

tion. In the second stage, the authors used the Wilcoxon signed-rank test to examine the difference between disclosure before and after the implementation of the Directive and the econometric model to test the relationship between the extent of policy disclosure and other relevant variables. The research has been carried out in the fiscal years of 2014–2019 and covered a sample of 71 companies listed on the Warsaw Stock Exchange (WSE) subject to the Directive transposed into the Polish Accounting Act (AA, 2016).

The results, better explained in the section “Results and discussion”, show that the extent of non-financial policy disclosure in Polish companies is significantly better than before the introduction of the Directive. Furthermore, we found that the extent of non-financial policy disclosure is significantly influenced not only by the Directive implementation but also by the company experience in sustainability reporting and the company membership in a risky industry.

This research is a preliminary analysis of non-financial policy-related disclosure required by the Directive and has several original points with respect to other studies on the policy disclosure issue. The chapter contributes to filling a relevant gap in the literature related to the insufficient investigation of the disclosure of non-financial policies. In doing so, first, it enriches the literature on non-financial disclosure by employing content analysis and providing a non-financial policy disclosure index based on the requirements of the Directive. Second, it provides empirical evidence of the extent of non-financial policy disclosure in the Polish setting over the period of 6 years. Furthermore, it is the first research study investigating the determinants of non-financial policy disclosure in the voluntary and mandatory context (the Polish one) before and after the adoption of the Directive.

The remainder of the chapter is as follows: Section 2.2 presents the normative background and literature review, Section 2.3 outlines the research methodology used, Section 2.4 offers the results and discussion, and Section 2.5 presents the main conclusions.

2.2. Institutional background and previous literature

Responding to the challenges of sustainable development, many companies have put together and disclosed non-financial policies that set out how companies handle their responsibility towards the environment and social matters. The problem is that non-financial policies are not yet properly included in corporate reporting, because while many European companies (albeit still a minority) disclose fairly detailed policies, significantly fewer businesses provide information which is necessary to understand their situation and future development (Alliance for Corporate Transparency, 2019).

Recent regulatory changes in non-financial reporting, such as the one related to as the NFRD, emphasise the importance of extending the disclosure of environmental and social policies within corporate reporting. Article 19a (1) of the Directive states as follows:

Large undertakings (...) shall include in the management report a non-financial statement containing information to the extent necessary for an understanding of the undertaking's development, performance, position and impact of its activity, relating to, as a minimum, environmental, social and employee matters, respect for human rights, anti-corruption and bribery matters, including (...) a description of the policies pursued by the undertaking in relation to those matters, including due diligence processes implemented; the outcome of those policies (...). (European Union, 2014)

The subsequent EU Guidelines 2017/C215/01 on non-financial reporting issued in 2017 (European Commission, 2017) and Supplement 2019/C 209/01 to the guidelines on reporting climate-related information (European Commission, 2019) provide the methodology for reporting on the policies in question (including policies addressing climate-related topics) and the outcomes of those policies. The EU Guidelines and the Supplement encourage companies, among others, to disclose information on their approaches to key non-financial aspects, main objectives, and how they are planning to deliver on those objectives and implementing those plans. The outcome analysis should include relevant non-financial key performance indicators (KPIs). There may be times when the company has not developed policies that cover certain matters that it still deems important. The company should then provide a clear and reasoned explanation as to why it has not developed these policies.

In Poland, the Directive was transposed into the Polish Accounting Act, which has been applied since the fiscal year 2017. The PAA also requires disclosing a description of the policies pursued by the undertaking in relation to social, employee and environmental matters, respect for human rights, anti-corruption and bribery matters, as well as the outcome of those policies.

In fact, the Directive does not specify a detailed way on how to report and disclose non-financial information, as well as policy, but it provides that companies may rely on national, Union-based or international frameworks. Among the existing reporting frameworks, it refers to the GRI Standards that require companies to provide policies for each material topic. The scope of these topics includes, among other things, the economic ones: procurement practices, anti-corruption, tax; the environmental ones: materials, energy, water and effluents, biodiversity, emissions and waste; the social ones: employment, labour/management relations, occupational health and safety, diversity and equal opportunity, non-discrimination, freedom of association and collective bargaining, child labour, forced or compulsory labour, security practices, rights

of indigenous peoples, human rights, local communities, public policy, customer health and safety, marketing and labelling, customer privacy (GRI, 2020).

Furthermore, in order to assist Polish listed companies in complying with the obligation to disclose non-financial information, the Non-Financial Information Standard (NFIS) was issued in 2017. NFIS is a voluntary regulation whose development was coordinated by the Reporting Standards Foundation and the Association of Stock Exchange Issuers, which has been accepted and supported by a number of institutions and organisations. NFIS enables Polish companies to fulfil their reporting obligations for non-financial information that was created pursuant to Directive 2014/95/EU. NFIS draws attention to the importance of measures and their selection from the point of view of capital markets, which by definition are to make it possible to determine to what extent the company's goals and plans are being implemented in three areas: management, environmental, social and employee (SEG, 2017).

Given such institutional pressure, the corporate response to providing disclosure of non-financial policies and their outcomes calls for attention and thorough examination. Neo-institutional theory covers both institutional and market pressures, and explains why companies may vary in their response to regulations or even to the best practices among their competitors (Aguilera & Jackson, 2003). Building on this theory, the rational logic behind providing non-financial policy information mandatorily and/or voluntarily derives from different levels of pressure from regulations and/or best practices, encouraging companies to respond in order to meet social norms and be acceptable.

Erkens et al. (2015), based on a bibliometric analysis of academic articles published on the topic of non-financial information over the timespan of 1973–2013, suggested that one of the most interesting areas for future research on non-financial disclosure is the analysis of the determinants and consequences after the adoption of major regulation changes. The rationale behind this is that new regulations on mandatory disclosure can be considered as “natural experiments” that can test agents' reactions and facilitate the interpretation of a causal relation.

The introduction of the Directive stimulates research on its impact on disclosed non-financial policies, but an in-depth analysis of this issue requires taking into account both the periods before and after its introduction. Studies that assessed the state of the art of non-financial reporting before the implementation of the Directive (Hoffmann et al., 2018; Manes-Rossi et al., 2018; Matuszak & Róžańska, 2017; Venturelli et al., 2017) showed that there was an information gap regarding some of the aspects required by the Directive. However, the information gap varied from country to country. As noted by Matuszak and Róžańska (2017), there was a low level of pre-implementation compliance with the Directive requirements on non-financial disclosure, especially in Poland. The

low level of compliance with the Directive among Polish listed companies was also confirmed by the studies conducted by Dyduch and Krasodomska (2017) and Szadziewska et al. (2018). In this case, the potential contribution of the Directive to narrow the non-financial information gap seems to be significant.

Nevertheless, to date, a limited number of studies (Cordazzo et al., 2020; García-Benau et al., 2022; Mio et al., 2020; Sierra-Garcia et al., 2018) have examined non-financial policies and/or their results provided by large companies located in the EU before and after the implementation of the Directive to learn how the Directive transposition has influenced reporting on non-financial policies in EU countries.

A relevant exception in this regard is one study (Sierra-Garcia et al., 2018) which focused on Spanish IBEX-35 listed companies. However, the study is fragmentary as the authors limited it to comparing one element of the content, namely KPIs, and this does not provide a complete picture of the changes in non-financial policies and their outcomes required by the Directive.

Subsequent studies (Cordazzo et al., 2020; Mio et al., 2020) that use content analysis and disclosure indexes and consider 1 year in the voluntary disclosure context and 1 year in the mandatory one to determine whether the Directive affected the level of non-financial disclosure, show conflicting results.

Mio et al. (2020) have tested the extent of non-financial disclosure in terms of risk, policy and outcome relying on reports of 253 randomly selected companies from all EU Member States for the years 2016 (the year prior to the implementation of the Directive) and 2017 (the year following the implementation of the Directive). Their results suggest that the Directive had a positive significant impact on non-financial disclosure. The Directive implementation affected the environmental, social and governance components of the non-financial index.

Cordazzo et al. (2020) have examined the non-financial disclosure practices of 231 Italian listed companies in the pre- (2016) and post- (2017) Directive application. Their results show that companies providing non-financial reports in both the pre- and post-Directive application do not improve their non-financial disclosure, as they do not provide any relevant increase of such information. Companies disclosing information under a mandatory regime limit their disclosure to a minimum requirement. Moreover, Doni et al. (2020), based on a sample of 60 Italian listed companies, have investigated whether the expertise and skills of companies on sustainability reporting can affect the level of compliance with the new mandatory reporting requirements introduced by the Directive. Their results showed that prior skills and competencies in non-financial reporting made a significant contribution.

As research on the extent and determinants of non-financial policy-related disclosure is still limited, there exists a literature gap. In such a context, this

chapter focuses specifically on the non-financial policies disclosure as required by the Directive for Polish listed companies and aims to analyse both the extent of non-financial policy disclosure and its determinants related to regulatory changes as well as to skills and competencies of companies in sustainability reporting. This chapter investigates four key variables potentially influencing the extent of non-financial policy disclosure in Poland. These variables are: Directive enforcement, experience in sustainability reporting, foreign ownership and external assurance. The analysis also takes into account the role played by the industry and the size of the company. For this purpose, they represent control variables in our research project.

2.3. Research methodology

2.3.1. Research sample and data collection

Our initial sample comprised all companies listed on the WSE. To be included in our sample, companies had to meet the following criteria:

1. They had to be Polish companies (ISIN — PL).
2. They had to be experienced in non-financial reporting at least in 2014.
3. They had to fulfil criteria imposed by the transposed Directive concerning employment, assets and income for the period of 2017–2019.
4. They needed to have the required data for 2014–2019.

The final study sample was composed of 71 Polish companies (426 company-year observations).

The data concerning employment, assets and income were obtained from the Notoria Service Database. The data concerning non-financial labour practices were hand-collected from non-financial statements being a separate section of the management commentary (not stand-alone) or being a separate stand-alone report. In order to verify the developed hypotheses, our time scope is 2014–2019 and it covers the period before (2014–2016) and after (2017–2019) the implementation of the Directive.

2.3.2. Variables

To quantify policy disclosure, the content analysis method was utilized. In order to measure the level of policy disclosure, based on the Directive's requirements, the existence of two content items was examined, namely:

Table 4.1 – cont.

Variables	Description / measurement approach	References
ENVIRONMENT	Dummy = 1, if the company has an impact on the environment; environmentally sensitive industries include: agriculture, automotive, aviation, chemical, construction, construction materials, energy, energy utilities, forest and paper products, logistics, metal products, mining, railroad, waste management and water utilities	(Branco & Rodrigues, 2008; Fernandez-Feijoo et al., 2014; Gamerschlag et al., 2011; Tagesson et al., 2009)
STANDARD	Dummy = 1, if the company uses GRI, NFIS or another well-known framework to present CSR information provided by standard setters; 0 if the company implemented its own approach to reporting or none	(Vurro & Perrini, 2011)
REGULATOR	Dummy = 1 for the timespan 2017–2019 reflecting period after implementation of Directive 2014/95/EU in Poland; 0 for the timespan 2014–2016 reflecting period before implementation of Directive 2014/95/EU in Poland	(Chauvey et al., 2015; Criado-Jiménez et al., 2008; Parmar et al., 2010)
Control variable		
PROFITABILITY	Return of sale measured as net profit divided by total revenue	(Vurro & Perrini, 2011)

Source: Own elaboration.

In terms of control variables, this research employs the company's profitability as a control variable since it may influence environmental disclosure practices.

4.3.3. Method of analysis

Three basic types of models, the pooled model (OLS), the fixed-effects models (FE) and the random-effects model (RE), were used to model panel data in the study. All models were estimated with robust (HAC – heteroskedasticity and autocorrelation consistent) standard errors. The proposed model is as follows:

$$\begin{aligned}
 ENV_{it} = & \beta_0 + \beta_{1,it} INVESTORS + \beta_{2,it} CREDITORS + \beta_{3,it} CUSTOMERS + \\
 & + \beta_{4,it} EMPLOYEES + \beta_{5,it} ENVIRONMENT + \beta_{6,it} STANDARD + \\
 & + \beta_{7,it} REGULATOR + \beta_{8,it} PROFITABILITY + \varepsilon_{it}
 \end{aligned}$$

In this research, the significance of the differences between groups (clustered years) was tested using the Wilcoxon signed-rank test since the participants are the same in each group.

4.4. Empirical results and discussion

Descriptive statistics are presented in Table 4.2. Among Polish listed companies, the level of environmental disclosure varies from the minimum level of 0 to the maximum level of 1. The average ENV is 0.72, indicating relatively high level of environmental disclosure. Standard deviation of ENV is 0.34, suggesting that there is relatively high variability among Polish companies in terms of environmental disclosure.

Table 4.2. Descriptive statistics

Variable	<i>n</i>	Minimum	Maximum	Mean	Median	Standard deviation
ENV	426	0.00	1.00	0.72	1.00	0.34
ENV1	426	0.00	1.00	0.91	1.00	0.28
ENV2	426	0.00	1.00	0.81	1.00	0.39
ENV3	426	0.00	1.00	0.62	1.00	0.49
ENV4	426	0.00	1.00	0.52	1.00	0.50
INVESTORS	426	1.03	72.20	33.74	34.10	15.21
CREDITORS	426	0.59	0.54	0.06	4.50	0.31
CUSTOMERS	426	0.00	1.00	0.52	1.00	0.50
EMPLOYEES	426	5.38	10.68	8.02	7.74	1.17
ENVIRONMENT	426	0.00	1.00	0.61	1.00	0.49
STANDARD	426	0.00	1.00	0.42	0.00	0.49
REGULATOR	426	0.00	1.00	0.50	0.50	0.50
PROFITABILITY	426	-3.24	0.83	0.06	0.05	0.21

Source: Own elaboration.

In table 4.3, we compare the mean ENV index and its components before and after the implementation of the Directive. The results indicate that in each case the change between the clustered years is statistically significant (p -value < 0.001). After the implementation of the directive, the ENV index and all the components increased significantly (the mean increased by 77%, 21%,

60%, 137% and 212% respectively). Furthermore, the variability among the sample companies decreased in relation to the ENV index and all its components.

Table 4.3. Comparison of mean ENV index and its components before and after Directive implementation (2014–2016 versus 2017–2019)

Period	n	ENV		ENV1		ENV2		ENV3		ENV4	
		Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Before implementation (2014–2016)	71	0.52	0.33	0.83	0.34	0.62	0.47	0.37	0.43	0.25	0.39
After implementation (2017–2019)	71	0.92	0.16	1.00	0.00	1.00	0.00	0.87	0.31	0.79	0.38
Change (%)		77	–51	21	–100	60	–100	137	–27	212	–3
Z		6.67		3.72		4.78		6.09		6.00	
p		<0.001		<0.001		<0.001		<0.001		<0.001	

SD – standard deviation; Z – Wilcoxon signed-rank test statistics; p – p-value.

Source: Own elaboration.

In order to verify the developed hypotheses, the panel data analysis was utilized. After running the necessary tests (*F*-test, Breusch-Pagan test, Wald test, Hausman’s test) in order to choose the right model, the random effect model was selected as the most appropriate model for this research. Thus, the results of the random effect model are considered for further discussion about the implications of the study (Table 4.4).

According to the results, CUSTOMERS, ENVIRONMENT, STANDARD and REGULATOR were found to have a positive and significant effect on ENV ($b_3 = 0.1$; $b_5 = 0.2$; $b_6 = 0.2$; $b_7 = 0.3$ respectively with p -value < 0.01), and thus the H3, H5, H6 and H7 is verified. The other independent variables, i.e., INVESTORS, CREDITORS, EMPLOYEES, have no statistically significant effect on ENV, and thus the H1, H2 and H4 cannot be confirmed. In terms of control variables, the current results show that the company profitability (SIZE) has no statistically significant impact on ENV ($b_8 = -0.1$; p -value < 0.1).

4.5. Conclusions, limitations and future research agenda

This chapter examines the effect of the primary stakeholders’ (shareholders, creditors, consumers and employees) as well as the secondary stakeholders’ (environment, regulators, standard setters) pressure on the extent of environ-

Table 4.4. Estimated coefficients from panel data analysis covering years 2014–2019

Independent variables	VIF	ENV (dependent variable)						
		Pooled model		Fixed effects models		Random effects model		
		OLS	FE model 1	FE model 2	RE			
INVESTORS	1.19	0	0.00	0.00	0.00	0.0	0.0	(-1.19)
CREDITORS	1.70	-0.13	-0.02	-0.02	-0.02	-0.1	-0.1	(-1.23)
CUSTOMERS ^(a)	1.47	0.12	(2.54)**			0.1	0.1	(2.75)***
EMPLOYEES	1.44	0.04	(1.78)*	-0.02	-0.03	0.0	0.0	(1.63)
ENVIRONMENT ^(a)	1.45	0.16	(3.22)***			0.2	0.2	(3.27)***
STANDARD	1.31	0.24	(6.52)***	0.24	(6.47)***	0.24	0.2	(7.03)***
REGULATOR	1.22	0.31	(8.71)***	0.30	(8.56)***	0.40	0.3	(8.82)***
PROFITABILITY	1.70	0	(0.04)	-0.02	(-0.14)	0.00	-0.1	(-0.6)
INTERCEPT		0.13	(0.89)	0.68	(1.53)	0.66	0.2	(1.07)
Firm fixed effects			YES		YES			
Year fixed effects					YES			
<i>n</i>		426		426		426		426
Adjusted R^2 ^(b)		0.52		0.61		0.64		
F-test				4.65***				
Breusch-Pagan test								136.18***
Wald test						23.89***		
Hausman's test								6.9

^(a)The CUSTOMERS and ENVIRONMENT variables were left out of the fixed effects analysis as they are time-invariant variables — they are constant across the years under analysis; ^(b) R^2 cannot be reported because the RE estimator does not minimise the sum of squared residuals; VIF – value inflation factor.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Source: Own elaboration.

mental disclosure. In particular, the potential pressure from the regulators that requires mandatory environmental disclosure under the Directive was examined. The results showed that the Directive enforcement is associated with the extent of environmental disclosure. This extent increased significantly across all content items, namely environmental policy, the outcome of this policy, the associated risks and their management after the Directive implementation period. Hence, this finding supports the stakeholder theory by providing empirical evidence of how companies responded to regulatory pressure in order to provide environmental disclosure. Unexpectedly, primary stakeholders, i.e., investors, creditors and employees, are not significant determinants of environmental disclosure, whereas secondary stakeholders, such as the environment, standard setters and regulators, are.

This study makes at least two major contributions to the literature on the subject. Firstly, this study examines the extent of environmental reporting according to the Directive requirements. Secondly, it provides a deeper understanding of the primary and secondary stakeholders' pressures related to environmental reporting. In particular, our study contributes to the understanding of the impact of regulatory pressure (the Directive) on environmental disclosure practices by EU companies. Our research has important implications for governments because it reveals that companies have responded positively to the regulator's pressure by increasing environmental disclosure.

As with all research, there are limitations related to our study. Firstly, our study focuses on a small sample of companies; however, the sample encompasses large PIEs examined over the period of 6 years. Secondly, we have focused on one country that has not had a long tradition connected with CSR reporting. It is possible that in countries where companies are more experienced in terms of CSR reporting the findings could be different.

These limitations open up some possibilities for future research. The pressure from the enforced Directive 2014/95/EU could be investigated across multiple EU countries.

References

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3. They had to fulfil the criteria imposed by the transposed Directive concerning employment, assets and income for the period of 2017–2019.
4. They needed to have the required data for 2014–2019.

The final study sample was composed of 71 Polish companies (426 company-year observations).

The data concerning employment, assets and income were obtained from the Notoria Service Database. The data concerning non-financial anti-corruption information were hand-collected from non-financial statements being a separate section of the management commentary (not stand-alone) or being a separate stand-alone report. In order to verify the developed hypotheses, our time scope is 2014–2019 and it covers the period before (2014–2016) and after (2017–2019) the implementation of the Directive.

7.3.2. Variables

To quantify the disclosure on anti-corruption practices (dependent variable), the content analysis method was utilized. In order to measure the level of anti-corruption disclosures, based on the Directive’s requirements, the existence of non-financial content items was examined, namely:

1. a description of the policies pursued by the undertaking in relation to anti-corruption,
2. a description of the outcome of anti-corruption policies,
3. a description of the principal risks related to anti-corruption,
4. a description of how the undertaking manages those risks related to anti-corruption.

If the content item was present in the management commentary or stand-alone CSR report, it scored 1, and 0 otherwise.

As the PAA as well as the Directive do not favour any content item over another, we treated each item as equally important, and we used the same binary scoring for each item. This approach allowed us to evaluate the extent of anti-corruption disclosure made by companies. Next, an anti-corruption disclosure index (AC) was computed according to the following formula:

$$\text{AC disclosure index} = \frac{\text{Sum of scores obtained by company}}{4 \text{ (total number of content items)}}$$

Table 7.1 presents independent and control variables together with the measurement approach.

In terms of control variables, in line with previous studies (Blanc et al., 2017; Sari et al., 2020), this research employs the company size and industry type as control variables as these variables may influence anti-corruption disclosure practices.

Table 7.1. Description of independent and control variables

Variables	Description / measurement approach
Independent variables	
Directive 2014/95/EU (DIRECTIVE)	Dummy = 1 for 2017–2019, 0 for 2014–2016
Respect index (RESPECT)	Dummy = 1, if the company is listed in the Respect index, 0 otherwise
State owned enterprise (SOE)	Dummy = 1, if the State is a shareholder of the company, 0 otherwise
Foreign investor (FOREIGN)	Dummy = 1, if the company has at least one foreign shareholder having more than 5% of shares, 0 otherwise
Control variables	
Risky industry (RISKY_IND)	Dummy = 1, if the company is a member of a risky industry, according to the TI's Bribe Payers Index (Transparency International, 2019), namely: oil and gas, basic materials (including forestry and mining), defence, capital goods, construction, telecommunications and utilities sectors; 0 otherwise.
Company size (SIZE)	Value of assets in mln PLN

Source: Own elaboration.

7.3.3. Method of analysis

Three basic types of models, the pooled model (OLS), the fixed-effects models (FE) and the random-effects model (RE), were used to model panel data in the study. All models were estimated with robust (HAC) standard errors. The proposed model is the following:

$$AC_{it} = \beta_0 + \beta_{1,it}DIRECTIVE + \beta_{2,it}RESPECT + \beta_{3,it}SOE + \beta_{4,it}FOREIGN + \beta_{5,it}RISKY_IND + \beta_{6,it}SIZE + \varepsilon_{it}$$

In this research, the significance of the differences between groups (clustered years) was tested using the Wilcoxon signed-rank test. According to Field (2018), the Wilcoxon signed-rank test is a non-parametric test that can be used in situations in which there are two sets of scores to compare, but these scores come from the same participants.

7.4. Empirical results and discussion

Descriptive statistics are presented in Table 7.2. Among Polish listed companies, the level of anti-corruption disclosures varies from the minimum level of 0 to the maximum level of 1. The average AC is 0.52, indicating that there is room for improvement in terms of the disclosure extent. Standard deviation of AC is 0.43, suggesting that there is high variability among Polish companies in terms of anti-corruption disclosure.

In Table 7.3, we compare the mean AC index and its components before and after the implementation of the Directive. The results indicate that in each case the change between the clustered years is statistically significant (p -value < 0.001). After the implementation of the directive, the AC index and all the components increased significantly (the mean increased by 203%, 196%, 218%, 208% and 190% respectively); however, the variability among the sample companies decreased, but only in relation to the AC index and the AC1 and AC2 components, which is reflected in a decrease in SD (31%, 58% and 36% respectively). In terms of AC3 and AC4, the variability increased (SD increased 22% and 31% respectively), which is an unexpected result. This result can be explained by indicating that before the Directive implementation companies did not disclose much information about anti-corruption issues in general. After the implementation of the Directive, in majority cases companies started reporting about anti-corruption policies and their outcomes (AC1 and AC2), but some of them do not treat their activity as exposed corruption, and thus do not identify the AC risks and how they mitigate those risks (AC3 and AC4).

Table 7.2. Descriptive statistics

Variable	<i>n</i>	Minimum	Maximum	Mean	Median	Standard deviation
AC	426	0.00	1.00	0.52	0.50	0.43
AC1	426	0.00	1.00	0.64	1.00	0.48
AC2	426	0.00	1.00	0.60	1.00	0.49
AC4	426	0.00	1.00	0.44	0.00	0.50
AC5	426	0.00	1.00	0.39	0.00	0.49
RESPECT	426	0.00	1.00	0.33	0.00	0.47
SOE	426	0.00	1.00	0.20	0.00	0.40
FOREIGN	426	0.00	1.00	0.47	0.00	0.50
RISKY_IND	426	0.00	1.00	0.45	0.00	0.50
SIZE (mln)	426	97.08	348044.00	26289.55	2154.09	56276.81

Source: Own elaboration.

Table 7.3. Comparison of mean AC index and its components before and after Directive implementation (2014–2016 versus 2017–2019)

Period	n	AC		AC1		AC2		AC3		AC4	
		Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Before implementation (2014–2016)	71	0.26	0.38	0.32	0.45	0.29	0.42	0.22	0.37	0.20	0.36
After implementation (2017–2019)	71	0.78	0.26	0.96	0.19	0.91	0.27	0.67	0.45	0.59	0.47
Change (%)		203	-31	196	-58	218	-36	208	22	190	31
Z		6.678		6.154		6.215		5.370		4.921	
p		<0.001		<0.001		<0.001		<0.001		<0.001	

SD – standard deviation; Z – Wilcoxon signed-rank test statistics; p – p-value.

Source: Own elaboration.

In order to verify the developed hypotheses, the panel data analysis was utilized. After running the necessary tests (*F*-test, Breusch-Pagan test, Wald test, Hausman’s test) in order to choose the right model, the fixed-effects model with the time fixed effect (FE model 2) was selected as the most appropriate model for this research. Therefore, the results of the fixed-effects model 2 have been considered for further discussion about the implications of the study (Table 7.4).

Table 7.4. Estimated coefficients from panel data analysis covering years 2014–2019

AC (dependent variable)									
Independent variables	VIF	Pooled model		Fixed effects models				Random effects model	
		OLS		FE model 1		FE model 2		RE	
Directive	1.01	0.51	(10.73)***	0.52	(11.52)***	0.64	(14.01)***	0.51	(11.00)***
Respect	1.30	0.27	(3.78)***	0.06	(0.71)	0.04	(-0.50)	0.18	(2.79)***
SOE	1.42	0.1	(1.13)	0.18	(1.41)	0.14	(1.12)	0.16	(2.25)**
FOREIGN	1.30	-0.04	(-0.61)	0.11	(0.85)	0.11	(0.96)	-0.00	(-0.06)
RISKY_IND	1.32	0.03	(0.49)	-0.28	(-10.21)***	-0.18	(-5.50)***	0.04	(0.60)
SIZE	1.25	-0.00	(-0.39)	-0.17	(-2.21)**	-0.00	(-4.01)***	-0.00	(-1.00)
INTERCEPT		0.17	(2.42)**	1.63	(2.65)***	0.20	(2.90)***	0.17	(2.60)***
Firm fixed effects				YES		YES			
Year fixed effects						YES			
n		426		426		426		426	

Table 7.4 – cont.

AC (dependent variable)					
Independent variables	VIF	Pooled model	Fixed effects models		Random effects model
		OLS	FE model 1	FE model 2	RE
Adjusted R^2		0.47	0.58	0.60	
F-test			4.73***		
Breusch-Pagan test					134.02***
Wald test				21.13***	
Hausman's test			13.10**		

VIF – value inflation factor.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Source: Own elaboration.

According to the results, independent variables explained almost 60% of the variation in the dependent variable. The Directive (DIRECTIVE) was found to have a positive significant effect on AC ($b_1 = 0.64$; p -value < 0.01), thus the first hypothesis (H1) is accepted.

The other independent variables, namely RESPECT, SOE, FOREIGN, have no statistically significant effect on AC, and thus the H2, H3 and H4 cannot be accepted.

In terms of control variables, the current results show that the size of the company (SIZE) and being a member of a risky industry (RISKY_IND) have a statistically significant and negative impact on AC ($b_6 = -0.001$; p -value < 0.01 ; $b_5 = -0.18$; p -value < 0.01 , respectively).

7.5. Conclusions, limitations and future research agenda

This chapter has investigated anti-corruption reporting practices by looking at both the extent of anti-corruption disclosure and the coercive determinants of that extent, in particular the potential pressure from the regulator that requires mandatory anti-corruption disclosure under the Directive. The examination indeed showed that the Directive enforcement is associated with the extent of anti-corruption disclosure. This extent increased significantly across all

Each reliability item, in each company was granted points separately. If the reliability item was present in the management commentary or stand-alone CSR report, it scored 1, otherwise is scored 0. In order to decrease the subjectivity of this evaluation, we employed cross-check analysis (scores given by one author were checked independently by the other author and conversely). Discrepancies among the members of the research team were discussed and reconciled. This approach allowed us to evaluate the selected quality principles for each company. An NFD reliability index (RI) was computed according to the following formula:

$$\text{NFD reliability index} = \frac{R11 + R12 + R13 + R14 + R15}{5 \text{ (total number of reliability items)}}$$

Table 10.1. NFD reliability index and its components

Reliability items:		Measurement approach
RI1	Visual tools	1 = use of visual presentation in NFD, e.g. graphs, diagrams, charts, etc.; 0 = otherwise
RI2	Readability	1 = evidence that information uses plain language and consistent terminology, avoiding boilerplate, and, where necessary, providing definitions for technical terms of definitions of technical terms; 0 = otherwise
RI3	Quality of data	1 = existence of at least one item: description of measurement methods or underlying assumptions or sources; 0 = otherwise
RI4	Consistent over time	1 = existence of comparable non-financial information; 0 = otherwise
RI5	Assurance	1 = evidence that non-financial information is externally assured; 0 = otherwise

Source: Own elaboration.

10.3.3. Method of analysis

In this research, the significance of the differences between years and/or groups was tested using the Wilcoxon signed-rank test, which is a non-parametric test that can be used in situations in which there are two sets of scores to compare, but these scores come from the same participants.

10.4. Empirical results and discussion

Descriptive statistics are presented in Table 10.2. Among Polish sample companies, the level of RI varies from the minimum level of 0 to the maximum level of 1. The average RI is 0.32, indicating a low level of reliability of non-financial information. This suggests that there is still room for improvement in terms of the reliability of non-financial information. Standard deviation of RI is 0.30, suggesting that there is high variability among Polish companies in terms of reliability of NFD. In terms of the reliability items, the highest mean RI4 (mean = 0.52) indicates that, on average, 52% of companies disclose comparable information in their non-financial statements.

Table 10.2. Descriptive statistics

Variable	<i>n</i>	Minimum	Maximum	Mean	Median	Standard deviation
RI	426	0.00	1.00	0.32	0.20	0.30
RI1	426	0.00	1.00	0.48	0.00	0.50
RI2	426	0.00	1.00	0.36	0.00	0.48
RI3	426	0.00	1.00	0.15	0.00	0.36
RI4	426	0.00	1.00	0.52	1.00	0.50
RI5	426	0.00	1.00	0.11	0.00	0.31

Source: Own elaboration.

According to Figure 10.1, the mean RI level as well as almost all its components (except for RI5) have increased over the years under analysis, which is a positive trend. Moreover, the increase within the period before the implementation of the Directive is visibly lower, compared with the increase after the implementation. This suggests that the implementation of the Directive could have a positive impact on the reliability of NFD. Surprisingly, the RI5 level decreased over the years under analysis. In 2014, approximately 20% of the sample companies had their non-financial statements verified by external auditors. In the period between 2015 and 2017, the share of such companies decreased to around 10%, and in 2019 non-financial statements were not assured. This indicates that after the Directive implementation, sample companies refrained from having their NFD verified by external auditors.

Figure 10.2 and Table 10.3 present a comparison of the mean RI across the years under analysis. The results shown on the graph indicate that there is a significant difference between the mean RI in the years before and after the implementation of the Directive (Figure 10.2). Moreover, in order to assess the changes between the years, the Wilcoxon signed-rank test was utilized. The test

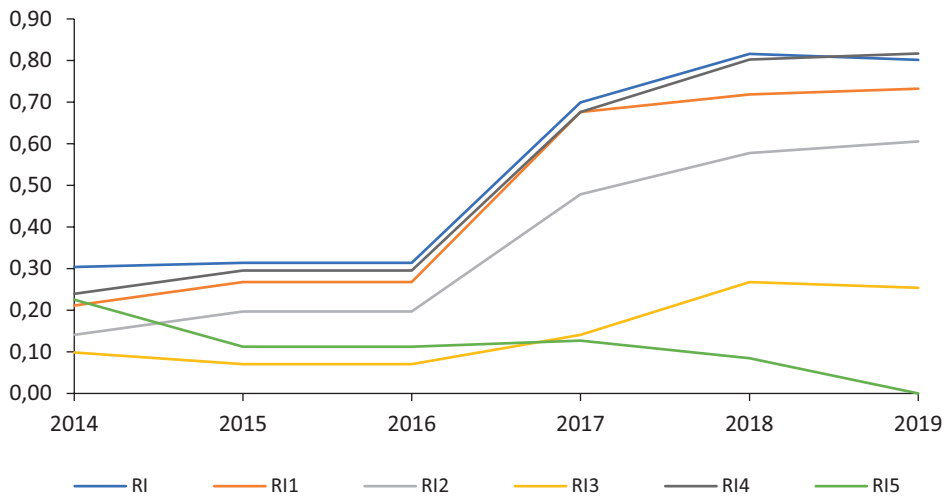


Figure 10.1. Development of the mean RI and its components

Source: Own elaboration.

confirms that the mean RI between the years before and after the implementation of the Directive differs significantly (p -value < 0.001) (Table 10.3: three stars). This difference cannot be observed within the years before and after the implementation of the Directive.

Table 10.3. Comparison of mean RI across the years under analysis

Years	RI_2014	RI_2015	RI_2016	RI_2017	RI_2018
	Z	Z	Z	Z	Z
RI_2015	0.2				
RI_2016	0.4	0.3			
RI_2017	4.8***	5.1***	5.1***		
RI_2018	5.8***	5.8***	5.9***	2.6**	
RI_2019	5.7***	5.7***	5.9***	2.2**	1.2

** $p < 0.05$, *** $p < 0.001$.

Source: Own elaboration.

In order to assess the statistical significance of the changes between the clustered years before and after the implementation of the Directive for RI and all the reliability items, the Wilcoxon signed-rank test was utilized. As presented in Table 10.4, statistically significant differences can be observed between the RI before and after the implementation of the Directive ($Z = 6.30$, p -value < 0.001). The RI increased by 147% between the clustered years, having

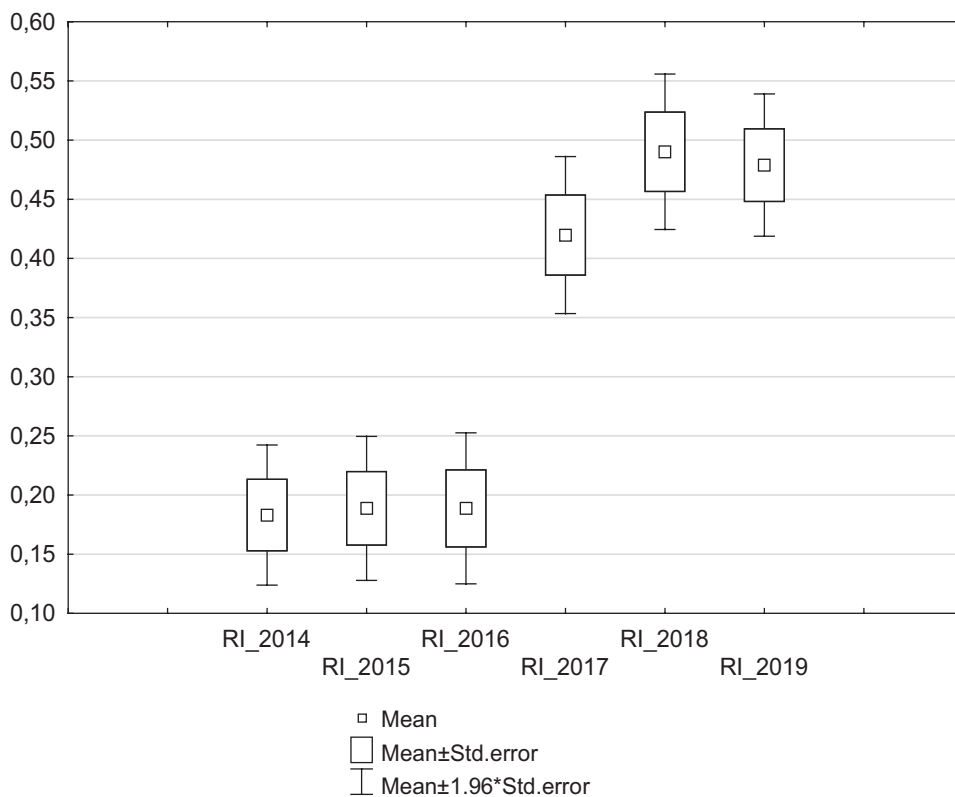


Figure 10.2. Comparison of mean RI across the years under analysis

Source: Own elaboration.

Table 10.4. Comparison of mean RI and its components before and after Directive implementation (2014–2016 versus 2017–2019)

Period	n	RI		RI1		RI2		RI3		RI4		RI5	
		Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Before implementation (2014–2016)	71	0.19	0.25	0.25	0.41	0.18	0.36	0.08	0.26	0.28	0.41	0.15	0.22
After implementation (2017–2019)	71	0.46	0.26	0.71	0.44	0.55	0.47	0.22	0.37	0.77	0.36	0.07	0.14
Change (%)		147	5	185	8	208	30	177	43	176	-12	-53	-37
Z		6.30		5.42		4.98		2.96		5.87		2.26	
p		<0.001		<0.001		<0.001		<0.001		<0.001		<0.001	

SD – standard deviation; Z – Wilcoxon signed-rank test statistics; p – p-value.

Source: Own elaboration.

standard deviation at almost the same level. This indicates that relative variability has decreased, which is a positive trend. In terms of the reliability items, the Wilcoxon signed-rank test confirmed the statistical significance of the differences between the clustered years for each RI component. The highest increase is observed around RI2 (208%), and the lowest one around RI4 (176%). In general, it can be noted that the implementation of the Directive has positively influenced the reliability of non-financial information. The improvement in the reliability of non-financial reporting is in line with Hąbek and Wolniak's (2016) as well as Mion and Loza Adauí's (2019) findings.

10.5. Conclusions, limitations and future research agenda

In this analysis, we have examined whether the reliability of NFD provided by Polish listed companies has changed over the period surrounding the implementation of the Directive. The undertaken analysis allowed us to confirm the statistically significant change in the reliability of NFD between the analysed periods. In general, the implementation of the Directive has increased the level of reliability of NFD, but there is still room for significant improvement, in particular in terms of the comparisons in time and between entities as well as the external assurance of NFD.

We assume that our study contributes to the understanding of the potential impact of the Directive on the reliability of the NFD practices by EU companies. Our research has important implications for policy makers since it reveals that mandatory regulations are a crucial instrument in improving harmonisation of the legislation of NFD. Our research suggests that, as a result of implementing the Directive, stakeholders should be provided with more comparable and externally assured information. This could encourage them to use NFD in their decision-making processes to a greater extent.

Our research has several limitations that should be noted. In terms of the measurement instrument developed for this study, we have used a binary coding scheme instead of a rating scale. We have focused only on the Polish setting. The impact of the Directive on the non-financial reporting of companies from other EU countries may be potentially different. Thus, future research should consider extending our research along each of the above-mentioned limitations.