ORIGINAL ARTICLE

Regulatory disclosure via the internet: does it make financial markets more efficient?

João Duque · Inês Pinto

Abstract In line with the regulatory framework of the majority of the European capital markets, the Portuguese Securities Market Commission imposes to security issuers the disclosure of any event that could influence share prices in a material way. These events are classified as "Price Sensitive Events". Through the analysis of market reaction to this kind of event, this study attempts to assess the appropriateness of this disclosure rule. Additionally, since the regulator defines its website as the appropriate manner to disseminate this publishable information through the market, we will also be providing evidence about the efficiency of this system.

1 Introduction

The turbulence and uncertainty that have characterized the world's financial markets have placed increased attention on fields such as valuation, market efficiency and market regulation. Scandals like Enron and WorldCom have deeply affected world capital markets, as well as their regulatory and supervisory structure. Thus, the disclosure of

J. Duque (✉) · I. Pinto
Instituto Superior de Economia e Gestão, Universidade Técnica de Lisboa, Rua Miguel Lupi, 20, 1249-078 Lisboa, Portugal
e-mail: jduque@iseg.utl.pt

I. Pinto
e-mail: inespinto@iseg.utl.pt

information has become an essential variable not only in terms of market workflow, but also in building up investors' confidence.

In this article, we investigate the stock price and volume reaction to the disclosure of "price sensitive events" made by security issuers in the Portuguese Stock Market, using the regulator's website. In line with the regulatory framework of the majority of the European capital markets, the Portuguese Securities Market Commission (CMVM—*Comissão do Mercado de Valores Mobiliários*) imposes some disclosure rules in order to guarantee the integrity and the transparency of the market. Therefore, under Portuguese law, besides the periodic disclosure obligation, security issuers have to provide information on an immediate basis in order to avoid information asymmetry. This information can be classified in two global categories: the first named "price sensitive events", the main characteristic of which is that it should lead to a substantial change in share prices; and the second, under the designation of "other communications", which should not influence the stock price in a material way.

We believe that this research is relevant, not only because it can provide evidence on whether this kind of information is useful to stock market participants, but also because it allows us to assess the relevance of CMVM's rules and compare it with different regulatory approaches. Furthermore, since the Portuguese regulator imposes its website[1] as the appropriate way to disseminate information on price sensitive events, we will also be providing evidence about the efficiency of this system.

Despite the vast literature on event studies, we find few pieces of research on market reaction to mandated disclosure information, mainly in European stock markets. In the U.S., Carter and Soo (1999) investigated the timeliness of stock price reaction to a sample of Form 8-K reports filed in 1993. The results show that the adjustment of stock prices to this form is small and generally occurs before the form disclosure. This seems to be the evidence that another kind of information disclosure in due time is playing the relevant role and reinforce the SEC's efforts in accelerate the filing period for all 8-K events.[2]

According to a document entitled "Principles for Ongoing Disclosure and Material Development Reporting by Listed Entities" issued by the Technical Committee of IOSCO (2002) individual jurisdictions have the possibility to add different requirements regarding material information disclosure. In the majority of European capital markets, the "general obligation approach" is adopted in which regulators require listed entities to disclose information in an immediate basis under a general obligation of materiality comprising price sensitive information, without specifically describing the types of events that would be deemed material. In contrast, in the US according to the "prescription approach" a set of rules specifies the disclosures that issuers must provide to investors and which are presumptively material. Such disclosures should be reported to the Securities and Exchange Commission (SEC) on Form 8-K within a few business days after the occurrence of the corporate event.

Additionally, considering that the CMVM imposes its website as the appropriate and principal way to disclose material information, this study can contribute positively

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[1] http://www.cmvm.pt

[2] In 2004, the SEC not only expanded the number of events that are reportable, but also created a uniform deadline of four business days compared to the previous range of 5–15 calendar days.

to the evidence that the use of the Internet is an important tool to disclose information immediately to all investors avoiding information asymmetry. Recent papers have explored this subject, providing evidence, that the Internet has had an impact on investors. Wysocki (1998) examines the determinants of message-posting volume on stock message boards on the Web, concluding that overnight message-posting volume predict changes in next day stock trading volume and returns. Antweiler and Frank (2001) conclude that Internet stock message boards are useful information to the market. Through the study of "webcast" conference calls via the Internet, Bushee et al. (2003) findings suggest that providing individual investors access to conference calls increase both the amount of informedness and consensus in the market.

Therefore, considering the difference in disclosure principles between US and European jurisdictions, extended work using a European sample could provide additional information about the importance of principles for regulatory disclosure, material development reporting and the way to disclose this information to investors.

In this study, we applied the traditional methodology of event studies to test the hypothesis of the existence of an abnormal return and abnormal trading volume around or about the day on which the price sensitive event was disclosed via the Internet.

We examined 509 price sensitive events and 471 other communications over the period 2000–2002. When the sample was split up into good and bad news, we found an average abnormal return of $+1.94$ and -0.93% respectively. Our findings suggest that the disclosure of price sensitive events classified as such contain useful market information. However, the information absorption seems to be done in a delayed way in comparison to what we would expect, especially when the Internet is the way imposed for communication. Furthermore, we find that some wrongly subjective classification can be affecting the distinction between price sensitive events and other communications, since this last kind of information also possesses informational value.

The remainder of the article is organized as follows. The next section presents the legal details about the duty of price sensitive events' disclosure. Section 3 explains the methodology applied and Section 4 discusses the empirical results. The last section contains the conclusions.

2 Legal aspects

In line with the regulatory framework of the majority of the European capital markets, the Portuguese Securities Market Commission (CMVM—*Comissão do Mercado de Valores Mobiliários*) imposes several rules on listed companies regarding their disclosure obligation.

Under the "price sensitive events" category, the Portuguese Securities Code (article 248 nr.1) requires that issuing companies with listed shares should immediately inform the market about events that are not of general knowledge and that could have a relevant influence on their share prices. A precise definition of "relevant influence" or "price sensitivity" is difficult to establish as the rule contains some flexibility and a number of factors relating to a particular case need to be taken into account.

According to CMVM (2000a) facts are price sensitive if they are expected to lead to a substantial change in share prices. It is therefore impossible to set out an automatic

way to identify price sensitive information. A variety of factors can influence the evaluation of the relevance of the information, since it is based on the interpretation of the issuing company. However, some examples of price sensitive events are given by the regulator, with the provision that, nevertheless, they can only be considered as indicative events that may cause potential price change and, therefore, they do not exempt the company from analyzing the relevance of each particular case.[3]

A further key point is that it is extremely important that the information quickly reaches all investors at the same time, avoiding information asymmetry. According to CMVM's regulation (Article 1 of Regulation nr. 11/2000) CMVM (2000b) relevant facts should be immediately communicated by the issuer to the regulator, which by turn will disclose it through its information diffusion system available at its website. Furthermore, the disclosure of the price sensitive events should be done after the close of the market, except if, given the urgency of the information, the opposite is authorized by the regulator. This will be judged on the basis of market and issuer interests.

Finally, investors can also disclose to the market a wide variety of events through the regulator's diffusion system but these are classified as other communications since it is expected that those events do not influence security prices in a material way. Examples of other communications are the publication of previously made earnings announcements, the acquisition or sale of company's own shares, dividend announcements, or any other event, since this type of information does not follow the criteria previously defined as price sensitive event.

3 Research design

3.1 Stock price returns analysis

3.1.1 Variables definition

Regarding the publishable information, our purpose is to analyze the impact of the disclosure of the supposed price sensitive events, adopting a traditional event study methodology as in MacKinlay (1997).

The event date (day zero) is the date when the disclosure is made available at the regulator's website. We will consider an event window of 11 days, which includes 5 days before the event, the event day, and 5 days after its disclosure. The choice of this period takes into account the need to have a sufficiently large period to capture

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[3] Examples of potential material events are: "cooperative or strategic deals; merger, split or transformation of the issuer or of other entities which are in a group relationship; restructuring of the liabilities of the issuing company or of other entities involved in a group relationship, particularly with regard to recovery plans for companies; cessation of activities or of business; modification of the development strategies of the issuer; the launch of new product lines or services; technological innovations, particularly the adoption of new methods of production; Acts of God, when these could affect the activities of the issuing company and the damage from which are not entirely covered by insurance; litigation, when this could affect the assets of the issuer or the group of which it is a member; the loss or attainment of clients in such a way as to have an impact on the turnover of the issuing company; contracts which are particularly significant to the activities of the issuing company; significant holdings in companies whose shares are not listed, particularly with regard to the obtaining of synergy and cost-effectiveness in the organisation of the company in question" (CMVM 2000a).

the market reactions around the event day, but not too long in order to avoid other effects or event overlaps, which could reduce significantly our sample. Brown and Warner (1985), Carter and Soo (1999), Seiler (2000), Kuipers et al. (2002), Duque and Fazenda (2003) used similar time periods.

We used the market model to measure the expected (normal) performance, with the *PSI Geral* as a proxy to the market portfolio. The *PSI Gera*l Index is a performance equity index, which considers all stocks listed in the Euronext Lisbon. We used daily prices for estimating daily stock returns and, like Beaver (1968), Isidro (1997), we considered all trading days from 01/01/2000 to 31/12/2002 excluding those within the event window. Therefore, we assumed that the model's parameters were constant during the period in study.

In order to test the sensitivity of our results to the benchmark model used to estimate expected returns, we also have computed test statistics using the mean adjusted return model.

3.1.2 Average abnormal return analysis—good and bad news

Several authors such as Conrad et al. (2002) have pointed out theoretical reasons for the intensity of stock price reactions to good and bad news, and empirical findings have proven such theories. Therefore, we may also suspect different behaviour for stock price reactions to good and bad news.

As in Cristie et al. (2002), we used the following criteria in order to classify events as "good or bad news": when the absolute return of security i on the event date (day zero) was positive, we classified the price sensitive event as "good news"; when the absolute return of security i on the event date (day zero) was negative, we classified the price sensitive event as "bad news".

3.1.3 Average abnormal return analysis—other communications

Since it is not possible to set out a formula to define automatically what should be disclosed as price sensitive events, companies could find it difficult to decide what to announce and when. Thus, we could frequently have events that, despite leading to substantial movement in the stock price, were not classified as price sensitive. However, they are also disclosed and made available at the regulator's website under the denomination of other communications. In this context, we considered it pertinent to carry out all tests previously presented not only with regard to price sensitive events but also with regard to other communications in order to analyze if these disclosures also lead to any significant change in stock prices.

3.2 Trading volume analysis

3.2.1 Abnormal trading volume analysis

In addition to stock price returns analysis, we also carried out tests to determine the impact of price sensitive events on stock trading volumes in order to complement the

results previously obtained. Thus, we computed the average abnormal trading volume (AAVOL).

The variable volume applied in tests was similar to the one presented in Ajinkya and Jain (1989) in order to approximate series to the normality:[4]

$$V_{it} = \ln \left(\frac{\text{nr. of shares of firm } i \text{ traded on day } t}{\text{nr. of shares outstanding for firm } i \text{ on day } t} + 0.00000255 \right)$$

However, as referred to by Deininger et al. (Unpublished), the number of outstanding stocks does not often correspond to the number of stocks available for trading at the stock exchange. Hence, volume should be measured in relation to the number of free-floating stocks and not outstanding shares. Nevertheless, as it was not possible to obtain this information for the period under analysis, we based our estimates on the amount of outstanding shares as in the studies mentioned above.

Finally, we also carried out tests considering the mean adjusted trading volume.

3.3 Data

3.3.1 Price sensitive events

Data on daily closing prices and trading volumes of companies listed in the Euronext Lisbon between January 2000 and December 2002 were collected using Dathis.[5] It was possible to collect data for the entire time period under analysis for 44 out of 54 companies that were listed on 31/12/2002.

Nevertheless, the estimation process of the parameters of the market model led to the exclusion of seven securities, because the estimated parameters were statistically insignificant. Thus, the final sample was composed of 37 companies, which represent about 86% of market capitalization computed on 31/12/2002.

In order to compute the abnormal return using the market model, we also collected data from a Portuguese stock market index for the same time period. We chose the *PSI Geral* since it is a market-wide performance equity index, includes all listed securities on the Euronext Lisbon, and is adjusted for dividends and stock splits.

We collected price sensitive events available at the regulator website (http://www.cmvm.pt). The initial sample of 798 price sensitive events of 44 companies was reduced to 757 events as result of the insignificance of the market model parameters when discussing their estimate.

Based on the classification presented in Thompson et al. (1987), Pritamani and Singal (2001), with the due alterations to our sample, we obtained the following categories summarized in Table 1.

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[4] In order to avoid the problem related to the day on which the security was not traded (logarithm of zero) a constant of 0.00000255 is added to the trading volume as described in Cready and Mynatt (1991). This constant is chosen in order to maximize the normality of trading volume distribution. In our sample, this transformation means that about 57% of the securities now present evidence of normality at a 5% significance level (Kolmogorov-Smirnov test for normality).

[5] Dathis is the brand name of the Euronext Lisbon database.

Table 1 Information classification

Type	Classification
1	Earning announcements
2	Changes in accounting principles/Information about taxes
3	Changes in the composition of the Board of Directors, and/or the Supervisory Board or any other supervisory body
4	Capital structure related information: dividends, own shares, stock/debt issues
5	Restructuring related information: mergers, acquisitions, asset sales
6	General business related information: turnover, alliances, new products or services
7	Miscellaneous information, not classifiable in the previous categories

Based on the classification presented in Thompson et al. (1987) and Pritamani and Singal (2001), the 757 price sensitive events collected were classified into seven categories of information

The most frequent type of information disclosed during the period under study is on company restructuring, namely acquisitions and asset sales which represent 46% of the events. With a considerably lower weight of 18%, we have price sensitive events related to changes in capital structure, namely share issues and dividend distribution.

Finally, it should be stressed that overlapping of event windows was taken into consideration. Therefore, when announcements occurred on consecutive days, or within less than a 5-day time interval, it was assumed as a single event and the "event day" was assumed to consist of the entire time interval between the day of first event and the day of the last event. The application of this criterion reduced the sample to 509 announcements.

A similar process was also applied to events classified as other communications. Starting with 1,030 collected announcements of other communications, the sample was reduced to 962 events due to the estimation process, and we ended up with 471 events after submission of the initial sample to the criterion detailed above. Table 2 details the steps for obtaining the final sample.

4 Empirical findings

4.1 Return analysis

4.1.1 Expected returns

The market model was applied to all securities included in the initial sample. Some summary statistics relating to these regressions are shown in Table 3.

The coefficient of determination R^2 is higher than 0.3 in only five of the 37 analyzed securities. The average value for this coefficient is only 0.12, which is close to the estimation found by Brown and Warner (1985). The average β_i is 0.61, which substantially differs from 1. This is quite unexpected since we selected a sample representative of the entire market. Nevertheless, the average beta was computed as a non-weighted average of 37 companies and additionally the *PSI Geral*, a value-weighted stock index, included 54 companies on 31/12/2002.

Table 2 Effect of selection criteria upon sample size

Criteria	Price sensitive events	Other communications	Total events
Initial sample size (events of 44 companies)	798	1,030	1,828
OLS parameter estimates criteria	−41	−68	−109
Reduced sample size (37 companies)	757	962	1,719
Overlapping data (event windows criteria)	−248	−491	−739
Final sample size (# publishable events)	509	471	980

The initial sample included 798 price sensitive events and 1,030 other communications of 44 out of 54 companies that were listed on the Euronext Lisbon between January 2000 and December 2002. The estimation process of the parameters of the market model led to the exclusion of seven securities and, consequently, to the reduction of the sample to 757 price sensitive events and 962 other communications. The overlapping of event window was also taken into consideration reducing the sample to 509 and 471 announcements respectively

Table 3 Summary of regression statistics return analysis

	Average	Standard deviation	Max.	Min.
Daily return	−0.05%	1.06%	0.15%	−4.85%
R_i^2	0.12	0.15	0.69	0.01
β_i	0.61	0.44	1.92	0.07

The market model is used to measure the expected performance with the *Psi Geral* index as a proxy for the market portfolio. The *Psi Geral* index is a performance equity index which includes all stocks listed in the Euronext Lisbon. All trading days from 01/01/2000 to 31/12/2002 are considered, excluding those within the event window

Different assumptions underlie the linear regression model computed according to the OLS methodology, such as: stock price returns should be linearly related to the market index and the daily abnormal returns should be independent and identically distributed with a constant variance and following a normal distribution. Thus, some statistical tests were conducted in order to assess the statistical properties of our daily database. Results are presented in Table 4 and are very similar to those observed by Coutts et al. (1995) when studying weekly data of 56 companies belonging to the FT-SE 100, between January 1984 and December 1993.

It is clear that in several cases the underlying assumptions of the market model are not verified. Nearly 60% of the regressions present evidence of residual autocorrelation, heteroscedasticity is present in a third of the regressions and about 22% suffer from non-linearity. However, the non-normality seems to be the main problem, since only two regressions displayed evidence of normality. In the other cases, the non-normality is expressed by the excess Kurtosis.

Nevertheless, as referred to in Brown and Warner (1985), "the Central Limit Theorem guarantees that if the excess returns in the cross-section of securities are independent and identically distributed drawings from finite variance distributions,

Table 4 Misspecification tests of the market model of the sample collected

Statistical tests	$p > 0.05$	$0.05 \geq p > 0.025$	$0.025 \geq p \geq 0.01$	$p < 0.01$
LM(1)[a]	15	1	0	21
KS[b]	2	0	1	34
White[c]	23	2	0	12
RESET[d]	29	1	0	7

[a] LM(1): Breusch-Godfrey test for autocorrelation
[b] KS: Kolmogorov-Smirnov test for normality of residuals
[c] White: White's test for heteroscedasticity
[d] RESET: Ramsay's RESET test for non-linearity
Source: Table adapted from the study of Coutts et al. (1995)

the distribution of the sample mean excess return converges to normality as the number of securities increases". For a sample of 50 companies, the authors conclude that the mean excess return converges to normality.

On the other hand, Brown and Warner (1985) also concluded that the improvement resulting from tests that introduce corrections to variance in order to correct autocorrelation are small.

Additionally, Kothari and Warner (2005) refer that with short-horizon methods the test statistic specification is not highly sensitive to assumptions about the cross-sectional or time-series dependence of abnormal returns.

Therefore, despite the eventual problems that can occur in classical event studies methodology, Brown and Warner (1985), Kothari and Warner (2005) conclude that, regarding short-horizon, methods are generally well specified.

4.1.2 Abnormal returns—price sensitive events

When we analyze the evolution of the cumulative average abnormal return along the event window considering the whole sample, despite the increase observed on day 0, the statistical test does not identify any abnormal return. In this context, we ran the corresponding test but distinguishing between "good" and "bad" news. The results of statistical tests are presented in Tables 5 and 6.

We can conclude that the market quickly incorporates the information during day 0 and evidence of abnormal returns on subsequent days does not exist. Therefore, our results strongly support the hypothesis that price sensitive events do indeed convey useful information for the determination of stock prices.

Nevertheless, we have to consider that day 0 represents the date on which the issuer communicates the event, and according to the rules and regulations, this communication should happen out of trading hours. This means that there is evidence of some existing abnormal returns before the disclosure of the event to the market and if tests were developed using intra-day data, conclusions of market inefficiency could be obtained.

Three reasons can justify this finding. On one hand, with the authorization of the regulator (CMVM) some events can be disclosed during trading hours when the urgency of information release is crucial to the market. This would lead to an

Table 5 Results of AAR tests—"Good and Bad News"— price sensitive events

"Good News"			"Bad News"	
Day	AAR (%)	Θ_{1G} Test	AAR (%)	Θ_{1B} Test
−5	0.12	0.78870	−0.06	−0.44853
−4	−0.10	−0.63550	−0.06	−0.44092
−3	−0.08	−0.50106	−0.12	−0.85741
−2	−0.04	−0.23102	0.14	1.01137
−1	−0.10	−0.66194	−0.02	−0.13410
0	1.94	12.27185*	−0.93	−6.67649*
1	−0.13	−0.84187	0.00	−0.00920
2	−0.02	−0.13694	−0.06	−0.45622
3	−0.04	−0.23544	−0.11	−0.75395
4	0.03	0.16424	−0.10	−0.73844
5	−0.06	−0.35681	−0.14	−0.97593

$\Theta_1 = \frac{AAR_t}{(\text{var}(AAR_t))^{1/2}}$ Event study of the information content of price sensitive events. The table provides a standard test for whether the average abnormal return is significantly different from zero. The events are classified into two categories: good and bad news according to the return on the event date. The sample consists of 509 events disclosed by 37 companies listed on the Euronext Lisbon for the period between January 2000 and December 2002. The market model is estimated for the expected daily returns using the *PSI Geral* as a proxy for the market portfolio. AAR is the sample average abnormal return for day t in event window
* Parameters statistically significant at 5% significance level

Table 6 Results CAAR tests—"Good and Bad News"—Price sensitive events

"Good News"			"Bad News"	
Day	CAAR (%)	Θ_{2G} Test	CAAR (%)	Θ_{2B} Test
−5	0.12	0.78870	−0.06	−0.44853
−4	0.02	0.10833	−0.12	−0.62894
−3	−0.05	−0.20084	−0.24	−1.00856
−2	−0.09	−0.28944	−0.10	−0.36775
−1	−0.20	−0.55491	−0.12	−0.38890
0	1.74	4.50340*	−1.05	−3.08068*
1	1.61	3.85114*	−1.06	−2.85563*
2	1.59	3.55400*	−1.12	−2.83250*
3	1.55	3.27226*	−1.22	−2.92182*
4	1.58	3.15627*	−1.33	−3.00540*
5	1.52	2.90181*	−1.46	−3.15979*

$\Theta_2 = \frac{CAAR(t_1,t_2)}{(\text{var}(CAAR(t_1,t_2)))^{1/2}}$ Event study of the information content of price sensitive events. The table provides a standard test for whether the cumulative average abnormal return is significantly different from zero. The events are classified into two categories: good and bad news according to the return on the event date. The sample consists of 509 events disclosed by 37 companies listed on the Euronext Lisbon for the period between January 2000 and December 2002. The market model is estimated for the expected daily returns using the *PSI Geral* as a proxy for the market portfolio. CAAR is the sample cumulative average abnormal return for day −5 to the specified day
* Parameters statistically significant at 5% significance level

immediate adjustment of stock prices during day 0 and, therefore, closing prices used to compute the event day stock price returns are prices already "corrected" by the market. On the other hand, some communications are made after midnight and before the opening of the market. In these cases day 0 will be the first day of negotiation after

the announcement. In other cases, even when the announcements are released after the market is closed, they are simply a correction to or a clarification of any incorrect or insufficient information that was disturbing the market before their release. In these situations prices are already affected by the information and have already incorporated this information. Despite not being official, this price reaction suggests some information asymmetry.

Although, in some cases, the release of information seems to be done in a delayed manner compared to what could be expected, our findings suggest that the Portuguese regulatory approach to the disclosure of relevant events is adequate to the need of consistent and timely disclosure in the stock market. Consequently, the CMVM's information diffusion system seems to be an appropriate vehicle to quickly disseminate the information to investors. These results differ from those presented by Carter and Soo (1999) who found little response from stock price at the filing date for Form 8-K. Therefore, we can conclude that the general obligation seems more adequate that the list of prescribed disclosure adopted in US and that the Portuguese's way of disclosure material information seems more efficient in terms of timing. These conclusions reinforce the importance of SEC's efforts in expanding the number of events reportable in Form 8-K and in shortening the filling deadline once other methods of disclosure such as press release and webcast conference seems a much more adequate vehicle of dissemination of information Roy (Unpublished).

It is also interesting to notice that in our sample, collected in a bear market[6], the largest impacts on stock prices were observed when the announcements were classified as "good news". On the event day, the change observed in the average abnormal return was 2% for "good news" but only 0.95% for "bad news". These conclusions are consistent with the results observed by Conrad et al. (2002), who, when studying price changes to "good" and "bad" news concerning earning announcements, found that prices tend to react less to "good" news when the market is increasing, and inversely when the market is falling.

The conclusions using the abnormal return extracted from the mean adjusted return are consistent with those from the market model, suggesting that results are not sensitive to the benchmark model of expected returns.

4.1.3 Abnormal returns—other communications

The results for "other communications" reveal that the disclosure of this type of announcement also affects stock prices around the event day as we can observe in Tables 7 and 8.

In order to compare the behavior of price sensitive events and other communications, we conducted a test for the difference between the means of the two samples. We conclude that the difference is not statistically significant regarding average abnormal return at 5% significance level. Nevertheless, regarding the cumulative impact, the null hypothesis of equality of means is rejected at the same level of significance for good news. Therefore, despite the results being less obvious than with price

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[6] In 2001 the Portuguese stock index PSI-20 registered a fall of 25.73% and in 2002 a fall of 25.62%.

Table 7 Results of AAR tests—"Good and Bad News"—other communications

	"Good News"			"Bad News"	
Day	AAR (%)	Θ_{1G} Test		AAR (%)	Θ_{1B} Test
−5	0.18	0.91178		−0.12	−0.87136
−4	−0.15	−0.77241		−0.12	−0.86833
−3	−0.24	−1.24580		−0.20	−1.47861
−2	−0.32	−1.61723		−0.09	−0.67205
−1	−0.12	−0.59488		0.28	2.06662
0	1.43	7.28425*		−0.89	−6.49440*
1	−0.08	−0.39758		0.24	1.76382
2	0.03	0.16784		0.12	0.84800
3	0.15	0.75445		−0.09	−0.65938
4	0.04	0.22087		−0.08	−0.60806
5	0.24	1.24692		−0.24	−1.74431

$\Theta_1 = \dfrac{AAR_t}{(var(AAR_t))^{1/2}}$ Event study of the information content of other communications. The table provides a standard test for whether the average abnormal return is significantly different from zero. The events are classified into two categories: good and bad news according to the return on the event date. The sample consists of 471 communications disclosed by 37 companies listed on the Euronext Lisbon for the period between January 2000 and December 2002. The market model is estimated for the expected daily returns using the *PSI Geral* as a proxy for the market portfolio. AAR is the sample average abnormal return for day t in event window

* Parameters statistically significant at 5% significance level

Table 8 Results CAAR tests—"Good and Bad News"—other communications

	"Good News"			"Bad News"	
Day	CAAR (%)	Θ_{2G} Test		CAAR (%)	Θ_{2B} Test
−5	0.18	0.91178		−0.12	−0.87136
−4	0.03	0.09855		−0.24	−1.23015
−3	−0.22	−0.63880		−0.44	−1.85809
−2	−0.53	−1.36183		−0.53	−1.94517
−1	−0.65	−1.48410		−0.25	−0.81560
0	0.78	1.61900		−1.14	−3.39586*
1	0.70	1.34863		−0.90	−2.47730
2	0.73	1.32086		−0.78	−2.01749
3	0.88	1.49681		−0.87	−2.12190
4	0.93	1.48984		−0.96	−2.20529
5	1.17	1.79647		−1.20	−2.62859

$\Theta_2 = \dfrac{CAAR(t_1,t_2)}{(var(CAAR(t_1,t_2)))^{1/2}}$ Event study of the information content of other communications. The table provides a standard test for whether the cumulative average abnormal return is significantly different from zero. The events are classified into two categories: good and bad news according to the return on the event date. The sample consists of 471 communications disclosed by 37 companies listed on the Euronext Lisbon for the period between January 2000 and December 2002. The market model is estimated for the expected daily returns using the *PSI Geral* as a proxy for the market portfolio. CAAR is the sample cumulative average abnormal return for day −5 to the specified day

* Parameters statistically significant at 5% significance level

Table 9 Results of AAVOL test—price sensitive events

Day	AAVOL	Θ_{MM} test
−5	0.0191	0.3368
−4	0.0571	1.0044
−3	−0.0301	−0.5292
−2	0.0189	0.3329
−1	0.0031	0.0543
0	0.1787	3.1432*
1	0.2502	4.4010*
2	0.1329	2.3385*
3	0.1576	2.7723*
4	0.0575	1.0119
5	0.0103	0.1816

$\Theta_{MM} = \frac{AAVOL_t}{(\text{var}(AAVOL_t))^{1/2}}$ Event study of the information content of price sensitive events. The table provides a standard test for whether the average abnormal trading volume is significantly different from zero. The sample consists of 509 events disclosed by 37 companies listed on the Euronext Lisbon for the period between January 2000 and December 2002. The abnormal trading volume is reported as the difference between trading volume and expected trading volume. This is estimated by the linear regression between trading volume for firm i and total trading volume for all securities included in the sample, using daily data. The trading volume is defined as the logarithm of the number of shares traded for firm i divided by the number of shares outstanding for firm i

* Parameters statistically significant at 5% significance level

sensitive events, we observe that other communications also possess informational value. Since it is not possible to automatically distinguish between price sensitive events and other communications, our findings may well be the result of wrongly subjective classification within this category as suggested by Wilton (2002).

4.2 Stock trading volume

4.2.1 Average abnormal trading volume

Table 9 shows that the AAVOL increases on day 0, showing an excess of activity around the event day. On average, volume on day 1 is twice the daily mean volume over the estimation period, revealing a significant increase of activity in the market during this time period. Nevertheless, it should be noted that, contrary to what happened with stock price returns, the return to the average trading volume proved to be slower. On day 3 we can still observe a statistically significant average abnormal trading volume.

Combining the results of the stock price returns analysis with the results of trading volume, we can conclude that the disclosure of price sensitive events leads, on average, to a substantial change of these two variables. Nevertheless, while the prices seem to revert quickly to their expected returns after the announcement, the same does not happen with trading volume. On the subsequent days, a significant excess of activity still persists. This result reinforces the idea that changes observed in prices are not due to short term supply and demand imbalances. They seem to be the result of changes in equilibrium prices, i.e. changes in future expected cash flows as a result of the released

news. At new price levels new agents are attracted to trading, namely liquidity traders, as defined in Copeland and Galai (1983).

Finally, it should also be mentioned that these results are compatible with the definition of information content presented in Beaver (1968). A substantial impact is observed around the event day, not only on returns but also on trading volume. We conclude that the information disclosed possesses informational value to the market that clearly reacts to the announcements.

5 Conclusions

In order to determine if price sensitive events are really price sensitive, we analyze the stock market reaction to the disclosure of information via the Internet, in particular material disclosure, imposed by the regulator on security issuers in the Portuguese market. Our purpose is to study if this kind of information communicated through the regulator's website is useful to stock market participants, and consequently to assess the appropriateness of CMVM's approach regarding information disclosure rules, a subject that has gained an increasing importance after early 2000s financial scandals.

We find that, on average, firms in our sample experience a statistically significant stock price reaction around the event day and a subsequent fast return to equilibrium. Thus, for the sample collected and considering the inherent limitations, we can conclude that the disclosure of price sensitive events through the Internet possesses informational value and that the information quickly reaches all investors at the same time.

These results are confirmed with a similar analysis regarding trading volume. In this case, an average abnormal volume is also observed around day 0. However, the return to equilibrium is slower, observing an excess of activity until the third day after the announcement. Hence, after prices return to equilibrium, investors continue to adjust their portfolios, maintaining a high level of market activity.

We also analyzed the stock price reaction to the release of other communications, which, by definition, should not influence the stock price in a material way. Contrary to what was expected, we found some market reaction around the event date. Since it is not possible to automatically distinguish between price sensitive events and other communications, our findings can be the result of a wrongly subjective classification of these announcements.

Overall, our results suggest that principles of information disclosure adopted by the Portuguese jurisdiction that impose communication via website the leading process to spread information, are adequate in providing more consistent and useful information to the market and that the vehicle for dissemination of information (the Internet) seems efficient and effective. Nevertheless, some efforts can still be made regarding the timeliness of the disclosure, since the release of information seems to be done in a delayed way in comparison to what we would expect. This especially concerning when the channel under use for information dissemination is taken into account.

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