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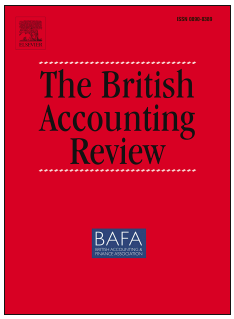

The valuation relevance of environmental performance revisited: The moderating role of environmental provisions

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Abstract

This study attempts to broaden our understanding of the value relevance of environmental performance by providing empirical evidence on the moderating role of financial environmental reporting. Previous studies find that firms' environmental performance can be both positively and negatively associated with market value. Such contradictory findings can be attributed to the fact that environmental performance is associated with future economic benefits and costs. This study suggests that firms with recognized environmental provisions on their balance sheets enable investors to disentangle these opposite effects either by signaling strong future financial performance or by enhancing the reliability of environmental performance information. Regardless of the mechanism by which this moderation effect is invoked, it is hypothesized that capital market participants place a positive and significantly higher value on the environmental performance ratings of firms with recognized environmental provisions than on the ratings of firms without environmental provisions. Utilizing a sample of 692 firm-year observations of French listed firms and employing a linear price-level model that associates the market value of a firm's equity with its environmental performance, I provide empirical evidence to corroborate this thesis. In addition to contributing to the academic debate on the market valuation implications of environmental performance, this study intends to provide useful insights from a country that can be considered a pioneer of environmental reporting legislation; hence, it provides valuable lessons for other jurisdictions that are in the process of developing their sustainability reporting regulations. Finally, the findings of this study support the calls for more integrated reporting showing that the interaction of financial and non-financial information has market valuation implications.

Keywords: Environmental performance; Environmental provisions; Value relevance; France; Mandatory disclosures

1. Introduction

Although a substantial number of studies have examined the relation between listed firms' market value and environmental performance, the results to date are inconclusive. Studies such as Johnston, Sefcik, and Soderstrom (2008), Kaspereit and Lopatta (2016) and Middleton (2015) find a positive association between market value and environmental performance, whereas Moneva and Cuellar (2009), Hassel, Nilsson, and Nyquist (2005) and Johnston (2005) find a negative one. The mixed results of previous studies can be attributed to the fact that superior environmental performance is associated with both economic

benefits (Albertini, 2014; Koh, Qian, & Wang, 2014) and costs (Hassel et al., 2005; Jensen, 2001; Kitzmueller & Shimshack, 2012), and consequently, investors may face difficulties in disentangling these opposite effects of environmental performance. In a recent article in the *Wall Street Journal*, Alex Edmans argues that "*…investors have a particularly hard time valuing it* [A/N: firms' corporate social responsibility performance]*. How do you measure the value of a company's environmental stewardship? As a result, traditional investors mostly ignore companies' social responsibility. They only catch on when its effects show up on the bottom line, for everyone to see*" (Edmans & Vogel, 2016). The above observation not only confirms the contradictory empirical evidence of previous studies but also emphasizes the usefulness of quantifying firms' environmental performance for valuation purposes in pecuniary terms.

This study intends to broaden our understanding of this issue by focusing on the role of financial environmental reporting on the market valuation of environmental performance. The importance of measuring firms' environmental impact in financial terms has been recently acknowledged not only by academics (for instance, Peloza, 2009) but also by practitioners and policy makers. In early 2016, the Financial Stability Board[1] established the Task Force on Climate-related Financial Disclosures (TCFD) with the aim of developing climate-related disclosures of a financial nature in order to encourage firms to align their disclosures with investors' needs. In its final report of recommendations, TCFD emphasizes the importance of climate-related financial disclosures for investors and recommends that these disclosures be included in firms' mainstream financial fillings (TCFD, 2017). Further, in 2013, the Framework of the International Integrated Reporting Council (IIRC, 2013) was released. The Framework argues that the integration of financial and non-financial

[1] The Financial Stability Board (FSB) is an international body that monitors and makes recommendations about the global financial system. The Board includes all G20 major economies and the European Commission. More information about FSB can be found at http://www.fsb.org/

information supports investors' decision making and recognizes that financial information is the point of reference to which the other information shall be related (IIRC, 2013).

My study posits that environmental reporting of financial nature – specifically environmental provisions – play a moderating role in the relationship between firms' environmental performance and market value either by signaling strong future financial performance (Beaver, Eger, Ryan, & Wolfson, 1989; Lys, Naughton, & Wang, 2015; Wahlen, 1994) or by enhancing the reliability of environmental performance information (Bae & Sami, 2005; Campbell, Sefcik, & Soderstrom, 2003; Kennedy, Mitchell, & Sefcik, 1998). Regardless of the mechanism by which this moderation effect is invoked, my study suggests and empirically examines whether capital market participants place a positive and significantly higher value on the environmental performance ratings of firms with recognized environmental provisions than on the ratings of firms without environmental provisions. To do so, I utilize a sample of French listed firms for the ten-year period from 2005 to 2014 and employ a linear price-level model based on Ohlson's (1995) valuation framework. This model associates a firm's market value with its accounting information and 'other information', which, similar to previous studies (for instance, Hassel et al., 2005; Middleton, 2015), is proxied by firms' environmental performance ratings. My study provides evidence that although the mean effect of environmental performance ratings on market value is negative, investors positively value the environmental performance of firms with environmental provisions recognized on their balance sheets.

France is chosen as the empirical setting of this study for a number of reasons. France has been at the forefront of sustainability reporting since the 1970s, when the French President mandated all firms with more than 300 employees publish a report on their social performance (Wensen, Broer, Klein, & Knopf, 2011). In 2001, extensive mandatory sustainability reporting legislation was introduced. According to the then-new legislation, all listed firms were required to disclose nearly 60 indicators of sustainability activities in their

annual reports. Half of these indicators were related to environmental performance (Albertini, 2014). Amendments to this legislation were enacted in 2009 and 2010 with the Grenelle I and Grenelle II Acts, respectively, and took effect at the end of 2013 (KPMG, Centre for Corporate Governance in Africa, Global Reporting Initiative & United Nations Environment Programme, 2013). Its long history in mandatory sustainability reporting makes France the first country in the world in which such disclosures were mandated (Levy & Brown, 2012; Wensen et al., 2011). Even more importantly, France has one of the highest rankings among countries worldwide in terms of the number of firms that engage in sustainability reporting (KPMG, 2011, 2013, 2015).

Moreover, France is an interesting laboratory for examining the valuation relevance of environmental performance in light of the recent developments in sustainability reporting in the European Union (EU) and its *Non-Financial Reporting Directive* 2014/95/EU (European Parliament and Council, 2014). According to the new Directive all large firms in the EU are required to provide information on their development, performance, position and impact of their activity on a number of matters; environmental ones included. This regulation has been effective since the beginning of 2017. Because French firms have had to comply with an extensive sustainability reporting regulatory framework much earlier than most of its European counterparts, "*France is now a global leader in mandatory climate change related reporting and provides a model for other countries … It will be interesting to watch the influence of these initiatives over the coming year as more countries start to build climate disclosure into existing regulatory frameworks*" (Asset Owners Disclosure Project [AODP], 2017, p. 24). Finally, the focus on a setting in which environmental disclosures have been mandated since 2001 ensures a high degree of uniformity in firms' reporting practices because firms must disclose both positive and negative aspects of their operations. Consequently, it can be expected that the market valuation of environmental performance is less distorted by differences in reporting incentives (Moneva & Cuellar, 2009).

This study contributes to the academic debate on the market valuation implications of environmental performance (Hassel et al., 2005; Johnston et al., 2008; Kaspereit & Lopatta, 2016; Middleton, 2015; Moneva & Cuellar, 2009) and specifically addresses calls for research on variables that may have a moderating effect on the CSR performance – firm value relation (Servaes & Tamayo, 2013). Although prior studies have shown that environmental liabilities are negatively related to firms' market valuation (Barth & McNichols, 1994; Bewley, 2005) this study is the first to provide evidence on the moderating role of environmental liabilities. Further, the corporate world is moving towards more extensive mandatory disclosures on sustainability reporting (for instance, the EU *Non-Financial Reporting Directive*). My study provides useful insights from a country that can be seen as a pioneer of environmental reporting legislation, and hence, it provides valuable experience for other jurisdictions that are in the process of developing their sustainability reporting regulations. Finally, the findings of my study support calls for more integrated reporting, showing that the interaction of financial and non-financial information has market valuation implications.

The rest of this study is organized as follows. Section 2 reviews the prior literature and develops the sole hypothesis of the study. Section 3 illustrates the research design and the sample. Section 4 describes the basic univariate and multivariate analysis. Section 5 reports a battery of additional tests. Finally, Section 6 discusses the findings and draws conclusions.

2. Literature review and hypothesis development

The market valuation of environmental performance has recently attracted a great deal of attention in the accounting literature. Although these studies acknowledge that environmental performance complements financial reporting for valuation purposes, they do not agree on the direction of this relationship. Whereas studies such as Johnston et al. (2008), Kaspereit and Lopatta (2016) and Middleton (2015) find that capital market participants positively value different proxies of environmental performance (such as listing status in

sustainability indices, the magnitude of environmental performance metrics and emissions allowances held), studies such as Moneva and Cuellar (2009), Hassel et al. (2005) and Johnston (2005) find a negative association between market value and firms' environmental performance proxies (such as expenditures on environmental activities and the magnitude of environmental performance metrics) .

The mixed results of prior studies can be attributed to the fact that environmental performance is associated with economic benefits and costs. On one hand, firms that are found to perform well in terms of environmental issues can increase their competitive advantage (Albertini, 2014) and decrease their litigation risk (Koh et al., 2014), resulting in increased future cash flows and, thus, increased current market values. On the other hand, in their literature review, Kitzmueller and Shimshack (2012) conclude that social and environmental performance cannot be strongly associated either to higher profitability or to lower costs. Hassel et al. (2005) argue that strong environmental performance is related to increased costs and consequently to lower earnings and market values, and Jensen (2001) conjectures that a firm's leadership in environmental or social issues can be interpreted by investors as managers' intention to use a firm's resources for their own interest (e.g., for building up their own reputation) and hence at the expense of shareholder value. Thus, the contradictory evidence from prior studies can be attributed to the difficulties faced by investors in disentangling future economic benefits and costs related to a firm's environmental performance.

According to Servaes and Tamayo (2013), in order "…*to fully understand under which circumstances CSR* [A/N corporate social responsibility and hence environmental] *activities enhance firm value, we need to focus on the moderating effects of other variables on the CSR–firm value relation*" (Servaes & Tamayo, 2013 p. 1059). My study posits that environmental provisions recognized in a firm's balance sheet can play such a moderating role.

According to the International Accounting Standard 37 (IAS 37) *Provisions, Contingent Liabilities and Contingent Assets*[2], a provision is a liability of an uncertain timing and/or amount. It is acknowledged that IAS 37 gives considerable discretion to a firm's management of both the timing of recognition and the measurement of provisions (Schneider, 2011; Schneider, Michelon, & Maier, 2017). Further, as Schneider et al. (2017) note, unlike other financial liabilities, the economic effect of environmental provisions may hold even longer than the life of the firm that bears them. Environmental liabilities are associated with a firm's assets in such a manner that even in case of a firm's default, they remain connected to the assets reducing their future net cash flows (Schneider et al., 2017). This particular attribute of environmental provisions may discourage firms from recognizing such provisions when they have the discretion not to do so (Schneider et al., 2017) unless these firms are confident in their future financial strength (Beaver et al., 1989; Lys et al., 2015; Wahlen, 1994).

Previous studies on bank loan loss provisions have shown that the recognition of provisions can be interpreted by investors as a signal of management's private information about firms' strong future financial performance (Beaver et al., 1989; Wahlen, 1994). As Beaver et al. (1989) argue, "*…management perceives the earnings power…to be sufficiently strong that it can withstand a 'hit to earnings'*" (Beaver et al., 1989, p. 169). More recently, Lys et al. (2015) show that expenditures related to CSR activities does not have a direct causal effect on firms' financial performance. This association does exist, but according to Lys et al. (2015), exceeding CSR expenditures is not found to create positive future cash flows but rather to play a signaling role regarding firms' strong future financial performance. In other words, Lys et al. (2015) argue that firms will not undertake such a cost if they are not confident in their future financial strength. Hence, it is reasonable to expect that investors will

[2] Specific reference to IAS 37 is made because my empirical setting focuses on a sample of firms that are mandated to apply International Financial Reporting Standards and hence IAS 37.

place a positive and significantly higher value on the environmental performance of firms that quantify their environmental impact in pecuniary terms compared to firms that do not do so.

In addition to their potential signaling role, environmental provisions may also enhance the reliability of information about a firm's environmental performance. Bae and Sami (2005) show that the reliability of a firm's reporting is dependent on the presence of unbooked environmental liabilities, among other factors. Unbooked environmental liabilities add noise to a firm's reported information and hence make it more difficult to estimate its future cash flows (Bae & Sami, 2005). In addition, it has been found that the disclosure of some form of financial information about a firm's contingent environmental liabilities strengthens investors' consensus on the amount of future cash outflows to be incurred (Kennedy et al., 1998). Finally, Campbell et al. (2003) argue that a firm's financial reporting may convey private information that has a moderating effect on the relation between unbooked environmental liabilities and market value. Specifically, they show that accounting information may reduce the uncertainty over a firm's unbooked environmental liabilities and hence increase their market valuation (Campbell, et al., 2003). Based on previous studies about the market valuation implications of unbooked environmental liabilities and following Benlemlih, Shaukat, Qiu, and Trojanowski (2016), it can be argued that the recognition of environmental provisions may enhance the reliability and thus the market valuation of environmental performance.

In summary, it can be argued that recognized environmental provisions play a moderating role in the relation between environmental performance and market value either by signaling strong future financial performance or by enhancing the reliability of environmental performance information. Regardless of the mechanism by which this moderation effect is invoked, it can be hypothesized that capital market participants place a positive and significantly higher value on the environmental performance ratings of firms with recognized

environmental provisions than on the ratings of firms without environmental provisions. Hence, this study tests the following hypothesis:

Hypothesis: *The market valuation of environmental performance is positive and significantly higher for firms with recognized environmental provisions on their balance sheets than for firms without.*

3. Research design

3.1 Main analysis

This study aims to examine whether market participants value the environmental performance ratings of French listed firms with recognized environmental provisions differently than the performance ratings of French listed firms without recognized environmental provisions. Following previous studies on the value relevance of environmental performance (for instance, Hassel et al., 2005; Lourenço, Branco, Curto, & Eugénio, 2012), a linear price-level model that associates a firm's market value of equity (MVE) with its book value of equity (BVE) and earnings (EARN) is employed:

$$MVE_{it} = \alpha_0 + \alpha_1 BVE_{it} + \alpha_2 EARN_{it} + \varepsilon_{it}$$

To address problems with heteroskedasticity and size effects, variables are deflated by the number of common shares outstanding six months after the end of the firm's fiscal year (Dimitropoulos, Asteriou, Kousenidis, & Leventis, 2013; Lang, Raedy, & Wilson, 2006). According to Barth and Clinch (2009), the above model on a per-share basis produces more consistent and less biased estimations of coefficients' p-values[3]:

[3] All the variables, their definitions, and the sources from which the data are extracted are presented in Appendix A.

$$PR_{it} = \alpha_0 + \alpha_1 BVS_{it} + \alpha_2 EPS_{it} + \varepsilon_{it}$$

The above model is augmented by the variable ENVPERF, which is the total score of the Environmental Performance Pillar of the Thomson Reuters ASSET4 database. The ASSET4 database collects information for up to 500 specific points related to a firm's sustainability practices. Based on these data points, more than 180 key performance indicators are calculated and structured into 15 categories that fall into three pillars (environmental, social, and governance). All the information used is publicly available and quality controlled by experienced analysts (Thomson Reuters, 2015). The Environmental Performance Pillar measures a firm's impact on the environment by evaluating how well the firm avoids environmental risks and capitalizes on environmental opportunities on a percentage scale. A relatively higher score indicates a better environmental performance.

Additionally, prior literature has shown that earnings of loss-making firms are valued differently than earnings of profit-making firms. Specifically, Collins Pincus, and Xie (1999) employ a model similar to my model and show that the earnings coefficient of profit-making firms is significantly larger than that of loss-making firms. More recently, Venter, Emanuel, and Cahan (2014) find that the earnings of profit-making firms are positively associated with market prices, whereas the price-earnings relation of loss-making firms is not statistically significant. Hence, in order to control for differences in the earnings coefficients of loss- and profit-making firms, the binary variable LOSS, which equals one if earnings are negative and zero otherwise, is included in the model and further allowed to interact with EPS (Coulmont & Berthelot, 2015; Xu, Magnan, & Andre, 2007).

Since the analysis is based on firms that belong to different industries and spans several years, the multiple dummy variables IND and YR that control for industry and year fixed effects, respectively, are also included in the model (Matsumura, Prakash, & Vera-Muñoz,

2014). IND is derived from nine out of the ten industries[4] of the Industry Classification Benchmark (ICB), whereas YR is derived from the ten years (i.e., 2005-2014) included in the analysis. Thus, the final form of the model is as follows:

$$PR_{it} = \alpha_0 + \alpha_1 BVS_{it} + \alpha_2 EPS_{it} + \alpha_3 LOSS_{it} + \alpha_4 (LOSS_{it} \times EPS_{it}) + \alpha_5 ENVPERF_{it} + \sum_{j=1}^{J=9} \alpha_{6j} IND_{it} + \sum_{y=2005}^{y=2014} \alpha_{7y} YR_{it} + \varepsilon_{it} \quad (1)$$

The focus of Model 1 is on coefficient α_3, which reflects the market valuation of environmental performance. If the coefficient α_3 is found to be significantly different from zero, it can be postulated that environmental performance is value relevant. Because the variable ENVPERF is measured on a percentage basis in which higher ratings indicate better performance, a positive and statistically significant coefficient indicates that investors view high ratings of environmental performance as reflecting future economic benefits, whereas a negative and statistically significant coefficient indicates future economic costs. However, if the coefficient α_3 is not found to be statistically significant, then it can be claimed that on average, either capital market participants do not find any benefits/costs related to French listed firms' environmental performance rating or the benefits and costs 'cancel' each other out, and thus, the resulting coefficient is not different from zero.

To test the hypothesis of this study, Model 1 discussed above is employed by pooling observations from the entire sample (as described in the next section) and introducing the indicator variable ENVPROVD, which equals one if a firm has recognized environmental provisions on its balance sheet and zero otherwise. To investigate whether there is a systematic difference in the valuation of ENVPERF between firms with and without recognized environmental provisions, I allow the ENVPROVD variable to interact with ENVPERF. The final model for testing my main hypothesis is as follows:

[4] As discussed in section 3.2, firms that belong to the Financials ICB industry are excluded from the sample.

$$PR_{it} = \alpha_0 + \alpha_1 BVS_{it} + \alpha_2 EPS_{it} + \alpha_3 LOSS_{it} + \alpha_4 (LOSS_{it} \times EPS_{it}) + \alpha_5 ENVPERF_{it} + \alpha_6 ENVPROVD_{it} + \alpha_7 (ENVPERF_{it} \times ENVPROVD_{it}) + \sum_{j=1}^{J=9} \alpha_{8j} IND_{it} + \sum_{y=2005}^{y=2014} \alpha_{9y} YR_{it} + \varepsilon_{it} \quad \textbf{(2)}$$

The focus of Model 2 is the coefficient α_7: If this coefficient is found to be positive and significantly different from zero, it can be postulated that the environmental performance ratings of firms with recognized environmental provisions on their balance sheets are valued higher than firms without these provisions. If the coefficient is not found to be significantly different from zero, then it can be concluded that the recognition of environmental provisions has no effect on the market valuation of environmental performance ratings. Finally, in all estimations standard errors are two-way clustered (by firm and year)[5].

Finally, with respect to the data sources utilized in this study, all accounting and market data are retrieved from the Thomson Reuters Datastream, whereas environmental data are retrieved from the Thomson Reuters ASSET4 database. Details about data sources are given in the Appendix.

3.2 Sample

The sample is based on French listed firms with available data on environmental performance and environmental provisions in the Thomson Reuters ASSET4 database for the

[5] Clustering on two dimensions was chosen over a fixed effects approach for a number of reasons. First, employing fixed firm effects assumes that these effects are indeed fixed throughout time. However, this assumption does not always hold empirically, and it is not always possible to identify whether firm effects are permanent or temporary (Petersen, 2009). According to Petersen (2009), standard errors clustered on multiple dimensions are unbiased regardless of whether the firm effects are permanent or temporary. Second, similar to Oikonomou, Brooks, and Pavelin (2014), my model includes time-invariant variables (such as the indicator variable ENVPROVD in the cases where a firm has recognized environmental provisions in all or none of the examined years) that cannot be included directly in the model if fixed effects are employed since their effects will be captured by the intercept (Oikonomou et al., 2014). Third, the environmental performance variable ENVPERF varies largely cross-sectionally and less over time [its average standard deviation by year is 2.5 times higher than its average standard deviation by firm (0.22 and 0.09, respectively)]. Consequently, fixed effects estimators may not detect an effect of this variable on the dependent variable even if one exists (Zhou, 2001). Lastly, it should be noted that similar (untabulated) results are found when the model is estimated with two-way (firm-year) clustered standard errors without controlling for year fixed effects and; with standard errors clustered only by firm and controlling for year fixed effects.

ten-year period from 2005 to 2014. I refrain from using data from earlier years because the mandatory introduction of the International Financial Reporting Standards occurred in 2005. In this case, I ensure that the environmental provisions of all firms and years are recognized under the same accounting standard (i.e., IAS 37). The number of firms covered by ASSET4 during this decade does not vary substantially: from a minimum of 72 firms found to have available environmental performance and environmental provisions data in 2005 to a maximum of 95 in 2012 and 2013. From a total of 868 firm-year observations, 129 observations of firms from the financial industry (ICB code 8000) are excluded because of the particularities of the assets and liabilities of this industry that might affect the relationship between accounting numbers and market value (Clacher, de Ricquebourg, & Hodgson, 2013; Dahmash, Durand, & Watson, 2009); 18 observations are withdrawn because of a negative book value of equity, which may reduce the inferential quality (Ahmed, Morton, & Schaefer, 2000) and increase the noise (Bugeja and Gallery, 2006) of my empirical tests; one observation is excluded because of a lack of earnings data availability. Finally, 28 observations are identified by Cook's distance statistic[6] as highly influential and are eliminated. The final sample is composed of 692 firm-year observations, of which 481 do not have environmental provisions recognized on their balance sheets and 211 include such provisions (Table 1).

[Insert Table 1 about here]

Table 2 breaks the total number of firm/year observations and unique firms down by industry and by group (with and without environmental provisions). Almost 40% of the observations with environmental provisions (83 out of the 211) are from the Industrials sector. In contrast, industries that can be considered as less energy-intensive, such as Consumer Services and Technology (Lund, 2007), are under-represented. Further, it should

[6] Observations with Cook's distance higher than 4/n, where n is the number of observations, are excluded.

be noted that although the total number of firms in the sample is 81, the 28 of them appear in both subsamples in Table 2 since they are found to have recognized environmental provisions on their balance sheets at least in one year but not in all years under examination[7]. As a final remark, it is worth stressing that although the number of firms covered by ASSET4 is relatively small, it corresponds to more than 80% of the total capitalization of the French capital market. Specifically, on aggregate, the 692 firm/year observations of my sample correspond to the 81.5% of the total market capitalization for the decade under examination[8] (untabulated).

[Insert Table 2 about here]

4. Findings

4.1 Data description and univariate analysis

Table 3 provides basic summary statistics of the variables utilized in the multivariate analysis separately for the full sample and subsamples of firms with and without recognized environmental provisions.

[Insert Table 3 about here]

The average firm of the full sample has a share price of €44.98, a book value of equity per share of €22.94, and earnings per share of €4.41. Taking a closer look at the subsample of firms with environmental provisions, the average firm has environmental provisions per share of €1.13, and interestingly, it has significantly higher environmental performance

[7] On average, these firms have recognized environmental provisions in almost 5 (specifically 4.86) annual accounting periods.
[8] On an annual basis, this ratio varies from a minimum of 72.4% in 2005 to a maximum of 88.9% in 2012 (untabulated).

ratings than the average firm that has no environmental provisions. Specifically, the mean ENVPERF of the subsample with recognized environmental provisions is 0.89, whereas the one without environmental provisions is 0.73.

[Insert Figure 1 about here]

Furthermore, Figure 1 provides annual mean scores of environmental provisions per share for the subsample with recognized provisions. As it can be seen, although there is some variation among years, a substantial amount of environmental provisions is recognized in all 10 years. Additionally, there is a large difference in the number of firms that have environmental provisions recognized on their balance sheets; fewer firms in earlier years than more recently.

[Insert Table 4 about here]

Table 4 reports Pearson's correlation coefficients for all variables used in the main analysis. Consistent with previous studies that employ a similar model, correlation coefficients between PR, BVS and EPS are positive and statistically significant, indicating a positive relationship between firms' basic accounting information and their market value. In addition, as is also expected, the variable LOSS is found to be significantly and negatively correlated to PR. Furthermore, the correlation coefficient between PR and ENVPROVS is found to be negative and significant, which is an initial indication that environmental provisions depict future cash outflows for a firm and hence, as expected, they are negatively priced by capital market participants. Finally, the main variable of interest (ENVPERF) is found to be negatively but not significantly correlated to PR. This finding can be seen as a preliminary

indication that the environmental performance rating of the average French listed firm is not related to the firm's market valuation.

4.2 Multivariate analysis

The results of the main multivariate analysis are presented in Table 5. Although the main model of interest is Model 2, a basic model without environment-related variables and two different specifications of Model 1 are estimated. The first specification of Model 1 is estimated as described in section 3.1, whereas the second specification is estimated by replacing the ENVPERF variable with the binary ENVPROVD variable, which indicates whether a firm has recognized environmental provisions on its balance sheets[9]. A general comment that can be made is that in all four models, the coefficients of the basic summary accounting-information variables of BVS and EPS are positive and highly significant. This finding indicates that both the book value of equity and earnings have an impact on the market valuation of French listed firms during the first decade of IFRS implementation (i.e., 2005-2014). Furthermore, the magnitude of the coefficients of BVS and EPS are similar to previous studies on the value relevance of the book value of equity and earnings in France (Devalle, Onali, & Magarini, 2010). Another interesting and expected finding is that the earnings valuation coefficient of loss-making firms significantly differs from that of profit-making firms (Collins et al., 1999; Venter et al., 2014), as evidenced primarily by the coefficient of the interaction variable EPSxLOSS, which is found to be negative and statistically significant at the 10% level in all four specifications.

[Insert Table 5 about here]

[9] In Table 5, this model is indicated as Model 1b.

Regarding Model 1, the estimated coefficient of the main variable of interest (ENVPERF) is found to be negative (-16.571) and statistically significant (at the 10% level). This finding suggests that on average, French listed firms' environmental performance ratings are negatively related to their market valuation. Further, in the second specification of Model 1 (i.e., Model 1b), the ENVPERF variable is replaced by the ENVPROVD variable. The results reveal a strong negative association between market valuation and the recognition of environmental provisions (-14.431 at 1% level). This finding indicates that, ceteris paribus, firms with environmental provisions recognized on their balance sheets are valued at €14.4 less on average than firms without environmental provisions.

More, the estimated coefficients of Model 2, in which the binary variable ENVPROVD and the interaction term ENVPERFxENVPROD are incorporated, unveil a systematic difference between firms with recognized environmental provisions on their balance sheets compared to firms without environmental provisions. The coefficient of ENVPROVD is found to be negative (-37.457) and statistically significant (at the 1% level). In addition, the main effect of environmental performance (that is, ENVPERF) remains negative but is not statistically significant (-12.591). Finally, the interaction effect ENVPERFxENVPROD is found to be positive and statistically significant at the 10% level (27.646).

5. Additional analyses

Aside from the primary research design discussed before, several additional tests are performed to examine the sensitivity of my results. First, I employ a series of propensity score-matching methods to match the 211 observations found to have recognized environmental provisions to observations without recognized environmental provisions. In addition, I correct for potential sample selection bias. Finally, I estimate a battery of different specifications to further ensure the robustness of my results.

5.1 Matched samples

In the main analysis, my examination is based on the total number of firm/year observations with available environmental performance and environmental provision data in the Thomson Reuters ASSET4 database. The full sample of 692 observations is divided into two subgroups based on whether a firm has recognized environmental provisions on its balance sheet. Nevertheless, this approach might suffer from sample selection bias and thus from biased parameter estimates (Armstrong, Jagolinzer, & Larcker, 2010). To rule out the possibility that my results are driven by differences in firms' characteristics between the two subgroups, I employ a propensity score matching approach (Rosenbaum & Rubin, 1983, 1985) to match the subgroup of firms with environmental provisions with a subgroup of firms that have a number of similar characteristics but do not recognize environmental provisions on their balance sheets. To implement this approach, I first employ a probit model in which I regress the binary variable ENVPROVD on a number of firm-level variables (Benlemlih & Bitar, 2015; Hooghiemstra, Kuang, & Qin, 2015), such as SIZE for size effects, LEV for leverage, TOBINQ for growth opportunities (Dhaliwal, Li, Tsang, & Yang, 2011), BM for risk (Fama & French, 1992), ROE for profitability, ETS for participation to an emissions-trading scheme (Luo, Lan, & Tang, 2012) and SUSTREP for sustainability reporting (Dhaliwal et al., 2011). Finally, the matching process is controlled for industry and year (Table 6, Panel A).

Based on this model, I derive the propensity scores of each observation, and I use four alternative methods to match the 211 observations that are found to have recognized environmental provisions (i.e., ENVPROVD=1) to observations that do not have recognized environmental provisions (i.e., ENVPROVD=0). First, I employ a one-to-one nearest-neighbor matching without replacement in which each observation of the 'treated' group (i.e., ENVPROVD=1) is matched with one unique observation of the 'untreated' group that is found to have the lowest distance in their propensity scores. Second, according to Stuart (2010), the

method of k:1 matching without any restrictions may lead to poor matches if no observations of the 'untreated' group have propensity scores similar to those of the observations of the 'treated' group. To avoid such poor matches, the literature suggests the use of a caliper that would determine the maximum distance within which a match can be found (Stuart, 2010). In order to adequately address this potential problem of a poor match, I match my sample based on a caliper size of 0.05. In addition, I recalculate the propensity scores by employing a reduced version of the PSM probit model discussed above, which is based on the variables found to be statistically significant in the initial estimation of the model (Table 6, Panel A). Employing the same two matching methods discussed above (i.e., one-to-one nearest-neighbor and caliper size of 0.05), I derive two additional alternative matched samples.

[Insert Table 6 about here]

Table 6, Panel B reports the specifications of Model 2 based on the four matched samples discussed above and on the full unmatched sample. The results of all specifications are similar to the main analysis. It is indicative that the interaction term ENVPERFxENVPROD is not only positive and statistically significant but its relation with PR is also stronger (significant at the 5% level).

5.2 Heckman sample selection correction

Another potential problem of the sample is that it may not be random due to the (unknown to the public) procedure that ASSET4 follows in order to decide on covering a firm (El Ghoul, Guedhami, & Kim, 2017). If this is the case, then my sample is plagued by sample selection bias. In order to eliminate such concerns, I follow Matsumura et al. (2014) and use Heckman's (1979) full maximum likelihood method to correct for potential sample selection bias by jointly estimating the valuation and selection models (Table 7). Similar to El Ghoul et

al. (2017), the selection model is a probit model in which the dependent variable is the binary variable ASSET4, which equals one if a firm is covered by ASSET4 analysts and zero otherwise. The ASSET4 binary variable is regressed on a number of firm-level variables (SIZE, LEV, TOBINQ, BM and, ROE). The estimation of this model is performed based on a sample that derives from merging my main sample from ASSET4 (692 observations) with the total of French listed firms found in Datastream (7,133 observations). After excluding firms from the financial industry (1,187 observations), observations with a negative book value of equity (315 observations) and observations with missing values (359 observations), the final sample for the Heckman test is 5,964 firm/year observations. Table 7 reports the estimations of both the valuation and selection models. The results corroborate the initial findings: the interaction effect ENVPERFxENVPROD is found to be positive and statistically significant at the 10% level (25.509).

[Insert Table 7 about here]

5.3 Other specifications

A battery of additional specifications is estimated in order to further ensure the robustness of my results. Table 8 reports estimated coefficients for seven models [(Models (i) to (vii)]. The results in all these models are in line with the initial analysis.

First, it has been shown that loss-making firms are priced differently than profit-making firms by capital markets (Collins et al., 1999; Venter et al., 2014). Although the inclusion of the binary variable LOSS and the interaction term LOSSxEPS in Model 2 are expected to control for this difference, I re-estimate the model based on a sample that includes only profit-making firms (641 firm/year observations).

Second, ASSET4 Environmental Performance ratings are used in this study as the main proxy of firms' impact on the environment. Despite its merits, a potential drawback of this

performance measurement is that it considers a firm's recognized environmental provisions, which, in turn, are related to the independent variable ENVPROVD, which indicates whether a firm has recognized environmental provisions on its balance sheet. Although environmental provisions are only one out of the almost 180 data points used for calculating Environmental Performance and even though the untabulated univariate analysis reveals a relatively low correlation between ENVPERF and ENVPROVD (0.32), an alternative proxy for environmental performance ratings is used in order to ensure that my results are not driven by the underlying relationship between ENVPERF and ENVPROVD. The alternative proxy for ENVPERF is constructed by removing the common variation between the two variables. For this, the ENVPERF variable is regressed on the ENVPROVD variable, and the residuals are used as the alternative proxy of environmental performance.

Third, in order to mitigate concerns related to reverse causality between market values and environmental provisions, Model 2 is re-estimated with all independent variables being one-period lagged (Chang, Kim, & Li, 2014; Oikonomou et al., 2014; Oikonomou, Brooks, & Pavelin, 2012). Due to the use of lagged variables, the sample is shrunk into 601 firm/year observations.

Fourth, an augmented version of Model 2 is estimated [Model (iv)] in which a number of control variables that may have an impact on a firm's market valuation are included. First, Berk (1995) indicates that firms with greater assets tend to have higher market value. To control for size effects, variables are deflated by the number of common shares outstanding. As a second control for size effects, the variable SIZE, which is computed as the natural logarithm of total assets, is included in the model. Second, the variable LEV denotes a firm's leverage and is computed as the total liabilities divided by the book value of equity. Third, the variable BM is the book value to market value of equity. Fama and French (1992) show that the book to market value explains a large amount of stock return variation; thus, it is a good proxy for risk. Finally, the binary variable ETS equals one if the firm's emissions are traded in

an emissions trading scheme and zero otherwise (Chapple, Clarkson, & Gold, 2013), and the binary variable SUSTREP equals one if the firm publishes a stand-alone sustainability report in the current year and zero otherwise (Dhaliwal et al., 2011)

Fifth, I examine the effect of the levels of environmental provisions on the market valuation of environmental performance ratings. Based on the main analysis, the valuation coefficient of environmental performance is expected to significantly differ between firms with and without recognized environmental provisions. If the recognition of probable future environmental liabilities indeed enables investors to disentangle the economic benefits and costs related to a firm's environmental performance, then it is reasonable to expect the level of environmental provisions to have a moderating effect on the relationship between environmental performance ratings and market values. If such an effect is found, then I can conclude with greater certainty that environmental provisions play a role in the market valuation implications of environmental performance ratings. To examine whether such a moderating effect exists, I focus on the subsample of 211 observations with recognized environmental provisions and further develop the basic model by decomposing BVS across the book value of equity, excluding the environmental provisions per share (BV_ENVPROVS) and the book value of environmental provisions per share (ENVPROVS). It should be noted that because environmental provisions are a liability, to exclude the recognized amount of environmental provisions from the total book value of equity, the former is added to the latter accounting item. Finally, the moderating effect of environmental provisions on the market valuation of environmental performance ratings is tested by including the interaction variable ENVPERFxENVPROVS [Model (v)]. Utilizing the subgroup of 211 firm-year observations that are found to have recognized environmental provisions, the regression results confirm the findings of my main analysis, in which investors positively value the environmental performance ratings of firms with recognized environmental provisions. Specifically, the coefficient of ENVPERF is found to be positive (11.480) and statistically insignificant. Further,

a significant moderation effect of the levels of environmental provisions on the market valuation of environmental performance is found. Specifically, the coefficient of the interaction effect is found to be positive (17.813) and statistically significant at the 5% level. Furthermore – and as expected – the main effect of environmental provisions (ENVPROV) is negative and significant at the 5% level. The above findings reveal an economically significant relationship. Specifically, it is shown that for every one Euro of recognized environmental provisions, an increase of environmental performance by 1% has a positive impact of 0.18 Euros on firms' market valuation. Further, it is revealed that for any given level of environmental provision, environmental performance is valued positively by investors only for firms with environmental performance higher than the mean of the sample (that is, 0.89). Thus, it can be surmised with even greater certainty that environmental provisions recognized by French listed firms have a moderating effect on the market valuation of firms' environmental performance ratings.

Finally, in order to test whether my results are sensitive to the model employed, I estimate two alternative models. The first one [Model (vi)] is the balance sheet valuation model (Barth & McNichols, 1994; Campbell et al., 2003; Matsumura et al., 2014), which relates share prices (PR) to total assets per share (TAS), total liabilities per share (TLS) and earnings per share (EPS). The second model [Model (vii)] is inspired by El Ghoul et al. (2017) and Servaes and Tamayo (2013) and relates Tobin's Q (TOBINQ) to Environmental Performance (ENVPERF) after controlling for a number of firm-level characteristics (SIZE, ROE, LEV, BM, ETS, SUSTREP).

[Insert Table 8 about here]

6. Discussion and concluding remarks

The purpose of this study is to provide insights on the moderating role of environmental provisions in the market valuation of environmental performance. Utilizing a sample of French listed firms for the ten-year period from 2005 to 2014, I find that although the mean effect of environmental performance ratings on market value is negative, investors positively value the environmental performance of firms with environmental provisions recognized on their balance sheets. My findings hold for a battery of different model specifications and robustness tests. Regarding the first finding, my study provides evidence of a negative relation between environmental performance ratings and market value. This negative relation may be indicative of investors perceiving strong environmental performance as costly and hence having negative effects on future earnings (Hassel et al., 2005) or as an attempt by firm managers to use a firm's resources for their own interests and hence at the expense of shareholders value (Jensen, 2001).

Nevertheless, this negative relation, albeit statistically significant, is found to be relatively weak. This weak relation may suggest that two opposite effects on the market valuation of environmental performance 'cancel' each other out: a positive effect that depicts future economic benefits (Albertini, 2014; Koh et al., 2014) and a negative effect that depicts future costs (Hassel et al., 2005; Jensen, 2001; Kitzmueller & Shimshack, 2012). My study posits that environmental provisions enable investors to disentangle future economic benefits and costs related to a firm's environmental performance either by signaling strong future financial performance (Beaver et al., 1989; Lys et al., 2015; Wahlen, 1994) or by enhancing the reliability of environmental performance information (Bae & Sami, 2005; Campbell et al., 2003; Kennedy et al., 1998). My study's main finding supports this position by showing that capital market participants positively value the environmental performance of firms with environmental provisions recognized on their balance sheets. This finding is also in line with

Campbell et al. (2003), who show that environment-related accounting information has a moderating effect on the market valuation of environmental information.

Furthermore, this study provides evidence on the moderating effect of levels of environmental provisions on the market valuation of environmental performance. Specifically, I show that for any given level of environmental performance, as the magnitude of the environmental provisions recognized on a firm's balance sheet increases, the positive effect of environmental performance on the firm's market valuation increases. This finding further supports my position that the recognition of future environmental liabilities enables investors to disentangle the economic costs and benefits associated with a firm's environmental performance. My findings show not only statistical but also economic significance.

Finally, it should be stressed that my study does not examine whether strong environmental performance drives firms to recognize environmental provisions or vice versa. Its intention is to examine whether environmental provisions play a moderating role in the relation between a firm's environmental performance and market value. Although the mechanism of this effect is not explored in depth in this study, it is suggested that investors can better disentangle the costs and benefits related to a firm's environmental performance if the firm recognizes environmental provisions on its balance sheet.

To conclude, the following remarks can be made. First, although we have recently witnessed numerous initiatives in socially responsible investing activities – which focus on firms' social and environmental impact – the evidence found in this study suggests that environmental reporting of a financial nature still plays a prominent role in investors' decision making. Recent developments in environmental reporting, such as the TCFD endeavor, which aims at developing climate-related disclosures of a financial nature, further support this argument. Second, the significant interaction effect of the two main variables of interest of this study emphasizes the interrelatedness between financial and non-financial

information for valuation purposes. This finding corroborates the recent developments in integrated reporting, which argues that the integration of financial and non-financial information supports investors' decision making. Finally, the fact that financial environmental reporting is found to play a significant moderating role in the market valuation of environmental performance in a country characterized as the leader in mandatory environmental reporting worldwide (AODP, 2017; KPMG, 2015) underlines the importance of financial environmental reporting, especially in jurisdictions with few or no regulations on sustainability reporting. In such jurisdictions, investors are expected to face even greater difficulties in disentangling the costs and benefits related to environmental performance, thus making the disclosure of financial environmental information even more necessary. Future research can examine this issue.

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Tables

Table 1. Sample selection process

	Firm/Year obs.
Initial number of observations with environmental performance data found in Asset4 for the period 2005-2014	**868**
less observations from Financials industry (ICB code 8000)	-129
less observations with negative book value of equity	-18
less observations with no earnings data	-1
less highly influential observations identified by Cook's distance* statistic	-28
Final sample	**692**
without recognized environmental provisions	481
with recognized environmental provisions	211

*Observations with Cook's distance higher than 4/n, where *n* is the number of observations

Table 2. Observations and unique firms by industry

	Without Environmental Provisions		With Environmental Provisions	
Industry	**Firm/Year Obs**	**Unique firms**	**Firm/Year Obs**	**Unique firms**
Basic Materials	14	3	16	3
Consumer Goods	81	14	40	9
Consumer Services	132	15	3	2
Health Care	24	4	12	2
Industrials	116	18	83	12
Oil & Gas	36	5	9	2
Technology	65	8	3	1
Telecommunication	2	1	8	1
Utilities	11	4	37	5
Total	**481**	**72**	**211**	**37**

The total number of unique firms in the sample is 81: 44 of them do not have recognized environmental provisions in any of the years under examination; 28 of them have recognized environmental provisions at least in one year but not in all years and; 9 of them have recognized environmental provisions in all years.

Table 3. Descriptive statistics

	Full sample			With Environmental Provisions			Without Environmental Provisions		
	Mean	**Median**	**S.D.**	**Mean**	**Median**	**S.D.**	**Mean**	**Median**	**S.D.**
	(N=692)			(N=211)			(N=481)		
PR	44.98	37.36	34.24	42.48	37.77	31.23	46.07	37.29	35.45
BVS	22.94	19.31	16.77	**28.43**	**27.21**	17.53	**20.53**	**17.21**	15.86
EPS	4.41	3.85	4.25	**4.92**	**4.36**	4.69	**4.18**	**3.59**	4.02
LOSS	0.07	0.00	0.26	0.08	0.00	0.27	0.07	0.00	0.26
ENVPERF	0.78	0.89	0.22	**0.89**	**0.92**	0.09	**0.73**	**0.84**	0.25
ENVPROVS	0.34	0.00	1.87	1.13	0.16	3.25	-	-	-
ENVPROV_BV	0.02	0.00	0.12	0.06	0.01	0.21	-	-	-
ENVPROV_MV	0.04	0.00	0.44	0.12	0.01	0.80	-	-	-

PR is the market value of equity six months after fiscal year-end scaled by the number of common shares; BVS is the book value of equity scaled by the number of common shares; EPS is the earnings before interest and taxation scaled by the number of common shares; LOSS is a binary variable which equals one if EPS is negative and zero otherwise; ENVPERF is the environmental performance pillar of ASSET4 (on a % scale) as measured by ASSET4 analysts; ENVPROVS is the environmental provisions recognized in a firm's balance sheet scaled by the number of common shares; ENVPROV_BV is the environmental provisions recognized in a firm's balance sheet scaled by book value of equity; ENVPROV_MV is the environmental provisions recognized in a firm's balance sheet scaled by market value of equity.

Figures in bold indicate statistically significant difference between the 'without' and the 'with' recognized environmental provisions samples at least at 5% level: T-test for mean and Wilcoxon test for median differences are applied respectively

Figure 1. Mean Environmental Provisions by year

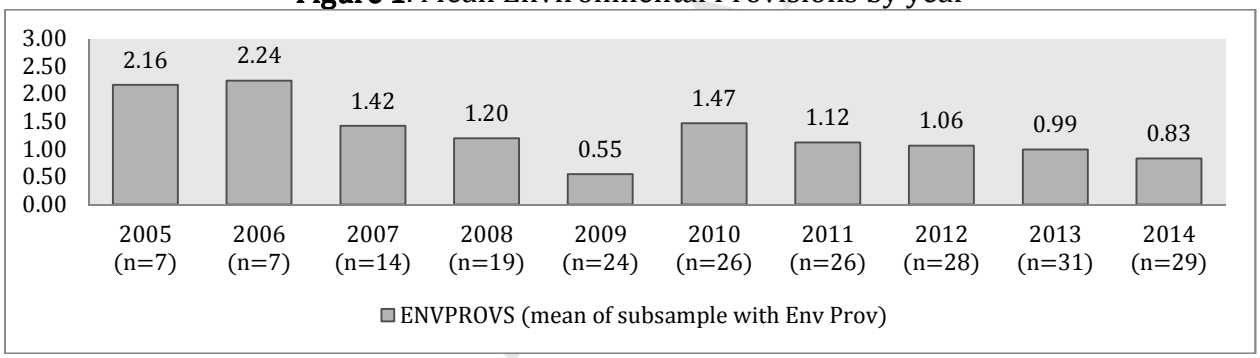

Table 4. Pearson's correlation coefficients for the full sample

	PR	BVS	EPS	ENVPERF	ENVPROVS	ENVPROVD
BVS	0.63*					
EPS	0.69*	0.61*				
ENVPERF	-0.02	0.12*	0.04			
ENVPROVS	-0.02	0.06	-0.05	0.10*		
ENVPROVD	-0.05	0.22*	0.08*	0.32*	0.28*	
LOSS	-0.23*	-0.09*	-0.42*	0.09*	0.10*	0.02

PR is the market value of equity six months after fiscal year-end scaled by the number of common shares; BVS is the book value of equity scaled by the number of common shares; EPS is the earnings before interest and taxation scaled by the number of common shares; ENVPERF is the environmental performance pillar of ASSET4 (on a % scale) as measured by ASSET4 analysts; ENVPROVS is the environmental provisions recognized in a firm's balance sheet scaled by the number of common shares; ENVPROVD is a binary variable which equals one if a firm has recognized environmental provisions in its balance sheet in the current year and zero otherwise; LOSS is a binary variable which equals one if EPS is negative and zero otherwise.

* indicates significant correlation at least at 5% level

Table 5. Regressions results – full sample

Model 1 $PR_{it} = \alpha_0 + \alpha_1 BVS_{it} + \alpha_2 EPS_{it} + \alpha_3 LOSS_{it} + \alpha_4 (LOSS_{it} \times EPS_{it}) + \alpha_5 ENVPERF_{it} + \sum_{j=1}^{J=9} \alpha_{8j} IND_{it} + \sum_{y=2005}^{y=2014} \alpha_{9y} YR_{it} + \varepsilon_{it}$

Model 1b $PR_{it} = \alpha_0 + \alpha_1 BVS_{it} + \alpha_2 EPS_{it} + \alpha_3 LOSS_{it} + \alpha_4 (LOSS_{it} \times EPS_{it}) + \alpha_5 ENVPROVD_{it} + \sum_{j=1}^{J=9} \alpha_{8j} IND_{it} + \sum_{y=2005}^{y=2014} \alpha_{9y} YR_{it} + \varepsilon_{it}$

Model 2 $PR_{it} = \alpha_0 + \alpha_1 BVS_{it} + \alpha_2 EPS_{it} + \alpha_3 LOSS_{it} + \alpha_4 (LOSS_{it} \times EPS_{it}) + \alpha_5 ENVPERF_{it} + \alpha_6 ENVPROVD_{it} + \alpha_7 (ENVPERF_{it} \times ENVPROVD_{it}) + \sum_{j=1}^{J=9} \alpha_{8j} IND_{it} + \sum_{y=2005}^{y=2014} \alpha_{9y} YR_{it} + \varepsilon_{it}$

Variables	Basic model	Model 1	Model 1b	Model 2
Constant	32.250***	44.137***	33.004***	42.077***
	(6.224)	(8.247)	(5.814)	(8.026)
BVS	0.573***	0.587***	0.660***	0.663***
	(0.196)	(0.192)	(0.184)	(0.185)
EPS	4.042***	4.066***	3.997***	3.989***
	(1.002)	(0.992)	(0.988)	(0.987)
LOSS	-4.082	-2.266	-3.222	-2.287
	(4.437)	(4.164)	(4.060)	(3.902)
LOSSxEPS	-2.684*	-2.665*	-2.799*	-2.673*
	(1.561)	(1.537)	(1.604)	(1.554)
ENVPERF		-16.571*		-12.591
		(8.761)		(8.101)
ENVPROVD			-14.431***	-37.457***
			(3.529)	(11.880)
ENVPERFxENVPROVD				27.646*
				(14.338)
Industry effects	yes	yes	yes	yes
Year effects	yes	yes	yes	yes
N (firm/year)	692	692	692	692
Adj. R^2	0.646	0.656	0.672	0.678

PR (dependent variable in all specifications) is the market value of equity six months after fiscal year-end scaled by the number of common shares; BVS is the book value of equity scaled by the number of common shares; EPS is the earnings before interest and taxation scaled by the number of common shares; LOSS is a binary variable which equals one if EPS is negative and zero otherwise; ENVPERF is the environmental performance pillar of ASSET4 (on a % scale) as measured by ASSET4 analysts; ENVPROVD is a binary variable which equals one if a firm has recognized environmental provisions in its balance sheet in the current year and zero otherwise.

***, ** and * denote statistical significance at 1%, 5% and 10% level respectively

Two-way clustered (by firm and year) standard errors (in parentheses)

Table 6. Additional analysis 1: Alternative matched samples based on PSM

Panel A. Estimation of propensity score functions

Probit Model $ENVPROVD_{it} = \alpha_0 + \alpha_1 SIZE_{it} + \alpha_2 LEV_{it} + \alpha_3 TOBINQ_{it} + \alpha_4 BM_{it} + \alpha_5 ROE_{it} + \alpha_6 ETS_{it} + \alpha_7 SUSTREP_{it} + \sum_{j=1}^{J=9} \alpha_{8j} IND_{it} + \sum_{y=2005}^{y=2014} \alpha_{9y} YR_{it} + \varepsilon_{it}$

Variables	Full model	SE	Reduced model	SE
Constant	-3.200***	(1.165)	-4.243***	(1.022)
SIZE	0.205***	(0.070)	0.260***	(0.060)
LEV	-0.111***	(0.042)	-0.093**	(0.039)
TOBINQ	-1.416***	(0.222)	-1.299***	(0.190)
BM	-0.066	(0.070)		
ROE	0.323	(0.483)		
ETS	0.261	(0.171)		
SUSTREP	-0.002	(0.247)		
Industry effects	yes		yes	
Year effects	yes		yes	
N(firm/year)	692		692	
Pseudo. R^2	0.399		0.395	

ENVPROVD (dependent variable) is a binary variable which equals one if the firm has recognized environmental provisions in its balance sheet in the current year and zero otherwise; SIZE is the natural logarithm of total assets; LEV is a leverage ratio computed as total liabilities divided by book value of equity; TOBINQ is computed as market value of equity divided by total assets; BM is book-to-market ratio computed as book value of equity to market value of equity; ROE is return on equity ratio computed as earnings before interest and taxation to book value of equity; ETS is a binary variable which equals one if the firm's emissions are traded in an emissions trading scheme and zero otherwise; SUSTREP is a binary variable which equals one if the firm publishes a stand-alone sustainability report in the current year and zero otherwise.

Panel B. Specifications based on alternative matching methods

Valuation model $PR_{it} = \alpha_0 + \alpha_1 BVS_{it} + \alpha_2 EPS_{it} + \alpha_3 LOSS_{it} + \alpha_4 (LOSS_{it} \times EPS_{it}) + \alpha_5 ENVPERF_{it} + \alpha_6 ENVPROVD_{it} + \alpha_7 (ENVPERF_{it} \times ENVPROVD_{it}) + \sum_{j=1}^{J=9} \alpha_{8j} IND_{it} + \sum_{y=2005}^{y=2014} \alpha_{9y} YR_{it} + \varepsilon_{it}$

Variables	Unmatched sample	Full model		Reduced model	
		1-to-1 without replacement	Caliper 0.05	1-to-1 without replacement	Caliper 0.05
Constant	42.077***	30.107**	28.860*	28.045**	30.373*
	(8.026)	(13.932)	(16.801)	(12.932)	(16.165)
BVS	0.663***	0.628***	0.660***	0.642***	0.700***
	(0.185)	(0.197)	(0.224)	(0.191)	(0.204)
EPS	3.989***	3.948***	3.783***	3.883***	3.696***
	(0.987)	(1.012)	(1.087)	(0.972)	(1.015)
LOSS	-2.287	1.139	5.551	1.525	-2.980
	(3.902)	(4.095)	(6.599)	(4.031)	(3.824)
LOSSxEPS	-2.673*	-2.478*	-1.551	-2.214	-1.829
	(1.554)	(1.490)	(1.448)	(1.367)	(1.502)
ENVPERF	-12.591	-11.855	-15.675	-7.922	-13.164
	(8.101)	(16.353)	(18.111)	(14.854)	(18.125)
ENVPROVD	-37.457***	-37.441***	-40.830**	-34.583***	-41.999**
	(11.880)	(13.723)	(17.151)	(11.976)	(17.807)
ENVPERFxENVPROVD	27.646*	33.791**	44.936**	30.100**	46.337**
	(14.338)	(16.645)	(20.731)	(14.612)	(21.877)
Industry effects	yes	yes	yes	yes	yes
Year effects	yes	yes	yes	yes	yes
N (firm/year)	692	422	242	422	238
Adj. R^2	0.678	0.734	0.729	0.741	0.763

PR (dependent variable in all specifications) is the market value of equity six months after fiscal year-end scaled by the number of common shares; BVS is the book value of equity scaled by the number of common shares; EPS is the earnings before interest and taxation scaled by the number of common shares; LOSS is a binary variable which equals one if EPS is negative and zero otherwise; ENVPERF is the environmental performance pillar of ASSET4 (on a % scale) as measured by ASSET4 analysts; ENVPROVD is a binary variable which equals one if a firm has recognized environmental provisions in its balance sheet in the current year and zero otherwise.

***, ** and * denote statistical significance at 1%, 5% and 10% level respectively

Two-way clustered (by firm and year) standard errors (in parentheses)

Table 7. Additional analysis 2: Heckman selection model

Valuation model $PR_{it} = \alpha_0 + \alpha_1 BVS_{it} + \alpha_2 EPS_{it} + \alpha_3 LOSS_{it} + \alpha_4 (LOSS_{it} \times EPS_{it}) + \alpha_5 ENVPERF_{it} + \alpha_6 ENVPROVD_{it} + \alpha_7 (ENVPERF_{it} \times ENVPROVD_{it}) + \sum_{j=1}^{J=9} \alpha_{8j} IND_{it} + \sum_{y=2005}^{y=2014} \alpha_{9y} YR_{it} + \varepsilon_{it}$

Selection model $ASSET4_{it} = \alpha_0 + \alpha_1 SIZE_{it} + \alpha_2 LEV_{it} + \alpha_3 TOBINQ_{it} + \alpha_4 BM_{it} + \alpha_5 ROE_{it} + \sum_{j=1}^{J=9} \alpha_{6j} IND_{it} + \sum_{y=2005}^{y=2014} \alpha_{7y} YR_{it} + \varepsilon_{it}$

Valuation model	**Coef.**	**SE**
Constant	47.613***	-8.17
BVS	0.654***	-0.16
EPS	3.921***	-0.949
LOSS	-1.862	-4.259
LOSSxEPS	-2.509*	-1.506
ENVPERF	-16.499**	-8.07
ENVPROVD	-35.881***	-11.968
ENVPERFxENVPROVD	25.509*	-14.136
Industry effects	yes	
Year effects	yes	
Selection model		
Constant	-12.999***	-1.277
SIZE	0.896***	-0.091
LEV	-0.130***	-0.042
TOBINQ	0.141***	-0.026
BM	-0.334***	-0.118
ROE	-0.029***	-0.009
Industry effects	yes	
Year effects	yes	
Likelihood Ratio χ^2	4.57**	
n	5,964	
Uncensored	692	

Valuation model PR (dependent variable of the valuation model) is the market value of equity six months after fiscal year-end scaled by the number of common shares; BVS is the book value of equity scaled by the number of common shares; EPS is the earnings before interest and taxation scaled by the number of common shares; LOSS is a binary variable which equals one if EPS is negative and zero otherwise; ENVPERF is the environmental performance pillar of ASSET4 (on a % scale) as measured by ASSET4 analysts; ENVPROVD is a binary variable which equals one if a firm has recognized environmental provisions in its balance sheet in the current year and zero otherwise.

Selection model ASSET4 (dependent variable of the selection model) is a binary variable which equals one if the firm is covered in ASSET4 and zero otherwise; SIZE is the natural logarithm of total assets; LEV is a leverage ratio computed as total liabilities divided by book value of equity; TOBINQ is computed as market value of equity divided by total assets; BM is book-to-market ratio computed as book value of equity to market value of equity; ROE is return on equity ratio computed as earnings before interest and taxation to book value of equity.

***, ** and * denote statistical significance at 1%, 5% and 10% level respectively

Huber-White robust standard errors clustered by firm

Table 8. Additional analysis 3: Other specifications

Model (i) $PR_{it} = \alpha_0 + \alpha_1 BVS_{it} + \alpha_2 EPS_{it} + \alpha_3 ENVPERF_{it} + \alpha_4 ENVPROVD_{it} + \alpha_5 (ENVPERF_{it} \times ENVPROVD_{it}) + \sum_{j=1}^{J=9} \alpha_{6j} IND_{it} + \sum_{y=2005}^{y=2014} \alpha_{7y} YR_{it} + \varepsilon_{it}$

Model (ii) $PR_{it} = \alpha_0 + \alpha_1 BVS_{it} + \alpha_2 EPS_{it} + \alpha_3 LOSS_{it} + \alpha_4 (LOSS_{it} \times EPS_{it}) + \alpha_5 ENVPERF2_{it} + \alpha_6 ENVPROVD_{it} + \alpha_7 (ENVPERF2_{it} \times ENVPROVD_{it}) + \sum_{j=1}^{J=9} \alpha_{8j} IND_{it} + \sum_{y=2005}^{y=2014} \alpha_{9y} YR_{it} + \varepsilon_{it}$

Model (iii) $PR_{it} = \alpha_0 + \alpha_1 BVS_{it-1} + \alpha_2 EPS_{it-1} + \alpha_3 LOSS_{it-1} + \alpha_4 (LOSS_{it-1} \times EPS_{it-1}) + \alpha_5 ENVPERF_{it-1} + \alpha_6 ENVPROVD_{it-1} + \alpha_7 (ENVPERF_{it-1} \times ENVPROVD_{it-1}) + \sum_{j=1}^{J=9} \alpha_{8j} IND_{it} + \sum_{y=2005}^{y=2014} \alpha_{9y} YR_{it} + \varepsilon_{it}$

Model (iv) $PR_{it} = \alpha_0 + \alpha_1 BVS_{it} + \alpha_2 EPS_{it} + \alpha_3 ENVPERF_{it} + \alpha_4 ENVPROVD_{it} + \alpha_5 (ENVPERF_{it} \times ENVPROVD_{it}) + \alpha_6 LOSS_{it} + \alpha_7 (LOSS_{it} \times EPS_{it}) + \alpha_8 SIZE_{it} + \alpha_9 LEV_{it} + \alpha_{10} BM_{it} + \alpha_{11} ETS_{it} + \alpha_{12} SUSTREP_{it} + \sum_{j=1}^{J=9} \alpha_{13j} IND_{it} + \sum_{y=2005}^{y=2014} \alpha_{14y} YR_{it} + \varepsilon_{it}$

Model (v) $PR_{it} = \alpha_0 + \alpha_1 BV\_ENVPROVS_{it} + \alpha_2 EPS_{it} + \alpha_3 LOSS_{it} + \alpha_4 (LOSS_{it} \times EPS_{it}) + \alpha_5 ENVPERF_{it} + \alpha_6 ENVPROVS_{it} + \alpha_7 (ENVPERF_{it} \times ENVPROVS_{it}) + \sum_{j=1}^{J=9} \alpha_{8j} IND_{it} + \sum_{y=2005}^{y=2014} \alpha_{9y} YR_{it} + \varepsilon_{it}$

Model (vi) $PR_{it} = \alpha_0 + \alpha_1 TAS_{it} + \alpha_2 TLS_{it} + \alpha_3 EPS_{it} + \alpha_4 LOSS_{it} + \alpha_5 (LOSS_{it} \times EPS_{it}) + \alpha_6 ENVPERF_{it} + \alpha_7 ENVPROVD_{it} + \alpha_8 (ENVPERF_{it} \times ENVPROVD_{it}) + \sum_{j=1}^{J=9} \alpha_{9j} IND_{it} + \sum_{y=2005}^{y=2014} \alpha_{10y} YR_{it} + \varepsilon_{it}$

Model (vii) $TOBINQ_{it} = \alpha_0 + \alpha_1 SIZE_{it} + \alpha_2 ROE_{it} + \alpha_3 LEV_{it} + \alpha_4 BM_{it} + \alpha_5 ETS_{it} + \alpha_6 SUSTREP_{it} + \alpha_7 ENVPERF_{it} + \alpha_8 ENVPROVD_{it} + \alpha_9 (ENVPERF_{it} \times ENVPROVD_{it}) + \sum_{j=1}^{J=9} \alpha_{10j} IND_{it} + \sum_{y=2005}^{y=2014} \alpha_{11y} YR_{it} + \varepsilon_{it}$

	(i) Profit Making	(ii) Altern Envir Perf	(iii) Lagged Variables	(iv) Additional Variables	(v) Env Provisions	(vi) Balance Sheet Model	(vii) TobinQ Model
Constant	44.191***	32.830***	43.936***	41.359*	-3.996	44.444***	3.775***
	(8.008)	(5.143)	(9.655)	(23.205)	(9.024)	(8.954)	(0.859)
ENVPERF	-13.067	-12.591	-11.635	-6.852	11.480	-11.572	-0.088
	(8.296)	(8.103)	(8.195)	(8.266)	(10.149)	(9.643)	(0.270)
ENVPROVD	-36.050***	-14.842***	-33.323***	-42.640***		-45.105***	-1.108***
	(12.871)	(3.485)	(10.016)	(12.766)		(10.518)	(0.368)
ENVPERFxENVPROVD	25.790*	27.646*	23.629**	35.196**		39.131***	0.968**
	(15.673)	(14.333)	(11.215)	(15.858)		(12.717)	(0.448)
ENVPROVS					-15.932**		
					(7.202)		
ENVPERFxENVPROVS					17.813**		
					(8.055)		
BVS	0.660***	0.663***	0.537***	0.777***			
	(0.209)	(0.183)	(0.207)	(0.170)			
BV_ENVPROVS					0.413**		
					(0.203)		
TAS						0.563***	
						(0.182)	
TLS						-0.642***	
						(0.219)	
EPS	3.981***	3.989***	3.982***	3.613***	3.996***	4.029***	
	(1.080)	(0.991)	(0.849)	(0.854)	(1.208)	(0.746)	
LOSS		-2.287	-6.452**	-0.644	5.784		
		(3.900)	(3.193)	(3.635)	(5.156)		

LOSSxEPS		-2.673*	-4.414**	-3.448**	-1.863		
		(1.555)	(1.927)	(1.344)	(1.935)		
SIZE				0.055			-0.149***
				(1.584)			(0.051)
ROE							1.036***
							(0.256)
LEV				-0.716			-0.097***
				(0.602)			(0.023)
BM				-7.563**			-0.143**
				(3.858)			(0.072)
ETS				-4.466			0.004
				(3.223)			(0.080)
SUSTREP				-2.024			-0.018
				(2.701)			(0.086)
Industry effects	yes	yes	yes	yes	yes	yes	yes
Year effects	yes	yes	yes	yes	yes	yes	yes
N (firm/year)	641	692	601	692	211	692	692
Adj. R2	0.666	0.678	0.603	0.713	0.761	0.648	0.510

PR [dependent variable in all but Model (vii) models] is the market value of equity six months after fiscal year-end scaled by the number of common shares; TOBINQ [dependent variable in Model (vii)] is computed as market value of equity divided by total assets; ENVPERF is the environmental performance pillar of ASSET4 (on a % scale) as measured by ASSET4 analysts [in Model (ii) ENVPERF is constructed by removing the common variation between ENVPERF and EVPROVD]; ENVPROVD is a binary variable which equals one if a firm has recognized environmental provisions in its balance sheet in the current year and zero otherwise; ENVPROVS is the environmental provisions recognized in a firm's balance sheet scaled by the number of common shares; BVS is the book value of equity scaled by the number of common shares; BV_ENVPROVS is the book value of equity minus environmental provisions scaled by the number of common shares; TAS is total assets scaled by the number of commons shares; TLS is total liabilities scaled by the number of common shares; EPS is the earnings before interest and taxation scaled by the number of common shares; LOSS is a binary variable which equals one if EPS is negative and zero otherwise; SIZE is the natural logarithm of total assets; ROE is return on equity ratio computed as earnings before interest and taxation to book value of equity; LEV is a leverage ratio computed as total liabilities divided by book value of equity; BM is book-to-market ratio computed as book value of equity to market value of equity; ETS is a binary variable which equals one if the firm's emissions are traded in an emissions trading scheme and zero otherwise; SUSTREP is a binary variable which equals one if the firm publishes a stand-alone sustainability report in the current year and zero otherwise.

***, ** and * denote statistical significance at 1%, 5% and 10% level respectively

Two-way clustered (by firm and year) standard errors (in parentheses)

Appendix

Variables definitions

Variables	Description
PR	Market value of equity (Datastream item identifier: MV) six months after fiscal year-end scaled by the number of common shares (Datastream item identifier: WC05301)
BVS	Book value of equity (Datastream item identifier: WC03995) scaled by the number of common shares (Datastream item identifier: WC05301)
EPS	Earnings before interest and taxation (Datastream item identifier: WC18191) scaled by the number of common shares (Datastream item identifier: WC05301)
ENVPROVD	Binary variable which equals one if a firm has recognized environmental provisions in its balance sheet in the current year and zero otherwise (Asset4 identifier: ENERDP092)
ENVPROVS	Environmental provisions recognized in a firm's balance sheet (Asset4 identifier: ENERDP092) scaled by the number of common shares (Datastream item identifier: WC05301)
BV_ENVPROVS	Book value of equity (Datastream item identifier: WC03995) minus environmental provisions (Asset4 identifier: ENERDP092) scaled by the number of common shares (Datastream item identifier: WC05301)
ENVPERF	Environmental performance (on a % scale) measured by ASSET4 analysts (ASSET4 item identifier: ENVSCORE)
LOSS	Binary variable which equals one if EPS is negative and zero otherwise
SIZE	Natural logarithm of total assets (Datastream item identifier: WC02999)
ROE	Return on equity ratio computed as earnings before interest and taxation (Datastream item identifier: WC18191) to book value of equity (Datastream item identifier: WC03995)
LEV	Leverage ratio computed as total liabilities (Datastream item identifier: WC03351) divided by book value of equity (Datastream item identifier: WC03995)
BM	Book-to-market ratio computed as book value of equity (Datastream item identifier: WC03995) to market value of equity (Datastream item identifier: MV)
TAS	Total assets (Datastream item identifier: WC02999) scaled by the number of commons shares (Datastream item identifier: WC05301)
TLS	Total liabilities (Datastream item identifier: WC03351) scaled by the number of common shares (Datastream item identifier: WC05301)
TOBINQ	Tobin's Q computed as market value of equity (Datastream item identifier: MV) divided by total assets (Datastream item identifier: WC02999)
ETS	Binary variable which equals one if the firm's emissions are traded in an emissions trading scheme and zero otherwise (Asset4 identifier: ENERDP068)
SUSTREP	Binary variable which equals one if the firm publishes a stand-alone sustainability report in the current year and zero otherwise (Asset4 identifier: CGVSDP026)
YR	Multiple dummy variable based on the ten years under examination
IND	Multiple dummy variable based on the nine out of the ten industries of the Industry Classification Benchmark (Datastream item identifier: ICBIC)

All variables are based on data extracted from Thomson Reuters Datastream and Thomson Reuters ASSET4