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ESG Rating in Investment Risk Analysis of Companies Listed on the Public Market in Poland

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This study verifies the hypothesis that greater transparency of public companies in disclosing non-financial (ESG) data results in lower volatility of return rates on securities issued by them, thereby reducing investment portfolio risk understood as return rate volatility. Non-financial data reporting contributes to increased transparency, predictability of companies' operations and hence to significant reduction in information asymmetry on the capital market, and ultimately considerably reduces forecasting errors in risk–return profile of investment portfolios. The research conducted has shown that there is a large information gap on the Polish market, especially as regards ESG reporting. The overall level of reporting on non-financial data is low. In the analysed period, the shares issued by companies with higher ESG rating were distinguished by an over-average return rate and lower return rate volatility as well as lower forecasting error in return rates, which is indicated by the standard error parameter (alpha and beta coefficients).
(*J.E.L.*: *A13, G11*).

1. Introduction

According to the classical approach, an investor makes investment decisions taking into account two key parameters, namely: expected rate of return and the level of investment risk. The assessment of these parameters is made primarily on the basis of publicly available information provided by both companies and other capital market participants, i.e. analysts, advisers, the supervisor etc. Information obligations of securities issuers on the public market concern mostly information on economic and financial condition; however, as experience shows, a company's value is created not only in the financial dimension, but also through a permanent combination of management in the economic, social and environmental dimensions both at the company level and at the level of the whole economy. As revealed by the research conducted on world markets, tangible assets currently account

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for 1/5 of a company's market value (in 1975 they accounted for 83 per cent of this value), while intangible assets, i.e. human capital, stakeholder relations, repute, constitute the remaining part (Ocean Tomo, 2013). Environmental, Social and Corporate Governance (ESG) factors generate the risk that is equally significant in the investment assessment as financial data. Therefore, there is a growing need for the investment process to include (to a greater or lesser extent) social and environmental interests and a dialogue with stakeholders, in addition to purely economic criteria (UNEP Finance Initiative and the UN Global Compact, 2007).

This study verifies the hypothesis that greater transparency of public companies in disclosing non-financial (ESG) data results in lower volatility of return rates on securities issued by them, thereby reducing investment portfolio risk understood as return rate volatility. This is due to a lower information asymmetry since non-financial data disclosure allows for a complete holistic assessment of a company's risk and its valuation. Transparency of companies listed on the public market was assessed on the basis of the non-financial data reporting rating—ESG Risk Rating, developed on the basis of GES Agency's rating methodology. Return rate volatility was verified by means of statistical significance tests and classical volatility measures, i.e. standard deviation and beta coefficient indicating the vulnerability of the rate of return on a selected asset in relation to the market portfolio.

The research included the entire population of public companies listed on the Warsaw Stock Exchange and the New Connect market in the analysed period, comprising a total of 831 companies in 2012 and 853 companies in 2013. Given that companies' rating for non-financial ESG data reporting has been analysed only since 2012, the research was based on the 2013 GES Rating Survey data.

The first part of this study reviews the literature concerning research on non-financial ESG data inclusion in designing and managing an investment portfolio. The second part of the study analyses the level of non-financial ESG data reporting by companies listed on the public market in Poland. It identifies the relationship between ESG reporting and return-risk profile as regards the information gap in non-financial data reporting by public companies. The third and fourth parts of the study contain a description of the research methodology and a presentation and discussion of the results.

2. Information Asymmetry in Respect of Non-Financial Data Information Gap

In view of E. Fama's Efficient Market Hypothesis (Fama, 1970, 1991), which is fundamental for capital market, the market continuously uses available information to set the price of listed securities. Markets may vary

in terms of the level of informational efficiency. The range of information available to investors and its completeness and reliability affect the level of information asymmetry on the capital market. Given that the risk–return profile of an investment portfolio is the result of measurable, strictly economic and financial factors and, non-financial parameters, i.e. Environment, Social, Corporate Governance (ESG), specific to a financial instrument issuer, investors and portfolio managers, in taking decisions, seek information concerning not only economic and financial parameters of a company, but also undertake (directly or indirectly) an assessment of investment risks associated with the company operations in the social dimension as well as of its environmental impact. The effects of information asymmetry are observable on both sides of capital market participants, both among investors and portfolio managers and among issuers. For the issuer, the risk associated with ESG information asymmetry is primarily connected with the risk of failure to achieve the target financial result because of disclosure of 'sensitive information', e.g. regarding complaint handling and employment practices, training and remuneration of employees, additional costs borne due to sanctions or social ostracism and the risk of losing good name and credibility among both consumers and counterparties (Table 1). For investors, on the other hand, the ESG-related risk is considered primarily in terms of investor's reputation risk and the portfolio effectiveness (Czerwińska, 2013).

Researchers argue that, as a result of information asymmetry in non-financial ESG data disclosure, the use of ESG criteria to design an investment portfolio gives investors an information edge, which may enable them to achieve returns above the average (Kekäläinen, 2004). From this perspective, the use of ESG criteria has a positive influence on the investment portfolio effectiveness because better long-term results on operational and financial activity are achieved by companies operating in line with the concept of corporate social responsibility (CSR). Investors, especially institutional global ones, treat an analysis of non-financial ESG data primarily as an analysis of additional risk factors, covering mainly opportunities and threats related to investing in companies (e.g. operating in raw materials and energy sectors), such as the impact of stricter regulations concerning environmental standards on the profitability of investing in these sectors (Asset Management Working Group, UNEP FI and Mercer, 2007). In this case, correlations between ESG and economic and financial results achieved by companies in the long term are addressed to a much lesser extent. This appears to result from paradigm-related barriers among both managers and investors, and particularly from the so-called short-termism as regards companies' performance and usual quarterly assessment of investment portfolio management results.

Research is often conducted in respect of the impact of the inclusion of selected ESG criteria, such environmental responsibility factors, on an

Table 1: ESG Risks and Effects of Risk Materialisation for a Company's Market Valuation

Areas	ESG-related risks	Effects of risk materialisation
Environment	• climate change—extreme weather, greenhouse effect—greater frequency and severity of natural disasters • depletion of natural resources—waste of resources, overexploitation • ecosystem degradation, environmental pollution and disposal of hazardous waste	Direct costs: charges for emission allowances increased cost of raw materials, materials and energy elimination of environmental emergencies social protests, blockades Indirect costs: loss of reputation, social ostracism additional costs of the adverse effects of climate change and environmental pollution low economic innovation
Society	• financial exclusion—poverty, access to health services and medicines • civilisation diseases—risks associated with nanotechnology, obesity, pandemics	Direct costs: lawsuits, labour disputes, strikes penalties and restrictions imposed by supervisory authorities accidents at work, downtime increased costs of human resources management lower labour productivity product defects, complaints 'brain drain' boycott by consumer organisations
	• human rights and workers' rights—increased efficiency at the expense of workers, mobbing, unfavourable terms of outsourcing, discrimination in the workplace (especially on grounds of gender) • ageing population—changes in demographic structure	Indirect costs: increase in social costs loss of reputation, social ostracism mismatch of new products to social expectations lack of employee loyalty and high staff turnover higher unemployment
Corporate governance	• legal regulations—corruption, inappropriate complaint/appeal procedure, price fixing • professional ethics rules—unethical contract design, controversial marketing practices, misleading advertising	Direct costs: problems in the supply chain penalties restrictions imposed by supervisory authorities, lawsuits difficulties in attracting business partners and funding sources
	• equal treatment of stakeholder groups • conflicts of interest, structure of management and supervisory boards, creating value for the different stakeholder groups • transparency of operations and information policy—communication with the environment	Indirect costs: lack/loss of customer loyalty bad reputation costs of conflicts of interest deterioration of the social and economic environment in which a company operates—lack of transparency and predictability of activities

Source: own study based on Gasiński and Piekalski (2009), Zrównoważony biznes: podręcznik dla małych i średnich przedsiębiorstw, Ministerstwo Gospodarki 2009.

investment portfolio efficiency and risk (Derwallet al., 2005; Olsson, 2007). The aspects that are most frequently studied cover the consequences of excluding issuers categorised as irresponsible and non-transparent from an investment portfolio and the correlation between ESG data and the value of a company; see: negative impact of exclusions on an investment portfolio efficiency and risk: Chong et al. (2006) research revealing a positive impact of selection on an investment portfolio efficiency and risk: Statman (2006). In the light of the classical portfolio theory and the efficient market hypothesis, a portfolio structure that takes into account the ESG criteria may reduce a long-term investment portfolio efficiency. Indeed, on an efficient market, the market portfolio efficiency is higher than that of all other portfolios (Kekäläinen, 2004). Integration of the ESG criteria in the investment process may entail the issue of its adequate diversification. Excluding certain sectors or geographic areas from an investment portfolio may lead to an increase in systematic risk of the portfolio (Kekäläinen, 2004).

A significant part of research is the search for correlations between corporate governance and a company's value and its ability to generate long-term above-average returns (Gompers et al., 2003; Drobetz et al., 2004). There are attempts to demonstrate the positive impact of the use of ESG criteria on economic and financial condition of a company and its ability to maintain a long-term competitive advantage (Asset Management Working Group, UNEP FI and Mercer, 2007; Gillan et al., 2010; Peiró-Signes et al., 2012). Some studies show that the market is paying a premium for companies that invest in ESG initiatives due to the fact that as a company's position is increasing in the ESG rating, cash flow generated by it is also being valued higher in relation to similar enterprises (Perez-de Toledo and Bocatto, 2014). However, the results of such research are inconclusive. This is because it is extremely difficult to demonstrate a clear long-term relationship between valuation and volatility of a company's share prices in terms of statistical significance and its ability to generate cash flow on the one hand, and responsible human resources management, rational use of natural resources and its ability to minimize the impact on climate change on the other hand. At the same time, implementation of the corporate social responsibility concept contributes to increased transparency and predictability of corporate operations, thereby significantly reducing information asymmetry on the capital market and, consequently, which in turn largely reduces forecasting errors in risk–return profile of investment portfolios. Studies reveal that it is actually difficult to speak about a direct relationship between valuation effects and ESG as it appears that institutional investors are less likely to own or buy more shares of stronger environmental or socially responsible firms. However, it was observed that institutions do appear to prefer firms with fewer corporate governance concerns (Gillan et al., 2010). In addition, corporate operations

that are compliant with CSR aim to mitigate controversies and conflicts of interest of the various stakeholder groups which often cause crises in a company and affect its efficiency, resulting in an increased price volatility of the instruments issued by companies and price shocks (Becchetti et al., 2012). Currently, managers, often following their intuition, take many of these ESG factors into consideration as components of strategic management, but the added value of the inclusion of ESG criteria into management is most often disregarded in the long-term company valuation.

Information inequality of the parties to a contract is an inherent feature of the market (Ackerlof, 1970), but its intensity on the capital market depends largely on non-financial data reporting because existing regulations in this respect should be regarded as the so-called soft regulations that allow for greater freedom of interpretation and can be complied with on an optional basis; for example, comply or explain. Moreover, non-compliance does not entail any real sanctions. Studies worldwide show that there is a significant information gap in terms of non-financial data (PricewaterhouseCoopers International, 2012). The research was conducted in 2011 among Chief Executive Officers on a sample of 1,250 companies in 60 countries. The disclosure of non-financial information considered by managers as important (or very important) in the decision-making process are insufficient, especially for data on the return on investment in human capital, the costs of staff turnover as well as assessment of labour productivity and workers' internal development (Figure 1). The level of information asymmetry varies from one EU market to another. In some EU countries, non-financial data reporting by companies, especially large ones, is not only a part of the so-called good practices, but also a legal requirement as for

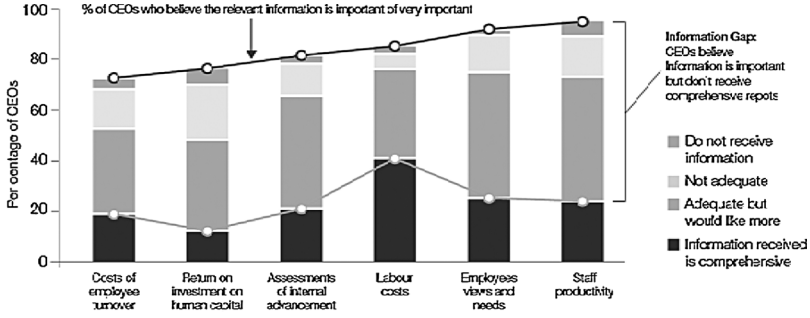

Figure 1: Information gap* in respect of corporate non-financial data

* Measured by difference between answers to questions: (1) When making decisions, how important is it to have information on each of the following talent-related areas? and (2) For those areas that are important to you, how adequate is the information that you currently receive?
Source: PricewaterhouseCoopers International (2012).

example in France, where initially (from 1977) companies employing more than 300 people were required to present the so-called 'social balance sheet' (*Nouvelles Regulations Economiques*, Article 116) and in July 2010 an additional obligation was imposed on all the major companies to report on ESG and their contribution to sustainable development. According to estimates, currently less than 10 per cent of the largest companies disclose non-financial data in the EU countries (European Commission, 2013a). Moreover, an attempt was earlier made on highly developed markets to reduce the information gap in non-financial data through implementing regulations that extended disclosure obligations of companies and recommended disclosure of non-financial data, as in: the United Kingdom (2006), Sweden (2007) (Ministry of Enterprise, Energy and Communications, 2007), Denmark (2011) (Reporting on corporate social responsibility —an introduction for supervisory and executive boards, 2009).

Reduction of information asymmetry requires a reliable periodic reporting on non-financial data. As part of the revision of the EU accounting directives (78/660/EEC and 83/349/EEC), the European Commission sees the need to impose a general requirement to report non-financial data, especially for large enterprises. The non-financial data reporting obligation is to cover companies operating in the EU (public companies and companies unlisted on the public market) that employ over 500 people and have a balance sheet total of over 20 million euros (or net turnover of more than 40 million euros) (European Commission, 2013b). These companies have to prepare supplements to their annual financial statements, providing information on policies and outcome of their activities as well as the ensuing corporate risks associated with the following issues: social, environmental, employment, respect for human rights, anti-corruption activities and practices relating to diversity in their management and supervisory bodies. This requirement will be implemented according to the comply or explain principle. Currently, Polish legal regulations (Article 49 of the Accounting Act of 29 September 1994; Minister of Finance, 2009) also require companies to disclose non-financial data on employment, corporate governance and environment, but this requirement is treated in a very liberal way. In principle, reports containing non-financial data are published only by the largest companies, mainly those listed on the public market. Still there is no uniform, comprehensive, and—more importantly—systematic assessment of the risks associated with the ESG areas of public companies.

3. ESG Risk Rating Survey Among the Public Companies in Poland

The main material for the research were the results of GES Risk Rating for Polish listed companies whose shares were listed on the Warsaw Stock Exchange on 30th June 2013. The list included companies listed on the

main market as well as in the alternative New Connect trading system (853 companies in total) Financial results and stock exchange information on companies from the bases of Notoria Service were used. The companies covered were assigned ratings concerning their activities in the environmental, social (human rights), and corporate governance areas as well as a total rating. These were awarded according to the GES Risk Rating method developed by the GES company. The achieved results are supposed to mirror the risk management effectiveness as regards the risk associated with a given sector and a degree of compliance with international standards. For the purpose of this analysis, a scale from 0 to 3 points for each of the three components was used to rate the companies. The total rating is an average for the three given areas and ranges in 0–3 (Table 2). On the basis of the analysed sample of 853 listed companies, the ratings shown in Table 2 were obtained for individual ESG factors.

The research conducted allows for a formulation of an ESG sectoral risk matrix that may constitute an additional criterion in investment decisions. The basis for the evaluation is the risk of a sector in which a given company operates, which is sector-specific. Hence, the risk assessment criteria are chosen in accordance with specific requirements, e.g. in the field of environmental protection for a given sector. On the other hand, the risk associated with corporate governance does not vary from one sector to another (hence it is not included in the matrix). The rating categories are identified by letters from A (lowest risk) to C (highest risk) (see SEG, n.d.). The first matrix shows risk rating for a given sector, according to GES Risk Rating criteria (Figure 2).

Taking the level of reporting on the point-based scale into account all criteria are assigned a specific value in points (SEG, n.d.), it should be noted that the overall level of reporting is relatively low (Figure 3). Statistical analysis of rating distribution shows that most companies do not disclose data on environmental policy and social responsibility or have not developed a policy in this regard. The highest level of reporting relates to corporate governance. There is also a statistically significant correlation

Table 2: Company Rating Methodology (0–3 scale)

Number of points	Rating	Rating description
<0.00–0.30)	c	Negligible information or complete absence
<0.30–0.75)	c+	Instructions for a company strategy development
<0.75–1.20)	b−	Expanded company policy
<1.20–1.18)	b	Policy + programme or policy + management system
<1.80–2.25)	b+	Policy + programme + management system
<2.25–2.70)	a-	Progress rating
<2.70–3.00>	a	External verification mechanism

Source: GES Risk Rating data.

General Human Rights Risk								
	A						Capital Markets	Software; Internet Software & Services
	A-					Commercial Banks; Biotechnology	Media; Diversified Financial Services	Consumer Finance
	B+			Real Estate; Management & Development	Health Care Equipment & Supplies	Diversified Telecommunications Services		
	B	Chemicals; Containers & Packaging	Building Products; Machinery		Health Care Providers & Services	Commercial Services & Supplies	Internet & Catalogue Retail; Professional Services	
	B-	Construction Materials	Electrical Equipment	Electronic Equipment, Instruments & Components; Household Durables	Office Electronics	Textiles, Apparel & Luxury Goods	Distributors	
	C+	Construction & Engineering; Independent Power Producers & Energy Traders	Water Utilities	Road & Rail; Beverages	Hotels, Restaurants & Leisure	Specialty Retail		
	C	Metals & Mining; Oil, Gas & Consumable Fuels	Food Products	Food & Staples Retailing				
		C	C+	B-	B	B+	A-	A

General Environmental Risk

Figure 2: ESG sectoral risk matrix.

Source: own study based on GES Risk Rating data.

between the levels of data reporting in the fields of corporate social responsibility and natural environment (Table 3).

Research conducted among public companies in Poland on non-financial data reporting has shown that there is a significant information gap, particularly in terms of reporting on environmental and social issues. Amidst public companies in the Consumer Discretionary, Consumer Staples, Industrials sectors, only 20–30 per cent of companies report on managing risks related to the environment and general socio-economic issues (Figure 4). Public companies mostly provide information on corporate governance, in accordance with the WSE policy on good practices. At the same time, taking the diversity of sectors into account, the research has proven that the public companies with the highest level of reporting are those operating in the following sectors: energy, consumer staples, materials and financials (Figure 5). The quality of information supplied by the analysed companies is varied. In most cases there is, however a relationship between ESG reporting level and a company's capitalisation as well as the sector in which the company operates.

The division of listed companies by their capitalisation and market clearly indicates that, taking into consideration average values, large cap

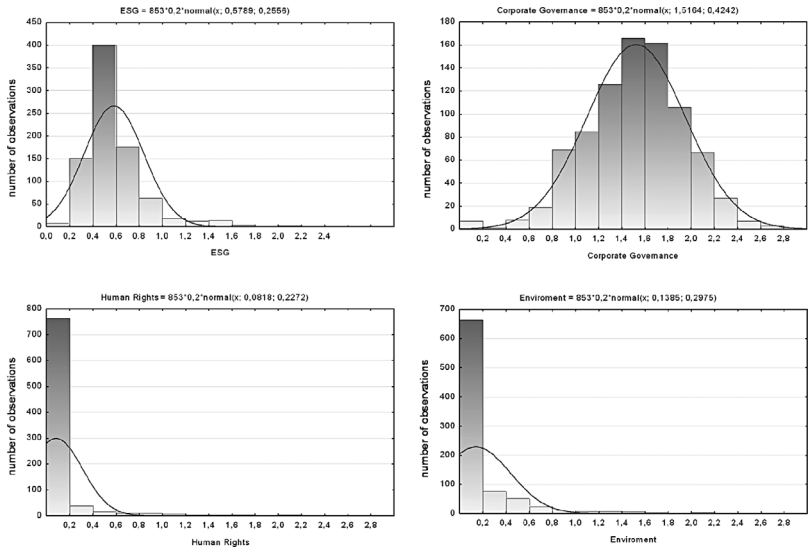

Figure 3: Distribution of ESG reporting ratings of listed companies in Poland (2013).

Source: own study based on GES Risk Rating data.

companies (mainly WIG20 constituents) are the best at disclosing ESG data, with an average ESG Rating score of 1.18 points (Figure 6). They are followed by WIG60, which is WIG20 and mWIG40 combined (0.97 points), sWIG80 (0.74 points), non-indexed Main Market companies (0.60 points), and New Connect-listed companies (0.44 points). Compared with

Table 3: Descriptive Statistics for Analysed Population

Assessment area	No. of observations	Average	Minimum	Maximum	Std. deviation
Environment	853	0.1385	0.00	2.060	0.2975
Human rights	853	0.0818	0.00	2.025	0.2272
Corporate governance	853	1.5164	0.00	2.715	0.4242
ESG	853	0.5789	0.00	2.137	0.2556
Correlation matrix					

	Corporate governance	Human rights	Environment
Environment	0.3697*	0.7583*	1.0000
Human rights	0.3739*	1.0000	
Corporate governance	1.0000		

The correlation coordinates marked with an asterisk are relevant for $p < .05000$ ($N = 853$).
Source: own study based on GES Risk Rating data.

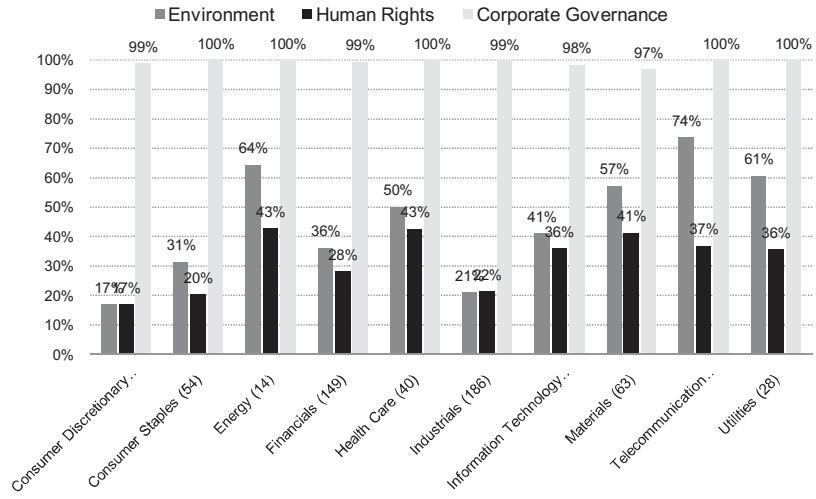

Figure 4: Information gap in ESG reporting of listed companies in Poland (2013) (per cent of companies with ESG reporting).

Source: own study based on GES Risk Rating data.

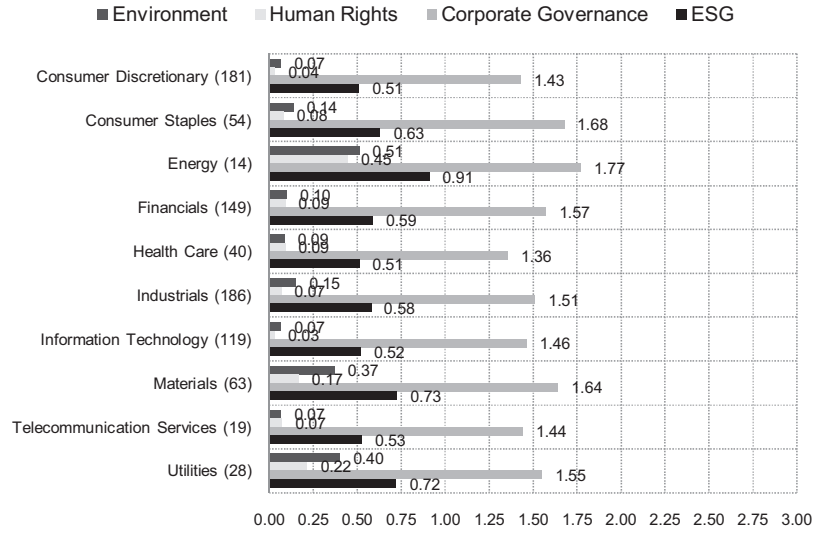

Figure 5: Evaluation of ESG reporting of listed companies by sector (2013, $N = 853$).

Source: own study based on GES Risk Rating data.

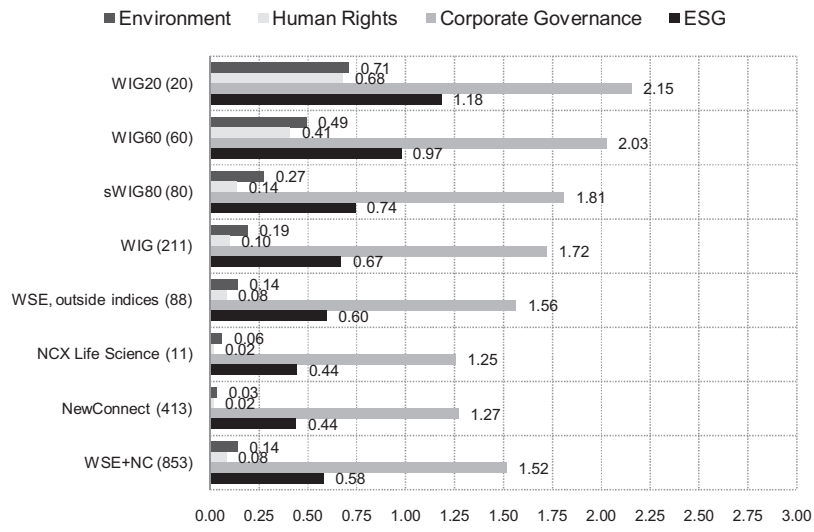

Figure 6: Evaluation of ESG reporting of listed companies by capitalisation (2013, $N = 853$).

Source: own study based on GES Risk Rating data.

the first survey (2012), the level and quality of companies' reports which disclosed non-financial data are better, but the same entities (mainly WIG20-listed companies) remain the leaders. As in the previous year, other companies still disclose their non-financial data on corporate governance only. It results from the fact that while the New Connect companies show a satisfactory level of reporting on corporate governance, the quality and significance of information in other areas (environmental and social) remain very low.

The situation looks similarly if we look at reporting companies by country of origin. The foreign companies are the best at disclosing ESG data (average 0.79 point), followed by companies domiciled in Poland (0.56 point) (Figure 7). And again, in both groups mostly reported information is corporate governance (1.78 points for foreign companies and 1.5 points for domestic companies). It is worth noting that in the case of corporate governance reporting the distance between foreign companies and domiciled companies disclosure is not so significant.

In summary, we created ESG sectoral risk matrix for the Polish market according to MSCI sectors classification (Figure 8). The average levels of risk estimated for companies in the different industries taken into account (based on the results obtained in the study) is shown in Figure 8.

The research in Poland is to some extent at variance with the matrix above and has shown that the industries characterised by the lowest

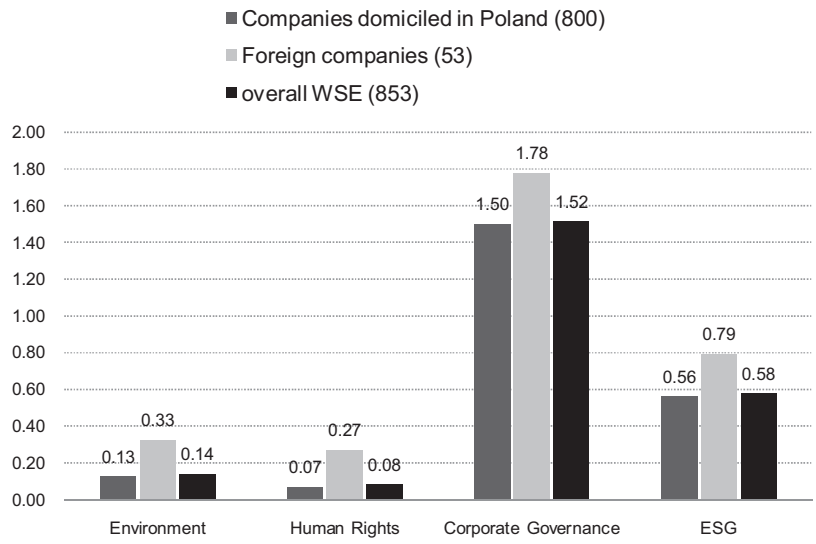

Figure 7: Evaluation of ESG reporting of listed companies by country of origin (2013 $N = 853$).

Source: own study based on GES Risk Rating data.

investment risk in terms of ESG-related factors include: Metals and Mining, Food Products and Machinery sectors (Table 4). On the other hand, the highest ESG-related risk is attributed to companies in Internet Software and Services, Software and Diversified Financial Services sectors.

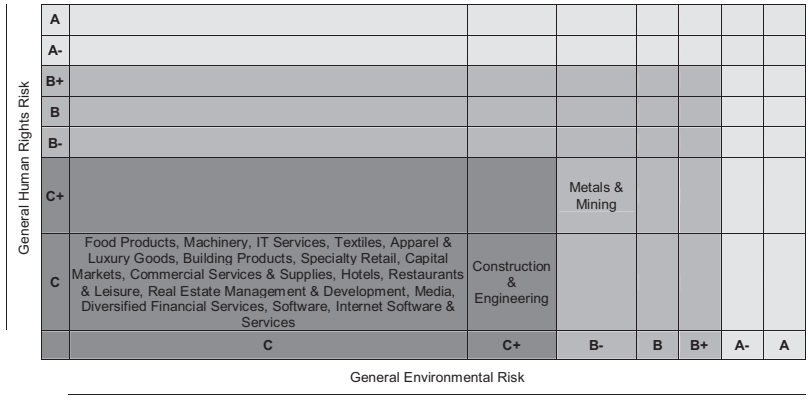

Figure 8: ESG sectoral risk matrix for companies listed in Poland.

Source: own study based on GES Risk Rating data.

4. Methods

In order to capture the relationship between the inclusion of ESG criteria and related risks in the investment process and their impact on the effectiveness of portfolio, we decided to concentrate on the period of 3 years before the ESG survey was conducted. This is the period over which the number of quoted companies, their market capitalisation and liquidity together with the average value of trading volume were high enough to assure the necessary quality of outcomes. All risk indices (beta coefficient and standard deviation) were calculated based on monthly logarithmic return rates, including dividend payments, for 3 years.

In the first part of our analysis, in order to be certain that the differences in the quality of firm-level corporate governance and their environmental and social responsibility indeed help to explain firms' performance, we decided to sort the companies by the level of ESG reporting, using ratings, and create a portfolio that consists of long position in high-ranked companies (upper 10 per cent of results) and short position in low-ranked companies (bottom 10 per cent of results). In order to verify the Long/Short strategy, referring to studies by Gompers et al. (2003) and subsequent studies by Drobetz et al. (2004), we ran a regression of returns on the ESG rating-based portfolio in line with Fama–French factors (Fama and French, 1992, 1993). This model assumes that systematic risk may be explained by three factors: the excess rate of return on a market portfolio in the CAPM model and SMB and HML factors. The first factor introduced by Fama and French (SMB, small minus big) explains the difference between the return rate on a portfolio of shares of companies with low capitalisation and the return rate on a portfolio of shares of companies with high capitalisation. For the purposes of this study, at the beginning of each month a distinction was made between companies, assuming that the portfolio of large-sized companies consisted of 30 per cent of companies with the highest capitalisation on a given day while the portfolio of small-sized companies comprised 30 per cent of companies with the lowest capitalisation on a given day in the analysed group of entities. The second of the parameters introduced (HML, high minus low) describes the difference between the return rate on the stock portfolio of companies with a high BV/MV ratio and the return rate on the stock portfolio of companies with a low value of this ratio. For the purposes of this study, at the beginning of each month a distinction was made between companies, assuming that the 'high-book-to-market stocks' portfolio consisted of 30 per cent of companies with the highest equity to market capitalisation ratio while the 'low-book-to-market stocks' portfolio comprised 30 per cent of companies with the lowest value of this ratio. We used the return rate on the WIG index less the risk-free rate defined as WIBOR1M at the beginning of each month as the excess rate of return on a market portfolio. The sample period is from 30 June 2010 to 30

June 2013 (36 months). The time series regression model is specified as follows:

$$TMNT = \alpha + \beta_1 \times RMRF_t + \beta_2 \times SMB_t + \beta_3 \times HML_t + \varepsilon_t$$

The dependent variable is the monthly return difference between the 'transparency' and 'non-transparency' portfolios, denoted as TMNT ('transparency' minus 'non-transparency'). RMRF is the monthly value-weighted market return minus the risk-free rate, and SMB_t (small minus big) and HML (high minus low) are the monthly returns of factor-mimicking portfolios designed to capture the size and book-to-market characteristics, respectively; that is, white noise.

In the second part, in order to investigate if there is any relationship between the introduction of ESG criteria in portfolio management and the efficiency and risk of investment activity, we adopted a different approach to the level of corporate reporting. This was done by dividing all companies into groups, using percentiles of scores in each of the ESG areas as criteria. The value of each percentile indicates the value below which a given percentage of observations forms an investment portfolio. For each portfolio, we calculated the risk/return relationship and compared it with the values for the broader market (whole population). Such an approach was also the basis for examining whether non-random portfolio diversification based on the ESG rating has any impact on the parameters of an investment portfolio built in this way. The risk of a stock portfolio depends on the proportions of individual shares, their variances and covariances. In the classical portfolio theory, it is generally true that when shares are randomly selected, and combined in equal proportions in a portfolio, the risk of a portfolio declines as the number of different shares increases. Evans and Archer (1968) observed that the risk reduction effect diminishes rapidly as the number of shares increases. They concluded that the economic benefits of diversification are virtually exhausted when a portfolio contains even fewer than fifteen companies. However, as the volatility of individual shares has risen over time and the correlation among stock returns has fallen over time, further research showed that this number is to be around 50 (Campbell et al., 2001).

At the same time, it is believed that the implementation of corporate social responsibility concept contributes to increased transparency and valuation of a company's operations, which in turn contributes significantly to reducing information asymmetry on the capital market. In order to examine if this phenomenon exists on the Polish capital market, a study was conducted on whether the correlation between ESG reporting levels and the level of error in systematic risk estimation is significant. To estimate the systematic risk of a given asset (e.g. a share) relative to the risk of a well-diversified market portfolio, we decided to use the Capital Asset Pricing Model (CAPM)

developed by Sharpe (1964) and Lintner (1965). In the second analysis of information asymmetry, we investigate if the market is surprised by the news at the date of non-financial (ESG) data release. To verify the market reaction to the ESG rating information, the classical event study methodology (Fama et al., 1969) was used. On that basis, the event window was defined as a period of 25 trading sessions before and after the announcement of the ESG rating data. The length of the event window was limited to 25 sessions so as not to disrupt the results of the analysis in view of the influence of the publication of WSE-listed companies' financial reports for the third quarter of 2013, which began in mid-November 2013. It was assumed that the measure of investors' reactions to the ESG rating were abnormal returns—the difference between the actual ex-post return on the asset and the expected rate of return. There are several approaches to estimating the expected rate of return, but we assume simple data generating process for the expected return rate, i.e. the industry benchmark return for a company, or the return that one would have expected in the absence of the event. In this study, the average rate of return for WSE-listed companies in a specific MSCI sector was assumed to be the benchmark return rate. The Event Study methodology offers two different measures of aggregated abnormal returns that are commonly used in event study analyses: (1) the cumulative abnormal return measure and (2) the buy-and-hold abnormal return (BHAR), defined as the difference between the realised buy-and-hold return and the normal buy-and-hold return. In our test of the reduction of information asymmetry, we used the first approach, whereby the cut-off date for both time series was the last close of trading session on the Warsaw Stock Exchange before the ESG rating was announced. The day on which the ESG rating was made public is 23 October 2013, when the ESG rating for public companies was made available for the second time in the history of the Polish capital market. Subsequently, a test was conducted on information asymmetry reduction, which checked whether the correlation between ESG reporting levels and cumulative excess rates of return for the analysed companies was significant.

In the last part of our research attempts were made to demonstrate the impact of ESG criteria use on the financial and economic condition of a company. To find out how closely financial measures of individual shares are correlated with ESG factors, we conducted a test of significance for coefficient of correlation ρ. From the wide range of financial measures, we chose three measures which are important for investors when assessing the attractiveness of each company:

- Return on equity (ROE) [net profit (loss)/equity]—ROE measures how much of a company's net income is generated by each unit of shareholder equity.
- Earnings per share attributable to equity holders of the parent (basic EPS) [net profit (loss) attributable to equity holders of the parent/weighted

average shares]—Basic EPS is calculated by dividing net profit attributable to equity holders of the parent for a given reporting period by the weighted average number of outstanding ordinary shares in the period.
- Dividend yield (DY) [dividends and other payments to owners/market capitalisation]—shows how much a company pays out in dividends each year relative to its share price. In the absence of any capital gains, the dividend yield is the return on investment for a share.

Despite quite a large research sample, looking at sectoral division at the WSE, we can still see considerable disproportions in numbers of companies between individual sectors. The analysed companies with the greatest representation operate in the following sectors: industrials (79 companies), which along with consumer discretionary (54) and financials (51) considerably prevailed over other sectors. A large number of representatives belonged to such sectors as: IT (37), materials (31) and consumer staples (28). The remaining groups did not meet the condition of a minimum size of a sample for the purposes of statistical inference and, if included, could cause a significant error in the process. Given the above limitations, a cross-sectoral analysis and an examination of the so-called cost of sin were excluded from this study. Instead, it was decided to verify the impact of positive selection on the characteristics of an investment portfolio: its risk and return rate.

Table 4: Sectoral ESG Risk Rating for Polish Market*

MSCI Industry	Number of companies	Score environment (0–3)	Score human rights (0–3)	Score corporate governance (0–3)	Score ESG equal weight (0–3)
Metals and mining	22	0.52	0.29	1.81	0.87
Food products	33	0.13	0.09	1.71	0.64
Machinery	33	0.18	0.05	1.68	0.64
Construction and engineering	52	0.21	0.11	1.54	0.62
IT Services	24	0.05	0.04	1.62	0.57
Textiles, apparel and luxury goods	21	0.08	0.02	1.57	0.55
Building products	21	0.17	0.04	1.43	0.54
Specialty retail	21	0.10	0.06	1.46	0.54
Capital markets	45	0.02	0.01	1.54	0.53
Commercial services and supplies	38	0.07	0.06	1.41	0.52
Hotels, restaurants and leisure	26	0.05	0.06	1.38	0.50
Real estate management and development	35	0.02	0.00	1.47	0.50
Media	51	0.03	0.03	1.40	0.49
Diversified financial services	40	0.02	0.03	1.41	0.49
Software	45	0.01	0.02	1.37	0.47
Internet software and services	24	0.00	0.01	1.33	0.45

Source: own study based on GES Risk Rating data.
*MSCI industries classification with a sample size of 20 or more entities (0–3 rating scale).

5. Results

5.1. Risk/Return Relationship

The next part of the report contains an attempt to compile risk measures and non-financial data. As mentioned earlier—because of an absence of sufficiently big sample of New Connect-listed companies with at least minimum level of reporting on significant environmental (11.3 per cent) and human rights (10.2 per cent) data—only companies listed at the WSE were included in the correlation analysis (440 entities). Furthermore, companies listed for less than 3 years were excluded from the analysis ($N = 308$).

As mentioned previously, in order to verify the Long/Short strategy, referring to studies by Gompers et al. (2003) and subsequent studies by Drobetz et al. (2004), we differentiated between two portfolios: companies with the highest and lowest values in the ESG rating (10 per cent of upper and lower results). The limit for the first portfolio was the sum of the ESG rating of 1.424. A group of companies that met this criterion was called the 'transparency portfolio' ($N = 16$). The limit for the second portfolio was the sum of the ESG rating of 0.420. A group of companies that met this criterion was called the 'non-transparency portfolio' ($N = 18$). Both portfolios were portfolios of equal shares and their characteristics are described in Table 5. All parameters were estimated based on monthly logarithmic return rates, including dividend payments, for 3 years.

The fifth column of Table 5 shows how significant the differences between the variables are. As could be expected, there are several marked differences. First of all, the portfolio of companies with the highest ESG results was marked by an average monthly return rate over the three years preceding the rating that was higher than the corresponding average return rate on 'non-transparency' portfolio by about 1.59 per cent. It should be added, however, that this difference was not statistically significant. Companies included in the 'transparency' portfolio were, in turn, significantly larger (in terms of capitalisation) and were characterised by a lower market-to-book ratio (Table 5).

The next step of the analysis was to calculate the rates of return on the portfolios described previously ('transparency' and 'non-transparency'), assuming that an investor invested PLN 1 in each of these portfolios at the beginning of the analysed period (30 June 2010). The backtest conducted indicated that an investor would have received PLN 1.12 for every PLN 1 invested in the 'transparency' portfolio at the end of the investment (30 June 2013). For the 'non-transparency' portfolio, the value of identical investment would have been only PLN 0.60 after this period. These results, when analysed, are 3.88 per cent average yearly return and 15.57 per cent average loss, respectively. Figure 9 shows the result of the buy-and-hold strategy for both portfolios and the WIG index as well as the Long/Short strategy on the basis of both portfolios (Long for the 'transparency' portfolio

Table 5: Characteristics of Portfolios Used in the Development of a Long/Short Strategy

	Transparency portfolio	Non-transparency portfolio	Difference between portfolios	Significance of the difference between parameters
N	16	18	−2	n/a
Average monthly return rate	0.44%	−1.14%	1.59%	0.2384
Standard deviation of monthly return rates	5.05%	7.32%	−2.27%	<0.0001
Average capitalisation (millions of PLN)*	14 025.5	43.1	13 982.4	0.0108
Standard deviation of capitalisation (millions of PLN)*	23 181.0	41.1	23 139.9	<0.0001
Average MV/BV (market-to-book) ratio*	1.148	2.462	−1.314	0.0533
MV/BV (market-to-book) standard deviation*	0.705	3.045	−2.340	0.0737

Source: own study based on GES Risk Rating, WSE and KDPW data.
*as at the date of the ESG rating completion (30 June 2013).

and Short for the 'non-transparency' portfolio). It must be noted that our analysis is hampered by the fact that we have no time-varying ESG ratings. Therefore, we implicitly assume a constant ESG rating during the sample period.

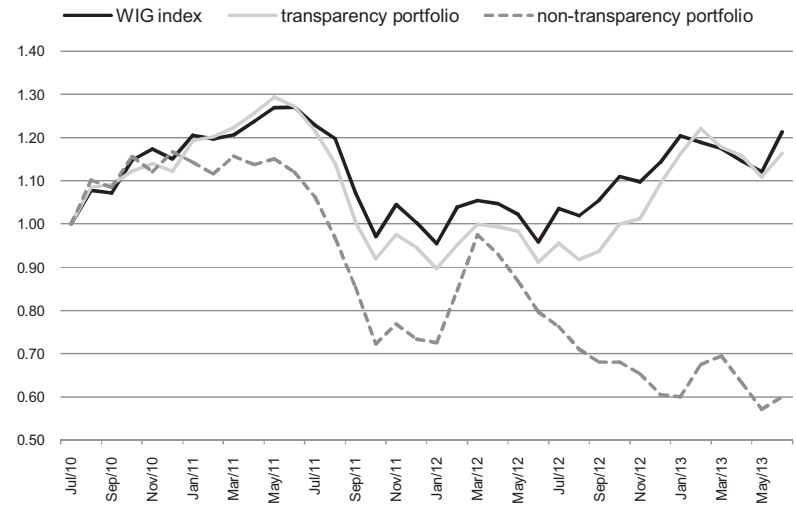

Figure 9: Cumulative portfolio return rates in the buy-and-hold strategy for 'transparency' and 'non-transparency' portfolios and the WIG index.

Source: own study based on GES Risk Rating data.

Although the above results support our thesis about better investment parameters of companies with a high transparency level and a premium gained in the quotations of these companies in relation to entities classified as non-transparent, further research will have to be conducted to confirm the findings, with particular emphasis on verifying whether the conclusions are sustainable over time.

Nevertheless, based on the 2013 results, we decided to examine if this premium for transparency is due to the reporting level or is a consequence of other variables. To do so, we used the Fama–French three–factor model (FF) described in part 3. As a reminder, the distinction between companies was made in terms of capitalisation (the portfolio of large-sized companies consisted of 30 per cent of companies with the highest capitalisation on a given day while the portfolio of small-sized companies comprised 30 per cent of companies with the lowest capitalisation on a given day in the analysed group of entities; SMB parameter) and investment style (the 'high-book-to-market stocks' portfolio consisted of 30 per cent of companies with the highest equity to market capitalisation ratio while the 'low-book-to-market stocks' portfolio comprised 30 per cent of companies with the lowest value of this ratio). We used the return rate on the WIG index less the risk-free rate defined as WIBOR1M at the beginning of each month as the excess rate of return on a market portfolio. The sample period is from 30 June 2010 to 30 June 2013 (36 months) (Table 6).

Table 6: Three–Factor Model (Transparency Portfolio Minus Non-Transparency Portfolio)

	Parameter value	Standard error of coefficient	*t*-value	Significance level
Intercept (α)	0.0144	0.0086	1.6677	0.0524
RMRF	0.2074	0.1810	1.1458	0.1301
SMB	−0.1142	0.3428	−0.3331	0.3706
HML	0.7344	0.2687	2.7332	0.0050
R^2	28.32%			

TMNT, transparency portfolio minus non-transparency portfolio; RMRF, month *t* value-weighted market return minus the risk-free rate; SMB, small minus big; HML, high minus low.
Source: own study based on GES Risk Rating data.

The regression results show that the RMRF and SMB coefficients are entered with positive and negative signs, respectively, but they are not significant at any level of significance. The alpha and HML parameters are, however, significant (at the levels of 10 per cent and 1 per cent, respectively), which means that the excess rate of return on a portfolio based on the level of ESG reporting cannot be attributed to differences in company size. At the same time, a correlation may be found between social responsibility of the company and its market valuation. If we assume that

companies with higher ESG rating are also more socially responsible (although this is an oversimplification), it can be concluded that above-average return rates are the result of higher market valuation of socially responsible companies. Finally, it is worth to stress that our estimate for the intercept (statistically significant at the 10 per cent level) amounts to 144 basis points per month (or 4.98 per cent per year), which is similar in magnitude to the annualised abnormal return from the buy-and-hold strategy analysed above. Consequently, it may be argued that the level of reporting can be used to explain the differences in returns alone or in combination with an investment style.

Knowing that non-financial data can help to improve investment results, a further part of the research was to determine the impact of ESG rating-based portfolio diversification on the parameters of a portfolio built in this way. As a reminder, according to the classical portfolio theory, it is generally true that when shares are randomly selected, and combined in equal proportions in a portfolio, the risk of a portfolio declines as the number of different shares increases. Figure 10 shows a different approach to the level of corporate reporting. On the horizontal axis, the numbers of individual percentiles are marked, while the vertical axis shows the values of these percentiles in individual areas. There is a non-zero limit at the 55th percentile (environmental data) and the 60th percentile for data concerning human rights. It is worth noticing that there is a significant growth in values of the highest percentiles (over 90).

Twelve months concluded on 30th June created favourable conditions for investment. An increase in WIG by 9.6 per cent led to an average monthly index return rate of 0.47 per cent for the last three years. mWIG40 constituents contributed considerably, gaining +0.55 per cent on average per month over that period. Because of a limited group of analysed companies (complying with the above-mentioned criteria; 308 entities) and equal shares of companies in portfolios, their characteristics differed from the values of classic index constituents. In the limited group of companies, an average monthly return rate was −0.25 per cent, while for WIG20, WIG60 and sWIG80 it stood at +0.74, 0.44 and 0.46 per cent, respectively.

By comparing the breakdown of reporting results (presented in Figure 10) with the parameters describing the return on investment in companies (3-year average and standard deviation of monthly return rates), we obtain the table below (Table 7). For example, the first three cells of the first row (upper 5 per cent of results) mean that 5 per cent of 308 companies reached a reporting result in environmental area equal to 1.11 or more. Moreover, companies with the result in the environmental area equal to 1.11 or more, brought an average monthly 0.49 per cent return during the last three years and the investment in such shares was subject to risk of about 9.51 per cent. The first three cells of the fifth row (third quartile) mean that 25 per cent of 308 companies achieved a reporting result equal to 0.46 or

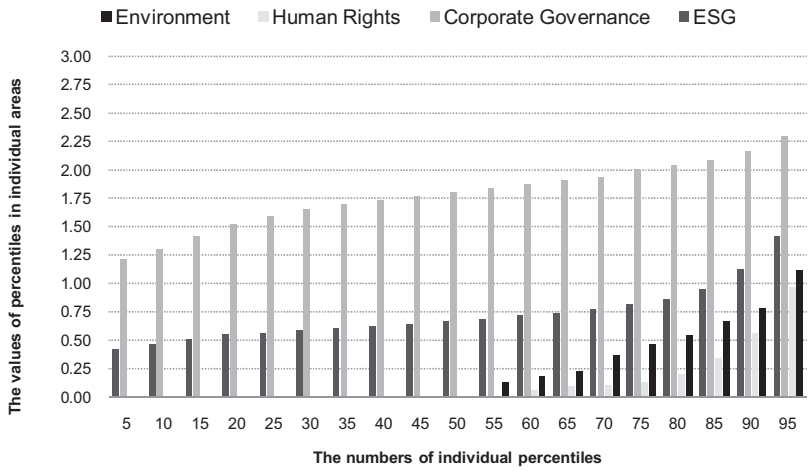

Figure 10: Distribution of reporting levels in individual areas (scale: 0–3 points; $N = 308$).

Source: own study based on GES Risk Rating data.

more in the environmental area. In addition, companies with the result in the environmental area equal to 0.46 or more, brought an average monthly loss of 0.05 per cent during the last three years and the investment in such shares was subject to risk of about 11.77 per cent. It is worth noting that in the environmental area, the median of all results reaches the value of 0.00. It means that a half of 308 companies do not disclose any significant data in this area. Average values and deviations in this case mean that the companies with the result in the environmental area equal to 0 or more (technically all 308 companies) brought a monthly 0.25 per cent loss with the level of risk at 12.74 per cent.

Looking from the angle of historical results, it appears that companies disclosing significant non-financial data stand out positively both against other companies in their sector and the whole market. Although over a half of the analysed companies report significant non-financial data in the corporate governance area only, these entities were positively seen by investors and had a better return-risk profile. Moreover, in each category, 5 per cent of the best companies always had a positive average return rate with significantly lower risk rate. Therefore, these companies achieved desirable relationships between these values (return/risk relation for 5 per cent of the best companies in environmental area equals 5.1, 6.8 in human rights and 4.4 in corporate governance).

In order to have a closer look at the characteristics of each percentile portfolio, we decided to test the differences between means (for these portfolios compared with the whole market) in each ESG area. The results are shown in Tables 8–11.

Table 7: Level of Reporting in Individual Areas and Investment Return in 3-year Horizon (2013 $N = 308$)

	Percentiles of factors distribution in environmental area	Average monthly return rate	Standard deviation of monthly return rates	Percentiles of factors distribution in human rights area	Average monthly return rate	Standard deviation of monthly return rates	Percentiles of factors distribution in corporate governance area	Average monthly return rate	Standard deviation of monthly return rates	Percentiles of distribution —total result (ESG)	Average monthly return rate	Standard deviation of monthly return rates
upper 5 per cent of results	**1.11**	**0.49**	**9.51**	**0.96**	**0.59**	**8.69**	**2.30**	**0.37**	**8.41**	**1.42**	**0.48**	**9.18**
upper 10 per cent of results	0.78	0.34	10.23	0.56	0.43	9.68	2.16	0.46	9.88	1.12	0.70	9.34
upper 15 per cent of results	0.66	0.26	10.25	0.35	−0.05	10.03	2.09	0.24	10.42	0.95	0.17	9.84
upper 20 per cent of results	0.54	0.01	11.46	0.20	−0.04	9.90	2.04	0.07	10.66	0.86	0.08	10.22
third quartile	**0.46**	**−0.05**	**11.77**	**0.14**	**−0.04**	**10.46**	**2.01**	**−0.14**	**11.20**	**0.81**	**−0.04**	**10.59**
upper 30 per cent of results	0.37	0.07	11.58	0.11	0.04	10.91	1.94	−0.18	11.20	0.78	0.07	10.79
upper 35 per cent of results	0.23	0.20	11.48	0.09	0.09	11.53	1.91	−0.14	11.56	0.74	0.06	11.07
upper 40 per cent of results	0.18	0.28	11.48	0.06	0.05	11.57	1.88	−0.10	11.53	0.72	0.18	11.40
upper 45 per cent of results	0.13	0.30	11.89	0.00	−0.25	12.74	1.85	−0.11	11.68	0.69	0.18	11.32
median	**0.00**	**−0.25**	**12.74**	**0.00**	**−0.25**	**12.74**	**1.80**	**−0.05**	**11.73**	**0.67**	**0.09**	**11.46**
upper 55 per cent of results	0.00	−0.25	12.74	0.00	−0.25	12.74	1.77	−0.04	11.87	0.65	0.00	11.59
upper 60 per cent of results	0.00	−0.25	12.74	0.00	−0.25	12.74	1.73	−0.08	11.96	0.63	0.00	11.77
upper 65 per cent of results	0.00	−0.25	12.74	0.00	−0.25	12.74	1.70	−0.11	11.94	0.60	−0.01	12.20
upper 70 per cent of results	0.00	−0.25	12.74	0.00	−0.25	12.74	1.65	−0.15	12.08	0.59	−0.01	12.28
first quartile	**0.00**	**−0.25**	**12.74**	**0.00**	**−0.25**	**12.74**	**1.59**	**−0.13**	**12.09**	**0.56**	**−0.06**	**12.21**
upper 80 per cent of results	0.00	−0.25	12.74	0.00	−0.25	12.74	1.52	−0.16	12.64	0.55	−0.13	12.35
upper 85 per cent of results	0.00	−0.25	12.74	0.00	−0.25	12.74	1.41	−0.18	12.75	0.51	−0.17	12.60
upper 90 per cent of results	0.00	−0.25	12.74	0.00	−0.25	12.74	1.31	−0.19	12.68	0.47	−0.17	12.65
upper 95 per cent of results	**0.00**	**−0.25**	**12.74**	**0.00**	**−0.25**	**12.74**	**1.21**	**−0.18**	**12.62**	**0.42**	**−0.19**	**12.60**

Source: own study based on GES Risk Rating, WSE and KDPW data.

Table 8: Difference of Means Test-Environmental Area (2013 $N = 308$)

	Percentiles of factors distribution in environmental area	Average monthly return rate	Standard deviation of monthly return rates in the group	Number of companies in the group	Total number of companies	*p*-value
upper 5 per cent of results	**1.11**	**0.49**	**1.45**	**16**	**308**	**0.04**
upper 10 per cent of results	0.78	0.34	1.93	32	308	0.06
upper 15 per cent of results	0.66	0.26	1.75	46	308	0.04
upper 20 per cent of results	0.54	0.01	1.97	68	308	0.17
third quartile	**0.46**	**−0.05**	**1.93**	78	308	**0.22**
upper 30 per cent of results	0.37	0.07	2.02	93	308	0.10
upper 35 per cent of results	0.23	0.20	2.05	107	308	0.03
upper 40 per cent of results	0.18	0.28	2.05	120	308	0.01
upper 45 per cent of results	0.13	0.30	2.08	135	308	0.01

Source: own study based on GES Risk Rating, WSE and KDPW data.

The results are promising—the highest ratings in each of the three ESG areas were assigned to companies which may be regarded as the companies with below-average risk, estimated on historical data. What is most important, the difference in average return between populations was statistically significant—the most transparent companies outperformed the broad market with *p*-value below 0.05.

This result perhaps requires a broader discussion. As mentioned earlier, on the one hand, prices of securities issued by a more transparent and predictable company are less volatile due to reduced information asymmetry. On the other hand, the risk–return relationship is inverse, according to the portfolio theory. Therefore, the return rates on securities issued by companies that are perceived as bearing lower risk should not exceed the average. According to the research conducted, the shares of companies with a higher ESG rating (5th percentile) showed above-average rates of return and the differences in return rates between groups of issuers with higher and lower ESG rating were statistically significant. This can be considered interesting also because a much higher ESG rating was mainly assigned to large companies. It should be emphasised that despite a large disparity between the sizes of companies in 'transparency' and 'non-transparency' portfolios, the results for the significance of the Fama–French

Table 9: Difference of Means Test-Human Rights Area (2013 $N = 308$)

	Percentiles of factors distribution in human rights area	Average monthly return rate	Standard deviation of monthly return rates in the group	Number of companies in the group	Total number of companies	*p*-value
upper 5 per cent of results	**0.96**	**0.59**	**1.07**	**17**	**308**	**<0.01**
upper 10 per cent of results	0.56	0.43	1.92	32	308	0.04
upper 15 per cent of results	0.35	−0.05	2.02	50	308	0.27
upper 20 per cent of results	0.20	−0.04	1.87	62	308	0.23
third quartile	**0.14**	**−0.04**	**1.83**	77	308	**0.20**
upper 30 per cent of results	0.11	0.04	1.84	101	308	0.10
upper 35 per cent of results	0.09	0.09	2.00	115	308	0.07
upper 40 per cent of results	0.06	0.05	1.97	123	308	0.09

Source: own study based on GES Risk Rating, WSE and KDPW data.

model parameters did not attribute any statistical significance to the BML parameter. A statistically significant difference was, however, noticeable between return rate standard deviations for the portfolios, which may indicate a positive impact of ESG rating-based portfolio diversification on the parameters of a portfolio built in this way, also in light of the simultaneous significance of the alpha parameter (at the level of 10 per cent).

5.2. Information Asymmetry

So far, empirical research carried out has shown that introducing ESG criteria in portfolio management does not reduce the efficiency or increase the risk of investment activity. To make this statement stronger, we decided to investigate if companies' transparency reduces forecasting errors in the risk-income profile of investment portfolios. Firstly, we conducted a test of significance for coefficient of correlation between ESG values in each area and the values of beta coefficient and its standard error (Table 12). The beta parameter was estimated by means of the CAPM model, based on monthly return rates for the three years prior to the ESG rating completion (30 June 2013).

The results showed that the implementation of corporate social responsibility concept contributes to increased transparency which in turn contributes significantly to reducing information asymmetry on the capital

Table 10: Difference of Means Test-Corporate Governance Area (2013 $N = 308$)

	Percentiles of factors distribution in corporate governance area	Average monthly return rate	Standard deviation of monthly return rates in the group	Number of companies in the group	Total number of companies	*p*-value
upper 5 per cent of results	**2.30**	**0.37**	**1.22**	**18**	**308**	**0.03**
upper 10 per cent of results	2.16	0.46	1.13	35	308	<0.01
upper 15 per cent of results	2.09	0.24	1.35	49	308	0.02
upper 20 per cent of results	2.04	0.07	1.52	64	308	0.08
third quartile	**2.01**	**−0.14**	**1.66**	78	308	**0.31**
upper 30 per cent of results	1.94	−0.18	1.71	101	308	0.37
upper 35 per cent of results	1.91	−0.14	1.84	115	308	0.30
upper 40 per cent of results	1.88	−0.10	1.87	127	308	0.24
upper 45 per cent of results	1.85	−0.11	1.97	142	308	0.26
median	**1.80**	**−0.05**	**1.96**	160	308	**0.17**
upper 55 per cent of results	1.77	−0.04	1.96	180	308	0.14
upper 60 per cent of results	1.73	−0.08	1.98	184	308	0.20
upper 65 per cent of results	1.70	−0.11	2.04	200	308	0.24
upper 70 per cent of results	1.65	−0.15	2.07	212	308	0.30
first quartile	**1.59**	**−0.13**	**2.11**	228	308	**0.27**
upper 80 per cent of results	1.52	−0.16	2.31	244	308	0.32
upper 85 per cent of results	1.41	−0.18	2.33	261	308	0.36
upper 90 per cent of results	1.31	−0.19	2.30	277	308	0.39
upper 95 per cent of results	**1.21**	**−0.18**	**2.28**	292	308	**0.36**

Source: own study based on GES Risk Rating, WSE and KDPW data.

market. That leads to a more accurate estimation of linear regression coefficients. It is notable that together with an increase in ESG score, standard error of the OLS beta estimate (in absolute terms) was considerably reduced.

This picture is complemented by an analysis of the correlation between reporting results on the one hand and the relationship between a parameter

Table 11: Difference of Means Test-ESG Area (2013 $N = 308$)

	Percentiles of distribution —total result (ESG)	Average monthly return rate	Standard deviation of monthly return rates in the group	Number of companies in the group	Total number of companies	p-value
upper 5 per cent of results	**1.42**	**0.48**	**1.27**	**16**	**308**	**0.02**
upper 10 per cent of results	1.12	0.70	1.56	31	308	<0.01
upper 15 per cent of results	0.95	0.17	1.87	46	308	0.09
upper 20 per cent of results	0.86	0.08	1.80	64	308	0.11
third quartile	**0.81**	**−0.04**	**1.85**	77	308	**0.21**
upper 30 per cent of results	0.78	0.07	1.79	93	308	0.08
upper 35 per cent of results	0.74	0.06	1.87	106	308	0.08
upper 40 per cent of results	0.72	0.18	1.95	122	308	0.02
upper 45 per cent of results	0.69	0.18	1.94	139	308	0.02
median	**0.67**	**0.09**	**1.98**	152	308	**0.05**
upper 55 per cent of results	0.65	0.00	1.97	167	308	0.11
upper 60 per cent of results	0.63	0.00	1.98	182	308	0.11
upper 65 per cent of results	0.60	−0.01	2.11	197	308	0.12
upper 70 per cent of results	0.59	−0.01	2.10	212	308	0.11
first quartile	**0.56**	**−0.06**	**2.12**	228	308	**0.16**
upper 80 per cent of results	0.55	−0.13	2.15	244	308	0.26
upper 85 per cent of results	0.51	−0.17	2.29	261	308	0.34
upper 90 per cent of results	0.47	−0.17	2.29	277	308	0.35
upper 95 per cent of results	**0.42**	**−0.19**	**2.27**	293	308	**0.38**

Source: own study based on GES Risk Rating, WSE and KDPW data.

estimation error and a parameter value which proved to be significant at the level of 5 per cent for corporate governance and 10 per cent for the total ESG result.

The second approach used to examine whether information asymmetry exists among investors involved the determination of a direction and strength of the relationship between the ESG reporting level and a

Table 12: Correlation Matrix-Systematic Risk ($N = 308$)

	Environment		Human rights		Corporate governance		ESG area	
	ρ	p-value	ρ	p-value	ρ	p-value	ρ	p-value
Beta coefficient	−0.0080	0.8893	−0.0706	0.2165	−0.0131	0.8195	−0.0352	0.5386
Standard error of Beta coefficient	−0.1718	0.0025	−0.2190	0.0001	−0.2094	0.0002	−0.2445	<0.0001
Error to parameter level relationship	−0.0784	0.1699	−0.0445	0.4364	−0.1159	0.0420	−0.0992	0.0822

Source: own study based on GES Risk Rating, WSE and KDPW data.

company's return rate achieved within 25 days before the announcement of the ESG rating results and during 25 trading sessions, beginning on the day when the ESG reporting data were disseminated among WSE-listed companies. Due to the fact that it was the second edition of the rating and the results of the first one were publicly available, correlations were calculated based on result increments in the different ESG dimensions (differences between the 2012 and 2013 results of the companies). Only companies with non-zero results were studied.

The results presented in Table 13 suggest that changes in the results achieved in 2013 as compared with 2012 were the reason for an adjustment of investor portfolios over several days after the analysis was made publicly available. This observation is true for longer than 17 days after the publication of the ESG rating results for 2013, at the significance level of 10 per cent for changes in the result achieved in corporate governance and at the significance level of 5 per cent for changes in the combined ESG result (Table 14). The negative signs at the correlation parameters indicate that the disclosure of new relevant non-financial data could affect the result of estimation of the risk level inherent in the investment in a company and, in consequence, lead to lower investment in those companies which disclosed more ESG information than a year before. The results, although forming an interesting basis for examination of the transparency cost, are, nevertheless, difficult to generalise, notably because of the research material that is limited to one edition. Similarly to many other studies, our findings allow for the conclusion that not all ESG dimensions are equally relevant for stock returns and for certain costs of a company's transparency. This in part refers to the results of C. Mănescu's studies (2011), which reveal that the market does not fully and properly incorporate the net benefits of ESG into stock prices. This is because the cited studies showed that only community relations had a positive effect on stock returns, potentially due to mispricing (Mănescu, 2011). Similarly to our research, the results indicate, however, negative estimated effects for human rights, i.e. transparency costs, and that the benefits of transparency in this area might actually have been lower than costs. It can be assumed that this is a manifestation of reduced information asymmetry in the field of human rights. Investors' presumptions as to a company's practices in the field of human rights may have been verified negatively, which was reflected in a price adjustment.

5.3. Financial Performance

The last part of our research was an attempt to answer the question if and which relationships exist between companies' profitability and the level of reporting in particular areas. It was done to identify the strength and direction of impact of ESG criteria application on the financial and economic condition of a company. In order to achieve full comparability,

Table 13: Event Study Correlation Matrix–Rates of Return before and after Making the ESG Rating Publicly Available ($N = 308$)

	Score environment (0–3)		Score human rights (0–3)		Score corporate governance (0–3)		Score ESG equal weight (0–3)	
	ri-rbench	*p*-value	ri-rbench	*p*-value	ri-rbench	*p*-value	ri-rbench	*p*-value
t−25	0.0579	0.2781	−0.0192	0.7188	−0.0690	0.1956	−0.0491	0.3580
t−24	0.0648	0.2247	−0.0130	0.8077	−0.0772	0.1476	−0.0511	0.3388
t−23	0.0531	0.3213	−0.0173	0.7466	−0.0562	0.2939	−0.0376	0.4831
t−22	0.0821	0.1240	0.0105	0.8443	−0.0391	0.4645	−0.0147	0.7837
t−21	0.0792	0.1380	−0.0020	0.9708	−0.0406	0.4477	−0.0183	0.7320
t−20	0.0961	0.0713	0.0150	0.7795	−0.0703	0.1874	−0.0324	0.5443
t−19	0.0669	0.2096	−0.0036	0.9461	−0.0725	0.1743	−0.0433	0.4176
t−18	0.0661	0.2151	−0.0090	0.8662	−0.0728	0.1726	−0.0453	0.3966
t−17	0.0644	0.2276	−0.0144	0.7870	−0.0575	0.2811	−0.0310	0.5621
t−16	0.0469	0.3785	−0.0354	0.5073	−0.0585	0.2726	−0.0323	0.5449
t−15	0.0485	0.3627	−0.0154	0.7733	−0.0511	0.3373	−0.0216	0.6855
t−14	0.0593	0.2657	−0.0060	0.9109	−0.0574	0.2815	−0.0245	0.6461
t−13	0.0652	0.2221	−0.0181	0.7350	−0.0711	0.1824	−0.0397	0.4567
t−12	0.0855	0.1083	−0.0143	0.7892	−0.0939	0.0777	−0.0486	0.3621
t−11	0.0938	0.0781	−0.0172	0.7474	−0.0928	0.0813	−0.0450	0.3987
t−10	0.0982	0.0657	0.0092	0.8635	−0.1113	0.0368	−0.0531	0.3205
t−9	0.0680	0.2016	−0.0095	0.8591	−0.1011	0.0573	−0.0569	0.2857
t−8	0.0810	0.1284	−0.0363	0.4956	−0.0993	0.0619	−0.0544	0.3076
t−7	0.1138	0.0324	0.0302	0.5710	−0.0608	0.2537	−0.0105	0.8437
t−6	0.0418	0.4327	0.0025	0.9623	−0.0641	0.2292	−0.0386	0.4685
t−5	0.0765	0.1504	0.0407	0.4445	−0.0596	0.2627	−0.0190	0.7214
t−4	0.0443	0.4065	0.0622	0.2433	−0.0587	0.2703	−0.0280	0.5992
t−3	0.0716	0.1808	0.0512	0.3386	−0.0309	0.5634	0.0034	0.9491
t−2	0.0712	0.1833	0.0223	0.6774	−0.0370	0.4900	−0.0151	0.7776
t−1	0.1029	0.0562	0.0820	0.1283	0.0067	0.9016	0.0284	0.5989

continued

Table 13: Continued

	Score environment (0–3)		Score human rights (0–3)		Score corporate governance (0–3)		Score ESG equal weight (0–3)	
	ri-rbench	*p*-value	ri-rbench	*p*-value	ri-rbench	*p*-value	ri-rbench	*p*-value
t	**Close of the trading session on 2013-10-22**							
t+1	0.0136	0.8040	−0.0249	0.6488	0.0318	0.5604	0.0283	0.6049
t+2	0.0444	0.4107	0.0096	0.8585	−0.0026	0.9608	0.0209	0.6983
t+3	0.0127	0.8131	−0.0644	0.2305	0.0323	0.5477	0.0122	0.8207
t+4	0.0044	0.9349	−0.0567	0.2893	0.0332	0.5351	0.0160	0.7651
t+5	−0.0437	0.4132	−0.0914	0.0865	0.0031	0.9542	−0.0256	0.6313
t+6	−0.0004	0.9933	−0.0649	0.2234	−0.0301	0.5719	−0.0374	0.4828
t+7	−0.0221	0.6780	−0.0853	0.1091	−0.0054	0.9187	−0.0360	0.4999
t+8	−0.0221	0.6780	−0.0853	0.1091	−0.0054	0.9187	−0.0360	0.4999
t+9	−0.0175	0.7424	−0.0902	0.0902	−0.0680	0.2019	−0.0892	0.0940
t+10	−0.0015	0.9773	−0.0946	0.0754	−0.0601	0.2597	−0.0796	0.1351
t+11	−0.0278	0.6024	−0.0830	0.1198	−0.0641	0.2294	−0.0857	0.1081
t+12	−0.0620	0.2444	−0.1025	0.0539	−0.0751	0.1587	−0.1080	0.0422
t+13	−0.0661	0.2148	−0.1077	0.0429	−0.0660	0.2155	−0.1036	0.0514
t+14	−0.0661	0.2148	−0.1077	0.0429	−0.0660	0.2155	−0.1036	0.0514
t+15	−0.0485	0.3640	−0.0847	0.1122	−0.0655	0.2199	−0.0984	0.0647
t+16	−0.0521	0.3288	−0.0880	0.0986	−0.0507	0.3419	−0.0862	0.1060
t+17	−0.0655	0.2199	−0.0888	0.0957	−0.0628	0.2391	−0.0997	0.0613
t+18	−0.0810	0.1287	−0.0807	0.1304	−0.0912	0.0870	−0.1202	0.0239
t+19	−0.0690	0.1950	−0.0682	0.2002	−0.1075	0.0432	−0.1195	0.0245
t+20	−0.0940	0.0775	−0.0910	0.0875	−0.1126	0.0342	−0.1325	0.0126
t+21	−0.1093	0.0401	−0.0932	0.0804	−0.0968	0.0692	−0.1231	0.0207
t+22	−0.0955	0.0728	−0.0705	0.1859	−0.0938	0.0781	−0.1142	0.0317
t+23	−0.1042	0.0505	−0.1058	0.0470	−0.0963	0.0707	−0.1225	0.0214
t+24	−0.0942	0.0770	−0.1008	0.0584	−0.1169	0.0282	−0.1325	0.0127
t+25	−0.1006	0.0590	−0.0920	0.0843	−0.1133	0.0334	−0.1315	0.0134

Source: own study based on GES Risk Rating, WSE and KDPW data.

Table 14: Correlation Matrix – Financial Performance

		Enviroment		Human rights		Corporate governance		ESG area	
Financial ratio	N	ρ	p-value	ρ	p-value	ρ	p-value	ρ	p-value
Return on Equity for 2012	397	0.1190	0.0177	0.1455	0.0037	0.1806	0.0003	0.1848	0.0002
Return on Equity (ROE) – three-year average	396	0.1114	0.0266	0.092	0.0663	0.167	0.0009	0.156	0.0018
basic EPS – YoY growth rate	438	−0.2057	<0.0001	−0.0908	0.0680	−0.0407	0.4137	−0.1420	0.0042
Dividend Yield (as of 20 June 2013)	438	0.1985	<0.0001	0.1928	<0.0001	0.0963	0.0436	0.2004	<0.0001
Dividend Yield – YoY growth rate	423	0.2037	<0.0001	0.1947	<0.0001	0.1463	0.0021	0.2254	<0.0001

Source: own study based on GES Risk Rating, WSE and Notoria data.

entities whose equity in any year was negative were excluded from the research. The results are presented in the following table.

In the analysed sample, in almost every ESG area, the level of non-financial data reporting was positively correlated with return on equity for 2013 and its 3-year average (2011–2013). Although the correlation coefficient was significant in almost every case, the strength of the relationship between variables was weak at most. What is more, the negative correlation between ESG values and basic EPS year-over-year growth rate indicates that investors expect lower EPS growth for the companies engaged in a broad dialogue with stakeholders (reporting more important facts in non-financial areas). However, shares seem to have been priced significantly higher than they were worth and this premium was due to significantly higher dividend yield and its growth rate over one year period.

6. Conclusions

The level of information asymmetry on the capital market today is largely determined by transparency in non-financial data reporting by an issuer. Regulations introduced on highly developed markets are intended to increase transparency, thereby contributing to their greater stability and mitigating price shocks. The analysis of an issuer's non-financial data allows for a more adequate assessment of investment risk and a much more reliable valuation of the company. The research conducted on the extent of non-financial data reporting by public companies listed on the Polish capital market has shown that:

- there is a significant information gap, especially in reporting on environmental protection as well as social and employment issues (the lowest level of reporting);
- the overall level of non-financial ESG data reporting is low: the vast majority of companies do not disclose data on environmental and social responsibility policies;
- non-financial data reported by public companies relate primarily to corporate governance, according to the Warsaw Stock Exchange policy on good practices;
- non-financial data are reported mostly by companies with the highest market capitalisation that are included in the WIG-20;
- there is a significant difference in the level of reporting by Polish and foreign companies whose level of reporting is higher in respect of each of the ESG areas;
- companies with higher level of ESG rating had lower return rate volatility and lower forecasting error, as indicated by the standard error parameter (alpha and beta coefficients);

- the ESG rating can be used to explain the differences in returns alone or in combination with an investment style – despite a large disparity between the sizes of companies in 'transparency' and 'non-transparency' portfolios, the results for the significance of the Fama–French model parameters did not attribute any statistical significance to the BML parameter. A statistically significant difference was, however, noticeable between return rate standard deviations for the portfolios, which may indicate a positive impact of ESG rating-based portfolio diversification on the parameters of a portfolio built in this way, also in light of the simultaneous significance of the alpha parameter (at the level of 10 per cent);
- the market reacted to the publication of the ESG rating results of public companies—the study results, which should be treated with caution because the research material was limited to one edition, indicate negative estimated effects for human rights, i.e. transparency costs, and that the benefits of transparency in this area might actually have been lower than costs.

The research assessing public companies' ESG rating in Poland was carried out for the first time. The results obtained are interesting because the review of empirical studies conducted worldwide to date shows that the inclusion of ESG criteria in portfolio analysis does not directly result in increased efficiency and reduced portfolio risk in most cases. For objective reasons, the time span of the research is relatively short, which does not allow for more binding conclusions to be drawn at this stage. Nevertheless, at the present stage it is already possible to indicate correlations between non-financial ESG data reporting and investment risk understood as return rate volatility.

REFERENCES

Accounting Act of 29 September 1994 (Dz. U. z 1994 r. Nr 121, poz. 591).

G. A. Ackerlof (1970), "The Market for 'Lemons': Quality, Uncertainty and the Market Mechanism", *Quarterly Journal of Economics*, 84(3), pp. 488–500.

Asset Management Working Group, UNEP FI and Mercer (2007), "Demystifying Responsible Investment Performance: A Review of Key Academic and Broker Research on ESG Factors", Joint report, October.

L. Becchetti – R. Cicirettiy – A. Giovannelli (2012), "Corporate Social Responsibility and Stock Market Efficiency", Working Paper, Sustainable Investment Research Platform.

J. Y. Campbell – M. Lettau – B. G. Malkiel – Y. Xu (2001), "Have Individual Stocks Become More Volatile? An Empirical Exploration of Idiosyncratic Risk", *Journal of Finance*, 56, pp. 1–43.

J. Chong – M. Her – G. M. Phillips (2006), "To Sin or Not to Sin? Now That's the Question", *Journal of Asset Management*, 6(6), pp. 406–17.

T. Czerwińska (2013), "Ryzyka ESG w spńókach publicznych", in *Transparentnołś w obszarze ESG jako element przewagi konkurencyjnej spńóki gieódowej, Wyd. Stowarzyszenie Emitentńw Gieódowych*, ed. R. Sroka, Warszawa, pp. 69–80.

Danish Commerce and Companies Agency (2009), "Reporting on Corporate Social Responsibility—An Introduction for Supervisory and Executive Boards"

J Derwall – N Guenster – R Bauer – K. Koedjik (2005), "The Eco-Efficiency Premium Puzzle", *Financial Analysts Journal*, 61(2), pp. 51–62.

W. Drobetz – A. Schillhofer – H. Zimmermann (2004), "Corporate Governance and Expected Stock Returns: Evidence from Germany", *European Financial Management*, 10(2), pp. 267–93.

European Commission (2013a), "Commission Moves to Enhance Business Transparency on Social and Environmental Matters", IP/13/330 , 16 April.

European Commission (2013b), "European Commission Proposes ESG Disclosure for Large Companies", 17 April, (http://ec.europa.eu/internal_market/accounting/non-financial_reporting/index_en.htm).

J. L. Evans – S. H. Archer (1968), "Diversification and the Reduction of Dispersion: An Empirical Analysis", *Journal of Finance*, 23, pp. 761–7.

E. F. Fama (1970), "Efficient Capital Markets: A Review of Theory and Empirical Work", *Journal of Finance*, 25(2), pp. 373–417.

E. F. Fama (1991), "Efficient Capital Markets: II ", *Journal of Finance*, 46(5), pp. 1575–617.

E. Fama – K. French (1992), "The Cross-section of expected returns", *The Journal of Finance*, 47, pp. 426–465.

E. F. Fama – K. R. French (1993), "Common Risk Factors in the Returns on Stocks and Bonds", *Journal of Financial Economics*, 33(1), pp. 3–56.

E. F. Fama – L. Fisher – M. C. Jensen – R. Roll (1969), "The Adjustment of Stock Prices to New Information", *International Economic Review*, 10(1), pp. 1–21.

T. Gasiński – G. Piekalski (2009), "Zrńwnowaóony biznes: Podrżcznik dla mąeych i łrednich przedsiżbiorstw", Ministerstwo Gospodarki (www.mf.gov pl).
S. L. Gillan – J. C. Hartzell – A. Koch – L. T. Starks (2010), "Firm's Environmental, Social and Governance (ESG) Choices, Performance and Managerial Motivation", Working Paper, 10 November.
P. Gompers – J. Ishii – A. Metrick (2003), "Corporate Governance and Equity Prices", *The Quarterly Journal of Economics*, 118(1), pp. s.107–55.
S. Kekäläinen (2004), "Sustainability of Privately Managed Pension Funds", Final thesis for the Department of Organization and Strategy, University of Tilburg.
J. Lintner (1965), "The Valuation of Risk Assets and the Selection of Risky Investments in Stock Portfolios and Capital Budgets", *Review of Economics and Statistics*, 47(1), pp. 13–37.
C. Mănescu (2011), "Stock Returns in Relation to Environmental, Social and Governance Performance: Mispricing or Compensation for Risk?" *Sustainable Development,* 19, pp. 95–118. Published online in Wiley Online Library (wileyonlinelibrary.com), DOI: 10.1002/sd.510.
Ministry of Enterprise, Energy and Communications (2007), "Guidelines for External Reporting by State-Owned Companies", 11/2007.
Ocean Tomo (2013), "Components of S&P 500 Market Value", Raportowanie danych pozafinansowych—przewodnik dla przedsiębiorstw, Ministerstwo Gospodarki, Warszawa.
R. Olsson (2007), "Portfolio Performance and Environmental Risk", Sustainable Investment Research Platform Working Papers, November, pp. 11–22.
A. Peiró-Signes – M. Segarra-Oña – J. Mondéjar-Jiménez – M. Vargas-Vargas (2012), "Influence of the Environmental, Social and Corporate Governance Ratings on the Economic Performance of Companies: An Overview", *International Journal of Environmental Research*, 7(1), pp. 105–112.
E. Perez-de Toledo – E. Bocatto (2014), "The Impact of Environmental, Social and Governance (ESG) Standards on the Value of Cash Holdings: Evidence from Canadian Firms", Canadian Academic Accounting Association (CAAA) Annual Conference.
PricewaterhouseCoopers International (2012), "Delivering Results: Growth and Value in a Volatile World", 15th Annual Global CEO Survey 2012 (www.pwc.com/ceosurvey).
Minister of Finance (2009), "Regulation of the Minister of Finance of 19 February 2009 on Information … ("Rozporządzenie Ministra Finansów z dnia 19 lutego 2009 r. w sprawie informacji bieżących i okresowych przekazywanych przez emitentów papierów wartościowych oraz warunków uznawania za równoważne informacji wymaganych przepisami prawa państwa niebędącego państwem członkowskim", Dz. U. Nr 33, poz. 259).
SEG (n.d.), "Methodology of GES Risk Rating" (www.seg.org.pl).
W. F. Sharpe (1964), "Capital Asset Prices: A Theory of Market Equilibrium under Conditions of Risk", *Journal of Finance*, 19(3), pp. 425–42.
M. Statman (2006), "Socially Responsible Indexes: Composition, Performance, and Tracking Error", *The Journal of Portfolio Management*, 32(3), pp. 100–9.
UNEP Finance Initiative and the UN Global Compact (2007), "The Principles for Responsible Investment".

Non-technical Summary

According to the classical approach, an investor makes investment decisions taking into account two key parameters, namely: expected rate of return and the level of investment risk. The assessment of these parameters is made primarily on the basis of publicly available information provided by both companies and other capital market participants. By adopting an investors' perspective, we took a closer look at whether the greater transparency of public companies in disclosing non-financial (ESG) data results in lower volatility of return rates on securities issued by them, thereby reducing investment portfolio risk understood as return rate volatility. In other words—this study verifies the hypothesis that non-financial criteria can be a source of significant advantages over the traditional approach, in a process of estimating a relation between risk and expected investment return rate. The moment of discussion is crucial, as the Council of the European Union has adopted the Directive on disclosure of non-financial and diversity information by large companies and groups, according to which large public-interest entities with more than 500 employees will be required to disclose information in their annual reports on environmental, social and employee matters, respect for human rights, anti-corruption and bribery matters. Therefore, companies concerned will start reporting under the new Directive as of their financial year 2017.

The research has shown that there is a large information gap on the Polish market, especially as regards ESG reporting. The overall level of reporting on non-financial data is low. Although the time span of the research is relatively short, which does not allow for more binding conclusions to be drawn at this stage, the final results are promising—the highest values of rating in each of the ESG areas were assigned to companies that may be regarded as the companies with below-average risk, estimated on historical data. This means that non-financial data reporting contributes to increased transparency, predictability of companies' operations, and hence to significant reduction in information asymmetry on the capital market, ultimately considerably reducing forecasting errors in the risk–return profile of investment portfolios. This constitutes a promising base for further research on using ESG disclosing filters in the investment process, as there is every reason to believe that widening the financial analysis to include non-financial data can be required by investors looking for above-market-average investment return rates without being exposed to additional risk.