Instituto Superior de Economia e Gestão

HOW SENSITIVE ARE PRICE SENSITIVE EVENTS?

João Duque †

Universidade Técnica de Lisboa
Instituto Superior de Economia e Gestão
Rua Miguel Lupi, 20, 1249-078 LISBOA, PORTUGAL
Fax: 21. 396 64 07/609867 - Tel. 21. 392 58 00
Email: jduque@iseg.utl.pt

and

Inês Pinto †

Universidade Técnica de Lisboa
Instituto Superior de Economia e Gestão
Rua Miguel Lupi, 20, 1249-078 LISBOA, PORTUGAL
Fax: 21. 396 64 07/609867 - Tel. 21. 392 58 00
Email: inespinto@iseg.utl.pt

† Financial support granted by the Fundação para a Ciência e a Tecnologia (FCT) and the Programa Praxis XXI is gratefully acknowledged.

HOW SENSITIVE ARE PRICE SENSITIVE EVENTS?

João **Duque** and Inês **Pinto**

Abstract

According to the Portuguese law and in line with the regulatory framework of the majority of the European capital markets (namely the UK market), security issuers have the obligation to reveal, in an appropriate way, publishable information, in order to avoid information asymmetry. This information is classified into two categories: the first called "Price Sensitive Events" and the second under the designation "Other Events/Communications" and, as it is expected, it does not necessarily influence share prices in a material way. The Portuguese regulator (CMVM – Comissão do Mercado de Valores Mobiliários) defines its website as the appropriate manner to disseminate this publishable information through the market.

This study aims to find out how price sensitive these revealed price sensitive events are, and how timely the market reaction to their disclosure is.

We applied the traditional event studies methodology, not only concerning stock prices, but also the trading volume (number of traded shares). Thus, we tested the hypothesis of the existence of an abnormal stock price returns and abnormal trading volume around or about the day, on which the price sensitive event was disclosed.

Using a database of 1828 events that were considered significant for this purpose by issuers and collected from the regulators' website from 01/1/2000 to 31/12/2002, we found an average abnormal return of 0.23% on the announcement day with a subsequent price stabilization. However, when the sample was split up into good and bad news, we found an average abnormal return of +1.92% and –0.93% respectively. Although the return to equilibrium proved to be slower with regard to the trading volume, we found that, on average, there was an excess of activity around the announcement day.

We can therefore conclude that the disclosure of price sensitive events classified as such contain useful market information, and that this information is incorporated in an efficient way in the share price formation process. However, the release of information seems to be done in a delayed way in comparison to what we would expect.

Keywords: Price Sensitive Events; Event Studies; Semi-strong Form Efficiency; Abnormal Return; Abnormal Trading Volume; Security Regulation; CMVM.

JEL classification: G14 and G18.

1. INTRODUCTION

The turbulence and uncertainty which have characterized the world's financial markets have placed increased attention on fields such as valuation, market efficiency and market regulation. On the other hand, globalization and the development of information and communications technology have increased the importance of disclosure and regulation in the financial sector.

The Portuguese Securities Market Commission (CMVM – *Comissão do Mercado de Valores Mobiliários*), created in 1991, is the regulatory body responsible for the regulation and regulation and supervision of the Portuguese capital markets. One of its major concerns is to guarantee the integrity and transparency of the market. With that purpose in mind, CMVM follows some fundamental guidelines with emphasis on the quality of information and the contribution to the market's efficiency and security. In this context, and according to the Portuguese Securities Code (CVM – *Código dos Valores Mobiliários*), security issuers have an obligation to inform the market about price sensitive events. They have to inform the regulator about price the sensitive event under scope in a timely fashion. The regulator will then inform the market, using its diffusion system, which is basically a specific website available for this purpose[1].

Using these supposed "price sensitive events" that are elected by issuing companies to be disclosed through the CMVM website, this study has two related objectives: first to study how sensitive are "price sensitive" events and, secondly, how efficient and timely has this process been.

With that purpose in mind, we applied the traditional methodology of event studies to test the hypothesis of the existence of an abnormal return or abnormal trading volume around or about the day, on which the price sensitive event was disclosed. This will enable us to reach a conclusion with regard to the semi-strong efficiency hypothesis of the Portuguese equity market.

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

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 presents the literature review. Section 4 explains the methodology applied and Section 5 discusses the empirical results. The last section contains the conclusions.

2. LEGAL ASPECTS

The Portuguese Securities Market Commission (CMVM – *Comissão do Mercado de Valores Mobiliários*) was created in 1991 with the objective of regulating and supervising the Portuguese capital market, looking at the integrity and transparency of markets. Stock markets need a flow of relevant and timely information in order to work efficiently. The disclosure of information for investors is therefore a vital topic in CMVM´s guidelines. In this context, the Portuguese Securities Code (CVM – *Código dos Valores Mobiliários*) imposes several rules on listed companies regarding their information obligations.

Finally, for legal purposes CMVM foresees two categories of publishable information: the first called "Price Sensitive Information" and the second under the designation "Other Events/Communications" to the market.

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. In this sense, it is important to analyze the delimitation of theses concepts in the context of this work. For this purpose we will consider the guidelines published by CMVM on the subject. They were published in July 2000, in a document entitled "Statement of opinion regarding a legal duty of issuers of securities listed on the Stock Exchange to disclose information on material events" (CMVM, 2000a).

In this document, CMVM states that the disclosure obligation of price sensitive events should be perceived in a broad sense, i.e. including not only facts/events but also observed changes,

deficiencies or inaccuracies, if they are not of public knowledge, that may lead to a substantial price change on listed securities.

Secondly, the event to be disclosed should be given to have been finished, not necessarily in a formal way, but at least in terms of the management process. Therefore, CMVM considers that companies do not have to inform the market about preliminary stages of negotiations or internal processes while confidentiality is maintained between the intervening parties.

A further and essential point when assessing whether a matter requires announcement is to define what constitutes "price sensitive". According to CMVM´s guidelines, facts are price sensitive if they are expected to lead to a substantial change of 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[2].

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

[2] 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 with the same; restructuring of the liabilities of the issuing company or of other entities involved in a group relationship with the same, 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 2000 a).

urgency of the information, the opposite is authorized by the regulator. This will be judged on the basis of market and issuer interests.

Finally, according to this system, investors can also have access to a wide variety of information such as the publication of previously made earnings announcements, the acquisition or sale of company's own shares, and dividend announcements, among others, which are classified as "Other Events/Communications". Once this type of information does not follow the criteria previously defined as price sensitive event, it is expected that it does not influence security prices in the same way.

3. LITERATURE REVIEW

Assuming that asset values are determined by the asset expected cash flows, any information leading to a change in those expectations is supposed to have a direct influence on the asset pricing. The study of how security prices incorporate information has been a dominant topic in Finance, and has commonly been studied under the market efficiency scope. As this study intends to analyze the impact of the price sensitive events disclosure on stock prices, the literature review is based on the research of semi-strong form tests for the adjustment of prices to public announcements, currently known as event studies (Fama, 1991).

The seminal study of Fama, Fisher, Jensen and Roll (FFJR) (1969) introduced the event study methodology, still in use today to analyze how stock prices incorporate public information. Since we aim to analyze the impact of "price sensitive events" which could include a wide variety of events such as earning announcements, mergers, tender offers or company restructurings, we have chosen only to review the literature on the most frequent type of events that occur in our sample[3]. Based on the classification presented in Thompson, Olsen and Dietrich (1987) and Pritamani and Singal (2001), with the due alterations to our sample, we obtained the following categories summarized in Table 3.1:

[3] Our sample initially included forty four listed companies in Euronext Lisbon from which it was possible to collect price series and price sensitive events. As price sensitive events have only been available on CMVM´s website since 2000, the period under analysis is between 01/01/2000 and 31/12/2002.

Table 3-1: 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.

We concluded that, during the considered time window (3 years of observations), the most frequent type of information (46%) is on company restructurings, namely acquisitions and asset sales. With a considerably lower weight (18%), we have material events related to changes in capital structure, namely, share issues and dividend distribution.

A number of studies have examined the effects of the announcements of mergers, tender offers or divestitures on share prices. These studies are unanimous in supporting that the capital market attributes value to these disclosures. Nevertheless, despite existing consensus that such events have a positive influence with regard to shareholders´ target firms, the same is not valid for acquiring firms, the conclusions sometimes being contradictory. Jarrel and Poulsen (1989), Servaes (1991), and Georgen and Renneboog (2002) identified cumulative abnormal returns superior to 20% on target firms. With regard to bidding firms some authors argue that the wealth increase is positive (Jarrel and Poulsen (1989), Loderer and Martin (1990), Mulherin and Boone (2000) and Gorergen and Renneboog, 2002), while other studies indicate that the gain is null or even slightly negative (Servaes (1991), Healy, Palepu and Ruback (1992), Kaplan, Weisbach (1992), and Kuipers, Miller and Patel 2002).

With regards to the influence of share issues on share prices, the findings show that, in general, prices tend to observe a decline after the disclosure. Asquith and Mullins (1986) concluded that abnormal returns are about -2.7% two days following the announcement. Using intra-day stock prices data, Barclay and Litzenberger (1987) confirmed the same tendency, concluding that the market responds quickly with a 1.3% decline in price fifteen minutes after the announcement.

As a final example of a market efficiency test, we consider the examination of dividend announcements or the so-called *Dividend Puzzle* (Black, 1976). According to Miller and Modigliani (1961), in a perfect capital market, the decision about dividends should be irrelevant. Nevertheless, the evidence has shown that companies tend to deliberately follow certain strategies (La Porta *et al.*, 2000) that turn the issue into a real *puzzle*: how do companies choose their dividends policy? Some argue that the unexpected changes in dividends present a positive correlation with stock-price changes (Ahorony and Swary (1980) and Asquith and Mullins, 1983). This finding is justified by the "information signalling hypothesis", dividends being a way of communicating information to the market (Miller and Rock (1985), Ofer and Siegel (1987) and Healy and Palepu, 1988). A second approach justifies changes in dividends based on the agency cost theory (Jensen (1986), La Porta *et. al.*, 2000). A third explanation relates to the tax effect, once the differences in taxes can have an impact on stock prices (Travlos, Trigeorgis and Vafes, 2001).

Regarding price sensitive events in general, Wilton (2002) concludes that earnings announcements provoke a substantial change in stock prices in 21.25% of the cases analyzed for the Portuguese capital market. However, this disclosure has been only classified as a price sensitive event for 5% of cases.

In the U.S., the results obtained regarding the filling out of form 8-K[4] show that the adjustment of stock prices to this form is small and generally occurs before the form disclosure. This seems to be evidence that other types of information disclosure in due time is playing the relevant role (Carter and Soo, 1999).

Fleming (2001) analyzed the impact of the "open briefing" process established in the Australian Stock Exchange in 1999[5], however, his results are mixed. While abnormal trading volume and volatility are significantly higher during open briefings, abnormal return is not significantly different from zero.

---

[4] According to Securities and Exchanges Commission's rules this form should be filled out in the period five to fifteen days after the occurrence of an event considered relevant.

[5] The Australian Stock Exchange established that firms can provide greater information to the market about price sensitive events through "open briefing".

4. RESEARCH DESIGN

4.1. Stock Price Returns Analysis

4.1.1. Variables Definition

Regarding the publishable information, our purpose is to analyze the impact of the disclosure of the supposed price sensitive events, the event date (day zero) being the date when the disclosure is made available at the regulator's website. Following the methodology of MacKinlay (1997), we will consider an event window of eleven days, which includes five days before the event, the event day, and five days after its disclosure. The choice of this period takes into account the need to have a sufficiently large period to capture 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, Miller and Patel (2002),and 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 Geral 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), Oppong (1980) and 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, firstly, the model's parameters were anticipated by the market and, secondly, they were constant during the analyzed period.

The abnormal return of security *i* in the event window is defined as follows:

$$AR_{it} = R_{it} - \hat{\alpha}_i - \hat{\beta}_i R_{mt}$$

where $\hat{\alpha}_i$ and $\hat{\beta}_i$ are market model parameter estimates[6], R_{it} and R_{mt} are, respectively, the period *t* returns on security *i* and the market index.

[6] Ordinary least squares (OLS) were used for the estimation procedure.

Under the null hypothesis (H_0) that the event has no impact on the behaviour of stock price returns, the distribution of the sample abnormal return of a given observation in the event window is assumed to be:

$$AR_{it} \sim N(0, \sigma^2(AR_{it}))$$

where,

$$\sigma^2(AR_{it}) = \sigma^2_{\varepsilon_i}$$

Nevertheless, it is usual to aggregate through time and across securities (MacKinlay, 1997) in order to draw overall inferences for the event under scope.

Considering the aggregation through time, we arrive at the Cumulative Abnormal Return (CAR) for the asset *i* along the time period $(t_2 - t_1)$.

$$CAR_i(t_1, t_2) = \sum_{t=t_1}^{t_2} AR_{it}$$

The distribution of cumulative abnormal return is

$$CAR_i(t_1, t_2) \sim N\left(0, \sigma_i^2\left(CAR_i(t_1, t_2)\right)\right)$$

where,

$$\sigma_i^2\left(CAR_i(t_1, t_2)\right) = (t_2 - t_1 + 1)\,\sigma^2_{\varepsilon_i}$$

On the other hand, it is also common to aggregate abnormal returns across observations. Considering *N* events and assuming that there is no overlapping of event windows for the included securities, we can estimate the Average Abnormal Return (AAR) which can be defined by the following equation:

$$AAR_t = \frac{1}{N}\sum_{i=1}^{N} AR_{it}$$

The average abnormal return could also be aggregated along the event window, leading to the Cumulative Average Abnormal Return (CAAR):

$$CAAR(t_1, t_2) = \sum_{t=t_1}^{t_2} AAR_t$$

Inferences about the cumulative abnormal returns can be drawn assuming:

$$CAAR(t_1, t_2) \sim N(0, \text{var}(CAAR(t_1, t_2)))$$

where,

$$\text{var}\left(CAAR\left(t_1,t_2\right)\right) = \sum_{t=t_1}^{t_2} \text{var}\left(AAR_t\right)$$

where,

$$\text{var}\left(AAR_t\right) = \frac{1}{N^2}\sum_{t=t_1}^{N}\sigma_{\varepsilon_i}^2$$

Then, the null hypothesis (H_o) of the event having no impact on stock price returns can be tested using the following statistics:

$$\Theta_1 = \frac{AAR_t}{\left(\text{var}\left(AAR_t\right)\right)^{1/2}} \sim N(0,1)$$

$$\Theta_2 = \frac{CAAR\left(t_1,\, t_2\right)}{\left(\text{var}\left(CAAR\left(t_1,t_2\right)\right)\right)^{1/2}} \sim N(0,1)$$

In order to test if our conclusions could be biased as a consequence of an inadequate model for testing abnormal returns, we also used the market adjusted model, where abnormal returns are taken as:

$$AR_{it} = R_{it} - \overline{R}_i$$

where $\overline{R}_i$ is the daily average returns for the security *i* for the estimation period.

4.1.2. Average Abnormal Return Analysis – Good and Bad News

Several authors such as Conrad, Cornell and Landsman (2002) have pointed out theoretical reasons for different stock price reactions to good and bad news, and empirical findings have proven such theories. Therefore, we may also suspect different behaviours for stock price reactions to good and bad news.

Since the classification of price sensitive events as good and bad news is subjective, we assumed that the market is efficient regarding the incorporation of information and as in Cristie, Corwin and Harris (2002), we used the following criteria in order to classify events:

- When the return of security *i* in the event date (day zero) was positive, we classified the price sensitive event as "good news";
- When the return of security i in the event date (day zero) was negative, we classified the price sensitive event as "bad news".

Therefore, all tests presented in section 4.1.1 were repeated considering this classification, using the notations Θ_{1G} and Θ_{2G} for good news and Θ_{1B} and Θ_{2B} for bad news.

4.1.3. Average Abnormal Return Analysis – "Other Events"

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, are not classified as price sensitive. However, they are also disclosed and made available at the regulator's website under the denomination of "Other Events/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 Events/Communications" in order to analyze if these disclosures also lead to any significant change in stock prices.

4.2. Trading Volume Analysis

4.2.1. Volume Ratio

In addition to stock price returns analysis, we also carried out tests to determine the impact of price sensitive events in stock trading volumes in order to complement the results previously obtained. The Harris and Gurel (1986) methodology was first applied. In this study, the abnormal trading volume is measured by the determination of adjusted market volume ratio (VR) as follows:

$$VR_{it} = \frac{V_{it}}{V_{mt}} x \frac{V_m}{V_i}$$

where V_{it} and V_{mt} are the trading volume of, respectively, security *i* and the market index at the event window *t*, and V_i and V_m are the average trading volumes of, respectively, security *i* and the market index, during the estimation period. The expected value of this ratio is 1 if there are no changes in volume during event window *t* with regard to the estimation period.

Later, the average for the *N* events included in the sample could be computed:

$$MVR_{it} = \frac{1}{N}\sum_{i=1}^{N} VR_{it}$$

In this study, V_m represents the trading volume for all listed companies included in our sample (Landsman and Maydew, 2001) and the estimation period includes all trading volumes from 01/01/2000 to 31/12/2002, excluding the event window.

According to Beaver (1968), Landsman and Maydew (2001), Cready and Mynatt (1991) and Chae (2002), the measure used to determine the trading volume is[7]:

$$V_{it} = \frac{\text{nr. of shares of firm } i \text{ traded in day } t}{\text{nr. of shares outstanding for firm } i \text{ in day } t}$$

However, as referred to in Deininger, Kaserer and Ross (2000), 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.

4.2.2. Abnormal Trading Volume Analysis

Additionally, an analysis to obtain the abnormal trading volume was carried out through similar tests to those presented in section 4.1.1, using the notation Θ_{MM}. Thus, the abnormal trading volume (AVOL) for any security *i* in the event window is:

$$AVOL_{it} = V_{it} - \hat{\alpha}_i - \hat{\beta}_i V_{mt}$$

where $\hat{\alpha}_i$ and $\hat{\beta}_i$ are parameters estimates of the linear regression:

$$V_{it} = \alpha_i + \beta_i V_{mt} + \varepsilon_{it}$$

where V_{it} is the trading volume for the security *i* on day *t*, V_{mt} is the total trading volume for all securities included in the sample and α_i and β_i are the regression model parameters.

[7] See Lo and Wang (2000) for a more detailed description of volume measures.

Considering *N* events, the average abnormal trading volume (AAVOL) can be determined as follows:

$$AAVOL_{it} = \frac{1}{N}\sum_{i=1}^{N} AVOL_{it}$$

Assuming the normality, statistical tests presented above were computed regarding trading volume.

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[8]:

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

Finally, we also carried out tests considering the mean adjusted trading volume, where the abnormal trading volume for the security *i* on day *t* is given by:

$$AVOL_{it}^{M} = V_{it}^{*} - \overline{V}_{i}^{*}$$

where V_{it}^{*} is the logarithm of the trading volume of security *i* on day *t* and $\overline{V}_{i}^{*}$ is the average trading volume for the security *i* for the period from 01/01/2000 to 31/12/2002, excluding the event windows.

4.3. Data

4.3.1. 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.[9] It was possible to collect data for the entire time period under analysis for forty four out of fifty four companies that were listed on 31/12/2002.

[8] 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.

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

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 thirty seven 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 forty four companies was reduced to 757 events as result of the insignificance of the market model parameters when discussing their estimate.

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 five-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 Events/Communications". Starting with 1030 collected announcements of "Other Events/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 4.1 details the steps for obtaining the final sample.

Table 4-1 Effect of Selection Criteria upon Sample Size

Criteria	Price Sensitive Events	Other Communications	Total Events
Initial sample size (events of 44 companies)	798	1030	1828
OLS parameters estimates criteria	- 41	- 68	- 109
Reduced sample size (37 companies)	757	962	1719
Overlapping data (event windows criteria)	- 248	- 491	- 739
Final sample size (# publishable events)	**509**	**471**	**980**

5. EMPIRICAL FINDINGS

5.1. Return Analysis

5.1.1. 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 5.1:

Table 5-1: Summary of Regression Statistics Return Analysis

	Average	Standard Deviation	Max.	Min.
Average Daily Return	-0.05%	1.06%	0.15%	-4.85%
Average R_i^2 ($\overline{R}_i^2$)	0.12	0.15	0.69	0.01
Average β_i ($\overline{\beta}$)	0.61	0.44	1.92	0.07

The coefficient of determination R^2 is higher than 0.3 in only five of the thirty-seven 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 thirty seven companies and additionally the *PSI Geral* included fifty four companies on 31/12/2002.

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 5.2 and are very similar to those observed by Coutts, Mills and Robert (1995) when studying weekly data of fifty six companies belonging to the FT-SE 100, between January 1984 and December 1993.

Table 5-2: Misspecification tests of the Market Model of the sample collected

Statistical Tests	p>0.05	0.05≥p>0.025	0.025≥p>0.01	p<0.01
LM(1)	15	1	0	21
KS	2	0	1	34
White	23	2	0	12
Reset	29	1	0	7

Font: Table adapted from the study of Coutts, Mills e Roberts (1995)

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, the distribution of the sample mean excess return converges to normality as the number of securities increases". For a sample of fifty 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.

Therefore, despite the eventual problems that can occur in classical event studies methodology, Brown and Warner (1985) support that results of simulations performed with daily data reinforce the conclusions already presented in Brown and Warner (1980) with monthly data, with those tests correctly specified.

5.1.2. Abnormal Returns – Price Sensitive Events

After analyzing average abnormal returns and cumulative average abnormal returns across the event window (Figures 5.1 and 5.2), it seems that a significant change is observed around day

zero with an increase of the stock price returns on this day and followed by a decrease on the subsequent days.

Figure 5-1: Average Abnormal Return – Price Sensitive Events

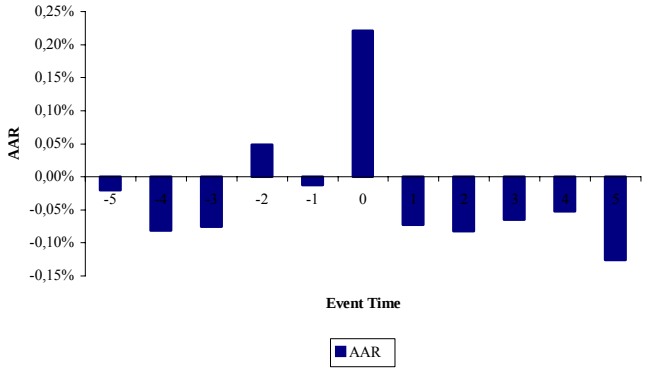
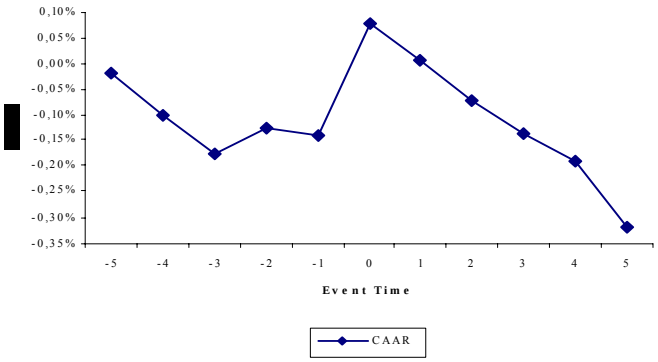


Figure 5-2: Cumulative Average Abnormal Return – Price Sensitive Events



These results can be confirmed by the analysis of the statistical tests described earlier, with results being presented in Table 5.3:

Table 5-3: Results of Tests to AAR and CAAR – Price Sensitive Events

Day	AAR	Test Θ_1	CAAR	Test Θ_2
-5	0.00%	0.00086	0.00%	0.00086
-4	-0.07%	-0.65793	-0.07%	-0.46462
-3	-0.07%	-0.64395	-0.14%	-0.75115
-2	0.05%	0.51300	-0.08%	-0.39401
-1	-0.02%	-0.16043	-0.10%	-0.42416
0	0.23%	2.20498*	0.13%	0.51297
1	-0.04%	-0.34058	0.10%	0.34619
2	-0.05%	-0.43489	0.05%	0.17008
3	-0.07%	-0.63634	-0.02%	-0.05176
4	-0.04%	-0.39143	-0.06%	-0.17289
5	-0.12%	-1.13236	-0.18%	-0.50626

* Parameters statistically significant at 5% significance level.

Focusing on the event day (day 0), the sample average abnormal return is 0.23%, which together with a standard error of 0.125% results in a value of 2.2 for test Θ_1. Thus, the null hypothesis that the event has no impact is rejected with a 95% confidence level. On the other days, the hypothesis that the variable is null is accepted with the same degree of confidence.

However, when we analyze the evolution of the cumulative average abnormal return along the event window, 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. Results can be observed in Figures 5.3 and 5.4:

Figure 5-3: Average Abnormal Return – "Good and Bad News"

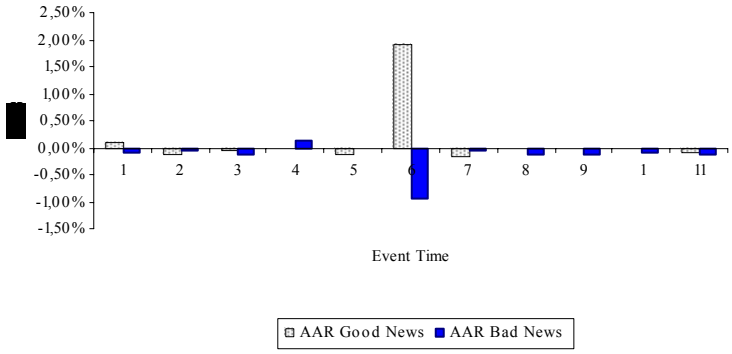
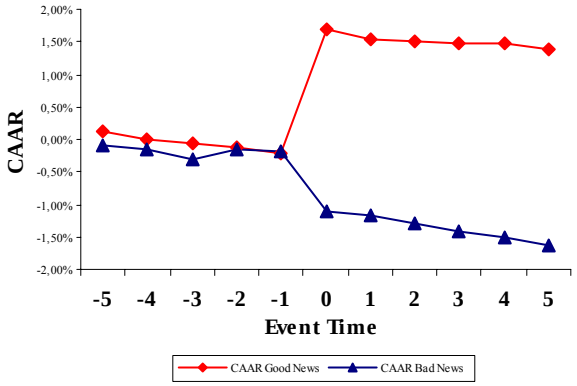


Figure 5-4: Cumulative Average Abnormal Return – "Good and Bad News"



The results obtained and the statistical tests confirm the conclusions shown in previous figures and are presented in Tables 5.4 and 5.5:

Table 5-4: 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

* Parameters statistically significant at 5% significance level.

Table 5-5: 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*

* Parameters statistically significant at 5% significance level.

The results are consistent with a great majority of the literature on the market efficiency in its semi-strong form. The evidence strongly supports the hypothesis that price sensitive events do indeed convey useful information for the determination of stock prices. We can conclude that

the market quickly incorporates the information during day 0 and evidence of abnormal returns on subsequent days does not exist.

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.

Two 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 immediate adjustment of stock prices in day 0 and therefore, closing prices used to compute the event day stock price return are prices already "corrected" by the market. On the other hand, in other cases, even when the announcements are released after the market close, they simply represent a correction to or a clarification of any incorrect or insufficient information that was disturbing the market before their release. In these situations prices were already affected by the information although it was not yet official. Thus it is under these circumstances that we detect signs of some information asymmetry leading to some suggestion of semi-strong form of inefficiency.

It is also interesting to notice that in our sample, collected in a bear market[10], 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, Cornell and Landsman (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 from the mean adjusted return are consistent with those from the market model.

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

5.1.3. Abnormal Returns – Other Communications

The results for "Other Events/Communications" reveal that the disclosure of this type of announcement also affects stock prices around the event day as we can observe in Figures 5.5 and 5.6:

Figure 5-5: Average Abnormal Return – "Other Communications"

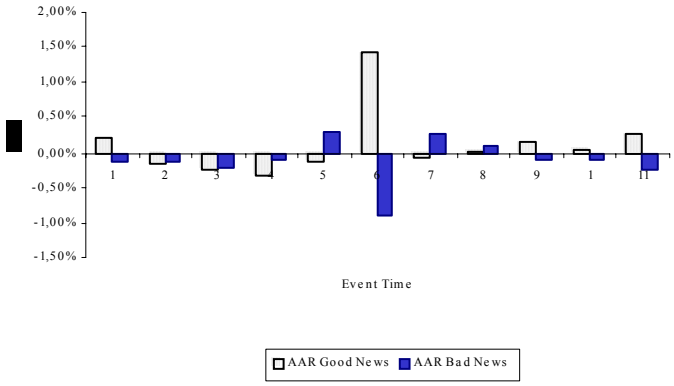
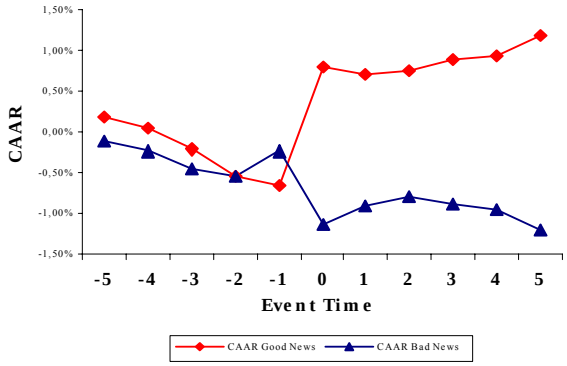


Figure 5-6: Cumulative Average Abnormal Return – "Other Communications"



However, the tests obtained for the cumulative average abnormal return of "good news" are statistically insignificant at a 5% significance level. Despite the results being not so obvious than with price sensitive events, we observed that "Other Events/Communications" also possess informational value. Since it is not possible to automatically distinguish between "Price Sensitive Events" and "Other Events / Communications" our findings may well be the result of wrongly subjective classification within this category as suggested by Wilton (2002).

5.2. Stock Trading Volume

5.2.1. Adjusted Volume Ratio

As observed in Figure 5.7 and Table 5.6, the trading volume increases around day 0 with larger significance on the day following the disclosure of the price sensitive information (the first day on which trading is possible after the event). 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.

Figure 5-7: Market Adjusted Volume Ratio

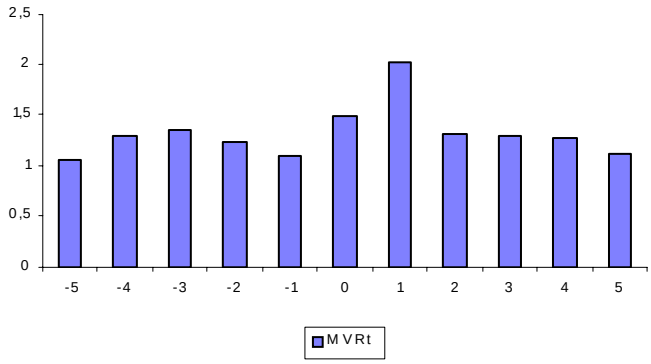


Table 5-6: Market Adjusted Volume Ratio

Event Time	MVRt
-5	1.057
-4	1.293
-3	1.357
-2	1.226
-1	1.093
0	1.480
1	2.021
2	1.315
3	1.298
4	1.279
5	1.103

5.2.2. Average Abnormal Trading Volume

Figure 5.8 and Table 5.7 show that the AAVOL increases on day 0, showing an excess of activity around the event day. 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.

Figure 5-8: Average Abnormal Trading Volume – Market Model

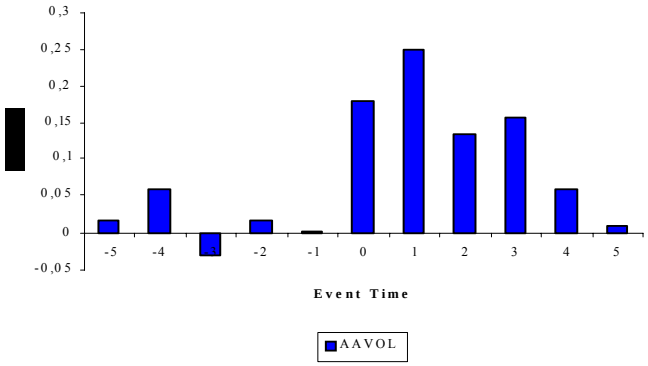


Table 5-7: Results of AAVOL test – Price Sensitive Events

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

* Parameters statistically significant at 5% significance level.

Combining the results of the analysis of stock price returns with the results on 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 the changes observed in prices are not due to supply and demand imbalances, but 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 the new prices new agents are attracted to trading, namely liquidity traders, as defined in Copeland and Galai (1986).

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, concluding that the information disclosed possesses informational value to the market that clearly reacts to the announcements.

6. CONCLUSIONS

In the competitive environment that characterizes today's capital markets, the transparency of the price formation process is crucial in order to build up investor's confidence that recently has been deeply shaken after the Enron or the Worldcom scandals. Thus, the disclosure of information to the market constitutes a fundamental pillar not only for market workflow but also in its regulation and supervision activity. In this context and with the purpose of leading to greater integrity and market transparency, regulators have increased the pressure on listed companies for information disclosure of price sensitive events. This pressure applies to both the detail and quality of the information to be disclosed, and the timing of their announcements.

In this work we intend to analyze the relevance of the disclosure of price sensitive events in the Portuguese stock market, with the purpose of determining if the disclosure of such information is efficiently incorporated into stock prices. It is our additional intention to reach a conclusion on the speed of any price adjustments that may be recorded.

With that purpose in mind, we used the traditional event studies methodology applied to the analysis of the average abnormal return (AAR), as well as its cumulative value along the

event window. According to MacKinlay (1997), the abnormal return is calculated as the difference between the return of a security and its expected return computed through the market model. After the splitting of events into "good" news and "bad" news, the results demonstrate an average abnormal return around day 0, 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 possesses informational value and that the market is efficient in its semi-strong form. Nevertheless, considering that announcements are made after the close of trade in the exchange, the adjustment in prices seems prior to the disclosure, which may indicate that in several cases the announcements are mere rectifications or simple validations of rumours already spreading around.

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.

7. REFERENCES

Aharony, J. and Swary, I. (1980) `Quarterly Dividend and Earnings Announcements and Stockholder Return: an Empirical Analysis´, *Journal of Finance,* Vol.35, pp.1-12.

Ajinkya, B. and Jain, P. C. (1989) `The Behavior of Daily Stock Market Trading Volume´, *Journal of Accounting and Economics,* Vol.11, pp.331-359.

Asquith, P. and Mullins, D. (1983) `The Impact of Initiating Dividend Payments on Shareholders´ Wealth´, *Journal of Business,* Vol.56, pp.77-96.

Asquith, P. and Mullins, D. (1986) `Equity Issues and Offering Dilution´, *Journal of Financial Economics,* Vol.15, pp.61-89.

Barclay, M. and Litzenberger, R. (1987) `Announcement Effects of New Equity Issues and the Use of Intraday Price Data´, *Journal of Financial Economics,* Vol.21, pp.71-99.

Beaver, W. H. (1968) `The information Content of Annual Earnings Announcements´, *Journal of Accounting Research,* Vol.6 (supplement), pp.67-92.

Black, F. (1976) `The Dividend Puzzle´, *Journal of Portfolio Management,* Vol.2, pp.5-8.

Brown, S. J. and Warner, J. B. (1980) `Measuring Security Price Performance´, *Journal of Financial Economics,* Vol.8, pp.205-258.

Brown, S. J. and Warner J. B. (1985) `Using Daily Stock Returns - The Case of Event Studies´, *Journal of Financial Economics,* Vol.14, pp.3-31.

Carter, M. E. and Soo, B. S. (1999) `The Relevance of Form 8-K Reports´, *Journal of Accounting Research,* Vol.37, pp.119-132.

Chae, J. (2002) `Trading Volume, Information Asymmetry, and Timing Information´, working paper, Massachusetts Institute of Technology.

CMVM (2000 a) "Statement of Opinions on the Legal Duty of Issuers of Securities Listed on the Stock Exchange to Disclose Information on Material Events", Comissão do Mercado de Valores Mobiliários, htttp://www.cmvm.pt/english_pages/papers_documents/understandings/legalduty.asp, Lisbon, Portugal.

CMVM (2000 b) `Regulation Nº 11/2000´, Comissão do Mercado de Valores Mobiliários, http://www.cmvm.pt/english_pages/legislacao_e_publicacoes/legislacao_01.asp, Lisbon, Portugal.

Conrad, J., Cornell, B. and Landsman, W. (2002) `When is bad news really bad news?´, *Journal of Finance,* Vol.57, pp.2507-2532.

Copeland, T. and Galai, D. (1983) `Information Effects on the Bid Ask Spread´, *Journal of Finance,* Vol.38, pp.1457-1469.

Coutts, A., Mills, T. and Roberts, J. (1995) `Misspecification of the Market Model: The Implications for Event Studies´, *Applied Economics Letters,* Vol.2, pp.163-165.

Cready, W. M. and Mynatt, P. G. (1991) `The Information Content of Annual Reports: a Price and Trading Response Analysis´, *Accounting Review,* Vol.66, pp.291-312.

Cristie, W. G., Corwin, S. and Harris, J. H. (2002) `Nasdaq Trading Halt: The Impact of Market Mechanisms on Prices, Trading Activity and Executions Costs´, *Journal of Finance,* Vol.57, pp.1443-1478.

Deininger, C., Kaserer, C. and Ross, S. (2000) `Stock Price Effects Associated with Index Replacements in Germany´, unpublished manuscript, University of Fribourg.

Duque, J. and Fazenda, A. R. (2003) `Evaluating Market Supervision Through an Overview of Trading Halt in the Portuguese Stock Market´, *Journal of Financial Regulation and Compliance,* Vol.11,n.4, pp.349-376.

Fama, E. F. (1991) `Efficient Capital Markets: II´, *Journal of Finance,* Vol. 36, pp.1575-1617.

Fama, E. F., Fisher, L., Jensen M. C. and Roll, R. (1969) `The Adjustment of Stock Prices to New Information´, *International Economic Review,* Vol.10, pp.1-21.

Fleming, Grant (2001) `Fair Disclosure and Open Market Briefings: Evidence from the Australian Stock Exchange´, working paper, Australian National University.

Georgen, M. and Renneboog L. (2002) `Shareholder Wealth Effects in Large European Takeover Bid´, unpublished manuscript, University of Manchester Institute of Science and Technology.

Harris, L. and Gurel, E. (1986) `Price and Volume Effects Associated with Changes in the S&P 500 list: New Evidence for the Existence of Price Pressures´, *Journal of Finance,* Vol. 41, pp.815-829.

Healy, P. M. and Palepu, K. G. (1988) `Earnings Information Conveyed by Dividend Initiations and Omissions´, *Journal of Financial Economics,* Vol. 21, pp.149-175.

Healy, P. M., Palepu, K. G. and Ruback, R. S. (1992) `Does Corporate Performance Improve After Mergers?´, *Journal of Financial Economics,* Vol. 31, pp.135-175.

Isidro, H. (1997) `O preço dos Títulos e o Anúncio dos Resultados no Mercado Accionista Português´, master dissertation, Instituto Superior de Ciências do Trabalho e da Empresa.

Jarrell, G. and Poulsen, A. (1989) `The Returns to Acquiring Firms in Tender Offers: Evidence from Three Decades´, *Financial Management,* Vol.18, pp.12-19.

Kaplan, S. and Weisbach, M. (1992) `The success of Acquisitions: Evidence from Divestitures´, *Journal of Finance,* Vol.47, pp.107-138.

Kuipers, D. R., Miller, D. and Patel, A. (2002) `Shareholder Wealth Effect in the Cross Border Market for Corporate Control´, working paper, Wake Forest University.

La Porta, R., Lopez-De-Silanes, Shleifer, A. and Vishny, R. (2000) `Agency Problems and Dividend Policies Around the World´, *Journal of Finance,* Vol.55, pp.1-33.

Landsman, W. R. and Maydew, E. L. (2001) `Beaver (1968) Revisited: Has the Information Content of Quarterly Earnings Announcements Declined in the Past Three Decades?´, working paper, University of North Carolina.

Lo, A. W. and Wang, J. (2000) `Trading Volume: Definitions, Data Analysis, and Implications of Portfolio Theory´, *Review of Financial Studies*, Vol. 13, pp. 257-300.

Loderer, C. and Kenneth M. (1990) `Corporate Acquisition by Listed Firms: The Experience of a Comprehensive Sample´, *Financial Management,* Vol.19, pp.17-33.

MacKinlay, C. A. (1997) `Event Studies in Economics and Finance´, *Journal of Economic Literature,* Vol.35, pp.13-39.

Miller, M. and Modigliani, F. (1961) `Dividend Policy, Growth and the Valuation of Shares´, *Journal of Business,* Vol.34, pp.411-433.

Miller, M. H. and Rock, K. (1985) `Dividend Policy under Asymmetric Information´, *Journal of Finance,* Vol.40, pp.1031-1051.

Mulherin, H. J. and Boone, A. L. (2000) `Comparing Acquisitions and Divestitures´, *Journal of Corporate Finance: Contracting, Governance and Organization,* Vol.6, pp.117-139.

Ofer Aharon R. and Siegel, D. R. (1987) `Corporate Financial Policy, Information, and Market Expectations: An Empirical Investigation of Dividends´, *Journal of Finance,* Vol.42, pp. 889-911.

Oppong, A. (1980) `Information Content of Annual Earnings Announcements Revisited´, *Journal of Accounting Research,* Vol.18, pp.575-584.

Pritamani, M. and Singal, V. (2001) `Return Predictability Following Large Price Changes and Information Releases´, *Journal of Banking & Finance,* Vol.25, pp.631-656.

Seiler, M. J. (2000) `The Efficacy of Event-Study Methodologies: Measuring EREIT Abnormal Performance Under Conditions of Induced Variance´, *Journal of Financial and Strategic Decisions,* Vol.13, pp.101-112.

Servaes, H. (1991) `Tobin´s Q and the Gains from Takeovers´, *Journal of Finance,* Vol.46, pp.409-419.

Thompson, R., Olsen, C. and Dietrich, R. (1987) `Attributes of News About Firms: An Analysis of Firm-Specific News Reported in the Wall Street Journal Index´, *Journal of Accounting Research,* Vol.25, pp.245-273.

Travlos, N., Trigeorgis, L. and Vafeas, N. (2001) `Shareholder Wealth Effects of Dividend Policy Changes in an Emerging Stock Market: The Case of Cyprus´, *Multinational Finance Journal,* Vol.5, pp.87-112.

Wilton, P. (2002) `Impacto da Divulgação de Resultados na Negociação em Mercado de Bolsa´, *Cadernos do Mercado de Valores Mobiliários - CMVM,* Vol.15, Lisbon, Portugal.