The Informativeness of Quarterly Financial Reporting: The Portuguese Case

Carlos F. Alves
and
F. Teixeira dos Santos

CEMPRE - Centro de Estudos Macroeconómicos e Previsão

U. PORTO

FEP FACULDADE DE ECONOMIA
UNIVERSIDADE DO PORTO

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THE PORTUGUESE CASE[°].

Carlos F. Alves
CEMPRE[•], Faculdade de Economia do Porto
email: calves@fep.up.pt
Rua Dr. Roberto Frias,
4200-464 Porto, Portugal
Telephone: + 351 225 571 100
Fax: + 351 225 505 050

F. Teixeira dos Santos
CEMPRE and CMVM - Comissão do Mercado de Valores Mobiliários
email: ftsantos@cmvm.pt
Avenida da Liberdade, nº 252
1056-801 Lisboa, Portugal
Telephone: (351) 213 177 000
Fax: (351) 213 537 077/8

ABSTRACT
With the Directive 2004/109/EC, of December 15, 2004 – Transparency Directive –, the European Union decided not to require listed companies to disclose financial information in the first and third quarters of each year. Each EU country now has to decide whether to oblige its companies to disclose this information. Using a sample of 1751 firm-earnings announcements between 1994 and 2004, this paper ascertains the informativeness of quarterly financial reporting in Portugal, one of the seven European countries where the disclosure of such information is currently compulsory in all quarters. Evidence suggests that the information of the first and third quarters, both in terms of price volatility and trading volume, is significant and not inferior to that of the remaining earnings announcements.

1. INTRODUCTION

The Financial Services Action Plan of the European Commission of May 1999 included the updating of Directive 81/121/EEC on periodic information as one of the measures to be promoted. The objective was to provide more frequent and better quality information so as to reduce the asymmetry of information and to reinforce confidence in the market and its capacity to attract investors. With the aim of making a well-founded decision on the application of its savings, investors require information that will enable them to evaluate the characteristics of the financial products offered. Following the work developed within the framework of this Action Plan, on 15 December 2004, the European Parliament and the Council approved Directive 2004/109/EC on the harmonisation of transparency requirements in relation to information about issuers whose securities are admitted to trading on a regulated market – the so-called Transparency Directive.

This directive lays down for the issuers of shares and/or debt securities on regulated markets the requirement of disseminating an audited annual financial report (Art. 4), a half-yearly financial report covering the first six months of the financial year (Art. 5) and, to the issuers of shares admitted to trading on a regulated market, the dissemination of interim management reports during the first and second half of each financial year (Art. 6). Contrary to what has been requested in the US and in some EU-15[1] markets, the Transparency Directive does not require the dissemination of quarterly financial reports. The solution found is a compromise between the present requirements of these countries and those who feel that the reporting of financial reports in all quarters, besides involving costs for issuers, will lead to short-termism in the management of companies. Furthermore, the solution put in place leaves it up to each of the EU countries to decide whether or not to request the dissemination of financial information in all quarters. As far as costs are concerned, these should not be significantly different from those involved in drawing up and disseminating the interim management reports required by the directive. In relation to their impact on the decision-making processes of the stakeholders involved, the main issue that should be considered under the revision of Directive 81/121/EEC is that of knowing if the quarterly financial information has information content that may affect investors' decisions. This is an important question that each country should ask itself in order to decide whether or not to make earnings announcements in the first and third quarters and not that of the possible generation of a

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[1] Austria, Finland, France, Italy, Portugal, Spain and Sweden.

hypothetical risk of "strategic myopia", which the market would evaluate in any case[2].

There is extensive literature pointing to the apparent importance of quarterly financial reporting in investors' decision-making[3]. The first work on this issue goes back almost forty years. Beaver (1968) shows that the announcement of quarterly results has a relevant information content, which translates into a significant impact on trading volume and price volatility when they are announced. Several subsequent works have corroborated the thesis that the quarterly announcement of earnings or dividends brings relevant information to the market on the future perspectives of companies, thereby affecting investors' decisions, both when considered alone (p.e., Pattit (1972), Joy et al. (1977), Watts (1978), Aharony and Swary (1980), Pope and Inyangete (1992), Lee and Mucklow (1993), Martikainen (1998), Pellicer and Rees (1999) and Eilifsen et al. (2001)), and when added to non-financial information (Amir and Lev (1996))[4]. Moreover, some literature has shown that the information content of the quarterly financial reporting has not decreased over time. Kross and Kim (1999) conclude that the information content of quarterly earnings was greater in the 1990's than in the early 1960's and more recently Landsman and Maydew (2002) reveal that the information content in quarterly earnings announcements has not deteriorated over the last 30 years; on the contrary, it has increased. These studies contradict the thesis of Lev and Zarowin (1999), according to which the change in economic conditions has brought about a reduction in the informativeness of financial information (earnings, cash flows and book values), as well as the evidence documented by Lo and Lys (2000), according to which the informativeness (measured by the volatility of abnormal returns) of the earnings announcement has not changed over time. Therefore, having established the importance of the dissemination of quarterly indicators on the financial situation of listed companies, it may be concluded that the non-requirement of financial reporting to the market may lead to deterioration in the flow and quality of the financial information reported to investors with unavoidable damage to their decision-making capacity.

The aim of this paper is to establish whether the quarterly financial information announced has relevant information content that may affect investors' decisions. Furthermore, we will try

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[2] As example, for Finland, a country with four year announcements, Martikainen (1998) reports that investors do not value temporary components of losses, because they believe that the temporary components are not reflected in future cash flows.

[3] For a revision of the literature on the relationship between the operation of capital markets and financial statements in general, see Kothan (2001). For a survey on European evidence, see Durmontier and Raffournier (2002).

[4] The impact of financial information is in fact extensive to stock options (Donders et al. (2000)).

to discover if this impact occurs in all four earnings announcement quarters or if otherwise the information of the first and third quarters is nonessential. There are very few studies that analyse the informativeness of the financial information, distinguishing the impact among the four different quarters. Nevertheless, in view of the new European regulatory framework, it becomes necessary to find out if the information of the first and third quarters is nonessential or if its informativeness is significant and not distinct from the informativeness of the half-year and annual reporting.

Very little is in fact known on this issue. McNichols and Manegold (1983) studied the effect of the change from the annual reporting system to a quarterly reporting system among 34 companies listed on AMEX during the sixties and concluded that after adopting the quarterly reporting system, the importance of their annual earnings dropped slightly. On studying the same period, Butler et al. (2003) concluded that annual earnings are more quickly incorporated in stock prices when companies adopt a quarterly disclosure system. Other papers on the US market study the frequency of information disclosure. However, in these studies it is not clear if it is the *frequency* or the *quality* of the disclosure that is being studied.

Outside the US context, and more particularly in Europe, the studies that exist on this issue are still too few. Alford et al. (1993) look at this problem indirectly when analysing the return-earnings relationships and return timeliness among 17 different countries, where some have quarterly earnings announcements while others bi-annual announcements. Nevertheless, in this context it is difficult to isolate the question of the frequency of the announcement of critical variables such as the regulatory framework, the market structure and the earnings announcements[5]. Leuz and Verucchia (2000), in turn, reveal that German companies that increase the frequency of disclosure by adopting international rules increase their turnover and register a decrease in the asymmetry of information. In the UK, where there is evidence of the relevance of half-year and annual information, there are no earnings announcements in the first and third quarters (Pope and Inayangete (1992)). In France, Gajewski and Quéré (2001) report that the reaction to quarterly earnings announcements is significantly different from that reported for other countries, assigning this reaction to the fact that investors do not value interim reports as highly as annual reports, given the difference in the quality of the information announced in both circumstances. In fact, in this country earnings are only

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[5] Moreover, it should be noted that the results obtained by Alford et al. (1993) are mixed. Using the US as a benchmark, there are countries with quarterly earnings announcements where the impact measures are greater or lesser, the same being true for the group of countries with bi-annual earnings announcements.

announced on an interim and annual basis, given that in the first and third quarters only turnovers are announced (Gajewski and Quéré (2001)). Spanish companies, on the other hand, are obliged to announce their earnings on a quarterly basis and to publish an half-year report containing the profit and loss account and a balance sheet, in addition to their audited annual accounts (Pellicer and Rees (1999)). The results obtained by Pellicer and Rees (1999) reveal that there is no significant difference between the volatility of returns that accompany the disclosure of annual earnings and the volatility of the returns associated to the disclosure of interim releases. We therefore have very different evidence for Spain and France. The reason for this is possibly the absence of information on the quarterly earnings in the case of France. These papers alone seem to indicate that the option of the EU to create an even less demanding prescriptive framework than the one that currently exists in France evolved in the wrong direction. It has to be admitted, however, that very little empirical evidence has been published on the European experience in this regard.

This study aims to contribute towards this literature, expressly analysing the impact of earnings announcements in the four different quarters, using a sample of 1751 earnings announcement periods in Portugal, one of the European countries where reporting is compulsory in all quarters. The sample takes into account a 10.5 year-period (from January 1994 to June 2004) and includes a period in which only half-year and annual reporting (up until the end of 1998) were compulsory and another period (as from 1999) in which compulsory reporting is extended to the other two quarters.

It should be noted that, just as in Spain and contrary to what happens in France, in Portugal earnings are disclosed in all four quarters.

The methodology followed is that of the study of the impact of events, where these events are the quarterly earnings announcements. The main impact measures used are the variation of price volatility and the abnormal trading volumes as a result of the earnings announcements, as proposed by Beaver (1968) and recently refined by Landsman e Maydew (2002)[6]. Several alternative measures were used to capture the abnormal returns depending on whether the risk adjustment was made based on the market model or merely using the return observed during the control period. Two alternative ways of defining the control period were used: one year prior to the event date (corresponding to the 248 trading days) with the exception of the 10

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[6] The study of price and volume indicators isn't necessarily a redundant exercise. The utilization of returns data and volumes information could identify investor's knowledge which results in different reactions to public announcements across firms or across types of announcements (Kim and Verrecchia (1991)).

days immediately prior to this date [-248,-10]; or centred on the event date with the six previous months and the six subsequent months, with the exception of the 10 trading days immediately before and after the event date [-124,-10[e]+10,+124]. Similarly, possible alternative measures for the trading volumes were also defined. Two ratios were used to measure the turnover of the security: one taking the market trading as a reference and the other taking the trading of the security during the control period as a reference. In both cases, the control period was the six preceding months, excluding the 10 trading days immediately prior to the event date. Just as with the abnormal returns, for the definition of the abnormal trading volumes a similar methodology to that adopted in the definition of the abnormal returns was used. Finally, to define the duration of the events, 3 time windows were adopted: 3, 5 or 7 days.

For all the possible metrics, control periods and duration of the events, we can conclude that statistically significant changes take place in the trading volumes after the announcement of quarterly information. This is true both overall for all four quarters and for each of them considered individually. As far as the changes in price volatility are concerned, statistically significant changes take place in all four quarters as well as in the second and fourth quarters considered individually, irrespectively of the alternative control periods and measures used. The results in relation to the change in price volatility following the earnings announcement in the first and third quarters also uphold the thesis of their informativeness. With the exception of the case in which the control period is centred on the six months before and after the event, the hypothesis of significant changes based on the defined measures cannot be dismissed. It should also be stressed that the regression analysis carried out using dummy variables to identify the various quarters upholds the idea that the information content of the information reported in the first and third quarters is not inferior to the earnings announcements in the second and fourth quarters. There is no reason therefore to believe that such information would be relegated by investors in their decision-making processes, both in terms of prices and trading.

The following section describes the sample, measures and methodology used to evaluate the impact of the quarterly earnings announcements of companies listed on the Portuguese stock exchange. Section 3 deals with the statistical analysis of the informativeness of this announcement on price volatility and on trading volumes. The statistical analysis is confirmed

by the econometric results reported in section 4. Section 5 attempts to summarise the main conclusions of this work.

2. DATASET AND METHODOLOGY

(*i*) Forms of Announcement and Types of Information

The announcement of earnings by Portuguese companies is done in one of two ways: *i*) through press releases, which include key economic and financial performance indicators and brief comments on the activity developed; or *ii*) through immediate announcement of legally required financial statements.

The direct disclosure of information with no prior announcement is common in some companies and only regarding first and third quarter earnings. The method most frequently used is therefore the prior announcement of earnings, followed by the publication of financial reports under the terms required by the regulations in force.

A significant period of time may elapse between the announcement date and the publication date, especially when the reporting of annual accounts is involved. The law requires that the documents used for disseminating accounts be made available to shareholders at least 15 days prior to the annual shareholders meeting whereas they may only be formally published after being approved.

Therefore, when the publication of legally required documents is preceded by an announcement or press release in which the earnings and main indicators are disclosed, the impact of the information is felt on the announcement date and not on the date on which the final reports are formally published[7]. For the purposes of this paper, therefore, what is important is not the date on which the documents are formally published but rather the date on which they are pre-announced, should this pre-announcement have taken place.

With regard to the type of information disclosed, the annual information (which includes the announcement of fourth quarter data for the first time) corresponds to the situation in which more extensive information is disclosed. This includes *inter alia* the report by the Board of Directors, the balance sheet, the income statements, the cash-flow statements and the report by the supervisory body. The annual accounts are subject to certification and external auditing

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[7] Obviously, should there be a difference between the pre-announced earnings and indicators and the accounts approved in the general meeting, this difference will necessarily have to be announced to the market.

(complete audit). The half-yearly information (which includes the announcement for the first time of information on the second quarter) also includes the report by the Board of Directors, the balance sheet and the income statements. An audit report is also drawn up, through which the auditor expresses him/herself with a moderate degree of certainty (limited audit). Finally, the quarterly information on the first and third quarters is basically made up of brief balance sheets and income statements. This information is not audited. The situation in Portugal is therefore very similar to that in Spain (Pellicer and Rees (1999)) and is characterised by a greater homogeneity among the type of information announced in the different quarters than in France (Gajewski and Quéré (2002)).

(*ii*) Information Sources

A first source of information used as regards earnings announcement dates was CMVM[8], which publishes all material facts of corporate issuers on its website. Using the history of this site, it was therefore possible to know the dates (day and time) on which the listed companies announced their earnings over the last four years.

A second information source on the earnings announcement dates was *Diário Económico*. This newspaper was chosen as it is the only daily publication specialising in economic and financial news which covers the entire period of the sample. All the editions of this newspaper published between that start of 1994 and the end of 2000 were consulted. A search was also made on the historical information available on Bloomberg regarding earnings announcement dates.

The websites of the listed companies were also used to obtain information on the earnings announcement dates, although for only a reduced number of cases.

A final source of information was Isidro (1997). This study includes a set of annual earnings announcement dates between 1994 and 1997.

The remaining information needed for this study, namely information on market prices, stock exchange indices, Lisbor/Euribor rates and issuers' reporting documents, was obtained on the Dathis information system of Euronext Lisbon.

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[8] The Portuguese securities exchange commission.

(*iii*) Brief Description of the Sample

In total, 1,751 information announcement dates (events) were identified. The period under analysis corresponds to 10.5 years, which ran between January 1994 and June 2004. The first events are relative to the 1993 annual accounts and the most recent events are relative to the earnings announcement of the first quarter of 2004.

Information was provided on 86 companies. All companies with shares listed on the main Portuguese stock market were included in the study, irrespective of their admission date and their listing period.

With regard to the distribution of events by quarters, 399 cases involved earnings announcements of the first quarter (Q1), 467 were relative to earning announcements of the first semester/second quarter (Q2), 348 concerned earnings announcements of the third quarter (Q3) and the remaining 537 had to do with announcements of annual earnings/fourth quarter (Q4).

TABLE *1* – TEMPORAL DISTRIBUTION OF ANNOUNCEMENT EVENTS

Year	Quarter	No. Events	Accumulated %	Year	Quarter	No. Events	Accumulated %	Year	Quarter	No. Events	Accumulated %
1993	Q4	35	2.0%	1997	Q2	42	19.8%	2000	Q4	53	62.0%
1994	Q1	0	2.0%	1997	Q3	18	20.8%	2001	Q1	56	65.2%
1994	Q2	29	3.7%	1997	Q4	47	23.5%	2001	Q2	53	68.2%
1994	Q3	0	3.7%	1998	Q1	22	24.7%	2001	Q3	55	71.3%
1994	Q4	30	5.4%	1998	Q2	49	27.5%	2001	Q4	50	74.2%
1995	Q1	0	5.4%	1998	Q3	26	29.0%	2002	Q1	51	77.1%
1995	Q2	31	7.1%	1998	Q4	62	32.6%	2002	Q2	53	80.1%
1995	Q3	0	7.1%	1999	Q1	72	36.7%	2002	Q3	52	83.1%
1995	Q4	57	10.4%	1999	Q2	70	40.7%	2002	Q4	51	86.0%
1996	Q1	8	10.9%	1999	Q3	70	44.7%	2003	Q1	52	89.0%
1996	Q2	30	12.6%	1999	Q4	56	47.9%	2003	Q2	50	91.8%
1996	Q3	14	13.4%	2000	Q1	71	51.9%	2003	Q3	50	94.7%
1996	Q4	52	16.3%	2000	Q2	60	55.3%	2003	Q4	44	97.2%
1997	Q1	18	17.4%	2000	Q3	63	58.9%	2004	Q1	49	100.0%

Table *1* contains the temporal distribution of the earnings announcement. As shown, 32.6 per cent of the observations are relative to the first half of the sample (until the end of 1998) and 67.4 per cent of the observations are relative to the remaining period. The reason why there are more observations in the last years is due to the fact that the disclosure of information relative to the first and third quarters of each year became compulsory only as from 1999. It should be noted that since 1999, the number of events relative to the announcement of annual accounts (Q4) is surpassed by or at least equal to the number of events relative to the announcement of accounts in other quarters (Q1, Q2 and Q3). This is due to the greater

difficulty of setting the exact date for the announcement of annual earnings. As previously explained, this difficulty results from the fact that these earnings, as opposed to other earnings, are subject to approval by the shareholders meeting, which means that the effective date for the public disclosure of annual earnings was only possible in those cases in which the company announced this information as "relevant facts" or made the public disclosure via another form of communication.

(*iv*) **Informativneness Metrics**

Two types of measures (informativeness metrics) are used to evaluate the impact of earnings announcements by each company at each given moment. These measures aim at calculating the impact of the announcement of earnings on the volatility of stock prices, on the one hand, and the impact of this dissemination on the trading volume, on the other. In the first case, the volatility of the abnormal return of the stock on the proximity of the event date is involved; and in the second case, the abnormal trading volume on the same occasion is involved. The abnormal stock price volatility (AVAR) was used in the first type of measures. With regard to the analysis of the impact of the earnings announcement on trading, trading volume ratios (VR) and abnormal trading volumes (AVOL) were used. Both AVAR and AVOL are measures proposed by Beaver (1968) and refined in subsequent studies (by Landsman and Maydew (2002), among others). In terms of trading volume ratios, the stock's turnover is used controlled by the market turnover (in line with Harris and Gurel (1986)) and the stock's turnover in the event period controlled by the turnover of the asset in the control period. The various metrics used are described in the following paragraphs.

abnormal stock price volatility (AVAR)

The abnormal return of stock i on date t (AR_{it}) was calculated as the difference between the actual return (R_{it}) and the expected return for this date $(E(R_{it}))$, i.e.:

$$AR_{it} = R_{it} - E(R_{it}). \quad [1]$$

The volatility of the return of stock i on date t $(AVAR_{it})$, in turn, was calculated as follows:

$$AVAR_{it} = \frac{AR_{it}^2}{\sigma_i^2} \quad [2]$$

where σ_i is the standard deviation of abnormal returns in the estimation period (control). An $AVAR_{it}$ between zero and one indicates below-normal volatility (control period), while a

figure of more than one indicates above-normal volatility, which implies that the earnings announcement had an information impact. The metrics used in the statistical tests reported in this paper correspond to the arithmetic average of the $AVAR_{it}$ in the announcement period (event window).

Two variants were used to calculate the expected return for stock i on date t ($E(R_{it})$). In the first alternative (M1), the risk-adjusted return was calculated in accordance with the market model $[E(R_i) = \alpha_i + \beta_i R_{mt}]$[9]. In the second variant (M2), raw returns were used, with the expected return being the average of the returns obtained in the control period. Therefore, in the first case, the returns are controlled by the market returns, while in the second case each asset is controlled by itself.

Two variants were also used in the control (and estimation) period. In a *first case*, the control period chosen was the year prior to the event date. In practice, the 248 preceding trading days were considered, excluding the 10 days prior to the event day (i.e. [-248, -10[)[10]. The 10 days preceding the trading day are excluded so as to prevent market speculation or insider trading from disturbing the definition of the normality pattern. In a *second case*, a one-year period was also used, this time the window was centred on the event date, i.e. the control period comprises a six-month period preceding the event ([-124; -10[) and a six-month period subsequent to the event (]+10, +124]). This second variant aims at controlling the possible non-stationarity of the abnormal stock price volatility (Landsman and Maydew (2002))[11].

If we combine the two variants used to calculate the normal returns with the two variants used to define the control period, we have four versions to calculate the AVAR. In the first version (AVAR1), the risk-adjusted returns (M1) are combined with the control period before the event date ([-248, -10[); in the second version (AVAR2), returns are also risk-adjusted (M1), however the control period is centred on the event date ([-124; -10[and]+10, +124]). In the third and fourth versions, raw returns (M2) are used, where in the case of AVAR3 the control period is well before the event date, while in the case of AVAR4 the control period is centred on the event date[12].

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[9] The return of PSI Geral index, which includes all shares listed on Euronext Lisbon, was used as a proxy for the market return (R_{mt}).

[10] The 248 days correspond to 4 quarters with an average size of 62 trading days.

[11] Any changes to the volatility pattern over time, either through an increase or decrease in volatility, may lead to a bias of the conclusions resulting from Beaver's metrics (1968).

[12] To be more precise, as explained further on, two other variants of these metrics will be used.

abnormal trading volume

With regard to the analysis of informativeness of earnings announcement on transactions, trading volume ratios (VR) and abnormal trading volumes (AVOL) were used.

First of all, the trading volume ratio (VR1) was calculated according to the method used by Harris and Gurel (1986), in which the relative turnover of security i in relation to the market turnover on the event date is compared with an identical ratio in the control period. In practice, the following ratio was used:

$$VR1_{it} = \frac{V_{it}/V_{mt}}{V_i/V_m}, \qquad [3]$$

where V_{it} represents the turnover of security i on date t and was calculated by dividing the number of shares i traded on date t by the number of shares i listed on that date. V_{mt} represents the market turnover on date t[13]. V_i and V_m correspond to the average turnovers, respectively, of securities i and of the market in the control period. The control period used corresponds to the previous semester, excluding the 10 trading days immediately prior to the event date[14].

The second metric used (VR2) differs from the previous one by the fact that each security is used as a control element of itself instead of using the market turnover as the control element. Thus:

$$VR2_{it} = \frac{V_{it}}{V_i}, \qquad [4]$$

with V_{it} and V_i representing the same as in the previous metric. The control period in this case also corresponds to the previous semester (62 trading days), excluding the 10 trading days immediately preceding the event date.

Along the lines of Landsman and Maydew (2002), the abnormal trading volume (AVOL) was calculated as being the difference between the transactions effectively made and the anticipated transactions for this date, divided by the standard deviation of the abnormal trading volumes in the control period (σ_i)[15], i.e.:

$$AVOL_{it} = [V_{it} - E(V_{it})]/\sigma i. \qquad [5]$$

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[13] The market turnover on date t was calculated by dividing the trading volume of the market on that day by the respective stock market capitalisation.

[14] Once again, the quarter was standardised into 62 trading days.

[15] The reason for dividing by the standard deviation is to ensure that the abnormal values have the same variance (Patell (1976)).

As regards the determination of the anticipated transactions, two variants were used as with the AVAR. In the first variant, the anticipated trading volume for a given date (as in Beaver (1968) and Landsman and Maydew (2002)) was estimated through a linear regression:

$$E(V_{it}) = \hat{a}_i - \hat{b}_i V_{mt}, \qquad [6]$$

where V_{it} and V_{mt} represent the same as in the previous example.

In the second variant, $E(V_{it})$ was calculated as the average of the V_{it} observed in the control period (V_i).

As in the AVAR calculation, multiple variants of the AVOL ratios were calculated, taking into consideration different periods defining the normality pattern. Therefore, if we combine the two variants used to calculate the normal returns with the two variants used to define the control period, we have four versions to calculate the AVOL. In the first version (AVOL1), the volumes fitted according to equation [6] are combined with the control period before the event data ([-248, -10[; in the second version (AVOL2) the volumes are also adjusted according to [6], but the control period is centred on the event date ([-124; -10[and]+10, +124]). In the third and fourth versions, V_i is used as the anticipated trading volume, where in the case of AVOL3 the control period is well before the event date, while in the case of AVOL4 the control period is centred on the event date.

Finally, it should be noted that, due to the different construction of the various ratios, the null hypothesis being tested is different for VR1 and VR2, on the one hand, and the AVOL metrics, on the other. While in the first metrics, the null hypothesis postulates that the ratio average is equal to one, in the second case it postulates that the metrics average is zero.

3. UNIVARIATE ANALYSIS OF INFORMATIVENESS

3.1 IMPACT ON THE VOLATILITY OF PRICES

The impact of earnings announcements on asset prices, all events being considered, is apparent. Table 2 presents the results obtained for the different AVAR metrics, considering event windows with 3, 5 or 7 trading days. Taking all announcements, an increase in volatility of between 37.8 per cent (AVAR4) and 61.5 per cent (AVAR1) is seen on the three trading days following the announcement. In all cases, the values obtained are greater than one (null hypothesis) for a 1 per cent significance level. If wider windows (5 or 7 days) are considered, the results obtained have the same statistical significance, although the averages of the AVAR

values decrease with the increase in the event period, revealing some tendency to return to normality. The results obtained make it possible to conclude that the increase in volatility is obvious, both when the normality pattern is defined exclusively by what happens before the event date (AVAR1 and AVAR3) and when it is defined by what happens before and after this date (AVAR2 and AVAR4). Furthermore, the results are equally robust in relation to the method of calculating the normal return. Both in those cases in which the risk was adjusted through the market model (AVAR1 and AVAR2) and in those in which the return of each asset was merely controlled by the return of the asset itself in the estimation period (AVAR3 and AVAR4), the hypothesis in which volatility increases was always chosen over the null hypothesis. The informativeness of the earnings announcements obtained for most of the quarters is in agreement with what is reported among others, by Beaver (1968), Joy et al. (1977), Watts (1978), Aharony and Swary (1980), Pope and Invangete (1992); Lee and Mucklow (1993), Pellicer and Rees (1999), Kross and Kim (1999) and Landsman and Maydew (2002).

TABLE *2*–AVAR IN EVENT WINDOWS FITTED AFTER ANNOUNCEMENT DAYS

Type of Announcement	Average AVAR					
	Announcement Window			Announcement Window		
	]0;+3]	]0;+5]	]0;+7]	]0;+3]	]0;+5]	]0;+7]
	AVAR Calculation Method - AVAR1			**AVAR Calculation Method - AVAR3**		
All Quarters	1.615	1.395	1.278	1.604	1.416	1.382
Z-Value	17.2*	11,0*	7.7*	19.3*	13.7*	12.7*
First Quarter	1.702	1.419	1.259	1.686	1.432	1.327
Z-Value	9.4*	5.5*	3.4*	9.4*	5.9*	4.4*
Second Quarter [First Half Year]	1.355	1.201	1.097	1.548	1.407	1.478
Z-Value	5.1*	2.8*	1.3***	8.1*	6.0*	7.0*
Third Quarter	1.272	1.129	1.032	1.114	1.034	1.010
Z-Value	3.4*	1.5***	0.3	1.4***	0.3	0.0
Fourth Quarter [Annual Report]	2.005	1.726	1.614	1.908	1.658	1.581
Z-Value	15.6*	27.0*	25.3*	14.5*	10.5*	9.2*
	AVAR Calculation Method - AVAR2			**AVAR Calculation Method - AVAR4**		
All Quarters	1.411	1.243	1.158	1.378	1.237	1.183
Z-Value	9.1*	4.7*	2.4*	10.8*	6.7*	5.1*
First Quarter	1.060	0.963	0.952	1.059	1.037	1.078
Z-Value	0.7	-0.6	-0.7	0.7	0.4	1.0
Second Quarter [First Half Year]	1.593	1.376	1.221	1.469	1.330	1.207
Z-Value	8.3*	5.2*	3.0*	6.9*	4.8*	3.0*
Third Quarter	0.908	0.918	0.910	1.092	1.022	1.015
Z-Value	-1.2	-1.1	-1.2	1.1	0.2	0.1
Fourth Quarter [Annual Report]	1.829	1.538	1.409	1.722	1.445	1.347
Z-Value	12.6*	8.1*	6.2*	11.5*	7.0*	5.5*

Obs.: (*i*) AVAR$_{it}$ was calculated as in equation [2], and Average AVAR [AAVAR] was calculated including all days in the announcement window and all companies; (*ii*) the Z test the null hypothesis of equality of AAVAR to one, applying the normal approximation (Beaver's test); (*iii*) the symbols *, ** and *** and show statistical significance at the 1%, 5% and 10% level, respectively; (*iv*) the alternative hypothesis is one-sided; (*v*) the alternative hypothesis of statistics marked with shadow is AAVAR less than one.

If attention is focused on each of the earnings announcement quarters *per se*, it can be seen that the conclusions drawn for most of the earnings announcement days apply to both annual reporting (Fourth Quarter) and reporting of the second quarter (Second Quarter). In all cases, the hypothesis of the abnormal returns in the event window being equal the volatility calculated for the control period is rejected – with the highest significance level adopted. Note, for example, that the average volatility in the three days subsequent to the annual reporting (Fourth Quarter 4) increases by between 72 per cent (AVAR4) and 100 per cent (AVAR1). As the event window widens, to include trading days that are further away from the annual reporting date (Fourth Quarter 4), the effect decreases, although a rise of 34.7 per cent in price volatility is seen if the seven days following the announcement date are included and if the lowest average obtained (AVAR4) is considered.

With regard to the first quarter earnings announcement, the increase in price volatility is unmistakable when the normality pattern is defined based exclusively on the year preceding the announcement date (AVAR1 and AVAR3). However, when the control period is centred on the event date (AVAR2 and AVAR4), including (approximately) a six-month period before and a six-month period after the announcement date, under no circumstance is the hypothesis of the price volatility in the event period being equal to that in the control period rejected.

A similar conclusion can be drawn when only the events relative to the third quarter earnings announcements are considered. Once again, an increase can be seen in volatility in relation to the previous year, at least in a three-day (AVAR1 and AVAR3) and five-day (AVAR1) period. This effect disappears, however, without the null hypothesis being rejected, when the normality pattern is defined based on what occurs before and after the event date (AVAR3 and AVAR4). The average AVAR values obtained in either of these cases are in fact less than one, whereby should the null hypothesis be rejected, it would have to be concluded that the volatility in the event period would have been lower than that calculated for the control period.

It therefore seems that the informativeness revealed by metrics AVAR1 and AVAR3 for the first and third quarters should be assigned to changes in the overall volatility pattern and not to the quarterly earnings announcements. However, taking into account what happens in the event windows prior to the earnings announcements, the results obtained affect this conclusion.

To be exact, Table 3 shows that volatility increases as the annual reporting date (Fourth Quarter) draws near. This is true when the comparison is made only with the preceding period (AVAR1 and AVAR3) and when the control period is centred on the event date (AVAR2 and AVAR4). This means that the market appears to be more volatile than usual, both after the annual reporting and immediately before this announcement[16]. The same cannot be said of the other announcement periods, however.

TABLE *3* –AVAR IN EVENT WINDOWS FITTED BEFORE ANNOUNCEMENT DAYS

Type of Announcement	Average AVAR					
	Announcement Window			Announcement Window		
	[-3;0[	[-5;0[	[-7;0[	[-3;0[	[-5;0[	[-7;0[
	AVAR Calculation Method - AVAR 1			**AVAR Calculation Method - AVAR 3**		
All Quarters	1.107	1.331	1.275	1.136	1.389	1.311
Z-Value	2.8*	9.1*	7.6*	5.4*	12.9*	10.6*
First Quarter	0.891	0.949	0.991	0.857	0.948	0.981
Z-Value	-1.6***	-0.8	-0.2	-2.1**	-0.8	-0.4
Second Quarter [First Half Year]	1.040	0.960	1.026	1.087	1.006	1.050
Z-Value	0.5	-0.7	0.3	1.2	0.0	0.6
Third Quarter	0.826	0.828	0.815	1.005	0.942	0.906
Z-Value	-2.3**	-2.3*	-2.5*	0.1	-0.9	-1.3***
Fourth Quarter [Annual Report]	1.512	2.274	2.010	1.469	2.336	2.043
Z-Value	7.9*	35.6*	31.4*	7.4*	21.4*	16.7*
	AVAR Calculation Method - AVAR 2			**AVAR Calculation Method - AVAR 4**		
All Quarters	1.159	1.208	1.210	1.147	1.223	1.202
Z-Value	2.4*	3.7*	3.8*	4.0*	6.3*	5.6*
First Quarter	0.794	0.865	0.942	0.713	0.802	0.889
Z-Value	-2.8*	-1.9**	-0.9	-4.1*	-2.9*	-1.7**
Second Quarter [First Half Year]	1.365	1.207	1.352	1.360	1.197	1.299
Z-Value	5.1*	2.8*	4.9*	5.3*	2.8*	4.4*
Third Quarter	0.758	0.812	0.796	0.927	0.927	0.892
Z-Value	-3.1*	-2.4*	-2.6*	-1.1	-1.1	-1.5***
Fourth Quarter [Annual Report]	1.502	1.706	1.544	1.427	1.750	1.550
Z-Value	7.6*	10.7*	8.2*	6.8*	12.0*	8.7*

Obs.: This Table should be read similarly to Table *2*.

As far as the half-year reporting is concerned (Second Quarter), volatility in the period immediately preceding the earnings announcements is not different from that calculated for the preceding year (AVAR1 and AVAR3). This means that, in contrast to annual reporting, if metrics AVAR1 and AVAR3 are taken into consideration, investors calmly wait for the half-year reporting, with the information content being expressed in the volatility of prices after the event date.

A similar situation to that of the half-year reporting can be seen in the earnings announcements of the first and third quarters. These announcements are in fact awaited with a

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[16] Note that companies generally tend to announce their reporting dates well in advance. Note also, for instance, that Eilifsen et al. (2001) found a significant reduction in stock price volatility in post-announcement period relative to the pre- announcement period for companies traded on the Oslo Stock Exchange.

significantly lower-than-normal volatility (see Table 3), irrespective of the manner in which the normality pattern is estimated, with an increase in volatility when compared to the periods immediately preceding and following the event date (compare the results of Tables 2 and 3)[17].

These results indicate that the one-year period required the definition of the normality standard for the reporting of results other than the annual reporting, or at least as far as the first and fourth quarters are concerned, is probably too wide. It should be noted that other earnings announcement dates are always included in this period. As a consequence, the standard used to compare the event period is over-evaluated and the capacity to detect abnormal behaviour associated to quarterly earnings announcements is under-evaluated[18].

Therefore, in order to avoid upsetting the definition of the normality standard with other earnings announcement dates, fifth and sixth metrics were defined (AVAR5 and AVAR6). As in the case of AVAR3 and AVAR4, these metrics use M2 as a method of calculating the normal return (i.e. they use each asset as a self-controlling element); however, they define the quarter preceding the event date (AVAR5) or the quarter before and the quarter after the earnings announcement date (AVAR6)[19] as the control period. Note that the utilization of a period of six months or less as the control period is not infrequent (e.g. Damodaran (1989) and Cohen et al. (2004)).

The results obtained are shown in Table 4 where it can be seen that the increase in volatility following the earnings announcement date in comparison to the control period is significant and apparent. The informativeness of the earnings announcements is evident for all four announcement periods in each year. These results also clearly show that using control periods that are longer than the quarter may lead to an incorrect perception of the informativeness of the first and third quarters. In sum, the results obtained reveal that the information announced in any of the four quarters has an information content that is translated into an increase in the volatility of prices on the trading days immediately following their announcement.

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[17] Such differences are in general statistically significant. Due to lack of space, results are not reported.

[18] Note that, when using AVAR2 or AVAR4, in the case of Q3, the period of events associated to the announcement of the preceding half-year earnings (Q2) and subsequent annual earnings (Q4) is always included in the normality period. In the same way, when dealing with Q1, the period of events associated to the announcement of the subsequent half-year earnings (Q2) and preceding annual earnings (Q4) is included in the normality period. Therefore, with AVAR2 and AVAR4, besides capturing any changes in stationarity, one may also be overestimating the value of the metric for the control period, consequently biasing the values of the statistics of the tests unfavourably towards the rejection of null hypotheses.

[19] Considering the 62 trading days prior to the earnings announcement date as a quarter, and excluding as always the 10 trading days preceding and following the announcement date.

TABLE *4* – AVAR IN EVENT WINDOWS FITTED AFTER ANNOUNCEMENT DAYS, WITH QUARTER CONTROL PERIODS

Type of Announcement	Average AVAR					
	Announcement Window			Announcement Window		
	]0;+3]	]0;+5]	]0;+7]	]0;+3]	]0;+5]	]0;+7]
	AVAR Calculation Method - AVAR5			**AVAR Calculation Method - AVAR6**		
All Quarters	2.123	1.832	1.800	2.166	1.783	1.628
Z-Value	29.4*	21.5*	20.6*	30.1*	19.7*	15.6*
First Quarter	2.660	2.073	1.860	1.477	1.386	1.375
Z-Value	20.8*	13.2*	10.4*	5.5*	4.3*	4.2*
Second Quarter [First Half Year]	2.317	2.015	2.205	1.907	1.648	1.500
Z-Value	17.7*	13.5*	16.1*	11.9*	8.3*	6.2*
Third Quarter	1.319	1.467	1.509	1.451	1.372	1.261
Z-Value	3.3*	5.0*	5.6*	4.8*	3.9*	2.5*
Fourth Quarter [Annual Report]	2.079	1.731	1.594	3.358	2.458	2.161
Z-Value	15.4*	10.2*	8.2*	34.5*	36.8*	32.3*

Obs.: This Table should be read similarly to Table *2*.

Finally, it is important to mention that although (in order to save space) the results obtained when analysing only the observations after to the end of 1998 are not reported – i.e. those corresponding to the period in which earnings announcements were compulsory in all four quarters – the earnings of this year concur with those reported for the entire period of the sample, also making it possible to conclude that the information announced in the four quarters is relevant.

3.2 TRADING VOLUME EFFECTS

The effect of the earnings announcements on the trading volumes is clear and significant, both when the VR ratios (Table 5) are used and when the AVOL metrics (Table 6) are taken into consideration.

TABLE *5* – TRADING VOLUME RATIOS IN EVENT WINDOWS FITTED BEFORE ANNOUNCEMENT DAYS

Type of Announcement	Average Trading Volume Ratio					
	Announcement Window			Announcement Window		
	]0;+3]	]0;+5]	]0;+7]	]0;+3]	]0;+5]	]0;+7]
	Trading Volume Ratio - VR1			**Trading Volume Ratio - VR2**		
All Quarters	1,773	1,701	1,763	1,626	1,545	1,512
t-Value	5,10*	7,00*	4,41*	4,83*	6,40*	5,93*
First Quarter	1,859	1,572	2,153	1,659	1,373	1,516
t-Value	1,43***	1,57***	1,58***	1,31***	1,23	1,57***
Second Quarter [First Half Year]	1,853	1,799	1,675	1,622	1,621	1,498
t-Value	5,10*	6,66*	7,44*	4,40*	5,75*	6,12*
Third Quarter	1,671	1,711	1,637	1,904	1,817	1,729
t-Value	3,71*	3,83*	4,25*	4,29*	4,91*	5,13*
Fourth Quarter [Annual Report]	1,708	1,706	1,632	1,425	1,429	1,379
t-Value	7,01*	7,80*	7,48*	5,20*	5,71*	4,83*

Obs.: (*i*) VR1$_{it}$ was calculated as in equation [3], and VR2$_{it}$ was calculated as in equation [4]; Averages were calculated including all days in the announcement window and all companies; (*ii*) the t test the null hypothesis of equality of averages ratios to one; (*iii*) the symbols *, ** and *** and show statistical significance at the 1%, 5% and 10% level, respectively; (*iv*) the alternative hypothesis is one-sided.

As far as the VR ratios are concerned, the increase in the trading volume in relative terms on the three days following the earnings announcement, including all the earnings announcements dates is, on average, 77.3 per cent with VR1 and 62.6 per cent if the VR2 variable is used. Table 5 further shows that the effect can be generalized to the four quarters, with only a slight drop (10 per cent) in the significance level of the first quarter averages. This is due not to the fact that the average obtained was less expressive, but rather to the greater variance of the results obtained in this case. Nevertheless, an increase in the trading volume during the event period can also be inferred for this quarter, both with VR1 and VR2.

With regard to the AVOL metrics, the rejection of the null hypothesis is also clear. In this case, it is a question of rejecting the hypothesis of the abnormal volumes being null and of choosing instead the hypothesis of these abnormal volumes being positive. For all the metrics used and for the four earnings announcement periods, this rejection is inferred using the highest significance levels (1 per cent).

TABLE *6* – AVOL IN EVENT WINDOWS FITTED AFTER ANNOUNCEMENT DAYS

Type of Announcement	Average AVOL					
	Announcement Window			Announcement Window		
	]0;+3]	]0;+5]	]0;+7]	]0;+3]	]0;+5]	]0;+7]
	AVOL Calculation Method - AVOL1			**AVOL Calculation Method - AVOL3**		
All Quarters	0.682	0.683	0.677	0.615	0.602	0.591
Z-Value	58.6*	58.8*	58.2*	52.9*	51.7*	50.9*
First Quarter	0.660	0.676	0.670	0.605	0.567	0.562
Z-Value	56.7*	58.1*	57.6*	52.1*	48.7*	48.3*
Second Quarter [First Half Year]	0.782	0.768	0.726	0.663	0.619	0.583
Z-Value	67.3*	66.0*	62.4*	57.0*	53.2*	50.2*
Third Quarter	0.644	0.644	0.673	0.577	0.603	0.627
Z-Value	55.4*	55.4*	57.9*	49.6*	51.9*	53.9*
Fourth Quarter [Annual Report]	0.635	0.641	0.643	0.607	0.611	0.597
Z-Value	54.7*	55.1*	55.3*	52.2*	52.6*	51.3*
	AVOL Calculation Method - AVOL2			**AVOL Calculation Method - AVOL4**		
All Quarters	0.706	0.645	0.615	0.578	0.571	0.558
Z-Value	60.(*	55.5*	52.9*	49.7*	49.1*	48.0*
First Quarter	0.566	0.528	0.528	0.621	0.590	0.561
Z-Value	48.7*	45.4*	45.4*	53.4*	50.7*	48.2*
Second Quarter [First Half Year]	1.089	0.858	0.742	0.588	0.579	0.542
Z-Value	93.7*	73.8*	63.8*	50.5*	49.8*	46.6*
Third Quarter	0.521	0.554	0.579	0.496	0.542	0.569
Z-Value	44.8*	47.7*	49.8*	42.7*	46.6*	49.0*
Fourth Quarter [Annual Report]	0.597	0.606	0.592	0.591	0.570	0.563
Z-Value	51.4*	52.1*	50.9*	50.8*	49.0*	48.4*

Obs.: (*i*) AVOL$_{it}$ was calculated as in equation [5], and Average AVOL [AAVOL] was calculated including all days in the announcement window and all companies; (*ii*) the Z test the null hypothesis of equality of AAVOL to zero, applying the test for standardized abnormal returns in Serra (2002)); (*iii*) the symbols *, ** and *** and show statistical significance at the 1%, 5% and 10% level, respectively; (*iv*) the alternative hypothesis is one-sided.

Note that the results obtained are robust, both as regards the form of estimating the anticipated trading volume and as regards the definition of the time horizon in which the normality pattern is determined. The conclusions obtained are in fact similar in the four metrics used. The positive effect on the trading volume underlying earnings announcements is therefore apparent, thereby confirming the international literature on the information content of earnings announcements (see, among others, Beaver (1968), Bamber (1986), Atiase and Bamber (1994), Amir and Lev (1996) and Landsman and Maydew (2002)). Furthermore, the results obtained here lead to the conclusion that the informativeness on the trading volume is significant in the four earnings announcement periods.

Finally, it is important to refer that although (in order to save space) the results obtained when analysing only the observations following to the end of 1998 are not reported, as was the case with the AVAR metrics, the earnings of this year do not concur with those reported for the entire period of the sample.

4. REGRESSION ANALYSIS

4.1 THE MODEL

In order to check for the existence of a difference among the various earnings announcement periods, a regression analysis was carried out within the framework of which the different metrics (AVAR, VR and AVOL) described above were used as dependent variables[20]. In terms of explanatory variables, three categories of variables were used: i) dummy variables aimed at identifying the quarter to which the earnings announcement refers; ii) time variables aimed at capturing the variation over time of the information content of the earnings announcement; and iii) variables aimed at describing the main characteristics of the companies which announce their earnings in each period.

As regards the first type of variables, the following were used: Q1, Q2, Q3 and Q4. Q1 is a dummy that is equal to one in the case of first quarter results and 0 otherwise. Similarly, Q2, Q3 and Q4 are dummies that are equal to one in the case of second, third and fourth quarter results, respectively, and 0 otherwise. On some occasions, variables Q1 and Q3 are added together, giving rise to a new dummy (Q1+Q3), which is equal to one in the case of the first or third quarter and 0 otherwise, and on other occasions, Q2 and Q4 are added together, giving rise to a new dummy (Q2+Q4), which is equal to one in the case of the second or

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[20] The observations used in this analysis therefore correspond to the values of the different metrics in the 1751 earnings announcements studied.

fourth quarter and 0 otherwise. The main objective of regression analysis is in fact to assess the effect of these variables. If Q1, Q3 and/or Q1+Q3 have negative and significant coefficients, it may be concluded that the information of the first and third quarters has less informativeness than the information of the second and fourth quarters. Should the coefficients of these variables not be significantly different from zero, it will have to be concluded that the informativeness of the first and third quarters is no different from the informativeness of the second and fourth quarters. Finally, should the estimates be positive and significant, the conclusion to be drawn would be that not only is the information of the first and third quarters informative, but that this information content is more expressive than in the other earnings announcement periods.

Two variables were used to estimate the time effect. Following Landsman and Maydew (2002), a TIME variable – defined as adding a unit at each passing day[21]. In addition, an A99 dummy was used, its value being equal to one if the event occurred after the start of 1999 (After 99) and 0 otherwise. This variable was introduced in order to detect possible changes to the informativeness after the publication of first and third quarter accounts became compulsory[22].

Finally, variables were used to describe the main characteristics of companies making quarterly earnings announcements. These variables were included because research has revealed the existence of individual factors associated to abnormal trading volume and volatility. One of these factors is the size of the company, which is usually justified by Bamber (1987) having reported that the effect on the trading volume decreases with the size of the company. Another factor that is usually included is the book-to-market equity value, which is used as a proxy of accounting conservatism (Landsman and Maydew (2002)). In this study, however, instead of directly using the values of these variables to characterize each asset, the coefficients of the exposure of each asset to portfolios that reflect the size and book-to-market effects are used[23]. Furthermore, a momentum effect was included to reinforce the

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[21] This variable was constructed by adding a unit for each calendar day. Therefore, between the date of the first earnings announcement (February 3, 1994) and the date of the last earnings announcement (April 28, 2004), there is a difference of 3737 units, which is equivalent to the difference of 3737 days between these dates.

[22] Before 1999, only those companies that wished to make quarterly earnings announcements did so. It is therefore possible that in this period mainly large companies and those with higher-than-expected earnings disclosed this kind of information. This fact may lead to a different impact of the information of the first and third quarters before and after 1999.

[23] The use of these coefficients instead of the market capitalisation and book-to-market value is common in equilibrium return models (e.g. Fama and French (1993) and Carhart (1997)). If the size and book-to-market factors are important in explaining asset prices (and the variation in prices), they will be reflected in portfolios

capacity of the model to incorporate the predictability of earnings and to capture the effects of possible investors' disagreements (the relevance of which was manifested by Kim and Verrecchia (1991)).

In this study, we proxy the companies' characteristics by the estimated coefficients of Carhart's model (1997). This model is based on a 4 factor APT model, which, besides the excess of market return gauged by the return differential of the PSI Geral Index and the return of the risk free interest rate[24], also includes the HML factor, SMB and the WML factors. The model specification is:

$$R_{i,t} = \alpha_i + b_i PSI_t + s_i SMB_t + h_i HML_t + g_i WML_t + \varepsilon_{it} \qquad [7]$$

where R_{it} is the average excess return of the asset i (vis-à-vis the return of the risk free interest rate) on date t (t=1, .., T); PSI represents the average excess return of the PSI Geral index (vis-à-vis the return of the risk free interest rate). The variable HML attempts to quantify the *book-to-market* (B/M) effect and corresponds to the return of a portfolio that is long in high book-to-market stocks and short in low book-to-market stocks; SMB measures the size effect, and corresponds to the return of a portfolio that is long in small *caps* and short in *big caps*; WML measures the *momentum* effect, being therefore a return for a portfolio long in *stock winners* and short in recent *losers*. Due to the reduced size of the Portuguese stock market, the factors HML, SMB and WML were calculated using the methodology of Alves and Mendes (2004).

This means that, in the first place, a regression of Carhart's model (1997) was run – first step regressions – and subsequently the estimates of coefficients s, b, h and g obtained in those 1751 regressions were used as explanatory variables of second step variables[25]. Thus, in the second step regressions, the "Beta" variable corresponds to b estimates, the "Size" variable corresponds to s estimates, the "Book-to-Market" (B/M) variable corresponds to h estimates and finally, the "Momentum" (MoM) variables correspond to g estimates.

that control these effects. So, the exposure of each asset to the return of these portfolios defines its characteristics. However, as we know, this is the first time that in studies designed to analyse the impact of earnings announcements coefficients are used instead of the value of variables to capture the characteristics of the different shares. In favour of this option, it may also be said that Cheon et al. (2001) witness the relevance of the sensitivity of investors to certain characteristics of companies in justifying the different impact of the earnings announcements of companies listed on the NYSE in comparison to those listed on the NASDAQ.

[24] We use as a proxy of risk free interest rate the Lisbor 3 months interest rate and the Euribor 3 months interest rate, respectively before and after the introduction of the euro as the Portuguese currency (beginning of 1999).

[25] These regressions were estimated for each share and for each earnings announcement date taking into account daily returns and a time series of 248 trading days.

4.2 REGRESSION RESULTS

A first set of regressions was computed in which the different AVAR metrics are considered as dependent variables. Table 7 summarises the results obtained for AVAR1 and AVAR3. As previously referred, these metrics diverge as to the calculation model of the expected return, using the market model in AVAR1 and the raw returns in AVAR3[26].

TABLE 7 - REGRESSION OF ABNORMAL VOLATILITY [AVAR1 AND AVAR3]

	Coef.	t-stat.	Coef.	t-stat.	Coef.	t-stat.	Coef.	t-stat.	Coef.	t-stat.
Panel I - Dependent Variable: AVAR1									N = 1751	
C	-77,62	-2,10 **	-75,06	-2,04 **	-74,95	-2,03 **	-78,39	-2,12 **	-81,88	-2,21 **
Q1			0,33	0,24						
Q2					-1,05	-0,81				
Q3							-1,59	-1,10		
Q4									1,97	1,55
Q1+Q3	-0,87	-0,72								
BETA	-2,54	-1,75 ***	-2,56	-1,76 ***	-2,53	-1,74 ***	-2,54	-1,74 ***	-2,48	-1,70 ***
SIZE	0,00	-0,30	0,00	-0,32	0,00	-0,32	0,00	-0,33	0,00	-0,30
B/M	-0,31	-0,42	-0,31	-0,42	-0,30	-0,41	-0,33	-0,45	-0,31	-0,42
MoM	-0,41	-0,43	-0,41	-0,42	-0,40	-0,42	-0,40	-0,41	-0,39	-0,41
TIME	0,00	2,32 **	0,00	2,25 **	0,00	2,26 **	0,00	2,34 **	0,00	2,40 **
A99	-4,23	-1,93 ***	-4,44	-2,03 **	-4,51	-2,06 **	-4,35	-1,99 **	-4,26	-1,96 ***
R-squared	0,0064		0,0061		0,0065		0,0068		0,0075	
Panel II - Dependent Variable: AVAR3									N = 1751	
C	-59,44	-1,66 ***	-56,32	-1,58	-56,56	-1,59	-60,60	-1,70 ***	-61,32	-1,71 ***
Q1			0,46	0,35						
Q2					-0,28	-0,22				
Q3							-1,94	-1,40		
Q4									1,37	1,13
Q1+Q3	-1,01	-0,87								
BETA	-2,79	-2,04 **	-2,82	-2,06 **	-2,81	-2,05 **	-2,78	-2,03 **	-2,75	-2,01 **
SIZE	0,00	-0,27	0,00	-0,30	0,00	-0,29	0,00	-0,31	0,00	-0,28
B/M	-0,23	-0,34	-0,23	-0,34	-0,23	-0,33	-0,25	-0,36	-0,23	-0,33
MoM	-0,73	-0,79	-0,72	-0,78	-0,72	-0,78	-0,71	-0,77	-0,71	-0,77
TIME	0,00	1,90 ***	0,00	1,82 ***	0,00	1,83 ***	0,00	1,94 ***	0,00	1,93 ***
A99	-3,98	-1,91 ***	-4,22	-2,02 **	-4,19	-2,01 **	-4,11	-1,98 **	-4,08	-1,96 ***
	0,01									
R-squared	0,0063		0,0059		0,0059		0,0070		0,0066	

Obs.: (i) The regression dependent variable in the first panel is the sum of the $AVAR1_{it}$ for all events in the three events days after announcement day; The regression dependent variable in the second panel is the sum of the $AVAR3_{it}$ for all events in the three events days after announcement day; (ii) In the first column C identifies the constant term, and the acronyms Q1, Q2, Q3, Q4, Q1+Q3, Q2+Q4, Beta, Size, B/M, MoM, Time and A99 identify the independent variables; (iii) The symbols *, ** and *** show statistical significance at 1%, 5%, and 10%, respectively.

When any of the dependent variables are considered, not only individually but also when added together, variables Q1 and Q3 do not have a significant statistical effect. It may therefore be concluded that the effect on the volatility of the first and third quarters is no different from that computed for the remaining quarters. An identical conclusion can be drawn when looking at Q2, Q4 and Q2+Q4, whereby it may also be concluded that the volatility observed for these quarters is not statistically different from that observed for the

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[26] Note that, both in the case of the regressions reported in this table and in the case of the regressions reported in the following tables, no heterocedasticity or self-correlation was detected.

first and third quarters[27]. Furthermore, when included together, Q1, Q2 and Q3 – with Q4 being used as the control element, therefore – under no circumstance is rejected the hypothesis of the respective coefficients being null. The results of this table therefore support the thesis that the informativeness is no different among the various quarters and, in particular, support the assertion that the earnings announced in the first and third quarters have no less impact than those announced in the second and fourth quarters.

With regard to the variables that control the individual characteristics of the shares, only Beta emerges as (negative and) statistically relevant. This means that the effect on volatility underlying the earnings announcement seems to be more significant for securities which reveal less exposure to the variation of market return.

As far as the time effect is concerned, the results obtained point to an increase in informativeness in prices over time, given that the TIME variable is statistically and positively significant. However, variable A99 has a negative effect, showing that although volatility increases over time, there is a negative effect underlying the "post-1999" period. This means that there is a tendency for volatility to increase throughout the period and that making reporting in the first and third quarters compulsory did not invert this tendency, although it did contribute to moderating it. This moderation could be due to the fact that in the voluntary disclosure period, it is mainly the companies with more surprising (and positive) news or those whose profile (for example, in terms of size) is likely to cause greater impact that announce their earnings publicly.

The R-squared obtained are rather low and similar to those reported by Landsman and Maydew (2002). Note that the fact that the R-squared are low reveals the model's lack of overall explanatory capacity, which concurs with the thesis defended here that the variables Q1, Q2, Q3 and Q4 are not able to explain the values obtained for the AVAR metrics in the 1751 different earnings announcement periods analysed.

For the remaining AVAR variables, the results obtained are also in line with those detected in section 3. As shown in Table 8, if the six-month period following the event date is included in the control period (AVAR2 and AVAR4), it must be concluded that earnings announcements in the first and third quarters have less impact than in the remaining cases. However, if the control period is restricted to the preceding quarter (AVAR5) or the quarter preceding and

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[27] Although the regressions obtained using Q2+Q4 are not reported in order to save space, the estimates of the coefficients obtained for this variable are symmetrical values of the coefficients calculated for Q1+Q3 and also have no statistical significance.

following the event date (AVAR6), once more it can be concluded that the values obtained for the first and third quarters do not differ significantly from those obtained in the other earnings announcement periods.

TABLE *8* - REGRESSION OF ABNORMAL VOLATILITY [AVAR2; AVAR4; AVAR5 AND AVAR6]

	Coef.	t-stat.	Coef.	t-stat.	Coef.	t-stat.	Coef.	t-stat.	Coef.	t-stat.
Panel I - Dependent Variable: AVAR2									N=1751	
C	-16,69	-0,64	-11,12	-0,43	-10,26	-0,39	-13,83	-0,53	-16,51	-0,63
Q1			-1,32	-1,33						
Q2					0,69	0,75				
Q3							-1,92	-1,88 ***		
Q4									1,88	2,11 **
Q1+Q3	-2,34	-2,73 *								
R-squared	0,0057		0,0021		0,0013		0,0032		0,0038	
Panel II - Dependent Variable: AVAR4									N=1751	
C	-10,83	-0,48	-7,13	-0,32	-6,36	-0,28	-8,40	-0,37	-11,41	-0,51
Q1			-1,23	-1,46						
Q2					0,34	0,44				
Q3							-1,07	-1,22		
Q4									1,52	1,98 **
Q1+Q3	-1,68	-2,29 **								
R-squared	0,0043		0,0026		0,0014		0,0022		0,0036	
Panel III - Dependent Variable: AVAR5									N=1751	
C	-59,45	-0,78	-55,59	-0,73	-57,38	-0,75	-63,91	-0,84	-57,17	-0,75
Q1			1,97	0,69						
Q2					0,97	0,36				
Q3							-3,39	-1,14		
Q4									0,04	0,02
Q1+Q3	-0,88	-0,35								
R-squared	0,0027		0,0029		0,0027		0,0034		0,0026	
Panel IV - Dependent Variable: AVAR6									N=1751	
C	-70,19	-0,47	-72,22	-0,48	-67,01	-0,45	-57,18	-0,38	-80,58	-0,53
Q1			-6,19	-1,10						
Q2					-2,83	-0,54				
Q3							5,35	0,91		
Q4									3,73	0,73
Q1+Q3	-0,94	-0,19								
R-squared	0,0014		0,0021		0,0016		0,0019		0,0017	

Obs.: (i) The regression dependent variable in the panel I is the sum of the AVAR2$_{it}$ for all events in the three events days after announcement day; The regression dependent variable in the panel II is the sum of the AVAR4$_{it}$ for all events in the three events days after announcement day; The regression dependent variable in the panel III is the sum of the AVAR5$_{it}$ for all events in the three events days after announcement day; The regression dependent variable in the panel II is the sum of the AVAR6$_{it}$ for all events in the three events days after announcement day; (ii) In the first column C identify the constant term, and the acronyms Q1, Q2, Q3, Q4, Q1+Q3, Q2+Q4, Beta, Size, B/M, MoM, Time and A99 identify the independent variables; (iii) all regressions also include Beta, Size, B/M, MoM, Time and A99 as independent variables; (iv) The symbols *, ** and *** show statistical significance at 1%, 5%, and 10%, respectively.

All the regressions reported in Table 8 included the Beta, Size, B/M, MoM, TIME and A99 variables as explanatory variables. To save space, however, the coefficients estimated for these variables are not given[28].

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[28] The results obtained do not confirm the significance of the Beta, TIME and A99, with the exception of the Beta variable for AVAR5. This means that when these other metrics are used, the positive TIME and the negative A99 effects are not confirmed. It should be noted that the literature reports hybrid results in relation to

Table 9 contains the results obtained in regressions in which metrics related to the trading volume (VR and AVOL) were used as dependent variables. Here, regressions using Q1+Q3 as a dummy variable to identify the first and third quarters to which the earnings announcement refers are given. No significance was detected in this variable, which makes it possible to infer that there is no significant difference between the impact on trading volumes for the first and third quarters and for the second and fourth quarters. Although these regressions are not given in order to save space, when Q1 and Q3 are considered individually or when Q1, Q2 and Q3 are considered simultaneously, under no circumstance is rejected the hypothesis of the respective coefficient being null.

TABLE 9 - REGRESSION OF TRADING RATIOS [TR] AND ABNORMAL VOLUMES [AVOL]

	Coef.	t-stat.		Coef.	t-stat.		Coef.	t-stat.	
								N=1751	
Dependent Variable:	VR1			VR2			AVOL1		
C	43.60	1.44		4.91	0.19		13.50	0.56	
Q1+Q3	0.65	0.67		1.09	1.29		-0.28	-0.35	
BETA	-0.72	-0.67		-0.69	-0.74		-0.29	-0.33	
SIZE	0.00	-0.22		0.00	-0.32		0.00	-0.04	
B/M	0.46	0.80		0.56	1.12		0.76	1.62	
MoM	-0.57	-0.73		-0.59	-0.87		1.13	1.82	***
TIME	0.00	-1.22		0.00	0.03		0.00	-0.41	
A99	-0.24	-0.13		-1.25	-0.82		-1.43	-1.01	
R-squared	0.0036			0.0030			0.0061		
Dependent Variable:	AVOL2			AVOL3			AVOL4		
C	-2.76	-0.71		-11.27	-1.71	***	-15.24	-2.08	**
Q1+Q3	-0.06	-0.51		-0.02	-0.08		0.00	-0.01	
BETA	0.34	2.46	**	0.19	0.81		0.30	1.15	
SIZE	0.00	-0.52		0.00	-0.22		0.00	-0.20	
B/M	-0.13	-1.78	***	-0.14	-1.08		-0.18	-1.25	
MoM	-0.02	-0.21		-0.07	-0.40		-0.03	-0.16	
TIME	0.00	1.24		0.00	2.03	**	0.00	2.34	**
A99	-0.62	-2.75	*	-1.15	-2.99	*	-1.31	-3.06	*
R-squared	0.0122			0.0065			0.0068		

Obs.: (i) The regressions dependent variables are the variables identified in the table; (ii) In the first column C identifies the constant term, and the acronyms Q1+Q3, Beta, Size, B/M, MoM, Time and A99 as independent variables; (iii) The symbols *, ** and *** show statistical significance at 1%, 5% , and 10% , respectively.

With regard to the evolution of abnormal volumes over time, once again a positive effect of the TIME variable and a negative effect of the A99 variable become obvious. It should be noted however, that in contrast to what happened with the AVAR metrics, this time the effect

the evolution over time of the information content of quarterly earnings announcements. Kross and Kim (1999) and Landsman and Maydew (2002) report abnormal return volatility at earnings announcements increase over the last 30 years, but Lo and Lys (2000) find no change over time.

is not only noticeable when the normality pattern is defined well before the event date (AVOL1 and AVOL3). On the contrary, these effects are more robust for the metrics that define the normality pattern based on a control period centred on the event date (AVOL2 and AVOL4). Therefore, as far as trading is concerned, these results support the thesis of an increase in the information content of the results over time, thereby corroborating the results of Kross and Kim (1999) and Landsman and Maydew (2002) and not supporting the evidence of Lo and Lys (2000), nor the thesis of Lev and Zarowin (1999).

5. CONCLUSION

The European Union, through the Transparency Directive (Directive 2004/109/EC) decided not to require listed companies to announce their earnings in the first and third quarters. Currently financial reporting in all quarters is only compulsory in seven countries of the European Union. Each country, and particularly those seven, will have to decide whether to maintain this requirement of whether to adopt a less demanding regime. Most likely, the competitive pressure among the different markets and the companies of the different countries and the regulatory arbitration will lead to the adoption of a biannual reporting regime in most European Union countries. Only time will tell, however, of the evolution of each Member State.

This study is dedicated to one of the countries in which quarterly earnings announcements are compulsory – Portugal. Here, the informativeness of the announcement of this information in terms of prices and trading was analysed on 1751 different occasions.

The results obtained indicate that overall financial reporting has a significant impact on the 3, 5 and 7 trading days following the earnings announcements. This happens both when changes in price volatility are involved and when the analysis centres on abnormal volumes. The results obtained are robust for the different forms of defining normal return (risk-adjusted and non-risk-adjusted) and for the different forms of defining the anticipated trading volume (controlled by the market or controlled by the security itself). The results are equally robust in relation to the different windows defining the normality period, both as regards its duration and as regards the fact that only the preceding period or the preceding period and the period following the event date are considered. These results therefore concur with the multiple studies that witness the informativeness of earnings announcements (Beaver (1968), Joy et al. (1977), Watts (1978), Aharony and Swary (1980), Popoe and Inyangete (1992), Lee and

Mucklow (1993), Pellicer and Rees (1999), Kross and Kim (1999) and Landsman and Maydew (2002), among others).

With regard to the different earnings announcement quarters (Q1, Q2, Q3 and Q4) and in relation to their impact on price volatility, the output obtained upholds the fact that there is an increase in volatility following earnings announcements, irrespective of the manner in which the normal return is defined, if the control period is defined well before the event date. If, in order to avoid problems related to the absence of stationarity, the control period is centred on the event date, the results also confirm the thesis of an increase in volatility if a three-month period before and a three-month period after the announcement date is considered. If these periods are extended into six-month periods, it will not be possible to infer this increase in volatility. Nevertheless, in this case the control values of the different metrics are positively biased due to the systematic inclusion in the respective calculation the event window of the preceding and subsequent earnings announcements quarters. The relevance of this bias was proven using metrics that consider only 3-month control periods (AVAR5 and AVAR6), which confirm the existence of informativeness in terms of prices as a result of earnings announcements in all quarters.

The regressions analysis, in keeping with the statistical analysis, confirmed that the results of quarters one (Q1) and three (Q3) do not have a lower information content (in terms of prices) than that seen in quarters two (Q2) and four (Q4), in all of the cases analysed, with the exception once more of the circumstance in which a six-month control period before the announcement date and a six-month period after the announcement date is used.

With regard to the impact of the earnings announcement (Q1, Q2, Q3 and Q4) on the trading volume, the results reveal that volatility increases after the earnings announcement, irrespective of the manner in which the normal volumes are defined and irrespective of the manner in which the control period is defined.

In relation to the comparison of the impact for the first and third quarters versus the impact for the second and fourth quarters, the regression analysis, in line with the statistical analysis, confirmed that the results of quarters one (Q1) and three (Q3) have a lower information content (in terms of prices) than that seen in quarters two (Q2) and four (Q4), irrespective of the metrics used to quantify the effect on the trading volume.

Our results, therefore, both as regards the volatility of prices and the abnormal trading volume, support the thesis that quarterly earnings announcements have an impact and that this impact is no less in interim announcements than in annual announcements. The outputs obtained therefore concur with that reported in Spain by Pellicer and Rees (1999) and differ from that reported in France by Gajewski and Quéré (2001). If we consider that in both in Portugal and Spain earnings announcements are made in all four quarters, whereas in France the turnover is announced only in the first and third quarters, we have to conclude that economic agents only consider the information relevant if it has the minimum content that is currently required in the Iberian peninsula but do not consider the intermediate information if this is limited to the type of disclosure made in France. The option of the EU established in the Directive of 2004/109/EC, of December 15, 2004, which lays down the conditions for the adoption of even lower reporting standards in the first and third quarters of each year than those currently required in France, may lead companies to make earnings announcements in the first and third quarters, which investors may disregard.

As far as the evolution of the information content over time is concerned, our results – and particularly as regards the impact on trading – are in line with those of Kross and Kim (1999) and Landsman and Maydew (2002), who uphold that the information content of financial reporting has increased over time. However, the consideration of a dummy variable to distinguish earnings announcements after 1999 (date on which reporting became compulsory for the first and third quarters) of the preceding period, reveals that this variable generally has a negative and significant coefficient. This indicates that the introduction of compulsory quarterly earnings announcements contributed to reduce price volatility and trading normality, but that it did not prevent the information from having a significant impact and this impact from increasing over time.

In sum, the results obtained support the idea that the information reported in the first and third quarters has information content and that statistically this content is not inferior to that of the second and fourth quarters, there being no reason to believe that this information will be disregarded by investors in their decision-making processes, both in terms of prices and trading.

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