



Innovative Applications of O.R.

## Synthetic indicators of mutual funds' environmental responsibility: An application of the Reference Point Method

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## ABSTRACT

Socially Responsible Investing (SRI) is broadly defined as an investment process that integrates not only financial but also social, environmental, and ethical (SEE) considerations into investment decision making. SRI has grown rapidly around the world in the last decades. In the last years, given the causes of the 2008 financial crisis, ethical, social, environmental and governance concerns have become even more relevant investment decision criteria. However, while a diverse set of models have been developed to support investment decision-making based on financial criteria, models including also social responsibility criteria are rather scarce.

The aim of this paper, in which we focus on the environmental dimension, is to assist individual investors in their investment decisions providing them with a synthetic indicator of mutual funds' environmental responsibility, which is by nature a multicriteria concept and therefore multicriteria techniques are to be used to measure it.

The proposed approach is based on the double (reservation–aspiration) Reference Point Method. This scheme is applied to each fund of a randomly selected set of U.S. equity mutual funds, in order to determine, on the basis of a given set of indicators, a pair of synthetic indicators that measure the weak and the strong environmental responsibility degree of each mutual fund, relying on the particular preferences of the investor.

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### 1. Introduction

The majority of investors follow a conventional investment strategy based on maximization of wealth. Traditionally, choosing an alternative or non-conventional investment strategy (as a SRI strategy) is associated with a higher psychological risk than that associated with the selection of a conventional investment strategy (non-SRI strategy). There is then a gap between perceived financial risk and psychological risk when investing conventionally as compared with investing in SRI. But, although marginal at its beginning, the stream of investors seeking to invest only on Social and Environmental Responsible (SER) firms has grown to become an unavoidable fact in capital markets. Indeed, the last financial crisis and the succession of financial scandals have catalyzed and reinforced the SER investors' movement. This growing interest on Socially Responsible Investment has also been reflected in the increasing number of publications focusing on portfolio selection with non-financial criteria. Some recent examples are Dorfleitner and Utz (2012); Ballesterro, Bravo, Pérez-Gladish, Arenas-Parra,

and Plà-Santamaria (2012) and Utz, Wimmer, Hirschberger, and Steuer (2014).

In order to assist these investors to identify and select socially and environmentally responsible companies, several signals and measurements have reached financial markets: certifications, codes of conduct and social notations by agencies. Because certifications are specific to the industry where companies operate, and the codes of conduct are often distinctively and independently developed by each firm, the social rating agencies tried to standardize social and environmental information conveyed in connection with the companies. MSCI is a leading provider of investment decision support tools. MSCI ESG STATS (known under the name of KLD Research & Analytics Inc.) is a statistical summary of MSCI ESG Research's US environmental, social and governance research database. KLD offers an aggregate rating of corporate social responsibility for more than 3000 U.S. companies. To meet the needs of social investors, KLD provides research, benchmarks, compliance, and consulting services analogous to those provided by financial research service firms. KLD has been providing research products and services to the financial services market since 1988. Featuring the largest corporate social research staff in the world, KLD produces high-quality consistent research that institutions have come to rely on. This rating is based on 8 social and environmental

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dimensions, which are in turn, integrated by more than 60 criteria. Nevertheless, given their heterogeneity, SER investors are motivated by different values and will seek companies respecting particular dimensions of Corporate Social Responsibility (CSR). However, very few studies can be found aimed at assisting the investors in their selection of SER companies which serve best their social and environmental values (e.g. Hallerbach, Ning, Soppe, & Spronk, 2004). This lack of tools assisting investors in SRI is even more important when we refer to the main tool for SRI, socially responsible mutual funds (SRMF).

Socially responsible mutual funds, also known as socially responsible invested funds, are one of the main instruments of SRI. The SRI strategy most used by mutual fund managers is screening, positive and/or negative, which means the evaluation of mutual funds based on social, environmental, ethical and/or good corporate governance criteria. Positive screening implies investing in profitable companies that make positive contributions to society. Conversely, negative screening implies avoiding investing in companies whose products and business practices are harmful to individuals, communities, or the environment.

Several attempts have been done to measure mutual funds' social responsibility degree based on the above described investment strategy. Barnett and Salomon (2006); Renneboog, Horst, and Zhang (2008); Lee, Humphrey, Benson, and Ahn (2010); Jegourel and Maveyraud (2010); and Scholtens (2007) propose screening intensity (number of applied screens) as a proxy of mutual funds' social responsibility degree. Renneboog et al. (2008) and Scholtens (2007) take into account not only the number of applied screens but also their type: positive, negative, direct and/or indirect infringement. Pérez-Gladish and M'Zali (2010) propose an AHP-based ranking method for socially responsible mutual funds based on screening which also takes into account the engagement policy of the fund, the followed SRI research process, control of companies, external control of the fund, competence of fund managers and communication with companies and investors, among others. Pérez-Gladish and M'Zali (2010) call these criteria "Quality of Information" as referred to the transparency and credibility of the non-financial information provided by the fund manager about SRI funds.

The evaluation model proposed in this paper, instead of using screening intensity for measuring the environmental responsibility degree of the mutual funds, evaluates the Corporate Social Performance of each of the firms invested in by the equity mutual funds. Then, given the percentage invested by the mutual fund in each company, the scores are aggregated into one quantitative measure for each mutual fund. In addition, a new criterion, quality of SRI management, is included in the model to incorporate information about the companies' selection process, investment policy, screening process, research process and the level of expertise of the fund managers with respect to SRI. Thus, the evaluation model considers two different levels when measuring the environmental responsibility of mutual funds: the company level and the mutual fund management level.

The proposed evaluation model depends on the particular preferences about the importance to each decision criterion of a concrete investor with knowledge in the field of SRI (in what follows, Decision Maker, DM). The list of decision making criteria to be considered, especially socially responsible criteria, could change from one DM to another as they depend on diverse facts as the country, culture, religion or personal values and beliefs of the DM.

The uncertainty, imprecision and/or ambiguity associated to social responsibility measurement have not been included in this paper although they can affect the investor's perception of risk. We have relied on the precise measures of CSR provided by KLD rating agency for US companies including in the model only financial risk

and return based on historical data provided by Morningstar Ltd. In this work, a mutual funds' evaluation model was designed for U.S. equity mutual funds. The proposed model is based on a Multicriteria Decision Making Technique: the Reference Point Method. This technique, which is briefly described in Section 2, has been applied in order to develop weak and strong synthetic indicators for each fund. These indicators are based, respectively, on the weak sustainability paradigm, which allows compensations among the different indicators (that is, a bad performance in one can be compensated by a good performance in another one), and on the strong sustainability paradigm, which does not allow such compensations.

The following steps have been considered in the proposed approach in this paper:

- Step 1. Identification of the relevant investment criteria.
- Step 2. Definition of descriptors of qualitative performance for each criterion.
- Step 3. Definition of "targets" associated with each criterion: "good" (aspiration) and "neutral" (reservation) performance levels.
- Step 4. Criteria weighting through MACBETH approach.
- Step 5. Construction, using the reference point approach, of synthetic indicators for measuring the weak and strong environmental responsibility of the considered mutual funds.

The structure of the paper is the following: in Section 2, the multicriteria techniques used are briefly described; Section 3 presents the main decision making criteria; in Section 4, the descriptors of performance for each criterion are presented and reference levels are obtained from dialogue with the DM; Section 5 presents criteria weighting obtained using MACBETH and based on the qualitative judgments of the DM; Section 6 is devoted to the construction of the synthetic indicators that measure the weak and strong environmental responsibility degree of each mutual fund; finally, conclusions are presented.

## 2. The reference point based approach

In general, a Multiple Criteria Decision Making (MCDM) problem consists of analyzing (ranking, classifying, choosing) a series of possible alternatives, taking into account different criteria simultaneously. In our case, the set of alternatives is the set of mutual funds, while the criteria are the different SRI indicators. The idea is to give an overall measure of the social responsibility of each fund, by means of taking into account the values of all the indicators. Many different MCDM techniques have been developed so far (see, for example, Steuer (1986) or Miettinen (1999), for overviews). When the decision makers can give desirable values for each criterion, then it is natural to measure the goodness of each alternative in terms of its closeness to these desired levels. This is precisely the basic idea underlying the reference point approach, where the reference point is formed by these desirable values (called reference levels). Originally proposed in Wierzbicki (1980), this approach consists of considering a so-called achievement scalarizing function, which somehow gives an idea of how far is the alternative from satisfying the reference values. In a traditional multiobjective problem, where  $I$  objective functions  $f_i, i = 1, \dots, I$ , have to be simultaneously optimized (let us say maximized), the simplest achievement scalarizing function takes the following form:

$$s(\mathbf{f}(\mathbf{x}), \mathbf{q}, \boldsymbol{\mu}) = \min_{i=1, \dots, I} \{ \mu_i (f_i(\mathbf{x}) - q_i) \}, \quad (1)$$

where  $\mathbf{f}$  is the vector of objective functions (criteria),  $\mathbf{x}$  is the vector of decision variables (alternatives),  $\mathbf{q} = (q_1, \dots, q_I)$  is the vector formed by the reference values, and  $\boldsymbol{\mu}$  is a vector of weights, whose

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