




“Shock events: The impact of news media and communication strategies on listed companies’ share price”

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SHOCK EVENTS: THE IMPACT OF NEWS MEDIA AND COMMUNICATION STRATEGIES ON LISTED COMPANIES' SHARE PRICE

Abstract

Academics studied the theory of a company's communication when it is involved into a crisis but they were less concerned about the impact of the communication on a listed company's share price, especially when it resulted from a shock event. There is a lack of information about the role played by news media. The aim of this paper is to investigate if in cases of shock events (i) a company's response strategy has a different effect on shareholders, observing the effect on share prices, and (ii) how the news media can affect the value change. Using the event study methodology, the Cumulative Abnormal Return of companies' share prices involved in shock events was calculated. Statistics show a best effect of an accommodative response than a defensive strategy in cases of scandals and product recalls. There is no valuable impact of company communication in cases of incidents. With news media variable, the results show a worsening effect with bad news and a mitigating effect with good news. It was proved that the impact of a response strategy is surpassed by news media. When there is absolute certainty of guilt for a given situation, it is more convenient for management to apologize, and when there is no certainty, there was no substantial difference, because in the mind of an investor the focus shifts to the event itself. The news media has been shown to have a huge impact on investor perception, even more so than a company's best response strategy.

Keywords

communication theory, shock events, emotional
reaction, news media, financial markets, event studies

JEL Classification

G14, G41

INTRODUCTION

The analyses to discover whether there is a link between the market share price of a company involved in an event crisis and the communication used to make public that event for listed companies, is one of the topics in the finance crisis communication theory.

Several academic studies have attempted to estimate the trend of a company's share price during a crisis and the consequent reactions from shareholders. Marcus and Goodman (1991) and Ferretti et al. (2015) tried to establish whether the type of declaration had any effect on the corresponding share price. Coombs (2006) regards the best type of response to propose when a specific crisis occurs, where the first step consists in clustering the shock event types and then to link the more appropriate communication strategy to each cluster. Jim et al. (2010) apply a psychological approach to understand the individual emotion felt by a generic shareholder.

Another important topic has emerged concurrent with the study carried out about Crisis Communication: the role of news media. Relevant studies (Kim & Cameron, 2011; An et al., 2011) have shown how in-

dividuals, in most cases, despite being interested in the information provided by a company, are more influenced by what they read in the daily papers than by company announcements and have established how the news may generate a certain type of impact on the emotional state experienced by the reader.

This study focuses on those crises originated by shock events, where minimum responsibility could be placed on company management, and it is explored which is the best declaration that managers have to announce to the market in the event of crisis in order to guide investors' behavior, who often find themselves in an asymmetrical position following a shock event.

The event study methodology has been detected as being the most suitable instrument for this type of study, as it allows considering multiple variables and identifying a time window for carrying out the analysis.

Indeed, in such cases most of studies aiming to find variations in share prices carry out a short-term analysis as in this way it is easier to manage to exclude those external factors that may invalidate results. For such reasons, the test shall be carried out over a total ten-day time frame: two days before and seven days after the date of the event.

1. LITERATURE REVIEW, THEORETICAL FRAMEWORK AND HYPOTHESES

In relation to the purpose, firstly it's necessary to define the shock event, based on the concept of crisis. Various researchers (Weiner & Kahn, 1972) began to specifically address the concept of crisis, identifying three key elements that may lead a company to the crisis: high threat, limited time for decision making, and surprise element.

The analysis by Pearson and Claire (1998) is related to these three points, since the crisis is defined as "a low probability but high impact event which threatens the company's profitability and is characterized by ambiguity on the cause, the effects and the means with which it will be solved, as on the decisions which must be made rapidly."

The main points of a crisis may be also used to consider the key characteristics of a shock event which, however, only turns out to be one part of the crisis process and it stands out for its speed of execution, which always allows one to identify the day on which it has occurred.

The literature has carried out important research on the subject, but the main study is Timothy Coombs' (1995–2010) *Situational Crisis Communication Theory* (SCCT). It is a theory

developed as a search guide concerning the best types of responses that a company intends to propose when a specific crisis occurs; for the purposes of this paper, it can be useful to understand whether it is connected with a company's financial recovery following the event.

To make any type of analysis, it is necessary to classify shock events; the basic principle offered here has been that investors attribute responsibilities to companies, whereby reputation becomes a crucial element for the purposes of the valuation of an investment.

Hence, shock events fall into the following different categories:

- a) **Incidents:** Unpredictable events for which investors are uncertain as regards a company's responsibility and in which the company itself may also turn out to be a victim of the crisis.
- b) **Scandals:** This type of a shock event is mainly attributable to a company. The behavior behind this type of shock event is often the result of shortcomings and slyness on the part of a particular entity.
- c) **Product recall:** This typology includes all cases in which a company has put on sale a product, which has turned out to be substandard or faulty and it has been obliged to recall it due to actual or potential damages.

During the last two decades there has been a rapid development in the research on *Crisis Communication*; after Coombs there were *Covariation-Based Causal Attributions* (Schwarz, 2008) and the *ICM model* (Jin, et al., 2007–2012). All the authors started from a psychological theory, which is used to study the different behavior that most people have in these types of situations, what is known as *Attribution Theory* (AT) by Bernard Weiner (1985, 2006, 2014).

The *Attribution Theory* wants to identify factors that influence the opinion of any one person and how these factors will modify behavior and attitudes. Jolly and Mowen (1985) analyzed the effects on consumers of the recall of the product from the market, and they proved that a socially responsible action by a company led to public acceptance by bodies that had previously forced the company to recall the product, thus implicitly increasing the consumers' trust. Stockmyer (1996) examined the behavior resulting from product tampering in terms of variations in consumers' purchase intentions, Jorgensen (1996) studied the relationship between the response given by a company following an incident and consumer behavior, and finally, Bradford and Garnett (1995) tried to study the cases of unethical behavior verifying the relationship that was created between the crisis situation, the company's response and the effects caused by the correlation between the two elements. However, companies are more reluctant to take the blame given the possibility of thereby worsening their legal responsibility (Benoit, 1997).

Unlike previous studies, the SCCT tries to connect the potential damage to a company's image, which a crisis may provoke with the organizations' responsibility for what has happened.

Furthermore, Coombs deals with the main sources of information, that is, with the media; indeed, the news one can find on the daily papers identify the guidelines to be followed in order to direct the type of crisis in the right group. Hence, a crucial issue for the management may be to go and publicly report their version of the facts, at odds with the circumstances reported by the newspapers (Coombs, 2007).

In 2008, A. Schwarz tries to pursue what Coombs had begun, using as a hypothesis the covariation

principle outlined by Kelley (1973) at the beginning of the 70s.

The covariation principle has highlighted that any isolated analysis of the effect of information on the attribution process may be misleading. Basically, relative to SCCT, a further strategy, prior to carrying out what is known as market communication, is that of influencing the knowledge acquisition of information. In other words, having relationships with influential newspapers or media, or special relationships with the most important stakeholders. All this would take place before the company's response concerning the crisis. Although this topic is strictly interesting, it was not possible for this study to collect this type of information.

Pang, Jin and Cameron were the main proponents of the Integrated Crisis Mapping model (2007–2012), who have built on Lazarus' intuitions (1991) about the formulation of the *Appraisal theory*.

At a primary level, it concerns the involvement in a situation of any one person, with reference to the relevance and to the consistency of the objectives. On the other hand, congruence ensures that an event is viewed positively; on the contrary, the objective's incongruence provokes a negative emotion. Finally, the involved parties shall be taken into consideration about their involvement in contribution to and responsibility in the event (Lazarus, 1991). At the secondary level, it concerns the different behavior that the involved parties may engage in when they must face the crisis.

From their numerous checks of ICM, authors found that the most dominant emotional state for any one stakeholder in the primary level in all crisis categories is that of anxiety.

The subsequent emotions felt by the publics in crises involving hostile takeovers, accidents and natural disasters were variations of sadness, anger, and fright, while the subsequent emotions felt by the publics involving CEO retirement, rumor and psychopathic acts were fright and anger (Pang et al., 2009).

Moreover, it is shown that an attitude of low involvement by a company may generate anger although it is often a subsequent reaction to the above-mentioned anxiety.

In highlighting the most accepted theories in the context of Crisis Communication, the role of media (daily papers, website, etc.) is clear, since they play a crucial part in the entire process. There have been many contributions in the literature on the subject like works by Kim and Cameron (2011) and An et al. (2011), based on what is known as the *Framing Theory*¹.

Kim and Cameron's approach (2011) tries to mix the *Framing* and *Appraisal theory*. In addition, they consider the concept of depth-of-processing, which, briefly, is used to understand what kind of decision-making process follows the occurrence of an emotion. Indeed, Lerner and Tiedens (2006) have demonstrated that a specific emotion influences the depth of thought; since anger is a more "certain" emotional state, it leads individuals towards heuristic processing, as opposed to sadness, considered more "uncertain", leading to systematic processing. Kim and Cameron, in agreement with Nabi (2007), try and demonstrate Lerner and Tiedens' contribution, find out whether heuristic and systematic processing actually takes place, also when opinion and assessment are influenced by external agents, such as new media. The results of the analysis confirmed the hypothesis that the persons who experienced anger induced by a crisis reported in newspaper articles were more likely to make sudden decisions without even considering the other possible aspects of the matter. On the other hand, it has symmetrically emerged that when there was sadness, readers were more inclined to obtain more information on the event and to read the news more carefully, postponing the decisional process.

An et al. (2011), in a different manner compared to Kim and Cameron, study framing theory following the Iyengar and Simon (1993) model that identifies two different typologies, the Episodic News Frame and the Thematic News Frame respectively. The first type is characterized by the description of an event in terms of personal experience, with a focus on social and emotional issues. On the oth-

er hand, the second is characterized by a description of the event in abstract and impersonal terms. Therefore, the news media may trigger people to blame the organization and have a negative attitude, impression, and image toward the organization through their use of thematic frames (An et al., 2011). However, news media have a critical role in shaping public opinion about who is responsible for causing or solving key social problems (Iyengar & Kinder, 1987). Although An et al.'s (2011) contribution is related to the purpose of this study, it was not possible for this study to go through this type of analysis.

Summarizing, based on *Situational Crisis Communication Theory*, the following division of shock events has been agreed:

1. Incidents;
2. Scandals;
3. Product recall.

The division is in accordance with Ferretti, Profumo and Tutore (2015) although the three authors, as had previously been done by Marcus and Goodman (1991), besides considering the disasters/catastrophes, only limit themselves to observing the event objectively and to cataloguing it according to the division they have identified and do not consider other factors such as the emotional aspect experienced by shareholders up to the consideration of the news media's role.

According to ICM model, emotions can be associated with each of the event classes as indicated in the diagram below²:

Incidents → Anger – Sadness – Fright
 Scandals → Anger
 Product Recall → Anger

Two main categories of possible communication strategies adopted to companies in response to a shock event can be then identified:

1 Framing theory has been developed starting from 1974, when Erving Goffman published the "Frame analysis: An essay on the organization of experience", a study in which the sociologist stated the existence of interpretative schemes with which the human being schematizes all the information he communicates and which is communicated to him. However, Erving is only a pioneer of the theory that reached its peak in 1993, when Robert M. Entman (1993) published an article entitled Framing: Towards clarification of a fractured paradigm, in which he defines the concept of frame as an interaction between selection and salience, and then continues his analysis in 2006 with his article Framing Bias: Media in the Distribution of Power.

2 Anxiety is not present because since it is common to all three categories, it is possible to omit it.

- **Defensive strategy:** A company shall distance itself from what has occurred, it will try to minimize the effects of what has happened.
- **Accommodative strategy:** A public apology, the willingness to remedy to what has occurred by compensation, referring to the company's historical qualities.

In agreement with previous research, these two types of answers can be associated to different cases of shock depending on the previous emotional states in the following way:

Sadness³ → Defensive Declaration
 Anger → Accommodative Declaration

About news media, according to Kim and Cameron's contribution, they can be categorized as follows:

- **Bad news:** The news that harshly criticize a company blaming it openly for what happened that lead anger to a potential shareholder.
- **Good news:** The news that are not too critical of a company, or which are generally quite impartial, with the possible shift of attention on other parties that can lead sadness to a potential shareholder.

In this framework, the aim of this paper is to empirically test theoretical predictions previously discussed. In more detail, it can be considered as a two-level purpose:

1. At first, predictions from attribution theory, situational crisis communication theory and ICM model are tested looking at investors' behavior depending on the response adopted by companies in different types of shock events. The results will give more consistence to previously reported results in literature to which they can be compared.
2. The second level tries to fill a gap in previous literature providing empirical evidence, test-

ing Kim and Cameron's predictions of framing theory, about the role played by news media, how they affect investor behaviors, and which is the overall impact compared, and together with, to the adopted company communication strategies.

Both research questions are addressed by analyzing trends in the share price using the event study methodology, which investigates whether data of different samples can be considered to belong to different populations or not.

More specifically, the following hypotheses that can be stated according to relevant theories are going to be empirically tested.

H₁: In the case of incidents, investors shall manifest various emotional states, and this process will lead to assessing a defensive response and an accommodative response in the same manner.

H₂: In the case of scandals, investors will feel a state of anger and they will prefer an accommodative response to a defensive one.

H₃: In the case of product recalls, investors will feel a state of anger and they will prefer an accommodative response to a defensive one.

H₄: News media influence investors' choices, improving (good news) or worsening (bad news) the effects of company communication.

2. METHODOLOGY

The event study methodology has been deemed the most appropriate to test the hypotheses. Based on this theory, the identified communications will constitute what is known as the event. According to McWilliams and Siegel (1997), the event window will always start two days before the declaration, and will always end seven days after, to have a ten-day time window⁴. Subsequently, the estimation window will be selected over which the

3 Since it manifests itself at the same time as sadness and anger and only in the case of incidents, it has been decided to exclude fright, indeed for that specific type of shock event it has not been thought possible to consider the association of one type of announcement to be better than that of another.

4 The day of the declaration shall be $t = 0$. Hence, the days will be counted as follows -2 -1 0 +1 +2 +3 +4 +5 +6 +7.

so-called “normal” returns necessary to estimate the abnormal return will be calculated. The estimation window will be 200 days before the event. Returns on shares and of the market are computed as in (1)

$$R_t = \frac{P_t - P_{t-1}}{P_{t-1}}, \quad (1)$$

where R_t = Return at time t ; P_t = Price at time t ; P_{t-1} = Price at time $t - 1$.

With linear regression in (2), the Market Modes is estimated to get “normal” returns.

$$\hat{R}_{it} = \alpha_i + \beta_i R_{mt} + \varepsilon_{it} \quad (2)$$

where \hat{R}_{it} = “Normal” return; R_{mt} = Return of the relevant market index.

Once normal returns are estimated, it will be subtracted from the actual one, thereby deriving the abnormal return as in (3).

$$AR_{it} = R_{it} - \hat{R}_{it} = R_{it} - \hat{\alpha}_i - \hat{\beta}_i R_{mt}. \quad (3)$$

The AR will then be grouped cumulatively, the CAR (Cumulated Abnormal Return), for three different intervals over the event window. They will be calculated as follows⁵:

$$\begin{aligned} CAR1 & \left(\sum_{-2}^{+1} AR \right); \\ CAR4 & \left(\sum_{-2}^{+4} AR \right); \\ CAR7 & \left(\sum_{-2}^{+7} AR \right) \end{aligned} \quad (4)$$

Depending on the type of examined case studies, statistical tests will be carried out in order to compare two sample data sets (CARn defensive response vs. CARn accommodative response) so as to verify if the populations from which they have been extracted may be considered significantly different. For this purpose, as a first step, descriptive statistics of each sample are calculated, including the Shapiro-Wilk test (and D’Agostino-Pearson) to verify the normality of distributions, as well

as the Levene test for the equality of variances. Should the normality test be positive (normal distribution for both), a T-Test comparing averages, with equal or different variances depending on the result of the Levene test, will be used to decide whether the working hypothesis must be accepted or not. Should the result of the normality test be negative, the comparison will be carried out using Mann-Whitney’s non-parametric test.

A first analysis is carried out on the two samples (only CAR7) represented by all the defensive response cases vis-à-vis all the accommodative response cases with no distinction of shock type.

As regards H_1 formulated for the case of incidents, namely that a company’s response should not influence the results, the two-tailed test will be used. For hypotheses H_2 and H_3 , in which one expects the accommodative response to give better results than the defensive one, the one-tailed test will be used.

Concerning news media, to test H_4 , a category had to be assigned for each response associated with the type of news. In detail, four case studies have been identified:

- Defensive & Bad News
- Defensive & Good News
- Accommodative & Bad News
- Accommodative & Good News

The analysis of the impact of the news is only carried out on CAR7. The comparison between more than two samples has been carried out according to the same logic. Firstly, descriptive statistics of each sample are calculated, the Shapiro-Wilk/D’Agostino-Pearson tests are carried out to verify the normality and the Levene test to verify the equality of variances. In case of normality, an ANOVA test will allow determining whether the four groups are similar to one another or not, and should the result be that they are significantly different, the Tuckey HSD test will be used to compare the group pairs.

In case of non-normality, the first comparison will be carried out using the non-parametric Kruskal-Wallis test, and should the groups turn out to be

⁵ The CAR are the total abnormal returns up to the indicated days, the first, the fourth and the seventh after the declaration, respectively.

significantly different from one another, the following non-parametric tests will be carried out on the pairs: Nemenyi, Mann-Whitney, Dunn, Schlaich-Hamerle, Conover.

3. RESULTS AND DISCUSSION

The sample has been selected by identifying communications of companies listed on a regulated market that are involved in sensational cases of incidents, product recalls and scandals. On this basis, 39 case studies have been selected, divided into three types of events (15 incidents, 11 scandals, and 13 product recalls) starting from the beginning of the 2000s.

The sources of the announcements have been the companies' official websites, *Bloomberg's* and *Thomson Reuters Eikon's* databases and official press releases, respectively; the dataset is coherent with the studies carried out in the literature. As regards the impact of news media, the articles present on the most popular newspapers in the world⁶ have been selected, using the LexisNexis database, where it has been possible to indicate the exact period over which the viewed news should be dated, for the search. Share prices have been obtained from *Bloomberg's* and *Thomson Reuters Eikon's* databases.

As a first look to the reaction of investors to the two different possible managerial responses in case of shock events, defensive or accommodative, the data presented reports on the descriptive statistics of the two CAR7's samples of all cases, together with statistical tests.

Table 1. All cases, CAR7. Descriptive statistics and statistical tests

	Defensive	Accommodative
Mean	-0.1875	-0.0706
St. dev.	0.2053	0.0785
Kurtosis	1.6607	11.7209
Skewness	-1.5017	-3.1026
Normality1	No	No
Normality2	No	No
Levene		0.00147
Mann-Whitney one tail		0.03085

Note: Normality1 is the result of Shapiro-Wilk test, and Normality2 is the result of D'Agostino-Pearson test. For Levene's test and Mann-Whitney's test, p-values are reported.

In Table 1, the defensive case shows a definitely worse CAR7 than the accommodative, and the Mann-Whitney test (the two samples are not normal) is significant accepting the alternative hypothesis that one population dominates the other, i.e. the two population from where samples are drawn can be considered to be different. The result is coherent with Seeger (2006) and Chen et al. (2009).

In the following, results for single cases are reported and discussed.

Concerning incidents, hypothesis H_1 assumes that the two populations from which samples are drawn are not significantly different.

As Table 2 shows, sample means are pretty similar for all CARs, and statistical tests always accept the null hypothesis of similar populations. For CAR1 and CAR7, two-tailed T-test with unequal variances (in both cases we have normal samples and different variances) is not significant, and for CAR4 (one non normal sample) the Mann-Whitney test is not significant.

Reported evidence support the theoretical conjecture, in particular, the ICM model showing the co-existence of different emotions in case of incidents.

Results also agree with the *Covariation-Based Causal Attributions Model* (Schwarz, 2008) theorizing that both an attribution to hazard and an attribution to the firm can be associated to incidents.

Otherwise, the results contrast with Marcus and Goodman (1991) and Ferretti, Profumo and Tutore (2015) whose studies have demonstrated that for this typology a denial of responsibility communication is more appropriate (defensive). This paper considers that the inconsistencies are mainly attributable to the different choice on the type of shock event, since in such research cases of environmental disasters and catastrophes were included, for which one can assume a stronger emotional state of sadness compared to the cases of incidents that have been selected here, implying a preference for a defensive response.

6 Amongst which the Financial Times, the WSJ, the Washington Post, the Sole24Ore.

Table 2. Incidents

	CAR1		CAR4		CAR7	
	Defensive	Accommodative	Defensive	Accommodative	Defensive	Accommodative
Sample data	-0.0859	-0.0099	-0.0712	-0.0003	-0.0809	0.0016
	0.0041	-0.0314	-0.0289	-0.0857	-0.0651	-0.0658
	-0.0250	-0.0608	-0.0278	-0.0993	-0.0450	-0.1092
	-0.0458	-0.0202	-0.0541	-0.0416	-0.0792	-0.0425
	-0.0237	0.0177	-0.0359	-0.0520	-0.0398	-0.0830
	0.0045	-0.0151	-0.0023	-0.1010	-0.0276	-0.1040
	-0.0162	-0.0632	-0.0173	-0.0730	-0.0946	-0.0541
	-0.1448	-	-0.2180	-	-0.1903	-
Mean	-0.0416	-0.0261	-0.0570	-0.0647	-0.0778	-0.0653
St. Dev.	0.0508	0.0287	0.0684	0.0362	0.0509	0.0384
Kurtosis	1.6077	-0.5137	3.7523	0.2427	3.7523	0.2427
Skewness	-1.4006	-0.0270	-1.7425	0.6738	-1.7425	0.6738
Normality	yes	yes	no	yes	yes	Yes
Levene	0.24082		0.46304		0.77448	
Two tailed T-test	0.49035		-		0.60463	
Mann-Whitney two tailed	0.68544		0.27159		0.95386	

Note: In the first panel, sample data are shown (8 Defensive cases and 7 Accommodative cases). In the second panel, descriptive statistics and normality test result are reported for each sample. P-values of Levene's test for variance homogeneity, T-test and Mann-Whitney are reported for each couple of samples.

About scandals, hypothesis H_2 assumes that investor reaction is worse in case of a defensive managerial response to the crisis. It is expected then that CARs in defensive samples are lower than in accommodative ones.

The results are reported in Table 3. As expected, for all CARs, the defensive sample mean is consistently lower than accommodative. Only for CAR1, the difference is not statistically significant, while for CAR4 and CAR7 it is with a very low p-value.

Following the results, hypothesis H_2 can be considered as verified. According to Marcus and Goodman (1991), in case of scandals, investors prefer an accommodative response with respect to a defensive one.

Results are consistent with Coombs (2010), especially due to his links with *attribution theory* that demonstrated that scandals could be associated with the internal *locus* and with the concept of controllability, key elements for the attribution of responsibility to a company.

Table 3. Scandals

	CAR1		CAR4		CAR7	
	Defensive	Accommodative	Defensive	Accommodative	Defensive	Accommodative
Sample data	-0.0329	-0.2811	-0.1712	-0.2800	-0.4095	-0.3639
	-0.1272	0.0478	-0.1337	0.0366	-0.1785	-0.0097
	-0.8698	-0.0595	-0.7837	-0.0694	-0.7286	-0.0784
	-0.3840	-0.0706	-0.5175	-0.1105	-0.6132	-0.1080
	-0.0023	0.0075	-0.0977	-0.0054	-0.1285	-0.0041
	-	-0.0639	-	-0.0283	-	-0.0601
Mean	-0.2832	-0.0700	-0.3408	-0.0762	-0.4116	-0.1040
St. dev.	0.3606	0.1137	0.2992	0.1121	0.2625	0.1334
Kurtosis	1.5523	3.0423	-2.4389	4.2258	-2.4389	4.2258
Skewness	-1.4321	-1.4941	-0.1067	-1.9714	-0.1067	-1.9714
Normality	Yes	Yes	Yes	No	Yes	No
Levene	0.03945		0.01425		0.09850	
One tailed t-Test	0.13173		-		-	
Mann-Whitney one tailed	0.15765		0.02762		0.01124	

Note: In the first panel, sample data are shown (5 Defensive cases and 6 Accommodative cases). In the second panel, descriptive statistics and normality test result are reported for each sample. P-values of Levene's test for variance homogeneity, T-test and Mann-Whitney are reported for each.

Table 4. Product recall

	CAR1		CAR4		CAR7	
	Defensive	Accommodative	Defensive	Accommodative	Defensive	Accommodative
Sample Data	-0.0175	-0.0585	-0.0202	-0.1223	-0.0308	-0.0545
	-0.0321	-0.0221	-0.0325	-0.0073	-0.0430	-0.0405
	-0.0534	0.0050	-0.0910	-0.0160	-0.1035	-0.0457
	-0.0089	-0.0087	-0.0052	-0.0205	0.0156	-0.0102
	-0.1682	-0.0200	-0.3342	-0.0422	-0.3636	-0.0455
	-0.1626	-0.0097	-0.1853	-0.0149	-0.2314	-0.0646
	-0.2685	-	-0.3233	-	-0.3418	-
Mean	-0.1016	-0.0190	-0.1417	-0.0372	-0.1569	-0.0435
St. Dev.	0.0990	0.0216	0.1413	0.0433	0.1549	0.0184
Kurtosis	-0.7316	2.6610	-1.6806	4.4289	-1.8822	2.5581
Skewness	-0.8006	-1.3632	-0.6155	-2.0816	-0.4259	1.2606
Normality	Yes	Yes	Yes	No	Yes	Yes
Levene one-tailed	0.00182		0.00558		0.00039	
T-test	0.03541		-		0.05075	
Mann-Whitney one-tailed	0.05021		0.11232		0.21602	

Note: In the first panel, sample data are shown (7 Defensive cases and 6 Accommodative cases). In the second panel, descriptive statistics and normality test result are reported for each sample. P-values of Levene's test for variance homogeneity, T-test and Mann-Whitney are reported for each.

For product recalls, hypothesis H_3 also assumes an investor's preference for an accommodative response. Results are reported in Table 4. Once again, for all three CARs, sample means are consistently different. The difference is statistically significant for CAR1, not for CAR4 and the t-test's p-value for CAR7, which is only slightly higher than 5%. At a 95% confidence level the null hypothesis must be accepted, but it can be rejected at 94%.

Given this small difference, the tendency is to consider the hypothesis verified and these results support the economic theories based on the *attribution theory* (Jolly & Mowen 1985). These theories state that in case of product recall, if a firm has a socially responsible behavior, consumers will regain, or even increase, their confidence. Similarly, Coombs (2010) showed that in such cases, a reconstructive strategy would have increased the probability for the firm to regain reputation.

Otherwise, the results presented here contrast with Marcus and Goodman (1991). They found no significant differences between managerial responses in case of dangerous products. It should be noted that Marcus and Goodman (1991) only considered five cases associated to important lawsuits or even resulting in victims among consumers.

For the purpose of this paper, the final concern is about the news media effect: how do bad news or

good news affect investors' behavior? How do they interact with firms' communication? To answer these questions, all data (with a focus on CAR7s) have been categorized with respect to both communication response and news type. Four samples are shown: defensive response and bad news, defensive response and good news, accommodative response and bad news, accommodative response and good news. It is expected that bad news worsens the effect of communication responses while good news improves it.

At first, it is worth considering the four samples together. Results are reported in Table 5.

Table 5 means show that the average CAR7 of defensive response consistently changes if associated to bad news or good news, the same happens for the accommodative case. Moreover, it should be noticed that the defensive/good case shows an average CAR7 greater than the accommodative/bad case, suggesting that not only the news effect matters, but it also could outclass the communication effect. The Kruskal-Wallis test, ran because samples' distributions are not normal, shows that sample's populations are not similar with a great statistical significance. To investigate differences among group samples, five follow-up tests have been carried out for Kruskal-Wallis: Nemenyi, Mann-Whitney, Dunn, Schlaich-Hamerle, Conover. Results are reported in Table 6.

Table 5. All cases, CAR7

	DEF & BAD	DEF & GOOD	ACC & BAD	ACC & GOOD
Mean	-0.2613	-0.0768	-0.1036	-0.0340
St. dev.	0.2233	0.1125	0.0949	0.0292
Kurtosis	0.3625	5.8520	8.0995	-1.6034
Skewness	-1.1637	-2.3169	-2.7516	-0.1770
Normality1	No	No	No	Yes
Normality2	Yes	No	No	Yes
Kruskal-Wallis	0.0005			

Note: Descriptive statistics and normality tests results (Shapiro-Wilk and D'Agostino-Pearson) are reported for each sample. P-values of significance test (Mann-Whitney) are shown in the last line.

Table 6. Comparison between group couples

Group 1	Group 2	Nemenyi	Mann-Whitney	Dunn	Schleich-Hamerle	Conover	Sign/Tot
DEF & BAD	DEF & GOOD	0.01528	0.00777	0.00275	0.02974	0.00477	5/5
DEF & BAD	ACC & BAD	0.41860	0.04431	0.12531	0.50307	0.13179	1/5
DEF & BAD	ACC & GOOD	0.00077	0.00057	0.00012	0.00197	0.00045	5/5
DEF & GOOD	ACC & BAD	0.43967	0.08316	0.13421	0.52351	0.14060	0/5
DEF & GOOD	ACC & GOOD	0.90398	0.53167	0.49532	0.92652	0.49695	0/5
ACC & BAD	ACC & GOOD	0.10721	0.01011	0.02337	0.16178	0.02865	3/5

Note: P-values of five different tests to compare two groups are reported. Last column shows the number of times the test is significant out of the five tests carried out.

The comparison between groups shows that:

1. Def/bad vs def/good: CAR7 means are -26.13% and -7.68% against an overall mean of defensive group of -18.75% (Table 1). The difference between populations is statistically significant in all the five tests. It can be assessed that with no doubt in this case news affect investors' behavior confirming the hypothesis that bad news worsens the result while good news improves it.
2. Def/bad vs acc/bad: although means are different (defensive lower than accommodative), only one test out of five results significant, indicating that there is no strong evidence supporting that difference. Since in the overall test defensive and accommodative were significantly different, one can say that the effect of bad news appears to outclass the effect of communication.
3. Def/bad vs acc/good. The largest difference can be observed between sample means, and it is statistically significant in five cases out of five. News affect the results and contribute to spread out difference between defensive and accommodative already discussed (see Table 1).
4. Def/good vs acc/bad. CAR7 means are very close and no statistical significance supporting a difference between them has been found. Despite the lack of statistical significance, it should anyway be noted that the mean of the defensive case supported by good news is now greater than that of the accommodative associated with bad news, reminding that without considering news, the defensive response showed a statistically significant lower mean, one can say that the effect of news overrides the effect of communication.
5. Def/good vs acc/good. Although the defensive case shows a lower average CAR7 than accommodative, now they are quite close to each other, and there is no statistical evidence supporting a difference between populations. Good news cancels the effect of communication outclassing it.
6. Acc/bad vs acc/good. Sample means are different, and the difference is statistically significant in three out of five cases. This is what was expected and allows us to say that the effect of news is important.

These results fill a gap in the literature providing the first empirical evidence on news media effect and giving a first confirmation of frame and appraisal theories.

CONCLUSION

The purpose of this paper is twofold: (1) to find out the best company response strategy to minimize the impact on share price when the company is involved in a shock event, and (2) how news media can influence investors' emotions and their perception of company communications.

This study aimed to provide further empirical evidence supporting crisis communication theories and as a new contribution to provide an empirical validation of framing theory and news media effect on share prices, filling the literature gap.

As for the first level of the purpose of this study, the results show that, from an overall point of view, when a shock event occurs, an accommodative response is the best strategy for the company management. Going deeper into the subject and considering different cases of shock events, together with associated emotions, statistical evidence has been found that accommodative responses are better than defensive for scandal and product recall cases, while the communication strategy chosen in case of incident does not definitely affect investors' behavior. All the results are in accordance with theoretical predictions. About news media, the results show that groups with the same type of response prove to be different if they are divided based on news, thus confirming that the effect of the latter worsens (bad) and mitigates (good) the attribution of responsibility by investors. Conversely, compared to the same type of news (def/bad & acc/bad; def/good & acc/good), a statistical consistency that supports the difference in average returns between the groups could not be found; it can therefore be stated in such cases that the effect of the news cancels that of communications overriding their impact on investors' behavior. Finally, comparing the opposite cases (def/bad & acc/good; def/good & acc/bad), there is a further confirmation that in any case of shock event, an accommodative strategy will be more accepted by investors, but if negative opinion is expressed in the news, this ameliorative effect of communication may be overridden by the media's opinion.

Therefore, a company's management has a reference framework based on theoretical considerations empirically validated as a guide for choosing the best communication strategy following various types of shock events. The results suggest that a socially responsible behavior apologizing and struggling to compensate event consequences is better than a denial strategy refusing to assume responsibility. That could also improve reputation among media, which may be induced to be favorably disposed toward the company and less critical, minimizing the effect of the shock.

Future research may be aimed at finding out whether the way in which a company had addressed the market on previous occasions will influence the investor's opinion. In the literature, this component is known as *intensifier* (Coombs, 2004). Furthermore, the presence of another emotional state known as "*schadenfreude*" can be verified (Coombs & Holladay, 2005), analyzing competitors' market price behavior.

It will also be interesting to find out if the behavior of investor and the media can be influenced by the previously adopted strategies by the company's management in order to try to guide their opinions.

AUTHOR CONTRIBUTIONS

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APPENDIX A

Table A1. Incidents. Shock event descriptions

Company	Case	Event date	Event window		CAR1	CAR4	CAR7	Strategy	News
Exxon Mobil	Oil Spill	29/03/2013	28-Mar	10-Apr	0.5%	-0.2%	-2.8%	Def	Good
KirbyCorp	Oil Spill	22/03/2014	20-Mar	2-Apr	-2.4%	-3.6%	-4.0%	Def	Good
Lufthansa	Plane Crash Germanwings	24/03/2015	23-Mar	3-Apr	-4.6%	-5.4%	-7.9%	Def	Good
Royal Dutch Shell	Collision Gulf of Mexico	15/05/2016	11-May	24-May	0.4%	-2.9%	-6.5%	Def	Bad
ThyssenKrupp	Fire Establishment Turin	06/12/2007	6-Dec	19-Dec	-2.5%	-2.8%	-4.5%	Def	Good
Atlantia	Morandi Bridge	16/08/2018	14-Aug	27-Aug	-14.5%	-21.8%	-19.0%	Def	Bad
Yahoo	Cyber Incident	14/12/2016	12-Dec	23-Dec	-8.6%	-7.1%	-8.1%	Def	Bad
British petroleum	Deepwater Platform	21/04/2010	20-Apr	3-May	-1.6%	-1.7%	-9.5%	Def	Good
BHP Billiton	Minerary Seawall Collapse in Samarco	06/11/2015	4-Nov	17-Nov	-6.1%	-9.9%	-10.9%	Acc	Bad
Consolidated Edison	Collapse Electricity by Hurricane Sandy	06/11/2012	5-Nov	16-Nov	-2.0%	-4.2%	-4.3%	Acc	Bad
Southwest Airlines	Chicago Airport Plane Crash	09/12/2005	7-Dec	20-Dec	-1.0%	0.0%	0.2%	Acc	Good
Southwest Airlines (2)	Phoenix-Sacramento Emergency Flight	01/04/2011	30-Mar	12-Apr	-3.1%	-8.6%	-6.6%	Acc	Bad
Vale On	Minerary Seawall Collapse in Brazil	15/11/2015	10-Nov	23-Nov	1.8%	-5.2%	-8.3%	Acc	Bad
Imperial Sugar	Explosion in Savannah	08/02/2008	6-Feb	19-Feb	-6.3%	-7.3%	-5.4%	Acc	Good
Air France-Klm	Plane Crash in Atlantic Ocean	03/06/2009	1-Jun	12-Jun	-1.5%	-10.1%	-10.4%	Acc	Bad

Table A2. Incidents. Shock event announcement sources

Company	Source announcements
ExxonMobil	Bloomberg/Thomson Reuters
KirbyCorp	Bloomberg/Thomson Reuters
Lufthansa	https://www.independent.co.uk/news/world/europe/germanwings-crash-full-transcript-of-press-conference-10136377.html
Royal Dutch Shell	Bloomberg/Thomson Reuters
ThyssenKrupp	https://www.repubblica.it/2007/12/sezioni/cronaca/incendio-acciaieria/thyssenkrupp-comunicato/thyssenkrupp-comunicato.html
Atlantia	http://www.atlantia.it/en/area-stampa/-/page/-/page/content-Clarification_about_the_announced_procedure_for_the_termination_of_Autostrade_per_l'Italia_concession.html?id=1326&lang=en&year=2018
Yahoo	https://www.businesswire.com/news/home/20161214006239/en/Important-Security-Information-Yahoo-Users
British petroleum	https://www.bp.com/en/global/corporate/news-and-insights/press-releases/bp-initiates-response-to-gulf-of-mexico-oil-spill.html
BHP Billiton	https://www.bhp.com/media-and-insights/news-releases/2015/11/statement-from-the-bhp-billiton-board-of-directors-samarco-incident
Consolidated Edison	Bloomberg/Thomson Reuters
Southwest Airlines	http://investors.southwest.com/news-and-events/news-releases/2005/09-12-2005
Southwest Airlines (2)	http://investors.southwest.com/news-and-events/news-releases/2011/02-04-2011a
Vale On	Bloomberg/Thomson Reuters
Imperial Sugar	https://www.sec.gov/Archives/edgar/data/831327/000119312508025742/dex992.htm
Air France-Klm	Bloomberg/Thomson Reuters

Table A3. Scandals. Shock event descriptions

Company	Case	Event date	Event window		CAR1	CAR4	CAR7	Strategy	News
Biovail (ex)	Financial Fraud	24/03/2008	20-Mar	2-Apr	-0.2%	-9.8%	-12.8%	Def	Bad
Olympus	Hide Financial Lose	14/10/2011	12-Oct	25-Oct	-38.4%	-51.8%	-61.3%	Def	Bad
Sino Forest	Financial Fraud	02/06/2011	31-May	13-Jun	-87.0%	-78.4%	-72.9%	Def	Bad
Tesco	Balance Sheet Fraud	22/09/2014	18-Sep	1-Oct	-12.7%	-13.4%	-17.8%	Def	Bad
Valeant	Manipulation of Price	14/10/2015	12-Oct	23-Oct	-3.3%	-17.1%	-40.9%	Def	Bad
21st FOX	Sexual Offences	07/09/2016	5-Sep	16-Sep	0.8%	-0.5%	-0.4%	Acc	Good
Royal Dutch Shell	Financial Scandal on Reserve	09/01/2004	7-Jan	21-Jan	-7.1%	-11.0%	-10.8%	Acc	Bad
Ryanair	Employment Scandal	15/09/2017	13-Sep	26-Sep	-5.9%	-6.9%	-7.8%	Acc	Good
Toshiba	Balance Sheet Fraud	21/07/2015	17-Jul	30-Jul	4.8%	3.7%	-1.0%	Acc	Good
Volkswagen	DieselGate - Test Tampering	21/09/2015	17-Sep	30-Sep	-28.1%	-28.0%	-36.4%	Acc	Bad
Facebook	Scandal Cambridge Data Analytics	25/03/2019	22-Mar	4-Apr	-6.4%	-2.8%	-6.0%	Acc	Bad

Table A4. Scandals. Shock event announcement sources

Company	Source announcements
Biovail (ex)	https://www.reuters.com/article/us-biovail-sec/biovail-execs-face-sec-charges-company-settles-idUSN2432594420080324
Olympus	Bloomberg/Thomson Reuters
Sino Forest	Bloomberg/Thomson Reuters
Tesco	https://www.tescopl.com/news/news-releases/2014/trading-update-1/
Valeant	https://www.prnewswire.com/news-releases/valeant-provides-update-regarding-government-inquiries-300160147.html
21st FOX	Bloomberg/Thomson Reuters
Royal Dutch Shell	Bloomberg/Thomson Reuters
Ryanair	https://corporate.ryanair.com/news/ryanair-to-cancel-less-than-2-of-flights-over-next-6-weeks-to-improve-punctuality/
Toshiba	http://www.toshiba.co.jp/about/ir/en/news/20150721_1.pdf
Volkswagen	https://www.theverge.com/2015/9/21/9364075/volkswagen-emissions-testing-apology
Facebook	https://www.cnn.com/2018/03/21/zuckerberg-statement-on-cambridge-analytica.html

Table A5. Product recall. Shock event descriptions

Company	Case	Event date	Event window		CAR1	CAR4	CAR7	Strategy	News
Bayer	Baycol	08/08/2001	6-Aug	17-Aug	-16.3%	-18.5%	-23.1%	Def	Bad
Bridgestone	Caused by Tires Incident	09/08/2000	8-Aug	21-Aug	-16.8%	-33.4%	-36.4%	Def	Bad
General Motors	Airbag Failure	09/09/2016	7-Sep	20-Sep	-0.9%	-0.5%	1.6%	Def	Good
Hasbro	Easy-Bake Oven	19/07/2007	18-Jul	31-Jul	-5.3%	-9.1%	-10.3%	Def	Bad
Mylan	EpiPen	31/03/2017	29-Mar	11-Apr	-3.2%	-3.2%	-4.3%	Def	Bad
Nestlé	Contaminated Milk for Children	22/11/2005	18-Nov	1-Dec	-1.7%	-2.0%	-3.1%	Def	Good
Merck's	Vioxx	30/09/2004	28-Sep	11-Oct	-26.8%	-32.3%	-34.2%	Def	Good
Apple	Iphone 4 - Problem Antenna	02/07/2010	30-Jun	13-Jul	-1.0%	-1.5%	-6.5%	Acc	Good
General Motors	Ignition Problem	15/05/2014	13-May	26-May	-0.9%	-0.5%	1.6%	Acc	Bad
Kellogg	Cereal Boxes Smell	26/06/2010	23-Jun	6-Jul	-0.9%	-2.0%	-1.0%	Acc	Good
Mattel	19 billion Chinese Toys	14/08/2007	10-Aug	23-Aug	0.5%	-1.6%	-4.6%	Acc	Good
Samsung	Galaxy Note Battery on fire	02/09/2016	31-Aug	13-Sep	-2.2%	-0.7%	-4.0%	Acc	Good
Toyota	Accelerator Problem	29/01/2010	27-Jan	9-Feb	-5.9%	-12.2%	-5.4%	Acc	Bad

Table A6. Product recall. Shock event announcement sources

Company	Source announcements
Bayer	http://edition.cnn.com/2001/BUSINESS/08/13/bayer/
Bridgestone	https://www.nashvillepost.com/business/management/public-relations/article/20447077/bridgestonefirestone-recall-a-financial-and-pr-disaster
General Motors	https://media.gm.com/media/us/en/gm/vehicles.detail.html/content/Pages/news/us/en/2016/sep/0909-airbag.html
Hasbro	https://www.hasbro.com/en-us/customer-service/recall/info?info=product_recall_information_easy_bake_oven
Mylan	http://newsroom.mylan.com/2017-03-31-Mylan-Provides-Update-on-Meridian-Medical-Technologies-a-Pfizer-Company-Expanded-Voluntary-Worldwide-Recall-of-EpiPen-R-Auto-Injector
Nestlé	Bloomberg/Thomson Reuters
Merck	https://www.nytimes.com/2004/09/30/business/merck-pulls-vioxx-painkiller-from-market-and-stock-plunges.html
Apple	https://www.theguardian.com/technology/blog/2010/jun/25/iphone-reception-problems-solved
General Motors	https://media.gm.com/media/us/en/gm/home.detail.html/content/Pages/news/us/en/2014/May/0514-five-recalls.html
Kellogg	http://newsroom.kelloggcompany.com/news-releases?item=76331
Mattel	https://www.wsj.com/articles/SB118709567221897168
Samsung	https://news.samsung.com/us/samsung-establishes-u-s-product-exchange-program-galaxy-note7/
Toyota	https://www.reuters.com/article/us-toyota/toyota-chief-apologizes-for-huge-recall-idUSTRE60R7GB20100130