

## RESEARCH ARTICLE

# The relation between corporate social responsibility certification and financial performance: An empirical study in Spain

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## Abstract

The relation between corporate social responsibility (CSR) and financial performance (FP) has been widely dealt with in specialized literature. This study has two points of interest: first, we develop a new tool which financially quantifies the value contributed to companies that are committed to CSR; then, we make a practical application of this tool through an empirical study focused on Spanish companies. This study is especially innovative because of the fuzzy methodology used and the way it defines CSR through the IQNet SR10 certification of social responsibility systems. In addition, the measurement of CSR through IQNet SR10 certification is a completely new approach to the subject. An interesting conclusion can be drawn from the empirical study: IQNet SR10 CSR certification increases the value of businesses. However, neither size nor the economic sector they belong to influence this relationship significantly.

## KEYWORDS

corporate social responsibility, empirical study, financial performance, fuzzy logic, IQNet SR10

## 1 | INTRODUCTION

The European Commission defined CSR as “a concept whereby companies integrate social and environmental concerns in their business operations and in their interaction with their stakeholders on a voluntary basis” (European Commission, 2001). This definition has been condensed over time as “the responsibility of enterprises for their impact on society” (European Commission, 2011).

Nevertheless, for a company to be socially responsible, one should never forget the responsibility it has toward its owners or investors. To paraphrase Milton Friedman, this is basically generating profits while, logically speaking, complying with the laws (Friedman, 1970). Corporate Social Responsibility (CSR) needs an economic justification (Charlo, Moya, & Muñoz, 2017). In fact, if there is no mutual benefit for both businesses and society at the same time, it will be difficult for actions promoting social well-being to be sustainable over time. The social goal of any company should necessarily be consistent with its long-term economic interests (Baron, 2009; Mishra & Suar,

2010; Porter & Kramer, 2006). Hasan, Kobeissi, Liu, and Wang (2018) suggest that the match between a firm's CSR strategies and its value chain is crucial for firms' survival and success, especially when firm managers recognize the contingent nature of CSR in a competitive context.

Carroll (1991) suggests that CSR comprises four types of responsibilities: economic, legal, ethical and philanthropic, which should be covered sequentially but not integrally. He indicates that “the social responsibility of a company involves the obligation of making a profit, obeying the law, being ethical and being a good citizen.” In this line, Brzezczynski and McIntosh (2014) highlight that it is necessary to develop strategies that combine financial profitability with other social and environmental benefits, thereby putting social, ethical, and ecological concerns in line with economic matters. Apart from this, companies that are more ethically and socially committed can expect their employees to be more enthusiastic and productive (Beccchetti, Ciciretti, Hasan, & Kobeissi, 2012), their reputation facilitates their access to sources of cheaper financing (Brzezczynski & McIntosh,



2014), and they also have fewer disputes, which in turn leads to a decrease in costs (Goldreyer, Ahmed, & Diltz, 1999). Consequently, all of this should contribute to an improvement in business performance (Junkus & Berry, 2015) and thereby increase a company's value for its shareholders (Porter & Van der Linde, 1995).

However, although there are several studies that analyze the relationship between financial performance (FP) and CSR, they are far from advancing in the same direction and obtain very different and even contradictory results.

There are different hypotheses that aim to provide a theoretical framework to explain the causal relations between CSR and FP). On the one hand, in the negative sense, there are hypotheses like the managerial opportunism hypothesis (Williamson, 1965, 1985), or in the positive sense, hypotheses like the slack resources hypothesis (Waddock & Graves, 1997), according to which it is FP that influences the CSR strategy that companies follow. On the other hand, there are hypotheses that sustain the contrary, that is to say, that it is socially responsible actions which affect the result, and not the opposite. For example, in a negative sense, the trade-off hypothesis (Friedman, 1970), or in the positive sense, the social impact hypothesis (Freeman, 1984), on the basis of which CSR activities can constitute an interesting strategic tool for obtaining economic benefits. An intermediary position would be one that defends the existence of positive or negative synergies between CSR and FP, so the relation between both variables would be of a bidirectional nature (Preston & O'Bannon, 1997).

Over the decades, the growing interest in this subject among authors has led to many different empirical studies which try and contrast the hypotheses outlined above. Empirical research about the relation between CSR and FP dates back to 1972 in the studies by Moskowitz (1972) and Bragdon and Marlin (1972). Since then and from different viewpoints, several authors have reached the conclusion that there are positive effects from the CSR–FP relation, in some cases considering CSR as the independent variable (see Berrone, Surroca, & Tribo, 2007; Blanco, Guillamon-Saorin, & Guiral, 2013; Godfrey, Merrill, & Hansen, 2009; Hou, 2019; Mishra & Suar, 2010; Tang, Hull, & Rothenberg, 2012; Van der Lann, Van Ees, & Van Witteloostuijn, 2008; Wang & Choi, 2013), and in others as the dependent variable (see Brammer & Millington, 2005; Melo & Garrido-Morgado, 2012). There is also a trend for similar conclusions to be reached in meta-analysis studies (see Busch & Friede, 2018; Endrikat, Guenther, & Hoppe, 2014; Miras, Carrasco, & Escobar, 2015; Wang, Dou, & Jia, 2015).

There are many other authors, however, who conclude that there is a negative relation between CSR and FP (see Brammer, Brooks, & Pavelin, 2006; Lima, De Souza, & Vasconcellos, 2011; Makni, Francoeur, & Bellavance, 2009; Wang & Bansal, 2012), or do not appreciate significant relations between these variables. Once again, among the latter are those who consider CSR an independent variable (see Garcia-Castro, Ariño, & Canela, 2010; Mahoney & Roberts, 2007; Yang, Lin, & Chang, 2010), those who consider it dependent (see Chih, Chih, & Chen, 2010; Consolandi, Jaiswal-Dale, Poggiani, & Vercelli, 2009; Reverte, 2009), and even those who, based on bidirectional relations, do not obtain conclusive results in either sense (see Zhao &

Murrell, 2016) or find a negative association (Rodrigo, Duran, & Arenas, 2016).

Finally, Lu, Chau, Wang, and Pan (2014) have examined empirical studies of the CSR–FP relationship published in the decade between 2002 and 2011. They found that, despite the enormous amount of relevant studies, the CSR–FP nexus is still a line of research that remains inconclusive.

Given the high number of empirical studies, we have cited only some examples from the most relevant articles published in recent years. Current literature makes it evident that the CSR–FP relation is a subject which widely interests academics, and is one that generates huge controversy. To try and throw some light on this matter, this article presents an empirical study which is innovative both in its definition of CSR and how it calculates profitability through a new methodology that will permit quantification of the value contributed to companies that opt for CSR.

As indicated by Junkus and Berry (2015), in most of the previous studies, the measures used for measuring socially responsible behaviors are qualitative and usually based on reports drawn up by the companies themselves, which makes them considerably less objective. In view of the above comments, a new focus is proposed. This article takes IQNet SR10 certification as reference of CSR.

Alcaide, De la Poza, and Guadalajara (2019) highlight the importance of standards to measure and disseminate companies' CSR actions. The requirements of a CSR management system according to the IQNet SR10 standard are based on the principles and recommendations of the ISO 26000 international standard, which has the express support of the European Commission (2011). However, the IQNet SR10 standard has the added advantage that it is certifiable by a technically competent, reliable and above all independent entity, and thereby redresses one of the main criticisms of the ISO 26000, which is not (Delchet-Cochet & Vo, 2013; Gonzalez, Sarkis, & Adenso-Diaz, 2008; Moratis & Cochiuș, 2011; Moratis & Tatang, 2014; Zinenko, Rovira, & Montiel, 2015).

The measurement of CSR through IQNet SR10 certification is a completely new approach to the subject of this study. On the Web of Science, there is only one paper, by Arimany and Sabata (2018), which focuses on this certification. Our paper, however, contains substantial differences. These authors used an exploratory study of items of social responsibility management system certification to develop a qualitative questionnaire. The questionnaire was administered to just one company and the findings describe how IQNet SR10 certification benefits a company.

Our study is also innovative in the method used for quantifying FP. Due to an increase in business transfer and an interest in setting goals in terms of value, business valuation has become increasingly significant for companies. In this respect and regardless of the method chosen, business valuation involves considering different accounting and financial aspects, and therefore surpasses other possible measures of FP. For this reason, the FP measure we have used is the value that IQNet SR10 certification contributes to a company. However, it is only possible to contemplate the estimation process for valuating a company by accepting that

the conditions of uncertainty and subjectivity in the valuations unequivocally determine the reliability of the information obtained. The valuation process involves not only the uncertain nature of the variables that appear in the assessment processes, but also an evident measure of subjectivity in the valuation itself. All these inaccuracies denote that most of the estimations carried out will be controversial, regardless of the method chosen to assess the business (Brotos & Sansalvador, 2018). Fuzzy logic provides a natural conceptual framework for knowledge representation and inference from knowledge bases that are imprecise, incomplete, or not totally reliable (Zadeh, 1983). For this reason, it can be seen as an adequate reference framework that sustains the design of models which permit business valuation.

Although the approaches proposed in this study are completely different, other authors have used Fuzzy methodologies to directly or indirectly study the relation between socially responsible strategies and the FP of organizations. Baeza-Sampere, Coll-Serrano, M'Zali, and Mendez-Rodríguez (2016) used a fuzzy DEA model for evaluating the efficiency of socially responsible and conventional mutual funds. Khan, Ali, Olya, Zulqarnain, and Khan (2018) used a fuzzy set qualitative comparative analysis (fsQCA) to examine the relationship between CSR, transformational leadership, and performance. Also using fsQCA, Rothenhoefer (2019) investigates the connection between CSR and corporate reputation. Rivera, Muñoz, and Moneva (2017) used fuzzy inference systems to measure sustainability management, providing empirical evidence about the social and FP relationship in the long run.

The study of the relation between CSR and FP is not new, but our approach toward this subject is innovative for the following three reasons: first, the measure used for measuring CSR is based on IQNet SR10 certification; second, the measure used for measuring FP is based on business valuation; third, we develop a new methodology which financially quantifies the value contributed to companies that are committed to CSR. This methodology takes into account size and company sector, and it also includes the subjectivity implicit in any FP measure in its formal approaches, so the application of fuzzy logic is very useful.

## 2 | METHODS

Two different valuations will be made for each company: the first considers that the company has obtained IQNet SR10 certification, and the second assumes that the company has not obtained it. In this way, it is possible to appreciate the variation that occurs in the value of the organizations as a consequence of CSR certification.

The discounted cash flow (CF) method is used as the valuation method of the companies. It is a widely used methodology but does present a high level of subjectivity, so the use of fuzzy logic is very useful. Other authors have previously made use of fuzzy logic for discounted CF. For example, Perrone and Noto La Diega (1999) use the current net values in a climate of uncertainty and analyze the suitability of their approach through triangular fuzzy numbers (TFNs). On

the other hand, Yao, Chen, and Lin (2005) extend the classic discounted CF model introducing vague discount, growth, and CF rates for valuing a company. In turn, Tsao (2012) presents a series of algorithms for evaluating capital investment in a random and uncertain climate.

### 2.1 | Valuation of the company under the premise of IQNet SR10 certification

As mentioned above, the theoretical model used for the valuation of companies is the discounted CF method, where according to financial theory the value of a company ( $V_0$ ) can be expressed as the company's future CF discounted at the interest rate "i." The application of the discounted free CF method contemplates a time frame of 5 years, on which different growth assumptions will be made according to the cases, and a residual period, on which a growth rate of constant CF will be applied for all assumptions ( $g$ ).

$$V_0 = \sum_{t=1}^5 \frac{CF_t}{(1+i)^t} + \frac{CF_5(1+g)}{(1+i)^5(i-g)} \quad (1)$$

Therefore, it will first be necessary to calculate the net amount of the company's revenue for the coming financial years. This will make it possible to project the profit and loss accounts for future financial years, and thereby obtain CFs. Afterward, the discount rate to be applied will be determined, and finally the valuation of the company under the premise of IQNet SR10 certification will be obtained.

#### 2.1.1 | Estimation of net CF

In order to proceed with the estimation of net amount of business revenue which permits determining net CF, it is necessary to establish a priori the growth rates to be considered. For Expression (1), two different growth rates are considered:

1. *Growth rate for the so-called time horizon:* The growth rate used for the time horizon, which in our case is 5 years, is the rate maintained by each company after obtaining the IQNet SR10 certificate.
2. *Growth rate for the residual period:* According to Casanovas (2009), the long-term growth rate of the company cannot be higher than the growth of the country's gross national product (GNP). For this reason, and as a precautionary measure, 50% of the growth of this variable in recent years is considered.

Once the growth rate in sales is obtained, the expected sales for each year are determined based on the net revenue from past year. Next, the profit and loss account is generated through the estimation of the rest of the items grouped as materials, personal

expenses, depreciation and amortization, other costs and FP. These estimations are reached by using regressions between the different items and net revenue based on the existing historical data for each company. In this way, it is possible to obtain the expected annual results for the different companies. Finally, the expected CF is obtained by adding amortizations to the company's revenue.

### 2.1.2 | Estimation of discount rates

The discount rate applicable is risk-free interest plus a discount premium. Risk-free interest is estimated using the interest rate on Spanish 10-year bonds, while the risk premium is situated between 4.2 and 8.5% as indicated by different authors like Siegel (2005), Dimson, Marsh, and Staunton (2007) or Aguirreamalloa and Corres (2011) among others. As there is dispersion, by considering the risk premium through a TFN this will make the final results consistent. When the information is uncertain, it can be represented in either confident intervals or fuzzy numbers. The latter gives more information because it provides the membership degree. Among the different kinds of fuzzy numbers, TFNs are the most used because they are more intuitive and easier to understand and compute, especially for nonexperts.

A TFN (Figure 1) is expressed by three real numbers ( $a, b, c$ ), whose membership function  $\mu(x)$  is defined by,

$$\mu(x) = \begin{cases} \frac{x-a}{b-a} & a \leq x < b \\ \frac{c-x}{c-b} & b \leq x \leq c \\ 0 & \text{in other case} \end{cases} \quad (2)$$

A TFN indicates the range of values a variable can fluctuate between, with  $a$  and  $c$  being the minimum and maximum values, and  $b$  the most possible value. The membership function indicates the possibility assigned to each value. In this case, the TFN discount rate is obtained by adding risk free interest to the TFN risk premium.

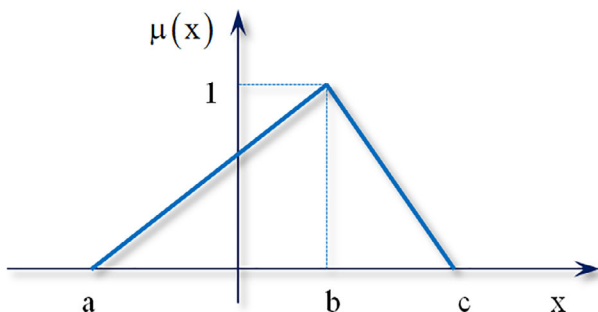


FIGURE 1 Triangular fuzzy number (TFN)

### 2.1.3 | Valuation of the company

According to Expression (1), the discounted CF estimated at the considered discount rate allows us to obtain the company's value. The result obtained is a TFN that can be defuzzified by any of the known methods. It is necessary to be aware that the results obtained are fuzzy numbers that do not necessarily conserve their original form. With respect to this, Terceño, Márquez, and Barbera (1995) and Perrone and Noto La Diega (1999) showed that the expressions of financial valuation of a set of equities (current value and final value) were correctly approximated with a TFN when the interest rates used were TFN and equities were real numbers.

### 2.2 | Valuation of the company under the premise of no IQNet SR10 certification

Once again we are dealing with the valuation of each company, but now under the assumption of not having IQNet SR10 certification. As it is based on a premise, the estimation of the growth rate of sales entails a high level of subjectivity. For this reason, two factors will be taken into account: the growth rates of the companies in the period when the social responsibility standard had not been implemented and the evolution of the sector that each company belongs to. However, only companies of a similar size are considered, and comparisons are between companies from the same quartile. By using TFN, it is possible to deal adequately with each company's forecasts as well as the information corresponding to the sector.

As it is difficult to estimate what the variation in the revenue would be under the new premise, the TFN growth rate is constructed as follows:

- **Central value:** based on the mean of the company's net revenue growth from the last financial years before obtaining the IQNet SR10 certificate. Added to this figure is the variation in net revenue growth for the whole of the sector that does not have the IQNet SR10 certificate, measured through the median, between the year the IQNet SR10 certificate was obtained and the last year for which there is information available. This central TFN value represents the most possible value that can be reached.
- **Minimum value:** this is to determine the behavior of the company in the worst scenario. The worst scenario is considered to occur on account of the behavior of the worst part of the sector that does not have IQNet SR10 certification. In order to avoid excessive distortions of the extreme values, the growth rates are given in ascending order and the value corresponding to the fourth quartile of the chosen companies (in the same sector and with similar size) is taken.
- **Maximum value:** this is to determine the behavior of the company in the best scenario. This behavior is understood as that of the best companies of the sector that do not have IQNet SR10 certification. In order to avoid distortion of extreme values in this case, the value

corresponding to the first quartile of the chosen companies is taken.

Based on these three scenarios, it is possible to construct a TFN corresponding to the net figure of estimated sales. As in Section 2.1, the next step is to generate the profit and loss account through the estimation of the rest of the items grouped as materials, personal expenses, depreciation and amortization, other expenses, and FP. Once again, these estimations, obtained from the regressions between the different items and the net sales figure, make it possible to determine expected annual results.

The repetition of this procedure for each of the extremes facilitates obtaining the TFN net profit and loss for the financial year, based on which, and after incorporating amortizations, the company's TFN CF will then be obtained.

As with the premise of IQNet SR10 certification, the final value of the company will be obtained by discounting expected CF for the time horizon and the residual period in each of the three scenarios considered. In order not to undermine the results, the same discount rates will be considered as in the previous section. Once again, the final result obtained will be a TFN, which can be defuzzified by any of the known methods. The comparison of this value with the one obtained in Section 2.1 enables us to appreciate the contribution of IQNet SR10 certification to the value of the company.

### 2.3 | Statistical analysis

First, to analyze whether IQNet SR10 certification of CSR improves the value of businesses, the contrast of fuzzy hypothesis based on Wu methodology (2005) will be used. In addition, a fuzzy ANOVA (Wu, 2007) will be performed to analyze if there are any differences in the firms' value according to size or sector after obtaining the IQNet SR10 certificate. The increment of the company's value is imprecise and is expressed as a fuzzy variable, which can be considered as random because the extremes are random variables. A statistical hypothesis test and a variance analysis for fuzzy data will be applied because it will be useful to apply statistical techniques to process the imprecise data. These methodologies improve the traditional methodology for real-valued data, by considering h-levels and introducing optimistic and pessimistic degrees. This will therefore help us to accept or reject the null and alternative hypothesis with respect to the pessimistic and optimistic degrees.

## 3 | EMPIRICAL STUDY AND RESULTS

Since our aim is to quantify the value that IQNet SR10 certification contributes to Spanish companies, the first step consisted in selecting sample companies. To do so, it was essential to obtain the registrations from the IQNet database. The International Certification Network is the world's largest network of leading certification bodies.

**TABLE 1** Information about companies included in the sample (net sales in euros)

Company	Year of certification	Sector	Net sales (2017)
1	2016	4120	227,535,512
2	2014	2444	1,790,595,000
3	2015	4939	12,746,045
4	2012	7490	10,644,058
5	2011	4120	20,025,920
6	2015	4399	2,442,823
7	2015	1812	10,396,000
8	2016	8020	67,718,339
9	2016	6202	3,102,684
10	2012	4931	43,061,139
11	2016	4321	36,906,639
12	2014	4120	11,722,167
13	2015	2042	17,718,123
14	2014	7430	4,886,755
15	2016	6201	6,399,970
16	2016	1320	13,893,816
17	2015	8129	33,661,294
18	2016	4299	37,852,367
19	2014	4931	63,099,144
20	2014	8121	10,302,448
21	2016	6910	547,142
22	2016	2790	64,039,000
23	2016	2899	6,948,856
24	2013	0.161	746,284
25	2011	3250	4,211,586
26	2011	3821	108,911,001
37	2011	4120	9,702,036
38	2011	1102	138,878,194
29	2011	6311	743,946
30	2011	2825	60,139,136
31	2016	6201	3,712,757

However, as not all companies need to file their annual accounts with the Company Registry, and considering that projections require minimum account information, the sample frame was finally established as the group of Spanish companies with IQNet SR10 certificate on December 31, 2016 that had filed their annual accounts for at least 2 years subsequent to the date of certification. Only 31 organizations met the restrictions, and consequently, all of them were included in the representative sample.

For a better knowledge of the companies included in the sample, Table 1 shows the year of IQNet SR10 certification, the net sales for 2017, and the business sectors (more specifically the NACE Rev. 2 codes, the latest version of the most important statistical classification of economic activities in the European Union).

**TABLE 2** Growth rates used for the valuation of the companies under the assumption of IQNet SR10 certification and noncertification

Certification IQNet SR10				Noncertification IQNet SR10		
Company id	Growth rate	Annual growth rate (before certification)	Sector annual growth (after certification)	Lower end (a)	Central point (b)	Upper end (c)
1	2.52	-7.27	9.77	-1.28	-1.28	14.91
2	-1.43	1.04	-2.18	5.65	5.65	9.14
3	-1.48	0.47	4.60	-0.22	0.47	9.14
4	4.60	-0.22	0.52	-2.78	-0.22	3.63
5	-5.73	17.64	-23.50	-15.82	-0.27	-0.27
7	22.93	8.15	6.96	-2.62	8.15	9.89
8	1.94	-0.23	9.24	-2.09	-0.23	4.27
9	11.98	16.63	5.02	-2.09	4.27	4.27
10	12.09	3.01	7.03	3.65	3.65	11.65
11	2.41	10.59	3.54	-1.87	1.17	1.17
12	5.56	-6.19	7.41	2.57	2.57	12.79
13	14.07	-11.16	20.70	-1.28	-1.28	14.91
14	1.60	-2.61	11.16	1.88	1.88	7.30
16	25.83	37.29	27.67	4.86	12.14	12.14
17	28.05	33.09	6.95	3.24	9.80	9.80
18	6.31	-10.75	1.58	-0.71	-0.71	6.18
19	-0.01	-0.67	7.52	0.66	0.66	5.38
20	5.33	0.46	7.20	-3.39	0.46	12.17
21	1.02	1.70	3.39	-0.21	1.70	2.43
22	15.46	-2.16	5.32	-0.30	-0.30	3.90
23	3.69	-4.58	3.05	0.21	0.21	6.36
24	2.84	3.58	3.05	2.51	3.58	9.99
25	-7.53	-3.29	6.14	0.47	0.47	9.58
26	-5.53	16.55	20.93	1.97	10.63	10.63
27	-3.02	-4.17	2.82	-1.32	-1.32	3.48
28	2.14	3.80	-1.37	-5.26	3.36	3.36
31	-15.28	-11.35	-23.50	-15.82	-11.35	-0.27
32	15.07	-5.84	11.80	0.07	0.07	7.69
33	-8.84	-13.68	1.23	-2.63	-2.63	2.70
34	16.76	19.04	-3.18	-4.65	2.70	2.70
35	-7.53	-3.29	10.39	0.47	0.47	9.58

Table 2 reflects the growth rates used for the time horizon. Each company is valued under the assumption of IQNet SR10 certification using the mean variation rate of the company's revenue from the year the certificate was obtained.

Each company is valued under the assumption of not having IQNet SR10 certification using a TFN as the growth rate. These valuations are based on the average net sales for the years prior to obtaining certification corrected by the average variation of the sector from the year the certificate was awarded up to the target year of the valuation. The lower and upper extremes of the TFN are the averages of the fourth and first quartiles respectively of the variation rate for company sector (see Columns 5 and 7 of Table 2). The central value of this TFN is given in the sixth column of Table 2 and is obtained

from the variation rate of the company's net sales figure for the period immediately prior to certification (third column of Table 2). It should be noted that the averages for the sector are obtained by selecting organizations of a similar size to each of the companies that make up the sample, making sure that the distinction between small, median, and large is respected according to Commission Regulation (EU) no. 651/2014.

As the average variance of the GNP in Spain has been 3.50% since 1961, the growth rate in the residual period is taken at 1.75%.

According to the proposed methodology, the value of each company is estimated under both premises: with and without IQNet SR10 certification. In the first assumption, with certification, for the time horizon net sales are obtained as a crisp value. However, for

**TABLE 3** Estimated net CFs for companies (values in euros)

Company	With certification	Without FSC certification			Year of estimation
		Pessimistic	Base	Optimistic	
1	191,762,033	180,184,643	180,184,643	209,723,772	2018
2	1,717,065,389	1,883,413,640	1,883,413,640	1,945,605,106	2018
3	11,141,754	11,874,209	11,956,995	12,988,333	2018
4	7,162,671	5,853,831	6,007,952	6,240,086	2016
5	15,850,097	12,983,739	15,383,426	15,383,426	2015
6	1,610,107	970,826	1,078,198	1,095,573	2018
7	5,965,303	6,049,244	6,164,424	6,442,354	2018
8	73,166,052	63,998,028	68,156,936	68,156,936	2018
9	2,278,514	1,709,863	1,709,863	1,841,787	2018
10	40,105,965	37,272,734	38,424,985	38,424,985	2016
11	33,528,793	29,984,854	29,984,854	32,972,806	2018
12	10,754,329	7,624,200	7,624,200	8,874,097	2018
13	13,350,310	13,782,275	13,782,275	14,515,600	2018
14	5,413,964	2,896,346	3,097,324	3,097,324	2018
15	6,673,708	4,688,229	4,986,473	4,986,473	2018
16	13,208,556	10,373,064	10,373,064	11,092,350	2018
17	33,515,458	36,149,920	36,149,920	37,845,633	2018
18	45,246,977	43,631,796	45,370,966	50,658,179	2018
19	32,381,486	32,081,197	32,697,852	32,932,682	2018
20	9,772,874	5,789,951	5,789,951	6,034,105	2018
21	390,754	318,696	318,696	338,249	2018
22	67,638,203	67,670,420	68,373,146	72,604,669	2018
23	10,557,189	15,024,094	15,024,094	16,386,776	2018
24	758,865	1,179,605	1,279,837	1,279,837	2017
25	3,543,575	4,071,581	4,071,581	4,269,359	2015
26	88,404,434	75,934,253	82,843,748	82,843,748	2015
37	6,697,332	8,573,217	9,028,733	10,157,741	2015
38	77,752,866	54,674,912	54,674,912	58,838,668	2015
29	795,254	1,138,658	1,138,658	1,201,036	2015
30	32,174,721	16,004,252	17,236,601	17,236,601	2015
31	10,557,189	15,626,257	15,626,257	17,043,555	2018

Abbreviation: CF, cash flow.

the second assumption, with greater uncertainty, net sales are considered as a TFN. Once net sales have been obtained, the rest of the magnitudes of the profit and loss account are estimated using regressions.

Table 3 shows the estimated net CFs for the first year under the assumption of certification and noncertification. For the second assumption, the lower and upper ends, and the central point of the TFN are shown. The valuations are those made 3 years after obtaining the certificate. Consequently, as each company obtained the certificate on a different date, Table 3 indicates the year the estimations correspond to.

To obtain the company value, according to Expression (1), net CFs obtained in Table 3 have been discounted. For this purpose, risk-

**TABLE 4** Discount rate used in percentages

	Optimistic	Base	Pessimistic
Risk premium	5.35	6.35	7.35
Risk free interest (December 29, 2017)	1.51	1.51	1.51
Discount rate	6.86	7.86	8.86

free interest is estimated using the interest rate on Spanish 10-year bonds for the date December 29, 2017 (Bank of Spain, 2019) plus a risk premium. For the risk premium, a range of  $\pm 1\%$  has been



**TABLE 5** Valuations of the companies with and without IQNet SR10 certificate and variation percentage

Company	Value with certificate	Value without certificate	Variation (%)
1	160,921,211	131,534,787	22
2	176,762,348	48,874,578	262
3	31,185,437	43,443,214	-28
4	13,276,249	8,343,300	59
5	5,035,366	6,189,628	-19
6	5,286,604	882,727	499
7	21,123,675	12,387,100	71
8	3,753,793	5,125,378	-27
9	9,660,050	8,645,387	12
10	183,646,685	138,947,173	32
11	47,858,400	42,708,355	12
12	30,504,326	9,535,600	220
13	14,713,926	18,003,547	-18
14	44,960,607	7,711,070	483
15	28,078,555	11,479,969	145
16	27,625,335	11,600,005	138
17	38,574,455	166,768,551	-77
18	49,963,317	44,270,694	13
19	55,816,830	47,642,652	17
20	7,006,568	2,929,882	139
21	101,204	188,881	-46
22	220,673,816	177,024,896	25
23	10,049,194	27,400,051	-63
24	693,713	615,114	13
25	2,499,059	3,443,385	-27
26	409,864,797	330,065,339	24
37	660,458	2,598,789	-75
38	573,088,990	332,774,424	72
29	-8,367,107	-1,002,788	734
30	83,677,216	26,711,316	213
31	10,049,194	28,606,193	-65

considered for optimistic and pessimistic values. Table 4 shows the risk premium and the discount rate ranges.

Since the results obtained are given as a TFN, they have been defuzzified using center of gravity. The defuzzified result for each company is shown in Table 5, where the value that CSR certification yields for each organization can be approximated by the differences between the valuation of the company with IQNet SR10 certification (second column) or noncertification (third column). The last column gives the variation in the value of each company as consequence of IQNet SR10 certification.

As can be seen in Table 5, IQNet SR10 certification increases the value of businesses in 21 of the 31 cases analyzed, which represents 67.74%. In this sense, a first examination of the results seems to support the conclusions reached by the authors cited in the introduction

that considered CSR as an independent variable and highlighted the positive effects of the CSR-FP relation.

Several authors are of the opinion that in small companies CSR is implemented differently to large companies because of the obstacles they come up against, (Ciliberti, Pontrandolfo, & Scozzi, 2008; Fitjar, 2011; Jenkins, 2009; Sweeney, 2007). Authors like Orlitzky and Benjamin (2001), Moore (2001) or more recently Nelling and Webb (2009), Arora and Dharwadkar (2011) and Charlo et al. (2017) find greater social responsibility in larger companies. D'Amato and Falivena (2019) show that the relationship between CSR and firm value is moderated by firm size. Agudo, Garcés, and Salvador (2012) find a positive relation between the firm's size and its level of social performance. In this sense, Van Beurden and Gössling (2008) and Chieh-Tse (2018) conclude that company size is a factor that influences the positive relation they observed between corporate social performance and FP. Size is therefore a variable that should be present when analyzing the results.

The grouping of the sample companies by size in line with EU Commission Regulation no. 651/2014 gives a total of 8 large, 12 median, and 11 small firms. IQNet SR10 certification increases business value in 87.5% of the large companies, 66.6% of the median companies, and 54.5% in small companies.

This first outline of the results seems to indicate that there is a positive relation between certification and an increase in business value, especially in larger companies.

Another possible variable to consider is company sector. Klassen and McLaughlin (1996) were the first to explain the moderating effect of sector on the CSR-FP relation. Since then other authors have concluded that since each industry operates in a different context with different environmental, social and financial concerns, the nature of the CSR-FP relation varies according to industry, (Baird, Geylani, & Roberts, 2012; Grewatsch & Kleindienst, 2017; Schreck, 2011). Friede, Busch, and Bassen (2015) carried out a complete bibliographical review of more than 2,000 empirical studies published since the 1970s. They concluded that there are positive relations, or at least not negative, between CSR and FP, although they are moderated by factors like business sector and geographical zone.

The sample firms in this study are grouped according to the classification of activities NACE Rev. 2. The most noteworthy group is the number of companies belonging to the manufacturing industry (nine companies, six of which experience increases in value), followed by those belonging to the construction sector, (seven companies, five of which experience increases in value). In all sectors, excepting the "administrative activities and auxiliary services" sector, there is a higher number of positive valuations than negative ones.

Nevertheless, academic rigor requires the results obtained to undergo a more in-depth statistical analysis. In order to obtain firmer conclusions, the contrast of fuzzy hypothesis based on the Wu methodology is used to contrast whether IQNet SR10 certification of CSR really increases the value of businesses.

**Hypothesis 1** The aim is to contrast the null hypothesis: The IQNet SR10 certificate does not alter the value of a company, as

opposed to the alternative hypothesis that the differences found are significant and consequently the IQNet SR10 certificate does alter the value of a company.

$$H_0 : \tilde{\mu} = 0$$

$$H_1 : \tilde{\mu} \neq 0$$

According to Wu (2005), since  $\bar{x} - \mu_0 = 1.80 > t_{30,0.05} \cdot S / \sqrt{31} = 0.47$ , we intend to accept  $\tilde{H}_1$  with some degrees. Now  $31 \cdot (t_{30,0.05} \cdot 1.53 / \sqrt{31} + 0) - \sum_{i=1}^{31} x_i^L = 31 \cdot (0.47 + 0) - 47.85 = -33.40 < 0$  we accept  $\tilde{H}_1$  at the level of significance 0.05 optimistically, since  $I(K_{\tilde{H}_1,0.05}) = 1$ .  $I(K_{\tilde{H}_1,0.05})$  means the total length of the set  $K_{\tilde{H}_1,0.05} = \{h : 0 \leq h \leq 1, x_h^L \geq \eta_{0.05}\}$ ,  $h \in [0, 1]$  being  $x_h^L = \frac{1}{31} \sum_{i=1}^{31} (\tilde{x}_i)_h^L - \text{core}(\tilde{\mu}_0)$  and  $\eta_{0.05} = z_{0.05} \cdot \sigma / \sqrt{31}$ . We have considered that  $\tilde{X}_1, \tilde{X}_2, \dots, \tilde{X}_n$  are independent and taken from the Gaussian fuzzy random variables  $N(\tilde{\mu}, \sigma)$ . According to Wu (2005),  $(\tilde{X}_1)_h^L, \dots, (\tilde{X}_n)_h^L$  and  $(\tilde{X}_1)_h^U, \dots, (\tilde{X}_n)_h^U$  are two random samples that are taken from  $N(\tilde{\mu}_h^L, \sigma)$  and  $N(\tilde{\mu}_h^U, \sigma)$ , respectively, for any fixed  $h \in [0, 1]$ . In this way, the notions of randomness and fuzziness are combined, since the significance level (0.05) comes from statistical concepts and the confidence level (1) is fuzzy.

Consequently, the study carried out affirms that IQNet SR10 certification of CSR increases the value of businesses. The results obtained are mostly consistent with the studies mentioned in the introductory section, one of which, by Rivera et al. (2017), particularly stands out for the use of fuzzy logic as well as focusing on Spanish companies. However, in their study, they only analyze listed companies and use a completely different methodology.

Additional aims are to contrast whether there are significant differences between companies according to size (Hypothesis 2) or according to sectors (Hypothesis 3). To do so, the fuzzy ANOVA methodology (Wu, 2007) is used.

**Hypothesis 2** The null hypothesis that the size of the company does not affect the influence of IQNet SR10 certification on the value of a company as opposed to the alternative hypothesis that Company size does affect it. The companies have been classified into large (L), median (M), and small (S).

$$H_0 : \tilde{\mu}_G = \tilde{\mu}_M = \tilde{\mu}_P = 0$$

$$H_1 : \text{not all } \mu_i \text{ are equal.}$$

To do so, following Wu (2007), this statistic is calculated

$$F^* = \frac{MSTR}{MSE} = \frac{SSTR/r-1}{SSE/n_T-r}$$

where MSTR stands for treatment mean square and MSE stands for error mean. SSTR is the treatment sum of squares, with  $r-1$  degrees

of freedom associated with it and SSE is the error sum of squares, with  $n_T-1$  degrees of freedom associated with it. The obtained results are  $SSTR = 1.58$  and  $SSE = 61.09$ .

According to the author, if  $\frac{SSTR}{r-1} = \frac{1.58}{3-1} = 0.79 < \frac{SSE}{n_T-r} = \frac{61.09}{31-3} = 2.18$ , we accept the null hypothesis  $\tilde{H}_0$  at the level of significance 0.05 with optimistic degree  $I(K_{\tilde{H}_0,0.05}) = 1$  and pessimistic degree  $h_{\tilde{H}_1} = 0$ . We can also conclude that we accept the null hypothesis  $\tilde{H}_0$  at the level of significance 0.05 with confidence degree  $\min\{I(K_{\tilde{H}_0}), 1 - h_{\tilde{H}_1}\} = \min(1, 1 - 0) = 1$ , being  $h_{\tilde{H}_1} = \sup\{h : 0 < h < 1, F_{h;\tilde{H}_1} \geq F_{1-0.05;3-1;31-3}\}$ . Consequently, and contrary to what one might think initially, it can be affirmed that business size does not affect the relation between IQNet SR10 certification and the value of firms. In many cases, the studies that relate CSR and FP assume a homogeneity principle of social awareness that does not exist in practice among investors (Beal, Goyen, & Phillips, 2005; Heinkel, Kraus, & Zechner, 2001) or among companies (Kim, 2010), where motivation varies from one to the other (Baron, 2001; Graafland & Schouten, 2012; Jenkins, 2009; Prajogo, Tang, & Lai, 2012). Although to date the specialized literature has not paid attention to the relation between IQNet SR10 certification and financial outcome, there are many studies that analyze how other voluntary certifications affect this result. The most relevant is ISO 9001 for quality management, which has been analyzed by several authors who conclude that internal motivation regarding certification decisively influences the final results obtained (Dick, Heras, & Casadesús, 2008; Feng, Terziovski, & Samson, 2008; Heras, Casadesus, & Marimon, 2011; Prajogo, 2011). With respect to CSR, Udayasankar (2008) points out that small companies can be as motivated as large companies to adopt initiatives that have positive results for their FP.

**Hypothesis 3** The aim is to analyze whether the business sector affects the increase in value that a company experiences as a consequence of IQNet SR10 certification. To do so, the null hypothesis that all the sectors have a similar increase in value as a result of having certification is contrasted to the alternative hypothesis that not all of them have a similar increase in value.

$$H_0 : \mu_1 = \mu_2 = \dots = \mu_n$$

$$H_1 : \text{not all are equal}$$

Likewise, in line with Wu (2007) if  $\frac{SSTR}{r-1} = \frac{7}{8-1} = 1 < \frac{SSE}{n_T-1} = \frac{56.75}{31-8} = 2.47$ , we accept the null hypothesis  $\tilde{H}_0$  at the level of significance  $\alpha$  with optimistic degree  $I(K_{\tilde{H}_0}) = 1$  and pessimistic degree  $h_{\tilde{H}_1} = 0.121$ . We can also conclude that we accept the null hypothesis  $\tilde{H}_0$  at the level of significance 0.05 with confidence degree  $\min\{I(K_{\tilde{H}_0}), 1 - h_{\tilde{H}_1}\} = \min(0.995, 1 - 0.121) = 0.879$ . Therefore, in line with other studies as Agudo et al. (2012) or Dixon-Fowler, Slater, Johnson, Ellstrand, and Romi (2013), it is possible to conclude that the business sector is not a determining factor in the relation between IQNet SR10 certification and the value that it contributes to companies.

## 4 | CONCLUSIONS

This study primarily aims to determine the increase in value that obtaining IQNet SR10 contributes to companies. This is done through the development of an innovative methodology underpinned by making two valuations for each organization, one under the hypothesis of certification and the other assuming there is no certification.

In both cases, the valuation has been carried out using the discounted CF method. Although this method is widely used for the valuation of companies its use involves a high level of uncertainty and subjectivity, both in the estimation of future CF and the type of interest to be used to discount it. Fuzzy logic is proposed to include this uncertainty. For the estimation of future CF, it is usual to differentiate a time horizon from a residual period. The former is the basis for establishing the main hypotheses regarding the evolution of the main magnitudes of the profit and loss accounts.

In determining the growth rate for the time horizon, TFN are used which include both the company's evolution in recent years and the evolution of the companies from the sector. Likewise, as the bibliography about the risk premium, and therefore, the discount rate to be used is very extensive, in order to adequately include all this information the use of fuzzy numbers is also recommended.

The value of each company thus obtained, considering both future CF and discount rate, is another TFN, whose minimum and maximum values indicate the company's range of values, with the central value being the one that presents a greater likelihood of occurring. Therefore, this method is not limited to a specific value, but offers us a range which the company's value moves within, also indicating likelihood of occurring. The defuzzification of these fuzzy numbers permits quantification of the company's value in each of the valuations carried out according to whether there is IQNet SR10 certification or not. Consequently, it makes it possible to approximate the contribution this certificate makes to the company's value.

The methodology proposed has been applied to Spanish companies who, having implemented the IQNet SR10 standard in social responsibility management, have been certified until 2016.

The results show that 67.74% of the companies analyzed increase their value as a result of having IQNet SR10 certification. After carrying out a contrast of fuzzy hypothesis based on the methodology by Wu (2005), it can be concluded that the IQNet SR10 certificate increase the value of businesses, with a significance of 5% and a confidence level of 1.

Subsequently, using the ANOVA fuzzy methodology (Wu, 2007), a contrast was made to determine if there were differences between companies according to size or sector. From the results, it can be concluded that neither size nor company sector affect the relation between IQNet SR10 certification and the value of businesses, with a significance of 5% and a confidence level of 1.

This article presents an original and innovative methodology to quantify the relation between CSR and FP, by estimating the contribution of IQNet SR10 certification to a company's value. However, the implications of the proposed method are beyond the goals of this

study. This methodology can be used in other studies to value other types of voluntary certifications, such as the ISO 14000 (environmental certifications) or the ISO 9001 (quality management certifications).

The contribution of the article to the existing literature lies in both the proposed methodology and the empirical study carried out. However, although the empirical study shows interesting conclusions, we are aware that it only considers Spanish companies. In this sense, we should point out that there are numerous researchers who have highlighted how national culture influences the CSR strategies developed in companies (Baughn, Bodie, & Mcintosh, 2007; Jamali & Mirshak, 2007; Ringov & Zollo, 2007; Svensson, Wood, Singh, Carasco, & Callaghan, 2009; Yong, 2008) which in turn affects the relation between CSR and FP. (Gray, Javad, Power, & Sinclair, 2001; Miras et al., 2015; Scholtens & Kang, 2013). Martínez-Ferrero and Frías-Aceituno (2015), using a sample from multiple developed countries, report that the positive bidirectional CSR-FP link is contingent on the institutional milieu in each location, and that sometimes it can be negative or nonsignificant. For this reason, we propose that future research should broaden the scope to include other geographical areas, and in addition, this will provide a larger population size because as Arimany and Sabata (2018) say, few companies currently have IQNet SR10 certification.

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