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Discussion paper

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Abstract

This paper examines the effect of temporarily suspending the trading of exchange-listed individual stocks. We evaluate whether the regulatory authorities can successfully use the mechanism of trading halts in forcing companies to disclose new and material information to the capital market. In contrast to previous studies which mainly concentrate on North-American stock markets, this study utilises a new data set comprising of firms listed on the Brussels Stock Exchange. Our results show that suspension is indeed an effective means of disseminating new information. Stock prices adjust completely and instantaneously to the new information released during trading suspensions. We also observe a significant increase in trading volume after the reinstatement of trading. On the other hand, we do not find any increase in stock return volatility around trading suspensions. Overall, our results confirm the efficacy of trading suspensions in disseminating new information.

1. Introduction

Trading suspension (also known as trading halt) represents a temporary interruption in official trading of an individual stock on a stock exchange[1]. Authorities usually adopt this regulatory measure to provide investors extra time to evaluate newly released information about a specific company. It is also used to require companies to disclose additional information. Trading suspension is a widely prevalent phenomenon and is used extensively by world's stock exchanges. However, little empirical evidence exists with respect to this regulatory measure.

The desirability of trading suspension is subject to debate among regulators, market participants and academics. Proponents of trading suspension argue that it provides traders extra time to evaluate newly released information so that no specific group of investors obtain an unduly advantage in stock trading. They also argue that stock prices become more informative, uncertainty is reduced and investors are protected from volatile price movements. On the other hand, critics argue that trading suspension simply delays stock price adjustments, imposes additional costs to investors who are deprived of trading opportunities and makes an exchange less attractive to investors.

How effective are trading suspensions? Do suspensions allow the stock market to receive new information? Do stock prices adjust quickly to the information released during the suspension period? Does the stock volatility change due to suspension? We investigate these issues by examining the stock return behaviour surrounding trading suspensions. We also examine the pattern of trading activity as well as the stock price volatility before and after trading suspensions. Specifically, our objective is to evaluate the efficacy of trading suspensions by using data from a new source, namely the Brussels Stock Exchange (BSE)[2].

This study complements the current literature in two important ways. First, examining BSE offers an opportunity to evaluate the efficacy of trading suspensions on a price-driven market with an electronic automated trading system without any influence of market-makers or specialists, as is the case, on the New York Stock Exchange (NYSE). While trading suspen-

[1] It is distinguished from a circuit breaker which involves a market-wide halt of trading of all stocks.
[2] Although the Exchange is now officially called Euronext Brussels, we shall use BSE as its popular name.

sions on the NYSE are mostly due to an imbalance of buy and sell orders and are used to protect specialists, trading suspensions on the BSE are related to the disclosure of new information. These are not enforced to protect any particular member or interest group such as specialists, but to protect investors in general. So the effect of the regulatory action can be measured without any of such interfering factors. Another important difference is that the usual length of NYSE trading suspensions is only an hour or two while that of the BSE is half to one full day. This is again related to the reason of suspension: many NYSE suspensions are due to order imbalances while those of the BSE are mainly information related.

Second, examining trading suspensions on the Brussels Stock Exchange offers an opportunity to examine this regulatory measure on a smaller European stock exchange, because earlier studies have investigated trading suspensions mostly on North-American stock markets. These studies comprise of samples with specific institutional characteristics and the obtained results are mixed. As the law and finance literature show, the institutional framework and the legal environment matter (La Porta, Lopez-de-Silanes, Shleifer and Vishny, 1997, 1998). In this way, empirical results on North-American markets cannot be transformed automatically to other (European) markets.

Hopewell and Schwartz (1978) examine trading suspensions on the NYSE. About 92% of these suspensions did not exceed the length of one trading day. In addition, almost half of these suspensions are not related to disclosure of new information, but to order imbalances. The authors find that events which trigger news suspensions typically result in suspensions of longer duration and stock price changes of greater magnitude than for imbalance suspensions. They also observe that stock prices adjust rapidly to the new information released during the suspension period.

On the other hand, investigating trading suspensions on Canadian stock exchanges, Kryzanowski (1979) finds that only the good news disseminated during a trading suspension is rapidly impounded in stock prices. When suspension leads to the disclosure of bad news, the stock market fails to fully and rapidly impound that information in stock prices. One particular feature of this sample is very long duration of suspensions: the average length of the trading suspension period for the good and bad news sample are 15 and 10 weeks, respectively.

Suspensions ordered by the Securities and Exchange Commission (SEC) in the U.S. are also of relatively longer duration. Howe and Schlarbaum (1986) analyse a sample of these suspensions with an average length of 12 weeks. They find a substantial disclosure of bad news during the suspended period. Moreover, they observe that stock price continue to decline even after the reinstatement of trading. The results of Kryzanowski (1979) and Howe and Schlarbaum (1986) suggest that trading suspensions are not an effective means of disclosing new information. These results are also confirmed by Ferris, Kumar and Wolfe (1992), who examine 40 SEC-initiated trading suspensions and detect anticipatory stock price behaviour as well as incomplete price adjustment to new information released during suspension, especially for the bad news sub-sample.

With the availability of new data sources, recent studies have started examining other issues related to suspensions. Ferris, Kumar and Wolfe (1992) and Lee, Ready and Seguin (1994) observe increased volume and volatility after trading suspensions while Corwin and Lipson (2000) document a decline in liquidity around trading suspensions on the NYSE. Kryzanowski and Nemiroff (1998) detect higher trading activity in the pre-suspension period on the Montreal Stock Exchange. Trading activity declines to pre-suspension level within two days after the resumption of trading. Increased volatility is also reported in the post-suspension period, but it declines very quickly to the pre-event level.

A few studies also investigate suspensions on non-American stock exchanges. Kabir (1994) observes that more than 70% of trading suspensions on the London Stock Exchange remain in force for more than one month. A majority of the suspended companies are afterwards removed from exchange listings due to merger, acquisition and liquidation. His findings of anticipatory price behaviour as well as significant stock price increases after the reinstatement of trading cast doubt on the efficacy of suspensions in disseminating new information. Wu (1998) examines suspensions taking place on the Hong Kong Stock Exchange and finds the presence of some anticipatory price behaviour in the pre-suspension period and increased trading volume and stock return variance in the post-suspension period. The review of empirical studies thus shows mixed results concerning the effectiveness of trading suspensions.

The remainder of this paper is organised as follows. In the next section, we explain the phenomenon of trading suspension with the help of an example. Section three explains the

research methodology and section four describes the sample. Empirical results are reported in section five. The final section summarises and presents conclusions.

2. Trading suspension: an illustration

In Belgium, the suspension of trading is the mandate of the Brussels Stock Exchange. The rules of suspension are formulated in broad and vague terms. The Exchange can suspend trading in one or more securities for the duration that it finds necessary to protect the public interest. The mission of the Exchange is to ensure equality among shareholders and correct information to the public, in particular with regard to the dissemination of price sensitive information. The generally followed policy is that any public disclosure of price sensitive information should be made after the closure of the market on the day on which the fact occurred or on which the decision was taken. This policy is justified on two grounds. Firstly, a disclosure during the opening hours would distort the stock's price formation. Secondly, a disclosure after the closing of the market allows information dissemination in the broadest sense (through the press). These grounds are obviously at odds with the goal of an informationally efficient stock market. Moreover, foreign dual listings can complicate such disclosure policy.

The guideline usually followed for trading halts can be described as follows. The Company Information Department of the Stock Exchange continuously monitors the price and the trading volume patterns of all listed stocks. If any abnormal behaviour is detected, the Department contacts the listed company to find out if there is any press release pending. If there is a suspicion of information leakage prior to the press release and a possibility of insider trading, the Exchange takes the decision to suspend the trading of the stock and asks the company to release the information to the market.

For example, on March 30, 1998, the Brussels Stock Exchange suspended trading in the shares of Barco (a Belgian industrial firm) for 35 minutes from 3:25 p.m. until 4 p.m. The suspension decision was taken because Barco was involved with the acquisition of Gerber Systems Corporation, a subsidiary of the NYSE-listed company Gerber Scientific Inc. The news was earlier released in the U.S. by Gerber Scientific Inc. during an analysts meeting held in New York. Barco issued a press release in Brussels confirming the acquisition.

The stock price behaviour surrounding the suspension is shown in figure 1. We can see that the share price of Barco increased substantially after the opening of the Exchange. The opening share price was EUR 235. By the time the suspension decision was taken, the share price increased by 1.5 percent to EUR 238.5. This sudden share price increase together with the news from the U.S. have probably led the market authority on the Brussels Stock Exchange to decide to temporarily halt the trading of Barco shares. The suspension of such a short duration led to the release of additional new information which was interpreted positively by investors. Stock prices of Barco jumped by another 1.7 percent from EUR 238.5 just before the start of suspension to EUR 242.7 at the reinstatement of trading. This change in stock price reflects the content of new information released during the suspension period.

<insert figure 1 here>

The volume of trade indicates a similar interpretation of the news disclosed during the trading suspension. There was a relatively higher trading volume on the day after suspension compared to the day before suspension. Investors appeared to have reacted to the information released through suspension by initiating new buy or sell orders. An increased trading volume was not observed anymore during the days afterwards.

3. Research methodology

In order to analyse the stock return behaviour surrounding trading suspensions, we use an event study methodology. We test if the average abnormal return (AAR_E) on the day of the event (suspension) is equal to zero (the null hypothesis). The alternative hypothesis is a non-zero abnormal stock return. The tests are expressed as follows:

$$\begin{cases} H_0: & AAR_E = 0 \\ H_1: & AAR_E \neq 0 \end{cases} \qquad [1]$$

If trading halts are effective, we expect to find no abnormal returns prior to or after the suspension. The average abnormal return on the event day is derived from aggregating individual stock abnormal returns aligned in event time, and is expressed as[3]:

$$AAR_E = \frac{1}{N}\sum_{i=1}^{N} AR_{i,E} \qquad [2]$$

where N is the number of stocks in the sample.

Individual stock abnormal returns are measured as the difference between the realised or actual return on the event day $R_{i,\,t}$ and the expected return $E[R_{i,\,t}]$, which is the benchmark normal return in the absence of the event:

$$AR_{i,t} = R_{i,t} - E[R_{i,t}] \qquad [3]$$

We analyse a 41-day event window that encompasses the event day and twenty trading days before and after suspension. We define the event day (day 0) as the day on which trading suspension occurs, day [–1] as the trading day immediately before the day of suspension, and day [+1] as the day immediately after the end of suspension. Daily stock returns are calculated using close-to-close stock prices. The return of day [0] is calculated using the last closing price before suspension and the first closing price after suspension. Similarly, the return of day [+1] is calculated as the return from the first closing price of the stock after trading suspension to the next closing price. Although many trading halts are single day suspensions, some are multiple day suspensions. In order to obtain a comparable daily return on the event day, the multiple day return over the suspension period is scaled by the number of suspension days.

[3] The following notations are used in the rest of the paper: $R_{i,t}$ = the continuously compounded return of stock i in period t; $R_{m,\,t}$ = the continuously compounded market index return in period t; $AR_{i,\,t}$ = abnormal return of stock i on day t of the estimation period; $AR_{i,\,E}$ = abnormal return of stock i on the event day; $R_{m,\,t}$ = market index return on day t of the estimation period; $R_{m,\,E}$ = market index return on the event day; $\overline{R}_m$ = average market index return during the estimation period; T = number of trading days in the estimation period; $\hat{s}_i$ = estimated standard deviation of the abnormal return of stock i during the estimation period; $SAR_{i,\,E}$ = standardised abnormal return of stock i on the event day.

We use three different models to estimate the expected return of stocks and to check the robustness of the results. These different models are as follows:

$E[R_{i,t}] = R_{m,t}$, called as the market-adjusted model, [4]

$E[R_{i,t}] = \hat{a}_i + \hat{b}_i \cdot R_{m,t}$, called as the market model, and [5]

$E[R_{i,t}] = \hat{a}_i^D + \hat{b}_i^D \cdot R_{m,t}$, called as the Dimson model. [6]

The regression parameters are estimated over a period from [–140] to [-21] trading days relative to the event day. The Dimson model is used to correct for thin trading. The estimation of the Dimson-beta is made by aggregating five coefficients using two lead and two lag variables.

We perform both parametric and non-parametric tests to determine statistical significance. A t-test assuming cross-sectional independence is performed first. This test statistic standardises abnormal returns for each stock by its standard deviation. The resulting test statistic is given by:

$$Z = \frac{\sum_{i=1}^{N} SAR_{i,E}}{\sqrt{\sum_{i=1}^{N} \frac{T_i - 2}{T_i - 4}}} \quad [8]$$

where,

$$SAR_{i,E} = \frac{AR_{i,E}}{\hat{s}_i \sqrt{1 + \frac{1}{T_i} + \frac{\left(R_{m,E} - \overline{R}_m\right)^2}{\sum_{t=-140}^{t=-21} \left(R_{m,t} - \overline{R}_m\right)^2}}} \quad [9]$$

Two non-parametric tests are used to test statistical significance of abnormal returns: the traditional sign-test and the generalised sign test of Cowan (1992). The sign test can be expressed as follows:

$$Z = \frac{(w - n\hat{p})}{\sqrt{n\hat{p}(1-\hat{p})}} \qquad [10]$$

where w represents the number of stocks in the sample with a positive abnormal return on the event date, p represents the fraction of positive abnormal returns expected under the null hypothesis, and

$$\hat{p} = \frac{1}{N}\sum_{i=1}^{N}\frac{1}{120}\sum_{t=-140}^{t=-21} j_{i,t} \qquad [11]$$

with $\varphi_{i,t} = 1$ when $AR_{i,E} > 0$, and 0 otherwise[4].

The main disadvantage of parametric tests is that they are based on assumptions about the probability distribution of returns. Non-parametric tests do not depend on the assumption of normality. Because non-parametric tests do not use the return variance, these tests are more appropriate in case of event-induced variance. For, if the variance is underestimated, traditional test statistics will reject the null hypothesis too frequently, even when the average abnormal return is in fact zero, and should be avoided accordingly. Besides event-induced variance, the problem of thin trading is also crucial for a test specification. Cowan (1992) shows that the generalised sign test performs well for thinly traded stocks.[5]

We also analyse the trading volume behaviour surrounding trading halts. Abnormal change in trading volume is an alternate way of investigating the value of information disclosed through an event. The trading volume analysis, performed following the methodology of Michaely, Thaler and Seguin (1994), is briefly described below.

The turnover of stock i on day t is defined as the number of traded shares divided by the number of outstanding shares:

[4] The difference between the generalized sign test and the traditional sign test is the value of *p* under the null hypothesis. While the traditional sign test uses a value of 0.50, the generalized sign test uses the fraction of positive returns in the estimation period, measured across N stocks and T days as value for *p*.

[5] Cowan and Sergeant (1996) point out that thinly traded stocks are characterized by numerous zero and large non-zero returns, causing non-normal return distributions. This causes traditional test statistics to be poorly specified (Campbell and Wasley, 1993).

$$TURN_{it} = \frac{VOLUME_{it}}{SHARES_i}, \quad [12]$$

where $VOLUME_{it}$ is the number of traded shares of stock i on day t, and $SHARES_i$ is the number of outstanding shares of stock i. The average turnover of suspended stocks on each trading day is calculated as:

$$TURN_t = \frac{1}{N}\sum_{i=1}^{N} TURN_{it}, \quad [13]$$

where N is the number of trading suspensions in the sample.

The expected trading volume for each stock is calculated over the estimation period [from day -100 to day -21] as:

$$\overline{TURN} = \frac{1}{80}\sum_{t=-100}^{t=-21} TURN_t \quad [14]$$

The abnormal (relative to the estimation period) stock turnover is calculated for each day of the event window [from day -20 to day +20] as:

$$AV_E = \frac{TURN_E}{\overline{TURN}}, \quad [15]$$

where 'E' denotes the event window.

Finally, the effect of trading suspension on the stock return volatility is also examined. The volatility is measured as the variance of daily stock returns. We use both adjusted and unadjusted stock returns to check the sensitivity of the results. To obtain a benchmark estimate of normal stock return volatility, the variance of daily returns over a historical period [from day -140 to day -81] is calculated. Analogously, the variances for the suspension period [from day -20 to day +20], for the pre-suspension period [day -20, day -1] and for the post-suspension period [day +1, day +20] are calculated. Following Skinner (1989), we use the

median as more representative of the true change in volatility rather than the mean. We test whether the median variance around suspension is different compared to the median historical variance. A Wilcoxon signed rank test is used to test statistical significance of the results.

4. Data

Our empirical analysis is based on data obtained directly from the Brussels Stock Exchange. We start by collecting information on all common stock trading suspensions of listed Belgian companies. We also gather information on the start and the end of the suspension period, stock prices immediately before and after trading suspension, and the reason for suspension. These data are collected either from the stock exchange or from the daily Belgian financial newspaper *De Financieel Economische Tijd.* Daily share price data are collected from *Datastream*.

Table 1 presents descriptive information of all trading suspensions during the period January 1992 – June 2000. We observe that there are 210 suspensions involving 112 companies. Of these 112 companies, 57 (51%) are suspended only once, 31 (28%) are suspended twice while the rest 24 (21%) companies are suspended three or more times. There are 148 (70%) single and intra-day suspensions, while 62 (30%) are multiple day suspensions.

<insert table 1 here>

Each trading suspension is categorised according to its reason. Panel D of Table 1 gives a summary of this categorisation. The most commonly stated reason of trading suspension is listed company's involvement in mergers and acquisitions (49%). Other important reasons include divestitures (10%), and other restructurings (23%) like capital structure changes (stock/debt issues) or internal reorganisations such as the establishment of a new management. There are a few instances of suspensions due to miscellaneous reasons such as the signing of an important sales contract.

Data limitations did not allow us to subsequently analyse the entire population of firms. We find that stock price data of 91 companies are available in Datastream. A few companies (12) are not included in the sample because these were delisted from the Exchange as trading did

not resume after the suspension. Trading of these firms were suspended mainly as a result of bankruptcy, corporate reorganisation or non-compliance of Exchange's disclosure regulation. Suspensions involving a few holding companies are also excluded because along with the suspension of one company's stock, the trading of all related company stocks are suspended as well. Finally, some suspensions are excluded from the sample because the period used for the estimation of model parameters to calculate expected returns overlap with the event period. These two last reasons lead to the exclusion of seven companies from the sample.

Thus, the final sample of our analysis consists of 102 trading suspensions involving 72 different companies. We use daily stock returns for our analysis. Due to unavailability of daily trading volume data, we could use a sample of 61 trading suspensions for the trading volume analysis.

A frequency distribution of trading suspensions in our sample is presented in Table 2. We observe that the sample is well distributed over the different years of the sample period. Only 30% suspensions are intra-day suspensions, which means that the reinstatement of trading takes place on the same day. The half of trading suspensions in the sample are single day suspensions. Trading of these companies is resumed on the following day. The rest of trading suspensions (20%) in our sample are for periods of two days or more.

<insert table 2 here>

5. Empirical results

In this section, we present the results of the empirical analysis. Because the sample includes trading suspensions due to different news categories, any aggregation across all stocks would make the results difficult to interpret. The price impacts of different news categories will tend to offset each other leading to negligible abnormal stock price movements. Therefore, we divide the total sample in three sub-samples according to the most important reasons for trading suspensions, i.e. mergers and acquisitions (54 suspensions), divestitures (14 suspensions) and other restructurings (21 suspensions). King, Pownall and Waymire (1991) also find that 80% of their sample trading suspensions are related to disclosures about corporate takeovers and leverage buyouts. Although a finer partitioning of the sample would lead to better results, it is not possible to do so because of the relatively small sample size.

If a trading suspension leads to a significant disclosure of new information, stock prices should change accordingly. One can also observe significant changes in trading volume in response to announcements of material information. These two tests are performed first and described in sections 5.1 and 5.2. Section 5.3 presents additional results on the suspension-related change in stock return volatility.

5.1 Analysis of stock returns

We analyse abnormal stock returns by estimating equation [3]. In this estimation, we use three different models as shown in equations [4] – [6] to measure expected stock returns. Table 3 presents the result of market adjusted excess returns. We find that trading suspensions lead, on average, to a statistically significant impact on stock returns. In the mergers and acquisitions sample, the mean abnormal return on the day of suspension is 8 percent. The t-test and the sign-tests show that this abnormal return is statistically significant at the 1% level. The excess stock returns during the days preceding trading suspension are very small in magnitude and statistically also insignificant. The findings do not indicate any information leakage prior to suspension. Most of the daily stock returns after trading suspensions are also very small in magnitude and insignificant. The small cumulative abnormal stock return during the post suspension period suggests that stock prices adjust quickly and completely to the new information released during the suspension.

The abnormal stock returns for the two other samples are also presented in Table 3. For the divestitures sample, we observe that the abnormal stock return is -0.4% on the day of suspension. Although the t-test indicates that the average return is statistically significant, the two non-parametric tests fail to show any significance. Note here that the sample size is relatively small. Similarly, for the restructuring sample, we find that the average excess stock return on the day of trading suspension is -3.8%. But, both the parametric and the non-parametric tests do not show statistical significance. In line with the mergers and acquisitions sample results, these findings indicate that trading suspensions take place unexpectedly. There is no indication of any information leakage during the pre-suspension period. The post-suspension period stock return shows no sign of inefficient stock price adjustment.

<insert table 3 here>

Another way to clearly observe the results is to present the abnormal returns over time in a figure. This is done in Figure 2 which depicts the market adjusted cumulative average abnormal daily stock returns around trading suspensions. The simple solid line is for mergers and acquisitions sample, the bold solid line is for restructuring sample and the dotted line is for divestitures sample. The figure clearly shows lack of information leakage prior to trading suspension, material information disclosure during suspension, and stock price full adjustment to the newly released information. These findings are consistent with the predictions of a semi-strong form of informationally efficient stock market. These are also consistent with those of Hopewell and Schwartz (1978). However, the results are in contrast to those obtained by Kryzanowski (1979) and Howe and Schlarbaum (1986) who find continuous downward adjustment of stock prices even after the resumption of trading. This specific finding is mainly related to unfavourable information suspensions of long duration (several weeks).

<insert figure 2 here>

We check the robustness of these results by estimating abnormal stock returns using two other benchmarks. Since the results are qualitatively very similar, we present the excess returns in a condensed form in Table 4. We find that the average abnormal stock returns in the pre-suspension period are negligible and statistically insignificant. For the mergers and acquisitions sample, the excess return over the suspended period is positive and significant. The finding is insensitive to the model used to estimate excess returns. The stock return results during the post-suspension period are also robust. The behaviour of excess stock returns for the mergers and acquisitions sample suggests that new and material information is conveyed to the market through trading suspension. The market also rapidly impounds the information released during suspension. The results from the divestitures and restructurings samples are also robust to the choice of model used in estimating excess stock returns. Here we find that stock price changes are, on average, insignificant. No material information disclosure takes place during suspensions.

<insert table 4 here>

5.2 Analysis of trading volume

The average abnormal trading volume surrounding trading halts [from day -20 to day +20] is estimated using equation [15]. These are reported in Table 5 and graphically shown in Figure 3. The results indicate that no abnormal trading volume pattern is present before trading suspensions. On the first trading day after the suspension, the average turnover is six times as high as normal. This increase is statistically significant at the 1% level. On days [+2] and [+3] the abnormal trading turnover is 3.70 and 3.27 (the estimated t-values are 8.51 and 7.15, respectively). Table 5 shows that significant abnormal volumes are found during the first five trading days after suspensions. It reflects the economic significance of the information released during suspension. It also confirms our earlier findings from the stock return analysis indicating that suspensions are associated with the release of new and material information. Figure 3 clearly shows that the trading volume has a decreasing trend from day [+1] onwards. Trading volume returns to its normal level only gradually. Overall, our results are consistent with the results of prior empirical studies such as Ferris, Kumar and Wolfe (1992), Lee, Ready and Seguin (1994) and Kryzanowski and Nemiroff (1998).

<insert table 5 here>
<insert figure 3 here>

5.3 Analysis of stock return volatility

Besides analysing abnormal return and trading volume behaviour around trading suspensions, we also examine stock return volatility around suspensions. We investigate if a sudden information flux from trading suspension causes abnormal stock price volatility. This is a parameter which can be of interest to regulatory bodies in order to decide whether to impose a trading suspension or not.

In Table 6 we present results of tests whether the median variance around trading suspension is different compared to the median historical variance. The variance is estimated using daily raw stock returns as well as abnormal stock returns. We find that the median variance of the event period [-20, +20] is about twice that of the historical variance. With the Z-scores for the Wilcoxon signed rank test of –4.30 and –4.42, the difference in variance is statistically

significant at the 1% level. This means that the increase in stock price volatility in the event period is due to the release of information during the trading suspensions.

Although the event period variance is observed to be higher than the historical variance, further investigation shows that this increase in variance is solely due to the large price change that takes place over the trading halt itself. This can be seen when the event window is broken down into pre-suspension and post-suspension periods. We find that the median stock return variance of the pre-suspension period [-20, -1] and the median variance of the post-suspension period [+1, +20] are not significantly different from that of the historical period [-140, -81]. None of the Z-values of the Wilcoxon signed rank test is significant at the conventional level. Moreover, we observe that the median stock return variance of the pre-suspension period is not significantly different from that of the post-suspension period.

<insert table 6 here>

Therefore, we conclude that there is no increase in stock return volatility prior to or after trading suspension. It implies that the decisions taken by the Brussels Stock Exchange to suspend trading and to reinstate trading did not cause a significant change in stock return volatility. The Exchange's policy appears to be successful towards the dissemination of price sensitive information without causing an abrupt change in volatility. The evidence contradicts the results reported by Ferris, Kumar and Wolfe (1992) and Lee, Ready and Seguin (1994) for the U.S. market, who report an increase of volatility around trading suspensions.

6. Conclusions

This paper empirically examines trading suspensions on the Brussels Stock Exchange. The study is of particular interest because of two reasons. First, these suspensions occur in order to compel firms to disclose new information to the market. This is different from suspensions of stock trading at times of imbalances in buy or sell orders and extreme volatility. Second, prior studies show conflicting results with regard to the effectiveness of trading suspensions. Both efficient and inefficient stock price adjustments are documented.

In this study, we focus on three different parameters: stock return, trading volume and return volatility to determine in a robust way the efficacy of trading suspensions. We subdivide the entire sample into three major categories based on the nature of information disclosed: mergers and acquisitions, divestitures and restructurings. Our results show that trading halts are associated with a significant release of new information. This is not surprising because trading halts on the Brussels Stock Exchange are mostly associated with the release of non-routine information, which is extremely price sensitive, such as mergers and acquisitions or restructurings. On average, the magnitude of the abnormal return over the span of the trading halt is over 8% for the mergers and acquisitions sub-sample, while restructurings have a negative price impact (-3.66%).

Our investigation shows that there is no anticipatory or unusual return behaviour before the suspension. Nor is there any significant abnormal return pattern in the post-suspension period. It indicates that there is a complete and instantaneous adjustment to the new information released during trading halts. It seems that the Exchange was successful concerning the correct timing to install a trading suspension as well as to reinstate trading.

Analysing the abnormal trading volume we find that an increase in trading volume takes place as trading resumes after the suspension. The daily trading volume pattern shows a decreasing trend and a gradual return to the normal level. The volume analysis confirms the results of the abnormal return analysis. Finally, the analysis of stock return volatility shows that volatility does not increase prior to or after trading halts.

Overall, our results show that the regulatory action of the Brussels Stock Exchange in temporarily suspending the trading of individual stocks has been effective. It indicates the efficacy of trading suspensions to disseminate price sensitive new information among market participants.

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Figure 1. Trading suspension: an illustration

This graph illustrates the daily stock price and the daily trading volume behaviour surrounding the trading suspension of Barco that took place on March 30, 1998 (defined as day 0). Stock price is expressed in Euros. Volume is the number of common shares traded, expressed in thousands.

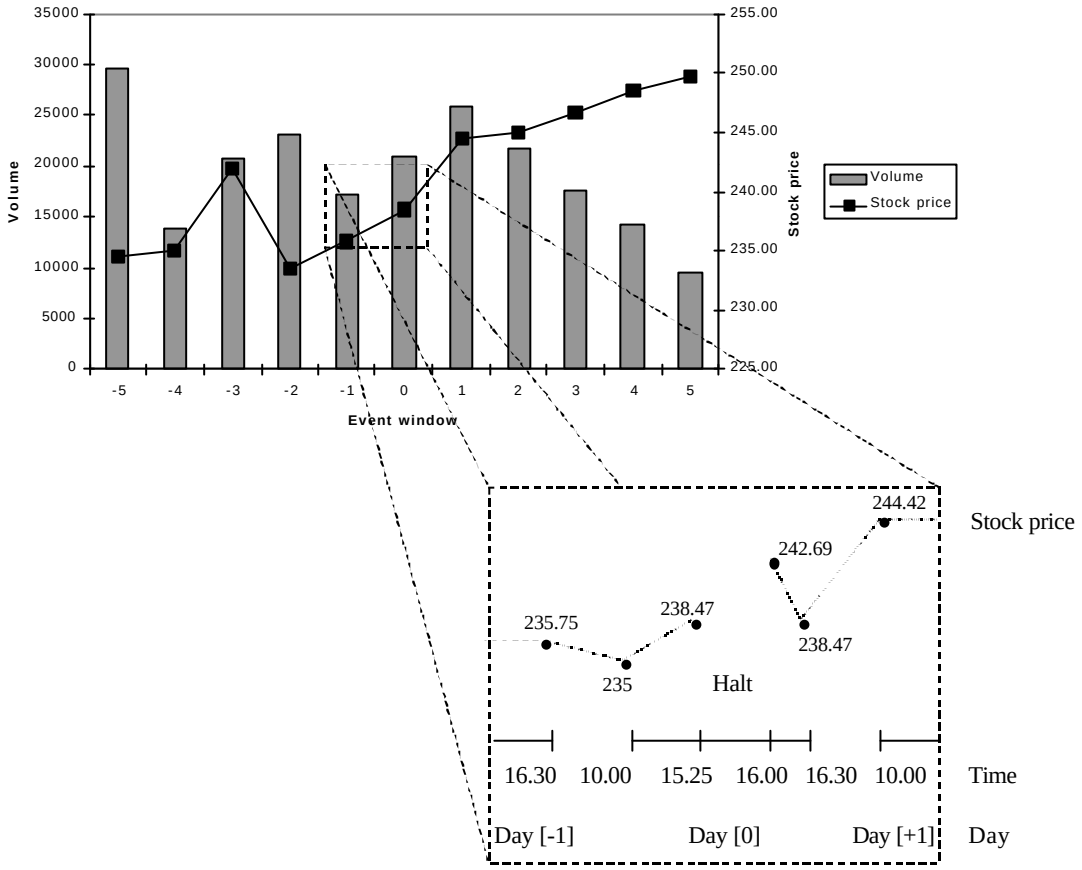

Table 1. Trading suspensions on the Brussels Stock Exchange

The table provides the details of trading suspensions on the Brussels Stock Exchange from January 1992 through June 2000. Information on the number and duration of suspensions is collected from the Exchange while information on the reasons of suspensions is collected from the daily financial newspaper.

Panel A: Total number of suspensions	
Number of trading suspensions	210
Number of companies	112

Panel B: Frequency of suspensions		
Frequency	Number of companies	%
1	57	51
2	31	28
3	14	12
4	2	2
5	7	6
6	1	1

Panel C: Duration of suspension		
Duration	Number of trading halts	%
Between 0 and 1 day	148	70
Between 1 and 2 days	30	14
Between 2 and 3 days	6	3
Between 3 and 4 days	5	2
More than 4 days	21	11

Panel D: Reasons of suspension		
Reason	Number of trading halts	%
Mergers and acquisitions	103	49
Divestitures	21	10
Other restructuring	49	23
Bankruptcy	6	3
Miscellaneous	31	15

Table 2. Sample distribution of trading suspensions

The table analyses the sample of trading suspensions on the Brussels Stock Exchange from January 1992 through June 2000. Intra-day, single-day and multi-day suspensions are defined as those for which trading is reinstated on the same day, the opening of the following day, and on any other time, respectively. The duration is measured from the start of suspension until the reinstatement of trading and is expressed in hours.

Year	Frequency	% multi-day	% single-day	% intra-day	Average duration (in hours)
1992	15	20%	73%	7%	0:28
1993	9	67%	225	11%	0:18
1994	5	40%	60%	0%	9:06
1995	5	0%	80%	20%	4:11
1996	19	5%	63%	32%	2:46
1997	8	25%	50%	25%	3:05
1998	14	21%	50%	29%	1:21
1999	18	5.5%	27%	67%	2:51
2000	9	22%	33%	44%	1:55
Total	102	20%	50%	30%	2:25

Table 3. Market adjusted abnormal returns surrounding trading suspensions

The table reports market adjusted average abnormal returns, cumulative average abnormal returns, t-statistic and sign statistics for days during the event window [-20, +20] for three sub-samples. The sample size for the mergers and acquisitions sample is 54, the divestitures sample is 14 and the restructurings sample is 21. The asterisks ** denote significance at the 1% level and * denotes significance at the 5% level.

	Mergers and Acquisitions					Divestitures					Restructurings				
Day	AR	CAR	t-test	Trad. sign test	Gen. sign test	AR	CAR	t-test	Trad. sign test	Gen. sign test	AR	CAR	t-test	Trad. sign test	Gen. sign test
-20	0,002	0,002	0,24	0,27	0,72	-0,002	-0,002	-0,53	1,07	-0,78	-0,007	-0,007	-0,94	1,09	-0,83
-15	-0,004	-0,004	-1,62	0,82	-0,37	0,002	0,013	0,62	0,00	0,29	-0,003	-0,008	-1,33	1,09	-0,83
-10	0,002	-0,005	1,91	0,00	0,45	-0,003	0,008	-0,21	1,60	-1,31	0,007	0,007	1,61	0,22	0,48
-5	0,002	0,005	0,80	0,54	0,99	0,005	0,010	1,76	0,53	0,83	-0,001	0,015	0,74	0,65	-0,39
-4	0,000	0,005	-0,74	0,54	0,99	0,001	0,011	0,91	0,53	0,83	-0,005	0,010	-1,03	1,09	-0,83
-3	0,003	0,007	0,99	0,82	1,27	0,001	0,012	0,14	1,07	-0,78	-0,005	0,004	-1,02	1,96	-1,70
-2	0,005	0,012	0,93	0,27	0,72	-0,006	0,006	0,35	0,00	0,29	0,000	0,005	1,14	0,65	0,92
-1	0,003	0,015	0,76	0,82	-0,37	0,005	0,012	1,89	1,07	-0,78	0,002	0,006	1,23	0,65	0,92
0	0,080	0,095	39,75**	3,27**	3,72**	-0,004	0,007	3,24**	0,53	0,83	-0,038	-0,032	-1,73	0,22	0,48
1	-0,005	0,090	-1,84	0,27	0,17	0,014	0,021	2,59*	0,00	0,29	-0,008	-0,040	-0,30	1,09	-0,83
2	-0,002	0,088	-0,62	0,54	0,99	-0,004	0,017	-1,09	1,60	-1,31	-0,004	-0,044	-0,14	0,65	-0,39
3	0,008	0,096	3,41**	1,91*	2,36*	0,003	0,020	-1,70	0,53	-0,24	-0,015	-0,059	-1,43	1,53	-1,26
4	0,003	0,100	0,34	0,00	0,45	-0,003	0,017	-0,71	1,60	-1,31	-0,007	-0,067	-1,97	1,96	-1,70
5	0,001	0,101	0,02	0,27	0,17	-0,004	0,014	-1,03	0,53	-0,24	0,001	-0,066	0,74	2,84	3,11*
10	-0,006	0,086	-2,00	1,36	-0,92	-0,003	0,020	-1,22	1,60	-1,31	0,000	-0,063	0,07	0,22	0,48
15	0,001	0,083	-0,13	0,54	-0,10	0,000	0,022	0,37	0,00	0,29	0,008	-0,042	0,89	0,22	0,48
20	-0,004	0,075	-1,59	2,18	-1,73	0,001	0,009	0,45	0,53	0,83	-0,005	-0,052	-1,15	0,65	-0,39

Table 4. Cumulative average abnormal stock returns at various event windows

The table presents cumulative average abnormal stock returns at various event windows surrounding trading suspensions. Abnormal returns are calculated using three different benchmark models: market-adjusted model, market model, and Dimson model to adjust for thin trading. Results for three sub-sample are presented separately. The sample size for the mergers and acquisitions sample is 54, the divestitures sample is 14 and the restructurings sample is 21. The superscript * denotes statistically significance as found from the t-test (at the 5% level), while the subscript a denotes statistical significance as found from the sign test (at the 5% level).

Trading period	Mergers and acquisitions			Divestitures			Restructurings		
	Market-adjusted model	Market model	Dimson model	Market-adjusted model	Market model	Dimson model	Market-adjusted model	Market model	Dimson model
-20, -11	-0.67	-0.82	-0.61	1.10	0.50	1.06	0.04	0.02	0.36
-10, -6	0.99	1.67	1.41	-0.57	-0.70	-0.82	1.56	1.56	1.72
-5, -1	1.16	1.47	1.16	0.63	0.90	0.72	-0.96	-0.82	-0.58
0	$_a$8.03*	$_a$8.39*	$_a$8.30*	-0.40*	-0.83	-0.92	-3.83	-0.55	-0.74
+1, +5	0.55	1.09	0.83	0.62	0.26	0.91	-3.42	-3.09	-3.03
+6, +10	-1.45	-1.59	-1.70	0.58	-0.03	0.08	0.28	-0.17	0.65
+11, +20	-1.15	-0.80	-0.98	-1.06	0.76	1.08	1.08	0.93	1.61

Figure 2. Cumulative average abnormal returns around suspension

This figure presents daily market adjusted cumulative average abnormal returns (CAR) for the event window [-20, +20] surrounding trading suspensions for three sub-samples: mergers and acquisitions (M&A), divestitures (Divest) and restructurings (Restr).

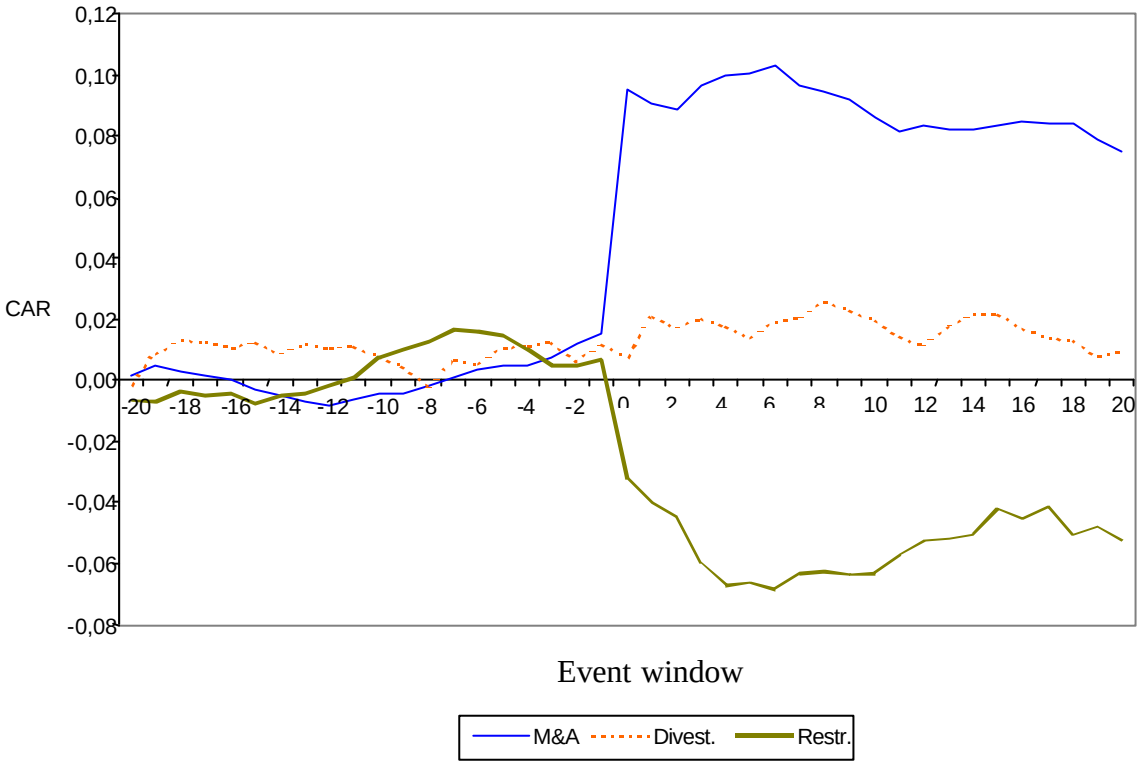

Table 5. Abnormal trading volume surrounding trading suspensions

The table presents average abnormal trading volume (AV) for the event window [-20, +20] surrounding trading suspensions. The sample comprises 61 trading halts. Volume is expressed as the number of shares traded of a stock relative to the total number of outstanding shares of the same stock. Abnormal volume during the days of the event period is calculated relative to the estimation period [-100, -21]. The asterisks ** denote significance at the 1% level.

Day	Abnormal Volume	p-value
-20	0.87	0.69
-15	1.21	0.50
-10	0.89	0.72
-5	0.90	0.74
-4	1.08	0.80
-3	1.19	0.55
-2	1.32	0.32
-1	1.16	0.61
1	6.32**	0.00
2	3.70**	0.00
3	3.27**	0.00
4	2.90**	0.00
5	1.93**	0.00
10	1.57	0.08
15	1.40	0.21
20	1.22	0.49

Figure 3. Abnormal trading volume pattern around suspensions

The figure plots average abnormal trading volume (AV) for the event window [-20, +20] surrounding trading suspensions. The sample comprises 61 trading halts. Volume is expressed as the number of shares traded of a stock relative to the total number of outstanding shares of the same stock. Abnormal volume during the days of the event period is calculated relative to the estimation period [-100, -21].

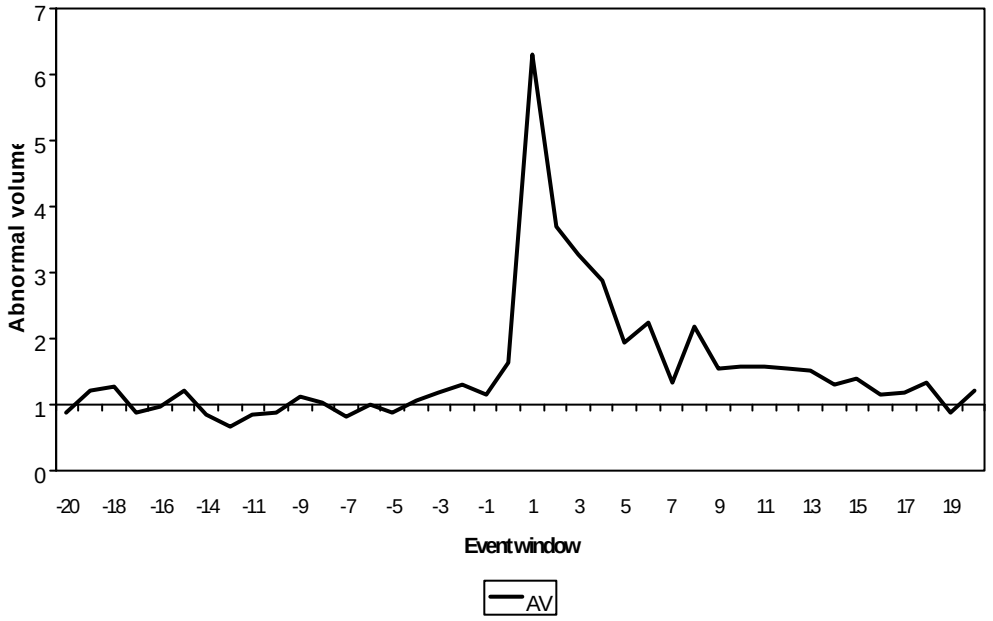

Table 6. Stock return volatility around trading suspensions

The table presents median stock return variance estimated over different periods covering before and after trading suspensions. Variances are calculated from daily raw stock returns and market-adjusted stock returns. The sample size is 102 trading halts. The Z-value and p-value test that the median variance is same in two periods. The asterisks ** denote significance at the 1% level.

Period	Raw returns			Abnormal returns		
	Median	Z-value	p-value	Median	Z-value	p-value
(-140, -81)	0.00027	-4.30**	0.00	0.00024	-4.42**	0.00
(-20, +20)	0.00060			0.00048		
(-140, -81)	0.00027	-0.30	0.39	0.00024	-0.12	0.45
(-20, -1)	0.00028			0.00024		
(-140, -81)	0.00027	-0.43	0.34	0.00024	-1.22	0.11
(+1, +20)	0.00028			0.00026		
(-20, -1)	0.00028	-0.19	0.42	0.00024	-0.70	0.24
(+1, +20)	0.00028			0.00026		