

# **Does Mandatory Non-Financial Reporting Affect Firms' ESG Behavior?**

**Shahnawaz Akhtar   Elisa Saporito**

## **Abstract**

*This paper studies whether regulations on mandatory non-financial performance reporting have positive effects on firms' environmental and social governance policies. Our identification strategy is based on studying the effect of a law enacted by the European Union (EU Directive 2014/95/EU) that mandates large companies to report their non-financial performance post 2017. Using data on (i) EEA Emissions Trading, (ii) MSCI ESG rating, (iii) R&D Spending, (iv) R&D Spending intensity (v) Operating Revenue per Employee and (vi) Profit Margin, we analyse firms' ESG behavior pre and post implementation of the directive in 2017.*

*The evidence does not suggest any significant positive change in ESG behavior of firms post implementation of the directive. There is some negative effect on operating revenue per employee which we used as a proxy for exploitation of employees, however the negative sign of the coefficient is counterintuitive, and significance is lost when controlled for other demographic and financial characteristics.*

## **Introduction:**

International Organizations have been promoting the idea that ESGs have an impact on investment portfolios for a long time. One example is The UN Principles for Responsible Investing Initiative. Given the growing concern for environmental issues the literature on the relation between ESG and financial performance has been increasing. In particular, previous research has shown that ESG information is of the essence in financial markets, where investors are particularly interested in Environmental and Governance issues (Eccles et al. 2011). In fact, non-financial performance is increasingly taken into account to reduce uncertainty in firms' valuation (Cormier and Magnan 2007). Furthermore, firms with better ESG performance can access finance more easily (Cheng et al. 2014) and report lower cost of capital (Dhaliwal et al. 2011). Thus, good CSR is seen as an effective strategy for dealing with the interdependencies that exist in an organization among employees, investors, communities, and constituencies (Perrini 2006). All this points towards sustainability becoming more important for good business-performance in the long-term.

We believe that governments have a central role in helping the private sector improve its sustainability performance. They provide the legal framework and coordination mechanisms that can potentially allow agents to effectively change behavior. But have the measures taken so far been effective? We set out to answer this question by focusing on one initiative in particular: the EU Directive 2014/95/EU. The European Union started discussing how to improve transparency on sustainability issues across all European member states already in 2011 with “The Single Market Act I - Twelve Levers to Boost Growth and Strengthen the Economy”. In 2013 the Commission was appointed with first drafting a regulation, in 2014 they issued the Directive 2014/95/EU, and in December 2016 shared some guidelines for companies. Implementation by each state had to occur by December 6, 2016. The Directive is set to create greater transparency and firm accountability on sustainability issues. It requires companies to disclose their non-financial information including the policies they implement with respect to environmental protection, social responsibility and treatment of employees, respect for human rights, anti-corruption and bribery, and diversity on company boards. The Directive applies to large public interest companies with more than 500 employees, for a total of 6000 companies. Note that the regulation is flexible as it does not require firms to adopt a specific reporting guideline which means that firms will have some space in terms of deciding what will be their key indicators and nonfinancial performance narrative. The issuance of this Directive could just be the first step before requiring fully-integrated financial and non-financial reporting. The success of this regulation resides in the message that the European Union has been able to transmit: companies with good ESG performance will be rewarded.

The strong opposition it has faced from a segment of the private sector suggests it will have material consequences for the business community. For example, the UK Prime Minister advocated to reduce covered firms to a third of the original proposed number, the German business association and EUROCHAMBRES both expressed their dissent to the directive. Many stakeholders were also in favor of the Directive. Presumably those with stronger ESG performance. Some governments opened a public consultation to learn the perception of businesses. Analyzing the responses to the consultation from the Italian Government it seemed that, while companies recognized that they would have incurred economic and administrative burdens, they thought long-term benefits would outweigh the cost. Furthermore, a substantial portion advocated for stricter standards in the future. We believe that the contrasting but substantial reactions from the private sector make the case for expecting a significant impact of the Directive. The focus of our study is on the real effects on firms of the policy. Our study is two-fold. Firstly, we want to see whether firms actually changed behavior once the directive was implemented improving their ESG performance. Furthermore, we want to analyze whether the directive changed their profitability. The latter point is important for two reasons: (i) whenever a policy is implemented it is important to analyze the costs (and profitability is the most immediate one in this case) and (ii), as mentioned above, ESG information affects firms expenses.

Our paper is organized as follows. After the Introduction Section we will have a Literature Review focused on: (i) importance of ESG information for the private sector (ii) studies on non-mandatory financial disclosure (iii) studies on mandatory financial disclosure. In the following section we will present our Data and Methods for both the financial and sustainability analysis after which we will have a Summary Analysis of our results. We will then address potential pitfalls and limitations of our findings before concluding. We also believe there is scope for further research and included our ideas under Future Research. The last two sections are the References and Appendix.

## **Literature review**

Undoubtedly, good ESG performance is extremely important for the private sector. Not only most activities need a healthy ecosystem to thrive, but it has been proved that business ESG drivers upstream contribute to long-term financial performance and investment (e.g. KPMG 2006). MSCI 2019 analysis shows that changes in ESG characteristics are a predictive financial performance indicator both from a standpoint of their systematic and idiosyncratic risk profile. In particular, they find lower cost of capital, lower exposure to tail risks, as well as higher valuations and profitability. The most comprehensive study on this topic seems to be the one of Friede et al. 2015 who report that 1980 out of 2000 studies on the relationship between ESG and CFP find a significant relation, the majority of which positive.

Given the results mentioned above it comes with no surprise that non-financial reporting has a substantial impact on firms. Non-financial reports have increased dramatically between 2002 and 2015, especially for listed European firms in environmentally sensitive industries (Stolowy et al. 2018). Given the limited extent of mandatory initiatives the current literature has mainly focused on non-mandatory disclosures. Clarkson et al. find that in the Australian context firms with higher pollution propensity scores disclose more objective and verifiable environmental information. Thus, they show that in a non-mandatory context the level and nature of environmental information may not correspond to the underlying standards. Plausibly this can be extended to other types of ESG information signaling a problem with non-mandatory disclosure.

One of the few studies that have analyzed mandatory non-financial disclosure is that of Moneva et al. 2009. The authors analyze the value relevance of different financial and non-financial environmental disclosure and find that the environment asset variable is value relevant under mandatory non-financial disclosure regimes contributing to equity valuation. This again is a sign that ESG information is relevant for investors in a mandatory disclosure context. Grewal et al. 2019 provide a deeper insight. Here the authors look at the market reactions associated with the EU Directive on non-financial disclosure. They find a negative (-0.79%) average market reaction

across firms in response to the policy with accentuated results for those with most material ESG issues. Instead, they find a weaker reaction for firms with a higher predictive ESG performance and non-financial disclosure. This study shows the expected financial impact of the EU Directive on firms. Jackson et al. 2019 go one step further studying the effects of mandatory non-financial disclosure on CSR. They analyze 24 OECD countries and conclude that non-financial disclosure regulation does not lead to improved CSR. This paper motivated us to go further and assess whether there was an effect from a more general ESG perspective.

Our contribution to the current literature resides in an in-depth analysis of a large scale mandatory non-financial disclosure program evaluated not only from a financial and social perspective but from a more comprehensive standpoint. In fact, our main objective is that of verifying whether this policy does indeed have real effects on firms' ESG behavior.

## **Description of Data**

First, we would like to discuss our measures of sustainability and financial performance. In both cases we decided to take a holistic approach by looking at different measures and how these speak to each other. Below are some of our main measures with a brief description of why we think they are appropriate indicators:

### **Sustainability Measures:**

- MSCI ESG rating: This is a Morgan Stanley Measure and is based on 37 key environmental and social governance issues. It is compiled using insights from regulatory filing data, incident reports, news and media discussions and other data available in the public domain. Insights have been extracted using AI, text mining and a group of 200+ employees. The index takes into account measures such as climate change, natural resources, pollution & waste, environmental opportunities, human capital, product liability, stakeholder opposition, social opportunities, corporate governance and corporate behavior. Companies are rated from AAA (industry leaders) to CCC (laggards) based on a weighted average of their ESG performance.

Our MSCI rating is an ordinal variable and we took a monotonic numerical transformation of it as a dependent variable. Since order of values in this variable may be important, we complemented our OLS with an Ordered Logit model.

- EEA Emissions Trading: EEA ETS data is a record of emissions credit trading and use by companies in the EU. We used company level verified emissions data to analyse the amount of CO2 and Greenhouse emissions pre and post 2017.
- R&D Investment Intensity: We measure this as R&D spending over operating revenue as in Moneva et al. 2009, where the authors argue that firms R&D policy is often linked to their ecological attitude. We find further evidence that this might be a good measure in

Eccles et al. 2015. The authors show through an econometric analysis of more than 3000 firms that if companies innovate it is easier to simultaneously improve ESG and financial performance and “reduce the costs of doing good”. Thus, it is plausible to assume that the higher investment in R&D, the better firms’ environmental performance.

- Operating revenue per employee: We base our measure on Phillis et al. 2008. The authors indicate sales revenue per employee as a measure of a company’s efficiency at producing wealth for a given amount of labor. They argue that the higher the revenue per employee, the more sustainable the company is. We can also interpret this variable as exploitation of employees because given everything constant, a higher value means that each employee is asked to generate higher revenue.

#### Financial Measures:

- Profit Margin: As mentioned above MSCI finds that higher ESG performance increases firms’ profitability. Therefore, if more transparency did effectively increase firms’ ESG performance we also expect higher profitability.

Below we also include some information on the database we use for our analysis:

- MSCI: This data is released by Morgan Stanley and is informative of firms’ ESG performance (MSCI index reported above).
- ETS: This data is released by European Environment Agency and has information about trading and use of emissions credit by companies.
- Amadeus: This database holds financial and business information for more than 520,000 European companies.
- Capital market IQ: This database holds financial and market information for companies worldwide. It has more firms and specifications compared to Amadeus. For our analysis we complement information on a sample of 2800 firms from Amadeus with information from Capital market IQ.

#### Empirical Strategy

Our two econometrics tools are Sharp RDD and Diff-in-Diff. There are different merits to both. We believe that Diff-in-Diff is applicable since we have pre and post “intervention” data for both treated and control. In particular, we take as treated firms slightly above the 500 employees and as control those slightly below. In our model we use firm, industry and country level fixed controls, and time varying controls. We report in the appendix the key identifying assumption of no differential trends before the intervention. Unfortunately, it does not hold in all our regressions. Overall, we believe that “treatment” allocation is not determined by outcome. Below is our Diff-in-Diffs model:

$$Y_{it} = \alpha + \beta_1 treat_i + \beta_2 post_t + \beta_3(treat \cdot post)_{it} + \sum_{i=1}^{n1} \gamma_i FC_i + \sum_{i=1}^{n2} \delta_i TV_{it} + \epsilon_{it}$$

Where

- $Y_{it}$  is our dependent variable (including MSCI index, R&D, R&D intensity ratio, profit margin, Operating Revenue per Employee)
- $treat_i$  is a dummy equal to 1 if a firm has more than 499 employees
- $post_t$  is a dummy equal to 1 if the year is 2017 or thereafter
- $FC_i$  are fixed controls (including country, industry, sector)
- $TV_{it}$  are firm level time varying controls (including total assets and financial ratios)

Given that pre-trend assumption in the Diff-in-Diff model is weak we decide to complement our analysis with Sharp RDD. We think Sharp RDD is appropriate as it allows us to have the advantages of classic experimental design without using random assignment of subjects but rather a rule base criterion (Cook et al. 1969). This seems to fit perfectly with the discontinuity in our case: the implementation of directive came in force 2017 onwards. We chose companies that are very similar in terms of the costs, profits, and ESG incentives and we assume there is no significant change in similarity around 2017. We are confident in using this technique which has been widely applied to different disciplines including evaluation of business and welfare programs (Wing et al. 2018). We made sure that Sharp RDD assumptions of continuity of all other firm characteristics (except running variable and dependent) at cutoff is satisfied by choosing firms which are very similar in terms of size, cost, profits and ESG incentives. Also, the running variable (year) is exogenous and firms cannot manipulate it.

Below is our Sharp RDD model:

$$Y_{it} = \alpha + \beta_1 X_i + \beta_2 C_i + \epsilon_{it}$$

Where:

- $C_i$  is year
- $X_i$  is 1 whenever  $C_i \geq 2017$ , otherwise it is 0

### Summary of Analysis

Table 1 shows that post implementation of the directive there is no evidence of significant positive change in MSCI index level for firms that need to report non-financial performance. To ascertain that insignificant result is not due to the ordinal nature of MSCI index, we tried DID using ordered logit and still obtained a similar result.

Table 1: Difference in Differences Analysis (Dependent Variable: MSCI Index)

Variable	OLS (1)	OLS (2)	OLS (3)	OLS (4)	Ordered Logit (1)
cons	3.7209*** (0.213)	3.7406*** (0.607)	3.2144*** (0.281)	3.5448 (0.596)	X
post	0.0964 (0.253)	0.3242 (0.236)	0.1286 (0.567)	0.3003 (0.210)	0.1175 (0.317)
treated	0.3459 (0.223)	0.2772 (0.213)	0.4115** (0.204)	0.2577 (0.195)	0.4276 (0.277)
post x treated	0.1132 (0.266)	-0.0969 (0.247)	0.0806 (0.238)	-0.0818 (0.220)	0.1470 (0.333)
Country FE		X		X	
Industry FE			X	X	
N	1339	1339	1339	1339	1339
R <sup>2</sup>	0.012	0.171	0.248	0.374	0.0036

\*  $p < 0.1$  \*\*  $p < 0.5$  \*\*\*  $p < 0.01$ 

To further extend our analysis, we focused on five industry sectors separately that are well known for the bad ESG policies. Table 2 shows the result for a similar DID analysis for each sector separately. One thing that has a severe confounding effect on these results is that for some industries we do not have the data for both treated and untreated. Technically it makes our identification strategy invalid for those sectors, but we have presented the results nonetheless. Due to constant value of treated in those sectors, there is an issue of multicollinearity of treated variable with intercept and hence we get the same value of coefficient for both intercept and treated, our standard errors are not reliable, and our diff-in-diffs strategy is not valid anyways.

Table 2: Sector wise Difference in Differences Analysis (Dependent Variable: MSCI Index)

Variable	Chemicals	Utilities	Oil & GAS	Metals & Mining	Pharmaceuticals
cons	2.2609*** (0.136)	6.0000*** (0.777)	5.0000*** (0.896)	1.7727 (0.179)	1.9250 (0.140)
post	0.0180 (0.110)	0.0000 (1.004)	0.6667 (0.577)	-0.0359 (0.225)	-0.0273 ( 0.169)
treated	2.2609 (0.136)	-1.3103 (0.804)	-0.5882 (0.947)	1.7727 (0.179)	1.9250 (0.140)
post x treated	0.0180 (0.164)	0.2319 (1.036)	-0.5784 (1.220)	-0.0359 (0.225)	-0.0273 ( 0.169)
N	75	85	50	30	64
R <sup>2</sup>	0.000	0.07	0.058	0.001	0

\*  $p < 0.1$  \*\*  $p < 0.5$  \*\*\*  $p < 0.01$

Note that the MSCI reports ESG ratings for significantly big or well known companies. Therefore, there was a significant imbalance between the number of firms in treated and untreated groups, and it may have a significant confounding effect on our DID analysis. But since we have a sharp discontinuity i.e. mandatory reporting post 2017, we tried sharp regression discontinuity design with year as a running variable and 2017 as a cutoff point. Table 3 shows that there is no significant change in MSCI index level post 2017. Result is similar when we try Ordered Logit instead of OLS for RDD.

Table 3: Regression Discontinuity Design Analysis (Dependent Variable: MSCI Index for 1-5)

Variable	OLS(1)	OLS(2)	OLS(3)	OLS(4)	Ordered Logit (5)	OLS(Y:EMISSIONS)
cons	4.1252*** (0.076)	4.7771*** (0.317)	3.6638*** (0.232)	4.6324*** (0.377)	X	4.161e+04*** (7463.077)
post 2017	0.0417 (0.139)	-0.0069 (0.129)	-0.0191 (0.127)	-0.0121 (0.118)	0.0535 (0.177)	-2009.0717 (1.28e+04)
year	0.0057 (0.004)	0.0077** (0.004)	0.0076** (0.003)	0.0078** (0.003)	(0.0071) (0.004)	717.7465 (1552.250)
Country FE		X		X		
Industry FE			X	X		
N	1339	1339	1339	1339	1339	236
R <sup>2</sup>	0.007	0.161	.237	0.354	0.002	0.001

\*  $p < 0.1$  \*\*  $p < 0.5$  \*\*\*  $p < 0.01$

Next, we used EEA emissions trading dataset to test the effect of directive on verified CO2 and greenhouse gases emission by the firms. We chose to try only RDD in this case because there are a very few companies with less than 500 employees included in ETS, and that would again lead to imbalance in the treated variable for DID method. Last column of Table 3 shows the result of RDD, and again it shows that there is no significant negative change in Emissions level post 2017.

We further extended our analysis to use some financial variables as proxy for ESG performance. We recognize that they may have less information about ESG performance than other more ad hoc indicators and there are many other factors that may affect these variables. As suggested by Moneva et al. 2009, Eccles et al. 2015, we use R&D spending and R&D spending intensity as a proxy for the ecological attitude of a firm. We tried both DID and RDD, and the results are available in Table 4 and 5 of appendix.

Phillis et al 2008 suggested operating revenue per employee as a measure of sustainability and employees exploitation. We did find some significant coefficients for this variable, but the coefficients have opposite signs than that of our hypothesis. Further, the significance was lost when controlled for demographics and financial characteristics, which suggests that the



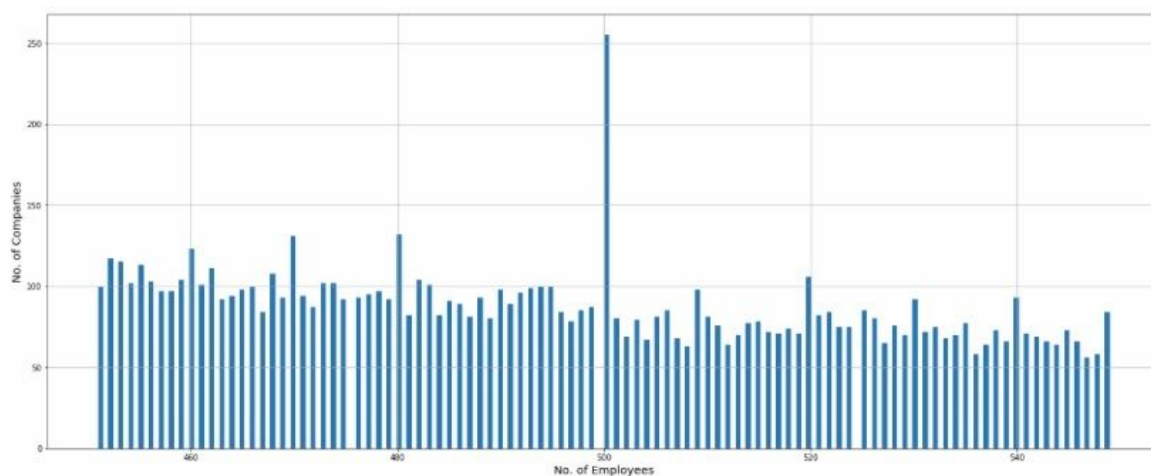
significance we had may have been due to omitted variable bias. Table 6 in appendix reports the results.

Last, we used Profit Margin to see if there is any significant change in profitability of firms who have to report non-financial performance when controlled for other financial and demographic characteristics. Again there was no significant result as reported in Table 7.

Since there was no significance in most of our regressions, we looked if there is any significant change in overall emission and pollution around 2017 in major industrial zones when controlled for region and country. We found significant results but with positive coefficients indicating that overall emission actually increased as opposed to decrease. Further we tried to run placebo regression for each year in the range 2010-2019 and again found significant results, indicating that no conclusions can be drawn from the first regression because emission is increasing in this period anyways.

### Potential pitfalls and limitations of result

Since regulation requires only firms with more than 500 employees to report non-financial performance, we were curious if firms are manipulating their number of employee records to keep themselves from reporting. Our hypothesis was that if this is the case, there would be a significant peak at 500 if we plot histogram of the number of employees data. Consistent with our hypothesis, there is indeed a significant peak at 500 as shown in Graph 1. This kind of manipulation may have serious implications for our strategy because it moves companies which should be in treated to control group, and there is no way to identify these companies exactly.



Graph 1: Number of employees reported by each firm

As mentioned in the summary of analysis, there is a strong imbalance between treatment and control groups. Imbalance arrives from the fact that companies with less than 500 employees are small and not enough data is available about them. This can have serious implications for the Difference in Differences method. Although there are matching methods to deal with such situations, we cannot use them because our sample size is already very small. Our complemented RDD analysis however is robust to this imbalance because in RDD our control and treatment groups are formed based on the running variable i.e. year.

Graphs 2-6 in appendix tests for the pre-trend assumptions graphically. As evident from the graphs, parallel trend assumption in pretreatment period is not exactly satisfied in most of the cases. This has implications such that validity of difference in differences methodology is questionable in this case.

Major setback for the research process was inability to match firms from different datasets. There is no universal identifier for firms in each dataset, and datasets are not consistent in naming the firms. For example, the same firm appears in two datasets in different languages, or with additional special characters. Even after conversion to common language and multiple cleaning attempts, matching of firms in datasets is by probabilistic similarity matching with high threshold probability. Implication is that there is still some possibility that a few firms matched incorrectly, and many firms left behind because they could not be matched.

At last, it is well known that there is no unique way to measure firms' ESG performance. We try to account for this by using different measures, both ESG indexes and financial proxies. Furthermore, firms were required to report their ESG data only once the Directive was implemented. Thus, we have a lack of actual ESG data for many firms. This is another reason that we decide to use financial proxies for ESG performance. However, financial proxies might be limited in the amount of ESG information they capture. Finally, due to lack of data we occasionally had to use in the control firms which were substantially smaller than 499 employees.

## **Conclusion**

Overall, the evidence does not suggest any significant positive change of firms' ESG behavior after the implementation of the directive. The only evidence we find is some negative effect on operating revenue per employee. However, the negative sign seems to go in the opposite direction of our hypothesis. Note that significance is lost when we control for other demographics and financial characteristics. Our result seems to confirm and complement that of Jackson et al. 2019: mandatory non-financial disclosure does not affect firms' individual ESG levels.

Note that the EU started discussing ways to increase transparency on sustainability issues already in 2011. It is plausible to assume that firms were already expecting stricter reporting standards to be implemented in the future. Given that we do not find any significant evidence that firms change behavior after the year of implementation we link this back to the efficient market hypothesis. In particular, we believe that agents had rational expectations about the Directive and, taking all available information, they adjusted their behavior progressively before 2017.

Given the increasing importance attributed to good firms' ESG performance we hope to have shed some light on whether the Directive 2014/95/EU is an effective policy tool to regulate firms' ESG behavior. Our paper, in agreement with previous research, suggests that increasing transparency on sustainability issues might not be the most effective regulatory tool.

### **Future Research**

There is definitely scope for further research. For example, it would be possible to complement the current paper with other measures for which we could not find data. Examples include:

- Better Datasets: Unavailability of firm level ESG data in public domain was a major setback for our research. MSCI ratings data that we manually scraped from their website is only a subset of the complete dataset. The complete dataset is available as a proprietary product. An even better proprietary dataset on ESG performance is provided by Thomson Reuters EIKON, and it gives a separate rating for each ESG issue. Obtaining these datasets and doing the same analysis would give a significant confidence in results.
- Age of Assets: this is defined as the ratio of between Accounting Depreciation and Gross Tangible Assets (Russo et al 1997, Reitenga 2000, Cormier et al 2005). This is often indicated as a suitable measure of environmental performance since it is plausible to assume they are more environmentally friendly and focused on prevention.
- Cost of Capital: firms with better ESG performance have lower costs of capital (Dhaliwal et al. 2011). If the Directive did help companies to improve their ESG performance then we would expect them to have a lower cost of capital. Unfortunately we could not check this due to lack of data.
- Pollutants Released by industry: EPRTTR is a possible source for this information. EPRTTR is a European level register that provides environmental data from around 28,000 industrial facilities across member states.
- Firms' Level Emissions: individual emissions level would certainly be one of the best indicators of firms' environmental performance. It would be extremely interesting to look at areas where a high concentration of firms were affected by this Directive and check whether pollution levels decrease. However, it was not possible to identify geographically the production plants of our firms. We attribute this to (i) lack of data and (ii) the fact that these are large corporations spread across the European Continent.

Looking at whether the effects of the Directive are persistent seems to be a natural next step. Since implementation by each state had to occur by December 2016 we expect the data for such an analysis to be available in the next few years. Furthermore, we think it would be important to analyze programs with similar objectives to that of the Directive and compare the benefits and costs. As mentioned above, one of the main reasons that pushed us to writing this paper was to evaluate whether the government was able to nudge firms' behavior effectively. We thought this initiative was particularly interesting as it is not imposing any quantitative rule per se but simply reducing asymmetric information between different stakeholders. This should reduce inefficiency and should come at a lower cost than imposing strict rules (e.g. diversity quotas, pollution limits). However, whether traditional programs are more effective is still an open question.

## References

- Campbell, Donald T. "Reforms as Experiments." *American Psychologist*, vol. 24, no. 4, 1969, pp. 409–429., doi:10.1037/h0027982.
- Cheng, Beiting, et al. "Corporate Social Responsibility and Access to Finance." *Strategic Management Journal*, vol. 35, no. 1, 2014, pp. 1–23., doi:10.1002/smj.2131.
- Clarkson, Peter M., et al. "Environmental Reporting and Its Relation to Corporate Environmental Performance." *Abacus*, vol. 47, no. 1, 2011, pp. 27–60., doi:10.1111/j.1467-6281.2011.00330.x.
- Cormier, Denis, and Michel Magnan. "The Revisited Contribution of Environmental Reporting to Investors Valuation of a Firms Earnings: An International Perspective." *Ecological Economics*, vol. 62, no. 3-4, 2007, pp. 613–626., doi:10.1016/j.ecolecon.2006.07.030.
- Dhaliwal, Dan S., et al. "Voluntary Nonfinancial Disclosure and the Cost of Equity Capital: The Initiation of Corporate Social Responsibility Reporting." *SSRN Electronic Journal*, 2011, doi:10.2139/ssrn.1687155.
- Eccles, Robert G., et al. "Market Interest in Nonfinancial Information." *Journal of Applied Corporate Finance*, vol. 23, no. 4, 2011, pp. 113–127., doi:10.1111/j.1745-6622.2011.00357.x.
- Eccles, Robert G., et al. "The Performance Frontier." *Harvard Business Review*, 2013
- Grewal, Jyothika, et al. "Market Reaction to Mandatory Nonfinancial Disclosure." *SSRN Electronic Journal*, 2015, doi:10.2139/ssrn.2657712.
- "Impact of ESG Disclosures." *KPMG*, KPMG, 9 Sept. 2019, home.kpmg/xx/en/home/insights/2019/09/impact-of-esg-disclosures.html.
- Jackson, Gregory, et al. "Mandatory Non-Financial Disclosure and Its Influence on CSR: An International Comparison." *Journal of Business Ethics*, vol. 162, no. 2, Dec. 2019, pp. 323–342., doi:10.1007/s10551-019-04200-0.

- “Lex Access to European Union Law.” *EUR*, eur-lex.europa.eu/legal-content/EN/ALL/?uri=CELEX:52011DC0206.
- Moneva, José M., and Beatriz Cuellar. “The Value Relevance of Financial and Non-Financial Environmental Reporting.” *Environmental and Resource Economics*, vol. 44, no. 3, 2009, pp. 441–456., doi:10.1007/s10640-009-9294-4.
- “Non-Financial Reporting.” *European Commission - European Commission*, 21 Feb. 2020, ec.europa.eu/info/business-economy-euro/company-reporting-and-auditing/company-reporting/non-financial-reporting\_en.
- Stollowy, Hervé, and Luc Paugam. “The Expansion of Non-Financial Reporting: an Exploratory Study.” *Accounting and Business Research*, vol. 48, no. 5, Apr. 2018, pp. 525–548., doi:10.1080/00014788.2018.1470141.
- Perrini F., “The Practitioner's Perspective on Non-financial Reporting.”, *California Management Review*, vol. 48, no. 2, 2006, pp. 73-103
- Phillis, Yannis A., and Benjamin J. Davis. “Assessment of Corporate Sustainability via Fuzzy Logic.” *Journal of Intelligent and Robotic Systems*, vol. 55, no. 1, 2008, pp. 3–20., doi:10.1007/s10846-008-9289-3.
- “Weighing the Evidence: ESG and Equity Returns.” *MSCI*, www.msci.com/www/research-paper/weighing-the-evidence-esg-and/01315636760.
- Wing, Coady, and Ricardo A. Bello-Gomez. “Regression Discontinuity and Beyond.” *American Journal of Evaluation*, vol. 39, no. 1, Dec. 2018, pp. 91–108., doi:10.1177/1098214017736155.

## Appendix

Table 4: Dependent Variable: R&D Spending

Variable	DID(1)	DID(2)	DID(3)	DID(4)	RDD(1)	RDD(2)	RDD(3)	RDD(4)
cons	2663.4355 (1.29e+04)	-7.081e+04 (9.77e+04)	1224.3435 (1.11e+04)	-5.396e+04 (8.39e+04)	1.683e+05*** (3.96e+04)	4.522e+04 (1.5e+05)	2.986e+04 (3.43e+04)	-6.916e+04 (1.28e+05)
post	795.7689 (2e+04)	8545.2341 (1.96e+04)	788.1515 (1.72e+04)	7359.2489 (1.68e+04)	-6061.3035 (5.41e+04)	4320.2899 (5.26e+04)	-1153.8299 (4.65e+04)	6547.6272 (4.52e+04)
treated	1.608e+05*** (1.8e+04)	1.127e+05*** (1.81e+04)	2.939e+04* (1.57e+04)	-1.713e+04 (1.58e+04)				
post x treated	-533.9673 (2.79e+04)	1.45e+04 (2.74e+04)	-2891.3056 (2.4e+04)	1.196e+04 (2.35e+04)				
year					2412.3757 (1.78e+04)	9188.6442 (1.74e+04)	-362.3693 (1.53e+04)	6792.3833 (1.49e+04)
Country FE		X		X		X		X
Total Assets RE			X	X			X	X
N	5559	5559	5559	5559	2854	2854	2854	2854
R <sup>2</sup>	0.024	0.067	0.279	0.312	0.000	0.056	0.262	0.306

\*  $p < 0.1$  \*\*  $p < 0.5$  \*\*\*  $p < 0.01$

Table 5: Dependent Variable: RD Spending/Operating Revenue

Variable	DID(1)	DID(2)	DID(3)	DID(4)	RDD(1)	RDD(2)	RDD(3)	RDD(4)
cons	8.0619*** (0.319)	14.4513*** (2.137)	8.0622*** (0.319)	-5.396e+04*** (8.39e+04)	2.9651*** (0.296)	10.7526*** (1.055)	2.9905*** (0.299)	-6.916e+04 (1.28e+05)
post	-0.6059 (0.496)	-0.6652 (0.466)	-0.6059 (0.496)	7359.2489 (1.68e+04)	0.0225 (0.405)	0.0782 (0.371)	0.0216 (0.405)	6547.6272 (4.52e+04)
treated	-4.9974*** (0.428)	-6.0573*** (0.415)	-4.9690*** (0.435)	-1.713e+04*** (1.58e+04)				
post x treated	0.4979 (0.666)	0.7857 (0.627)	0.4983 (0.666)	1.196e+04 (2.35e+04)				
year					-0.0498 (0.133)	-0.0150 (0.123)	-0.0493 (0.133)	6792.3833 (1.49e+04)
Country FE		X		X		X		X
Total Assets RE			X	X			X	X
N	5138	5138	5138	5138	2852	2852	2852	2852
R <sup>2</sup>	0.04	0.155	.040	0.312	0.000	0.163	0.000	0.306

\*  $p < 0.1$  \*\*  $p < 0.5$  \*\*\*  $p < 0.01$ 

Table 6: Dependent Variable: Operating Revenue per Employee

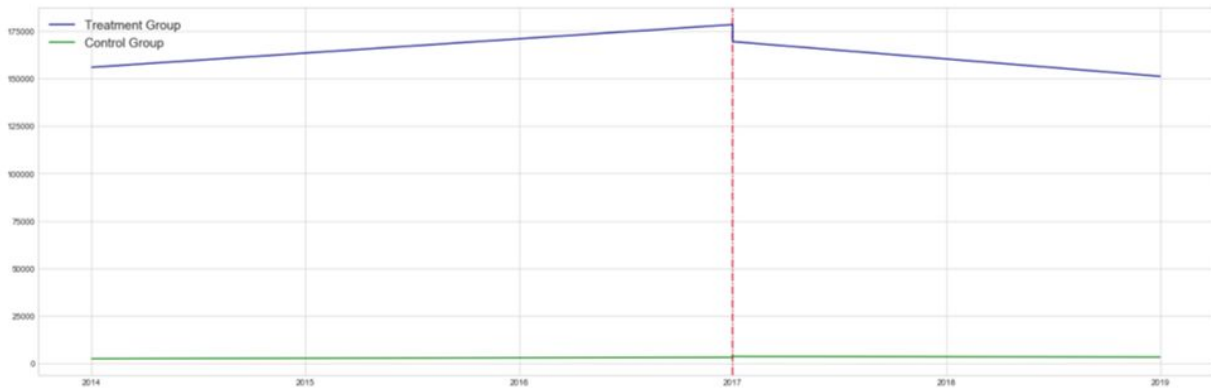
Variable	DID(1)	DID(2)	DID(3)	DID(4)	RDD(1)	RDD(2)	RDD(3)	RDD(4)
cons	435.5064*** (16.855)	624.4428*** (148.938)	434.8210*** (16.842)	-5.396e+04 (8.39e+04)	262.2419*** (21.922)	246.6003*** (66.466)	238.6102*** (21.741)	-6.916e+04 (1.28e+05)
post	108.0983*** (27.271)	61.8448** (26.901)	107.9960*** (27.250)	7359.2489 (1.68e+04)	22.1693 (29.478)	29.0204 (29.251)	22.2692 (29.163)	6547.6272 (4.52e+04)
treated	-152.4612*** (31.116)	-425.7267*** (32.774)	-182.6870*** (31.347)	-1.713e+04 (1.58e+04)				
post x treated	-112.7038** (49.355)	-67.5366 (48.308)	-113.6536** (49.318)	1.196e+04 (2.35e+04)				
year					-10.4266 (9.916)	-11.5736 (9.846)	-10.7696 (9.810)	6792.3833 (1.49e+04)
Country FE		X		X		X		X
Total Assets RE			X	X			X	X
N	37282	37282	37282	37282	11225	11225	11225	11225
R <sup>2</sup>	0.002	0.051	.004	0.312	0.000	0.022	0.021	0.306

\*  $p < 0.1$  \*\*  $p < 0.5$  \*\*\*  $p < 0.01$

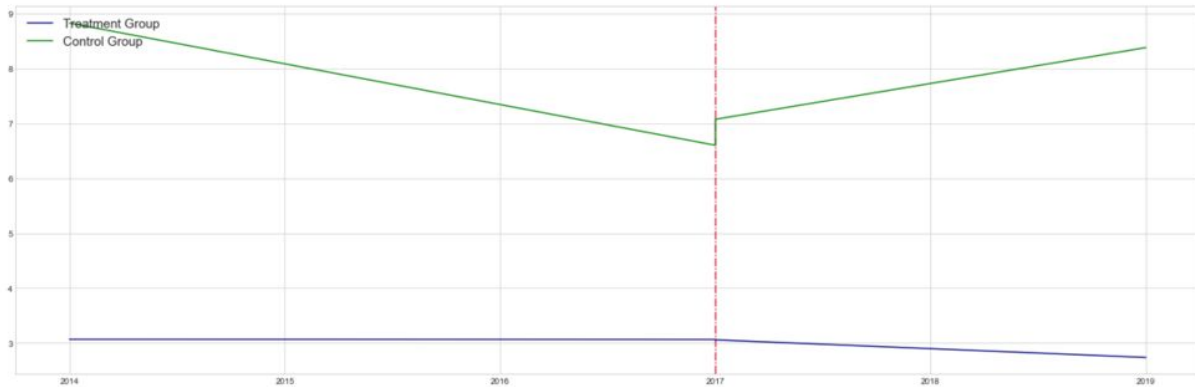
Table 7: Dependent Variable: Profit Margin

Variable	DID(1)	DID(2)	DID(3)	DID(4)	RDD(1)	RDD(2)	RDD(3)	RDD(4)
cons	2.8210*** (0.232)	7.1577*** (1.875)	2.8166*** (0.232)	-5.396e+04 (8.39e+04)	6.7087*** (0.392)	6.6032*** (1.166)	6.5461*** (0.393)	-6.916e+04 (1.28e+05)
post	1.6873*** (0.375)	0.9999*** (0.366)	1.6867*** (0.374)	7359.2489 (1.68e+04)	0.5234 (0.527)	0.5376 (0.519)	0.5329 (0.526)	6547.6272 (4.52e+04)
treated	3.6490*** (0.398)	-0.1923 (0.418)	3.4399*** (0.401)	-1.713e+04 (1.58e+04)				
post x treated	-0.8566 (0.631)	-0.4406 (0.614)	-0.8616 (0.631)	1.196e+04 (2.35e+04)				
year					0.1196 (0.177)	0.0916 (0.175)	0.1144 (0.177)	6792.3833 (1.49e+04)
Country FE		X		X		X		X
Total Assets RE			X	X			X	X
N	35253	35253	35253	35253	12267	12267	12267	12267
R <sup>2</sup>	0.004	0.062	.004	0.312	0.001	0.035	0.004	0.306

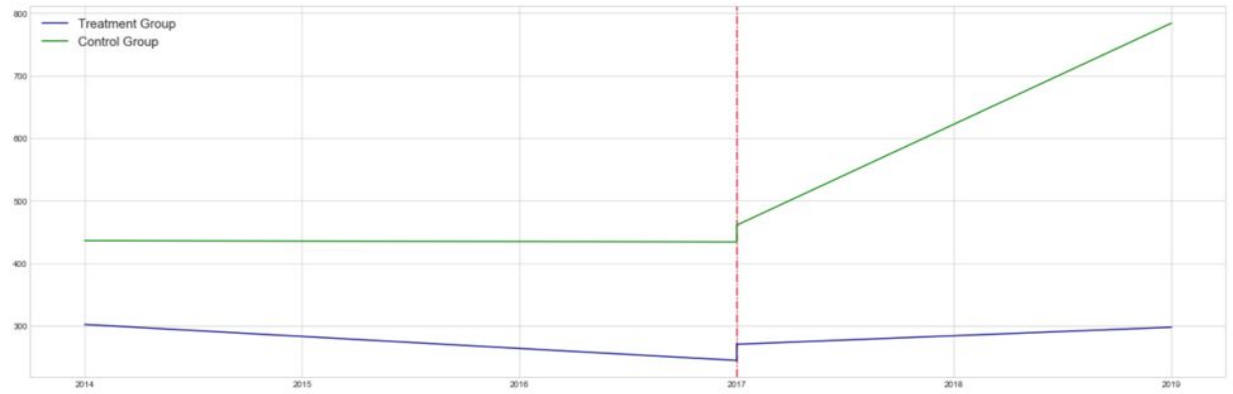
\*  $p < 0.1$  \*\*  $p < 0.5$  \*\*\*  $p < 0.01$



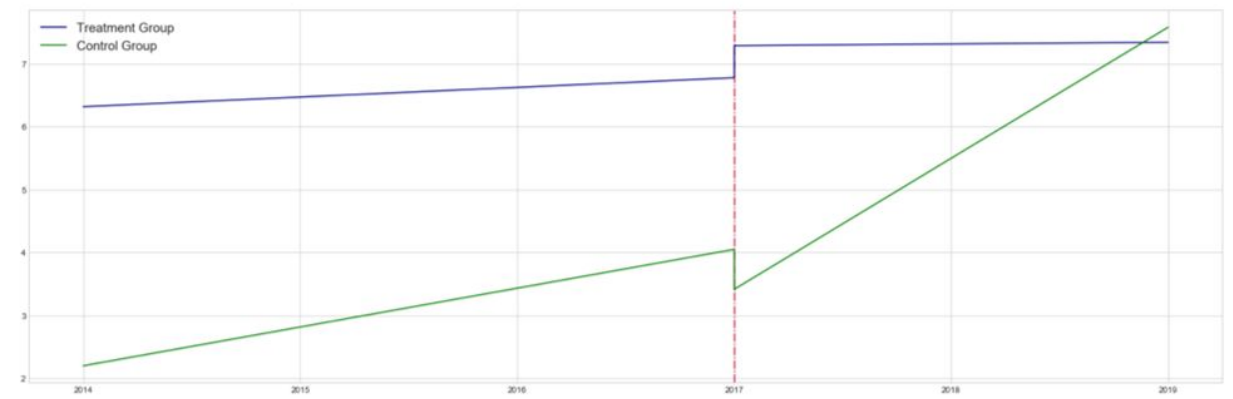
Graph 2: R&amp;D Spending



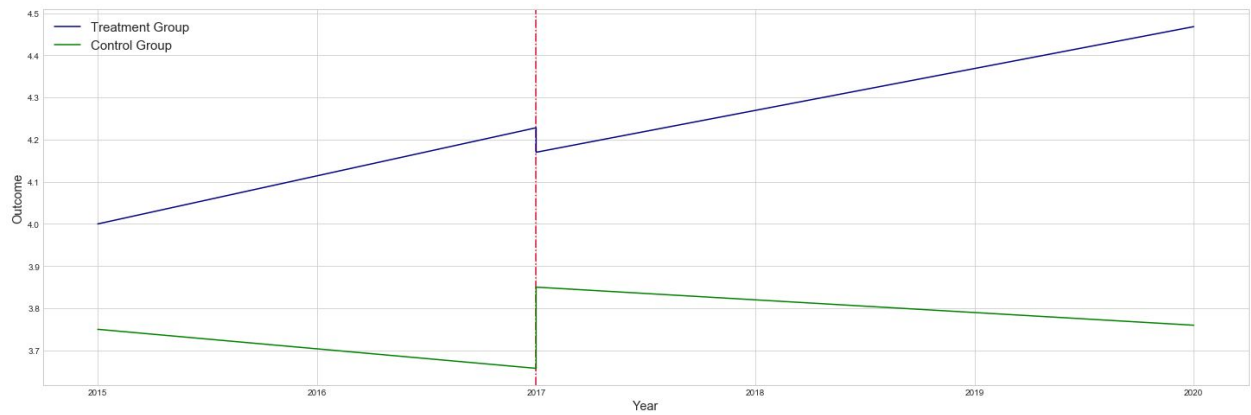
Graph 3: R&amp;D Spending / Operating Revenue



Graph 4: Operating Revenue over Employee



Graph 5: Profit Margin



Graph 6: MSCI Index