



Are the media drivers of R&D?

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ABSTRACT

Research exploring how extra-legal institutional aspects might impact corporate investment policy in innovation is still in its early stages. This lack of research is even greater when it comes to studying the role of media attention in corporate innovation. This study extends prior literature by investigating the relationship between media visibility and research and development (R&D) investment in a continental European context. Using a sample of Spanish listed firms in the 2008–2022 period, results indicate that media attention has a positive effect on corporate innovation. The results provide support for arguments that the media reduce agency conflicts, facilitate fundraising, and increase the reputational risk of internal agents as well as the pressure to meet stakeholder demands and the chances of obtaining external help to develop new ideas and projects. Moreover, we show that media attention encourages innovation in companies who are more isolated from stakeholder demands, who face greater agency conflicts, or who suffer from financial difficulties.

1. Introduction

The role played by innovation has become increasingly important for policymakers, academics, and investors alike, since innovation contributes towards companies' productivity, growth, and sustainability [1, 2]. Innovation has become a key factor in company development and growth in what is a highly competitive world [3,4]. Yet despite this interest, research exploring how extra-legal institutional aspects might impact corporate investment policy in innovation is currently still in its early stages [5–7].

This lack of knowledge is even greater when it comes to studying the role of media attention in business innovation. The media increase corporate decision transparency by pinpointing and spreading information related to companies' actions and the decisions taken by their internal agents. Bushee et al. [8] highlight that the financial press has enormous power of dissemination that can take information to all the stakeholders involved in the market. This great power to distribute keeps stakeholders informed about the firm's movements, with the media often being the only means through which they can access corporate information. The media can therefore reduce information asymmetries between internal and external agents [9–13]. The media also act as a social reference that can offer judgement and opinions on managers and dominant owners, thereby influencing many people's

views on company action and exerting an influence on the image and reputation of internal agents [14–19]. Moreover, the media encourage politicians to make legislative changes or to enforce legal provisions in favour of external investors and can also affect the level of punishment imposed for corporate governance violations [9]. In this sense, it is particularly important to shed light on the relationship between media and innovation, since in the digital era the media play a pivotal role in controlling business performance and in creating channels to convey information, such that their task as an information medium might also influence the firm's economic performance and, in particular, investment in innovation.

However, there are few studies that have analysed this relationship, and their results are inconclusive. Dai et al. [20] find a negative effect of media coverage on firm innovation, supporting arguments that media attention may obstruct firm innovation by pressuring managers to secure short-term profits or because increased media visibility facilitates knowledge leakage to rival firms. Their research focuses on the United States, i.e. in a setting of widely dispersed ownership where minority shareholders and managers are the main actors in agency relationships, where financial markets are highly developed, where the corporate governance system offers strong protection for the interests of external investors, and where public information channels are key actors in reducing information asymmetries between insiders and external

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investors. In contrast, studies by Chen et al. [21], Gao et al. [22], and Hu et al. [23] focusing on China suggest a positive relationship between media attention and innovation, supporting the arguments that media attention promotes innovation by reducing information asymmetries and financial constraints. The continental European setting shares some similarities with China in terms of the relevance of ownership concentration, weak legal protection of external investors' interests, and low litigation risk [24,25], leading to the main agency conflict being displaced towards the potential expropriation of external investors by dominant owners [26,27]. However, the results of previous studies cannot be directly extrapolated to Europe, essentially due to the fact that the role played by the media in China is conditioned by government control, which in many cases is the main shareholder and influences the type and tone of news, leading to scepticism regarding the effectiveness of media reporting in China [23,28].

Given the above, this paper addresses the following research question: does media attention drive investment in corporate innovation in a continental European context? In order to answer this question, we draw on a sample of Spanish listed firms over the period 2008–2022. Our results show a positive relation between media attention and investment in R&D, suggesting that greater company visibility in the media drives company investment in innovation. This result thus provides support for arguments that media coverage reduces agency conflicts, facilitates fundraising, increases pressure to meet stakeholder demands, and boosts the chances of obtaining external help to develop new ideas and projects. Our results are robust to different measures of R&D investment and to different econometric specifications.

This paper makes several contributions to the literature. To our knowledge, this is the first study to explore the relationship between media attention and investment in innovation in a context of concentrated ownership and widespread press freedom. Our study contributes to the current debate concerning what impact corporate governance mechanisms have on R&D investment and enriches current knowledge exploring the role played by the media as a driver of business innovation decisions. In this context, high ownership concentration, the less than efficient governance system, and the weak protection afforded to stakeholders by the legal system, might mean that the media play a key role as discipline mechanisms, influencing managerial and dominant owner decision-making [25,29]. The media can thus emerge as a substitute mechanism for the legal system [9], since reputation and public image in this context become a core factor in securing contracts and, therefore, in company sustainability [30]. Moreover, previous literature has also focused on the reduction of information asymmetries as a driver of innovation, examining the role of accounting information quality [1, 31–33]. Given such a context, our work sheds light on the part played by the media in the degree of transparency of company action. This may prove to be key in the continental European context, where accounting information plays a more restricted role in addressing information asymmetries in favour of the use of private channels between managers and dominant owners [34,35]. Our study thus complements the results of previous research that has analysed the relationship between transparency and innovation, focusing mainly on the quality of information disclosed by firms [33,36]. Finally, we further current understanding of how media attention acts as a company legitimising mechanism by looking at whether media scrutiny affects innovation in terms of meeting stakeholders' demands.

The paper is organised as follows. Section 2 provides the theoretical framework and hypotheses development. Section 3 describes the data and methodology. Section 4 presents the main empirical results and provides some robustness tests. Finally, we discuss the main conclusions.

2. Theory and hypothesis development

Analysis of corporate investment in innovation has been one of the main paradigms in recent years, principally because innovation has become a key factor for company survival and growth in an ever-more

competitive environment [4,37]. However, knowledge of what role the media play in terms of impacting investment in innovation remains in an embryonic state.

The media increase the transparency of business decisions by locating and disseminating information related to the performance of firms and the decisions made by their internal agents. Bushee et al. [8] and Peress [38] point out that the financial press has enormous power of dissemination that can bring information to all the agents involved in the market, and Mullainathan and Shleifer [39] note that the media have incentives to produce and disseminate accurate news. In addition, the media provide information about firms' future prospects, uncovering and exposing managerial opportunism and improprieties to public attention and scrutiny [40]. This great power of distribution keeps stakeholders informed about the firm's movements, with the media often being the only means through which they can access corporate information [41,42]. The media can thus reduce information asymmetries between internal and external agents [9–13]. The media also act as a social reference that can provide judgements and opinions about dominant managers and owners, thereby swaying many people's opinion of the firm's performance and exerting an influence on the image and reputation of internal agents [14–19]. In addition, the media encourage politicians to make legislative changes or to enforce legal provisions in favour of external investors and may also affect the level of punishment imposed for corporate governance violations [9]. This media role has become particularly relevant in the digital era due to the increasing diffusion of information transmitted by the media [21]. This has boosted academic interest in understanding the media's impact on the performance and valuation of firms, resource allocation decisions, and the relationship between firms and stakeholders [42]. Specifically, in the case of investment in innovation, the media may encourage or reduce R&D expenditure.

2.1. Positive effect of media coverage on investment in innovation

The stakeholder theory suggests that different groups can induce firms to adopt new practices, routines, services, or products that adapt to diverse and shifting needs [37,43,44]. Faced with the need to respond to their demands, companies must innovate [45]. In this context, the media encourage managers and dominant owners to accentuate stakeholders' interests, since greater media visibility increases firms' vulnerability to pressures from different stakeholders and will drive firms to meet such demands in order to ensure survival and long-term success [46,47]. Greater media attention will therefore foster investment in innovation as a source of legitimisation and reputation in the eyes of stakeholders. Additionally, the media increase the reputational risk of managers and controlling owners [11,48], such that media coverage heightens the incentives to make efficient investments [40] and increases the likelihood of inefficient managers and directors being removed [49,50].

In addition, increased visibility in the media can attract external actors, who can provide resources and capabilities that complement the firm's own, thereby boosting the chances of innovation [21–23]. Accordingly, greater visibility in the media enhances trust in firms' actions [51], which adds to the incentives of external actors to cooperate with firms [52], increasing information exchange and creating more opportunities for the dissemination of knowledge and innovative solutions [53,54].

Furthermore, investment decisions in R&D are linked to high risk and are difficult to understand for external agents. Moreover, the results are subject to great uncertainty, added to which they tend to be long-term investments related to intangible assets [1,55]. These characteristics may trigger agency conflicts between directors and shareholders, since directors' short-term horizon and their desire for personal wealth dampens their incentive to invest in innovation [56–59]. In such a context, the supervisory role of the media can alleviate the problem of managerial "laziness" to invest in innovation [20–23]. In this regard, the presence of dominant shareholders with both the capacity and the

incentive to control directors' actions may reduce the conflict between directors and shareholders linked to innovation [60]. However, the presence of these controlling shareholders may exacerbate conflicts between controlling owners and minority shareholders [24,61,62]. Given such a context, dominant owners may have the incentive to reduce activity in R&D, since such investments may restrict the use of corporate resources dedicated to securing private benefits and because their insufficiently diversified portfolios distort their risk aversion to innovation [63, 64]. Greater dissemination of company information may therefore reduce opportunistic behaviour when taking decisions concerning the allocation of economic resources. Specifically, the media play a corporate governance role by focusing the spotlight on firm performance and by spurring firms to make changes aimed at correcting deviant behaviour and alleviating potential agency problems [9,11,17,49,50]. As a result, significant media attention may promote investment decisions in corporate innovation, disciplining managers and dominant owners by inflicting reputational costs that can negatively affect their professional careers, public image, and access to capital markets [9,14,65]. Brown et al. [31] and Zhong [33] state that the information asymmetry and uncertainty linked to innovation projects are some of the main reasons to explain the low levels of investment in R&D, since the limited collateral value significantly reduces access to external funding of innovation projects. In this line, the intangible nature of innovation makes it difficult for external investors to obtain information about the efficiency or value of a firm's R&D projects [66]. Moreover, innovative firms may be reluctant to disclose private information in order to preserve their competitive advantage [67]. Innovative firms are therefore likely to face more severe financing problems. Greater transparency drives investment in innovation since it helps to evaluate directors' actions and to filter uncontrollable market risks [33,68]. In addition, the media can help attract more investors, since the increased visibility of dominant owner-managers lends greater credibility to their investment decisions [69]. Previous studies thus suggest that media attention reduces financing and transaction costs [8,10,21,40,70] and enhances company action transparency, which would lead to an increase in innovation incentives, either because the reduction in informational asymmetries reduces the limitations placed on external funding or because it curtails the risk of incorrectly assessing directors' actions [71].

2.2. Negative effect of media coverage on investment in innovation

Media attention may hinder investment in innovation as it may incentivise manager and dominant owner myopia by pressuring them to renounce long-term results in favour of short-term profits [20,56]. The media thus increase market pressure for short-termism because they tend to publish news that responds to the interests of investors, who are often more attracted to "breaking" news related to quarterly or annual earnings, in contrast to investors' less interest in news about investments whose outcome is expected to be long term [12,20,72,73]. In this vein, Ernst and Young's [74] report shows that media pressure is one of the key causes of short-termism in companies, especially in listed companies. Accordingly, Gao et al. [48] argue that media attention may increase the firm's conservative performance, as managers and dominant owners may be under pressure not to make mistakes, which thereby reduces incentives to make highly risky investments such as those associated with innovation.

On the other hand, Brown and Martisson [36] and Dai et al. [20] argue that concerns about knowledge leakage may reduce incentives to innovate since the media may increase worries about the transfer of relevant information to rival firms, thereby discouraging innovation, particularly in the most competitive sectors. As such, the media may draw competitors' attention to the creative activities of more visible firms, motivating them to acquire knowledge through public or private information channels.

In addition, media attention may have negative effects on the conduct of dominant managers and owners by creating "superstars" who

are indulged by investors to behave less efficiently [40,75] or by enabling them to use their reputation or public image as a tool for entrenchment and as a way to hide private benefits [75–81], thus reducing their incentives to invest in innovation. Considering the two possible relationships between media and innovation investment argued above, we formulate the following alternative hypotheses.

H1a. Media coverage positively affects investment in innovation.

H1b. Media coverage negatively affects investment in innovation.

The conceptual model of the theoretical arguments is illustrated in Fig. 1.

3. Research design

3.1. Sample and variables

3.1.1. Sample

Our sample is made up of 100 Spanish listed firms included in the OSIRIS (Bureau Van Dijk) database covering 2008–2022, not including financial firms and real estate firms. This leaves an unbalanced sample of 1494 firm-year observations, with 93 % of the firms having five or more observations over the period. This sample represents over 99.8 % of Spanish market capitalization in 2022. The continuous variables were winsorized at the 1st and 99th percentiles in order to lessen the impact of possible outliers.

3.1.2. Corporate innovation

In line with earlier literature, we use R&D intensity to measure corporate investment in innovation through the variable *R&D*, measured as the company's investment in R&D scaled by total assets [4,33,82–85]. Faleye et al. [86] argue that this variable is an appropriate indicator because the timing of R&D expenditure approximates the time at which innovation activity begins, and because it reflects the firm's contribution to this process.

3.1.3. Media attention

The main explanatory variable is *MEDIA*, which reflects the natural logarithm of 1 plus the number of news items that offer financial information by firm and year for the period 2008–2022 in the main national and international financial press. To generate our measures of media attention, we use data from Peña-Martel et al. [87], who compile the level of coverage from the *FACTIVA* database, considering the number of news items that offer financial information by firm and year for the period 1996–2014 in the Spanish financial press (*Expansión*, *El Economista*, and *Cinco Días*) and international press (*Dow Jones*, *Reuters*, *Financial Times*, *Wall Street Journal*, and *Business Wire*). These data exclude news that does not provide informative content, such as alerts, announcements of dividend payments or quotes. Since our study covers the period 2008–2022, we expand the previous database by adding new data covering 2015 to 2022.

3.1.4. Control variables

The remaining variables include specific characteristics considered in previous research that are expected to determine corporate innovation. Growth opportunities can positively affect investment in innovation [20,22,33,88], which we capture through the variable *QTOBIN*, measured as the ratio of the market value of the firm's assets to its book value. We also consider firm profitability and the relevance of tangible assets in the company's investments through the variables *ROA* and *MAT*, respectively, estimating a negative effect of both variables on innovation [20,23,33]. In addition, level of debt may discourage business innovation [4,23,86,89]. We thus include the variable *DEBT* as a control variable, measured as the ratio of total debt to total assets. The *SIZE* variable controls for the firm size effect. Nevertheless, its effect on innovation is unclear, since although larger firms have more knowledge,

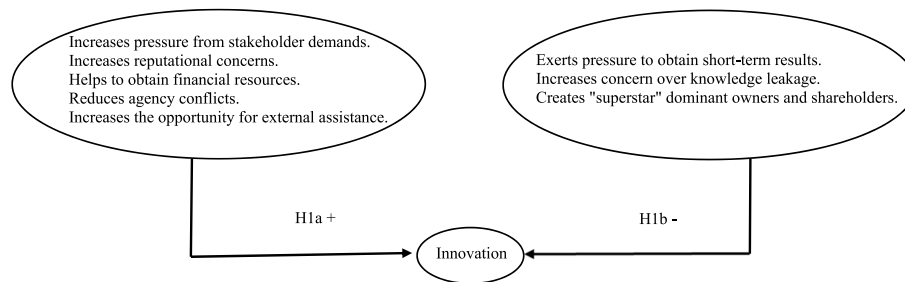


Fig. 1. Media attention and investment in innovation.

information advantages, economies of scale and resources that can be allocated to innovation, being larger may hinder the creative processes linked to innovation [33,84,90]. Additionally, we also control for a firm's age (*AGE*), since younger firms are more innovative [4,22,23]. Power in the hands of the dominant owner is controlled through the *VOTING* variable. No single unique effect of this variable on innovation has been found [91–93]. Finally, we include the variable *DUALITY*, since CEO power can impact innovation, although the sign is unclear from previous studies [94–97].

3.1.5. Instrumental variable

Given that media coverage may not be random [98], we consider the endogeneity of media attention in the estimations. In line with Dai et al. [20] and Hu et al. [23], we use *DISTANT* as an instrumental variable (IV), measured as the natural logarithm of the average value of the kilometres separating a firm's headquarters and the offices of the media. To measure this distance, we use Google Maps. The greater the distance, the lower the expected media coverage, due to the higher costs of obtaining information and the lower interest for journalists because of the longer travel time involved [20,50,99]. All the variables are defined in Table A in the Appendix.

3.2. Model specification and estimation

After carrying out a prior descriptive analysis, different analyses are then performed. First, a system of two simultaneous equations is estimated using three-stage least squares (3SLS). In the first of the equations, corporate innovation depends on media coverage as well as on several control variables. In the second equation, media attention is run against control variables and *R&D*. This enables us to control for possible reverse causality, given that increased corporate innovation might encourage media visibility. In order to further strengthen our control of reverse causality, *R&D* and *MEDIA* are both lagged one year.

However, the 3SLS method does not use the combination of time series and cross-sectional data in its estimates. We therefore consider firm-fixed effects –i.e., firm specific characteristics that remain invariant over time. Moreover, we lag the independent variable to control for endogeneity. In addition, in order to make the results more robust, we use an instrumental variables approach –specifically two-stage least squares (2SLS)– since this can be useful to eliminate endogeneity bias coefficients [11,20,100]. Furthermore, we use an IV TOBIT model to take account of the fact that many of the firms do not invest in innovation –such that the dependent variable is censored.

To reinforce the integrity of the analysis, we conduct an alternative estimation method that considers the problem of endogeneity. We run *R&D* analysis using a regression framework that employs a propensity score matching (PSM) sample to ensure that our treatment group is comparable to the benchmark group in observable covariates based on the nearest neighbour. We therefore employ PSM to match observations of firms with high media coverage to observations of firms with lower media coverage, based on observable firm characteristics. We use this procedure to try to control for differences in characteristics between firms with high and low media attention and to address possible

selection bias. To calculate the propensity score, we consider the instrumental variable *DISTANT* together with the control variables.

Finally, we employ the Generalised Method of Moments (GMM) developed by Blundell and Bond [101]. This technique allows us to address potential endogeneity problems arising from the simultaneity between *R&D* and *MEDIA*, as well as from uncontrolled individual heterogeneity. This creates problems arising from the omission of unobservable firm characteristics, which could affect corporate innovation. For example, media visibility might be influenced by exogenous features, which in turn influence *R&D*, such that the association between corporate innovation and media attention might be spurious.

4. Results

4.1. Univariate analysis

In this section, we report the descriptive statistics (Table 1). Panel A shows that the *R&D* variable has a mean of around 33 percent of total assets, and that the measure of media visibility displays a mean near to 370 news items, with a median of 130. In Panel B, we determine whether the mean values of innovation differ between firms subject to greater or less media coverage compared to the median. In this regard, results show that firms which receive greater media attention are more profitable, invest more in tangible assets, issue more debt, and are larger and older. Nevertheless, firms that receive greater media attention enjoy fewer growth opportunities. Moreover, firms that receive the most media attention are no different from those that are less visible in relation to innovation, ownership concentration, and the dual role of the CEO.

We report the correlation matrix for all the variables in Table 2. Given that the correlation between the main variables of interest is low, multicollinearity is unlikely to be the driver behind our regression results, and the low values of the VIF would seem to confirm this [102].

4.2. Multivariate analysis

After conducting a prior descriptive analysis, we employ different econometric specifications to test our hypothesis. The results obtained from estimating the system of simultaneous equations through (3SLS) are reported in Table 3 (Model 1). In the model, the dependent variable of Equation (1) is *R&D*, while the dependent variable of Equation (2) is *MEDIA*. The equation includes the main explanatory variables together with the control variables. Eq. 1 of Model 1 shows a positive and statistically significant effect of media coverage on corporate innovation. However, the presence of *R&D* expenditures has no significant influence on media attention (Eq. 2). These results lend support to the idea concerning the absence of reverse causality between media visibility and corporate innovation.

Table 4 shows the result for the five models in which we analyse how media attention affects investment in innovation vis-à-vis the different approaches. In Model 2, we estimate the regression using fixed effect, since this method has been widely used in the previous literature focusing on studying investment in corporate innovation [103,104]. The

Table 1
Descriptive statistics.

Panel A. Descriptive statistics					
	Mean	St. Dev.	Q1	Median	Q3
R&D	0.333	1.179	0.000	0.000	0.010
MEDIA ^a	369.386	602.813	55.000	130.000	399.000
ROA	5.286	10.301	2.020	5.047	8.893
QTOBIN	1.568	1.116	0.999	1.212	1.624
MAT	29.045	23.396	8.431	23.599	47.363
DEBT	67.967	26.765	51.333	67.597	81.458
SIZE	14.100	2.074	12.566	14.026	15.390
VOTING	32.612	22.310	14.500	25.690	50.135
AGE	52.189	30.748	27.000	46.000	74.000
DUALITY	0.589	0.492	0.000	1.000	1.000

Panel B. Firms with high and low media attention							
	Firms with high media attention N=750			Firms with low media attention N=744			
	Mean	St. Dev	Median	Mean	St. Dev	Median	Diff.
R&D	0.335	1.106	0.000	0.332	1.249	0.000	0.042
ROA	5.795	9.326	5.748	4.782	11.169	4.534	1.730*
QTOBIN	1.513	0.867	1.233	1.623	1.316	1.198	-1.734*
MAT	30.302	24.947	24.809	27.799	21.697	23.162	1.881*
DEBT	73.017	24.586	71.443	62.957	27.894	60.590	6.721***
SIZE	15.483	1.660	15.327	12.729	1.436	12.718	31.164***
VOTING	31.751	21.471	25.085	33.462	23.095	28.770	-1.345
AGE	53.980	28.447	46.000	50.458	32.807	46.000	2.018**
DUALITY	0.607	0.488	1.000	0.571	0.495	1.000	1.282

*, **, *** indicate significance at 10, 5, 1%, respectively.

^a For greater clarity in the interpretation of the descriptive statistics, the MEDIA variable is measured as the number of news items rather than the natural logarithm of 1 plus the number of news items.

Table 2
Correlation matrix.

	R&D	MEDIA	ROA	QTOBIN	MAT	DEBT	SIZE	VOTING	AGE	VIF
MEDIA	-0.035									2.40
ROA	-0.019	0.063**								1.45
QTOBIN	0.158***	-0.073***	0.419***							1.59
MAT	-0.173***	0.073***	-0.023	-0.115***						1.04
DEBT	-0.108***	0.171***	-0.292***	0.058**	-0.036					1.24
SIZE	-0.066**	0.820***	0.022	-0.257***	0.069***	0.142***				2.67
VOTING	-0.055**	-0.087***	0.046*	0.187***	-0.078***	0.073***	-0.019			1.11
AGE	0.031	0.148***	-0.031	-0.098***	-0.078***	0.141***	0.171***	-0.118***		1.08
DUALITY	0.045*	0.083***	0.070***	-0.069***	0.082***	-0.064**	0.113***	-0.102***	0.016	1.04

*, **, *** indicate significance at 10, 5, 1%, respectively.

Table 3
Media attention on R&D investment. 3SLS.

	Model 1	
	R&D (Eq.1)	MEDIA (Eq.2)
MEDIA _{t-1}	0.072* (1.74)	
R&D _{t-1}		0.024 (1.29)
ROA	-0.0005 (-1.32)	-0.003 (-1.52)
QTOBIN	0.079*** (3.65)	0.146*** (8.69)
MAT	-0.009*** (-6.56)	0.001* (1.84)
DEBT	-0.006*** (-4.59)	0.001 (0.46)
SIZE	-0.041 (-1.42)	0.593*** (53.46)
VOTING	-0.003** (-2.23)	-0.006*** (-5.96)
AGE	-0.008 (-0.43)	-0.008 (-1.23)
DUALITY	0.121* (1.76)	-0.089** (-2.00)
CONSTANT	1.235*** (4.11)	-3.387*** (-20.11)
Industry effect	Yes	Yes
Year effect	Yes	Yes
Wald Chi ² R&D	91.56***	
Wald Chi ² Media_Attention		304.29***
Breusch-Pagan LM test	0.0064 (0.936)	
No. of observations	1494	1494

*, **, *** indicate significance at 10, 5, 1%, respectively.

results obtained in Model 2 show a positive and statistically significant effect of media attention on the level of investment in R&D activities, in line with hypothesis H1a.

The results of the 2SLS and IV TOBIT method are shown in Models 3 and 4 (Table 4). The results of the first-stage regression, in which MEDIA is estimated using DISTANT as an instrument, show a negative and statistically significant relationship between the two variables. Moreover, Models 3 and 4 show the second-stage regressions, in which the dependent variable is R&D. The regression confirms the significant and positive impact that the media have on innovation. This result is confirmed by using PSM and GMM –Models 5 and 6, respectively. Hence, all the models analysed provide support for hypothesis H1a.

As regards the control variables, the results show that profitability, investment in tangible assets, debt level, firm size, ownership concentration, and firm age have a negative effect on innovation. However, growth opportunities and the role of the CEO have a positive effect on investment in innovation.

4.3. Robustness analysis

In order to ensure the reliability of our findings, we carried out a series of robustness tests in which we re-estimate the model, including

Table 4
Media attention on R&D investment.

	Model 2	Model 3	Model 4	Model 5	Model 6
		2SLS	TOBIT	PSM ^a	GMM
First-stage					
Dependent variable	MEDIA				
<i>DISTANT</i>		-0.014* (-1.72)	-0.006** (-2.23)		
<i>Control variables</i>		Yes	Yes		
<i>Industry effect</i>		Yes	Yes		
<i>Year effect</i>		Yes	Yes		
<i>F test</i>		32.02***			
<i>Wald test of exogeneity</i>			356.26***		
Dependent variable	R&D				
<i>MEDIA_{t-1}</i>	0.076* (1.80)	0.058* (1.75)	0.167*** (19.30)	0.086** (2.03)	0.117*** (14.43)
<i>ROA</i>	-0.005** (-2.58)	-0.043**(-2.01)	-0.006 (-0.10)	-0.005 (-1.36)	-0.009*** (-16.11)
<i>QTOBIN</i>	0.079** (2.59)	0.496 (0.48)	2.129*** (5.39)	0.079*** (3.55)	0.248*** (26.29)
<i>MAT</i>	-0.009*** (-14.84)	-0.023** (-2.49)	-0.062*** (-3.47)	-0.009*** (-6.68)	-0.008*** (-12.33)
<i>DEBT</i>	-0.005*** (-5.70)	-0.026* (-1.84)	-0.020** (-2.31)	-0.005*** (-4.29)	-0.008*** (-16.54)
<i>SIZE</i>	-0.043* (-1.83)	-3.231* (-1.65)	-9.500*** (-26.22)	-0.050* (-1.66)	-0.062*** (-7.03)
<i>VOTING</i>	-0.003** (-2.91)	-0.028 (-1.05)	-0.073*** (-3.65)	-0.003** (-2.41)	-0.005*** (-11.34)
<i>AGE</i>	-0.003 (-0.20)	-0.007*** (-3.45)	0.015 (1.07)	-0.001 (-0.30)	-0.003 (-0.39)
<i>DUALITY</i>	0.121** (2.22)	0.797** (2.11)	1.617* (1.93)	0.118* (1.72)	0.180*** (5.07)
<i>Constant</i>	1.236*** (5.47)	18.485 (1.60)	5.477 (0.90)	1.315*** (3.84)	1.204*** (7.72)
<i>Year effect</i>	Yes	Yes	Yes	Yes	Yes
<i>Industry effect</i>	Yes	Yes	Yes	Yes	Yes
<i>Adj. R²</i>	0.07			0.07	
<i>F test</i>	304.14***	13.99***		8.61***	285.17***
<i>Kleibergen-Paap rk LM statistic</i>		2.62			
<i>Wald test</i>			237.46***		
<i>Hansen test</i>					68.95 (0.897)
<i>M2</i>					-1.38 (0.167)
<i>Z1</i>					114.54***
<i>Z2</i>					111.37***
<i>Z3</i>					26.82***
<i>No. of observations</i>	1494	1494	1494	1190	1494

M2, Statistic test for lack of second-order serial correlation in the first-difference residual.

Z1, Wald test of the joint significance of reported coefficients.

Z2, Wald test of the joint significance of time dummies.

Z3, Wald test of the joint significance of industry dummies.

*, **, ***indicate significance at 10, 5, 1%, respectively.

^a In this method, the MEDIA variable is not lagged.

new definitions of the dependent variable and new measures of the independent variable. Table 5 shows the results of these additional tests, which strengthen our evidence that investment in innovation is positively affected by media visibility.

In Models 7 and 8 (Table 5), we re-estimate the principal model, considering different measures of investment in R&D [3,82,84,105,106]. In Model 7, we use the variable *R&D(Employees)*, and in Model 8 we use the variable *R&D(Sales)*. As can be seen through the results to emerge in these models the outcomes do not vary from the previous ones.

We also tested our results using a different measure of media attention. In line with Dai et al. [20], in Model 9 we use *MEDIA_R&D*, i.e., considering only news related to corporate innovation. The findings to emerge are consistent with those obtained previously, confirming the key role played by the media in investment in corporate innovation.

4.4. Further analysis

To further our knowledge of the impact of media attention on innovation, three regressions were performed in Table 6, considering firms according to their level of insulation from stakeholder demands, their degree of agency conflicts, and their financial difficulties. In Table 6, Model 10, we therefore consider firms belonging to regulated sectors (energy, infrastructure, transport and communications). Regulated sectors are often more insulated from stakeholder demands [107], among other reasons, because they are subject to strict government

regulations that often limit their ability to respond quickly to stakeholder demands or lack of competition. The results obtained show a positive effect of media attention on innovation in firms of this type. In continental Europe it is common to use pyramid structures that separate the voting and cash flow rights of dominant owners, thereby increasing their incentives to obtain private benefits and exacerbating agency conflicts [24,50,108]. Pyramid structures thus reduce the incentives for innovation by dominant owners, favouring tunnelling practices. Hence, we define the variable *PYRAMIDS* as a dichotomous variable that takes the value 1 when the dominant shareholder controls the company through a pyramid structure which allows them to own more voting than cash flow rights, and zero otherwise. In Model 11 (Table 6), we analyse the effect of media coverage in the presence of pyramid structures. This result supports the argument that the media reduce agency conflicts by incentivising investment in innovation. Finally, in order to consider the effect of media coverage in the presence of financial distress, we analyse firms characterised by a high risk of bankruptcy, using Altman's Z-score [109]. We define the *RISK* variable as a dichotomous variable that has a value of 1 when the firm is at risk of bankruptcy, and zero otherwise.¹ The results shown in Model 12 (Table 6)

¹ A firm is at risk of bankruptcy if its Z-score is ≤ 1.81 . The Altman Z-score is calculated as $1.2A + 1.4B + 3.3C + 0.6D + 1.0E$, where; A is working capital divided by total assets, B is retained earnings divided by total assets, C is earnings before interest and taxes divided by total assets, D is the market value of equity divided by total liabilities, and E is sales divided by total assets.

Table 5
Robustness analysis. Alternative measures of R&D and media coverage. GMM.

	Model 7	Model 8	Model 9
Dependent variable	R&D (Employees)	R&D (Sales)	R&D
<i>MEDIA</i> _{t-1}	0.903*** (11.81)	0.441*** (3.61)	
<i>MEDIA</i> R&D _{t-1}			0.161*** (19.25)
ROA	-0.137*** (-11.77)	-0.027** (-2.46)	-0.005*** (-6.50)
QTOBIN	2.381*** (12.25)	0.017 (0.17)	0.188*** (16.87)
MAT	-0.426*** (-6.46)	-0.009** (-2.22)	-0.004*** (-13.78)
DEBT	-0.055*** (-16.22)	-0.007* (-1.88)	-0.006*** (-18.39)
SIZE	-0.311*** (-4.96)	-0.313*** (-3.61)	-0.043*** (-6.23)
VOTING	-0.042*** (-5.61)	-0.003 (-0.82)	-0.004*** (-7.40)
AGE	-0.014** (-2.01)	-0.004 (-1.37)	-0.001 (-0.15)
DUALITY	3.305*** (12.34)	0.421** (2.11)	0.075*** (2.99)
Constant	2.256** (2.16)	3.078*** (3.45)	-0.707*** (-8.07)
Year effect	Yes	Yes	Yes
Industry effect	Yes	Yes	Yes
<i>F</i> test	106.22***	38.26***	795.72***
Hansen test	54.43 (0.926)	16.13 (0.723)	87.09 (0.941)
M2	-1.07 (0.284)	-0.56 (0.574)	-1.03 (0.305)
Z1	117.77***	32.81***	129.20***
Z2	4.87***	12.23***	74.91***
Z3	11.99***	7.87***	53.67***
No. of observations	1494	1494	1494

M2, Statistic test for lack of second-order serial correlation in the first-difference residual.

Z1, Wald test of the joint significance of reported coefficients.

Z2, Wald test of the joint significance of time dummies.

Z3, Wald test of the joint significance of industry dummies.

*, **, ***indicate significance at 10, 5, 1%, respectively.

indicate that media attention encourages innovation in firms with financial difficulties. This result may indicate that media coverage in this type of firm facilitates the help of external agents or a greater supply of resources due to less information asymmetry.

5. Discussion and conclusions

Investors, analysts and regulators display enormous interest in the level of investment in business innovation, since it has become a key aspect in terms of understanding the economic growth of firms and countries in an environment of fierce global competition. Yet, despite this interest, research into the impact of extra-legal institutional instruments on corporate innovation is still in its early stages [5–7]. This lack of knowledge is even greater when it comes to studying the role of media attention in business innovation. This thus study focuses on furthering present knowledge of the impact of extra-legal factors as determinants of innovation and seeks to fill the gap vis-à-vis the effect of media visibility as a driver of corporate innovation in the continental European environment.

Using a sample of Spanish listed firms over the period 2008–2022, the results obtained indicate that media attention has a positive effect on the level of corporate innovation. This result is robust when using different methods of estimation and measures of media coverage as well as investment in innovation. The result to emerge is consistent with the arguments which state that media coverage reduces agency conflicts, facilitates fundraising, increases pressure to meet stakeholder demands, and boosts the chances of obtaining external help to develop new ideas and projects.

In this regard, the results obtained differ from those of Dai et al. [20], who find a negative impact of media attention on innovation in North American firms. This difference in findings may be due to the different role that media visibility can play in the Anglo-American and continental European contexts. In the US context, more developed markets

Table 6
Media coverage and R&D. Further analysis. GMM.

	Model 10	Model 11	Model 12
Dependent variable	R&D		
<i>MEDIA</i> _{t-1}	0.040*** (4.70)	0.151*** (14.86)	0.093*** (12.61)
REGULATED_IND	-0.501*** (-3.93)		
<i>MEDIA</i> x REGULATED_IND _{t-1}	0.060** (2.58)		
PYRAMIDS		-0.394*** (-4.02)	
<i>MEDIA</i> x PYRAMIDS RISK		0.053*** (2.86)	-1.117*** (-15.53)
<i>MEDIA</i> x RISK			0.107*** (12.15)
ROA	-0.002*** (-4.03)	-0.14*** (-20.07)	-0.013*** (-19.73)
QTOBIN	0.080*** (6.68)	0.248*** (18.57)	0.174*** (12.33)
MAT	-0.005*** (-6.71)	-0.010*** (-15.36)	-0.010*** (-13.13)
DEBT	-0.004*** (-6.41)	-0.009*** (-20.55)	-0.008*** (-18.46)
SIZE	-0.020* (-1.82)	-0.080*** (-8.22)	-0.134*** (-12.96)
VOTING	-0.008** (-2.00)	-0.005*** (-9.91)	-0.005*** (-10.739)
AGE	-0.001** (-2.02)	-0.009 (-1.00)	-0.001 (-1.54)
DUALITY	0.077*** (2.97)	0.128*** (3.86)	0.090* (1.98)
Constant	0.735*** (5.05)	1.547*** (10.60)	2.797*** (19.76)
Year effect	Yes	Yes	Yes
Industry effect		Yes	Yes
<i>F</i> test	18.03***	14.80***	574.71***
Hansen test	54.06 (0.872)	74.57 (0.883)	82.41 (0.935)
M2	-1.25 (0.212)	-1.25 (0.211)	-1.11 (0.268)
Z1	17.98***	163.24***	526.95***
Z2		5.79***	3.09***
Z3	5.66***	7.23***	4.83***
No. of observations	1494	1494	1494

M2, Statistic test for lack of second-order serial correlation in the first-difference residual.

Z1, Wald test of the joint significance of reported coefficients.

Z2, Wald test of the joint significance of time dummies.

Z3, Wald test of the joint significance of industry dummies.

*, **, ***indicate significance at 10, 5, 1%, respectively.

and the leading role played by institutional investors and minority shareholders may encourage the short-term performance of companies with higher media visibility, as these investors tend to consider the results of their portfolios in the short term. However, in the continental European context, the role of the media seems to be more linked to enhancing firm trust and credibility for investors and other external actors, thereby boosting the likelihood that resources can be raised for innovation. The media also increase concern for the reputation of managers and dominant owners, thereby incentivising innovation as a way of coping with stakeholder demands. Our results are in line with those obtained by Chen et al. [21], Gao et al. [22], and Hu et al. [23] focusing on Chinese firms. The findings thus suggest that in settings of ownership concentration, the media incentivise investment in innovation, regardless of the level of press freedom.

The results point to important theoretical implications since they highlight the importance of media attention as a driver of innovation in business settings. This mechanism may be particularly relevant as a catalyst for corporate innovation in a setting where the legal system is an inefficient corporate governance mechanism, as is the case in most continental European countries [25]. Moreover, from a practical

perspective, our results indicate that policymakers and regulators should pay particular attention to mechanisms that augment the transparency of manager and dominant owner performance in order to drive investment in innovation. Aspects such as freedom of the press and the dissemination of news through specialised media can be instruments that boost the economic growth and competitiveness of firms by encouraging innovation. Additionally, our results have managerial implications, and indicate that managers should take an active role in their relationship with the media in order to develop media relations strategies as a mechanism to stimulate the possibilities for innovation. The results therefore suggest that managers should align the firm's innovation and communication investment decisions.

This study is not without limitations. Although our results can be extrapolated to other countries that have similar institutional environments –such as continental European countries– it may be necessary to consider other extra-legal aspects that might affect the role of the media, such as culture. Finally, the study opens the door to expanding future lines of research. For example, it might be interesting to explore the effect of media attention depending on the nature of the dominant owner (i.e. families or institutional investors). It might also prove enlightening to examine the effect of media attention on other innovation variables, such as patents or corporate procedures.

APPENDIX

Table A
Definitions of variables

Measures of R&D	
R&D	R&D expenditures over total assets.
R&D(Employees)	The relationship of R&D expenditures over employees.
R&D(Sales)	The relationship of R&D expenditures over sales.
Measures of media visibility	
MEDIA	The natural logarithm of 1 plus the number of news items on a firm reported by <i>Expansión</i> , <i>Cinco Días</i> , <i>El Economista</i> , <i>Financial Times</i> , <i>Wall Street Journal</i> , <i>Reuters</i> , <i>Dow Jones</i> , and <i>Business Wire</i> .
MEDIA_R&D	The natural logarithm of 1 plus the number of news items on a firm reported by <i>Expansión</i> , <i>Cinco Días</i> , <i>El Economista</i> , <i>Financial Times</i> , <i>Wall Street Journal</i> , <i>Reuters</i> , <i>Dow Jones</i> , and <i>Business Wire</i> , when the news is related to corporate innovation.
Control variables	
ROA	Return on assets, computed as earnings before interest, taxes, depreciation, and amortization divided by total assets.
QTOBIN	Market value of equity plus total debt, all divided by total assets.
MAT	The net value of property, plant, and equipment scaled by assets.
DEBT	The sum of short- and long-term debt divided by total assets.
SIZE	The natural logarithm of total assets.
VOTING	The voting rights of the largest shareholders.
AGE	The natural logarithm of one plus the firm's age in a given year.
DUALITY	Dummy variable that takes the value 1 if the CEO is the chair, and 0 otherwise.
Instrumental variable	
DISTANT	The natural logarithm of average value of the kilometres separating a firm's headquarters and the offices of the media
Other variables	
REGULATED_IND	Dummy variable that takes the value 1 if the firm belongs to a regulated sector (energy, infrastructure, transport and communications), and zero otherwise.
PYRAMIDS	Dummy variable that takes the value 1 when the dominant shareholder controls the company through a pyramid structure which allows them to own more voting than cash flow rights, and zero otherwise.
RISK	Dummy variable that takes the value 1 if the firm is at risk of bankruptcy, using Altman's Z-score, and zero otherwise. A firm is at risk of bankruptcy if its Z-score is ≤ 1.81 . The Altman Z-score is calculated as $1.2A + 1.4B + 3.3C + 0.6D + 1.0E$, where; A is working capital divided by total assets, B is retained earnings divided by total assets, C is earnings before interest and taxes divided by total assets, D is the market value of equity divided by total liabilities, and E is sales divided by total assets.

References

- [1] B. Guo, D. Pérez-Castrillo, A. Toldrà-Simats, Firms' innovation strategy under the shadow of analyst coverage, *J. Financ. Econ.* 131 (2019) 456–483, <https://doi.org/10.1016/j.jfineco.2018.08.005>.
- [2] S.O. Caballero-Morales, Innovation as recovery strategy for SMEs in emerging economies during the COVID-19 pandemic, *Res. Int. Bus. Financ.* 57 (2021) 101396, <https://doi.org/10.1016/j.ribaf.2021.101396>.
- [3] R. Rodrigues, A. Samagaio, T. Felício, Corporate governance and R&D investment by European listed companies, *J. Bus. Res.* 115 (2020) 289–295, <https://doi.org/10.1016/j.jbusres.2019.11.070>.
- [4] N.L. Díaz-Díaz, F.J. López-Iturriaga, D.J. Santana-Martín, The role of political ties and political uncertainty in corporate innovation, *Long. Range Plan.* 55 (2022) 102111, <https://doi.org/10.1016/j.lrp.2021.102111>.
- [5] C. Kurzhals, L. Graf-Vlachy, A. König, Strategic leadership and technological innovation: a comprehensive review and research agenda, *Corp. Gov.* 28 (2020) 437–464, <https://doi.org/10.1111/corg.12351>.
- [6] I. Miroshnychenko, A. De Massis, Three decades of research on corporate governance and R&D investments: a systematic review and research agenda, *R D Manag.* 50 (2020) 648–666, <https://doi.org/10.1111/rdm.12432>.

CRedit authorship contribution statement

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Data availability

Data will be made available on request.

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- [7] M.V. Dani, A.V. Gandhi, Understanding the drivers of innovation in an organization: a literature review, *Int. J. Innov. Sci.* 14 (2022) 476–505, <https://doi.org/10.1108/IJIS-10-2020-0201>.
- [8] B.J. Bushee, J.E. Core, W. Guay, S.J. Hamm, The role of the business press as an information intermediary, *J. Account. Res.* 48 (2010) 1–19, <https://doi.org/10.1111/j.1475-679X.2009.00357.x>.
- [9] A. Dyck, N. Volchkova, L. Zingales, The corporate governance role of the media: evidence from Russia, *J. Financ.* 63 (2008) 1093–1135, <https://doi.org/10.1111/j.1540-6261.2008.01353.x>.
- [10] L. Fang, J. Peress, Media coverage and the cross-section of stock returns, *J. Financ.* 64 (2009) 2023–2052, <https://doi.org/10.1111/j.1540-6261.2009.01493.x>.
- [11] B. Liu, J.J. McConnell, The role of the media in corporate governance: do the media influence managers' capital allocation decisions? *J. Financ. Econ.* 110 (2013) 1–17, <https://doi.org/10.1016/j.jfineco.2013.06.003>.
- [12] K.R. Ahern, D. Sosyura, Who writes the news? Corporate press releases during merger negotiations, *J. Financ.* 69 (2014) 241–291, <https://doi.org/10.1111/jofi.12109>.
- [13] B. Lauterbach, A. Pajuste, The media and firm reputation roles in corporate governance improvements: lessons from European dual class share unifications, *Corp. Gov.* 25 (2017) 4–19, <https://doi.org/10.1111/corg.12153>.
- [14] A. Dyck, L. Zingales, The Corporate Governance Role of the Media, 2002, <https://doi.org/10.2139/ssrn.335602>. Working Paper. NBER.
- [15] K.A. Farrell, D.A. Whidbee, Monitoring by the financial press and forced CEO turnover, *J. Bank Financ.* 26 (2002) 2249–2276, [https://doi.org/10.1016/S0378-4266\(01\)00183-2](https://doi.org/10.1016/S0378-4266(01)00183-2).
- [16] T.G. Pollock, V.P. Rindova, Media legitimization effects in the market for initial public offerings, *Acad. Manag. J.* 46 (2003) 631–642, <https://doi.org/10.5465/30040654>.
- [17] G.S. Miller, The press as a watchdog for accounting fraud, *J. Account. Res.* 44 (2006) 1001–1033, <https://doi.org/10.1111/j.1475-679X.2006.00224.x>.
- [18] B.M. Wiesenfeld, K.A. Wurthmann, D.C. Hambrick, The stigmatization and devaluation of elites associated with corporate failures: a process model, *Acad. Manag. Rev.* 33 (2008) 231–251, <https://doi.org/10.5465/amr.2008.27752771>.
- [19] M.K. Bednar, Watchdog or lapdog? A behavioral view of the media as a corporate governance mechanism, *Acad. Manag. J.* 55 (2012) 131–150, <https://doi.org/10.5465/amj.2009.0862>.
- [20] L. Dai, R. Shen, B. Zhang, Does the media spotlight burn or spur innovation? *Rev. Account. Stud.* 26 (2021) 343–390, <https://doi.org/10.1007/s11142-020-09553-w>.
- [21] Z. Chen, J. Jin, M. Li, Does media coverage influence firm green innovation? The moderating role of regional environment, *Technol. Soc.* 70 (2022) 102006, <https://doi.org/10.1016/j.techsoc.2022.102006>.
- [22] J. Gao, H. Wu, J. You, M. Smith, Green media coverage and corporate green innovation, *J. Bus. Finan. Account.* (2024) 1–43, <https://doi.org/10.1111/jbfa.12802>.
- [23] G. Hu, J.-H. Luo, L. Han, T. Liu, Does media spotlight really burn innovation? Evidence from China, *Pac.-Basin Financ. J.* 83 (2024) 102240, <https://doi.org/10.1016/j.pacfin.2023.102240>.
- [24] R. La Porta, F. Lopez-de-Silanes, A. Shleifer, Corporate ownership around the world, *J. Financ.* 54 (1999) 471–517, <https://doi.org/10.1111/0022-1082.00115>.
- [25] S. Djankov, R. La Porta, F. Lopez-de-Silanes, A. Shleifer, The law and economics of self-dealing, *J. Financ. Econ.* 88 (2008) 430–465, <https://doi.org/10.1016/j.jfineco.2007.02.007>.
- [26] B. Dharwadkar, G. George, P. Brandes, Privatization in emerging economies: an agency theory perspective, *Acad. Manag. Rev.* 25 (2000) 650–669, <https://doi.org/10.5465/amr.2000.3363533>.
- [27] M.N. Young, M.W. Peng, D. Ahlstrom, G.D. Bruton, Y. Jiang, Corporate governance in emerging economies: a review of the principal–principal perspective, *J. Manage. Stud.* 45 (2008) 196–220, <https://doi.org/10.1111/j.1467-6486.2007.00752.x>.
- [28] J.D. Piotroski, T.J. Wong, T. Zhang, Political bias in corporate news: the role of conglomeration reform in China, *J. Law Econ.* 60 (2017) 173–207, <https://doi.org/10.1086/693096>.
- [29] R. La Porta, F. Lopez-de-Silanes, A. Shleifer, R.W. Vishny, Law and finance, *J. Polit. Econ.* 106 (1998) 1113–1155, <https://doi.org/10.1086/250042>.
- [30] R. La Porta, F. Lopez-de-Silanes, A. Shleifer, R. Vishny, Investor protection and corporate governance, *J. Financ. Econ.* 58 (2000) 3–27, [https://doi.org/10.1016/S0304-405X\(00\)00065-9](https://doi.org/10.1016/S0304-405X(00)00065-9).
- [31] J.R. Brown, G. Martinsson, B.C. Petersen, What promotes R&D? Comparative evidence from around the world, *Res. Pol.* 46 (2017) 447–462, <https://doi.org/10.1016/j.respol.2016.11.010>.
- [32] L.Y. Zhang, M. Toffanin, The information environment of the firm and the market valuation of R&D, *J. Bus. Finan. Account.* 45 (2018) 1051–1081, <https://doi.org/10.1111/jbfa.12349>.
- [33] R.I. Zhong, Transparency and firm innovation, *J. Account. Econ.* 66 (2018) 67–93, <https://doi.org/10.1016/j.jacceco.2018.02.001>.
- [34] R. Ball, L. Shivakumar, Earnings quality in UK private firms: comparative loss recognition timeliness, *J. Account. Econ.* 39 (2005) 83–128, <https://doi.org/10.1016/j.jacceco.2004.04.001>.
- [35] C. Bona-Sánchez, J. Pérez-Alemán, D.J. Santana-Martín, Ultimate ownership and earnings conservatism, *Eur. Account. Rev.* 20 (2011) 57–80, <https://doi.org/10.1080/09638180903384676>.
- [36] J.R. Brown, G. Martinsson, Does transparency stifle or facilitate innovation? *Manage. Sci.* 65 (2019) 1600–1623, <https://doi.org/10.1287/mnsc.2017.3002>.
- [37] V. Scuotto, A. García-Perez, V. Cillo, E. Giacosa, Do stakeholder capabilities promote sustainable business innovation in small and medium-sized enterprises? Evidence from Italy, *J. Bus. Res.* 119 (2020) 131–141, <https://doi.org/10.1016/j.jbusres.2019.06.025>.
- [38] J. Peress, Learning from stock prices and economic growth, *Rev. Financ. Stud.* 27 (2014) 2998–3059, <https://doi.org/10.1093/rfs/hhu021>.
- [39] S. Mullainathan, A. Shleifer, The market for news, *Am. Econ. Rev.* 95 (2005) 1031–1053, <https://doi.org/10.1257/0002828054825619>.
- [40] X. Gao, W. Xu, D. Li, L. Xing, Media coverage and investment efficiency, *J. Empir. Financ.* 63 (2021) 270–293, <https://doi.org/10.1016/j.jempfin.2021.07.002>.
- [41] D.L. Deephouse, Media reputation as a strategic resource: an integration of mass communication and resource-based theories, *J. Manag.* 26 (2000) 1091–1112, <https://doi.org/10.1177/014920630002600602>.
- [42] L. Graf-Vlachy, Media coverage of firms: background, integration, and directions for future research, *J. Manag.* 46 (2020) 36–69, <https://doi.org/10.1177/0149206319864155>.
- [43] A.A. Elias, R.Y. Cavana, L.S. Jackson, Stakeholder analysis for R&D project management, *R D Manag.* 32 (2002) 301–310, <https://doi.org/10.1111/1467-9310.00262>.
- [44] R. Konadu, S. Owusu-Agyei, T.A. Lartey, A. Danso, S. Adomako, J. Amankwah-Amoah, CEOs' reputation, quality management and environmental innovation: the roles of stakeholder pressure and resource commitment, *Bus. Strateg. Environ.* 29 (2020) 2310–2323, <https://doi.org/10.1002/bse.2504>.
- [45] N.O. Ommen, M. Blut, C. Backhaus, D.M. Woisetschläger, Toward a better understanding of stakeholder participation in the service innovation process: more than one path to success, *J. Bus. Res.* 69 (2016) 2409–2416, <https://doi.org/10.1016/j.jbusres.2016.01.010>.
- [46] P.C. Fiss, E.J. Zajac, The symbolic management of strategic change: sensegiving via framing and decoupling, *Acad. Manag. J.* 49 (2006) 1173–1193, <https://doi.org/10.5465/amj.2006.23478255>.
- [47] S.C. Zygildopoulos, A.P. Georgiadi, C.E. Carroll, D.S. Siegel, Does media attention drive corporate social responsibility? *J. Bus. Res.* 65 (2012) 1622–1627, <https://doi.org/10.1016/j.jbusres.2011.10.021>.
- [48] X. Gao, W. Xu, D. Li, Media coverage and corporate risk-taking: international evidence, *J. Multinat. Financ. Manag.* 65 (2022) 100738, <https://doi.org/10.1016/j.mulfin.2022.100738>.
- [49] J.R. Joe, H. Louis, D. Robinson, Managers' and investors' responses to media exposure of board ineffectiveness, *J. Financ. Quant. Anal.* 44 (2009) 579–605, <https://doi.org/10.1017/S0022109009900044>.
- [50] J. You, B. Zhang, L. Zhang, Who captures the power of the pen? *Rev. Financ. Stud.* 31 (2018) 43–96, <https://doi.org/10.1093/rfs/hhx055>.
- [51] S.E. Ghoul, A. Gong, O. Guedhami, F. Hou, W.H.S. Tong, Social trust and firm innovation, *J. Int. Financ. Mark. Inst. Money* 84 (2023) 101745, <https://doi.org/10.1016/j.intfin.2023.101745>.
- [52] J. Kondo, D. Li, D. Papanikolaou, Trust, collaboration, and economic growth, *Manag. Sci.* 67 (2021) 1825–1850, <https://doi.org/10.1287/mnsc.2019.3545>.
- [53] C.P. Ruppel, S.J. Harrington, The relationship of communication, ethical work climate, and trust to commitment and innovation, *J. Bus. Ethics* 25 (2000) 313–328, <https://doi.org/10.1023/A:1006290432594>.
- [54] H.K. Wang, J.F. Tseng, Y.F. Yen, How do institutional norms and trust influence knowledge sharing? An institutional theory, *Innov.-Organ. Manag.* 16 (2014) 374–391, <https://doi.org/10.1080/14479338.2014.11081994>.
- [55] B.H. Hall, The financing of research and development, *Oxf. Rev. Econ. Pol.* 18 (2002) 35–51, <https://doi.org/10.1093/oxrep/18.1.35>.
- [56] J.R. Graham, C.R. Harvey, S. Rajgopal, The economic implications of corporate financial reporting, *J. Account. Econ.* 40 (2005) 3–73, <https://doi.org/10.1016/j.jacceco.2005.01.002>.
- [57] M.M. Keupp, O. Gassmann, Determinants and archetype users of open innovation, *R D Manag.* 39 (2009) 331–341, <https://doi.org/10.1111/j.1467-9310.2009.00563.x>.
- [58] F. Honoré, F. Munari, B.V.P. de La Potterie, Corporate governance practices and companies' R&D intensity: evidence from European countries, *Res. Pol.* 44 (2015) 533–543, <https://doi.org/10.1016/j.respol.2014.10.016>.
- [59] J. Pindado, V. de Queiroz, C. de la Torre, How do country-level governance characteristics impact the relationship between R&D and firm value? *R D Manag.* 45 (2015) 515–526, <https://doi.org/10.1111/radm.12115>.
- [60] M.C. Jensen, W.H. Meckling, Theory of the firm: managerial behavior, agency costs and ownership structure, *J. Financ. Econ.* 3 (1976) 305–360, [https://doi.org/10.1016/0304-405X\(76\)90026-X](https://doi.org/10.1016/0304-405X(76)90026-X).
- [61] A. Shleifer, R.W. Vishny, A survey of corporate governance, *J. Financ. Econ.* 52 (1997) 737–783, <https://doi.org/10.1111/j.1540-6261.1997.tb04820.x>.
- [62] S. Claessens, S. Djankov, L.H. Lang, The separation of ownership and control in East Asian corporations, *J. Financ. Econ.* 58 (2000) 81–112, [https://doi.org/10.1016/S0304-405X\(00\)00067-2](https://doi.org/10.1016/S0304-405X(00)00067-2).
- [63] P. Bolton, E.L. Von Thadden, Blocks, liquidity, and corporate control, *J. Financ.* 53 (1998) 1–25, <https://doi.org/10.1111/0022-1082.15240>.
- [64] R. Minetti, P. Murro, M. Paiella, Ownership structure, governance, and innovation, *Eur. Econ. Rev.* 80 (2015) 165–193, <https://doi.org/10.1016/j.euroecorev.2015.09.007>.
- [65] T.H. Choi, J. Jung, Ethical commitment, financial performance, and valuation: an empirical investigation of Korean companies, *J. Bus. Ethics* 81 (2008) 447–463, <https://doi.org/10.1007/s10551-007-9506-1>.
- [66] D. Aboody, B. Lev, Information asymmetry, R&D, and insider gains, *J. Financ.* 55 (2000) 2747–2766, <https://doi.org/10.1111/0022-1082.00305>.

- [67] M. Heeley, S. Matusik, N. Jain, Innovation, appropriability, and the underpricing of initial public offerings, *Acad. Manag. J.* 50 (2007) 209–225, <https://doi.org/10.5465/amj.2007.24162388>.
- [68] R.M. Bushman, A.J. Smith, Financial accounting information and corporate governance, *J. Account. Econ.* 32 (2001) 237–333, [https://doi.org/10.1016/S0165-4101\(01\)00027-1](https://doi.org/10.1016/S0165-4101(01)00027-1).
- [69] A. Falato, D. Li, T. Milbourn, Which skills matter in the market for CEOs? Evidence from pay for CEO credentials, *Manage. Sci.* 61 (2015) 2845–2869, <https://doi.org/10.1287/mnsc.2014.2024>.
- [70] R.M. Bushman, C.D. Williams, R. Wittenberg-Moerman, The informational role of the media in private lending, *J. Account. Res.* 55 (2017) 115–152, <https://doi.org/10.1111/1475-679X.12131>.
- [71] P.C. Tetlock, M. Saar-Tsechansky, S. Macskassy, More than words: quantifying language to measure firms' fundamentals, *J. Financ.* 63 (2008) 1437–1467, <https://doi.org/10.1111/j.1540-6261.2008.01362.x>.
- [72] J.E. Core, W. Guay, D.F. Larcker, The power of the pen and executive compensation, *J. Financ. Econ.* 88 (2008) 1–25, <https://doi.org/10.1016/j.jfineco.2007.05.001>.
- [73] M. Gentzkow, J.M. Shapiro, What drives media slant? Evidence from US daily newspapers, *Econometrica* 78 (2010) 35–71, <https://doi.org/10.3982/ECTA7195>.
- [74] Ernst & Young, *Short-termism in Business: Causes, Mechanisms and Consequences*, 2014.
- [75] U. Malmendier, G. Tate, Superstar ceos, *Q. J. Econ.* 124 (4) (2009) 1593–1638, <https://doi.org/10.1162/qjec.2009.124.4.1593>.
- [76] D.P. Baron, Managerial contracting and corporate social responsibility, *J. Public Econ.* 92 (2008) 268–288, <https://doi.org/10.1016/j.jpubeco.2007.05.008>.
- [77] A. Barnea, A. Rubin, Corporate social responsibility as a conflict between shareholders, *J. Bus. Ethics* 97 (2010) 71–86, <https://doi.org/10.1007/s10551-010-0496-z>.
- [78] S. Bear, N. Rahman, C. Post, The impact of board diversity and gender composition on corporate social responsibility and firm reputation, *J. Bus. Ethics* 97 (2010) 207–221, <https://doi.org/10.1007/s10551-010-0505-2>.
- [79] R. Borghesi, J.F. Houston, A. Naranjo, Corporate socially responsible investments: CEO altruism, reputation, and shareholder interests, *J. Corp. Financ.* 26 (2014) 164–181, <https://doi.org/10.1016/j.jcorpfin.2014.03.008>.
- [80] L. Baselga-Pascual, A. Trujillo-Ponce, E. Vähämaa, S. Vähämaa, Ethical reputation of financial institutions: do board characteristics matter? *J. Bus. Ethics* 148 (2018) 489–510, <https://doi.org/10.1007/s10551-015-2949-x>.
- [81] D. Peña-Martel, J. Pérez-Alemán, D.J. Santana-Martín, Media visibility and board gender diversity, *Bus. Ethics, Environ. Responsib.* 31 (2022) 192–208, <https://doi.org/10.1111/beer.12382>.
- [82] D. Hirshleifer, A. Low, S.H. Teoh, Are overconfident CEOs better innovators? *J. Financ.* 67 (2012) 1457–1498, <https://doi.org/10.1111/j.1540-6261.2012.01753.x>.
- [83] P.H. Hsu, X. Tian, Y. Xu, Financial development and innovation: cross-country evidence, *J. Financ. Econ.* 112 (2014) 116–135, <https://doi.org/10.1016/j.jfineco.2013.12.002>.
- [84] B. Balsmeier, L. Fleming, G. Manso, Independent boards and innovation, *J. Financ. Econ.* 123 (2017) 536–557, <https://doi.org/10.1016/j.jfineco.2016.12.005>.
- [85] J. Bena, M.A. Ferreira, P. Matos, P. Pires, Are foreign investors locusts? The long-term effects of foreign institutional ownership, *J. Financ. Econ.* 126 (2017) 122–146, <https://doi.org/10.1016/j.jfineco.2017.07.005>.
- [86] O. Faleye, T. Kovacs, A. Venkateswaran, Do better-connected CEOs innovate more? *J. Financ. Quant. Anal.* 49 (2014) 1201–1225, <https://doi.org/10.1017/S0022109014000714>.
- [87] D. Peña-Martel, J. Pérez-Alemán, D.J. Santana-Martín, The role of the media in creating earnings informativeness: evidence from Spain, *BRQ-Bus. Res. Q.* 21 (2018) 168–179, <https://doi.org/10.1016/j.brq.2018.03.00>.
- [88] S.M. Tsao, Y.W. Chang, K. Koh, Founding family ownership and myopic R&D investment behaviour, *J. Account. Audit. Financ. Times* 34 (2019) 361–384, <https://doi.org/10.1177/0148558X17704>.
- [89] R. Yuan, W. Wen, Managerial foreign experience and corporate innovation, *J. Corp. Financ.* 48 (2018) 752–770, <https://doi.org/10.1016/j.jcorpfin.2017.12.015>.
- [90] J. Atanassov, Do hostile takeovers stifle innovation? Evidence from antitakeover legislation and corporate patenting, *J. Financ.* 68 (2013) 1097–1131, <https://doi.org/10.1111/jofi.12019>.
- [91] N. Lacetera, Corporate governance and the governance of innovation: the case of pharmaceutical industry, *J. Manag. Gov.* 5 (2001) 29–59, <https://doi.org/10.1023/A:1017907119114>.
- [92] P.M. Lee, A comparison of ownership structures and innovations of US and Japanese firms, *Manag. Decis. Econ.* 26 (2005) 39–50, <https://doi.org/10.1002/mde.1188>.
- [93] R. Ortega-Argiles, R. Moreno, J.S. Caralt, Ownership structure and innovation: is there a real link? *Ann. Reg. Sci.* 39 (2005) 637–662, <https://doi.org/10.1007/s00168-005-0026-6>.
- [94] C. Crossland, D.C. Hambrick, How national systems differ in their constraints on corporate executives: a study of CEO effects in three countries, *Strateg. Manage. J.* 28 (2007) 767–789, <https://doi.org/10.1002/smj.610>.
- [95] T. Yang, S. Zhao, CEO duality and firm performance: evidence from an exogenous shock to the competitive environment, *J. Bank Financ.* 49 (2014) 534–552, <https://doi.org/10.1016/j.jbankfin.2014.04.008>.
- [96] N. Aktas, P.C. Andreou, I. Karasamani, D. Philip, CEO duality, agency costs, and internal capital allocation efficiency, *British J. Manag.* 30 (2019) 473–493, <https://doi.org/10.1111/1467-8551.12277>.
- [97] H. Sun, F. Cappa, J. Zhu, E. Peruffo, The effect of CEO social capital, CEO duality and state-ownership on corporate innovation, *Int. Rev. Financ. Anal.* 87 (2023) 102605, <https://doi.org/10.1016/j.irfa.2023.102605>.
- [98] J. Engelberg, C. Parsons, The causal impact of media in financial markets, *J. Financ.* 66 (2011) 67–97, <https://doi.org/10.1111/j.1540-6261.2010.01626.x>.
- [99] U. Gurun, A. Butler, Don't believe the hype: local media slant, local advertising, and firm value, *J. Financ.* 67 (2012) 561–698, <https://doi.org/10.1111/j.1540-6261.2012.01725.x>.
- [100] B. Liu, J.J. McConnell, W. Xu, The power of the pen reconsidered: the media, CEO human capital, and corporate governance, *J. Bank Financ.* 76 (2017) 175–188, <https://doi.org/10.1016/j.jbankfin.2016.12.004>.
- [101] R. Blundell, S. Bond, Initial conditions and moment restrictions in dynamic panel data models, *J. Econom.* 87 (1998) 115–143, [https://doi.org/10.1016/S0304-4076\(98\)00009-8](https://doi.org/10.1016/S0304-4076(98)00009-8).
- [102] A.H. Studenmund, *Using Econometrics: A Practical Approach*, Addison-Wesley, Boston, 1997.
- [103] M. O'Connor, M. Rafferty, Corporate governance and innovation, *J. Financ. Quant. Anal.* 47 (2012) 397–413, <https://doi.org/10.1017/S002210901200004X>.
- [104] A. Ferraris, C. Giachino, F. Ciampi, J. Couturier, R&D internationalization in medium-sized firms: the moderating role of knowledge management in enhancing innovation performances, *J. Bus. Res.* 128 (2021) 711–718, <https://doi.org/10.1016/j.jbusres.2019.11.003>.
- [105] Y.Y. Kor, Direct and interaction effects of top management team and board compositions on R&D investment strategy, *Strateg. Manage. J.* 27 (2006) 1081–1099, <https://doi.org/10.1002/smj.554>.
- [106] C.A. Cassell, S.X. Huang, J.M. Sanchez, M.D. Stuart, Seeking safety: the relation between CEO inside debt holdings and the riskiness of firm investment and financial policies, *J. Financ. Econ.* 103 (2012) 588–610, <https://doi.org/10.1016/j.jfineco.2011.10.008>.
- [107] R.A. Buchholz, S.B. Rosenthal, Stakeholder theory and public policy: how governments matter, *J. Bus. Ethics* 51 (2004) 143–153, <https://doi.org/10.1023/B:BUSI.0000033608.61005.1f>.
- [108] M. Faccio, L.H. Lang, The ultimate ownership of Western European corporations, *J. Financ. Econ.* 65 (2002) 365–395, [https://doi.org/10.1016/S0304-405X\(02\)00146-0](https://doi.org/10.1016/S0304-405X(02)00146-0).
- [109] E.I. Altman, Financial ratios, discriminant analysis and the prediction of corporate bankruptcy, *J. Financ.* 23 (1968) 589–609, <https://doi.org/10.2307/2978933>.