	2016	2017
<b>Turnover</b>							
<i>% growth</i>							
<b>EBITDA</b>							
<i>% turnover</i>							
<b>EBIT</b>							
<i>% turnover</i>							

BALANCE SHEET (k€)	2008	2009	2010
<b>Turnover</b>			

<sup>11</sup> Translated from French. Original French version available upon request. Note that in the French version, ESG information were visually similar in terms of number of lines.

*% change A-1 turnover restaurants*

Raw material costs

**Gross Profit**

*% gross profit restaurants*

Personnel costs - Restaurant

Other costs - Restaurants

**Gross Operating Income**

*% margin restaurants*

Building rental costs

*% margin restaurants*

Head office costs

**Gross Operating Profit -Total**

*% margin*

**Operating Capex:** About 4 M€/year (openings put apart), which is in the industry average in turnover %.

Comparables Transactions Multiples	
EBITDA Multiples	
Max	
Min	
Average	

Comparable Firms	Stock price (€)	Market Cap (€)	Firm Value (€)	Multiple Turn./LTM	Multiple EBITDA/LTM	Multiple EBIT/LTM
X						
Y						
Z						
.....						

Average Stock Market Multiples			
	Mult Turn.	Mult EBITDA	Mult EBIT
Max			
Min			
Average			

**DCF information:**

WACC baseline: Firm value 150 M€

Risk premium increase: Firm value 130 M€

Risk premium decrease: Firm value 170 M€

**Information Steps**

**Information 1:**

Firm A Board of Directors is strongly involved in Human Resources Management, particularly for employee training.

In 2010, 95% restaurant employees were trained, including e-learning trainings (for management, kitchen and dining room workers). Trained employees benefited in average from 0.63 training day in 2010, against a 0.20 industry

average. A “Challengers program” was implemented in 2009 to train future managers (Directors and Deputy Directors) over 18 months. Annual appraisals are formalized, with regular skill assessment for team managers.

In 2010, 191 employees (that is 11%) were granted an internal promotion against 56 (4%) in 2009. Employee promotion led to an average wage increase of +6%.

### **Information 2:**

Firm A commits to ensure that the greatest value is attached to work and skills and therefore especially targets wage increase and working condition improvement.

Wages are in the high range of the chain restaurant industry, with performance incentives based on quantitative and qualitative objectives. In 2010, Firm A raised the salary scale higher than demanded by the collective agreements. Since 2008, wages systematically increased by +2 to +3%, while the inflation increased by about 1.5%. 92% workers have permanent contracts, against a 64% industry average. Working conditions have been improved with the installation of skylights in the dishwashing area and a reduction of the cook stove heat.

Employee turnover was reduced from 130% in 2000 to 42% in 2010. Work stoppages (WS) decreased by 1 WS/13 000 worked hours in 2009 to 1 WS/15 500 in 2010. Finally, shirking decreased from 7.3% in 2009 to 4.3% in 2010.

### **Information 3:**

Firm A did not implement a voluntary policy of environmental footprint reduction.

The carbon footprint is not evaluated. Water, gas and electricity consumptions are not monitored by restaurant unit. Monitoring and implementing water and energy savings are not included in 2011 targets. Paper consumption for marketing and head office activities are not well-documented. New buildings do not follow the High Environmental Quality standards. There is no restaurant waste reduction policy and few recycling practices have been implemented.

Global energy and water consumptions increased between 2009 and 2010. Waste management deteriorated from an average 5.42 waste liters / consumer in 2009 to 5.78 liters in 2010.

### **Information 4:**

Firm A does not possess any supplier chart with environmental guidelines and does not audit its key raw material suppliers (including shellfish suppliers) on those issues.

A European directive recently implemented water classification criteria for shellfish production based on *Escherichia coli* bacteria concentration. Only Area A –produced shellfish can directly be sold for human consumption. 100% shellfishes sold by Firm A are produced in Area B, meaning human consumption is only allowed after sufficient treatment in a purification center.

The IFREMER national research center has shown that some pollutants (including heavy metals) and toxins (including endocrine disrupters) are not eliminated in the purification process.

## **CASE STUDY OF FIRM B**

### **Business summary**

Firm B produces packaging solutions for the agri-food industry. It has a twofold expertise: packaging and cooking products; and a twofold trade: processing and distributing its products. It currently employs 227 workers.

Firm B is the French leader on its niche market (144 M€ in total size), with 35% market shares on its segment (over 50% in specialized segments). The agrifood paper/cardboard industry market has a strong resilience (relative certainty of yield, small risk), that follows in volumes the agrifood product consumption. The market slightly decreased in volumes in 2008-2009 (-5% to -7%) due to the crisis, but should return to growth thanks to the population growth (0.5%/year). Firm B customers are wholesalers; large retailers (distribution channel well managed and with little competition); and large catering industrials.

Following the financial crisis, Firm B focused on maintaining a satisfactory level of profitability and underwent two years of activity decrease in 2008 and 2009 (-4.6%). Retailer price pressure exists but remains relatively limited, even though some competitors did several concessions over the period to maintain their volumes.

Since 2009, Firm A has undertaken a market consolidation with a focus on growth market segments and diversification thanks to external growth. In 2010, it acquired the tangible and intangible assets of a small promising packaging industrial, hence improving Firm B visibility in the industry, including at an international level. Salesmen have an active and substantial presence worldwide to defend Firm B markets. Despite decreasing results, Firm B acquires more than ever new clients and signs new contracts, developing profitable outlets. To sustain its aggressive action plan, an official growth-marketing position was created in 2010, giving Firm B new impetus. Firm A image is in the process of modernizing and this evolution creates a gap with its usual competitors.

Despite the crisis, Firm B has thus demonstrated its strength as a non-volatile asset to build portfolio long-lasting value.

## Financial Information

Similar to Case A (different values)

<b>DCF information:</b>	
WACC baseline:	Firm value 38.2 M€
Risk premium increase:	Firm value 33.4 M€
Risk premium decrease:	Firm value 44.5 M€

## Information steps

### Information 1:

Firm B implemented a policy to manage its environmental footprint.

Indicators were set up to monitor water, gas, electricity and paper consumptions and carbon emissions. A physical-chemical pre-treatment process for industrial water effluents was installed in 2000. A product waste (including toxic waste) monitoring system was also implemented. Finally, a policy of selective waste sorting and recycling is currently being installed.

Water and energy consumptions decreased in 2009 (-3%) and 2010 (-7%). 66% waster was recycled in 2010, against 55% in 2009.

### Information 2:

Firm B diversified into the ecodesign segment and now produces and commercializes products with reduced environmental footprint.

In terms of ecodesign, Firm B invested to develop products that optimize raw materials (basis weight and/or packaging thickness reductions) and decrease toxic waste (use of vegetal inks, reduction of harmful volatile organic compounds). In 2009, Firm B launched the fabrication and sale of 100% labeled FSC product mix (label of sustainable and responsible forest management, delivered by an independent NGO).

In 2010, 72% cardboard and 33% paper supplied are FSC (respectively + 24% and + 12% compared to 2009), so without additional cost. The new product targets retailers, includes 20% less materials, without affecting the product quality.

### Information 3

Firm B did not clearly formalize the organization and structure of authority delegation.

The current functional organization chart dates back to 2009 and has not been regularly updated. Authority delegation is not clearly established. No operational committee exists (management board, audit board, safety committee, sustainable development committee...) to formalize the firm strategic decisions. Audits and internal controls are not part of the corporate culture.

Most information on Firm B governance thus arises from dialog with its manager. Decision making is not participatory.

#### **Information 4**

Firm B is currently managed by Mister Z., CEO since 1991. His family founded the Firm in 1874.

Mister Z has a deep understanding on the firm's memory, background, know-how and key industrial and commercial account management. He largely supports the new Firm B growth-marketing strategy, influenced the recruitment in 2010 of Mister L. as head of the growth-marketing department, and follows its evolution.

For reasons of ill health, Mister Z. decided to retire starting from January the 1st, 2012. No successor is currently anticipated. Mister L. recently announced his resignation.

## **CASE STUDY OF FIRM C**

### **Business summary**

Firm C creates, produces and retails electronic components at the world scale. Its products are used in sensitive industries such as transport (airplanes, trains, aerospace). It currently employs 2608 workers. 2010 saw substantial increase in large contracts on new products.

Firm C is known for its important history in electronic components, with a worldwide market and production plants in Europe (4) and Asia (2) and commercial offices in Europe (4), Asia (2), the United States (2), and a network of salesmen in over 30 countries. Firm C encompasses a holding and a subsidiary company per production plant.

Due to the wide range of equipment and country-specific norms, the number of Firm C products is particularly important. Firm C markets are resilient despite a relatively low growth (about 1%/year). The competitive dynamics is in favor of Firm C, whose growth exceeds the market growth (including gains in market shares). The electronic component market for specific industries has above-average operational demands. Components indeed need to last long (above 5 years) without major machinery failure, so in demanding environments (shocks, vibrations, temperature changes...). Firm C brands benefit from a quality track record and a good image.

Firm C currently undergoes a high growth. In 2010, the firm achieved a 319.2 M€ turnover, that is +18,3% compared to 2009, with a 60,0m€ EBITDA (18,9% EBITDA margin). The 2011 budget shows a 335.2M€ turnover, that is a 5.1% increase. Productivity gains allowed by the automation of part of the production process and cost savings in the Chinese production enable a 68.0m€ EBITDA forecast (20.2% turnover).

The firm top management, mostly French, is acknowledged for its excellence. Over the past 5 years, it has been focusing on Firm C commercial growth, while keeping a tight hand on expenses. R&D efforts and upstream positioning on emerging products confirm Firm C management quality.

The growth potential of Firm C remains important considering the potential gains in world market shares. In particular, there are strong expectations on the commercialization of new products meeting the modern safety requirements of upcoming norms, which will likely lead clients to renew their demanding equipment.

### **Financial Information**

Similar to Firm A (different values)

<b>DCF information:</b>
WACC baseline: Firm value 497.8 M€

Risk premium increase:	Firm value 447.4 M€
Risk premium decrease:	Firm value 560.8 M€

## Information Steps

### Information 1

Firm C decided to implement new operational governance better involving its different subsidiaries.

A supervisory board exists since several years. It encompasses a former Firm C top manager and investors and meets every three months. At the management level, chairman and CEO are distinct posts and those managers constitute a balanced trio with the Financial Officer. Monthly meetings with managers of subsidiaries abroad are organized and formalized.

The Supervisory board members are highly satisfied by Firm C governance efficiency and their excellent relationships with the management.

### Information 2

Firm C decided to increase the formalization of the organization with its subsidiaries.

Following this decision, an organization chart was set up to clarify each subsidiary's governance. Operational committees (commercial committee; R&D; Quality; industrial Production) were created at the holding level, gathering plant managers. Meetings between subsidiaries as well as between their departments (R&D; Quality; industrial Production) were also organized and formalized.

Those structures enable Firm C to develop a more transversal and less hierarchical management, which particularly well suits its activity.

### Information 3

Firm C does not display its human resources policy as being a priority.

In terms of wages, Firm C is slightly lower than the industry average. Training programs implemented over the last four years focused on high-growth plant managers. The social dialog tensed over the last few months in two European production sites. Workers ask for a wage increase and a better management of their career in Firm C.

Employee turnover increased by + 12% between 2008 and 2010 and work stoppages increased by + 6%.

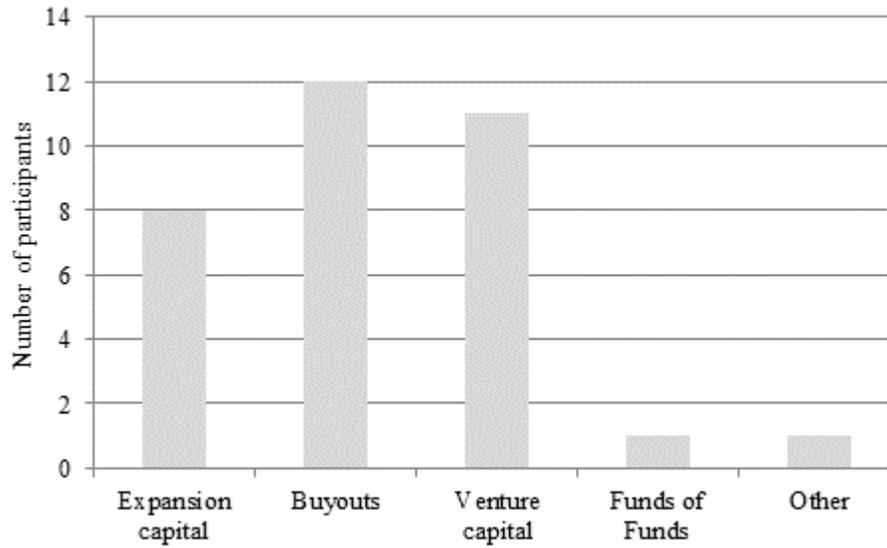
### Information 4

Firm C leaves its subsidiaries with as much freedom as possible regarding human resources management.

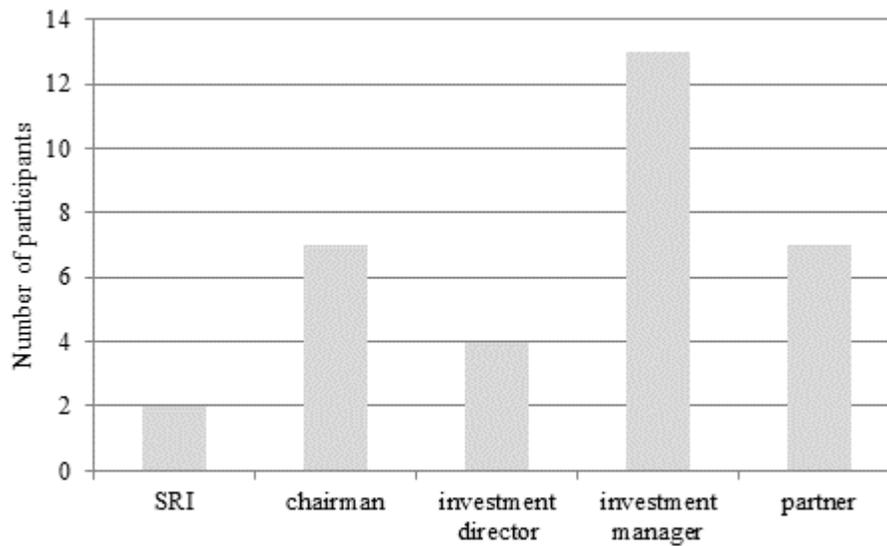
Reports of the subsidiary meetings highlight that subsidiary Z in China has implemented a human resources policy which strongly differs from the other subsidiaries. In particular, it is underlined that employees work 10 to 12 hours a day, 6 days a week and work 80 to 200 extra hours monthly (whereas the regulation limits them to 36). A two-day strike occurred last month, workers asking for a wage increase and an improvement of their working conditions.

The Southern Daily, a popular Chinese newspaper, just published its black list of the 20 worst multinational to work for in China, and Firm C appears among them.

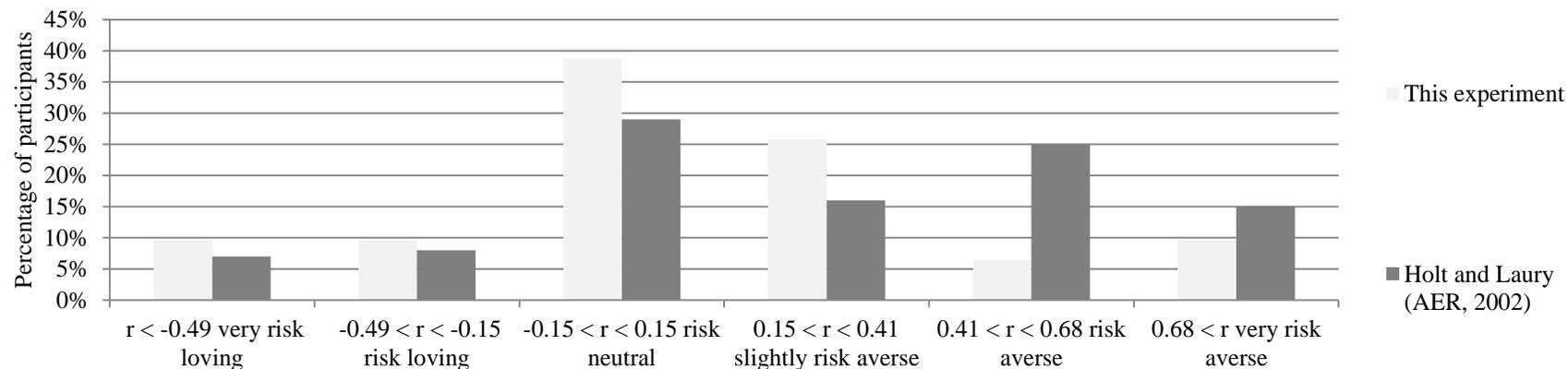
## APPENDIX B - Participants' profile



**Fig. B.1.** Distribution of participants by private equity specialty



**Fig. B.2.** Distribution of participants by position in their private equity firms



**Fig. B.3.** Distribution of the risk aversion of participants in our field experiment, compared to laboratory experiment participants

**Table B.2.**

Descriptive statistics on participants' profile (from questionnaire)

Variable (definition)	Treatment 1		Treatment 2		Treatment 3		Treatment 4		Full sample		Std. Dv.	Min	Max
	Obs	Mean											
Number of participants	110	11	70	7	90	9	60	6	330	33	-		
Age	110	43.81	70	36.86	90	36.33	60	34.67	330	38.64	9.78	24.00	57.00
Gender (=0 if man, 1 if woman)	110	0.45	70	0.29	90	0.22	60	0.00	330	0.27	0.45	0.00	1.00
ESG training (= 1 if trained, 0 otherwise)	110	0.46	70	0.43	90	0.44	60	0.67	330	0.48	0.50	0.00	1.00
Risk aversion	110	2.18	70	2.71	80	2.63	50	2.00	310	2.39	1.31	0.00	5.00
Venture capital (= 1 if specialist, 0 otherwise)	110	0.27	70	0.14	90	0.56	60	0.33	330	0.33	0.47	0.00	1.00
Expansion capital (= 1 if specialist, 0 otherwise)	110	0.09	70	0.43	90	0.44	60	0.00	330	0.24	0.43	0.00	1.00
Buyouts (= 1 if specialist, 0 otherwise)	110	0.64	70	0.57	90	0.33	60	0.50	330	0.52	0.50	0.00	1.00
SRI (= 1 if specialist, 0 otherwise)	110	0.09	70	0.00	90	0.00	60	0.17	330	0.06	0.24	0.00	1.00

## APPENDIX C - Experiment instructions<sup>12</sup>

### **The experiment**

You will successively be given two firm case studies during the experiment. For each case study, you will receive additional information as the experiment goes on. You will have to value each firm several times, as additional information is provided. You will write down your firm valuation after each new piece of information. You will undertake several valuation rounds, for each case study. You are competing against the other participants to make a deal with each of those firms. You can earn a Prize depending on your decisions and the other participants' decisions. This Prize consists in 3 bottles of Champagne.

At the end of the experiment, a valuation round will be randomly selected for each case study. For the randomly selected valuation round, the participant who will have proposed the highest value for the firm will make the deal. However, the Winner will only receive the Prize if he or she made a « good deal », that is if the firm was not paid at too high a price. You are not allowed to communicate with the other participants throughout the experiment. You must keep confidential your firm valuations for each information round.

### **What you are going to do in details**

A first case study will be handed over to you. The case study encompasses quantitative and qualitative information: business summary, business plan, firm history, balance sheet, comparable transactions, multiples and DCF. You will then value the firm for the first time and decide whether you want to invest in it or not. This is the valuation round n°1. You have 12 min to do so. A calculator is at your disposal would you need one. You will write down your firm valuation and investment decision on the valuation sheet (that we will shortly give you). We will then pick up your valuation sheet.

A new piece of qualitative information (valuation round n°2) will be given to you. You can then choose either to change your first valuation and investment decision, or to keep to your first decisions. You can choose not to invest in the firm, but you still need to write down your valuation. You have 4 min to take those decisions. Three new pieces of qualitative information (valuation rounds n°3, n°4 and n°5) will successively be given to you in the same way. You will proceed for valuation rounds n°3, n°4 and n°5 as for valuation round n°2. For each case study, you will be thus asked five firm valuations.

Once the first case study is completed by all, the second case study will be handed over to you, following the same rules. Once both case studies are completed, you will have to fill up a questionnaire. Finally, we will discover who the Winners are.

### **Results and Winners:**

One Winner is identified for each case study. Thus there will be two Winners in this experiment. For each case study, a valuation round (n°1; n°2, n°3, n°4 or n°5) is randomly selected using a dice at the end of the experiment. The selected round will be used to identify who is the Winner for each case study. The Winner for each case study is the one who « made the deal » with the firm at the randomly selected valuation round. It is the participant who proposed the highest firm valuation and decided to invest in the firm at the selected round. The Winner will be known to all.

The Winner only gets the Prize (3 bottles of Champagne worth about 120€) if he or she « made a good deal », that is if he or she did not pay too high a price for the firm. If he or she paid too much for the firm (that is « made a bad deal »), then he or she loses the Prize. Whether the firm has been paid too much for or not is decided by the market consensus. The market consensus on the firm valuation is given by the median of all firm valuations proposed by participants (for this case study, at this selected round). If the Winner paid the firm more than 10% above the market consensus, the Prize is lost. If the Winner paid the firm less than 10% above the market consensus, the Prize is won. Whether the Winner keeps or loses the Prize is known to all.

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<sup>12</sup> Translated from French. Original French version available upon request.

If there are several Winners for a given case study (ex aequo), a draw will be used to identify who keeps the Prize. You have a few minutes to read those instructions again. Please let us know would you have any question; we will privately answer them. When all participants will be ready, we will start the experiment.

## APPENDIX D - Post-experimental questionnaire

### 1. Do you agree with the following assertions?

a. The study cases were very clear.

strongly agree  agree  neutral  disagree  strongly disagree

b. The study cases were comprehensive enough to give a valuation of the firm.

strongly agree  agree  neutral  disagree  strongly disagree

### 2. For case A, do you agree with the following assertions?

a. You chose your valuation of the firm depending on your own judgment.

strongly agree  agree  neutral  disagree  strongly disagree

b. You chose your valuation of the firm depending on your anticipations on other participants' judgment.

strongly agree  agree  neutral  disagree  strongly disagree

### 3. For case B, do you agree with the following assertions?

a. You chose your valuation of the firm depending on your own judgment.

strongly agree  agree  neutral  disagree  strongly disagree

b. You chose your valuation of the firm depending on your anticipations on other participants' judgment.

strongly agree  agree  neutral  disagree  strongly disagree

### 4. Please indicate the following information:

a. Your age: \_\_\_\_\_

b. Your gender: \_\_\_\_\_

c. Your company: \_\_\_\_\_

d. Your function in this company: \_\_\_\_\_

e. Your specialization (VC, LBO...): \_\_\_\_\_

**ESG criteria are criteria that are used to evaluate how a firm takes into account environmental, social and governance impacts in its financial management.**

### 5. Did you receive training in your company about integration of ESG criteria into?

a. your target analysis?

yes  no

b. your due diligence contract?

yes  no

c. your portfolio management?

yes  no

### 6. Does your company have an ESG charter?

yes  no

### 7. Would you say that the integration of ESG criteria is important for:

a. LPs (Limited Partners) of your company?

strongly agree  agree  neutral  disagree  strongly disagree

b. stockholders of your company?

strongly agree  agree  neutral  disagree  strongly disagree

c. image of your company?

strongly agree  agree  neutral  disagree  strongly disagree

d. risk management of your company?

strongly agree  agree  neutral  disagree  strongly disagree

### 8. In your job, negative news:

a. about environmental practices has already led you to:

decrease the valuation of a target firm

- refuse to invest in a firm
- negative news about environmental practices of firms has no impact on our decisions

b. about social practices has already led you to:

- decrease the valuation of a target firm
- refuse to invest in a firm
- negative news about social practices of firms has no impact on our decisions

c. about governance practices has already led you to:

- decrease the valuation of a target firm
- refuse to invest in a firm
- negative news about governance practices of firms has no impact on our decisions

**9. In your job, positive news:**

a. about environmental practices has already led you to:

- increase the valuation of a target firm
- accept to invest in a firm
- positive news about environmental practices of firms has no impact on our decisions

b. about social practices has already led you to:

- increase the valuation of a target firm
- accept to invest in a firm
- positive news about social practices of firms has no impact on our decisions

c. about governance practices has already led you to:

- increase the valuation of a target firm
- accept to invest in a firm
- positive news about governance practices of firms has no impact on our decisions

**10. Please indicate for each decision if you choose option a of option b by ticking the corresponding box.**

	<b>Your decision</b>
<b>Decision 1</b> Option a: 3 chances over 10 to win 2 € and 7 chances over 10 to win 1.6 € Option b: 3 chances over 10 to win 3.85 € and 7 chances over 10 to win 0.1 €	Option a <input type="checkbox"/> Option b <input type="checkbox"/>
<b>Decision 2</b> Option a: 4 chances over 10 to win 2 € and 6 chances over 10 to win 1.6 € Option b: 4 chances over 10 to win 3.85 € and 6 chances over 10 to win 0.1 €	Option a <input type="checkbox"/> Option b <input type="checkbox"/>
<b>Decision 3</b> Option a: 5 chances over 10 to win 2 € and 5 chances over 10 to win 1.6 € Option b: 5 chances over 10 to win 3.85 € and 5 chances over 10 to win 0.1 €	Option a <input type="checkbox"/> Option b <input type="checkbox"/>
<b>Decision 4</b> Option a: 6 chances over 10 to win 2 € and 4 chances over 10 to win 1.6 € Option b: 6 chances over 10 to win 3.85 € and 4 chances over 10 to win 0.1 €	Option a <input type="checkbox"/> Option b <input type="checkbox"/>
<b>Decision 5</b> Option a: 7 chances over 10 to win 2 € and 3 chances over 10 to win 1.6 € Option b: 7 chances over 10 to win 3.85 € and 3 chances over 10 to win 0.1 €	Option a <input type="checkbox"/> Option b <input type="checkbox"/>

APPENDIX E -Descriptive statistics and robustness checks

**Table E.1.**

Detailed descriptive statistics on experimental results by treatment

Number	Treatment			Obs.	Valuation	Change in valuation			Investment decision	Change in investment decision			
	Firm	Factor	Sign		Mean (M€)	Mean (%)	Std. Er.	Min.	Max.	Mean (%)	Mean (%)		
<b>1</b>	<b>A</b>	<b>Base</b>		11	<b>166.82</b>					<b>90.91</b>			
		Social	+	11	169.82	1.92	2.99	0.00	8.55	90.91	0.00		
		Social	++	11	171.91	1.20	1.43	0.00	3.13	90.91	0.00		
		Env.	-	11	166.27	-3.28	6.24	-20.24	3.13	90.91	0.00		
		Env.	--	11	153.50	-7.26	8.74	-27.78	0.00	36.36	-54.55		
	<b>B</b>	<b>Base</b>		11	<b>38.06</b>					<b>63.64</b>			
		Env.	+	11	39.18	3.08	3.85	0.00	11.11	63.64	0.00		
		Env.	++	11	40.01	2.17	3.98	0.00	13.51	90.91	27.27		
Gov.		-	11	38.48	-3.88	6.56	-21.05	0.00	63.64	-27.27			
	Gov.	--	11	36.42	-5.82	5.76	-16.29	0.00	36.36	-27.27			
<b>2</b>	<b>C</b>	<b>Base</b>		7	<b>458.29</b>					<b>85.71</b>			
		Gov.	+	7	460.00	0.34	0.73	0.00	1.96	85.71	0.00		
		Gov.	++	7	459.71	-0.09	1.00	-2.17	0.00	100.00	14.29		
		Social	-	7	453.00	-1.32	1.54	-4.00	0.00	71.43	-28.57		
		Social	--	7	432.14	-4.12	6.76	-18.60	0.00	28.57	-42.86		
	<b>A</b>	<b>Base</b>		7	<b>133.71</b>					<b>71.43</b>			
		Social	+	7	135.14	0.96	1.32	0.00	3.03	71.43	0.00		
		Social	++	7	138.14	2.51	3.62	0.00	10.00	71.43	0.00		
		Env.	-	7	137.00	-0.75	1.29	-2.89	0.00	71.43	0.00		
		Env.	--	7	129.00	-6.68	7.02	-16.67	0.00	57.14	-14.29		
		<b>3</b>	<b>B</b>	<b>Base</b>		9	<b>40.68</b>					<b>77.78</b>	
				Env.	+	9	40.84	0.38	0.95	0.00	2.86	77.78	0.00
Env.	++			9	43.44	5.90	5.95	0.00	16.00	77.78	0.00		
Gov.	-			9	40.19	-8.15	4.70	-16.67	-2.10	66.67	-11.11		
Gov.	--			9	36.41	-9.60	8.56	-23.81	0.00	44.44	-22.22		
<b>C</b>	<b>Base</b>			9	<b>558.78</b>					<b>100.00</b>			
	Gov.		+	9	571.56	2.27	3.61	0.00	8.40	100.00	0.00		
	Gov.		++	9	578.83	1.14	3.09	0.00	9.38	100.00	0.00		
	Social	-	9	551.11	-4.26	8.03	-17.14	11.27	100.00	0.00			

		Social	--	9	495.00	-10.92	11.42	-38.20	0.00	66.67	-33.33
<b>4</b>	<b>A</b>	<b>Base</b>		6	<b>145.33</b>					<b>50.00</b>	
		Env.	-	6	135.33	-6.54	9.04	-23.08	0.00	50.00	0.00
		Env.	--	6	116.67	-11.21	11.72	-31.82	0.00	50.00	0.00
		Social	+	6	131.67	11.17	18.55	0.00	46.67	33.33	-16.67
		Social	++	6	132.5	0.79	1.94	0.00	4.76	33.33	0.00
	<b>B</b>	<b>Base</b>		6	<b>33.17</b>					<b>50.00</b>	
		Gov.	-	6	30.83	-5.79	9.18	-20.45	0.00	50.00	0.00
		Gov.	--	6	25.00	-18.56	10.74	-28.57	0.00	66.67	16.67
		Env.	+	6	25.33	1.11	2.72	0.00	6.67	66.67	0.00
		Env.	++	6	25.67	1.04	2.55	0.00	6.25	66.67	0.00

**TABLE E.2.**Effects of corporate sustainable and unsustainable policies on the change in firm valuation – robustness check <sup>a</sup>

	Model 1 <sup>b</sup>		Model 1' <sup>d</sup>		Model 2 <sup>c</sup>		Model 2' <sup>d</sup>	
Pos. x Env (global)	4.88	*** (1.79)	5.09	*** (1.89)				
Neg x Env (global)	-11.16	*** (1.86)	-11.12	*** (1.97)				
Pos x Soc (global)	5.36	*** (1.85)	5.40	*** (1.96)				
Neg x Soc (global)	-10.24	*** (2.18)	-10.65	*** (2.33)				
Pos x Gov (global)	2.26	(2.18)	1.85	(2.33)				
Neg x Gov (global)	-15.32	*** (1.79)	-15.12	*** (1.89)				
Pos x Env x soft					1.73	(1.40)	1.89	(1.43)
Pos x Env x hard					3.25	** (1.40)	3.40	** (1.43)
Neg x Env x soft					-3.51	** (1.44)	-3.53	** (1.48)
Neg x Env x hard					-8.24	*** (1.44)	-8.25	*** (1.48)
Pos x Soc x soft					3.79	*** (1.44)	3.78	** (1.48)
Pos x Soc x hard					1.33	(1.44)	1.32	(1.48)
Neg x Soc x soft					-2.81	* (1.69)	-3.04	* (1.75)
Neg x Soc x hard					-7.78	*** (1.69)	-8.01	*** (1.75)
Pos x Gov x soft					1.59	(1.69)	1.36	(1.75)
Pos x Gov x hard					0.77	(1.69)	0.54	(1.75)
Neg x Gov x soft					-5.75	*** (1.40)	-5.60	*** (1.43)
Neg x Gov x hard					-10.02	*** (1.40)	-9.87	*** (1.43)
Case study order	0.65	(1.13)	0.71	(1.18)	-0.13	(0.69)	-0.13	(0.71)
Internet session	-1.16	(1.65)			-0.67	(1.00)		
Investor age	0.10	(0.06)			0.06	* (0.04)		
Investor gender	1.87	(1.32)			1.20	(0.80)		
Venture capital	-1.75	(2.17)			-1.24	(1.31)		
Buyout	-1.14	(1.86)			-0.83	(1.12)		
Expansion capital	-2.49	(1.80)			-1.64	** (1.08)		
SRI	-3.98	(3.24)			-3.04	(1.95)		
ESG training	-0.14	(1.15)			-0.03	(0.69)		
Obs.	198		198		330		330	
Nb. investors	33		33		33		33	
Wald chi2	191.84	***			188.77	***		
F-test			23.83	***			12.96	***
R <sup>2</sup> (within)	0.51		0.51		0.37		0.37	

<sup>a</sup> Model 1 and 1' use the change in firm valuation (%) between rounds 1, 3 and 5. Model 2 and 2' use all rounds. Corporate policy effects are decomposed into factor (Env., Social or Gov.), sign (Positive or Negative) and quality (soft or hard) and crossed effects are estimated. \* p-value < 10%; \*\* p-value < 5%; \*\*\* p-value < 1

<sup>b</sup> Model 1 is a GLS model with random effects. Global effects (soft and hard practices cumulated) are estimated.

<sup>c</sup> Model 2 is a GLS model with random effects. Effects of hard and soft practices are distinguished.

<sup>d</sup> Model 1' and 2' are panel regression models with fixed effects.

**Table E.3.**Effects of corporate sustainability policies on investment decision – robustness check <sup>a</sup>

	Model 3 <sup>b</sup>				Model 3' <sup>d</sup>	
	Estimates		Predictive margins <sup>c</sup>		Estimates	
Pos x Env x soft	-0.80	(0.73)	0.71	***	(0.11)	-0.84 (0.74)
Pos x Env x hard	0.43	(0.83)	0.86	***	(0.08)	0.45 (0.89)
Neg x Env x soft	0.37	(0.80)	0.85	***	(0.09)	0.49 (0.86)
Neg x Env x hard	-2.08 ***	(0.72)	0.49	***	(0.13)	-2.05 *** (0.71)
Pos x Soc x soft	-0.06	(0.77)	0.81	***	(0.08)	0.00 (0.81)
Pos x Soc x hard	-0.09	(0.77)	0.80	***	(0.10)	-0.03 (0.81)
Neg x Soc x soft	0.93	(1.05)	0.90	***	(0.08)	0.92 (1.08)
Neg x Soc x hard	-2.44 ***	(0.84)	0.43	***	(0.15)	-2.28 *** (0.80)
Pos x Gov x soft	2.03	(1.31)	0.96	***	(0.05)	1.96 (1.27)
Pos x Gov x hard <sup>e</sup>	22.91	(26832.8)	1.00	***	(0.00)	16.35 (1184.48)
Neg x Gov x soft	-1.44 **	(0.71)	0.60	***	(0.12)	-1.49 ** (0.72)
Neg x Gov x hard	-2.58 ***	(0.72)	0.40	***	(0.12)	-2.52 *** (0.70)
Case study order	0.42	(0.39)				0.42 * (0.38)
internet session	-2.38 *	(1.28)				
investor age	-0.01	(0.05)				
investor gender	-1.14	(1.03)				
venture capital	-1.61	(1.63)				
buyout	-2.99 **	(1.42)				
expansion capital	-1.86	(1.38)				
SRI	-3.35	(2.39)				
ESG training	0.58	(0.89)				
risk aversion	-0.24	(0.47)				
Obs.	330					240
Nb. investors	33					24
Wald chi2	35.83 **					
LR chi2						53.91 ***
log_likelihood	-128.98					-62.64

<sup>a</sup> Effects of corporate policies on the investment decision (0 = don't invest; 1 = invest) depending on their Factor (Env., Social or Gov.), Sign (Positive or Negative) and Quality (soft or hard), estimated as crossed effects.

<sup>b</sup> Model 3 is a random effects logistic regression.

<sup>c</sup> Predictive margins are the predicted probability of deciding to invest knowing the Factor, Sign and Quality, assuming the random effect is zero (i.e. that it is an average investor).

<sup>d</sup> Model 3' is a fixed effects logistic regression. 9 investors had all positive (invest) or null (don't invest) outcome and were dropped from the sample.

<sup>e</sup> All observations = 1 when Factor = Governance, Sign = Positive and Quality = Hard

\* p-value < 10%; \*\* p-value < 5%; \*\*\* p-value < 1