A valuation model for corporate social responsibility

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Abstract

Purpose – *The purpose of this paper is to develop an analytical model for appraising and measuring corporate social responsibility (CSR). The theoretical and conceptual grounds that sustain the model are based on previous approaches.*

Design/methodology/approach – *The utility function, which is the basis of a company's economic dimension, is analyzed in its philosophical and ethical setting, concentrating largely on the Utilitarian and Hedonistic schools and a maximizing agent, the ''homo oeconomicus''.*

Findings – *The resulting new approach permits an analytical explanation of the behavior of a company and its owners when incorporating both economic rationality (*''homo oeconomicus''*) and social responsibility.*

Originality/value – *The quantitative determination of a global indicator for social responsibility is shown, as is the development of a method for calculating a monetary value of CSR.*

Keywords *Corporate ownership, Corporate social responsibility, Utility theory, Utilitarianism*

Paper type *Research paper*

1. Corporate social responsibility: its conception

1.1 The conception of corporate social responsibility (CSR)

The conception of corporate social responsibility (CSR) involves several matters related to a company's behavior in its social environment beyond the exclusively economic realms with which companies are traditionally associated. There are many definitions of CSR and most of them coincide. The intention of this paper, however, is not to discuss these definitions but rather to deal with the value of CSR. Therefore, the paper will rely mainly on a general definition of CSR.

When considering a context that is not exclusively economic, businesses face a set of rights and responsibilities regarding the surrounding society that does not allow them to focus strictly on economic management for obtaining a business objective. On a daily basis, companies are faced with social, economic, legal, ethical, and environmental challenges that condition their behavior. The sole objective of maximizing equity, in its modern version of maximizing the creation of value, does not allow a company to meet its social challenges.

The classical concept of a company is one of an economic unit that produces goods in order to satisfy needs and that is guided by the maximization of utilities, which implies the maximization of the owner's equity. This concept, which has been methodologically applied to company finances, comes from the Hedonistic and Utilitarian schools, the philosophical bases of economic sciences that constitute the theoretical grounds of economics. The resulting normative objective consists of maximizing the value of the company owners'

equity and has been the standard for evaluating the principle responsibility of directors and managers.

The concept of CSR has been added to the above approach. CSR has broader objectives involving socioeconomic aspects. Robbins and Coulter (2005) proposed that the social responsibility of the management extends beyond the pursuit of economic profit and also entails the defense and improvement of society's well-being. They base their argument on the idea that companies satisfy not only the needs of their owners but also of those of a set of social actors interested in the company (''stakeholders'').

The compound idea developed by Bestratén and Pujol (2005) indicates that a socially responsible company is an economically competitive organization that tries to fulfill its tasks remarkably in order to remain in existence and to assure its survival. According to these authors, this requires that a company fulfill certain conditions. For example, the company must offer products and services that respond to the user's needs, perform beyond the regulatory minimum, act ethically in all decision-making instances that are inseparable from the company's culture, provide safe and healthy working conditions, respect the environment, and integrate the company into the community in which it is inserted. This last condition implies that CSR is a multifactorial matter, a characteristic that is relevant when defining how to evaluate it.

Lozano (2003) indicated that the European and North American perspectives of CSR differ. In the United States, CSR has a strong management component with respect to the relationship with the stakeholders, especially those able to apply a great deal of pressure on the company. In Europe, however, CSR tends to be ever more related with an overall vision of the company. Although Lozano indicates that companies in Europe also establish relationships with local communities, they place more emphasis on all the processes in which a given company is involved, with heightened sensitivity towards the political and social context in which the company acts.

The concept of CSR is based on the interdependence between a company and society and the variables that influence this relationship. Several interactions come into play in this sense: enterprise and governments, enterprise and ethical wealth of nations, enterprise and sustainable development, and enterprise and the competitive advantage of nations. Nowadays, although countries develop CSR internally, they are also affected by globalization, which implies interdependence with the rest of the world. The traditional idea of the enterprise as a producer of goods or services considered from a perspective of benefit production and the search to maximize profits can be problematic when trying to explain reality from this single vantage point. However, attempts to coordinate the maximization of benefits with CSR requires expanding the classical conception of an enterprise from one of an exclusively economic unit to include the interrelationship in an enterprise's performance between its nature as both a ''homo oeconomicus'' and its vision of CSR.

To date, CSR has been considered in a rather descriptive manner in which its qualitative aspects are emphasized; little has been said about its appraisal and measurement.

1.2 Measurement of CSR

The measurement and evaluation of CSR is an important issue, but its development is just beginning. A study done by PriceWaterhouseCoopers in 2003 and cited by Bestratén and Pujol (2005) indicated that social responsibility is still in a state of clarification and consolidation in companies and that the incorporation of relevant indicators is still incipient.

The concept of a ''social balance'' provides a method for evaluating CSR by offering society an inventory of the social actions taken by a company through its social responsibility program. Nonetheless, the elaboration of a social balance has not yet been standardized and is still lacking universal criteria, rules, and conventions that permit homogeneous comparisons and evaluations of CSR in all companies.

Bestratén and Pujol (2005) presented some organizations that offer guidelines for evaluating and measuring some aspects of social responsibility. These include the EFQM Business

Excellence Model (European Foundation Quality Management), Dispositions of the United Nations and the ILO, the European Community Green Book, the SAI 8000 Index, and the Global Reporting Initiative Guide. In Brazil, the Ethos CSR Indicators are used.

One of the objectives of this article is to deal with the lack of global indicators for measuring social responsibility and we herein present an analytical approach to this matter.

2. Theoretical basis of the proposed CSR appraisal model

2.1 Economic conception of a company and the utility function

From an economic point of view, the classical analytical approach is that of the utility function. This is the basis of economic and finance theory and rests on definitions and explicit normative assumptions that perceive of a company as an exclusively economic unit focused on the maximization of the owners' equity. This vision stems from an analytical and reflexive process with conceptual precedents associated with philosophical schools, mainly the Utilitarianism of the eighteenth century.

The utility function tends to lead to a reductionist approach for analyzing the economic performance of individuals and, therefore, companies as a starting point for understanding the concept of CSR. However, CSR offers a wider vision of a company than that of an exclusively economic center. Schumpeter (1954) analyzed the way Utilitarianism, as a philosophical school, has influenced the development of economic thought. The essence of the utility function, used today to explain the economic behavior of people and companies, comes from the concept of ''useful'', which was originally a purely ethical aspect. The utility function's theoretical bases come from the Utilitarianism of D. Hume (1711-1776), J. Bentham (1748-1832), and J. Stuart Mill (1806-1873), but they are also based on the Hedonism of Socrates, Plato, and Aristotle.

As an ethical school, Utilitarianism's ultimate objective is to maximize the positive effects associated with pleasure and to minimize pain. Pleasure is associated with happiness and pain, or the absence of pleasure, with unhappiness. In this sense, ''useful'' is that which provides the most happiness to the greatest number of individuals. Thus, the concept of ''useful'' can be taken from an individual to a social level by combining the pleasure and pain of different alternatives and proposing calculations for measuring pleasure and pain.

Schumpeter (1954, p. 103) referred to this conceptual scheme as a mechanistic philosophy of the universe, noting that the approach's social attitude is Hedonism or a very sublime egocentric Eudaemonism. Schumpeter (1954, p. 172) indicated that Utilitarianism is a philosophy for explaining real life, being both a normative system with a marked legal bias and a social system made up of a set of principles that must be investigated. In other words, utilitarianism is a working hypothesis and, for Schumpeter, the utilitarian hypotheses have absolutely no value when it comes to interpreting the driving forces of economic history as it is unable to explain any aspects that escape economic behavior. Schumpeter adds that, in the field of economic theory, utilitarian hypotheses are useless, but not harmful.

Utility, as a qualitative concept, acquires a quantitative aspect through the formalization of the utility function and its later deduction as marginal utility. Between 1730 and 1731, D. Bernoulli wrote the article in which he developed his hypothesis of Utilitarianism. This contribution broadened the vision of individual utility to include a social level in which the degree of total satisfaction, defined as the sum of all individual satisfactions, is determined. This social level was based on a mathematical function that expressed the variations in the satisfaction levels of individuals as dependent on the variations in their monetary incomes, indicating limits of individual satisfaction and an individual proportionality factor assumed by every person. Thus the logarithmical function of utility was generated; nowadays, this function is used in both theoretical economics and theoretical and business finance.

The most commonly used utility function in literature is as follows: $U(w) = \ln(w)$, where $\ln(w)$ is the natural logarithm of wealth w. This is an increasing function with a positive slope that indicates that the greater the wealth, the higher the utility, but each additional increment of utility is less than the previous one.

Earlier concepts of Utilitarianism philosophy and, consequently, the utility functions are fundamental for understanding what is behind the quadratic or logarithmic utility functions. These functions condition the understanding of the analysis of an economic agent's performance and are exclusively understood in terms of the ''homo oeconomicus''. However, this does not fully explain the behavior of an individual making economic decisions in a scope that extends beyond acting as a mere economic being. When acting as a complete being, the individual's every act simultaneously shows aspects of a biological being (with instinctive and erotic values), a social being (with vital and social values), a cultural being (with religious, ethical, logical, and esthetic values), and a ''homo oeconomicus''.

Thus, a new analytical scheme was required with respect to actions that are motivated simultaneously by purely economic reasons as well as socially responsible objectives. This does not mean that social responsibility is not considered in the economic utility function, but that it is valued as if it were one with economic utility and, moreover, it is presumed to be well represented and included within the conception of a maximizing ''homo oeconomicus''. Hence, CSR is identified in a strictly mathematical sense since it will behave thus when its performance can be represented precisely over the set of geometric points that correespond to the utility function. In other words, social responsibility is, implicitly, a secondary task as compared to utility. Theoretically, the utility function is a very good intellectual artifice that simplifies analysis. However, it cannot fully explain the decisions of any company due to the simplifying assumption that any business decision is well explained by the performance of a ''homo oeconomicus''.

Given the initial mathematical influence in the formulation of the utility function theory, the subsequent methodological mathematical repercussion is relevant. According to Laffont (1995, p. 8), two interpretations should be highlighted:

1. The utility functions are a working hypothesis and, therefore, it is necessary to deduce empirically verifiable implications from them. If the empirical work does not permit the rejection of these implications, then we can conclude that people act in order to maximize the expected utility.
2. The normative interpretation consists of demonstrating that rational agents ''must maximize'' the expected utility.

These two aspects (maximization and normativeness) allow us to understand that the concept of a rational economic individual, ''*homo oeconomicus*'', is developed under these assumptions.

Research and literature on the relevance of the utility function are abundant. Carroll (1998, p. 14) considers this matter from the perspective of ''the spirit of capitalism''. This is based on Max Weber's (1958) definition, which is centered on the search for wealth for individual use and possession as the main cause of the system; models and empirical verifications have been developed to this end, such as those of Bakshi and Chen (1996) and Zou (1994). In another philosophical discussion on the topic, Joan Robinson (1962, p. 17) said that utility maximization is a metaphoric concept of impregnable circularity. Von Neumann and Morgenstern (1947) characterized rational agents with axioms. Debreu (1966) showed continuous and non-decreasing utility functions that represent the behavior of rational agents. Markowitz (1959) established the classical definitions of risk based on the utility function. Finally, Pratt (1964) and Arrow (1971) established coefficients for measuring the reward for risk, giving rise to the development of ''power utility functions'', as indicated in Aït-Sahalia and Brandt (2001), Mehra and Prescott (1985), Kydland and Prescott (1982), and Friend and Blume (1975).

There are specific areas, such as ambiguous risk aversion, in which agents do not know the distribution of the returns and, therefore, cannot or are simply unwilling to assign probabilities to a set of returns. In such cases, Tversky and Kahneman (1992) proposed another family of utility functions. Hwang and Satchell (2001), based on Bernoulli's utility function, established that part of the wealth that must be sacrificed in order to acquire information. The utility function has also been used to explain donations and to indicate that these have a behavior similar to that of luxury goods.

Carroll *et al.* (1992) noted that luxury goods are generally associated with wealth, such as arts, jewels, and sporting equipment. These items are always assets in an economic sense and, therefore, subject to the same pressure as any other economic asset. In another article, Carroll (1998) said that the love of wealth is certainly extreme as a motivation and that other sorts of motivations exist such as job satisfaction, status, philanthropic ambitions, power, etc. These other types of motivation resemble the CSR approach.

Theoretically, the utility function explains an agent's behavior and it is supposed that any type of motivation other than economic is well represented by utility-type functions. These, mathematically, are continuous functions with double derivations in which investments are only rationally located on the ascending slope but never on the descending slope. These functions also reveal how economic agents behave when facing risk.

Schumpeter (1954 p. 171) posed the following question: Why was the theory of Utilitarianism so easily accepted by so many good thinkers? He responded, indicating that those good thinkers were practical reformers who were battling a given historical situation that seemed, to them, to be irrational. In such a situation, simplicity and even triviality are the primary virtues of argumentation. He further noted that those authors were not insincere, as we all are rapidly convinced of the ''nonsense'' we tend to preach.

It is paradoxical then that, despite reasonable critiques, the utility function remains in use and has been only slightly modified from its original form. Von Mises (1968) helped clarify this by saying that the interest in the action of an economic individual is related to the individual as a participant in a market regardless of the objective of the action. From this perspective, it is irrelevant whether one is altruistic or egotistical, rational or irrational, as this is only a bit of information to be used in the analysis of the economic problem. According to Von Mises, psychological information is the business of the psychologist and social structures are problems for sociology. However, several real life examples of decisions made by companies cannot be totally explained by this approach, including donations, ethical funds, companies infringing on ethical principles, and social responsibility, amongst others.

Economics, as an autonomous science, needs its own definition of rationality in order to define the economic subject as a maximizing agent when it is necessary to explain different business decisions. Therein lies the importance of the definition of the utility function that has been developed.

2.2 Emotional well-being function

2.2.1 Definition of a new function: emotional well-being function. In order to appraise and measure CSR, it is necessary to search for a utility function with a more global approach than the classical economic utility function. Parada (2004) developed a broader function able to explain the behavior of people and companies by simultaneously incorporating both the typical rational economic facet with that of individuals and companies that are motivated concurrently by other values. A summarized theoretical exposition of that approach is presented herein, albeit in some detail since both the creation of a global indicator for measuring CSR and its monetary evaluation are based on it.

The article in question mathematically proved that the $U(w) = \ln(w)$ -type logarithmic utility function, which is the most commonly used in economics and finances, is an envelope function for another family of curves of the type:

$$BE(w) = a_1 sen(\pi w) + a_2 \ln(w) + c \quad \text{with } 0 \leq a_1 \leq 1;\ 0 \leq a_2 \leq 1 \tag{1}$$

Where $w =$ wealth; $BE(w) =$ emotional well-being in function of wealth; $\ln(w) =$ natural logarithm of wealth; $sen(\pi w) =$ the center of wealth; the coefficients a_1, a_2 are weights for sensitivity; c is a constant and an independent of wealth; and $\pi = 3.1416$.

The function $BE(w)$ has two envelope functions: the outer envelope function $U_1(w)$, which is joined to the function by the relative tangential maxima, and the inner envelope function $U_2(w)$, whose points are tangential and minimum relative to the function $BE(w)$. The $U_3(w)$

functions are found between these two, differing only in the position of their coefficients *c*. Figure 1 shows this new function; the function *BE*(*w*) increases at some points and decreases afterwards. In turn, this function has two logarithmic envelope functions: one outer and one inner. It is a continuous function.

2.2.2 Interpretation of the emotional well-being function, BE*(*w*)*. The BE (w) model is a rationalist vision and, therefore, makes no more sense than a typically mathematical deduction of the logarithmic function. However, to provide an interpretation that is more consistent with the Theory of Knowledge, we need a more empirical interpretation and adaptation in order to make it more valid. Thus, between the approaches of rationalism and empiricism, an explanatory model is generated that theoretically bases the behavior of individuals and companies as beings that are motivated in every act by their ''*homo oeconomicus*'' and socially responsible facets.

In order to comply with the previous aspects and provide an interpretation to the mathematical function *BE*(*w*), the following conditions are assumed:

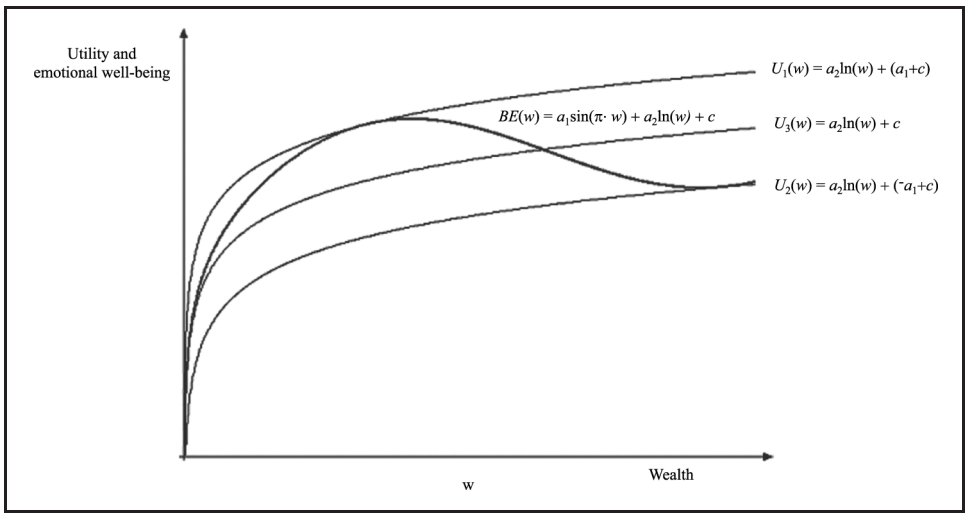
- Economically, all the normative aspects of the Utility Function Theory are fulfilled.
- The behavior of individuals is represented by the function *BE*(*w*) and the envelopes $U_1(w)$ and $U_2(w)$. It is assumed that their behavior is explained by the space between both *U*(*w*), with $U_2(w)$ being the minimum emotional compensation required of any decision and $U_1(w)$ being the maximum emotional compensation possible.
- Other utility curves can exist between the maximum and minimum utility curves; these are indicated as $U_3(w)$.
- Emotional well-being is understood to be the degree of satisfaction resulting from an act, whether its motivation is purely economic or a mixture of this with another rationale interpreted, in this case, as social responsibility. In other words, this approach is more global and includes different personal values, which are all captured by *BE*(*w*).
- It is assumed that emotional well-being *BE*(*w*) can be represented by:

$$BE(w) = a_1 sen(pw) + a_2 \ln(w) + c, \text{ where } w = \text{wealth}.$$

It is supposed that the coefficients a_1 and a_2 represent the respective relative weights that a company and its owner(s) assign a global behavior (social responsibility, in this case) and economic ethics.

As these are only two components, it is assumed that $(a_1 + a_2) = 1$. The original article by Parada (2004) considers two groups of ethics: global ethics, represented by $a_1 sen(\pi w)$, and

Figure 1 The relationship between w, U(w), and BE(w)



economic ethics, represented by $a_2\ln(w)$. In this paper, the concept of global ethics is expanded towards the concept of CSR, a broader definition.

If $a_1 + a_2 = 1$, and if $a_2 = 1$, then: $U_1(w) = BE(w)$; that is, we are in the presence of a behavior explained solely by economic rationality ethics, since the emotional well-being is fully explained by the traditional logarithmic utility function. On the other hand, if $a_1 = 1$, the individual will not give economic ethics more relevance, because the important thing is to act as a complete individual, motivated by social responsibility. In real life, individuals are expected to use both motivations simultaneously and instances of $a_1 = 1$ or $a_2 = 1$ are extreme cases. In this sense, the utility function theory $U(w)$ described in point 2.1 is a particular case of the emotional well-being function and is valid only when $a_2 = 1$.

The term ''*c*'' represents the minimal satisfaction independent of each individual or company's level of wealth. It can be zero, which implies that its emotional well-being only depends on wealth. The coefficient ''*c*'' is interpreted as ''enjoyment of belonging'' because the participation in the company gives the owner(s) emotional satisfaction independent of wealth. This enjoyment can be explained by factors such as business prestige, business tradition and history, business culture, and other factors typical of each company:

- economically, it is assumed that there are emotional sacrifices made when distancing oneself from the ethics of economic rationality, which are covered by emotional compensations based on an emotional rationality; and
- emotional well-being is assumed to depend on the level of wealth ''*w*'' and on other factors captured by the coefficient ''*c*''.

In summary, the model shows that emotional well-being depends on the three following effects: $BE(w) =$ social responsibility + economic + enjoyment of belonging, where the social responsibility effect $= a_1 sen\,(\pi w)$, the economic effect $= a_2\ln(w)$, and enjoyment of belonging $= c$.

2.2.3 Analysis of the emotional well-being function. From the aforementioned definitions, it is possible to deduce the following:

$$\frac{dBE(w)}{dw} = a_1\pi\cos(\pi w) + \frac{a_2}{w} \tag{2}$$

The first term on the right side of (2) represents the impact of changes in emotional well-being caused exclusively by behavioral aspects of social responsibility, that is $\pi a_1\cos(\pi w)$. The value each individual grants to this behavior is influential and is represented by the coefficient a_1. The second term, that is a_2/w, represents the marginal contribution of emotional well-being to the individual's behavior as a rational economic being, which is coincident with the benefit obtained when only the utility function is taken into consideration. Note that if $a_2 = 1$, then emotional well-being also includes purely economic behavior. This means that the theoretical framework of the utility functions, explained in 2.1, is valid because the case is considered given the following relationship: $(E(w) = U_1(w)$. This is interesting to observe, since the performance of the economic maximizing individual is presented as being a borderline or extreme solution; evidently such individuals do exist, but there are cases of economic individuals acting within certain utility margins; in other words, we have the following situation, when $0 < a_2 < 1$, meaning that some economic individuals have a weight of less than 1, so that there is still some analytical space left to explain the other facet of their behavior.

Equation (2) also shows that, economically, the change in emotional well-being remains an inverse proportion of wealth to utility. In other words, since $d(BE(w))/dw = a_2/w$, Bernoulli's hypothesis is verified. However, it is observed that the other facet of the behavior of individuals, conceived not only as purely economic beings but as beings with social responsibility, can be seen to have ascending or descending ranges in the change of emotional well-being. In this sinusoidally shaped logarithmic function, values can reach both the upward and downward slopes of the curve, which intuitively suggests that it is a variable including a value factor, which is represented by the first sum of (1). In fact, it is known that the utility function represents the individuals located only on the upward slope of the curve and never on the downward slope due to the economic rationality assumption.

Nonetheless, even when individuals behave as economic beings, they still sacrifice utility for other goals, without losing their rational character. This is possible because, in this new interpretation, the economic being can be located between two curves, one having a superior limit and the other having an inferior limit. This explains why individuals can be located on the downward slope of the curve. This, in turn, allows a more sensible interpretation of human behavior through the sinusoidally shaped logarithmic curve represented by the emotional well-being function and explains, with greater common sense, why an individual is located on the downward slope of said function. This situation is not accepted by the normative theory of the utility function.

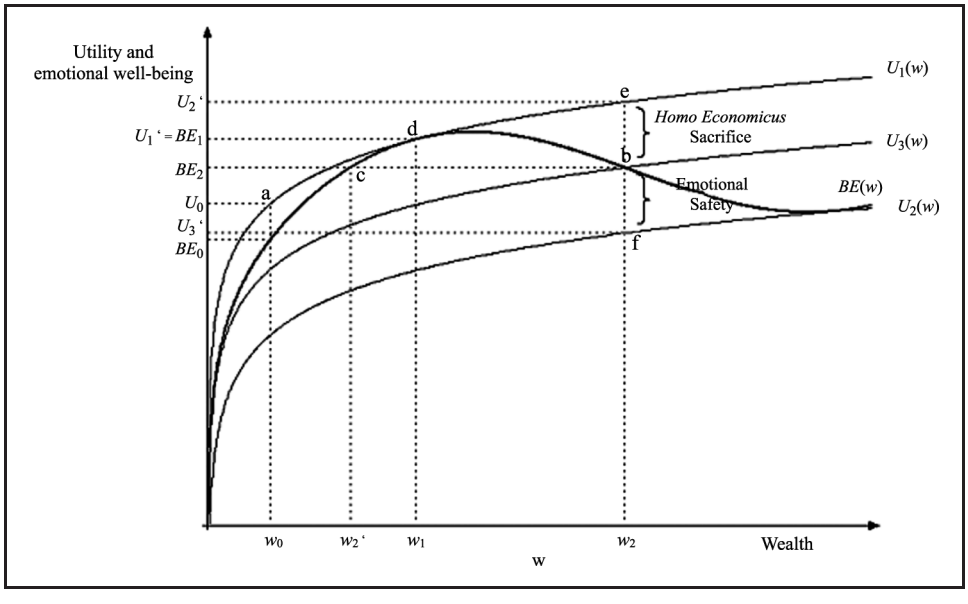
The utility function $U_2(w)$ indicates a minimum economic rationality; in other words, decisions motivated by social responsibility can be adopted, including ethical, religious, spiritual, or other values, but over a minimum base below which the individual is not willing to make economic decisions.

This new analytical approach results in a change in the economic perception of risk. As will be seen later in this paper, that utility minimum defines what an individual is willing to sacrifice economically in order to make a decision that is distanced from the typically economic rationale.

Figure 2 explains this new function. For a wealth of w_o, an emotional well-being of BE_0 is obtained. Economically, this should be U_0 of Figure 2 (point ''*a*''). Therefore, although there is an economic sacrifice, the greater level of wealth, *r*1, is still attractive. Obtaining an emotional well-being of BE_1 at this point coincides with the graph's rationally economic utility of U_1'. In other words, a total well-being is achieved here, since the economic being, a maximizer, need not analyze any function other than the rational economic individual's utility function, since $U_1' = BE$ for the same wealth level w_1 and it is at that point where both functions are maximized.

How, then, is it possible to justify an individual's willingness to have a greater level of wealth with a lower utility? This could be explained by human behavior having facets that differ from those of the strictly rational economic individual. Here, a wealth level w_2 obtains an emotional return of BE_1. This is equal to the utility obtained with a lower level of wealth, since the same emotional well-being is obtained with a wealth of w_2' (point ''*c*''), which is lower than w_2. What could motivate someone to act this way? This behavior could be motivated by personal values other than those of the economic individual, such as those indicated in the preceding

Figure 2 The wealth-utility-emotional well-being relationship



paragraphs. The individual knowingly sacrifices the greater utility due to a sense of social responsibility, including ethical and other values, in spite of the knowledge that this will be more costly. What is sacrificed? An individual knows that an economic utility of U_2' (point ''*e*'' of the graph) can be obtained for wealth level w_2, that is to say that the economic sacrifice is $U_2' - BE_2$. The individual, nevertheless, still receives returns, as the minimum required is U_3 (point ''*f*'' of the graph). If the person chooses this option, the compensation for moving away from the economic sacrifice is $BE_2 - U_3'$.

On the other hand, at point *b*, an individual making this decision faces another economic utility function, $U_3(w)$, which leaves the individual economically satisfied. The individual, being complete, is willing to make an economic sacrifice in exchange for other kinds of compensation. Finally, the degree of the emotional well-being sacrifice or compensation is given by the comparison between $U_2' - BE_2$ and $BE_2 - U_3'$.

The appearance of the new function $U_3(w)$ is the normal response to this subject, when exclusively considered from the economic science perspective and in accordance with the previously indicated human action approach of Von Mises (1968). In fact, if an individual renounces the greater utility given by $U_1(w)$, then the economic response is that the individual has a lower utility function independent of what originates that decrease. In spite of its intellectual validity, the approach is not complete, since the transfer from $U_1(w)$ to $U_3(w)$ has economic and value implications that should be explained through the concept of emotional well-being. It is an oversimplification to say that, if individuals are located on the downward slope of the curve and then lower their expectations of economic demand, the reasons for doing so do not matter. However, some people act this way due to both economic and social responsibility values and the latter cannot be assumed to be neutral or constant when facing an economic decision.

What happens on the downward slope of the emotional well-being function?

On the downward slope of the $BE(w)$ function in Figure 2, the following situations are given between points *b* and *d*:

- Economic individual's sacrifice: This is represented by the *e*-*b* line, meaning that if the individual were only a ''homo oeconomicus'', for a wealth of w_2, the individual should have an utility of ''*e*'', given at the highest part of the utility function. In the new emotional well-being situation, nonetheless, this same level of wealth w_2 is really located at point ''*b*''. In other words, the person sacrifices economic utility for other values such as social responsibility. Thus, this line is an appraisal of social responsibility. Analytically, it is given by the following expression:
  $$[a_2\ln(w_2) + (a_1 + c)][- [a_1 sen\,(\pi w_2) + a_2\ln(w_2) + c] = a_1[1\text{-}sen(\pi w_2)].$$
- Minimal emotional security: Given by the line represented by the difference between points *b* and *f*. This means that, for a level of wealth of w_2, an individual acts based on a minimum, which is represented by a minimal utility function; if this level is located below point *f*, then the person will be emotionally uncomfortable and will not develop any new activities. The BE function indicates that this individual obtains a compensation of BE_2 from the graph, that is to say, point *b*. It is a sort of ''emotional safety net'' that allows an individual to face emotionally the utility's decrease casued by not acting as a strictly ''homo oeconomicus''. This emotional net permits the person to assume social responsibility. Its analytical expression is as follows:
  $$[a_1 sen\,(\pi w_2) + a_2\ln(w_2) + c] - [a_2\ln(w_2) + (c - a_1)] = a_1[sen\,(\pi w_2) + 1].$$

Emotionally, this minimum safety net can be expected to be greater than the sacrifice of distancing oneself from the behavior of an exclusively economic individual.

In summary, a person can act on the downward slope given the emotional margin of safety provided by the difference between points *b* and *f* that compensates for the sacrifice of being an economic rational individual given by the difference between *e* and *b*.

3. Development of the csr appraisal and measurement model

So far, only the social responsibility of a company has been considered. However, in order to appraise and measure with only one indicator, it is necessary to separate social

responsibility into two approaches: corporate social responsibility (CSR) and a business owner's social responsibility (OSR). This is necessary to determine the wealth (w) that must be considered in order to evaluate and define the degree to which one is socially responsible and also to determine who perceives emotional well-being.

3.1 Corporate social responsibility

The classical definition of a company is a set of investments intended to produce a service or product in order to satisfy consumer needs. In an economic and financial sense, the set of investments is equal to a set of material and immaterial assets whose sum is the value of the corporation and is also equal to the total sum of debts plus equity; in other words, the corporation Company Value = Assets = Debt + Equity. Understood thus, a company's wealth is constituted by the sum of its assets, i.e. its investments. From the monetary perspective, a company is responsible up to the amount of its value.

On the other hand, the company is responsible to its capital suppliers, e.g. lenders and the company owner(s). Within the conception of social responsibility, the company is responsible to a set of individuals and social organizations interested in the company (stakeholders). Therefore, the level of emotional well-being is perceived and evaluated by these stakeholders, who then will indicate their degree of satisfaction with the company.

When we say that the company's wealth = the sum of its assets, it is necessary to determine the character that CSR would have within the assets and what its counterpart would be therein. Although it might seem theoretical, this matter is very important for the financial analyses and accounting matters implicit in the CSR concept.

3.1.1 CSR as an intangible asset and as an obligation. In light of the challenge of measuring and evaluating CSR as an obligation, there is also the interest in identifying, according to accounting theory, how CSR should be classified, since this, as all relevant issues, should be recorded. However, the literature has not yet delved into this aspect. Although this subject is not the main objective of the present work, for reflexive purposes, it is presented herein.

Two perspectives are proposed for analyzing the possible incorporation of CSR into accounting records. The first is based on Smith and Parr (1989), who developed useful concepts for stating that CSR can be assimilated as an intangible, but not necessarily as an asset. According to these authors, the accounting theory defines as intangibles all those assets not having physical substance and giving rights and privileges to the owners of the company and that are at the same time inseparable from it. Smith and Parr also define intangibles as those assets for which it is very difficult to determine and regulate the future benefits that they will provide. For the authors, intangible assets are all the elements of a company existing after having identified money and tangible assets; intangible assets also contribute to the power that generates benefits in the company. These intangible assets are grouped in four categories: rights, relationships, grouped intangibles, and intellectual property.

For the purpose of this work, rights are a significant case. Smith and Parr (1989) define these as all those rights established with other companies and businesses, individuals, or governments by means of contractual agreements. There are, nonetheless, rights that are not necessarily contractual, implying relationships that permit the company to develop its exclusively economic tasks and to have good relationships with the community, such as CSR. The definition of social responsibility includes explicit contracts, whose results are not always easy to appraise; likewise, there are also implicit contracts that are difficult to appraise, especially in the benefits they contribute to the company such as respect for ethics, respect for the environment, healthy jobs for workers, and others that imply the distribution of money and whose later returns are not always clearly identifiable.

According to Smith and Parr (1989), there are some contracts that are valuable because they give the company the opportunity to provide goods and services that are useful to others. These authors mention several, including well-being services for employees (health, insurance, etc.), loans among companies, student enrolment, licenses to use intellectual property, and franchises that protect a territory or product line. These aspects involve matters corresponding to CSR.

However, the norm that prevents CSR from being an intangible asset is its degree of separation with regard to the company. It is very difficult to claim that a company can consider CSR to be a saleable asset independently and separately from the company. In fact, CSR is inseparable from the company.

From another perspective and within the context of the International Financial Reporting Standards (IFRS), Rodríguez *et al.* (2006, p. 112) explicitly present the requirements to be fulfilled in order to determine whether an asset is an intangible or not. These authors, like Smith and Parr, mention that the asset should be identifiable, meaning that the intangible asset must be separable from the company. CSR fulfills all the IFRS's requirements to be an intangible, except those of identification and separation. Thus, the possibility of considering CSR as an asset is ruled out. In spite of this, it is possible to record CSR in off-balance sheets such as CSR rights and its counterpart, a responsibility of CSR rights sheet. These should be adjusted every year according to the CSR value of each period, which depends on the appraisal method proposed in the following paragraphs.

3.2 Social responsibility of the business owners

The value of a company is not equal to the value given by its owners because, in the event of third-party financing, not all of the total assets belong to the owners. This implies that the owners' wealth is not necessarily equal to the company's wealth if the latter is measured through the total assets. If the owners' wealth is evaluated through their equity, the measurement of social responsibility must consider this particularity; this will be explained in the coming paragraphs. On the other hand, the degree of emotional satisfaction is now perceived by the owners (stockholders) and is not necessarily equal to the degree of emotional satisfaction measured by stakeholders.

Thus, from the perspective of the owners, in the appraisal of social responsibility, they are responsible up to the amount of wealth contributed to the company, which is not necessarily equal to the company's wealth given by its total assets. This characteristic makes us separate both measurements from social responsibility.

3.3 Measuring and appraising corporate and business owner social responsibility

In the global emotional well-being model, the coefficients a_1 and a_2 represent the weighting or coefficients of sensitivity of the behavior of individuals or companies acting with the ethics of social responsibility and ''homo oeconomicus'', respectively. It is necessary, then, to determine the way in which such weights can be numerically obtained. A methodology to calculate the a_1 weight is elaborated that represents the importance given to CSR by owners and companies.

We know that $a_1 + a_2 = 1$; this implies that it is only necessary to determine one of the two coefficients and the other is obtained by the difference, in other words $a_2 = 1 - a_1$. To put it more simply, this means that, for example, if $a_1 = 0.6$, the company has then given an importance of 60 percent to its socially responsible behavior and of 40 percent to its behavior as ''homo oeconomicus''. According to the emotional well-being model, the extreme case of ''homo oeconomicus'' indicates that when an individual or a company behaves as a total maximizer, the emotional well-being is then completely explained by the logarithmic function, $a_2 = 1$. In other words, the image of the maximizing individual is exactly represented by the upward envelope function because in that case, $BE(w) = U(w)$, which is the classical representation of the economic being, which is also presented in the first part of this article.

On the contrary, when $a_1 = 1$, the individual or the company is distanced from the economic rationality criteria and behaves as an agent with only social responsibility, in other words $BE(w) = sen(\pi w)$. Therefore, the emotional well-being function permits the separation of the two extreme cases of analysis. As a hypothesis, both indexes are expected to be distanced from the value 1; this would indicate a performance consistent with real life or, in other words, companies and individuals that simultaneously incorporate their facets of ''homo oeconomicus'' and social responsibility.

In the following analysis, for profit and non-profit institutions are separated since, in the latter, social responsibility acquires some theoretical aspects that need to be studied in depth.

3.4 CSR measurement and appraisal in for profit institutions

3.4.1 Global indicator of corporate social responsibility. For profit institutions are represented in Quadrant I of Figure 1 because they are expected to have positive compensations. This also coincides with the definition of social responsibility equivalent to an intangible asset; in other words, any future return is expected to be received due to the performance as individuals with social responsibility. It is important to mention that this return is not necessarily monetary, that is why it is called emotional well-being, which is a broader utility than in the exclusively monetary sense. In this case, it is relevant to analyze the way the coefficient a_1, which is also the weight of social responsibility, is obtained. The global indicator of CSR, together with its determination, is relevant for the evaluation and weighting of social responsibility. As mentioned before, it is fairly obvious, given the intellectual construction developed here, that we need to obtain a numerical indicator to deduce the other. For that, the following equation is used: $a_2 = 1 - a_1$. If we replace it in the emotional well-being function and make some algebraic calculations, we have:

$$[BE(w) - \ln(w)] = a_1[sen(\pi w) - \ln(w)] + c \tag{3}$$

Equation (3) is a new model that guarantees that $(a_1 + a_2) = 1$, but now expressed in function of the global indicator of social responsibility, a_1. Equation (3) is important for better understanding the meaning of the coefficient a_1 as an exclusive indicator of the level of importance of corporate social responsibility and that of the business owners.

The interpretation of the new variables is as follows:

- $\text{Sen}(\pi w) - \ln(w) =$ the excess of CSR over exclusively economic behavior. Remember that $a_1 sen(\pi w)$ represents the effect of socially responsible people's behavior and $a_2 \ln(w)$ represents the part of the emotional well-being function that is attributed exclusively to behavior as an economic rational individual. The position of coefficient "*c*" represents the enjoyment of belonging to the company.
- $BE(w) - \ln(w) =$ the excess of emotional well-being over exclusively economic behavior. The previous background allows the calculation of a_1 using the Ordinary Least Squares (OLS)[1] method. In a finer solution, the Restricted Least Squares (RLS) method should be used. The restriction in this case is that both a_1 and a_2 are positive and less than or equal to 1. Using the OLS method, the following result is obtained:

$$\text{Social Responsibility Indicator} = a_1$$

$$= \text{Cov}[\{\text{sen}(\pi w) - \ln(w)\}, \{BE(w) - \ln(w)\}]/\sigma_{\text{sen}(\pi w) - \ln(w)}$$

where COV = symbol that indicates covariance[2]

$$\sigma^2 = \text{Variance of the difference between sen}(\pi w \text{ and } \ln(w).$$

When applying the OLS method, the coefficient of position *c* (enjoyment of belonging) can be obtained by calculating: Enjoyment of belonging$= \overline{\text{BE(w)} - \ln(\text{w})} - a_1(\overline{\text{sen}(\pi \text{w}) - \ln(\text{w})})$ where the line above the equation indicates the mean of the variable located below.

3.4.2 Methodology for calculating CSR coefficients. In order to calculate the CSR coefficient in a private limited corporation with market prices for its shares, the following steps are proposed:

1. *Measurement of wealth.* Wealth is measured as the value of the company's total assets. For methodological purposes and given that the value of the company = assets and assets = debt + equity, the value of the equity measured can be used, whether obtained by means of accounting or market price. The value of the company must be calculated considering a historical data series for a long time period and arranging it from least to greatest. The value of the company is measured in monetary units, but it must be transformed into decimals so that the trigonometric sine function retains its meaning; otherwise, this function would be equal to zero[3].
2. Measurement of emotional well-being. This is not a simple aspect to evaluate, because it is not necessarily a measurable variable. However, a "proxy" variable can be used that represents the desired phenonmenon as best as possible.

A fine measurement can be obtained from the opinion that stakeholders have of the company regarding its performance, both as complete individuals with social responsibility and as individuals concerned with mathematically maximizing their utilities. This way, the emotional well-being of stakeholders can be measured by a direct survey in which they evaluate this situation through an open-ended question: How do they rate their participation in the company in terms of their global satisfaction, including both economic and non-economic aspects? The rating scale can be from 1 to 10, 1 to 7, etc., depending on the culture of the country where the survey is being conducted. This scale is then presented in decimals to make it equivalent to the variable wealth, also expressed in decimals. For this, everything is divided by 10^j, where j is the number of whole integers in the data series. For instance, if the highest value in the data series is 5.2, then we have to divide by 10 because $j = 1$, and the result is 0.52.

3. The ln(w) and *sen*(πw) functions are calculated, where w = value of the company. Here, wealth is expressed in decimals.
4. The calculation (*BE*(w) – ln(w) and (*sen*(πw) – ln(w)(is done and the OLS method applied.

For the case of the social responsibility of the business owners, the method is the same, and only the proxy variables used to measure both wealth and emotional well-being are different. In this case, a proxy variable for emotional well-being can be the market price of the shares having determined the capital gains obtained by the business owners. For this, it is necessary to obtain the equity measured according to its stock-market value over time. The difference between the equity of one period and that of the previous period represents the capital gain, the proxy for emotional well-being. The disadvantage of using this proxy is that the measurement basically concentrates on a purely economic aspect. Thus, the owners can be surveyed using the same instrument and the previously defined scale regarding their degree of emotional satisfaction, according to the equity invested in the company and using the same methodological approach explained in the previous paragraph for the CSR. The proxy variable used to measure wealth is equity, taken as the stock-market value, if it is a private limited corporation or its accounting value if it is some other kind of organization.

3.4.3 Global indicator of social responsibility, as a management indicator. The calculation of the coefficient a_1 from one period to another can be used as a management indicator to evaluate the degree to which the CSR was fulfilled. To do so, it is necessary to calculate the indicator expected from one period to another; this was determined by using the differential calculation. In effect, if $y = BE(w) - \ln(w)$ and $x = sen(\pi w)$-ln(w) is established in the model, which in a simplified manner indicates that $y = a_1 x + c$, we then have:

$$dy/dx = a_1; \text{ but: } dy/dx(dy/dw)/(dx/dw) = a_1$$
$$dy/dw = -w^1 + d(BE)/dw; \text{ and}$$
$$dx/dw = \pi\cos(\pi w) - w^1.$$

With the previous information, it is possible to obtain an expected value of a_1 from one period to another, with wealth (w) and an estimation of $d(BE)/d(w)$ being the only known data.

Measuring the interperiodic coefficient a_1 is useful to evaluate management in CSR. This way, we can determine the CSR management at the end of a year or semester with regard to a previously determined standard. This can be accomplished if we establish the CSR coefficient, a_1, to be reached so that the emotional well-being $BE(w)$ increases before changes in wealth. Mathematically, this is represented by $d(BE)/d(w)$(0. If we calculate this expression, we arrive at:

$$d(BE) / d(w) = [\pi\cos(\pi w) - w^1]a_1 + w^1 > 0$$

The previous inequality implies that, in order to have a positive increase in emotional well-being before an increase in wealth, a CSR coefficient should exist that fulfils that inequality. This could be calculated by working out the value of a_1, so that we obtain:

$$a_1 > -w / [\pi\cos(\pi w) - w^{-1}]$$

3.5 Monetary value of CSR

The monetary value of CSR can be determined from the previous definitions by separating the emotional well-being function into the three aforementioned effects: $BE(w) =$ social responsibility + economic individual + enjoyment of belonging, where: the CSR effect $= a_1 sen(\pi w)$, the economic individual effect $= a_2 \ln(w)$, and the enjoyment of belonging $= c$.

If we take these definitions and divide them by the $BE(w)$ in the first place, and then multiply by W, we work out the CSR effect and arrive at:

$$W = W\left[\frac{a_1 sen(w\pi)}{BE'} + \frac{a_2 \ln(w)}{BE'} + \frac{c}{BE'}\right] \tag{5}$$

where $w = W€/10^t€$, $BE' = BE/10^j$, $c = C/10^j$, and t and j are the highest integers in the data series of wealth and emotional well-being, respectively. W is measured in monetary units and with the adjustment, w and BE' are expressed in decimals.

The equality (5) shows that wealth, measured in monetary units, is equal to the CSR monetary value measured by $Wa_1 sen(w\pi)/BE'$ and the ''economic individual'' value, measured by $Wa_2 \ln(w)/BE'$, and the monetary value of the enjoyment of belonging, measured by Wc/BE'. Working out the CSR monetary value, the following expression is obtained:

$$\text{CSR monetary value} = W\left[1 - \frac{(1 - a_1)\ln(w)}{BE} - \frac{c}{BE}\right]. \tag{6}$$

But:

$$\left[1 - \frac{(1 - a_1)\ln(w)}{BE} - \frac{c}{BE}\right] = \left[\frac{BE - (1 - a_1)\ln(w) - c}{BE}\right] = \left[\frac{a_1 sen(w\pi)}{BE}\right].$$

Finally:

$$\left[\frac{a_1 sen(w\pi)}{BE}\right] = \text{CSR proportion with regard to motional well} - \text{being}.$$

Therefore, the CSR value is given by equation (6); from this we obtain the following observations:

- The monetary value of CSR depends on the value of wealth, W, the global level of emotional well-being (BE), the enjoyment of belonging of the business owners (c), and finally the CSR global indicator $= (a_1)$.
- Although the definition of CSR, despite its differences, is more or less global, the model of monetary appraisal indicates that each organization has its own monetary value and this depends on the way that companies and their owners perceive social responsibility, expressed in the appraisal model's implicit variables.
- The CSR appraisal model presented in this article lies in the conceptual context of value; therefore, it is not a price. Nor is it the accountable concept of spent money either, but rather it is the value of an intangible asset.
- Since it is the value of an intangible asset, it also generates commitments. Social responsibility is, in fact, commitment and an obligation to society; therefore, the value determined here is equal to the commitment or duty of the company and its owners to the community. Thus, CSR also implies recognizing the obligation that is represented by the commitment with society, expressed as ''CSR obligation''.

From equation (6), it is observed that the CSR monetary value can adopt the following values:

1. RSE(€) $= 0$, when $a_1 = 0$, which implies that an individual or company acts motivated only by the reasons of an ''economic individual''.
2. RSE(€) $= W$, when $a_1 = 1$, which implies that the individual or the company acts motivated only by CSR reasons.

3. 0 (RSE(€) (*W*, when the individual or the company acts motivated simultaneously by CSR and the reasons of an ''economic individual''.

4. Conclusions

CSR is not a new concept; however, its treatment in regard to a company's operations has not occurred along with the methodological approach used in economics to explain the factors influencing business management. The development of CSR, stemming from its very definition, has focused on a rather descriptive approach. In this context, this work tries to develop a different explanation by using a methodology that is more normative than positive in order to elaborate the manner in which to quantitatively measure the incidence, value, and weight that social responsibility has in a company. This, like any kind of intangible asset, is not a trivial issue, in terms of how to determine precisely the benefits derived from it. The lack of indicators with spatial and temporary validity that permit the appraisal of the contribution of social responsibility to business decisions has influenced this subject.

Based on previous research, the horizon of CSR applications has been broadened and a global social responsibility indicator elaborated using the definition of the economic utility function. Since this is a normative criterion, it cannot fully explain business decisions. Considering the function's weaknesses, but using an analytical methodology, a mathematic interpretation was given to social responsibility by broadening its horizon of analysis for business decisions and by simultaneously incorporating both the behavior of an individual with economic rationality ethics (''homo oeconomicus'') and that of an individual acting with social responsibility. The weight each company and owner gives both dimensions allows the weighting and evaluating of their repercussions; this broadening of the initial study resulted in the presentation of the business ''Global Social Responsibility Indicator''. The most relevant conclusion in this article is the elaboration of a methodology for determining the monetary value of social responsibility, which is normally described in qualitative terms. When measured, its repercussions can be better evaluated.

Notes

1. To reach this result, an analysis of the model of the type $y = ax + b$ has been done; this model can be found in any book on Econometrics. In this case, it comes from A. Pulido, ''Modelos Econométricos'', Cap. V, 5.2, Editorial Pirámide, 1983.
2. Covariance is a statistical measurement between two variables. If these variables are x and y, then the covariance is defined as follows: $((x - xp)(y - yp)/n$, where xp and yp are the statistical means of variables x and y, respectively. n represents the number of data observed.
3. To convert into decimals, we have to divide the equity by $10t$ €, where t is the number of whole integers of the highest asset in all the data series. Thus, for example, if the highest value of the company in all the data series is 200€, then $t = 3$ and we have to divide by 103€, in other words, by 1,000 €, in order to leave it at 0.2.

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