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Abstract

In this paper, we study the financial market reactions to inclusion in and deletion from two Socially Responsible Investment (SRI) stock indexes (FTSE4Good Europe and ASPI Eurozone) for the period 2002-2011. Considering exclusively changes related to Corporate Social Responsibility (CSR) motives, we find new empirical evidence about the market reaction on both announcement and effective index recomposition. We confirm the informational relevance of SRI indexes to investors and corporations. Our main finding shows that financial markets react negatively and significantly to inclusions around the announcement and effective dates. This suggests that investors consider that being in a SRI index will induce higher costs for the firm. Moreover, a negative and significant reaction is observed for deletions around the announcement date. In addition, our results indicate that in periods of high uncertainty, the certification effect of SRI indexes is more important. Then, we show that the negative reaction to additions is true whatever the financial firm characteristics. In contrast, we find that these characteristics matter for exits. Indeed, the market penalizes firms with excess profitability which are excluded from SRI indexes.

Keywords: Corporate social responsibility, "environmental, social and governance" considerations, socially responsible investment stock indexes, firm value, stakeholders, event study.

JEL classification: G11, G12, G32, G34, M14

Abbreviations: Corporate Social Performance (CSP), Corporate Social Responsibility (CSR), Environmental, Social and Governance (ESG), Principles for Responsible Investing (PRI), So-

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cially Responsible Investment (SRI), Entry and Exit (E&E).

1. Introduction

Firms, investors and stakeholders have been increasingly concerned about CSR since the seventies. Recently, we have observed the development of the SRI market. Indeed, the SRI industry has grown rapidly around the world. To construct some standards and references to this industry, we have observed the development and the diffusion of SRI stock indexes (such as Dow Jones Sustainability indexes, KLD Domini 400, Calvert Social Index, FTSE4Good indexes and ASPI Eurozone, among others). Beyond providing performance benchmark for responsible portfolios, these indexes could give information to financial markets about the social responsibility of firms and help investors to take their investment decisions.

Indeed, many empirical studies (see Bouten et al., 2012; Brammer and Pavelin, 2006; Cormier et al., 2004; Gray et al., 2001, among others) have shown a lack of voluntary disclosure on CSR by firms. Moreover, the composition of SRI stock indexes gives to the market the only public information and external of the firm about its social responsibility. That is why some authors (Consolandi et al., 2009) speak about the "certification"[3] effect of SRI indexes. Investors, and especially institutional ones considered as key actors in this industry, can use this public information to re-balance their portfolios. We survey in our paper financial literature on SRI and financial indexes redefinitions.

The aim of our paper is to measure and analyze the market reactions to inclusion in and deletion from SRI stock indexes. We would like to state on the informational relevance of SRI indexes to investors and to corporations. Indeed, for investors and according to the efficiency hypothesis, the redefinition of SRI indexes could give a new information to the market and in that case we have to observe a market reaction. Moreover, for institutional investors, changes in SRI indexes can be the opportunity to re-balance their portfolios. For the firm side, we can wonder about the benefits to be in SRI indexes.

Our study explores the financial market reactions to redefinitions of two SRI stock indexes: FTSE4Good Europe and ASPI Eurozone (see Appendix A and Appendix B for more details). Our sample contains 373 changes (273 firms) over the period 2002 to 2011. We analyze 251 entries and 122 exits. To focus on CSR motives, unlike previous studies, we exclude all observations related to a change of the underlying financial index. Thus, our sample is free from financial contamination and only driven by CSR considerations. We follow the event study

[3] One can find several terms related to the same idea as "legitimacy" for Doh et al. (2010) or "reputation" for Robinson et al. (2011) or "reliability" for Lackmann et al. (2012).

regression methodology (Binder, 1998; Pynnonönen, 2005).

In this paper, we make many contributions to the existing literature on CSR. First, one purpose of our study is to extend research on CSR to an European sample, and especially on little studied European SRI indexes. Using on one side a long and recent period and on the other side two SRI indexes from different rating agencies, we find new and interesting empirical evidence about the market reaction. Second, we move beyond existing literature by distinguishing the announcement date and the effective date to analyze changes in SRI indexes composition. A reaction on the announcement date is consistent with the efficiency hypothesis of financial markets. However, one explanation of a change on the effective date can be the portfolios' re-balancing made by institutional investors. Third, unlike previous studies, we consider additions and deletions motivated exclusively by CSR considerations. Our results indicate a negative and significant reaction on financial markets. Moreover, this reaction is higher in high uncertainty periods. Fourth, our findings also illustrate the relationship between the market reaction and the firm characteristics. Especially in the case of exits, firms with excess profitability are penalized by investors.

The remainder of the paper is organized as follows. In section 2, we give a review of literature and develop our hypotheses. Section 3 presents our data and methodology. In section 4, we comment and discuss our empirical results with some robustness check. Lastly, in section 5, we provide our main conclusions and we suggest some further development for future research.

2. Review of Literature and Research Questions

2.1. Review of Literature

In this paper, we wonder about the role of SRI indexes in financial markets. Indeed, many empirical studies (Jiao, 2010; El Ghoul et al., 2011, among others) show that financial markets value positively CSR. Moreover, the index composition is considered as a signal of CSP. We do not question here the relevance of the construction process of these indexes[4]. After reviewing

[4]The interested reader can refer to Fowler and Hope (2007) who review the SRI indexes' methodologies and discuss theirs impacts on firms' and investors' practices. Moreover, Ziegler and Schröder (2010) explore the determinants of the inclusion of European firms in the Dow Jones sustainable indexes. They confirm the relevance of the slack resource theory. Studying the process selection of inclusions in these sustainability indexes, they claim that many factors used are not related to corporate social activities and thus question the relevance of these indexes as a proxy of CSP.

main studies about changes in SRI stock indexes, we give a survey of literature about the market reaction after redefinitions of financial indexes.

We review thereafter the closest papers to our study since each of them analyzes the market reaction to entry and/or exit (E&E) of a firm in a SRI index. Over 2001 to 2006, Consolandi et al. (2009) study inclusion in and deletion from Dow Jones Sustainability Stoxx Index (DJSSI). They suggest an increasing interest to CSR performance of firms through a significant market reaction. Lackmann et al. (2012) studying inclusions in the DJSSI from 2001 to 2008 conclude that the positive market reaction is stronger for firms with high systematic investment risk, high financial leverage, and high levels of opportunistic management behavior. On the Dow Jones Sustainability World Index (DJSWI) over the period 2003-2007, using a sample restricted to North American companies, Robinson et al. (2011) provide evidence of a positive relation between corporate sustainability and firm value. Entries (exits) induce a permanent (temporary) price increase (decline). They suggest that benefits (reputation) of firm membership to the DJSWI are more important than the associated costs. Cheung (2011) finds on the DJSWI from 2002 to 2008 that there is no significant impact of announcement (inclusion and exclusion) on stock return and risk. However, he documents an effect on the day of change. Doh et al. (2010) study the inclusion in and deletion from Calvert Social Index from 2000 to 2005. They find no positive effect for inclusions and a negative effect for exclusions. They suggest several explanations for this asymmetric reaction (investors' psychological asymmetry between gain and loss, prospect theory). To understand the increasing interest in social indexes, they propose the institutional theory on the antecedents and consequences of reputation. Becchetti et al. (2012) study inclusion in and deletion from the Domini 400 Social Index on the period of 1990 to 2004. They found a significant negative effect after deletion announcements from the index. They suggest that this negative effect is mainly due to the portfolio re-allocation of ethically funds rather than to an negative shock on expected firm value. Clacher and Hagendorff (2012) studying inclusions in the UK FTSE4Good index over the period 2001-2008 find no strong evidence in favor of a positive market reaction, but a large variation of effects depending on firm characteristics.

As one can see these results are far from uniform. Moreover, there are also discrepancies in studied periods and suggested interpretations. To our knowledge, there is no multi-indexes study that could bring some lights on the eventual differences between them. Lastly, some studies include revisions that are not solely related to CSR since some revisions of SRI indexes

are exclusively motivated by financial considerations.

For financial indexes redefinitions, many authors study changes of S&P500 index[5]. Harris and Gurel (1986) explain that changes in the S&P500 list over the period 1973-1983 are consistent with the price-pressure hypothesis (see also Elliott and Warr (2003)). The announcement of an addition increases immediately prices. However two weeks after, this increase is nearly fully reversed. Jain (1987) attributes the observed stock price effect to information about firms' future prospects. Pruitt and John-Wei (1989) confirm the price pressure effect and provide evidence of a positive correlation between institutional investors holdings and changes in S&P500 composition. Dhillon and Johnson (1991) find results consistent with both the imperfect substitutes and information signaling hypotheses. Beneish and Whaley (1996) study the effects of pre-announcing changes in S&P 500 index composition five days beforehand from January 1986 to June 1994. Their results show an increase of prices from the close on the announcement day to the close on the effective day. More recently, Denis et al. (2003) study earning expectations of added firms to S&P500 and they conclude that these inclusions are not an information-free event. Chen et al. (2004) find also an asymmetric reaction of the market to additions and deletions. They provide a new explanation of this result suggesting an increase of investor awareness for additions but not necessarily a decrease of awareness for deletions. These different arguments given by financial literature to understand market reactions to inclusions in and deletions from financial indexes give as some insights to study and explain SRI indexes changes.

2.2. Research Questions

From previous literature, different research questions can be studied about the market reaction to the inclusion (deletion) of a company in (from) a SRI index. In this paper we deal with four still open questions.

Our first question is to know if the market reaction is observed on the announcement date of the index composition change and/or on the effective one. Indeed, a reaction on the announcement date is consistent with the efficiency theory of financial markets. The redefinition of the index gives a new information to the market and as a consequence we could observe a reaction on this date. SRI indexes give the only public information about firms' CSR. Moreover, many

[5] Elliott et al. (2006) give a survey of literature of studies and theories on market reaction after S&P500 changes. For the Dow Jones Industrial Average (DJIA), see for exemple Beneish and Gardner (1995).

authors mention that firms disclose in a limited way information about their CSR (Brammer and Pavelin, 2005; Gray et al., 2001; Bouten et al., 2012; Cormier et al., 2004; Brammer and Pavelin, 2006; Clarkson et al., 2008). Finally, as mentioned in Cox et al. (2007), the development of institutional investment in the SRI industry can be added as another explanation to a reaction on the announcement date.

The other possibility is to expect a reaction on the effective date of the SRI index change (as in Beneish and Whaley, 1996). Investors and especially institutional ones could wait the effective date to re-balance their portfolios. Such a reaction is consistent with the price pressure hypothesis (Harris and Gurel, 1986). Furthermore, Cheung (2011) shows a significant but temporary change in stock returns on the day of the index change. So, to answer to this first question we test the following hypothesis:

Hypothesis 1:

The market reacts to SRI indexes redefinitions on the announcement and on the effective dates.

For our second question, we wonder about the sense and the strength of the market reaction for additions and deletions.

Indeed, in the case of additions, positive and negative reactions are observed in earlier empirical studies. Financial literature gives many explanations for a positive reaction. First, we have the short-term downward sloping demand curve argument consistent with the price pressure hypothesis (see Harris and Gurel, 1986; Blouin et al., 2000). Second, we have the long-term downward sloping demand curve arguing that the excess return should be permanent (see Shleifer, 1986; Beneish and Whaley, 1996; Lynch and Mendenhall, 1997; Kaul et al., 2000; Wurgler and Zhuravskaya, 2002). Third, we can also suppose that the demand curve is perfectly elastic. In that case, an addition to the index will change the expected cash-flows an/or the discounted rate of the firm (certification hypothesis, see Jain, 1987; Dhillon and Johnson, 1991) and will enhance investor awareness (see Denis et al., 2003). As a consequence, the firm price will increase. Merton (1987) argues that firms can spend resources to be rated by agencies in the objective to expand their investor base.

However, a negative reaction of the market after an addition means that investors consider that being in a SRI index will induce costs higher than benefits for the firm. In that case, CSR will be costly for the firm (see for example Aupperle et al., 1985). Such a reaction will

be consistent with neoclassical argumentation (Friedman, 1970)[6]. From financial literature about financial indexes, Hegde and McDermott (2003) and Chordia et al. (2011) explain such a negative reaction as a consequence of an increase of trading volume and liquidity. Investors will have more available information about firms added to an index which will reduce the information asymmetry and as a consequence improve liquidity and reduce the required rate of return.

For deletions, no reaction or a negative one are observed in earlier studies. Indeed, a significant price decline can be consistent with the information cost/liquidity explanation (see Beneish and Gardner, 1995). Other arguments related to investors behavior and awareness can be given (see Doh et al., 2010; Chen et al., 2004; Oikonomou et al., 2012) to understand both negative and no reaction. Taking into account all these arguments, we test the following hypothesis:

Hypothesis 2:

The market reaction differs in sign and magnitude for additions to and deletions from SRI indexes.

Our third question is to wonder about the market reaction over the time. Because, we have a ten-years period, we are able to analyze the stability of the market reaction over the time. First, we look about a trend evolution. Indeed, as a consequence of ethical demand of investors and of the increase of SRI industry, we could expect an increasing reaction of firms, investors and markets. Second, because our period study covers financial crisis, we test the dependence of our results to market conditions. Lackmann et al. (2012) argue that in high economic uncertainty, firms benefit more of an increased reliability of their sustainability information. These ideas are summarized in the following hypothesis:

Hypothesis 3:

The market reaction to changes of SRI indexes is not the same over the time.

H3a: *There is a trend evolution.*

H3b: *The reaction depends on the market conditions.*

Our fourth question concerns the relationship between the market reaction and the economic and financial characteristics of firms. Indeed, Gray et al. (2001) show that size, profit and industry affiliation are corporate characteristics determining information disclosure about CSR.

[6] Friedman (1970) argues that there is no role for CSR.

Moreover, Clacher and Hagendorff (2012) find that positive market reaction to inclusions is observed in the case of large firms, with low leverage and high level of employee productivity. Lourenço et al. (2012) indicate that large profitable firms can be penalized by the market due to their low level of CSP.

Otherwise, we can also mention the risk management hypothesis introduced by Godfrey et al. (2005) and Godfrey et al. (2009) to understand a possible relationship between firm characteristics and market reaction. Indeed, managers who decide to improve the CSR of their firms can create value for their shareholders.

Furthermore, Oikonomou et al. (2012) emphasize the importance of the market conditions in the determination of the nature and the strength of the CSP-risk relationship. Besides, they argue that exists a negative but weakly relation between CSR and systematic firm risk. Moreover, their results show a positive and strong relationship between corporate social irresponsibility and financial risk.

Finally, Lackmann et al. (2012) conclude that reaction to an increase in the reliability of sustainability information is stronger for firms with high systematic investment risk, high financial leverage, and high levels of opportunistic management behavior. Cheung (2011) finds little change of systematic risk and high idiosyncratic risk after announcements. Our objective here is to identify firm characteristics which interact with CSR. We study the following hypothesis:

Hypothesis 4:

The market reaction depends significantly on firm characteristics.

So, we test in our paper these four hypothesis related to changes in SRI indexes. Moreover, we add some other tests to check the robustness of our results. We give in the following section details about our data and methodology.

3. Data and Methodology

As mentioned above, we study the financial market reactions to inclusion in and deletion from two SRI stock indexes. We explain in the next subsection (3.1) how we construct our database. Then, we turn to the methodology (3.2).

3.1. Data

Our study explores the European financial market reactions to inclusion in and deletion from SRI indexes. We particularly focus on the evolution of these reactions over the time. Thus,

we need a long period. We choose the FTSE4Good Europe and the ASPI Eurozone indexes. Both were introduced in 2001 respectively by the FTSE Group and the extra financial rating agency Vigeo. Their objectives are different. The FTSE4Good Europe is based on the respect of minimal requirements within the FTSE Europe firms while the ASPI Eurozone index focus on the 120 best firms within the EURO STOXX 600 firms (see Appendix A and Appendix B for more details).

Even if their criteria differ, these indexes share a geographic area and rely on the same kind of methodology:

a. A financial index determines the investment universe;
b. Firms within this universe are analyzed from a CSR point of view;
c. Periodically, the list of the constituents is reviewed by a committee fixing addition in and deletion from the index;
d. Following a predefined agenda, these changes are announced and made later on an effective date.

All additions to and deletions from the two indexes are handled by a committee that conducts periodical reviews. The frequency and date of reviews change according to the index respectively Semi-annual (March and September) for the FTSE4Good Europe and Annual-Quarterly (September - March, June, and December) for the ASPI Eurozone. Outside of these scheduled announcements, reviews are made exclusively based on financial considerations (e.g. exit of the investment universe, M&A operation, spin-off).

We collect these announcements from different sources: the index provider archive website (FT and Vigeo provide a comprehensive archive set[7]) and the Factiva database[8]. Excluding the launching period, we start our collection by year 2002 until 2011. From this hand collected sample[9], we identify:

a. The changes made to the index: the firm(s) and the operation type (entry/exit);
b. The announcement date: the date when changes are announced;
c. The effective date: the date when the effective change of composition is made.

[7] By November 2012 http://www.vigeo.com/csr-rating-agency/en/5-3-communiques-aspi-2

[8] We run searches about news containing the index name in **newspapers**.

[9] We also cross-checked with Datastream Index Constituent Lists. However, these lists are monthly and thus provide less accurate information.

In this sample all revisions are not linked to CSR. For instance, exclusion from the financial underlying index (because of financial features) leads mechanically to the exclusion of the firm from the SRI index without any relation to the CSR. Focusing exclusively on entry as Clacher and Hagendorff (2012) does not solve this issue since some inclusions are also exclusively financially motivated (a spin off or a merger for instance).Thus, to focus on CSR motives and unlike previous studies, we exclude all operations motivated exclusively by financial considerations. To achieve this objective, we first exclud all unscheduled announcements. Then on remaining scheduled announcements, we exclud operations motivated by financial consideration. Table 1 describes the initial sample.

[Table 1 about here.]

We can observe from table 1 that we have a total of 508 firms with 720 events identified in 164 different announcement dates. These initial events are approximately balanced with 375 additions and 345 deletions. However, exclusion of financially motivated operations strongly unbalance the initial sample. It excludes 265 operations (36% of the initial sample) and affect much more deletions than additions. Indeed, deletions due to exit of the underlying financial index is the most frequent operation. To achieve our final sample, we also apply others selection criteria summarized in table 1.

We note that exclusions are numerous (345 cases). However, the most important filter accounts for 76% of exclusions (*Event Financially Motivated*). This selection grants that our findings are not contaminated by financial operations unrelated to firms' CSR behavior. Moreover, we consider only the first Entry or Exit of a firm in one of the two indexes. That is why we eliminate 67 events considered as a confirmation event. Missing data (Datastream, Worldscope or days) account only for 11 exclusions. These selections may affect more strongly the FTSE4Good Europe. Since the underlying index is wider, it may includes firms with lower size (Worldscope coverage) or lower liquidity (missing days). Our final sample contains 373 events with 273 firms. Table 2 details the composition of this sample: country, index, operation type, ICB super-sector, year, and type of announcement.

[Table 2 about here.]

As we can see from table 2, over the 373 events, 21% of observations concern France. Another group of countries (Germany, Spain, Italy and United Kingdom) are between 16% and

8%. Moreover, 67% of operations are entries (see figure B.1 for the number of E&E by date). We see also that these inclusions in and deletions from relate first to the financial sector by 20%, then we find three other important sectors: industrials, consumer services and consumer goods with respectively 18%, 14% and 12%. Finally, we can observe that in 2003, 2004 and 2005 we have over than 45% of indexes changes.

[Figure 1 about here.]

For financial data, we use Datastream and Worldscope. We particularly use: *P#S* the unppaded end of day adjusted price, *DDE* the dividend on ex date. These variables enable us to compute the share daily return: $R_{i,t} = \frac{P_{i,t}+DDE_{i,t}-P_{i,t-1}}{P_{i,t-1}}$. To proxy the market return for each country, we use a financial index such as for France CAC 40, for UK the FTSE 100, for Germany the DAX 30, for Belgium BEL 20, for Netherlands AEX 25 and for Portugal PSI 20 (Benchmark index from Datastream category "Market at a Glance")[10].

For these indexes, we compute the market daily return ($R_{m,t}$). We also download control variables (refer to table 3 for the complete list). For variables expressed as currency amounts, when several countries with different currencies are involved, we express all amounts using Euro.

3.2. Methodology

We follow the event study regression methodology (Binder, 1998; Pynnonönen, 2005). We first extract three time-series:

a. The estimation period $[-135; -15]$ relative to the announcement date;

b. The announcement period $[-5; 5]$ around the announcement of changes;

c. The effective period $[-1; 1]$ around the effective changes of the index composition.

Then, we stack these observations together removing possible duplicates between announcements and effective periods (see figure B.2 for the number of days between announcement and effective dates). We then run the following kind of regression:

$$R_{i,t} = \alpha_i + \beta_i \times R_{mt} + \sum_{a=-5}^{5}(A_a \times \gamma_{Aa}) + \sum_{e=-1}^{1}(E_e \times \gamma_{Ee}) + \epsilon_{i,t}$$

where $R_{i,t}$ is the share i return on day t, R_{mt} the corresponding market returns, A_a (E_e) are dummies that worth 1 if the day is day a (e) relative to the announcement (effective) date and 0

[10]We follow Campbell et al. (2009) a local market index without currency conversion.

otherwise. Hence, the first part of equation is the standard market model that applies to all days, the first summation captures the effects around the announcement while the second summation captures the effects around the effective date[11].

[Figure 2 about here.]

One advantage of this methodology is that it can deal with the cases where the effective change falls within the 5 days after the announcement (effective and announcement windows overlap) which is rare but exists in our sample. Moreover, it allows a single, one pass estimate taking directly into account the event/firm features by including relevant variables into the model.

From this base model, we distinguish the operation (entry or exit) and we add two other variables relative to trend and market uncertainty. Indeed, *Trend* represents the number of years elapsed since January the 1^{st} 2001. This variable should capture the growing interest and valuation of CSR. Thus, we use two different parameters for E&E on all days. For *Market Uncertainty*, the variable is zero if the market volatility is within the bottom 60% (low) and σ_m otherwise. According to the certification hypothesis, the reaction to an information should increase with uncertainty. We use also two different parameters for E&E exclusively to announcement days. We run the following regression:

$$
\begin{aligned}
R_{i,t} = {} & \alpha_i + \beta_i \times R_{mt} \\
& + \mathbb{1}_{Entry} \times \Bigg(\sum_{a=-5}^{5} A_a \times \gamma_{Entry,Aa} + \sum_{e=-1}^{1} E_e \times \gamma_{Entry,Ee} \\
& + \mathbb{1}_{Event} \times \gamma_{Entry,TT} \times Trend \\
& + \mathbb{1}_{Event} \times \gamma_{Entry,MU} \times Market\ Uncertainty \Bigg) \\
& + \mathbb{1}_{Exit} \times \Bigg(\sum_{a=-5}^{5} A_a \times \gamma_{Exit,Aa} + \sum_{e=-1}^{1} E_e \times \gamma_{Exit,Ee} \\
& + \mathbb{1}_{Event} \times \gamma_{Exit,TT} \times Trend \\
& + \mathbb{1}_{Event} \times \gamma_{Exit,MU} \times Market\ Uncertainty \Bigg) \\
& + \epsilon_{i,t}
\end{aligned}
\tag{1}
$$

[11] Capelle-Blancard and Couderc (2009) choose a shorter (longer) period around the announcement (effective) date.

To validate (H1) we expect that parameters around the announcement date ($\gamma_{.,A.}$) and around the effective date ($\gamma_{.,E.}$) be significantly different from 0. Moreover, to check our second hypothesis (H2) about the different reaction to E&E, we expect different parameters on entry ($\gamma_{Entry,.}$) and on exit ($\gamma_{Exit,.}$). For our third question (H3), we test if the impact of changes in SRI indexes evolves along the time and with market conditions. Thus to validate (H3), the values of trend parameters ($\gamma_{.,TT}$) and Market Uncertainty parameters (γ_{MU}) must be significantly different from zero.

Finally, our fourth question deals with the dependence of our results to firm characteristics. We add to the regression main corporate variables mentioned in the literature. Thus to validate (H4), the values of parameters for Firm Characteristics must be significant. The sign of these parameters will be discussed in the next section.

4. Results

We first provide descriptive statistics in next subsection. Then, we turn to the analysis of the regression results 4.2. Lastly, subsection 4.3 introduces the robustness tests we run.

4.1. Descriptive Statistics

Table 3 provides descriptive statistics of variables and table 4 the correlations among them.

[Table 3 about here.]

Extreme values of variables in table 3 (compare the extrema and $P10$, $P90$) lead us to winzorize all variables at a 1% level prior to the regression.

[Table 4 about here.]

From table 4, we notice that correlations albeit significant are not that important with the noticeable exceptions of couples $Firm\,Risk$ - $Market\,Uncertainty$; $Firm\,Risk$ - $Size$ and $Excess\,Profitability$ - $Market\,to\,Book$.

4.2. Regression Results

In this subsection, we discuss our results given in tables 5 and 6[12]. Dealing with our first question ((H1)), we study the market reaction to the changes of the SRI indexes around the

[12]Prior to regression, and after winzorization, we center and reduce all variables. Thus, the parameters detailed hereafter should be understood as the effect of one standard deviation of each variable.

announcement and the effective dates . As we have mentioned earlier, the meaning of these two dates are quite different. Indeed, announcement of SRI index revisions may bring new information to the market while the effective date is no surprise. Hence, an effect around the effective date is not informational but can be related to a re-balancing of portfolios by institutional investors as funds. For instance, replication of CSR index would lead to an effect around the effective date[13]. However, such effect does not reveal the market's valuation of CSR. From table 5, our results show significant market reactions both on announcement and effective windows. The period of effect depends on the kind of the index redefinition. For additions, the reactions are observed around the announcement and effective dates. However, for deletions the reactions occur only around the announcement. These results can be explained in three ways: an anticipation effect of investors (before the announcement) , the informational relevance of SRI indexes (around the announcement) and portfolio re-balancing effect (around the effective date). Theses effects are deeply analyzed with next hypotheses.

For the second hypothesis H2, we can observe significant and negative reaction for E&E. Indeed, for additions, we obtain negative and significant reaction four days after the announcement, on the effective date and one day after. Moreover, we can note that the cumulative effect is significant and negative around these two dates.

For exits, we obtain a negative and significant reaction only around the announcement date. The market reacts four and three days before the announcement. An exclusion of a firm from an SRI index is anticipated (a bad CSR performance or problems encountered as for example environmental accidents or ethical objections) and considered as bad news by investors (which are going to sell these stocks) corresponding to a "punctual" penalization. This negative and significant effect is also observed on day three after the announcement. We note also that this negative reaction around the announcement is confirmed with the cumulative coefficients.

[Table 5 about here.]

Dealing with our question about the market conditions, we test our third hypothesis H3. Results in table 5 show positive and significant coefficient only for trend in the case of additions. Market reaction is high and significant over the time for entries. As mentioned by Consolandi et al. (2009), the increase of investors' awareness to CSR and the development of SRI industry could explain this reaction. However, Market Uncertainty coefficient is negative and significant

[13]Changes close the true revision date minimize the tracking errors.

only in the case of exits. This result is consistent with recent literature (Lackmann et al., 2012; Oikonomou et al., 2012) showing that market reaction to CSR is higher in economic uncertainty period compared to a stable one.

[Table 6 about here.]

In hypothesis H4, we add to our base model variables related to the market and the firm characteristics. We summarize results in table 6. Fischer test indicates that this regression does add significant explanatory power compared to the previous model.
Our first observation is about trend coefficients which remain the same, positive and significant for entries. For market uncertainty, we obtain a significant and positive coefficient for entries and a significant and negative one for exits. This result reinforces the certification effect of SRI indexes in periods of high uncertainty. For firm characteristics, we can observe that no coefficient is significant for entries. Whatever the non-CSR characteristics of firms, an entry is analyzed by investors as costly in the future. For exists, the main result is obtained with a negative and significant coefficient for excess profitability variable. The market penalizes firms with excess profitability which are excluded from SRI indexes. In contrast, firms with high market to book value are less exposed in case of a deletion from a SRI index.

4.3. Robustness Checks

We make many tests to check the robustness of our results. First, we consider the choice of the benchmark. Indeed, we use for each country the national benchmark index (mainly these indexes are oriented toward the biggest firms). So, we make tests using the Datastream "Total Market Index (totmkXX)" which are broad indexes aimed to represent the whole market[14]. The results (available upon request) show that our evidences are robust to the benchmark we use.

To check for possible error measurement, we consider alternative measures of our main variables. For trend, instead of the time elapsed since January 2001, the 1^{st}, we consider the number of year (Ceil(Trend)) with similar results. In the case of uncertainty, we use the dummy counterpart ($\mathbb{I}_{Uncertainty>0}$) and the market volatility. Theses proxies provide almost identical

[14]Here are used indexes: Austria: wiener boerse index (WBI), Belgium: Luxembourg BEL 20, Denmark: omx Copenhagen (OMXC20), Finland: omx Helsinki (OMXH), France: SBF 120, Germany: DAX 30, Greece: athex composite, Ireland: Ireland se overall (ISEQ), Italy: Msci italy, Netherlands: AEX index (AEX), Norway: Oslo se (OBX), Portugal: Portugal PSI-20, Spain: IBEX 35, Sweden: omx affarsvarldens general, Switzerland: Swiss market (SMI), United Kingdom: Ftse all share

results although significance varies. Lastly, we consider the standard deviation of the firm return on equity over the last three years as an alternative to Firm Risk with similar conclusions.

During our study, we account for the data features to provide valid inference using clustered standard error. However, the significance we provide is only asymptotic and could be influenced by outliers, leverage or small sample. To provide further evidence of the robustness of our results, we bootstrap our regression model (see Flachaire, 2000, for an introduction) and compute bootstrapped p-values.

Since our model relies on dummies identifying the event days and to preserve the information into explanatory variables, we consider residual re-sampling rather than observation re-sampling. However, we do not use bootstrap residual (see Hein and Westfall, 2004) since it is only "marginally robust to non i.i.d. data". Moreover, the independent sampling of residual does not respect the peculiar cluster structure we are interested in. Thus, we consider wild bootstrap adapted to cluster following Cameron et al. (2008).

From the constrained model (enforcing H0 : the variable we introduce are jointly null), we generate a new pseudo sample as $y_t^* = \tilde{y}_{c,t} + \upsilon_t \times \tilde{\varepsilon}_{c,t}$. Where, $\tilde{y}_{c,t}$ and $\tilde{\varepsilon}_{c,t}$ are the predicted and residual obtained from the constrained model (a CAPM model without event parameter) and υ_t, is randomly chosen within a Rademacher distribution (as recommended by Davidson and Flachaire, 2008). Following, Cameron et al. (2008) we adapt the bootstrap to clustering by generating one υ_t for each cluster and each date (thus this wild bootstrap preserve the cross-correlation within the cluster). From the pseudo sample, we estimate the regression model and compute (exactly as previously) the statistic of interest (Wald tests). We repeat this procedure 1000 times to obtain the empirical distribution of the statistics. From theses estimated statistics, we report the bootstrapped confidence level (α) such that the $1 - \alpha$ quantile is the first one inferior to the obtained statistic.

As one can notice in table 7, bootstrap p-values are quite close to asymptotic one. Thus, our results are robust, they are not an artifact of event clustering.

[Table 7 about here.]

5. Conclusion

The existing literature on CSR is large. In this paper, we study the puzzling question of the market reaction to addition in and deletion from SRI indexes. We extend research on CSR to an European sample for a long and recent period. Using two different agencies of SRI indexes and

excluding all events not related to CSR considerations, we find new and interesting empirical evidence about the market reaction.

Indeed, by distinguishing the announcement and the effective dates of changes in SRI indexes composition, the market reaction is significant on both dates. Especially, we find a negative and significant market reaction around the effective date for entries. This new result is explained by different arguments. First, the cost of being and remaining in a SRI index for firms is higher than the benefits. Second, many non-SRI institutional investors decide to rebalance their portfolios on the effective date by selling these included firms. We can also argue that these investors may have speculative strategies concerning added firms by buying on the announcement and selling on the effective day. Consistent with earlier studies, we find a negative and significant market reaction around the announcement date for exits. The exclusion from an SRI index is considered as a bad news and the market penalizes excluded firms.

Giving the time trend effect, we show the increasing integration of CSR in asset management especially for entries. Moreover, we find that market uncertainty reinforces the certification effect of SRI indexes. Finally, we show that the negative market reaction to additions in SRI indexes is verified whatever the firms characteristics. Opposite, we find a relationship between the market reaction and the firm characteristics in the case of exits. Indeed, financial markets penalize firms with excess profitability excluded from SRI indexes.

For further research, we think that it is interesting to study the relationship between the market reaction and the firm reputation.

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Appendix A. FTSE4Good indexes

FTSE4Good index series were introduced in 2001 by FTSE Group. They are considered as a benchmark that should capture firms environmental, social and governance practices. FTSE Group works in partnership with EIRIS (Experts In Responsible Investment Solutions) a leading provider of ESG data. An independent oversight and governance is given by The FTSE4Good policy committee with the support of two specialist subcommittees and an advisory US committee. The committee's role is first to act as an independent judge that EIRIS and FTSE follow the criteria and methodology; second to approve changes in FTSE4Good indexes; third to oversee the consultation process undertaken to develop new criteria; and finally to approve criteria revisions or new criteria.

FTSE4Good index Series encompass four tradable indexes (Global 100, US 100, Europe 50, and UK 50) and five benchmark indexes (Global, US, Europe, UK, and Japan). Firms are eligible for inclusion in the appropriate FTSE4Good benchmark or tradable index if they are current constituents of universe indexes (relevant geographic part of the FTSE all world or all share index).

The FTSE4Good index Series are reviewed semi-annually in March and September, using market data as at the close of the last trading day in February and August respectively. Changes arising from the reviews of the FTSE4Good indexes will be implemented after the close of business on the third Friday in March and September. If one or more constituents are deleted from a FTSE4Good tradable index during the period up to the next semi-annual review, firms in the reserve list published by FTSE will be included. For inclusion, eligible companies must meet criteria requirements in five areas: Working towards environmental sustainability; up-holding and supporting universal human rights; ensuring good supply chain labor standards; countering bribery; and mitigating and adapting to climate change. Otherwise, firms that have been identified as having business interests in marketing of breast milk substitute, uranium mining or nuclear power are excluded (negative exclusionary screen).

Appendix B. ASPI Eurozone index

ASPI Eurozone index (Advanced Sustainable Performance Index) was introduced in 2001 by Vigeo. It is an equity index composed by the Eurozone's top 120 sustainability performers. It uses the Vigeo sustainability rating system and it is based on a best-in-class and a positive screening approach. Indeed, Vigeo assesses and rates the performances of firms in six areas of corporate environmental, social and governance responsibility (environment, human rights, human resources, community involvement, business behavior and corporate governance). It uses a rating scale of five levels (leader, advanced, average, below average and unconcerned). These ratings are translated into ASPI scores. Then, the six ASPI scores, relating to each of the six CSR domains, are geometrically averaged.

For the calculation of the ASPI index, Vigeo is working with two partners IEM Finance, a consulting firm and STOXX limited, a leading index producer. The reference index is the EURO STOXX 600. All additions to and deletions from the ASPI Eurozone index are implemented by the ASPI Committee. This latter is composed by members from Vigeo and IEM Finance. It is responsible of the management of ASPI including ASPI Eurozone. In September of every year, an annual review of the index composition is conducted. The results of this review are announced on the first Friday of September. However, implementation will be based on the closing share price on the third Friday of September and will become effective on the next trading day. Moreover partial reviews of the index are conducted in December, March and June (review first Friday, implementation third Friday and effective on the next trading day). Finally, on-going reviews are conducted in special cases (initial public offerings, spin-offs, mergers and acquisitions, etc.).

Figure B.1: Entries and Exits by Announcement Date

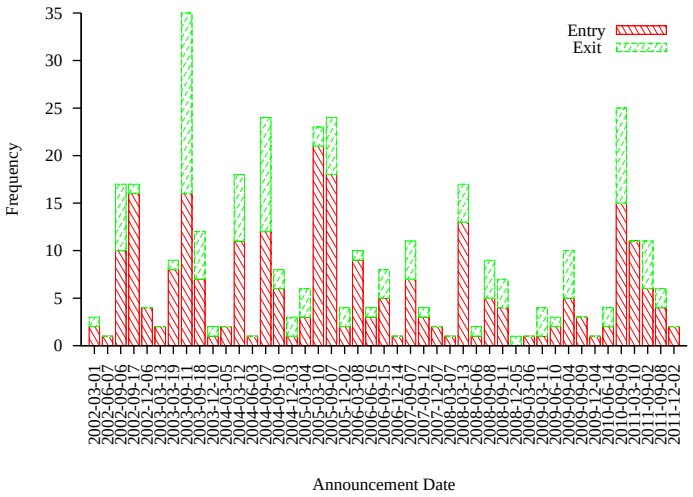

Figure B.2: Days between Announcement and Effective Dates

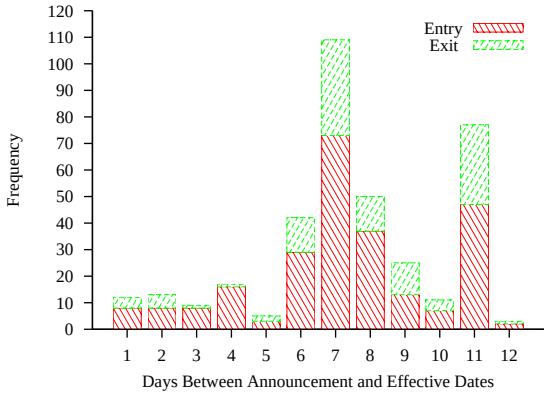

Table 1: Description of the Initial Sample and Filters

Index	# Events	# Announcements	# Firms	#Additions	# Deletions
ASPI Eurozone	305	57	191	153	152
FTSE 4 Good Europe	415	107	317	222	193
	720	164	508	375	345

Filter	# Exclusions	# Events	# Firms
Sample Population	.	720	419
Event Financially Motivated	265	455	.
Confirmation SRI Event	67	388	.
No Datastream Data	2	386	.
Confounding Corporate Event	2	384	.
Missing Trading Days	8	376	.
No Worldscope Data	3	373	.
Final Sample	.	373	273

The first part of this tables describes the initial sample. # Events is the total number of addition in and deletion from over the period, # Announcements is the number of announcement dates, # Firms is the number of firms, # Additions (# Deletions) is the number of addition in (deletion from) the index.
The second part details the filters used to construct our sample. Filter "Event Financially Motivated" deletes announcement due to exclusively to a financial motivation, "Confirmation SRI Event" deletes all changes in SRI indexes about a firm after the first announcement, "No Datastream Data" deletes share that we do not match reliably within Datastream, "Missing Trading Days" deletes event with missing days in one of the windows (the reference $[-135;-15] \cup$ the announcement $[-5;5] \cup$ the effective $[-1;1]$), "No Worldscope Data" deletes event without previous end of year Worldscope data.

Table 2: Sample Distribution

Country	#	Frequency (%)
Germany	60	16.09
Belgium	11	2.95
Denmark	5	1.34
Spain	36	9.65
Finland	15	4.02
France	82	21.98
Greece	7	1.88
Ireland	3	0.80
Italy	30	8.04
Luxembourg	3	0.80
Netherlands	31	8.31
Norway	2	0.54
Austria	5	1.34
Portugal	10	2.68
Sweden	19	5.09
Switzerland	9	2.41
United Kingdom	45	12.06
	373	100.0

Sector	#	Frequency (%)
Oil & Gas	19	5.09
Basic Materials	34	9.12
Industrials	70	18.77
Consumer Goods	46	12.33
Healthcare	12	3.22
Consumer Services	53	14.21
Telecommunications	13	3.49
Utilities	30	8.04
Financials	75	20.11
Technology	21	5.63
	373	100.0

Year	#	Frequency (%)
2002	42	11.26
2003	60	16.09
2004	56	15.01
2005	57	15.28
2006	23	6.17
2007	17	4.56
2008	37	9.92
2009	22	5.90
2010	29	7.77
2011	30	8.04
2E4	373	100.0

Index	Type	#
ASPI Eurozone	Annual	155
ASPI Eurozone	Quarterly	50
FTSE 4 Good Europe	Semi Annual	168
		373

Operation	#	Frequency (%)
Exit	122	32.71
Entry	251	67.29
	373	100.0

Index	#	Frequency (%)
ASPI Eurozone	205	54.96
FTSE 4 Good Europe	168	45.04
	373	100.0

This table describes the partition according to main features of the data: country, index, operation, sector (first level of the ICB classification), and year. # gives the number of observations while Frequency is the relative frequency in percent.

Table 3: Descriptive Statistics of Variables

Variable	#	μ	σ	min	P10	Median	P90	max
Panel A: Estimation & Event Days (50150 Days)								
Share Return	50150	0.0408	2.338	-35.38	-2.326	0	2.421	53.38
Market Return	50150	0.0098	1.501	-11.06	-1.646	0.0572	1.544	14.43
Panel B: Firms & Event Features (373 Observations)								
Trend	373	4.300	2.851	0.170	0.712	3.190	8.690	9.925
Market Uncertainty	373	1.638	2.347	0	0	0	4.567	10.72
Sales Growth (y - 1)	373	12.64	62.92	-46.88	-11.31	8.376	29.83	1155
Market to Book Value	373	2.427	3.096	-6.310	0.880	1.790	4.780	47.54
Size (log million €)	373	15.39	0.947	11.59	14.30	15.35	16.58	18.75
Firm Risk (scalled by market risk)	373	2.377	3.600	0.116	0.551	1.402	4.542	43.68
R&D (scalled by total assets)	373	1.157	2.775	0	0	0	3.358	24.21
Excess Profitability (percent deviation from the industry)	373	292.7	4385	-3033	-191.1	-42.97	252.2	81140
Root Mean Square Error	373	1.655	0.817	0.392	0.894	1.474	2.502	7.585

This table gives descriptive statistics (# the number, μ and σ are respectively mean and standard deviation and quantiles: min, $P10$, *Median*, $P90$, and max) about variables in regression. Panel A provides statistics based on all days (50.150 days: estimation + event days) and panel B on all event days (373 observations)

Table 4: Correlation among Variables (% - Pearson\Spearman - below\above the diagonal)

Variable	#1	#2	#3	#4	#5	#6	#7	#8	#9
#1: Share Return	100.	2.04	1.82	−5.82	7.28	−3.04	−6.40	−5.66	0.04
#2: Trend	−3.75	100.	−20.8***	1.60	−6.40	18.00***	−13.0**	−7.50	9.12*
#3: Market Uncertainty	10.06*	−7.07	100.	1.31	−12.2**	−9.06*	−22.6***	2.62	−5.85
#4: Sales Growth	0.83	−28.2***	19.11***	100.	6.10	−4.26	−2.22	−7.20	−0.57
#5: Market to Book Value	9.96*	−5.18	−22.4***	−1.67	100.	1.42	9.49*	11.54**	7.30
#6: Size	0.76	16.92***	−4.91	−1.60	12.69**	100.	−32.9***	−8.20	16.07***
#7: Firm Risk	7.24	−6.23	−47.4***	−5.70	16.49***	−25.5***	100.	−0.97	−0.78
#8: R&D	0.64	−5.01	5.95	−3.73	5.92	−10.2**	10.36**	100.	20.71***
#9: Excess Profitability	−3.65	6.64	−13.3***	6.13	32.14***	3.44	−9.39*	4.00	100.

This table provides, on the announcement day (A_0), the correlations among variables entering in regression. Pearson correlations are below the diagonal and above the Spearman (rank) correlations. *** stands a 1% significance level, ** 5%, and * 10%.

Table 5: Market Reaction to Entries and Exits in SRI indexes

Variable	Estimate		
	Entry	Exit	Dif.
A_{-5}	−0.035	0.014	−0.049
	(−0.65)	(0.18)	(0.33)
A_{-4}	0.028	−0.124**	0.152**
	(0.52)	(−1.67)	(5.22)
A_{-3}	−0.087	−0.146*	0.059
	(−1.60)	(−1.96)	(0.38)
A_{-2}	−0.063	−0.032	−0.031
	(−1.17)	(−0.44)	(0.11)
A_{-1}	−0.074	−0.051	−0.023
	(−1.37)	(−0.69)	(0.06)
A_0	−0.083	−0.042	−0.041
	(−1.54)	(−0.57)	(0.17)
A_1	−0.076	−0.040	−0.036
	(−1.41)	(−0.54)	(0.12)
A_2	−0.036	−0.039	0.004
	(−0.66)	(−0.53)	(0.00)
A_3	−0.004	−0.166*	0.161*
	(−0.08)	(−2.24)	(2.76)
A_4	−0.130***	−0.121	−0.009
	(−2.43)	(−1.64)	(0.01)
A_5	−0.070	−0.041	−0.029
	(−1.32)	(−0.56)	(0.13)
E_{-1}	0.031	−0.082	0.113
	(0.60)	(−1.12)	(1.52)
E_0	−0.118**	−0.038	−0.080
	(−2.22)	(−0.51)	(0.73)
E_1	−0.152***	0.131*	−0.283***
	(−2.88)	(1.78)	(12.18)
Trend	0.025**	0.000	0.024
	(1.69)	(0.03)	(1.24)
Market Uncertainty	0.020	−0.036*	0.056**
	(1.31)	(−1.57)	(4.94)
	Wald Tests		
$\sum_{t=-4}^{-1} A_t = 0$	−0.197	−0.354**	0.157
	(2.05)	(5.05)	(1.15)
$\sum_{t=-4}^{4} A_t = 0$	−0.526**	−0.762**	0.236
	(4.45)	(5.92)	(0.61)
$\sum_{t=0}^{4} A_t = 0$	−0.329**	−0.408*	0.079
	(4.11)	(3.18)	(0.09)
$\sum_{t=-1}^{1} E_t = 0$	−0.239**	0.012	−0.250*
	(5.25)	(0.01)	(3.34)
$\sum_{t=0}^{1} E_t = 0$	−0.270***	0.093	−0.363***
	(8.79)	(0.58)	(6.75)
	Fisher Tests		
	Against Base Model (Restricted)		1.682***
#	50150		
$Adj.R^2$	0.42		
Fixed Effect Country			
Fixed Effect Industry			

This table provides the estimates of model (1).
First part of the table provides the parameters estimates with the significance level (*** 1%, ** 5%, and * 10%) and below, in parentheses the t-values. Dif. column provides the value of *entry* − *exit* with the significance and the likelihood ratio test in parentheses bellow. Last two lines provides the adjusted R-Square ($Adj.R^2$) and number of observations (#).
Second part of the tables provides likelihood ratio test of the joint hypothesis written down. The first number provides the value of the sum with it significance and the number in parentheses below is the test value (distributed as a χ^2 with degree of freedom the number of constraints).
Since "star" significance is computed using a Likelihood ratio test, there can be some deviations between t-values and significance levels.

Table 6: Market Reaction to E&E in SRI indexes and Firm Features

Variable	Estimate		
	Entry	Exit	Dif.
A_{-5}	−0.029	0.021	−0.050
	(−0.53)	(0.28)	(0.33)
A_{-4}	0.034	−0.117**	0.151**
	(0.63)	(−1.56)	(5.13)
A_{-3}	−0.081	−0.139	0.057
	(−1.49)	(−1.85)	(0.34)
A_{-2}	−0.057	−0.025	−0.032
	(−1.05)	(−0.34)	(0.12)
A_{-1}	−0.068	−0.044	−0.024
	(−1.25)	(−0.59)	(0.07)
A_0	−0.078	−0.035	−0.043
	(−1.44)	(−0.47)	(0.19)
A_1	−0.071	−0.033	−0.038
	(−1.32)	(−0.44)	(0.14)
A_2	−0.031	−0.031	0.001
	(−0.57)	(−0.42)	(0.00)
A_3	0.001	−0.158*	0.158*
	(0.01)	(−2.12)	(2.72)
A_4	−0.125***	−0.114	−0.010
	(−2.33)	(−1.53)	(0.01)
A_5	−0.066	−0.034	−0.032
	(−1.24)	(−0.46)	(0.16)
E_{-1}	0.035	−0.077	0.111
	(0.67)	(−1.05)	(1.39)
E_0	−0.114**	−0.034	−0.080
	(−2.15)	(−0.47)	(0.72)
E_1	−0.148***	0.135*	−0.283***
	(−2.80)	(1.83)	(13.01)
Firm Risk (scalled by market risk)	0.031	−0.017	0.049
	(1.76)	(−0.50)	(2.42)
Sales Growth (y - 1)	−0.006	0.035*	−0.041
	(−0.39)	(1.13)	(2.54)
Market to Book Value	0.001	0.062**	−0.061
	(0.04)	(1.89)	(2.02)
Excess Profitability (percent deviation from the industry)	0.017	−0.028**	0.045**
	(0.80)	(−1.40)	(5.11)
R&D (scalled by total assets)	−0.014	−0.051	0.038
	(−0.80)	(−1.65)	(0.90)
Size (log million €)	0.009	−0.065	0.074
	(0.40)	(−2.10)	(2.08)
Trend	0.022*	0.024	−0.002
	(1.36)	(1.00)	(0.01)
Market Uncertainty	0.028**	−0.052**	0.079***
	(1.72)	(−1.84)	(10.40)
Wald Tests			
$\sum_{t=-4}^{-1} A_t = 0$	−0.172	−0.325*	0.153
	(1.60)	(3.79)	(0.96)
$\sum_{t=-4}^{4} A_t = 0$	−0.477*	−0.696**	0.220
	(3.83)	(4.58)	(0.50)
$\sum_{t=0}^{4} A_t = 0$	−0.304**	−0.371	0.067
	(3.91)	(2.61)	(0.07)
$\sum_{t=-1}^{1} E_t = 0$	−0.227**	0.024	−0.251*
	(5.11)	(0.02)	(3.27)
$\sum_{t=0}^{1} E_t = 0$	−0.262***	0.100	−0.362***
	(9.15)	(0.64)	(7.05)
Fisher Tests			
Against Base Model (Restricted)			1.375***
Against Uncertainty/Trend Model (Restricted)			1.273***
#		50150	
$Adj.R^2$		0.42	
Fixed Effect Country			
Fixed Effect Industry			

First part of the table provides the parameters estimates with the significance level (*** 1%, ** 5%, and * 10%) and below, in parentheses the t-values. Dif. column provides the value of *entry* − *exit* with the significance and the likelihood ratio test in parentheses bellow. Last two lines provides the adjusted R-Square ($Adj.R^2$) and number of observations (#).
Second part of the tables provides likelihood ratio test of the joint hypothesis written down. The first number provides the value of the sum with it's significance and the number in parentheses below is the test value (distributed as a χ^2 with degree of freedom the number of constraints).
Since "star" significance is computed using a Likelihood ratio test, there can be some deviations between t-values and significance levels.

Table 7: Bootstrap Results

Variable	Entry			Exit			Difference		
	Est.	As. P-Value	Bo. P-Value	Est.	As. P-Value	Bo. P-Value	Est.	As. P-Value	Bo. P-Value
A_{-5}	−0.029	0.568	0.595	0.021	0.740	0.740	−0.050	0.567	0.600
A_{-4}	0.034	0.456	0.455	−0.117	0.033	0.045	0.151	0.024	0.045
A_{-3}	−0.081	0.121	0.130	−0.139	0.120	0.125	0.057	0.559	0.600
A_{-2}	−0.057	0.290	0.315	−0.025	0.790	0.805	−0.032	0.728	0.725
A_{-1}	−0.068	0.337	0.385	−0.044	0.487	0.510	−0.024	0.795	0.805
A_0	−0.078	0.148	0.150	−0.035	0.616	0.645	−0.043	0.659	0.650
A_1	−0.071	0.127	0.130	−0.033	0.735	0.755	−0.038	0.710	0.745
A_2	−0.031	0.598	0.620	−0.031	0.626	0.620	0.001	0.994	0.995
A_3	0.001	0.993	0.995	−0.158	0.076	0.090	0.158	0.099	0.125
A_4	−0.125	0.009	0.020	−0.114	0.195	0.220	−0.010	0.915	0.910
A_5	−0.066	0.178	0.180	−0.034	0.699	0.705	−0.032	0.692	0.690
E_{-1}	0.035	0.575	0.555	−0.077	0.305	0.325	0.111	0.239	0.225
E_0	−0.114	0.023	0.035	−0.034	0.678	0.695	−0.080	0.395	0.440
E_1	−0.148	0.006	0.015	0.135	0.056	0.075	−0.283	0.000	0.005
Firm Risk (scalled by market risk)	0.031	0.118	0.200	−0.017	0.573	0.620	0.049	0.120	0.155
Sales Growth (y - 1)	−0.006	0.614	0.645	0.035	0.080	0.140	−0.041	0.111	0.165
Market to Book Value	0.001	0.968	0.980	0.062	0.040	0.085	−0.061	0.155	0.205
Excess Profitability (percent deviation from the industry)	0.017	0.268	0.370	−0.028	0.049	0.100	0.045	0.024	0.070
R&D (scalled by total assets)	−0.014	0.285	0.335	−0.051	0.182	0.295	0.038	0.344	0.455
Size (log million €)	0.009	0.728	0.750	−0.065	0.109	0.190	0.074	0.150	0.215
Trend	0.022	0.070	0.160	0.024	0.287	0.400	−0.002	0.942	0.945
Market Uncertainty	0.028	0.036	0.090	−0.052	0.018	0.055	0.079	0.001	0.020
Likelihood Ratio Tests									
$\sum_{t=-4}^{-1} A_t = 0$	−0.172	0.205	0.220	−0.325	0.052	0.060	0.153	0.326	0.360
$\sum_{t=-4}^{4} A_t = 0$	−0.477	0.050	0.055	−0.696	0.032	0.055	0.220	0.479	0.525
$\sum_{t=0}^{4} A_t = 0$	−0.304	0.048	0.045	−0.371	0.106	0.135	0.067	0.791	0.805
$\sum_{t=-1}^{1} E_t = 0$	−0.227	0.024	0.030	0.024	0.881	0.890	−0.251	0.071	0.105
$\sum_{t=0}^{1} E_t = 0$	−0.262	0.002	0.005	0.100	0.423	0.435	−0.362	0.008	0.020