

Research Paper

Aggregate Trend in the Financial Performance of Socially Responsible Investment: Case of Listed Moroccan Companies

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ABSTRACT

The development of socially responsible investment (SRI) in the mid-1990s opened up a vast area of research in portfolio construction. Indeed, investors are breaking with traditional financial theory by integrating extra-financial elements into their portfolio management strategies. In this sense, the emergence of this new type of investment has triggered a craze in the scientific community about the performance of SRI, which has led to mixed results. One of the possible explanations for this heterogeneity of results is that the methodology employed by the different studies has an inevitable influence on its result, or that the financial performance of SRI can be influenced by the measure of financial performance employed (risk or profitability variable). For this reason, the analysis of our data is conducted using a principal component analysis of financial performance, which permits the construction of a synthetic index that includes most of the variables used to measure financial performance in the empirical literature. The objective here is to capture a general trend in the impact of SRI on this composite index of financial performance. The results of the multivariate test on the composite index show that non-SRI firms have a negative and statistically significant impact on the financial performance index. Similarly, the effect of investments made by Engaged companies has a negative, but not statistically significant impact on financial performance.

HIGHLIGHTS

- ① The emergence of socially responsible investment (SRI) in the 1990s led to research on portfolio construction as investors adopted non-traditional strategies.
- ② Scientific interest in SRI's performance resulted in mixed findings, possibly due to differing methodologies and financial performance metrics.
- ③ Researchers used principal component analysis, revealing that non-SRI firms had significant negative impact on financial performance, while impact of Engaged companies' investments was negative but statistically insignificant.

Keywords: Socially responsible investment, financial performance, principal component analysis, modern portfolio theory

Socially responsible investment is one of the most dominant instruments of sustainable finance. It is a new form of finance that makes it possible to integrate non-financial criteria into the investment process. It is a lever for transforming the traditional economy into a responsible and more sustainable

economy (NOVETHIC, 2010). In the literature, SRI is a topic of concern for finance researchers, since

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this type of investment cannot prove its legitimacy in terms of financial performance. This is the reason why the majority of works are interested in studying this issue in all contexts and via different methodologies. Indeed, the diversity of the results of the various empirical studies does not allow us to conclude that SRI performs positively or negatively compared to conventional investments. These conclusions concur with those of Capelle-Blancard & Giamporcaro-Saunière (2006), who consider that the financial performance of SRIs is a complex issue in academic circles and is not the subject of a solid scientific consensus. The analysis of the empirical literature confirms that all of the theoretical foundations identified, and results observed have been validated separately according to different methodologies and variables for measuring financial performance. This leads us to consider that the nature of the impact of SRI on performance is a function of the empirical methodology, or the nature of the variables used by the researchers.

Derwall *et al.* (2005) and Galema *et al.* (2008) affirm that the financial performance of SRI can be influenced by the measure of financial performance employed (risk or profitability variable), since the financial performance of a fund necessarily depends on its profitability as well as its capacity to take risk. Thus, the methodology used by the different studies has an inevitable influence on its result. For this reason, the analysis of our data is done through a principal component analysis of financial performance, which will allow us to construct a synthetic index that includes most of the variables used to measure financial performance in empirical work.

The objective here is to capture a general trend in the impact of SRI on this composite index of financial performance. However, the debate on the performance of socially responsible investment is recent in Morocco both at the scientific research level and at the managerial level, which explains the interest in addressing this issue. Few studies in Morocco have attempted to understand the phenomenon of SRI itself. The objective is to take stock of the situation of this form of sustainable financing in Morocco, while overcoming the methodological limitations detected in the literature.

LITERATURE REVIEW

1. Theoretical foundations

Several theories have been mobilized to explain this causal relation between SRI and financial performance, namely:

(a) Modern Portfolio Theory (Markowitz)

According to this theory, socially responsible investments reduce investment opportunities due to their applicable selection criteria and therefore have lower expected returns than traditional investments. This is consistent with Clow, (1999) theory that SRIs increase their risk with much lower returns by limiting themselves to very specific industries and meeting certain criteria to narrow investment areas. Markowitz, (1952); Sharpe, (1994) and Mossin, (1966) will develop asset pricing models and arbitrage pricing models based on observations of CAPM anomalies.

(b) The “cost” theory of SRI

The “cost” theory of SRI explains why SRIs underperform traditional investments. According to Rudd, (1981) every transaction incurs costs represented by brokerage commissions or fees incurred to pursue or discard a few blocks of stock when selecting a portfolio. SRI selection criteria will reduce the average liquidity of an asset and will also make asset management more complex and costly as it generates more research to understand whether the security is SRI compliant. All of these costs ultimately degrade performance (Luther *et al.* 1992; Tippet, 2001; Bauer *et al.* 2005; Barnett & Salomon, 2006).

(c) Unsustainability risk premium theory

This theory confirms that extra-financial performance must be higher to compensate for un-sustainable levels of risk, including environmental risk, reputational risk, legal risk and even governance. The plurality of theoretical foundations mobilized in the literature to explain the nature of the impact between SRI and financial performance makes it difficult for a researcher to situate his work in a specific theoretical framework. But, given that the literature review presents a divergence about

the level of diversification of SRIs because of the discrimination bias that it imposes which impacts their financial performance, our work will be well positioned in a specific theoretical framework which is the modern portfolio theory developed by Markowitz, (1952).

2. Empirical Work

Research on SRI by its proponents and detractors is very obscure and mixed, aiming essentially to show how it works in order to recommend it or not as a credible and sustainable mitigation to traditional finance, while researchers vary on the subject of its performance, which boils down to the lack of a consensus around the topic. However, the literature shows three currents that approach the issues of SRI performance. One group of authors supports the hypothesis that SRI outperforms traditional investments, and others refute it, with a third taking the middle ground and arguing that SRI has a neutral impact on performance. However, these studies use different variables to measure financial performance, and have produced mixed results.

(a) Positive impact

Some studies claim that SRIs can generate higher financial returns than conventional funds, and therefore have no financial cost (Mallin *et al.* 1995; D'Antonio *et al.* 1997; Statman, 2000; Plantinga *et al.* Scholtens, 2001; ou encore Galema *et al.* 2008; Chang et Witte, 2010; Leite et Cortez, 2014).

(b) Negative impact

Other Some studies claim that SRIs can generate higher financial returns than conventional funds, and thus have no financial costs (Chang & Witte, 2010; D'Antonio *et al.* 2000; Galema *et al.* 2008; Leite & Cortez, 2014; Mallin *et al.* 1995; Plantinga & Scholtens, 2001; Statman, 2000). Research points to a negative causal relationship, arguing that SRI destroys value and offers lower returns than conventional investments (ALAMI CHENTOUFI *et al.* 2022; Burlacu *et al.* 2004; Chentoufi & Zari, 2020; Girard *et al.* 2007; Havemann & Webster, 1999; Leite & Cortez, 2015; Miglietta, 2005; Utz & Wimmer, 2014).

(c) Neutral impact

A final set of studies concluded that SRI had a

neutral or negligible effect on performance. (Bauer *et al.* 2007; Chang *et al.* 2012; Dhrymes, 1998; Hamilton *et al.* 1993; Kreander *et al.* 2005; Nofsinger & Varma, 2014; Renneboog *et al.* 2008). This heterogeneity of results allowed us to formulate our research question as follows: *What is the impact of socially responsible investment of companies listed on the Casablanca Stock Exchange on their financial performance?*

Following this first phase, a main hypothesis was formulated around this problem, namely: *SRI has a positive impact on financial performance.*

METHODOLOGY

This section highlights the methodology adopted to answer our main research question, it aims to detail the methodological reasoning followed.

To answer this question, we opt for a confirmatory approach that characterizes a positivist epistemological position that follows a hypothetical-deductive reasoning mode, insofar as we will try to explain the relationship between the SRI of companies listed on the Casablanca Stock Exchange and their financial performance.

Our study is spread over 9 years between "2011-2019" this period is well selected in order to overcome the consequences of the effects of the financial crisis of 2008 and avoid the economic effects of the Covid-19 pandemic. The sample of our study is a panel regrouping the data of 48 Moroccan stocks listed on the Casablanca Stock Exchange in this period, divided into two groups according to their commitment to social responsibility. On the one hand, the companies "Engaged" to social responsibility, which are either named "Top CSR performers" by Vigeo-Eiris or labeled CSR by the "CGEM", and on the other hand, the conventional or "Non engaged" companies. The design of a composite index of financial performance is explained to specify and understand the impact of SRI on financial performance. The objective here is to present the statistical treatment adopted for the construction of the composite performance index (CPI) based on the data of the sample studied. The logic behind the design of this index is guided by a dual objective. On the one hand, it allows us to identify a global and aggregated trend in financial performance, by synthesizing the variance caused by the multitude of variables used in a single composite aggregate, to facilitate the analysis of our collected

data. On the other hand, it allows us to reduce the number of variables to a limited minimum of dimensions (return and risk) by excluding any variable that does not contribute to the construction of the main component of financial performance. Based on the work of Cámara & Tuesta, (2014), we develop our index via the “Principal Component Analysis” method to find the appropriate weights (parametric method) and postulate that the latent variable (composite index of Performance) is linearly determined as follows:

$$IP_i = \beta_0 * \text{return} + \beta_1 * \text{risk} + \text{error} \quad \dots(1)$$

The data pre-processing phase includes essential steps to prepare data for modeling. These include eliminating outliers and normalizing the data to ensure it is suitable for model creation. Data cleansing is carried out, checking for errors such as duplicates, missing values and incomplete entries. Data from various sources, including the Moroccan Financial Markets Authority and the Casablanca Stock Exchange, are consolidated into a single CSV file for easy import into statistical software. The ensuing data transformation process involves normalization using formulas such as z-score normalization and data rescaling between specified limits. This normalization is adopted to account for the heterogeneity of the population under study. Principal Component Analysis (PCA) is used for data reduction, with the aim of identifying and retaining significant variables while reducing redundancy. This involves generating correlation matrices to detect weakly and strongly correlated variables. The Kaiser-Meyer-Oklin (KMO) test ensures data suitability for PCA. The process steps and indices confirm the feasibility of PCA for the financial data analyzed. The results of the Principal Component Analysis (PCA) conducted over the 9-year period (2011 to 2019) are presented here. This analysis aimed to construct a comprehensive “financial performance index” encompassing return and risk aspects. Each year within the studied timeframe yields a “financial performance index,” comprising two sub-indices: the return sub-index and the risk sub-index. The financial performance index is computed as the arithmetic average of these sub-indices. The PCA outcomes are highlighted through various elements. The “variance table” is

a crucial PCA outcome, showcasing the variance captured by each principal component and guiding the decision on the number of components to retain. For our analysis, we selected the first principal component, which accounts for the highest variance and aligns with our prior knowledge of the required components (one for each sub-index). Furthermore, the “extraction of scores for each sub-index” is discussed. This step involves generating scores for both the return and risk sub-indices across the analyzed periods. The “predict” command in Stata aids in obtaining scores from the first principal component of each PCA iteration. By multiplying the variance-explained percentage with the extracted scores, we derive the composite performance index scores. These scores are ultimately obtained by calculating the arithmetic mean of the sub-index scores, following a defined formula:

Financial performance index

$$(Company_i) \text{ in year } t = 0.5 * (\text{Risk_sub_index_score } (Company_i) \text{ in year } t) + * (\text{Return sub_index_score } (Company_i) \text{ in year } t)$$

RESULTS

1. Univariate Descriptive Analysis of the CFP Index

After designing the composite financial performance index (CFPI) and documenting the methodology followed for its design, we will, in a second step, conduct a descriptive analysis. The challenge is to find out whether the generated FPI shows significant variability according to the years, sector of activity and level of commitment to social responsibility.

Table 1: Descriptive statistics of the composite index by year

| Year | N | Min | Mean | St. dev | Max |
|------|----|-------|-------|---------|-------|
| 2011 | 48 | 0,046 | 0,399 | 0,144 | 0,740 |
| 2012 | 48 | 0,017 | 0,490 | 0,201 | 0,945 |
| 2013 | 48 | 0,197 | 0,512 | 0,169 | 0,892 |
| 2014 | 48 | 0,176 | 0,477 | 0,155 | 0,812 |
| 2015 | 48 | 0,166 | 0,446 | 0,143 | 0,769 |
| 2016 | 48 | 0,057 | 0,422 | 0,221 | 0,846 |
| 2017 | 48 | 0,153 | 0,492 | 0,158 | 0,755 |
| 2018 | 48 | 0,104 | 0,440 | 0,158 | 0,720 |
| 2019 | 48 | 0,370 | 0,610 | 0,129 | 0,956 |

Source : Author’s elaboration.

The analysis delves into the results of various statistical examinations conducted on the Composite Financial Performance Index (CFPI) across different years, sectors of activity, and levels of engagement in social responsibility. Table 1 portrays the fluctuating nature of CFPI's average distribution over the years, with notable diversity in standard deviations due to the sample's inherent nature.

Fig. 1 visually illustrates the CFPI's empirical distribution, showing slight deviation from the theoretical normal distribution.



Source: Stata software output, version 16.

Fig. 1: Empirical distribution of the financial performance index

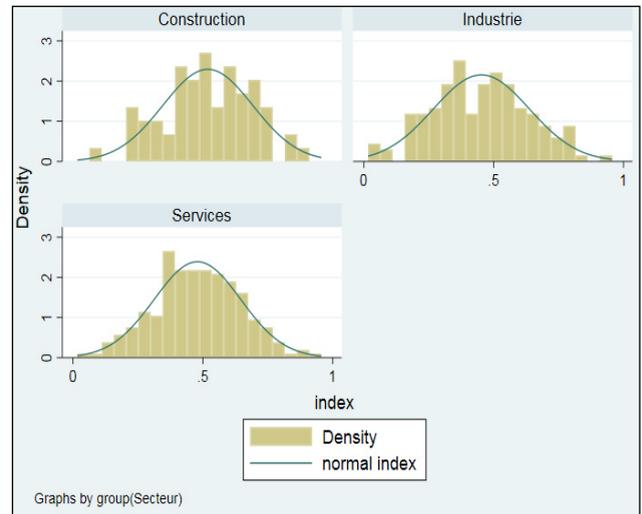
The following sections highlight the distribution analysis according to sector activity and social responsibility engagement. Distribution according to sector activity, depicted in Table 2, demonstrates substantial mean differences among sectors.

Table 2: Characteristics of the financial performance index by sector

| Activity sector | Min | Mean | St. dev | Max |
|-----------------|-------|-------|---------|-------|
| Construction | 0,077 | 0,519 | 0,173 | 0,892 |
| Industrie | 0,017 | 0,453 | 0,184 | 0,956 |
| Services | 0,046 | 0,479 | 0,167 | 0,945 |

Source: Author's elaboration.

The application of the ANOVA test confirms this difference and establishes the distribution's adherence to normality and homoscedasticity assumptions. Similarly, Fig. 2 visualizes the CFPI distribution across different sectors, mirroring a normal distribution.



Source: Stata software output, version 16.

Fig. 2: Distribution of the CFPI by sector of activity

These outcomes are supported by the normality test results shown in Table 3.

Table 3: normality test of CFPI

| Var | Obs | Skew | Kurt | Adj Chi ² (2) | Prob > Chi ² |
|------|-----|--------|--------|--------------------------|-------------------------|
| CFPI | 432 | 0,8837 | 0,1591 | 2,01 | 0,3659 |

Source: Stata software output, version 16.

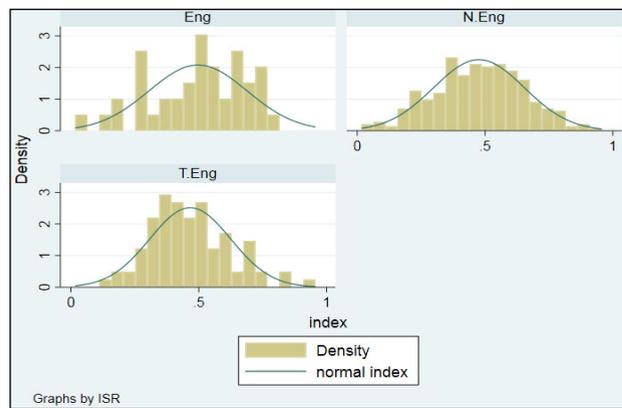
The examination of CFPI distribution by the degree of engagement in social responsibility is presented in Table 4, illustrating distinct mean disparities among levels of engagement.

Table 4: Descriptive statistics according to SRI

| Commitment | N | Min | Mean | St. Dev. | Max |
|--------------|-----|-------|-------|----------|-------|
| Engaged | 42 | 0,046 | 0,497 | 0,190 | 0,802 |
| Non Engaged | 303 | 0,017 | 0,476 | 0,177 | 0,945 |
| Very Engaged | 87 | 0,111 | 0,466 | 0,158 | 0,956 |

Source: Author's elaboration.

The ANOVA test validates these differences and verifies normality. Fig. 3 provides a visual representation of the CFPI's distribution within different engagement levels, also exhibiting a normal distribution.



Source: Stata software output, version 16.

Fig. 3: Distribution of the Financial Performance Index

These findings correspond to the normality test's outcomes presented in Table 5.

Table 5: Analysis of variances

| Source | SS | Df | MS | F | Prob > F |
|----------------|-------|-----|------|------|----------|
| Between groups | .19 | 2 | .097 | 3.22 | 0.041 |
| Within groups | 13.02 | 429 | .030 | | |
| Total | 13.21 | 431 | .030 | | |

Bartlett's test for equal variances: $\chi^2(2) = 1.87$ Prob>Chi² = 0.39

Source: Stata software output, version 16.

In summary, the analyses conducted across various dimensions of the CFPI contribute to a comprehensive understanding of its distribution and variability, both temporally and within distinct contexts of sector activity and social responsibility engagement. The application of appropriate statistical tests and the verification of assumptions ensure the credibility of these results.

2. Multiple linear regression model

After having defined, through uni-variate analysis, the behavior of the financial performance index as a function of years, sector of activity and engagement to social responsibility, the present paragraph follows an explanatory logic. It aims to highlight the impact of socially responsible on the financial performance index according to the control variables. In this regard, we will specify an econometric multiple linear regression model with the financial performance index as the dependent variable and SRI as the independent variable. The following model reports all the variables retained for the econometric specification.

$$CFPI = f(\text{SRI, T assets, share capital, activity sector, Cop22, Years})$$

L'examen complet des variables quantitatives, ainsi que des études de corrélation et des tests de normalité et d'hétéroscédasticité. Ces étapes sont essentielles pour assurer la fiabilité et la validité du modèle estimé. Les statistiques descriptives des variables sélectionnées pour l'estimation du modèle présentent des caractéristiques relativement cohérentes. La variable dépendante (CFPI) se distingue par un écart-type plus important que la moyenne (moyenne = 0,48, écart-type = 0,18). L'étude de corrélation entre les variables révèle une colinéarité potentielle entre "Log T.Ass." et "Log K", ainsi qu'entre "Cop22" et "Année». Ces observations justifient des tests supplémentaires pour assurer la validité du modèle. Après la spécification du modèle, des évaluations de l'hétéroscédasticité et de la normalité des erreurs sont effectuées. Ces analyses contribuent collectivement à établir les bases d'une modélisation précise et significative. L'exploration des caractéristiques des variables, leurs interrelations et la validation des hypothèses telles que la normalité et l'homoscédasticité sont des étapes cruciales pour garantir l'intégrité des résultats du modèle.

The results of the linear regression by the ordinary least squares method (OLS) are given in table 6.

Table 6: Estimation of the parameters of the Model

| CFPI | Coef | Err.stan (Robust) | T-test | Prob | CI à 95% |
|---------------|--------|-------------------|--------|-------|---------------|
| SRI | | | | | |
| Engaged | -0,065 | 0,046 | -1,400 | 0,161 | -0,155 0,026 |
| Non-Engaged | -0,069 | 0,033 | -2,120 | 0,035 | -0,133 -0,005 |
| Sector | | | | | |
| Industry | -0,069 | 0,065 | -1,050 | 0,295 | -0,197 0,06 |
| Services | -0,124 | 0,079 | -1,560 | 0,120 | -0,28 0,032 |
| Cop.22 | 0,210 | 0,032 | 6,480 | 0,000 | 0,146 0,273 |
| LogTAss | -0,041 | 0,062 | -0,670 | 0,504 | -0,163 0,08 |
| Years | | | | | |
| 2012 | 0,092 | 0,033 | 2,760 | 0,006 | 0,026 0,157 |
| 2013 | 0,117 | 0,031 | 3,830 | 0,000 | 0,057 0,177 |
| 2014 | 0,079 | 0,030 | 2,610 | 0,009 | 0,019 0,138 |
| 2015 | 0,047 | 0,031 | 1,510 | 0,132 | -0,014 0,107 |
| 2016 | 0,024 | 0,037 | 0,650 | 0,519 | -0,049 0,096 |
| 2017 | 0,091 | 0,031 | 2,900 | 0,004 | 0,029 0,153 |
| 2018 | 0,036 | 0,032 | 1,130 | 0,259 | -0,027 0,099 |

| | | | | | | |
|-----------------------|-------|----------------|-------|-------|--------|-------|
| 2019 | 0,210 | 0,032 | 6,480 | 0,000 | 0,146 | 0,273 |
| Constant | 1,012 | 0,588 | 1,720 | 0,086 | -0,143 | 2,168 |
| R ² Ajusté | 46% | R ² | 53,18 | RSS | 6,18 | F<1% |

Source: Author's elaboration.

DISCUSSION

As shown in Table 6, the analysis highlights the statistical rigor of the model used. A significant adjusted R-squared value, as $F < 1\%$. The coefficient of determination is 53%. A highly significant F statistic indicates that the model is statistically robust. The coefficients of the analysis reveal that the impact of SRI differs between companies classified as committed and non-committed. Non-committed companies have a negative and statistically significant influence on the Composite Financial Performance Index (CFPI). Investments made by non-committed SRI companies have a negative and statistically significant impact on the financial performance index. ($\beta = -0.069$, $SE = 0.033$, $p < 5\%$). Similarly, the effect of committed investments has a negative, but not statistically significant, impact on financial performance. ($\beta = -0.065$, $Std-Err = 0.046$, $p > 5\%$). This suggests that companies that do not engage in socially responsible practices tend to suffer a more pronounced negative effect on their financial performance than socially responsible companies. The lack of statistical significance of the impact of engaged companies implies the need for further research into the true relationship between SRI and financial performance. In contrast, the realization of the Cop.22 event in Morocco in 2016 exerts a highly significant positive effect on the financial performance index ($\beta = 0.210$, $Std-Err = 0.032$, $p < 1\%$). On the other hand, the control variables incorporated in the present model do not appear to act significantly on the financial performance index. Furthermore, the effect of industry and service sector does not appear to act significantly on the financial performance index. Companies in the "Industry" sector have a negative impact on financial performance, although this impact is not statistically significant. Similarly, companies in the "Services" sector also show a non-significant negative impact. This suggests that the influence of SRI on financial performance may differ according to the sector in which the company operates. Similarly, company size (LogTAct) has a negative effect on financial performance. However,

the effect is far from significant. ($\beta = -0.041$, $Std-Err = 0.062$, $p > 5\%$). However, further analysis is required to validate these trends. By performing a year-by-year analysis, the study identifies temporal variations in the impact of SRI on financial performance. Some years, such as 2012, 2013, 2014, 2017 and 2019, show positive and statistically significant impacts on financial performance. This suggests that the influence of SRI on financial performance evolves over time and can be influenced by economic, social, and regulatory factors. The dynamic nature of this relationship calls for further research to understand the factors contributing to these temporal variations. The discussion acknowledges the complexity of the relationship between SRI and financial performance. Even if the initial hypothesis is not fully confirmed by the results (i.e. the direct positive impact of SRI on financial performance), the findings provide valuable insights. Non-committed companies have a clear negative impact, indicating that neglecting social and environmental considerations can be detrimental to long-term financial performance. However, the lack of significant impact among committed companies suggests that the effect of SRI on financial performance depends on the specific strategies and actions undertaken by companies. In summary, the discussion provides a nuanced understanding of the relationship between SRI and financial performance among companies on the Casablanca Stock Exchange. It highlights the variable impacts according to company type, sector, and time. The results underline the importance of socially responsible practices for sustainable financial performance and highlight the need for further research into SRI.

CONCLUSION

This article aims to determine the impact of SRI on the financial performance of Moroccan companies listed on the Casablanca Stock Exchange between 2011 and 2019. The empirical part began with the presentation of the characteristics of the working sample, and different data collection techniques concerning the independent, dependent and control variables. In fact, through descriptive analysis, we delineated the characteristic of the study sample over the period 2011-2019. The results of the analysis of variance for the different segments of the sample by year, by sector and by level of engagement in

social responsibility are presented. Finally, this chapter concluded with a principal component analysis of financial performance.

The objective here is to establish a general and aggregated trend in the behavior of the composite index of financial performance designed from the composition of all the variables already used in the literature to operationalize financial performance, whether in its risk or return dimension.

The results of the multivariate test on the composite index show that companies with no SR engagement have a negative and statistically significant impact on the financial performance index. Similarly, the effect of investments engaged has a negative, but not statistically significant impact on financial performance.

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