

CSR, agency costs and investment-cash flow sensitivity: a mediated moderation analysis

Mediated
moderation
analysis

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299

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Abstract

Purpose – The purpose of this paper is to document the relation between investment-cash flow sensitivity and a firm's engagement in corporate social responsibility (CSR) activities in European context. Specifically, this paper aims to empirically examine how CSR moderates the sensitivity between investment spending and firm internal funds.

Design/methodology/approach – The Euler equation technique approach is applied to test the sensitivity of investment to internally generated funds for a panel data set of 398 European companies listed in the STOXX Europe 600 during 2009-2014. Furthermore, a mediated moderation model is developed in order to examine the moderating role of CSR in the investment-cash flow sensitivity, as well as the mediating role of agency costs on the moderation effect of CSR.

Findings – The results show that CSR performance weakens the sensitivity of investment to internal funds; agency costs of free cash flow mediate the negative moderating effect of CSR on investment-cash flow sensitivity. Thus, this study demonstrates empirically that firms with socially responsible practices are better positioned to obtain financing in the capital markets through reducing market frictions as well as agency costs.

Practical implications – Firms are invited to engage more in CSR activities that reduce agency conflicts between management and shareholders.

Originality/value – The originality of this paper consists in proposing the establishment of both direct and indirect link between CSR and investment-cash flow sensitivity.

Keywords Corporate finance, Investment, Social responsibility, Europe, Cash flow

Paper type Research paper

1. Introduction

In imperfect markets, investment decisions of firm are dependent on its financial situation. If the capital markets' participants face significant uncertainty about firm's future prospects, the cost of external capital often exceeds the cost of internal financing. In this case, the investment can exhibit an excess of sensitivity to the firm's internally generated funds.

Fazzari *et al.* (1988) open the debate on the investment-cash flow sensitivity. Using a sample of US manufacturing firms, they document that investments undertaken by more financially constrained firms are more sensitive to the availability of internal funds. They implicitly conclude that investment-cash flow sensitivity is a good indicator of financial constraints. However, this research is criticized by Kaplan and Zingales (1997). They point out that there is no strong theoretical reason to expect such a conclusion. They indicate that the sensitivity is nothing more than an indicator of an increase in the set of positive net present value investment project. Cleary (1999, 2006) contributes to the FHP-KZ debate and shows that the least financially constrained firms face greater investment-cash flow sensitivity, which supports Kaplan and Zingales (1997). More recent contributions, such as Kim (2014), provide some factors which can explain the negative relationship between investment-cash flow and financial constraints. Kim (2014) confirms that the level of external financing and reserved cash holdings can partially explain the investment-cash flow sensitivity puzzle. He concludes that investment-cash flow sensitivity can be a proxy for at least a relative measure of financial constraints, if not an absolute measure.



To sum up, the existing literature confirms the positive relation between investment and cash flow. This sensitivity is observed because of the cost wedge between internal and external capital that gives rise to the financing constraints. The observed sensitivity can be attributed either to agency costs of free cash flow (FCF) (Jensen, 1986) or to asymmetric information problems (Stiglitz and Weiss, 1981; Myers and Majluf, 1984). Therefore, the factors which reduce capital market frictions can decrease investment-cash flow sensitivity (Ağca and Mozumdar, 2008). In this paper, we consider that corporate social responsibility (CSR) can be one of these factors.

Several papers have examined various beneficial aspects of CSR and have found evidence that CSR is associated with higher firm value (Waddock and Graves, 1997; Lin *et al.*, 2009), lower capital constraints (Cheng *et al.*, 2014), cheaper equity financing (El Ghouli *et al.*, 2011), lower cost of bank debt (Nandy and Lodh, 2012), improved information quality (Cho *et al.*, 2013) and reduced agency conflicts (Harjoto and Jo, 2011). Building on this stream of research, we investigate the mediated moderating role of CSR performance in the investment-cash flow sensitivity.

The main purpose of this paper is to document the relation between investment-cash flow sensitivity and a firm's engagement on CSR activities in European context. Specifically, we aim to empirically examine how CSR moderates the sensitivity between investment spending and firm internal funds. In other words, we aim to identify the mechanism through which better CSR performance contributes to lower investment-cash flow sensitivity.

To examine the sensitivity of investment to internally generated liquidity, we adopt the Euler equation technique approach (Bond and Meghir, 1994). We construct a panel data sets for non-financial listed companies in Europe STOXX 600, covering the period 2009-2014. Our first result shows that firms with superior CSR performance face lower investment-cash flow. Then, we empirically test the mediating role of agency costs in the moderating effect of CSR. We find that CSR performance can reduce investment-cash flow sensitivity through helping firms address agency problems.

We contribute to this literature by providing some support for the hypothesis that the presence of CSR facilitates the access to external financing, hence decreasing the reliance of a firm's investment on internal cash. The better access to capital is driven by reduced agency costs of FCF. We complement the work of Attig *et al.* (2014). While the latter investigate whether CSR performance affects investment-cash flow sensitivity, this study sheds light on how CSR performance moderates investment-cash flow sensitivity.

The remainder of the paper is organized as follows. Section 2 contains the literature review and hypothesis development. Section 3 describes in detail the research design with the sample, the models and measures of variables. Section 4 presents the empirical results. Section 5 offers discussions to our findings. Section 6 concludes the paper.

2. Previous literature and hypotheses development

2.1 The moderating effect of CSR

Prior researches confirm that investment can exhibit an excess of sensitivity to cash flow in many circumstances (Ağca and Mozumdar, 2008; Cleary, 1999; Cull *et al.*, 2015; Fazzari *et al.*, 1988; George *et al.*, 2011; Islam and Mozumdar, 2006; Kaplan and Zingales, 1997; Kim, 2014; Love, 2003). This can be explained in terms of restricted access to external finance. In other words, the wedge between the cost of internal and external capital gives rise to investment-cash flow sensitivity.

Several empirical studies have attempted to investigate whether the adoption of CSR activities affect the firm's ability to access finance in capital markets. Such as Cheng *et al.* (2014), who argue that the implementation of CSR strategies that leads to superior CSR performance results in lower idiosyncratic capital constraints, hence better access to funds. Consistent with this, Sharfman and Fernando (2008) point out that firms who develop a strategy that improves their environmental risk management are rewarded by

the financial markets. The latter accept lower risk premiums on equity which can result in reduced cost of capital. Nandy and Lodh (2012) establish that more eco-friendly firms, defined as firms with higher environment score get a more favorable loan contract than the firms with lower environment score. So, CSR can be a determinant of cost of bank debt. For their part, El Ghouli *et al.* (2011) show that firms with better CSR scores exhibit cheaper equity financing. This is especially true for companies that improve their responsible employee relations, environmental policies and product strategies. Dhaliwal *et al.* (2011) examine the benefit associated with the voluntary disclosure of CSR activities. They find that firms with superior social responsibility performance enjoy a reduction in the cost of equity capital, while attracting dedicated institutional investors and analyst coverage. Recently, Attig *et al.* (2014) focus on a sample of US firms and find that CSR performance lead to a decrease in investment-cash flow sensitivity. The effect of CSR is driven by the areas community, diversity and human rights.

Taken together, the discussion above suggests that CSR can reduce the wedge between the cost of internal and external funds, and in turn investment-cash flow sensitivity. According to these arguments, our first hypothesis is:

H1. CSR moderates the investment-cash flow sensitivity.

2.2 The mediating role of agency problems in the moderating effect of CSR

Market imperfection, as well as agency costs, can lead to investment-cash flow sensitivity. According to Jensen (1986), when the management's aim function does not reflect the shareholders' interests, investment inefficiency can occur due to agency conflicts between managers and shareholders. Pawlina and Renneboog (2005) provide strong support for the FCF theory as the main source of the observed investment-cash flow sensitivity. In a similar vein, Andr n and Jankensg rd (2015) examine the differential role of cash flow to investment systematically across different types of firms, when capital becomes abundant. They conclude that the investment-cash flow sensitivity for large firms increase in the abundance period, suggesting that this relationship is driven by agency problems related to FCF. Using different firm-level proxies for agency problems (such as ownership concentration, firm size, etc.) Degryse and De Jong (2006), Goergen and Renneboog (2001), Hadlock (1998), Kathuria and Mueller (1995), Vogt (1994) and Schaller (1993) provide substantial evidence that indicates that firms' investment-cash flow sensitivity varies with the level of agency problems.

The conflict resolution view suggests that CSR investments are made to resolve the conflicts among various stakeholders. The adoption and implementation of CSR strategies limits the amount of FCF available which can be used by self-interested managers to undertake non-value adding projects (Jensen, 1986). Recently, a line of research has been developed on the relation between CSR activities and agency problems. Borghesi *et al.* (2014) investigate the factors that spur firms to make socially responsible investments. They find that firms with greater FCF demonstrate a higher level of CSR. Harjoto and Jo (2011) provide adding support that firms use governance mechanisms, along with CSR engagement, to reduce conflicts of interest between managers and non-investing stakeholders. Benabou and Tirole (2010) and Eccles *et al.* (2012) argue that high sustainability companies are more likely to establish a formal stakeholder engagement process which limits the likelihood of short-term opportunistic behavior.

Based on this discussion, we postulate that the negative impact of CSR on investment-cash flow sensitivity may be realized through mitigating agency costs of FCF. Cheng *et al.* (2014) reveal that firms with superior CSR performance have better access to capital because of reduced agency costs resulting from more effective stakeholder engagement. Stated formally, as shown in Figure 1, we hypothesize that:

H2. Agency costs mediate the negative moderating effect of CSR on the investment-cash flow sensitivity.

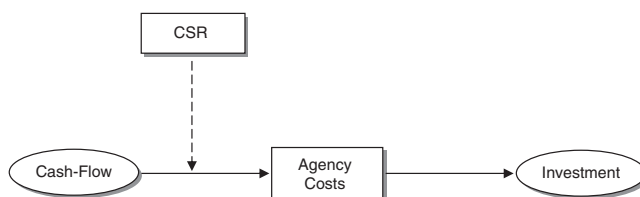
3. Research design

3.1 Data and sample selection

The sample in this study consists of European companies listed in STOXX 600 index between 2009 and 2014. The sample includes 15 supersectors and 18 countries. Firms in the financial sector, such as banks and insurance companies, are discarded from the study. We drop also firms with missing data. The final panel covers 398 firms, which corresponds to 2,388 firm-year observations. Table I summarizes the sample composition. Panel A presents the distribution of firms across sectors. Three sectors, industrials, consumer goods and consumer services represent a large portion of the total number of firms, although the remaining sectors are also populated. Panel B presents the distribution of firms across countries. Approximately 60 percent of the sample originates from UK, France, Germany and Switzerland.

For our empirical analysis, we use the database Datastream to compute firms' investment, cash flow and other financial information. Data concerning CSR performance derive from Thomson Reuters-ASSET 4. ASEET 4, a Thomson Reuters business, provides objective and systematic environmental, social and governance information to professional investors who are interested in integrating social responsibility features into their investment decisions.

Figure 1.
Research model



Panel A. Sample distribution across sectors

ICB code	Industry	<i>n</i>	%
0001	Oil and gas	22	5.53
1000	Basic materials	41	10.30
2000	Industrials	114	28.64
3000	Consumer goods	63	15.83
4000	Health care	32	8.04
5000	Consumer services	64	16.08
6000	Telecommunications	18	4.52
7000	Utilities	24	6.03
9000	Technology	20	5.03
	Total	398	100

Panel B. Sample distribution across countries

Country	<i>n</i>	%	Country	<i>n</i>	%
Austria	3	0.75	Italy	16	4.02
Belgium	9	2.26	Luxembourg	2	0.50
Czech	1	0.25	The Netherlands	19	4.77
Denmark	13	3.27	Norway	10	2.51
Finland	14	3.52	Portugal	3	0.75
France	62	15.58	Spain	16	4.02
Germany	44	11.06	Sweden	25	6.28
Greece	2	0.50	Switzerland	30	7.54
Ireland	5	1.26	UK	124	31.16

Table I.
Sample composition

3.2 Model specification

As Chen *et al.* (2013) and George *et al.* (2011), our point of departure in the multivariate analysis is the following Euler equation model for estimating investment-cash flow sensitivity:

$$\left(\frac{I}{K}\right)_{i,t} = \alpha_1 \left(\frac{S}{K}\right)_{i,t-1} + \alpha_2 \left(\frac{CF}{K}\right)_{i,t-1} + \alpha_3 \left(\frac{I}{K}\right)_{i,t-1} + \alpha_4 \left(\frac{I}{K}\right)_{i,t-1}^2 + \alpha_5 \left(\frac{D}{K}\right)_{i,t-1}^2 + \beta_i + \beta_t + \varepsilon_{i,t} \quad (1)$$

where I is the investment in fixed assets; K the capital stock; S represents total sales; CF stands for the cash-flow; D represents total debt; β_i the firm fixed effects; β_t the period fixed effects and ε is an error term.

To examine the impact of CSR performance on the sensitivity of investment to cash flow, we extend the previous analysis and include an interaction effect between CF and CSR . Specifically, our main regression is:

$$\begin{aligned} \left(\frac{I}{K}\right)_{i,t} = & \alpha_1 \left(\frac{S}{K}\right)_{i,t-1} + \alpha_2 \left(\frac{CF}{K}\right)_{i,t-1} + \alpha_3 CSR_{i,t} + \alpha_4 CSR_{i,t} \times \left(\frac{CF}{K}\right)_{i,t-1} \\ & + \alpha_5 \left(\frac{I}{K}\right)_{i,t-1} + \alpha_6 \left(\frac{I}{K}\right)_{i,t-1}^2 + \alpha_7 \left(\frac{D}{K}\right)_{i,t-1}^2 + \beta_i + \beta_t + \varepsilon_{i,t} \end{aligned} \quad (2)$$

In this equation, the coefficient α_2 reflects the investment-cash flow relationship and is expected to be positive. According to our hypothesis, firms with better CSR performance face lower investment-cash flow sensitivity. In this case, the regression coefficient α_4 should be negative.

We construct an aggregated CSR index by using the annual environmental, social and corporate governance scores obtained from Thomson Reuters-ASSET 4. In the absence of theoretical guidance about how to weight each measure, we follow the convention established by Sharfman (1996), Waddock and Graves (1997). We assign equal importance to each of the three pillars. Thus, the variable CSR is the equally weighted average of the environmental, the social and the governance score for each focal firm for every year.

CSR index reflects a balanced view of a company's performance in these three areas. In fact, the corporate governance pillar measures a company's systems and processes, which ensure that its board members and executives act in the best interests of its long term shareholders. The social pillar measures a company's capacity to generate trust and loyalty with its workforce, customers and society, through its use of best management practices. The environmental pillar measures a company's impact on living and non-living natural systems, including the air, land and water, as well as complete ecosystems.

The application of standard panel data methods such as the ordinary least squares method to estimating model (1) is problematic due to the presence of an explanatory lagged dependent variable and a fixed effect. Since we want to ensure that our results are free from any estimation bias, we apply the instrumental variables estimation procedure. Similar to prior studies, we use previous year's values as instruments to control for endogeneity resulting from the lagged dependent variable. All estimations in this study use the STATA program.

$H2$ is tested using the mediated moderation procedure outlined by Baron and Kenny (1986) and Muller *et al.* (2005). At a first stage, the dependent variable is regressed on the independent variable, the moderator and their product-term. At the second stage, the mediator is regressed on the independent variable, the moderator and their product-term. Finally, the dependent variable is regressed on the independent variable, the moderator, their product-term and the mediator. Therefore, to test our second hypothesis, we formulate

the conceptual framework as the following three models:

$$\begin{aligned} \left(\frac{I}{K}\right)_{i,t} = & \alpha_1 \left(\frac{S}{K}\right)_{i,t-1} + \alpha_2 \left(\frac{CF}{K}\right)_{i,t-1} + \alpha_3 \text{CSR}_{i,t} + \alpha_4 \text{CSR}_{i,t} \times \left(\frac{CF}{K}\right)_{i,t-1} \\ & + \alpha_5 \left(\frac{I}{K}\right)_{i,t-1} + \alpha_6 \left(\frac{I}{K}\right)_{i,t-1}^2 + \alpha_7 \left(\frac{D}{K}\right)_{i,t-1}^2 + \beta_i + \beta_t + \varepsilon_{i,t} \end{aligned} \quad (3)$$

$$\text{FCF}_{i,t} = \alpha_1 \left(\frac{CF}{K}\right)_{i,t-1} + \alpha_2 \text{CSR}_{i,t} + \alpha_3 \text{CSR}_{i,t} \times \left(\frac{CF}{K}\right)_{i,t-1} + \beta_i + \beta_t + \varepsilon_{i,t} \quad (4)$$

$$\begin{aligned} \left(\frac{I}{K}\right)_{i,t} = & \alpha_1 \left(\frac{S}{K}\right)_{i,t-1} + \alpha_2 \left(\frac{CF}{K}\right)_{i,t-1} + \alpha_3 \text{CSR}_{i,t} + \alpha_4 \text{CSR}_{i,t} \times \left(\frac{CF}{K}\right)_{i,t-1} \\ & + \alpha_5 \text{FCF}_{i,t} + \alpha_6 \left(\frac{I}{K}\right)_{i,t-1} + \alpha_7 \left(\frac{I}{K}\right)_{i,t-1}^2 + \alpha_8 \left(\frac{D}{K}\right)_{i,t-1}^2 + \beta_i + \beta_t + \varepsilon_{i,t} \end{aligned} \quad (5)$$

Motivated by Chi and Scott Lee (2010), we use the FCF as a proxy for agency costs. Conflicts of interest between managers and shareholders are especially severe when the company generates substantial FCF (Jensen, 1986). Specifically, the availability of FCF under management control will induce them to invest in non-value-maximizing projects, creating an over-investment problem and consequently increasing the costs incurred by shareholders.

Following Nekhili *et al.* (2009) and Chi and Scott Lee (2010), we employ the measurement established by Lehn and Poulsen (1989). Thus, the FCF is defined as operating income minus the sum of the following four components: income taxes, interest expenses on debt, common stock dividend and preferred stock dividend. We scale this FCF measure by the firm's book value of assets. All other variables are as defined earlier.

4. Results

4.1 Descriptive statistics

Table II provides descriptive statistics for the regression variables. Panel A presents descriptive statistics for the entire sample, including the mean, minimum, first quartile, median, third quartile, maximum and standard deviation. The mean value of I/K is 0.044 and the standard deviation is 0.037, implying that significant variation exists across firms regarding the investment they make. The CSR varies also significantly since the mean score is 72.684 and the standard deviation is 18.305. The firms in our sample have an average CF/K of 0.142 and a FCF of 0.034. Panel B presents the average values of the regression variables for each of the European countries represented in our sample. The country factor plays a role for many variables. In particular, CSR index is clearly different from one country to the next. The Finland shows the highest index with an average score of 80.534, followed by the Italy (79.491).

4.2 Regression results

Table III shows that the estimated coefficient of CF/K in model 1 is positive and significant ($\alpha = 0.0181$, $p < 1$ percent), suggesting that cash flow has a positive effect on investment. The result indicates that investment exhibits an excess of sensitivity to internal funds. This can be explained in terms of restricted access to external capital.

The second model, presented in Table III, seeks to analyze the interaction between the company's cash flow (CF/K) with the CSR performance (CSR). To this end, a new independent variable was included ($CF/K \times CSR$). Model 2 shows that the estimated coefficient of CF/K

Table II.
Descriptive statistics

Panel A. Summary statistics of the sample

Variable	Mean	Min	Q ₁	Median	Q ₃	Max	SD
I/K	0.0447	0.0000	0.0202	0.0343	0.0580	0.4042	0.0371
S/K	0.9157	0.0000	0.5517	0.7892	1.1172	4.3810	0.5830
CF/K	0.1422	-0.5671	0.0878	0.1234	0.1683	3.1918	0.1385
D/K	0.2504	0.0000	0.1416	0.2384	0.3504	1.2611	0.1575
CSR	72.6839	6.8567	65.4633	78.2800	86.0600	96.0833	18.3046
FCF	0.0342	-0.5103	0.0094	0.0311	0.0531	1.7229	0.0737

Panel B. Average value of variables across countries

Variable	I/K	S/K	CF/K	D/K	CSR	FCF
Austria	0.0598	1.0070	0.1087	0.2446	61.4137	0.0108
Belgium	0.0577	1.2200	0.1409	0.2938	77.9032	0.0126
Czech	0.0920	0.3478	0.1386	0.3042	52.3233	0.0083
Denmark	0.0433	0.8706	0.1737	0.2350	65.6598	0.0573
Finland	0.0402	0.9934	0.1197	0.2501	80.5340	0.0096
France	0.0419	0.7490	0.1092	0.2549	75.7315	0.0236
Germany	0.0497	0.8218	0.1248	0.2751	63.6410	0.0218
Greece	0.0435	1.7857	0.3271	0.2822	56.2646	0.0336
Ireland	0.0491	1.2053	0.1600	0.1596	62.7428	0.0012
Italy	0.0452	0.5511	0.1047	0.3301	79.4911	0.0112
Luxembourg	0.0540	0.4648	0.0986	0.3557	68.0918	0.0184
The Netherlands	0.0418	1.0212	0.1234	0.2553	73.7111	0.0360
Norway	0.0604	0.6657	0.1740	0.2031	64.0941	0.0215
Portugal	0.0562	1.2132	0.1274	0.3117	72.9963	-0.0078
Spain	0.0526	0.7466	0.1494	0.3352	71.9704	0.0093
Sweden	0.0392	0.9531	0.1518	0.2741	74.6758	0.0297
Switzerland	0.0362	0.9253	0.1482	0.1991	66.7044	0.0452
UK	0.0441	1.0461	0.1631	0.2272	75.8034	0.0545

	Investment		FCF	Investment
	Model 1	Model 2	Model 3	Model 4
Constant	0.0312 (10.36)***	0.0310 (4.16)***	-0.0062 (-2.41)**	0.0315 (4.30)***
(S/K) _{t-1}	0.0011 (0.41)	0.0002 (0.09)		0.0037 (1.36)
(CF/K) _{t-1}	0.0181 (2.90)***	0.0779 (2.64)***	0.6497 (25.76)***	0.0447 (1.52)
(I/K) _{t-1}	0.2501 (6.36)***	0.2508 (6.38)***		0.2393 (6.18)***
(I/K) _{t-1} ²	0.3032 (1.94)*	0.3006 (1.92)*		0.3092 (2.01)**
(D/K) _{t-1} ²	-0.0290 (-3.64)***	-0.0299 (-3.71)***		-0.0311 (-3.91)***
CSR		1.14e-05 (0.13)	-5.45e-05 (-1.74)*	-7.81e-06-0.09
CSR×(CF/K) _{t-1}		-0.0007 (-2.05)**	-0.0075 (-24.71)***	-0.0004 (-1.21)
FCF				0.1397 (8.20)***
Firm fixed effects	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes
R ²	0.6852	0.6775	0.5666	0.5258
N-obs	2,388	2,388	2,388	2,388

Notes: CSR, annual corporate social responsibility performance; FCF, free cash flow. Models (1), (2) and (4): regression using the instrumental variables estimation. The dependent variable is the investment-to-capital ratio of a firm. Model (3): regression using the generalized least squares (GLS) estimator. The dependent variable is the FCF. (S/K)_{t-1} is the one-period lagged sales-to-capital ratio. (CF/K)_{t-1} is the one period lagged cash flow-to-capital ratio. (I/K)_{t-1} is the one-period lagged investment-to-capital ratio. (I/K)_{t-1}² is the squared value one-period lagged investment. (D/K)_{t-1}² is the squared value of total debt divided by total assets lagged by one-period. All variables are defined in Table A1. *t*-statistic values are in the parentheses. *, **, ***Significant at the 10, 5 and 1 percent levels, respectively

Table III.
Results of regression
analysis for mediated
moderation

remains virtually unchanged ($\alpha = 0.0779$, $p < 1$ percent), while the new interaction term $CSR \times CF/K$ has a negative and significant coefficient ($\alpha = -0.0007$, $p < 5$ percent), as predicted. If the CSR performance increases by one unit, the investment-cash flow sensitivity decreases by 0.0007 unit. This result is in line with those reported by Attig *et al.* (2014) and supports *H1*, which indicates the negative moderating effect of CSR on the relationship between investment and cash-flow. In other words, investment is less sensitive to internally generated cash flow when firms have higher levels of CSR performance. The lack of positive response of investment to cash flow would seem to reflect the ability of socially responsible firms to provide access to external funds. This interpretation is consistent with Cheng *et al.* (2014), who find that firms with superior performance on CSR have better access to finance and lower capital constraints. Given that lower investment-cash flow sensitivities are associated with better financial health, the development of CSR strategies would improve firms' sustainability and competitive position (Legnick-Hall, 1996; Whitehouse, 2006).

This study evaluates the proposed models using a mediated moderating approach. Following the procedure used by Baron and Kenny (1986) and Muller *et al.* (2005), three conditions must be fulfilled to prove the existence of mediated moderating process: in the first regression, the product-term of the independent variable and the moderator must significantly predict the dependent variable; in the second regression, the product-term of the independent variable and the moderator must significantly predict the mediator and in the third regression, the mediator must significantly predict the dependent variable.

The estimations of models 3 and 4 are required to test the mediated moderation hypothesis (i.e. *H2*). Model 3, in Table III, suggests that the estimated coefficient of $CSR \times CF/K$ is significant ($\alpha = -0.0075$, $p < 1$ percent). Model 4 demonstrates that the coefficient on FCF is significant ($\alpha = 0.1397$, $p < 1$ percent). The original significant moderating effect of CSR on investment-cash flow is tenuous ($\alpha = -0.0004$, $p > 10$ percent), unlike that of model 2. In summary, the effect of cash flow on FCF depends on CSR and the effect of FCF on investment is greater than zero. According to Muller *et al.* (2005), these results meet the requirements of identifying a mediated moderation. That is the results in Table III support *H2*, suggesting that the moderating role of CSR is mediated through FCF. In other words, the effect of cash flow impacted by CSR on investment follow the path through FCF. Hence, with their legal responsibilities to stakeholders and their ethical responsibilities to society, firms reduce agency costs, which leads to improved relationships with stakeholders and consequently lower investment-cash flow sensitivities.

As an extension to our research, we explore the impact of the three pillars of CSR individually: the environmental, the social and the governance performance. The environmental pillar reflects how well a company uses best management practices to avoid environmental risks and capitalize on environmental opportunities in order to generate long term shareholder value. It covers three categories including emission reduction, product innovation and resource reduction. The social pillar is a reflection of the company's reputation and the health of its license to operate, which are key factors in determining its ability to generate long term shareholder value. It covers a total of seven categories including product responsibility, diversity and opportunity, employment quality, health and safety, training and development, community and human rights. The corporate governance pillar reflects a company's capacity, through its use of best management practices, to direct and control its rights and responsibilities through the creation of incentives, as well as checks and balances in order to generate a long term shareholder's value. It covers four categories including vision and strategy, board function, board structure and compensation policy.

Table IV reports the estimated results from the regression model for each one. Models (5)-(7) show that the interaction of the three pillars of CSR and cash flow $environmental \times CF/K$, $social \times CF/K$ and $governance \times CF/K$ has a negative and

	Model (5)	Model (6)	Model (7)	Model (8)
Constant	0.0226 (3.21)***	0.0186 (2.72)***	0.0269 (5.16)***	0.0194 (2.35)**
$(S/K)_{t-1}$	0.0019 (0.71)	0.0018 (0.68)	0.0004 (0.17)	0.0016 (0.59)
$(CF/K)_{t-1}$	0.1578 (4.88)***	0.1390 (3.91)***	0.1235 (3.75)***	0.1963 (4.67)***
$(I/K)_{t-1}$	0.2402 (6.28)***	0.2408 (6.29)***	0.2373 (6.18)***	0.237 (6.19)***
$(I/K)_{t-1}^2$	0.3278 (2.12)**	0.3320 (2.15)**	0.3288 (2.12)**	0.3371 (2.18)**
$(D/K)_{t-1}^2$	-0.0328 (-4.2)***	-0.0319 (-4.06)***	-0.0311 (-3.94)***	-0.0316 (-3.99)***
Environmental	0.0001 (1.39)			0.00006 (0.70)
Environmental × $(CF/K)_{t-1}$	-0.0016 (-4.38)***			-0.0015 (-2.64)**
Social		0.0001 (2.13)**		0.00005 (0.64)
Social × $(CF/K)_{t-1}$		-0.0013 (-3.43)***		0.0002 (0.34)
Governance			0.00007 (1.27)	0.00002 (0.41)
Governance × $(CF/K)_{t-1}$			-0.0013*** (-3.23)	-0.0007* (-1.82)
Firm fixed effects	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes
R^2	0.6453	0.6557	0.6620	0.6461
N -obs	2,388	2,388	2,388	2,388

Notes: The table presents the regression results where the estimation method is the instrumental variables estimation. The dependent variable is the investment-to-capital ratio of a firm. Models (5)-(7) show the effect of three pillars of CSR individually. Model (8) shows the effect of three pillars simultaneously. $(S/K)_{t-1}$ is the one-period lagged sales-to-capital ratio. $(CF/K)_{t-1}$ is the one period lagged cash flow-to-capital ratio. $(I/K)_{t-1}$ is the one-period lagged investment-to-capital ratio. $(I/K)_{t-1}^2$ is the squared value one-period lagged investment. $(D/K)_{t-1}^2$ is the squared value of total debt divided by total assets lagged by one-period. Environmental is the annual environmental performance of a corporation. Social is the annual social performance of a corporation. Governance is the annual corporate governance performance. t -statistic values are in the parentheses. *, **, ***Significant at the 10, 5 and 1 percent levels, respectively

Table IV.
Investment-cash
flow sensitivity and
CSR pillars

significant coefficient at the 1 percent level. In model (8), we consider the effect of three pillars simultaneously. We find that both environmental and corporate governance performance have a negative and significant effect on the investment-cash flow sensitivity. In contrast, the social performance exhibits an insignificant effect on investment-cash flow sensitivity. The results show that the moderating role of CSR is driven by both environmental and corporate governance performance.

4.3 Robustness tests

To check the robustness of our main results, we verify whether the mediated moderating role of CSR remains intact if we replace the cash flow (CF/K) with cash (CASH/K). Following Love (2003), we re-estimate regressions (1)-(4) using the cash as proxy for the availability of internal funds. The results are similar to those previously reported, as displayed in Table V. In addition, three countries (UK, France and Germany) seem to dominate the sample. We repeat the analysis after excluding observations from these countries. Our results reported in Table VI remain unchanged.

5. Discussion

How the development of CSR strategies affects the corporate investment policy? This is the main question of this study. Adopting the Euler equation technique approach (Bond and Meghir, 1994), we examine the moderating role of CSR in the relationship between investment spending and internally generated funds, as well as the mediating role of agency costs in the moderating effect of CSR.

	Investment		FCF	Investment
	Model 1	Model 2	Model 3	Model 4
Constant	0.0256 (8.38)***	0.0084 (0.04)	0.1466 (26.07)***	0.0317 (4.61)***
$(S/K)_{t-1}$	0.0059 (2.49)**	0.0058 (2.43)**		0.0038 (1.55)
$(CASH/K)_{t-1}$	0.0404 (4.85)***	0.1507 (3.71)***	0.1027 (1.80)*	0.0797 (2.37)**
$(I/K)_{t-1}$	0.2666 (6.82)***	0.2720 (6.96)**		0.2595 (6.65)***
$(I/K)_{t-1}^2$	0.2654 (1.70)*	0.2505 (1.61)		0.2730 (1.76)*
$(D/K)_{t-1}^2$	-0.0323 (-4.10)***	-0.0331 (-4.20)***		-0.0283 (-3.47)***
CSR		0.0002 (0.09)	-0.0015 (-21.27)***	-8.21e-05 (-0.90)
CSR \times $(CASH/K)_{t-1}$		-0.0014 (-2.77)***	-0.0013 (-1.86)*	-0.0005 (-1.14)
FCF				0.0279 (3.65)***
Firm fixed effects	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes
R^2	0.5669	0.5395	0.6761	0.5665
N-obs	2,388	2,388	2,388	2,388

Notes: CSR, annual corporate social responsibility performance; FCF, free cash flow. Models (1), (2) and (4): regression using the instrumental variables estimation. The dependent variable is the investment-to-capital ratio of a firm. Model (3): regression using the generalized least squares (GLS) estimator. The dependent variable is the FCF. $(S/K)_{t-1}$ is the one-period lagged sales-to-capital ratio. $(CASH/K)_{t-1}$ is the one period lagged cash-to-capital ratio. $(I/K)_{t-1}$ is the one-period lagged investment-to-capital ratio. $(I/K)_{t-1}^2$ is the squared value one-period lagged investment. $(D/K)_{t-1}^2$ is the squared value of total debt divided by total assets lagged by one-period. All variables are defined in Table A1. t -statistic values are in the parentheses. *, **, ***Significant at the 10, 5 and 1 percent levels, respectively

Table V.

Results of regression analysis for mediated moderation using the variable cash

	Investment		FCF	Investment
	Model 1	Model 2	Model 3	Model 4
Constant	0.0209 (4.61)***	0.0105 (0.81)	0.0591 (11.86)***	0.0174 (1.35)
$(S/K)_{t-1}$	-0.0016 (-0.45)	-0.0011 (-0.32)		0.0012 (0.34)
$(CF/K)_{t-1}$	0.0492 (3.67)***	0.2533 (2.52)**	1.6905 (29.26)***	0.0645 (0.60)
$(I/K)_{t-1}$	0.5771 (8.22)***	0.5734 (8.17)***		0.5648 (8.15)***
$(I/K)_{t-1}^2$	-1.3848 (-4.38)***	-1.3878 (-4.39)***		-1.3857 (-4.44)***
$(D/K)_{t-1}^2$	-0.0327 (-3.26)***	-0.0302 (-2.97)***		-0.0322 (-3.20)***
CSR		0.0001 (0.84)	-0.0005 (-9.99)***	5.68e-05 (0.37)
CSR \times $(CF/K)_{t-1}$		-0.0025** (-2.05)	-0.0198 (-29.11)***	-0.0003 (-0.30)
FCF				0.1752 (4.64)***
Firm fixed effects	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes
R^2	0.6373	0.6392	0.3936	0.4940
N-obs	1,008	1,008	1,008	1,008

Notes: CSR, annual corporate social responsibility performance; FCF, free cash flow. Models (1), (2) and (4): regression using the instrumental variables estimation. The dependent variable is the investment-to-capital ratio of a firm. Model (3): regression using the generalized least squares (GLS) estimator. The dependent variable is the FCF. $(S/K)_{t-1}$ is the one-period lagged sales-to-capital ratio. $(CF/K)_{t-1}$ is the one period lagged cash flow-to-capital ratio. $(I/K)_{t-1}$ is the one-period lagged investment-to-capital ratio. $(I/K)_{t-1}^2$ is the squared value one-period lagged investment. $(D/K)_{t-1}^2$ is the squared value of total debt divided by total assets lagged by one-period. All variables are defined in Table A1. t -statistic values are in the parentheses. *, **, ***Significant at the 10, 5 and 1 percent levels, respectively

Table VI.

Results of regression analysis for mediated moderation (without three countries)

Despite the fact that some researchers claim that CSR may impose unnecessary cost to a company (Navarro, 1988; Galaskiewicz, 1997), here we provide evidence that CSR may cause a reduction in the wedge between the costs of external and internal funds. Our findings contribute to the debate on whether CSR investments are value-increasing by showing that

the adoption of CSR activities positively influences the ability of firms to undertake profitable strategic investments. In addition, by disaggregating the CSR performance into its components, we show that both the environmental and corporate governance aspect of CSR activities weaken the sensitivity of investment to internal funds. With their best management practices to avoid environment risks and to control their rights and responsibilities, firms alleviate the cost of external financing and thus ease the reliance on internal cash for making investment.

The key premise of this paper is that CSR performance not only directly affects firms' investment policy but also affects firms' investment policy via its complementary effect on agency problems. High CSR firms reduce potential agency costs by pushing managers to adopt a long-term rather than a short-term orientation, which significantly reduces the investment-cash flow sensitivity. Our evidence lends support to the hypothesis that the sensitivity of investment to internal funds decreases with factors that reduce capital market imperfections (Ağca and Mozumdar, 2008).

Some practical managerial implications can be derived from the results of this study. The association between CSR, agency problems and investment-cash flow sensitivity suggests to organizations that improving CSR strategies is an efficient instrument to facilitate the access to external financing through mitigating agency conflicts between management and shareholders. So, firms are invited to engage more in CSR activities that reduce the likelihood of opportunistic behavior and align managers and shareholders interest.

6. Conclusion

In this paper, we investigate the sensitivity of investment to the availability of internal funds in a CSR context. We use a representative sample of European listed firms for the period 2009-2014. We find that firms with higher CSR scores enjoy significantly lower investment-cash flow sensitivity. The empirical results are consistent with Attig *et al.* (2014). Furthermore, we find that agency costs of FCF mediate the negative moderating effect of CSR on investment-cash flow sensitivity. Hence, our contribution consists in proposing the establishment of both direct and indirect link between CSR and investment-cash flow sensitivity. This study demonstrates empirically that firms with socially responsible practices are better positioned to obtain financing in the capital markets through reducing market frictions as well as agency costs.

Our study opens interesting future research. First, the present work can be extended internationally by using a global sample. Assuming that financial markets around the world are segmented, it might be interesting to investigate cross-country and cross-culture variations in the relationship between CSR and investment behavior. Second, it would be worthy to examine whether, and in what ways, CSR affects investment efficiency.

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Table AI.
Definition of variables

Variable	Definition
<i>I</i>	Capital expenditures
<i>K</i>	Book value of total assets
CF	Earnings before interest, taxes, depreciation and amortization
<i>S</i>	Total sales
<i>D</i>	Book value of total debt
CSR	Equally weighted average of the environmental, the social and the governance score
FCF	(Operating income – income taxes – interest expenses on debt – common stock dividend – preferred stock dividend)/Book value of total assets

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