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Changes in index composition: effects in the stock price and possible explanations (Spremembe v sestavi indeksa: učinki na ceno delnice in možna pojasnila)

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Contents

Abstract

The purpose of this research is to study the effects on the share price of firms that has been added or deleted from the EURO STOXX 50. To this end, all official STOXX Ltd. press releases regarding inclusion and deletion announcement in the EURO STOXX 50 index have been collected. We will also collect the share price of the companies involved around the date of the announcements and, finally, an event study will be conducted to achieve the purpose of this research. We also want to find possible determinants that could explain the share price movement (if any) and we will use statistical techniques to test whether they could actually explain the share price movements.

Introduction

In 2017 Moody's published an announcement which says that passive investing will overcome active investing and achieve a leading share in U.S. investment management business by 2024 (for more information see the announcement of February 2, 2017 *"Moody's: Passive investing to overtake active in just four to seven years in US; global traction to pick up"*)[1]. Moody's announcement also predicts that more than 50% of all assets will consist of passive investments between 2021 and 2024. This means that the demand for indices is expected to increase and consequently if a stock is listed in one or more indices, the demand for that stock will increase and, therefore, there could be an effect on its price. In fact, it is reasonable to assume that if a stock is added to an index, its price will increase since it will be required by those who want to replicate the index (for example a manager of an ETF fund or a passively managed mutual fund) and therefore the demand for that stock will increase.

If Moody's predictions prove to be correct, it is therefore reasonable to expect that the effect on prices following an inclusion or deletion announcement will be higher in the future. If we assume that the price of an asset reflects all the publicly available information and that all investors have access to the same type of information, then the reaction of any relevant information to the firm's value when there is the announcement of addition or deletion to an index must occur on the day of the announcement. It is consistent with the hypothesis which the market is informatively efficient in semi-strong form, see Fama (1970). This means that if the price shift (abnormal performance) persist after the announcement date, the markets are not informatively efficient and the stock price may depend on something that generally does not affect the value of the company itself.

In this research we want to investigate if there is a share price effect after the announcement of inclusion or deletion of a firm from the European EURO STOXX 50 index. This type of research could be very interesting because, as suggested by Jain (1987), the results on excess returns could be useful for financial analysts to evaluate the economic usefulness of this type of information. This research could also be useful for analysts to develop models through which to build trading strategies based on the purchase of shares that are likely to earn excess returns compared to the market.

The literature on changes in index composition is very comprehensive but most of the studies have limited themselves to studying the effects only on the Standard & Poor's 500 (S&P 500) index. Indeed, many studies have measured abnormal performance in conjunction with the announcement of listing or de-listing to an index but most of them have focused on the S&P 500 index. The literature agrees that there is an effect on the shares price following the change in S&P 500 index composition. It would be interesting to investigate whether the effects on prices that are being found in previous studies can also be found on a more relevant index for the European market. That is, we want to investigate whether (cumulative average) abnormal returns can also be found following the announcement of inclusion or deletion from the EURO STOXX 50 index.

We will test whether the efficient market hypothesis in semi-efficient form holds and if the announcement of addition in the index is followed by abnormal performance. Moreover, we want to find possible determinants that can explain abnormal returns (if any). We want to check if the explanations found for the S&P 500 also apply to the EURO STOXX 50 and we will use statistical techniques to check if possible explanations actually explain abnormal returns.

We further assume that the inclusions and deletions do not have any effect on the value of the stock in order to test the efficient market hypothesis (Fama, 1970). If this holds, we should not find any abnormal returns after inclusion or deletion from the index. If we find them, it means that the post-announcement price shift cannot be explained by this hypothesis (Lynch and Mendenhall, 1997).

The remainder of this research is organized as follows. Chapter 1 describes the research background focusing on share price effect and on possible determinants that can explain price movements. Chapter 2 describes the dataset and the methodology useful for conducting this research is developed. Chapter 3 show the results of the research, in which it is studied whether there is an effect on prices and the determinants are tested. Chapter 4 is devoted to discussing the results. Chapter 5 concludes this research.

Chapter 1

Research background

In this chapter, we will discuss about the possible determinants that could explain price movements following the announcements of inclusion or deletion from the index. The determinants we will discuss are well known from the literature and we will provide a theoretical background on them. We will also examine the literature on event studies on changes in index composition, in order to study the average impact on share prices of firms involved. In addition, we will briefly review event studies in general, we will provide a definition of them, and we will discuss their usefulness. Finally, some very useful information will be provided for the EURO STOXX 50 index.

1.1 Possible determinants of price shift

Regarding the explanations on price movements following a change in index composition, the literature has identified four possible explanations:

- price pressure;
- downward-sloping long-run demand curves;
- information value;
- liquidity effect.

We will delve into each of these possible explanations.

1.1.1 Price pressure hypothesis

Price pressure hypothesis refers to the deviation from the equilibrium price caused by the increase in demand from index fund managers (Elliott et al., 2006): price movements of firms interested in inclusion or deletion from the index could be caused by massive index-fund trading which make the stocks price temporarily moves to a higher (lower)

level in additions (deletions) to the index. Therefore, price pressure hypothesis involve that stocks exhibited a downward sloping demand curve in the short run rather than having a horizontal demand curve.

There are previous studies that use the term "price pressure" to describe similar effects. For example, Scholes (1972) uses the term price pressure to describe the effects of investor preferences on stock prices. Instead, Chen et al. (2004) use the term "short-term decreasing demand curves" to describe the short-term price changes. This is consistent with the current definition of price pressure. Indeed, when authors talk about the price pressure in recent studies, they are generally referring to a temporary effect on share prices due to market liquidity effects.

One of the first studies documenting the existence of price pressure is the Harris and Gurel's study (1986) which found an abnormal return of 3.13% associated with inclusion in the S&P 500 index and a price reversal after the price increase. The authors of this study argued that the price reversal was a proof of the temporary price pressure. This hypothesis was confirmed by Sui (2006) which argued that the evidence for the price pressure hypothesis was the finding of a price reversal after the date on which the index composition changes. Moreover, Elliott et al. (2006) analyzed inclusions in the S&P 500 between 1993 and 2000 and they found evidence to support short-run price pressure.

1.1.2 Downward-sloping long-run demand curves

The downward-sloping for stocks demand curves could explain the relationship between stock's supply (in the x-axis) and its price (in the y-axis). Shleifer (1986), Lynch and Mendenhall (1997), Wurgler and Zhuravskaya (2002) and Kaul et al. (2000) supported the evidence that downward sloping demand curves explained the price shift (abnormal return) in the announcement and the effective inclusion day.

There are investors interested in buying stocks that track an index (let's think for example of an ETF that tracks the S&P 500). Consequently when a stock is added to an index, its trading volume will increase (i.e. the demand for that stock will increase) and, assuming the downward sloping demand curve hypothesis holds, this could be another explanation of the effect of the share price increase.

If the downward-sloping long-run demand curves hypothesis holds, the price movements could be explained by massive index-fund trading that reduce stock's supply for investors who do not invest in index funds; as a result stock's supply will decrease and the market price will increase. The opposite is true for deletions from the index. In other words, as soon as a firm is added (deleted) in the index, index funds will increase (decrease) its demand. In case the index is well known around the world, the shares demand for the added companies will increase as more foreign investors tend to invest in that firm (see Sui (2006) for the S&P 500 case). This creates an imbalance between

supply and demand for stocks, and stock market prices will consequently rise (because the supply of that share will be reduced for nonindexing investors).

According to Shleifer (1986), Harris and Gurel (1986) and Sui (2006), evidence of the downward-sloping long-run demand curves can be found in a permanent price effect after the index composition change.

If the long-term demand curves for stocks would have been a straight horizontal line (as in the classic CAPM world, because stock prices reflect market perceptions of risk and expected returns), there would have been no permanent effect on prices.

1.1.3 Information hypothesis (Investor awareness)

Information hypothesis claims that the index manager uses non-public (confidential) information to add or delete firms. This hypothesis was supported by Jain (1987) for the S&P 500 index. A company that is added to the index will attract the interest, attention of investors and financial analysts and then public information about it will increase (Shleifer (1986), see also Jain (1987)). Denis et al. (2003) demonstrated that inclusion in the S&P index is an informed event, although S&P officially states that inclusion or deletion from the index is not a judgment of investment. This is a very important evidence because all previous studies assumed that composition changes in the S&P 500 were an uninformed event: both Shleifer (1986) and Harris and Gurel (1986) studies were based on the assumption that the information did not have any role since the purpose of the S&P 500 is to be a "proxy" for the market and, therefore, it does not aim to represent a list of future "winners".

1.1.4 Liquidity hypothesis

As we have just seen, public information will increase after the inclusion of a company in the S&P 500 index because it will generate interest, attention from investors and financial analysts. Consequently its shares will be traded more widely. This means that the trading volume will increase and, consequently, the bid-ask spread will decrease (Kyle (1984) and Vishny (1985)) and the agency costs as well (Dhillon and Johnson, 1991). In other words, the security will become more liquid and the investors will have a lower required rate of return and, therefore, they will be willing to buy the security at a higher price. Amihud and Mendelson (1986) and (1997) agree that liquidity could have an explanatory effect on price movements. Harris and Gurel (1986) and Edmister et al. (1996) analyzed the companies added before October 1989 and found evidence to support a permanent increase in trading volume after the inclusion in the S&P 500 index. Hegde and McDermott (2003) found that inclusion in the index permanently reduced both actual and related bid-ask spreads. Madhavan (2003) argued that the change in

liquidity caused a permanent effect on the share prices of the companies involved in the change in the Russell 2000 and 3000 indices. Instead, Beneish and Whaley (1996) found a transitory effect in liquidity. Erwin and Miller (1998) found that the bid-ask spread have narrowed and they attributed this effect to increased information. Amihud and Mendelson (1986) and Brennan et al. (1998) stated that liquidity and expected returns were negatively correlated.

As all these assumptions are also plausible regarding EURO STOXX 50 index, we have decided to test them in our research as well. Before that, we will delve into the results of the other studies regarding the index addition and deletion effect.

1.2 Index addition and deletion effect

As mentioned above, most of the research aimed at studying this phenomenon is focused on the S&P 500. In the current literature, a first line of research can be identified in the previous century.

Research carried out before October 1989 which performed an event study on the change in S&P 500 index composition show that the day after the addition (deletions) in the index there is a significant positive (negative) abnormal return (e.g. Harris and Gurel (1986), Shleifer (1986), Dhillon and Johnson (1991) for additions and Goetzmann and Garry (1986) and Harris and Gurel (1986) for deletions to the index). The empirical relevance shows that the effect of additions ranges from 3% to 8%. In case of deletion from the index, the price effect is the opposite as the stock prices is approximately 1.5% lower.

For example, Shleifer (1986) found an average abnormal announcement day return of 2.79% for the 1976-1983 period, whereas Harris and Gurel (1986) analyzed index composition changes during the 1973-1983 period and they found an average share price increase of 3.13% for index additions. Instead, Goetzmann and Garry (1986) and Harris and Gurel (1986) found that S&P 500 deletion announcements were associated with abnormal negative returns of about 1.5%.

In post-October 1989 studies, Denis et al. (2003) found an abnormal return of 4.65% regarding the 1987-1999 period whereas Chen et al. (2004) found an abnormal return of 5.45% during the 1989-2000 period. Elliott et al. (2006) concluded that the abnormal return at the inclusion-date is 2.24% on average for the firms added in the 1993-2000 period. Therefore, all studies agree that there is always a positive (negative) price effect for firms that are added (deleted) in the S&P 500.

Regarding the long-term price effect, there is no unanimity in the conclusions of the studies. Shleifer (1986), Dhillon and Johnson (1991), Beneish and Whaley (1996), and Lynch and Mendenhall (1997) note that although the price of the shares affected by

the changes of the S&P 500 composition tended to partially reverse, the price increase is permanent (more precisely it generally does not reverse after a few months). Jain (1987) and Wurgler and Zhuravskaya (2002) also find evidence of a permanent effect on share prices following inclusion in the index. Since a permanent price effect was found, then these studies implicitly support the downward-sloping long-run demand curves hypothesis.

In contrast, Harris and Gurel (1986) found evidence to support that the stock prices completely reverts quickly (within 2 weeks). They showed that there was a price pressure that caused the price to return to its initial level.

Chen et al. (2004) documented an asymmetric effect on the shares price: they found a permanent increase in prices for the firms added to the index and a temporary price decline for the deleted firms. Ravi and Hong (2015) also found an asymmetric effect on the share price for additions and deletions.

As mentioned previously, we can identify two time frames for the event studies carried out on the S&P 500. Researchers often divide the sample of firms analyzed into two groups to reflect changes in the S&P 500 policy on the disclosure of additions and deletions (which took place in October 1989). Among the research before October 1989, one of the first studies which conducted an event study on S&P 500 additions was the study of Shleifer (1986). Shleifer collected data on firms added to the S&P 500 from 1966 to 1983 and found that firms earned significant abnormal returns for at least 10 days after the announcement of inclusion. That is, the price effect is still present 10 days after the inclusion in the index.

The author found a mean abnormal return of -0.192% on the announcement day for the period 1966-1975, of 2.27% for the period spanning September 1976-1980, and finally of 3.19% during the period 1981-1983.

For the 1981-1983 period the mean abnormal return at the announcement day persists for a longer period of time and it grows with increasing time. Returns have a positive correlation with the demand for index funds.

Furthermore, Shleifer (1986) argued that one of the reasons for these results could be the downward sloping demand curve, whereas no clear evidence for the informative value has been found.

The author regressed the abnormal returns on the announcement date volume and found that the abnormal volumes have a significant positive coefficient when explaining the abnormal returns, whereas the usual volume is significant and negative. These results were consistent with the downward sloping demand curves.

This theory was also confirmed by the study of Harris and Gurel (1986), which also found an increase in the share prices of the added firms that was explained by the increase in demand.

Shleifer (1986) did not find any explanatory effects from liquidity: firms that became better known as a result of inclusion in the index did not perform differently from already known companies.

Another study from the 1980s is the study of Jain (1987) which analyzed shares price of added and deleted firms from the S&P 500 index from November 1977 to December 1983. He found a significant average excess returns of 3.07% the day following the addition announcement and a significant negative average excess returns of -1.16% the day after the deletion announcement. The evidence also showed that there was no information leaks in the analyzed period because the excess returns computed 5 days before the event day were not statistically different from zero. In addition, the cumulative average excess returns for the periods following the event day were zero. Other scholars have analyzed a different period and they, instead, found evidence about information leaks, for example the study of Sui (2006) which will be deepen thereafter.

Jain (1987) also found positive and negative abnormal returns for added and deleted firms on supplementary S&P indices (i.e. that are not tracked by index funds). The price pressure hypothesis fails to explain excess returns. The results of this study demonstrate that the announcements of changes in index composition had an informative component.

In the 1990s the study of Dhillon and Johnson (1991) covers both the period before October 1989 and after. They analyzed additions to the S&P 500 from 1978 to 1988 and found that the prices effect of inclusion announcements was also present in the 1984-1988 period: the authors found significant abnormal returns of 3.334% in the day after the announcement. The estimates were not significant on the other dates. It was found that the stock price did not go back down to the initial level over the whole time period analyzed, even when analyzing the stock price up to 60 days after the inclusion announcement date, although the estimate was not significant. A significant abnormal return of 2.258% was found after the announcement day throughout the time period analyzed but thereafter the prices steadily falls (the cumulative average abnormal returns (CARs) over that period are significant and negative).

Regarding the increase in trading volume after the announcement, for the 1984-1988 period the authors found a significant increase in trading volume after the announcement of inclusion. The trading volume had decreased one year after the announcement of inclusion but had stabilized at a higher level (the mean volume ratio 40 days before the announcement was 1.013, after the announcement it increased to 1.445, and one year after the announcement it was 1.084). This suggests that there was a permanent effect on the trading volume of the shares that have been added to the index and, therefore, a positive effect on their liquidity. The authors did not reject the efficient markets hypothesis.

Beneish and Whaley (1996) analyzed some additions in the S&P 500 index from

January 1986 to June 1994. For the period from January 1986 to September 1989 they found that index funds pay a premium of 3.7% for the shares of the newly added firms. The results for the period prior to October 1989 was consistent with the efficient market hypothesis as the abnormal return was entirely generated by the difference between the closing price of the security and its opening price. In other words, the return given by the difference between the closing prices was generated by the price movements that virtually take place from the closing price to the next's day opening price. For the same reason, the authors argued that there were no arbitrage opportunities in that period. Regarding the period after October 1989 and up to June 1994 there was a price increase of 3.1% on the day of the announcement and a further increase of 4.1% on the day of the addition to the index. The stock price stabilized on average at a 5% higher price level two weeks after the effective addition to the index. This suggested a permanent increase in prices also for the period after October 1989. They concluded that the market was not efficient in the period after October 1989 because it was possible to build a trading strategy gaining an abnormal trading profit (net of trading costs) of 4.011%.

Lynch and Mendenhall (1997) analyzed a similar period and also taken index deletions into account. They analyzed inclusions and deletions from the S&P 500 index from March 1990 to April 1995 and found a significant positive cumulative average abnormal return of 3.807% from the day after the announcement to the day before the effective inclusion. These results were similar to those found by Eades et al. (1984). The authors found an opposite performance for deletions from the index: they found a significantly negative cumulative average abnormal returns of -12.690% from the day immediately following the index deletion announcement and up to the day before the actual index deletion.

Recall that the semi-strong form of the efficient market hypothesis predicts that the publicly available information is unable to predict the returns of stocks. The fact that significant abnormal returns have been found after the announcement suggests that the semi-strong form of the efficient market hypothesis was rejected in this context, because in the time period between the inclusion or deletion announcement day and the effective change day, it was possible to construct a trading strategy which earned significantly higher (possibly risk-adjusted) returns than the market, relying only on publicly available information (see Fama (1970) and (1991)). This is in contrast to the studies which analyzed the period before October 1989 (see for example Dhillon and Johnson (1991)) because they did not find any significant daily abnormal return after the announcement and, therefore, the hypothesis of semi-strong efficiency was not rejected.

Evidence was found to support a significant price reversal for both inclusions and deletions from the index (the price reversal is opposite for deletions). The price reversal

results for firms that were deleted from the index are more pronounced than those for additions.

Lynch and Mendenhall also found evidence on the existence of a temporary prices pressure: the significant price reversal before and after the date of effective inclusion or deletion from the index could be explained by the price pressure hypothesis caused by the massive trading of index funds.

Further evidence was found regarding the long-term downward sloping demand curve as the permanent effect on prices was positive for additions to the index and negative for deletions.

Both the information hypothesis and the liquidity hypothesis were not supported by the data (i.e. it was excluded that they could be a valid explanation to the price effect), although they could contribute to the returns on the announcement day.

Regarding changes in trading volume, Lynch and Mendenhall found that the volume was very high the day before the addition or deletion from the index. In fact, significant mean abnormal values were found in the six consecutive days after the announcement day. The mean abnormal value peaked at 11.612% in the day before inclusion in the index. A mean abnormal value of 1.334% was recorded in the day before the inclusion announcement, and then a mean abnormal value of 5.784% was recorded on the announcement day. For index deletions, a mean abnormal value of 8.139% was found on the announcement day but the highest significant estimate was found three days after the announcement day of the deletions, where a mean abnormal value of 9.588% was recorded. A higher volume was associated the day before the effective inclusion or deletion. Additionally, the sample mean abnormal return was 1.127% the day before inclusion and 3.158% on the day of announcement.

In the early 2000s, the study of Cusick (2002) analyzed the firms that were added and removed from the S&P 500 from October 1989 through December 1999. The author stated that the share price of the firms that were added stabilizes at about 8% above the price they had before the inclusion announcement. The effect was more pronounced for the index deletions. In fact, the author found that the price stabilized at about 14% below the price before the announcement. There was evidence of the change in volume as a large increase in volumes was found both for index additions and deletions after the change in the index composition.

For 49 firms deleted from the S&P 500 during 1996-2001 period, Beneish and Whaley (2002) found a 10.8% loss from announcement date to the effective change date. However, over a longer period of time, firms have recovered more of their loss since they gain an adjusted 23.7% during the 40 trading days after the effective change date.

In a study of 53 index deletions, Dash (2002) found that short term price reactions for deleted stocks were reversed within six days. He analyzed 59 stock price data which

were deleted from the S&P 500 between January 1, 1998 and June 25, 2002 and found that, on average, the deletion of a stock from the S&P 500 was followed by a 11.7% stock price loss between the announcement and the effective days, but no long-term impact was found since over 10 trading days after the inclusion it regained 10% in price.

Sui (2006) analyzed historical price and volume data for firms added and deleted from the S&P 500 from January 1990 to December 2002. From the announcement day to the effective change day, a mean cumulative abnormal return of 8.44% for the additions and of −11.10% for deletions was found. The author found a permanent price effect as abnormal returns decreased after a few days, but after 20 days the effective change day it still remained above 6.19% for index additions and −6.20% for deletions. The price remained approximately stable 20 days after the effective inclusion or deletion (and it was symmetrical for the inclusions and deletions from the index) and that means there was a long-term effect on prices. Despite this evidence, the author also found a price reversal effect 20 days after the effective change in the index composition, which however was not strong enough to rule out the long-term effect.

Interestingly, the author observed a slight increase (decrease) in the price from 10 days prior to the inclusion (deletion) announcement and he stated that this could be explained by insider trading or information leaks. The price change became much more pronounced after the day of the announcement. The efficient market hypothesis was rejected because an arbitrage opportunity which earned 3.2% for additions and −6.7% for deletions was found by trading from the announcement day and holding these positions (covering). The arbitrage opportunity arises from the fact that fund managers tend to minimize the tracking error and therefore they prefer to change the composition of the portfolios they manage on the day of the effective index composition change rather than in the days between the inclusion or deletion announcement and the effective change day. The short-term profit of traders comes from the markets inefficiency in the short-term. However, Sui found that market became more efficient from 1990 to 2002. In other words, the market took time to become semi-strong efficient.

Evidence for the downward sloping short-run demand curve and against the downward sloping long-run demand curve has been found. As there has been a reversal of the abnormal return from the index composition change day and a partial reversal of the abnormal return between the announcement day and the day before the effective change day, it was excluded that there could be a downward sloping long-run demand curve. The abnormal return found on the inclusion or deletion day was evidence to support the downward sloping short-run demand curve.

Regarding volume changes, an abnormal volume was found twice as high as the cumulative abnormal volume calculated from the first day up to the five days following that of the announcement; whereas as regards the deleted firms, an abnormal volume

was found three times higher than the cumulative abnormal volume from the first day up to four days following the announcement of the deletion. Sui detected a positive correlation (0.2227) between the abnormal return and abnormal volume for inclusions on the announcement day, and a negative correlation (-0.1664) for deletions. During the effective change day, the correlations became -0.10759 for index additions and 0.09464 for deletions. Therefore, as the correlations have been inconclusive, the volume of shares of firms involved in adding or deleting from the index was not explanatory about the direction of price movements, but only as to the price volatility. The author found empirical evidence indicating a disagreement over the magnitude of the price effect for inclusion or deletion announcements from the S&P 500 index and, more importantly, whether there was a permanent price effect.

Kasch and Sarkar (2014) analyzed a group of firms added to the S&P 500 index between October 1989 and October 2012 and concluded that disagreed with the literature. They argued that the firms included in the index had already experienced large returns and earnings growth prior to the event. In fact, they also analyzed firms not included in the index with similar performance before the event and found that the price movements and changes in value of these firms was similar to that of the firms added to the S&P 500 index. This means that the pricing effects attributed to inclusion in the S&P 500 were only coincidental and not caused by the inclusion. Furthermore, the authors found that inclusions in the S&P 500 index had no permanent effect on either market value or systematic risk.

There is also the recent study of Ravi and Hong (2015) which analyzed the changes in the composition of the S&P 500 on added and deleted firms from 2001 to 2010. The authors also disagreed with the results of the previous literature as they found that the increase (decrease) in prices following the addition (deletion) from the S&P 500 index, was overcompensated by the subsequent decline (increase) in prices about one month after the announcement. In fact, the cumulative average abnormal returns computed one month after the announcement were -3.44% for additions whereas for deletions were 1.39%. The cumulative average abnormal returns for deletions was not significant, but the effect on prices in deletions was generally more pronounced than that of additions. These results were consistent with the findings of Zhou (2011) which analyzed the added and deleted firms until 2008 and has also found an asymmetric prices behavior: "pure" deletions have a higher price increase (11.96%) than the gain by "pure" additions (7.13%).

This study also investigated information asymmetry (measured by the cost of adverse selection of the bid-ask spread) and found evidence of a decrease in information asymmetry between investors after the addition. The authors argued that this could be caused by a greater dissemination of information from the firm to the market or a

greater knowledge of the stock.

The authors concluded that information asymmetry played an important role in price movements. In fact, they found that information asymmetry was positively associated with the abnormal returns around the index addition announcements date. On the other hand, no association was found regarding the deletion announcements. Finally, the authors found a significant improvement (worsening) of liquidity following the addition (deletion) to the index.

There are also evidence of changes in the composition of other indices compared to the S&P 500. For example, it might be interesting the Islamic equity funds which are essentially very different from conventional equity funds because the list of constituents is updated on the basis of Sharia principles (i.e. the rules of life and behavior of Muslims) which also take into account the qualitative aspect of firms (for example, firms that are engaged in usury-based activities are not allowed in the index). In a way, Sharia-compliant funds could be seen as funds that take social principles into account.

In this regard, Sadeghi (2011) analyzed the companies that were added to the Dow Jones Islamic Market index (DJIM) during the period of January 2008 until December 2009. The author found that the share price of the firms added in the DJIM index increased. Indeed, in general, positive CARs were found on the day the firms were added to the index. However, the author also found that the magnitude of CARs varies between different countries (for example, significant CARs of 5.80% and 4.96% were found in Kuwait and United Arab Emirates on the day of the announcement whereas for Oman and Qatar non-significant CARs of -0.04% and -0.54% were found).

The author found evidence that the addition in the Shariah-compliant index provided positive information to the market, because higher cumulative returns were found 150 days after the announcement of inclusion. It was not possible to obtain unambiguous results regarding the change in liquidity of added firms as the results depended on the country of origin of the firms and from the different liquidity measures.

Analyzing the effects of additions or deletions from other indexes can be helpful as it is commonly known that the nature of stock markets varies in different countries. Emerging markets are potentially riskier because they are more exposed to multiple sources of risk: political, economic and currency. Indeed, yields are expected to be much more volatile than developed country markets. The study of Parthasarathy (2010) aimed to analyze the effects on the Indian stock market. It is interesting to consider this study because the Indian stock market is very different from developed markets as there are higher transaction costs, there is less information efficiency and the investors are smaller on average (see Chakrabarti et al. (2005) and Hacibedel and van Bommel (2007) for more information). Furthermore, the time gap between the announcement day and the effective inclusion day is not constant.

The author analyzed the effects on price, volume and liquidity of the shares of firms that were added to the benchmark index of the Indian stock market, the Nifty index, between 1999 and 2010. A positive and permanent abnormal return was found approximately between the announcement date and the effective inclusion. An abnormal return of 1.67% was found for inclusion announcements disseminated from 1999 to 2006, whereas an abnormal return of 5.11% was found for inclusion announcements disseminated from 2007 to 2010.

Evidence regarding the (permanent) effect on share volume was limited. The announcement of inclusion in the Nifty index appeared to have informational value, probably because the (newly) added firms will attract the attention of foreign investors. The author argued that the neither the downward sloping demand curve nor the price pressure hypothesis were the main reason of index inclusion effects.

The peculiarity of the Taiwanese stock market is that the main investors are individuals [2]. Tu and Chang's study (2012) compared changes in earnings-per-share forecast of analysts from May 17, 1999 to May 4, 2007 of the companies added to the MSCI Taiwan Index with two of its benchmarks to estimate the information effect from index additions. The results showed that the information effect did not have a significantly relevant effect for the firms added to the index because changes in analysts' earnings-per-share forecasts of the firms added to the index are similar to those of two benchmarks. Furthermore, the additions to the index showed significant performance improvements because the absolute forecast errors made by analysts were smaller for added firms and foreign analysts were more accurate than local ones.

Kotait (2016) examined the effects of additions and deletions from a plurality of indices, both American, foreign and global. The additions and deletions from 41 different indices (including the S&P 500, S&P 600, S&P 400 and S&P global indices) that occurred from 2000 to 2015 were analyzed. The results of this study showed that there were abnormal positive (negative) returns for additions (deletions) in all markets. What is different is the magnitude of the effects of additions and deletions. The author attributed these findings to increased liquidity and increased visibility from overseas investors, leading to a shift in stock betas.

There is a suspect that a survivorship bias may be present in the analyzes carried out on the S&P 500 index. Indeed, Chen et al. (2004) showed that about three-quarters of deletions from the S&P 500 index were due to mergers, bankruptcies or other major restructuring. This is not the case with the Hang Seng Index, a stock index of the Hong Kong Stock Exchange, where most of the changes in the index occur due to the representativeness of the market and, therefore, most of the deleted firms remain listed on the markets for a enough time to conduct the analyzes. For this reason, examining the Hong Kong market may be interesting because it should not suffer from survivorship

bias. Kot et al. (2015) conducted an event study on Hang Seng index additions and deletions from June 1986 to October 2008.

Firms deleted from the Hang Seng index were shown to have abnormal returns over a 5 year holding period. On the other hand, no abnormal returns were found for the firms included in the index. Deleted shares outperformed added shares. Firms included in the index registered operating performances above the businesses averages. As for the liquidity evidence, the authors found that liquidity decreased for both added and deleted firms. The systematic risk of the added firms decreased over 5 years whereas the systematic risk of the deleted firms remained unchanged.

The results of this study were very different from what we have just seen for the S&P 500 index. Indeed, it appeared that buying a stock that had just been added to the index did not allow the investor to outperform the market. Conversely, stocks deleted from the index were able to outperform the market over the long term.

Kaul et al. (2000) examined the slope of the demand curve for stocks in the Toronto Stock Exchange 300 index after a change in firms index inclusion rules occurred on November 15, 1996. Consequently of the change in these rules, some firms were included in the index and, therefore, the demand for their shares increased because index funds that track the Toronto Stock Exchange 300 index bought the shares of the newly added firms.

The authors found evidence for the downward sloping demand curves as they detected a significant 2.34% excess return during the event week and, on the contrary, no price reversal was found as trading volume returned to normal levels. Trading volume increased abnormally in the event week but bid-ask spreads were not affected. Furthermore, the authors argued that the event is information-free (the information hypothesis is rejected). The price increase was maintained even when the abnormal volume disappeared and this was enough to reject the short-term price pressure effects hypothesis.

1.3 Event studies

In economics and finance, an event study (Ball and Brown, 1968) is a statistical method to analyze the behavior or reaction of a time series (e.g. share price return, trading volumes) in the period around a well-specified event. Typically the event analyzed is a stock purchase program, businesses mergers or acquisitions, dividend payments announcement or the addition into an index. Since generally the time series analyzed are very volatile, the greatest challenge for event studies is to "isolate" the part of the volatility that results from that specific event.

As we have just seen in previous research, event studies provide an ideal tool for

examining the information content of disclosures as financial statements and related disclosures which incorporate an informative content. If a well defined event provides information to the market, there should be a correlation between the observed change of the market value of the company and the information. The first step in conducting an event study is to define the event of interest. In this research the defined event is the change in composition in the EURO STOXX 50 index.

Once the event the identified, it is necessary to determine the selection criteria for the inclusion of a given firm in the study. After this, it is necessary to specify the *Event window*, which is the period during which the share prices of the companies involved in this particular event will be examined. The *Event window* must be greater than the period of interest.

The event studies have many applications. For example they can be used in accounting and finance field to evaluate a variety of firm specific and economy events. They can also be used in field of law and economics to measure for example the impact on firm's value of a change in the regulatory environment. As we said previously, we will go further with this research. In addition to carrying out an event study we will try to understand which are the determinants (if any) which can explain the economic impact of the event we are going to study.

1.4 Details on EURO STOXX 50 index

It would be useful to describe the EURO STOXX 50 index before going further in our research. The EURO STOXX 50 index is the first regional blue-chip index covering the Eurozone launched on February 28, 1998 prior to the introduction of the euro. The index provider is STOXX Ltd. which is now part of Qontigo.

It represents the 50 leading supersectors in the Eurozone in terms of free-float market capitalization and it is the most used regional blue-chip index for index-related financial products in Europe. Its objective is therefore to represent the supersector leaders in the Eurozone, to measure the Eurozone performance and to provide a benchmark for it. This equity index is a useful tool for those who want to invest in the 50 biggest companies in the Eurozone. Moreover, since this index only includes Eurozone companies, it is very attractive to European investors because it is free of currency risk.

The constituents are the companies located in the Eurozone and they are weighted according to the free-float market capitalization.

The free-float market capitalization represents the share of the total market capitalization of a security available for trading. Hence, it is given by the product of free-float factor and full market capitalization.

The change in value of the index is calculated according to the Laspeyres (1871)

formula and is therefore given by the ratio between the change in price and a fixed divisor:

$$\text{SX5E}_t = \frac{\sum_{i=1}^{n} (p_{it} \cdot s_{it} \cdot ff_{it} \cdot cf_{it})}{D_t} = \frac{M_t}{D_t}$$

where:

$$\begin{aligned} n &= \text{number of companies in the EURO STOXX 50 index} \\ p_{it} &= \text{share price of company } (i) \text{ at time } (t) \\ s_{it} &= \text{number of shares of company } (i) \text{ at time } (t) \\ ff_{it} &= \text{free float factor of company } (i) \text{ at time } (t) \\ cf_{it} &= \text{weighting cap factor of company } (i) \text{ at time } (t) \\ M_t &= \text{free float market capitalization of the index at time } (t) \\ D_t &= \text{divisor of the index at time } (t) \end{aligned}$$

The divisor is adjusted in order to take into account corporate actions. It is given by the following formula:

$$D_{t+1} = D_t \cdot \frac{\sum_{i=1}^{n} (p_{it} \cdot s_{it} \cdot ff_{it} \cdot cf_{it}) \pm \Delta MC_{t+1}}{\sum_{i=1}^{n} (p_{it} \cdot s_{it} \cdot ff_{it} \cdot cf_{it})}$$

where:

$$\begin{aligned} D_t &= \text{divisor of the index at time } (t) \\ D_{t+1} &= \text{divisor of the index at time } (t+1) \\ \Delta MC_{t+1} &= \text{difference between the closing market capitalization and the} \\ &\quad \text{adjusted closing market capitalization of the EURO STOXX 50} \end{aligned}$$

Stocks are added to the index through a well-defined procedure which begins with the selection of a group of companies that reaches 60% of the free-float market capitalization of the EURO STOXX TMI Supersector index. The constituent selection methodology guarantees a stable and updated index composition. The index has a fixed number of constituents which are constantly monitored to maintain the representation of the 50 leaders supersectors in Eurozone. The list of current constituents, updated in September 2021, is available in Table (1.1).

Firms name	ISIN	Country	Free Float Market capitalization (BEUR)
ASML Holding	NL0010273215	NL	271.0
LVMH Moet Hennessy	FR0000121014	FR	163.4
Linde	IE00BZ12WP82	DE	131.8
SAP	DE0007164600	DE	127.7
Totalenergies	FR0000120271	FR	109.1

Siemens	DE0007236101	DE	106.7
Sanofi	FR0000120578	FR	95.1
L'Oréal	FR0000120321	FR	86.4
Schneider Electric	FR0000121972	FR	81.9
Allianz	DE0008404005	DE	80.3
Adyen	NL0012969182	NL	67.8
Airbus	NL0000235190	FR	67.0
Air Liquide	FR0000120073	FR	65.7
Daimler	DE0007100000	DE	64.4
BNP Paribas	FR0000131104	FR	63.9
Prosus	NL0013654783	NL	61.6
BASF	DE000BASF111	DE	60.5
Deutsche Telekom	DE0005557508	DE	56.4
BCO Santander	ES0113900J37	ES	54.4
Vinci	FR0000125486	FR	53.9
Deutsche Post	DE0005552004	DE	53.7
Enel	IT0003128367	IT	51.7
Adidas	DE000A1EWWW0	DE	50.7
iberdrola	ES0144580Y14	ES	50.5
Essilorluxottica	FR0000121667	FR	49.8
AXA	FR0000120628	FR	49.6
ING Group	NL0011821202	NL	49.1
Infineon Technologies	DE0006231004	DE	46.4
Bayer	DE000BAY0017	DE	46.2
Kering	FR0000121485	FR	45.0
Intesa Sanpaolo	IT0000072618	IT	44.8
Anheuser-Busch Inbev	BE0974293251	BE	41.6
Safran	FR0000073272	FR	41.6
Pernod Ricard	FR0000120693	FR	39.1
Danone	FR0000120644	FR	38.4
BBV Argentaria	ES0113211835	ES	38.1
Volkswagen	DE0007664039	DE	35.4
Industria de Diseno Textil SA	ES0148396007	ES	35.4
Philips	NL0000009538	NL	35.2
Stellantis	NL00150001Q9	IT	34.5
Muenchener Rueck	DE0008430026	DE	33.2
CRH	IE0001827041	IE	32.3
Ahold Delhaize	NL0011794037	NL	30.0
Flutter Entertainment	IE00BWT6H894	IE	30.0
ENI	IT0003132476	IT	29.0
Vonovia SE	DE000A1ML7J1	DE	26.8
Deutsche Boerse	DE0005810055	DE	26.7
BMW	DE0005190003	DE	26.5
Kone 'B'	FI0009013403	FI	24.6
UMG	NL0015000IY2	NL	18.1

Table 1.1: EURO STOXX 50 constituents at the end of September, 2021.

The index is updated every year in September. The review cut-off date is the last trading day of August. Qontigo generally discloses the monthly ranking of the firms according to the index valuations criteria. In this way, it is sufficient to look at the ranking before the announcement date to know in advance which company will be likely to be added or deleted from the index.

Figure 1.1: Historical price of EURO STOXX 50 from February 28th, 1998.

The index is usually rebalanced quarterly after closing every third Friday in March, June, September and December to reflect the stock markets trend and the changes becomes effective on the next trading day.

The weight of the constituents is limited to the threshold of 10%.

In Figure (1.1) we can see the historical chart of the EURO STOXX 50. That is, the closing price starting from February 28th, 1998 and until September 30th, 2021 is shown in the figure.

Since April 2000, STOXX Ltd. has licensed the EURO STOXX 50 index to underlie the first European equity exchange-traded funds (ETFs).

This index constitutes a powerful tool for investing in the performance of the Eurozone stock market thanks to its liquidity, transparency and rules. Indeed, on October 22, 2008 the chairman and STOXX supervisory board at the time Werner Bürki states that *"The Dow Jones EURO STOXX 50[3] has become the leading pan-European index not only because its rule-based and transparent methodology, but because it was the first index that included only Euro denominated stocks"*.

Moreover, STOXX Ltd. has recently received many awards. For example, in 2018 it won the Investment Excellence Award in the category *"Index Provider of the Year"* by the Global Investor Group, the *"Best Index Provider Japan"* award from The Asset for the excellence in its sector, and the *"Most Innovative Index Provider Global"* award among index providers worldwide from Capital Finance International. With regard to 2019 it won the *"Best Index Provider 2019"* and the *"Most Innovative Index Asia-Pacific 2019"* awards at the Structured Retail Products (SRP) Europe conference for its product innovation. Also the at time Head of Sales won a award by SRP. It again won an award from The Asset, *"Best Index Provider for Innovation"*.

Today the EURO STOXX 50 index is widespread all over the world, even licensed

to Singapore and Australia Exchange and, most recently, to Korea Exchange.

In a press release of July 12, 2017[4] it was disclosed that: *"The EURO STOXX 50 Index is licensed to financial institutions to serve as underlying for a wide range of investment products such as Exchange Traded Funds (ETF), Futures and Options, and structured products worldwide. The total asset under management for ETFs based on the EURO STOXX 50 was EUR 41.5 billion at the end of June 2017."*

Chapter 2

Data and methodology

In this chapter we will discuss how the data useful for the purpose of this research were obtained. We will start with the description of the data set and we will accurately describe the methodology used to measure the impact on share prices (i.e. *Abnormal Returns* and their aggregation). We will pay particular attention to the methodology used to measure *Normal returns* and then to test assumptions about the determinants that could explain price movements.

2.1 Data set description

To carry out this research, it is first necessary to collect data on inclusions and deletions from the EURO STOXX 50 index. To this end, all official press releases of STOXX Ltd. (which is the index provider that is now part of Qontigo) regarding inclusion and deletion announcement in the EURO STOXX 50 index has been collected. We also collect the stock price of the companies involved in that time period.

The data sources of the inclusion and deletion announcements are the official websites stoxx.com and qontigo.com[5]. Additionally, we double checked the inclusion and deletion announcements through Refinitiv Datastream software.

The list of all inclusions and deletions from the EURO STOXX 50 index that occurred up to 2021 has been formed and it is available in Table (2.1). Overall, there have been 48 changes in index composition (48 inclusions and 48 deletions from the index) since 1999 to date.

Firm name	ISIN code	Event	Announcement day	Change day
Banco Santander	ES0113900J37	Addition	19/08/1999	20/09/1999
BASF	DE000BASF111	Addition	19/08/1999	20/09/1999
HypoVereinsbank	DE0008022005	Addition	19/08/1999	20/09/1999
Dresdner Bank	DE0005350003	Addition	19/08/1999	20/09/1999
Muenchener Ruck. (ex Munich Re)	DE0008430026	Addition	19/08/1999	20/09/1999
Sanofi	FR0000120578	Addition	19/08/1999	20/09/1999

Suez(Rompus)	FR0000120529	Addition	19/08/1999	20/09/1999
Akzo Nobel	NL0013267909	Deletion	19/08/1999	20/09/1999
AIB Group	IE00BF0L3536	Deletion	19/08/1999	20/09/1999
Relx (ex Elsevier)	NL0006144495	Deletion	19/08/1999	20/09/1999
Stellantis (ex Fiat)	NL00150001Q9	Deletion	19/08/1999	20/09/1999
Deutsche Lufthansa	DE0008232125	Deletion	19/08/1999	20/09/1999
Pharol SGPS (ex Portugal Telecom)	PTPTC0AM0009	Deletion	19/08/1999	20/09/1999
Schneider Electric	FR0000121972	Deletion	19/08/1999	20/09/1999
Enel	IT0003128367	Addition	17/02/2000	20/03/2000
Saint Gobain	FR0000125007	Deletion	17/02/2000	20/03/2000
Danone	FR0000120644	Addition	15/08/2000	18/09/2000
Intesa Sanpaolo (ex Sao Paolo - IMI)	IT0000072618	Addition	15/08/2000	18/09/2000
Electrabel	BE0003637486	Deletion	15/08/2000	18/09/2000
Ceconomy (ex Metro)	DE0007257503	Deletion	15/08/2000	18/09/2000
Saint Gobain	FR0000125007	Addition	03/09/2001	24/09/2001
Kpn Kon	NL0000009082	Deletion	03/09/2001	24/09/2001
Lafarge	FR0000120537	Addition	02/09/2002	23/09/2002
Kering (ex Pinault Printemps Redoute)	FR0000121485	Deletion	02/09/2002	23/09/2002
Iberdrola	ES0144580Y14	Addition	01/09/2003	22/09/2003
HypoVereinsbank	DE0008022005	Deletion	01/09/2003	22/09/2003
Crédit Agricole	FR0000045072	Addition	01/09/2004	20/09/2004
Volkswagen	DE0007664005	Deletion	01/09/2004	20/09/2004
Arcelormittal	LU1598757687	Addition	03/09/2007	24/09/2007
Schneider Electric	FR0000121972	Addition	03/09/2007	24/09/2007
Vinci	FR0000125486	Addition	03/09/2007	24/09/2007
Ahold Delhaize	NL0011794037	Deletion	03/09/2007	24/09/2007
AIB Group	IE00BF0L3536	Deletion	03/09/2007	24/09/2007
Lafarge	FR0000120537	Deletion	03/09/2007	24/09/2007
Volkswagen	DE0007664005	Addition	05/10/2007	10/10/2007
Endesa	ES0130670112	Deletion	05/10/2007	10/10/2007
Deutsche Boerse	DE0005810055	Addition	10/10/2007	15/10/2007
ABN Amro Holding	NL0000301109	Deletion	10/10/2007	15/10/2007
Alstom	FR0010220475	Addition	01/09/2008	22/09/2008
Alcatel-Lucent	FR0000130007	Deletion	01/09/2008	22/09/2008
Anheuser-Busch Inbev	BE0974293251	Addition	31/08/2009	21/09/2009
CRH	IE0001827041	Addition	31/08/2009	21/09/2009
Ageas (Ex-Fortis)	BE0974264930	Deletion	31/08/2009	21/09/2009
Renault	FR0000131906	Deletion	31/08/2009	21/09/2009
WFD Unibail-Rodamco	FR0013326246	Addition	01/02/2010	08/02/2010
Volkswagen	DE0007664005	Deletion	01/02/2010	08/02/2010
BMW	DE0005190003	Addition	31/08/2010	20/09/2010
Aegon	NL0000303709	Deletion	31/08/2010	20/09/2010
Volkswagen Pref.	DE0007664039	Addition	31/08/2011	19/09/2011
Inditex	ES0148396007	Addition	31/08/2011	19/09/2011
Alstom	FR0010220475	Deletion	31/08/2011	19/09/2011
Crédit Agricole	FR0000045072	Deletion	31/08/2011	19/09/2011
ASML Holding	NL0010273215	Addition	01/06/2012	18/06/2012
Essilorluxottica (ex Essilor International)	FR0000121667	Addition	01/06/2012	18/06/2012
Deutsche Boerse	DE0005810055	Deletion	01/06/2012	18/06/2012
Telecom Italia	IT0003497168	Deletion	01/06/2012	18/06/2012
Airbus (ex EADS)	NL0000235190	Addition	01/03/2013	18/03/2013
Nokia	FI0009000681	Deletion	01/03/2013	18/03/2013
Deutsche Post	DE0005552004	Addition	30/08/2013	23/09/2013
Arcelormittal	LU1598757687	Deletion	30/08/2013	23/09/2013
Nokia	FI0009000681	Addition	29/08/2014	22/09/2014
CRH	IE0001827041	Deletion	29/08/2014	22/09/2014
Fresenius	DE0005785604	Addition	31/08/2015	21/09/2015

Safran	FR0000073272	Addition	31/08/2015	21/09/2015
Repsol YPF	ES0173516115	Deletion	31/08/2015	21/09/2015
RWE	DE0007037129	Deletion	31/08/2015	21/09/2015
Adidas	DE000A1EWWW0	Addition	31/08/2016	19/09/2016
Ahold Delhaize	NL0011794037	Addition	31/08/2016	19/09/2016
CRH	IE0001827041	Addition	31/08/2016	19/09/2016
Assicurazioni Generali	IT0000062072	Deletion	31/08/2016	19/09/2016
Unicredit	IT0005239360	Deletion	31/08/2016	19/09/2016
Carrefour	FR0000120172	Deletion	31/08/2016	19/09/2016
Amadeus It Group	ES0109067019	Addition	21/09/2018	24/09/2018
Kering	FR0000121485	Addition	21/09/2018	24/09/2018
Linde (Tendered)	DE000A2E4L75	Addition	21/09/2018	24/09/2018
Saint Gobain	FR0000125007	Deletion	21/09/2018	24/09/2018
E ON N	DE000ENAG999	Deletion	21/09/2018	24/09/2018
Deutsche Bank	DE0005140008	Deletion	21/09/2018	24/09/2018
Deutsche Boerse	DE0005810055	Addition	02/09/2019	23/09/2019
Wfd Unibail-Rodamco	FR0013326246	Deletion	02/09/2019	23/09/2019
Adyen	NL0012969182	Addition	01/09/2020	21/09/2020
Prosus	NL0013654783	Addition	01/09/2020	21/09/2020
Vonovia	DE000A1ML7J1	Addition	01/09/2020	21/09/2020
Kone 'B'	FI0009013403	Addition	01/09/2020	21/09/2020
Pernod-Ricard	FR0000120693	Addition	01/09/2020	21/09/2020
Orange	FR0000133308	Deletion	01/09/2020	21/09/2020
BBV Argentaria	ES0113211835	Deletion	01/09/2020	21/09/2020
Telefonica	ES0178430E18	Deletion	01/09/2020	21/09/2020
Fresenius	DE0005785604	Deletion	01/09/2020	21/09/2020
Société Générale	FR0000130809	Deletion	01/09/2020	21/09/2020
Infineon Technologies	DE0006231004	Addition	01/03/2021	22/03/2021
Nokia	FI0009000681	Deletion	01/03/2021	22/03/2021
BBV Argenteria	ES0113211835	Addition	01/09/2021	20/09/2021
Stellantis	NL00150001Q9	Addition	01/09/2021	20/09/2021
Engie	FR0010208488	Deletion	01/09/2021	20/09/2021
Amadeus It Group	ES0109067019	Deletion	01/09/2021	20/09/2021

Table 2.1: List of all inclusions and deletions from the EURO STOXX 50 index occurring up to 2021.

Most of the announcements for inclusion or deletion took place in August or September. On average, about 15 trading days (working days) have elapsed from the announcement day (AD) to the day of actual inclusion or deletion (change day, CD). Considering all the announcements of changes in index composition, the minimum time lapse between the AD and CD was 2 trading days occurred in the announcement of September 21th, 2018 whereas the maximum time lapse between the AD and CD was 25 trading days observed in the announcement of August 15th, 2000.

2.2 Abnormal returns calculation methodology

An important step in this type of research consists in checking whether *Abnormal Returns* can be found following the inclusion or deletion announcement of the EURO

STOXX 50 index. In other words, we are verifying if there is a share price effect following the changes in index composition.

Daily stock price and (log) returns calculation Before starting to investigate about *Abnormal Returns* it is necessary to obtain the (actual) stock returns and to specify the length of observation interval. For this research the length of observation interval is set to one day, thus daily stock returns are used.

Daily stock returns will be obtained through the difference between the natural logarithm of adjusted close price and its lagged value, i.e. for every time t we compute the difference between the observation in time t and the observation in previous time $t-1$. The use of log return reduce the variation of the time series and allows us to examine the relative changes in adjusted close price with the previous date. Moreover, we can directly compare the values assumed on different dates.

We use Datastream to download daily stock price (official adjusted closing price) of the affected firms for a well defined range of dates which includes the day of the inclusion or deletion announcement. We will download adjusted close price to perform better historical return analysis of past performance since it analyzes the stock's dividends, stock splits and new stock offerings to determine an adjusted value.

The next step is the calculation of log returns. As we said previously, since they are given by the difference between the natural logarithm of adjusted close price and its lagged value, we can compute them through the following formula:

$$R_{i,t} = \ln\left(\frac{P_{i,t}}{P_{i,t-1}}\right) = \ln\left(P_{i,t}\right) - \ln\left(P_{i,t-1}\right)$$

where $P_{i,t}$ and $P_{i,t-1}$ are the adjusted closing prices of stock i of the current and previous date, respectively.

Windows length definition MacKinlay (1997) defined the *Abnormal Return* as the actual stock return on the *Event window* less the so-called *Normal return* of the stock calculated in the *Event window*. The *Normal return* is the expected return without considering the effect of the event studied.

We want to investigate whether *Abnormal Returns* can be found following the inclusion or deletion announcement of the EURO STOXX 50 index in order to verify if there is a share price effect following the changes in index composition. Thus, it is necessary to specify an *Event window* and an estimation window to investigate about *Abnormal Returns*. We will also establish the post-event window to investigate about longer-term stock performance following the event.

Typically, the *Estimation window* and the *Event window* did not overlap in the

papers that performed an event study. Considering a gap between the *Estimation window* and the *Event window* makes the estimates of *Normal returns* insensitive to (unexpected) returns around the event.

The *Estimation window* consists in the time period through which we estimate *Normal returns* whereas the *Event window* is the time period in which the event occurs. Numerous studies have used *Event window* in different lengths. In general the length of the *Event window* goes from 20 days before the event up to 20 days after the event $(-20, 20)$, for example in the study of MacKinlay (1997), up to a very small length, used for example in the study of Denis et al. (2003), where the event window length goes from the day before the announcement to the next one $(-1, 1)$. Dhillon and Johnson (1991) used a "asymmetrical" *Event window* $(-10, 20)$, since the time interval between the days before the announcement date and the announcement date is different from the time interval between the announcement date and the days after the announcement date. Lynch and Mendenhall (1997) used an event window length of $(-10, 10)$ to calculate *Abnormal Returns*. Using a wide *Event window* allows us to capture effects on prices both before and after the announcement day. This could be profitable because there could be an information leakage and, consequently, the effect on the price may occur a few days earlier the announcement day and, as we have already said in the previous section, the index fund trackers could wait a few days before changing the composition of the portfolios they manage. For these reasons a 15-day *Event window* is employed in this research, comprised of 7 pre-event days, the event day, and 7 post-event days.

The exact event we want to study is the announcement of inclusion or deletion from the EURO STOXX 50 index. For this reason, all the dates of the event (AD) were aligned with each other and the value of $t = 0$ was assigned to the event date, in such a way that counted the days following the event (positive value) and the days before the event (negative value). For each announcement the 120 trading days period prior to the announcement date is used as the *Estimation window*. We consider a 3-day gap with the *Event window*. So, the announcement date is set to $t = 0$, the *Event window* is $(-7, 7)$ and the *Estimation window* is $(-120, -11)$.

Finally, adjusted close price data of shares was collected in order to include the post-event window, which is set from 8 trading days after the announcement up to 60 days $(8, 60)$. We have chosen this post-event window length because it is the maximum length of the data we will need to study the determinants of *Abnormal Returns*. Therefore, to be included in the final sample, any added or deleted firm from the EURO STOXX 50 index is required to have over 120 trading days prior to the announcement date and at least 60 trading days thereafter.

It is required to collect stock price data over 120 trading days before the AD as the log returns are given by the difference between the natural logarithm of adjusted close

price and its lagged value, and therefore we would not have obtained the log returns of the 120th day prior to the AD.

In the final sample, 6 firms were removed due to missing data. In detail, Enel (IT0003128367) was removed because the adjusted close price data were available only from 78 days prior to the announcement. BBV Argentaria (ES0113211835), Stellantis (NL00150001Q9), Engie (FR0010208488) and Amadeus It Group (ES0109067019) were also removed because they were affected by the announcement of the changes in index composition on September 1st, 2021 and therefore there was too few data available afterwards the inclusion or deletion to the index. Linde Tendered (DE000A2E4L75) was also removed because its adjusted close price always assumed the same value starting from the twenty-fifth day until the end of the post-event window.

Overall, from the initial 96 firms (48 additions and 48 deletions from the index) we obtained a sub-sample of 90 firms (44 additions and 46 deletions).

Consistently with what all the papers presented in the previous chapter so far, we have assumed that the share price effect of an index addition announcement will be different from the effect of an index deletion announcement. So we have separated the analyzes for additions and deletions by making two final samples: the first consisting of 44 firms added to the index and the second consisting of 46 deleted firms. The list of companies for the two final samples is available in Tables (2.2) and (2.3). Hence we need to calculate the log returns on the daily returns from the period from 120 trading days before the event date to 60 trading days after. Log returns will be treated as *Actual returns*.

Firm name	ISIN code	Announcement day	Change day
Banco Santander	ES0113900J37	19/08/1999	20/09/1999
BASF	DE000BASF111	19/08/1999	20/09/1999
HypoVereinsbank	DE0008022005	19/08/1999	20/09/1999
Dresdner Bank	DE0005350003	19/08/1999	20/09/1999
Muenchener Ruck.	DE0008430026	19/08/1999	20/09/1999
Sanofi	FR0000120578	19/08/1999	20/09/1999
Suez(Rompus)	FR0000120529	19/08/1999	20/09/1999
Danone	FR0000120644	15/08/2000	18/09/2000
Intesa Sanpaolo	IT0000072618	15/08/2000	18/09/2000
Saint Gobain	FR0000125007	03/09/2001	24/09/2001
Lafarge	FR0000120537	02/09/2002	23/09/2002
Iberdrola	ES0144580Y14	01/09/2003	22/09/2003
Crédit Agricole	FR0000045072	01/09/2004	20/09/2004
Arcelormittal	LU1598757687	03/09/2007	24/09/2007
Schneider Electric	FR0000121972	03/09/2007	24/09/2007
Vinci	FR0000125486	03/09/2007	24/09/2007
Volkswagen	DE0007664005	05/10/2007	10/10/2007
Deutsche Boerse	DE0005810055	10/10/2007	15/10/2007
Alstom	FR0010220475	01/09/2008	22/09/2008
Anheuser-Busch Inbev	BE0974293251	31/08/2009	21/09/2009
CRH	IE0001827041	31/08/2009	21/09/2009
WFD Unibail-Rodamco	FR0013326246	01/02/2010	08/02/2010

BMW	DE0005190003	31/08/2010	20/09/2010
Volkswagen Pref.	DE0007664039	31/08/2011	19/09/2011
Inditex	ES0148396007	31/08/2011	19/09/2011
ASML Holding	NL0010273215	01/06/2012	18/06/2012
Essilorluxottica	FR0000121667	01/06/2012	18/06/2012
Airbus	NL0000235190	01/03/2013	18/03/2013
Deutsche Post	DE0005552004	30/08/2013	23/09/2013
Nokia	FI0009000681	29/08/2014	22/09/2014
Fresenius	DE0005785604	31/08/2015	21/09/2015
Safran	FR0000073272	31/08/2015	21/09/2015
Adidas	DE000A1EWWW0	31/08/2016	19/09/2016
Ahold Delhaize	NL0011794037	31/08/2016	19/09/2016
CRH	IE0001827041	31/08/2016	19/09/2016
Amadeus It Group	ES0109067019	21/09/2018	24/09/2018
Kering	FR0000121485	21/09/2018	24/09/2018
Deutsche Boerse	DE0005810055	02/09/2019	23/09/2019
Adyen	NL0012969182	01/09/2020	21/09/2020
Prosus	NL0013654783	01/09/2020	21/09/2020
Vonovia	DE000A1ML7J1	01/09/2020	21/09/2020
Kone 'B'	FI0009013403	01/09/2020	21/09/2020
Pernod-Ricard	FR0000120693	01/09/2020	21/09/2020
Infineon Technologies	DE0006231004	01/03/2021	22/03/2021

Table 2.2: List of added analyzed firms.

Firm name	ISIN code	Announcement day	Change day
Akzo Nobel	NL0013267909	19/08/1999	20/09/1999
AIB Group	IE00BF0L3536	19/08/1999	20/09/1999
Relx	NL0006144495	19/08/1999	20/09/1999
Stellantis	NL00150001Q9	19/08/1999	20/09/1999
Deutsche Lufthansa	DE0008232125	19/08/1999	20/09/1999
Pharol SGPS	PTPTC0AM0009	19/08/1999	20/09/1999
Schneider Electric	FR0000121972	19/08/1999	20/09/1999
Saint Gobain	FR0000125007	17/02/2000	20/03/2000
Electrabel	BE0003637486	15/08/2000	18/09/2000
Ceconomy	DE0007257503	15/08/2000	18/09/2000
Kpn Kon	NL0000009082	03/09/2001	24/09/2001
Kering	FR0000121485	02/09/2002	23/09/2002
HypoVereinsbank	DE0008022005	01/09/2003	22/09/2003
Volkswagen	DE0007664005	01/09/2004	20/09/2004
Ahold Delhaize	NL0011794037	03/09/2007	24/09/2007
AIB Group	IE00BF0L3536	03/09/2007	24/09/2007
Lafarge	FR0000120537	03/09/2007	24/09/2007
Endesa	ES0130670112	05/10/2007	10/10/2007
ABN Amro Holding	NL0000301109	10/10/2007	15/10/2007
Alcatel-Lucent	FR0000130007	01/09/2008	22/09/2008
Ageas (Ex-Fortis)	BE0974264930	31/08/2009	21/09/2009
Renault	FR0000131906	31/08/2009	21/09/2009
Volkswagen	DE0007664005	01/02/2010	08/02/2010
Aegon	NL0000303709	31/08/2010	20/09/2010
Alstom	FR0010220475	31/08/2011	19/09/2011
Crédit Agricole	FR0000045072	31/08/2011	19/09/2011
Deutsche Boerse	DE0005810055	01/06/2012	18/06/2012
Telecom Italia	IT0003497168	01/06/2012	18/06/2012
Nokia	FI0009000681	01/03/2013	18/03/2013

Arcelormittal	LU1598757687	30/08/2013	23/09/2013
CRH	IE0001827041	29/08/2014	22/09/2014
Repsol YPF	ES0173516115	31/08/2015	21/09/2015
RWE	DE0007037129	31/08/2015	21/09/2015
Assicurazioni Generali	IT0000062072	31/08/2016	19/09/2016
Unicredit	IT0005239360	31/08/2016	19/09/2016
Carrefour	FR0000120172	31/08/2016	19/09/2016
Saint Gobain	FR0000125007	21/09/2018	24/09/2018
E ON N	DE000ENAG999	21/09/2018	24/09/2018
Deutsche Bank	DE0005140008	21/09/2018	24/09/2018
Wfd Unibail-Rodamco	FR0013326246	02/09/2019	23/09/2019
Orange	FR0000133308	01/09/2020	21/09/2020
BBV Argentaria	ES0113211835	01/09/2020	21/09/2020
Telefonica	ES0178430E18	01/09/2020	21/09/2020
Fresenius	DE0005785604	01/09/2020	21/09/2020
Société Générale	FR0000130809	01/09/2020	21/09/2020
Nokia	FI0009000681	01/03/2021	22/03/2021

Table 2.3: List of deleted analyzed firms.

Abnormal Returns Since all the preliminary steps have been carried out, we can calculate the *Abnormal Returns*. To obtain *Abnormal Returns* we computed the difference, for each firm i and date t in the *Event window*, between the *Actual return* of firm i for period t and the (expected) *Normal return* of firm i for period t. As per the following formula:

$$AR_{it} = R_{it} - E(R_{it}|X_t) \tag{2.1}$$

where AR_{it}, R_{it} and $E(R_{it}|X_t)$ are the *Abnormal*, *Actual*, and *Normal returns* respectively for time t. The *Actual return* will be treated as a log return. To calculate the *Abnormal Returns* is therefore necessary to calculate the *Normal returns*.

There are two common choices to modeling *Normal returns*: the *Constant Mean Return Model* where X_t of formula 2.1 is constant, and the *Market model* where X_t is the market return. Both approaches were widely described in the paper of MacKinlay (1997).

There are also other statistical models such as multifactor models where generally the explanatory power is not improved and the reduction of the variance of *Abnormal Returns* is thus very limited (MacKinlay, 1997). Multifactor models generally offer greater benefits only when the firms analyzed have something in common (for example, they operate in the same business or they have a similar market capitalization).

Economic models could also be used, the most common being the Capital Asset Pricing Model (CAPM) and the Arbitrage Pricing Theory (APT). It is not worth using economic models because Fama and French (1996) argued that the CAPM assumptions may be unsuitable for the real world whereas S. J. Brown and Weinstein (1985) argued

that the benefits of using the APT are very limited compared to the *Market model*.

As we have previously said, the *Abnormal Returns* are estimated through the *Estimation window* and therefore when we compute *Normal returns* we assume that $t \in [-120, -11]$ i.e. t is within the limits of the *Estimation window*.

2.2.1 Constant Mean Return Model

The *Constant Mean Return Model* ($CMRM$), as the name implies, assumes that the mean return of a given security is constant through time. The $CMRM$ is given by the following formula:

$$R_{it} = \mu_i + \zeta_{it} \tag{2.2}$$

where: $E(\zeta_{it}) = 0$ and $var(\zeta_{it}) = \sigma^2_{\zeta_{it}}$

Notice that R_{it} is the period-t return on security i and ζ_{it} is the time t disturbance term for security i with an expectation of zero and variance $\sigma^2_{\zeta_{it}}$. In the $CMRM$ the *Normal return* is defined as the expected return without conditioning on the event taking place. Therefore it is given by, for each firm i, the mean of (log) return computed in the *Estimation window*. This model is criticized to the assumption that the returns will be constants over time. However, it is worth using it for the purpose of this research because S. J. Brown and Warner (1980) and S. J. Brown and Weinstein (1985) has shown that it often provides a measure of security performance similar to other more sophisticated models.

2.2.2 Market model

We can also use the *Market model* to modeling *Normal return*. The *Market model* assumes a stable linear relation between the market return and the security return and it predicts *Normal returns* by regressing stock returns on market returns over the *Estimation window*. It can also be seen as a one factor model. The *Market model* assumes that X_t of formula (2.1) is the market return at time t.

By using this model, we isolate the part of excess return that can be explained by market movements (i.e. the EURO STOXX 50 index).

When using the *Market model* it is important to look at the R^2 of the market model regression because the higher is R^2, the more the model will be able to isolate the returns of a specific security related to the market and, therefore, the greater the benefit of using this model since the variance reduction of the *Abnormal Returns* will be greater.

For each firm i, using *Market model*, the return for each time t can be expressed as follows:

$$R_{it} = \alpha_i + \beta_i R_{mt} + \varepsilon_{it} \tag{2.3}$$

where: $E(\varepsilon_{it}) = 0$ and $var(\varepsilon_{it}) = \sigma^2_{\varepsilon_i}$, R_{it} and R_{mt} are the period-t returns on security i and the market portfolio, respectively, and ε_{it} is the zero mean disturbance term.

In other words, the yield at time t of firm i is affected in part by the yield of the reference index at time t (the measure of which is expressed by beta) plus an (eventual) intercept and an error term. Obviously, we used the EURO STOXX 50 index as a measure of the reference index.

As we said previously, the *Estimation window* is the time period in through which the parameters of normal performances are estimated, whereas the *Event window* is the time period in which the event occurs. So, we estimate the normal performance parameters for each firm for the *Event window* using the data from the *Estimation window*.

If we observe its assumptions, the ordinary least squares (OLS) approach is a consistent estimator of the market model parameters (α_i, β_i, $\sigma^2_{\varepsilon_i}$), so we will use it.

Since for each company we have event dates different from each other, consequently the absolute time reference changes according to the reference company and, therefore, the yield of the EURO STOXX 50 index to be taken into account varies from company to company because the date of the event is different. This step allows us to perform an OLS regression to estimate the parameters alphas (intercepts), betas (slopes) and the disturbance terms which will be used to compute *Normal return* (see formula 2.3).

By using *Market model* to measure the *Normal return*, the sample *Abnormal Return* of firm i at time t is:

$$AR_{it} = R_{it} - \hat{\alpha}_i - \hat{\beta}_i R_{mt} \tag{2.4}$$

The *Abnormal Return* is therefore the disturbance term of the *Market model* calculated on the *Estimation window*. In other words, the *Abnormal Return* of firm i at time t is given by the return at time t of firm i minus an intercept and beta which multiplies the (corresponding) return of the reference market at the same date (i.e. always at the same time t). Notice that $\sigma^2_{\varepsilon_i}$ is the abnormal returns variance and the intercept and beta for different firms are different.

In the null hypothesis (H_0) the event has no impact on either the returns or their variability.

2.3 (Cumulative) Average Abnormal Returns

To understand the economic impact on the firm(s) involved in inclusion or deletion announcements from the index, it is necessary to aggregate the *Abnormal Returns*.

In the sample we will have a plurality of firms, for each of them we will calculate its *Abnormal Returns*. Regardless of the method used to estimate *Normal returns*, we can compute the average of each firm's *Abnormal Returns* (ARs) for each day in order to

obtain the *Average Abnormal Returns* ($AARs$ or $\overline{ARs}$):

$$AAR_\tau = \frac{1}{N}\sum_{i=1}^{N} AR_{i\tau} \tag{2.5}$$

The AAR is useful to measure the average impact of an event for each day within the *Event window*.

In addiction, we can aggregate the ARs through sample firms to find the *Cumulative Abnormal Returns* ($CARs$). The underlying concept is very simple: $CAR_i(\tau_1, \tau_2)$ is the cumulative AR for firm i from τ_1 to τ_2 where $T_1 < \tau_1 \leq \tau_2 \leq T_2$. The CAR from τ_1 to τ_2 for firm i is given by the sum of the ARs of firm i included in (τ_1, τ_2). So it is given by the following formula:

$$CAR_i(\tau_1, \tau_2) = \sum_{\tau=\tau_1}^{\tau_2} AR_{i\tau} \tag{2.6}$$

This type of aggregation is useful to investigate about the total economic impact of the announcement of inclusion or deletion in the time period specified by the *Event window* for each individual company in the sample.

We can also aggregate the CAR across sample firms. To do this it is required to assume that there is no clustering in the observations. This is a fairly reasonable assumption since the *Event windows* does not overlap and so there is not any clustering. We define the *Cumulative Average Abnormal Returns* ($CAAR$ or $\overline{CAR}$) as:

$$CAAR(\tau_1, \tau_2) = \frac{1}{N}\sum_{i=1}^{N} CAR_i(\tau_1, \tau_2) \tag{2.7}$$

Or alternatively:

$$CAAR(\tau_1, \tau_2) = \sum_{\tau=\tau_1}^{\tau_2} AAR_\tau \tag{2.8}$$

The $CAAR$ can be seen as the magnitude of the economic impact of the event we are analyzing.

In our research we will calculate the $CAARs$ from 7 days before the announcement by adding the ARs day by day until 7 days after the announcement, in order to cover the *Event window*. In other words, τ_1 is set to -7 and τ_2 ranges from -6 to 7 (note that $CAAR(-7, 7) = AAR_{-7}$). That is, we will get $CAAR(-7, -6)$, $CAAR(-7, -5)$, $CAAR(-7, -4)$, and so on until we get to $CAAR(-7, 7)$. We will then calculate the statistical significance of the $AARs$ and $CAARs$ to study the economic impact of inclusion or deletion announcements.

2.3.1 Statistical significance

It is important to evaluate the statistical significance of $AARs$ and $CAARs$ because we will verify if they are statistically different from zero. If the $AARs$ or $CAARs$ are not different from zero, then there is statistically no effect on the share price of the firms involved in inclusion or deletion from the index.

Therefore, to evaluate the statistical significance we will test the null hypothesis in which they are assumed to be 0. If we do not reject the null hypothesis, it means that there is no economic effect on the event and therefore our AAR or $CAAR$ estimates are not statistically significant. Thus, we use the t-test and its test statistic (or t-statistics) is given by the following formula for AAR:

$$t_{AAR,\tau} = \sqrt{N}\,\frac{AAR_\tau}{S_{AAR,\tau}} \tag{2.9}$$

or in the case of $CAAR$:

$$t_{CAAR,\tau} = \sqrt{N}\,\frac{CAAR_\tau}{S_{CAAR,\tau}} \tag{2.10}$$

where $t_{AAR,\tau}$ and $t_{CAAR,\tau}$ are the t-statistics for AAR and $CAAR$, respectively, N is the sample size, $S_{AAR,\tau}$ and $S_{CAAR,\tau}$ are the standard deviation of AAR and $CAAR$ across the sample computed at the event day τ, respectively.

We decided to consider a minimum significance level (α) of 0.1 (that is a 90% confidence level). This choice is motivated by the fact that the study population is very small, and therefore it would have been really difficult to pass the t-test at lower significance levels. Raising the significance level to a higher value makes it more likely to be wrong, but it also makes it easier to conclude that the coefficients are different from zero (Hair et al., 2009). Furthermore, the choice of significance level is entirely conventional (Hardy and Bryman, 2004). Critical value for a 90% significance level is $\simeq 1.68$ for both the sample of additions and deletions.

2.4 Price shift explanations (methods)

2.4.1 Price pressure hypothesis

As we previously said, price pressure hypothesis involve that stocks exhibited a downward sloping demand curve in the short run. According to Sui (2006), if the price pressure hypothesis holds, then there must be a reversal of prices of firms added or deleted following the change of composition of the index. Therefore we will verify the price pressure hypothesis by analyzing stock prices of added and deleted firms before and after the date of index composition changes. For greater clarity and to make homo-

geneous data, the adjusted close price of the change day will be used as a benchmark by attributing to it the value of 1. We will analyze and show data on price and return movements from 10 trading days prior to the change day through 30 trading days after to study the effects of the price pressure hypothesis. Furthermore, we will perform the t-test to verify the significance.

2.4.2 Downward-sloping long-run demand curves

According to Shleifer (1986), Harris and Gurel (1986) and Sui (2006), the proof of a downward-sloping long-run demand curve is a permanent price effect after the index composition changes. Therefore, similarly with regard the test of the price pressure hypothesis, it is necessary to analyze the stock prices to investigate about the downward-sloping long-run demand curve. The data to be collected and analyzed are exactly the same as those for the price pressure hypothesis.

In order to study the effects of the downward-sloping long-run demand curve, we analyze price and return movements from 10 trading days prior to the change day through 30 trading days after, and then we will attribute the value of 1 to the adjusted closing price on the day of the announcement. This is the same methodology we will use to test the price pressure hypothesis.

Very similar time windows length have been used in the literature to those used for this research. For example, Shleifer (1986) used a time window from 20 days prior to the announcement up to 20 or 60 days after the announcement to study downward-sloping long-run demand curve. Sui (2006) studied both price pressure hypothesis and downward-sloping long-run demand curve and used a time window length of about 35 days ranging from 10 days prior to the announcement day to 20 days after the effective change day. Harris and Gurel (1986) and Denis et al. (2003) used instead a time window ranging from the announcement day up to 30 days after to study the permanent price effect.

2.4.3 Information hypothesis (Investor awareness)

Denis et al. (2003) used earnings per share (EPS) forecasts to investigate whether inclusion in the S&P 500 index can be perceived as an informed event. Comparing EPS forecasts before and after an inclusion or deletion announcement should allow us to understand whether the market expectations of the shares of the firms involved have changed. Inclusion in the index has a positive informational value if the future EPS estimates become more optimistic after the inclusion or deletion announcement.

Differently from Denis et al. (2003), we will also apply this methodology for deleted firms. Hence we will collect the current-year and one-year-ahead annual median EPS

forecasts for firms that have been added or deleted.

Previous studies have argued that investor awareness was not affected by index deletions, because once people are aware of a stock, they do not become unaware after it is removed (Chen et al., 2004). If this is true, then we should not find any significant change in EPS forecasts.

If an index inclusion or deletion announcement occurs in the three months prior to the end of the affected company's fiscal year, we consider the EPS forecasts for the next fiscal year as forecasts for the current year.

For example, if the end of a company's fiscal year is December 31, 2021 and the announcement day occurs before October 2021 (i.e. more than three months before the end of the company's fiscal year), the EPS forecast for fiscal year 2021 is treated as a forecast for the current year, and the EPS forecast for 2022 is treated as a forecast for the next year. Instead, if the end of a company's fiscal year is December 31, 2021 and the announcement day occurs after October 1, 2021 (i.e. less than three months before the end of the company's fiscal year), the EPS forecast for 2022 is treated as a forecast for the current year (i.e. 2021) and the earnings forecast for December 2023 is treated as a forecast for the next year (i.e. 2022). Therefore, we also collected fiscal year-end data of all the added firms to check whether the inclusion announcement took place less than three months from the end of the year and, in this case, we have adjusted the EPS forecasts. The data source of the current-year and one-year-ahead annual median EPS forecasts is Datastream.

To verify the informational impact of the index addition announcement, we look at the change in current-year EPS forecasts and one-year-ahead EPS from 22 working days before the announcement to the next 22. This methodology is very similar to that of Denis et al. (2003), Tu and Chang (2012) and Kotait (2016) who instead carry out the comparison from one month before the announcement to the next one.

To get the raw changes in forecasts, we subtract the pre-announcement EPS forecast and post-announcement forecasts, as the following formula:

$$\Delta FE_i = FE_{i,+} - FE_{i,-}$$

where ΔFE_i is the raw change in EPS forecast for firm i, $FE_{i,+}$ is the post-announcement EPS forecast for firm i, and $FE_{i,-}$ is the pre-announcement EPS forecast for firm i.

This measure does not take into account the change in the EPS forecast relating to the share price. To standardize the changes in EPS forecast for the share price we use the following formula:

$$\Delta PFE_i = \frac{FE_{i,+} - FE_{i,-}}{P_{i,-}}$$

where ΔPFE_i is the change in EPS forecast for firm i standardized by share price, and

$P_{i,-}$ is the share price of firm i prior to the announcement month.

Instead, to standardize by EPS for those firms that have a positive pre-announcement median EPS forecast, we divide the raw changes in forecasts by the pre-announcement EPS forecast:

$$\Delta EFE_i = \frac{FE_{i,+} - FE_{i,-}}{FE_{i,-}}$$

where ΔEFE_i is the change in EPS forecast for firm i standardized by pre-announcement EPS forecast. Only deletions sample companies have negative prannouncement median EPS forecasts. They are Renault (FR0000131906), which has negative forecasts in both current-year and one-year-ahead forecasts, and Nokia (FI0009000681) for the 01/03/2013 announcement day, which has negative forecasts in the current-year forecasts. These firms will be removed from the sample when we calculate ΔEFE.

Once we have measured the change in EPS forecasts, we will examine whether it differs from a set of benchmark companies. This is useful for example to rule out the impact of a macroeconomic shock that has led analysts to make their estimates more optimistic or pessimistic for all or equivalent firms. Therefore we use a benchmark to compare differences in changes in EPS forecasts for added companies. Denis et al. (2003) and Tu and Chang (2012) draw on the I/B/E/S database to form the list of benchmark firms. Since we do not have access to this database, we will use instead the list of current EURO STOXX 50 constituents as a benchmark (see Table 1.1).

Then, we collected the price data and median EPS forecasts of the current EURO STOXX 50 constituents for each date on which an inclusion or deletion from the index occurred. Subsequently, we obtained FE, PFE and EFE for each constituents and each date, and then we calculated the mean so that for each announcement date it was possible to make comparisons with the benchmark. Volkswagen (DE0007664005) for the 01/09/2004 announcement day has been removed from the deletions sample due to missing data on median EPS forecasts around the announcement day.

2.4.4 Liquidity hypothesis

We will use different liquidity measures to investigate about liquidity.

A natural measure of liquidity is the spread between the bid and ask price (see Bogdan et al. (2012)): the higher the bid-ask spread, the less liquid the stock is. Therefore we should expect a smaller (higher) spread for additions (deletions). We will apply the methodology presented by Elliott et al. (2006) to deal with the bid-ask spread. The *Percentage spread* is defined as the difference between the ask price and the bid price for the each firm's stock, divided by the midpoint of the spread. So it is given by the

following formula:

$$\textit{Percentage spread} = \frac{\text{Ask price} - \text{Bid price}}{\text{Midpoint}}$$

Where "Midpoint" is the average between the bid and ask price:

$$\text{Midpoint} = \frac{\text{Ask price} + \text{Bid price}}{2}$$

According to the methodology of Elliott et al. (2006), we will collect and analyze data in the time window that goes from 60 days before the change day up to the following 60 (-60, 60) and then we will compare the mean of *Percentage spread* for each company from -60 to -10 days with the mean computed over the time window ranging from 1 to 4 days (short window) before the change day and over the time window ranging from 10 to 60 days (long window). AIB Group (IE00BF0L3536) for the 20/09/1999 change day was removed from the deletions sample due to missing data.

Following the work of Elliott et al. (2006), we also investigate *Volume* which is given by the product of the daily average number of trades and the daily average trade size. We will compare the changes in *Volume* that have occurred between the window $(-60, -10)$ and the short and long window.

BASF (DE000BASF111), HypoVereinsbank (DE0008022005), Dresdner Bank (DE00 05350003), Muenchener Ruck. (DE0008430026) and Suez(Rompus) (FR0000120529) were removed from the additions sample due to missing data whereas Akzo Nobel (NL0013267909), AIB Group (IE00BF0L3536) for the 20/09/1999 change day, Relx (NL0006144495), Deutsche Lufthansa (DE0008232125), Electrabel (BE0003637486), Ceconomy (DE0007257503), Kpn Kon (NL0000009082), HypoVereinsbank (DE0008022 005), Volkswagen (DE0007664005) for the 20/09/2004 change day, and ABN Amro Holding (NL0000301109) were removed from the deletions sample due to missing data.

Another liquidity proxy is *Share turnover* which is given by the ratio between the total number of shares traded and the daily number of shares outstanding, for each stock i and over the period t (see Kotait (2016), and Kot et al. (2015)):

$$T_{i,t} = \frac{VO_{i,t}}{N_{i,t}}$$

Similarly with Kotait's (2016) work, *Share turnover* will be analyzed from 60 days prior the change day to 60 days following.

Dresdner Bank (DE0005350003) was removed from the additions sample due to missing data. For the same reason, AIB Group (IE00BF0L3536) for the 20/09/1999 change day, and Volkswagen (DE0007664005) for the 20/09/2004 change day were removed. We will compare the changes in *Share turnover* between $(-60, -10)$ window and the

short and long window to examine the changes in this liquidity proxy. This allows us to compare it directly with the other two liquidity proxies introduced by Elliott et al. (2006). The delta calculated from the mean calculated in the $(-60, -10)$ window and the short or long window of the three liquidity measures will allow us to study the change in liquidity associated with the addition or deletion from the index. We will perform the t-test on the three liquidity measures to verify their significance.

2.5 Market efficiency hypothesis

In this research we will test the efficient market hypothesis in semi-strong form (see Fama (1970)). A corollary of the efficient market hypothesis is that the price of an asset reflects all the publicly available information, and that all investors have access to the same type of information. This implies that it is impossible or unlikely to earn or "beat the market" by predicting prices (Kot et al., 2015).

Harris and Gurel (1986) looked at the mean excess returns to test the efficient market hypothesis. Similarly, we will look at the $AARs$ after the announcement date. Lynch and Mendenhall (1997) stated that the semi-strong form of the efficient market hypothesis is rejected if it was possible to construct a trading strategy which earned significantly higher (possibly risk-adjusted) returns than the market in the time period between the inclusion or deletion announcement day and the effective change day, relying only on publicly available information. If the efficient market hypothesis holds, we should not find any significant $AARs$ after the announcement, provided there is no information assertion (see Harris and Gurel (1986) and Lynch and Mendenhall (1997)). If we find them, it means that the stock price may depend on something that generally does not affect the value of the company itself.

If we find significant $AARs$ before the announcement day, the efficient market hypothesis could be violated if it is proved that this phenomenon depends on an information leakage. In fact, if there is an information leak then investors do not have access to the same type of information and it is probably possible to build a trading strategy by earning abnormal returns.

Moreover, the market efficiency hypothesis is also rejected if we find a temporary price pressure (see Lynch and Mendenhall (1997) and Harris and Gurel (1986)) and downward-sloping long-run demand curves for stocks (Lynch and Mendenhall, 1997).

Therefore, to test the efficient market hypothesis it is sufficient to look at the price movements of stocks involved and the $AARs$.

Chapter 3

Results

In this section we will present the results of our analyzes. The first result we will show is the calculation of log returns. Then we will show the results on *Abnormal Returns*, calculated through the *Constant Mean Return Model* and the *Market model*, and finally we will aggregate them. We will investigate the efficient market hypothesis and the determinants that could explain stock price movement (if any) that we have presented in the methodology: price pressure hypothesis, downward-sloping long-run demand curves hypothesis, information hypothesis, and liquidity hypothesis. We will use statistical techniques to check if our estimates are significant.

3.1 Price results for additions and deletions to EURO STOXX 50 index

3.1.1 Abnormal return calculation

As we previously said in section (2.2), *Abnormal Returns* are given by the difference, for each firm i and date t in the *Event window*, between the *Actual return* of firm i for period t and the *Normal return* of firm i for period t. Recall that the *Actual return* is given by the log return. In Tables (A.1) and (A.2) the log returns are shown over the *Estimation window* i.e. from $t = -120$ to $t = -11$ for the two final samples (additions and deletions). For the sake of simplicity and space only some summary statistics are shown in the tables.

As previously mentioned, we have calculated *Normal returns* with both the *Constant Mean Return Model* and the *Market model* and the results will be shown in the next paragraphs.

Constant Mean Return Model

Recall that the *Normal return* in the $CMRM$ is defined as the expected return without conditioning on the event taking place, and so in the *Estimation window*. Remember that in our research the *Estimation window* is from $t = -120$ to $t = -11$. In Table (A.3) it is possible to see the *Normal return* for each firm in the two sample computed over the *Estimation window*.

Once *Normal return* is calculated, we can find the *Abnormal Return* in the *Event window*. By applying formula (2.1) and defining the *Normal return* as we stated previously, we obtained the *Abnormal Return* for both additions and deletions in Tables (A.4) and (A.5). In Tables (3.1) and (3.2) we can see some summary statistics of *Abnormal Returns* for the additions and deletions samples aggregated across firms (i.e. aggregated for different values of t). The statistical significance of the means will be studied thereafter.

In absolute terms, the maximum value obtained is 6.651% (22.010%) for Fresenius (Kpn Kon) at time $t = -2$ ($t = 7$) for the sample of additions (deletions), whereas the minimum value obtained is -8.421% (-23.638%) for firm Saint Gobain (Kpn Kon) at time $t = 6$ ($t = -1$) for the sample of additions (deletions). The average of all observations across all firms and all dates is less than -0.019% (0.008%) for the sample of additions (deletions) and this is a desirable property (see formula 2.2).

Market model

Market model is another approach that can be used to modeling *Normal returns*. As a measure of the reference market we used the EURO STOXX 50 index (STOXX50E).

Since each company in the sample have a different event date, the absolute time reference changes according to the reference company and, therefore, the return of the EURO STOXX 50 to be taken into consideration varies from company to company because the date of the event is different. So, to make it easier to read the results, we have reported in the Tables (A.6) and (A.7) the (log)returns of the EURO STOXX 50 corresponding to the *Event window* of each sample company of additions and deletions. For the sake of simplicity and space we have not shown all the log returns of the EURO STOXX 50.

The last step to compute the *Normal return* (see formula 2.3) is the estimate of the parameters α_i, β_i and ε_{it}. To obtain these estimates, we performed the OLS regression over the *Estimation window* $(-120, -11)$ for each firm i. In this way we estimated the value of α_i, β_i, ε_{it} for each firm i. We also verified the robustness of the estimates (R^2). The results are summarized in Tables (3.3) and (3.4) for both the additions and deletions sample, whereas in Tables (A.8) and (A.9) it is possible to see all the values.

	-7	-6	-5	-4	-3	-2	-1	0	1	2	3	4	5	6	7
Mean	-0.00538	0.00564	0.00201	0.00239	0.00049	0.00440	0.00092	0.00638	0.00115	-0.00694	-0.00724	-0.00012	-0.00344	0.00184	-0.00490
Standard Error	0.00334	0.00328	0.00225	0.00266	0.00267	0.00315	0.00271	0.00267	0.00318	0.00383	0.00337	0.00284	0.00233	0.00383	0.00259
Median	-0.00677	0.00552	0.00078	0.00079	0.00094	0.00347	-0.00018	0.00583	0.00328	-0.00790	-0.00316	0.00142	-0.00296	0.00475	-0.00294
Sample Variance	0.00049	0.00047	0.00022	0.00031	0.00031	0.00044	0.00032	0.00031	0.00044	0.00064	0.00050	0.00035	0.00024	0.00065	0.00030
Kurtosis	-0.41096	2.56787	0.82107	0.15077	1.67122	1.51959	0.55459	-0.17885	0.64329	0.00226	2.08580	0.45703	2.98999	2.93455	0.35012
Skewness	0.21654	-0.63468	-0.08015	0.00569	-0.38804	0.86889	0.52415	0.15944	-0.46704	-0.24540	-1.21279	-0.14727	1.07677	-1.19865	-0.51301
Minimum	-0.04628	-0.06853	-0.03853	-0.04296	-0.05527	-0.03595	-0.03553	-0.03357	-0.06179	-0.07096	-0.08019	-0.04376	-0.03038	-0.08421	-0.05119
Maximum	0.04156	0.05950	0.03795	0.04201	0.04571	0.06651	0.05050	0.04198	0.04767	0.04529	0.02883	0.04979	0.05148	0.05158	0.03261
Conf. Level 95%	0.00675	0.00662	0.00454	0.00537	0.00538	0.00636	0.00547	0.00539	0.00641	0.00772	0.00680	0.00572	0.00470	0.00773	0.00523

Table 3.1: Summary statistics of *Abnormal Returns* calculated through the $CMRM$ for added firms over the *Event window* $(-7, 7)$.

	-7	-6	-5	-4	-3	-2	-1	0	1	2	3	4	5	6	7
Mean	-0.00151	0.00717	0.00174	0.00310	-0.00768	0.00357	-0.00948	-0.00277	-0.00328	-0.00716	0.00383	-0.00090	0.00681	0.00455	0.00319
Standard Error	0.00494	0.00327	0.00456	0.00372	0.00268	0.00381	0.00599	0.00397	0.00403	0.00577	0.00410	0.00360	0.00370	0.00392	0.00562
Median	-0.00382	0.00691	-0.00136	0.00142	-0.00364	-0.00096	-0.00370	-0.00245	0.00223	-0.00032	0.00299	-0.00031	0.00429	0.00312	-0.00172
Sample Variance	0.00112	0.00049	0.00095	0.00064	0.00033	0.00067	0.00165	0.00073	0.00075	0.00153	0.00077	0.00059	0.00063	0.00071	0.00145
Kurtosis	14.99808	1.46035	3.56949	0.26777	0.98262	-0.52424	21.80621	-0.37632	0.49654	9.15488	0.17928	0.13576	5.10480	2.12716	24.10421
Skewness	2.99093	0.02827	0.20351	0.49144	-0.88220	0.21202	-4.00950	-0.03766	-0.51681	-2.16527	-0.06746	0.34856	1.47853	-0.55663	4.08328
Minimum	-0.04867	-0.05153	-0.09149	-0.04284	-0.05826	-0.05327	-0.23638	-0.06614	-0.08265	-0.18694	-0.06191	-0.04348	-0.03795	-0.08609	-0.07596
Maximum	0.17037	0.06948	0.09024	0.06786	0.02471	0.05178	0.03188	0.05009	0.05347	0.07021	0.06473	0.06582	0.10943	0.05679	0.22010
Conf. Level 95%	0.00994	0.00659	0.00918	0.00750	0.00540	0.00767	0.01205	0.00800	0.00811	0.01161	0.00826	0.00724	0.00745	0.00790	0.01132

Table 3.2: Summary statistics of *Abnormal Returns* calculated through the $CMRM$ for deleted firms over the *Event window* $(-7, 7)$.

	Intercept	Slope	Standard Error	R^2	Average error	Variance of errors
Mean	0.00134	0.70617	0.01602	0.27521	0.00134	0.00028
Standard Error	0.00023	0.05002	0.00083	0.02094	0.00023	0.00003
Median	0.00118	0.69354	0.01431	0.25465	0.00118	0.00020
Sample Variance	0.00000	0.11007	0.00003	0.01930	0.00000	0.00000
Kurtosis	-0.00313	1.06070	0.34631	-0.71874	-0.00313	2.58805
Skewness	0.28636	-0.20577	0.97537	0.13086	0.28636	1.59632
Minimum	-0.00150	-0.31321	0.00878	0.01683	-0.00150	0.00008
Maximum	0.00548	1.43740	0.03204	0.59369	0.00548	0.00101
Conf. Level 95%	0.00046	0.10087	0.00168	0.04223	0.00046	0.00006

Table 3.3: Average of the *OLS* parameters estimates used to calculate the *Normal returns* in the *Market model* (added firms).

	Intercept	Slope	Standard Error	R^2	Average error	Variance of errors
Mean	-0.00099	1.00305	0.01891	0.35994	-0.00099	0.00041
Standard Error	0.00040	0.07558	0.00119	0.03428	0.00040	0.00005
Median	-0.00072	0.92111	0.01817	0.31955	-0.00072	0.00032
Sample Variance	0.00001	0.26279	0.00007	0.05406	0.00001	0.00000
Kurtosis	2.18521	-0.08351	-0.46289	-1.14159	2.18521	0.76719
Skewness	-0.82784	0.47875	0.43588	0.14711	-0.82784	1.16980
Minimum	-0.00977	0.11120	0.00302	0.00722	-0.00977	0.00001
Maximum	0.00494	2.37605	0.03758	0.79894	0.00494	0.00139
Conf. Level 95%	0.00081	0.15223	0.00241	0.06905	0.00081	0.00010

Table 3.4: Average of the *OLS* parameters estimates used to calculate the *Normal return* in the *Market model* (deleted firms).

Note that in Tables (3.3) and (3.4) the row "Conf. Level 95% " is the margin of error for the 95% confidence level for the mean.

As we can see in the previous tables, the minimum β_i is $\simeq -0.31321$ ($\simeq 0.11120$) whereas the maximum β_i is $\simeq 1.43740$ ($\simeq 2.37605$) for additions (deletions) sample. When β_i is greater than 1, the firm should be less risky than the market (firms have lower risk than the market, they are less sensitive), whereas a negative value of β_i means that the (log) returns are moving in the opposite direction to the market (Jensen et al., 1972). The errors are approximately equal to 0 (max: $\simeq 0.00548$, min: $\simeq -0.00150$ for additions sample; max: $\simeq 0.00494$, min: $\simeq -0.00977$ for deletions sample) and this is a desirable property. By looking the value of R^2 (max: $\simeq 0.59369$, min: $\simeq 0.01683$ for additions sample; max: $\simeq 0.79894$, min: $\simeq 0.00722$ for deletions sample) we can state that this model does not always do a good job of explaining the returns of firms. These R^2 values can be seen as the percentages of explanation of the variation of firms returns.

As we have all the parameter estimates, we can calculate *Normal returns* through the *Market model* as well (see formula 2.3). For the sake of simplicity and space, *Normal returns* are shown only referring to *Event window* $(-7, 7)$ in Tables (A.10) and (A.11) for additions and deletions sample, respectively.

Recall that the *Abnormal Returns* of firm i at time t are given by the return at time t of firm i minus an intercept and beta which multiplies the (corresponding) return of the

reference market at the same date (see formula 2.3). It is possible to see the *Abnormal Returns* for the *Event window* $(-7, 7)$ in Tables (A.12) and (A.13), and some summary statistics for the samples aggregated through firms (i.e. aggregated for different values of t) in Tables (3.5) and (3.6), for additions and deletions respectively. The statistical significance of the means will be studied thereafter.

3.1.2 Abnormal Returns aggregation

Aggregating *Abnormal Returns* is useful for evaluating the economic impact of the event we are studying. In this section we will aggregate the *Abnormal Returns* under different levels.

Average Abnormal Returns We compute the average of each firm's *Abnormal Returns* for each day in the *Event window* $(-7, 7)$. We then obtain the $AARs$ and we can see the results for both the $CMRM$ and *Market model* respectively in Tables (3.7) and (3.8) together with their significance.

In *Abnormal Returns* found for the index additions and calculated via the $CMRM$ (see Panel A of Table 3.7), a significant AAR of 0.564% (p-value = 0.0894) was found six days before AD. A significant 0.638% was found (p-value = 0.0201) on the AD. Subsequently, on the second and third days following AD, negative $AARs$ of -0.694% and -0.724% were respectively found (p-values are 0.0734 and 0.0354). Finally, a significant AAR of -0.490% (p-value = 0.0625) was found on the seventh days after AD.
On the other hand, regarding the deletions from the index (see Panel B of Table 3.7), a significant positive AAR of 0.717% (p-value = 0.0319) was found on the sixth day before the AD, a negative AAR of -0.768% (p-value = 0.0058) was found on the third day before the AD, and finally a positive AAR of 0.681% (p-value = 0.0694) was found five days after the announcement.

In *Abnormal Returns* calculated through the *Market model* for index additions (see Panel A of Table 3.8), a highly significant AAR of 0.861% (p-value = 0.0011) was found on the AD. Subsequently, significant $AARs$ of -0.591% and -0.605% were found on the second and third days after the AD (p-value s are 0.0865 and 0.0212, respectively). Finally, a significant AAR was also found on the fifth day following the announcement (-0.495%, p-value = 0.0126) and in the seventh (-0.400%, p-value 0.0818). Regarding the index deletions (see Panel B of Table 3.8), a negative (-0.508%) and significant (p-value 0.0158) AAR was found in the three days preceding the AD. Significant and negative AAR was also found the day before the AD (-1.100%, p-value = 0.0602) and on the third day following the AD (0.883%, p-value = 0.0227).

The AAR peak for additions is reached on the day of announcement of inclusion for both the $CMRM$ and the *Market model*. For the $CMRM$ the peak is 0.638% whereas

	-7	-6	-5	-4	-3	-2	-1	0	1	2	3	4	5	6	7
Mean	-0.00196	0.00221	0.00026	-0.00174	0.00134	0.00199	0.00028	0.00861	-0.00116	-0.00591	-0.00605	-0.00054	-0.00495	0.00071	-0.00400
Standard Error	0.00287	0.00255	0.00174	0.00231	0.00233	0.00236	0.00252	0.00250	0.00266	0.00341	0.00256	0.00245	0.00192	0.00310	0.00227
Median	-0.00253	-0.00094	0.00023	-0.00264	0.00147	0.00101	-0.00138	0.00746	-0.00231	-0.00210	-0.00356	-0.00177	-0.00544	0.00345	-0.00197
Sample Variance	0.00036	0.00029	0.00013	0.00023	0.00024	0.00025	0.00028	0.00027	0.00031	0.00051	0.00029	0.00026	0.00016	0.00042	0.00023
Kurtosis	1.43131	1.96518	0.77784	0.86336	2.08136	1.90118	1.13657	-0.01929	3.53064	0.04191	6.06388	1.10451	-0.14570	2.17672	3.16873
Skewness	-0.03273	0.47082	0.02134	0.01349	-0.34731	0.80294	0.77160	-0.19794	-1.01946	-0.48597	-1.83378	0.00260	0.17646	-0.57551	-1.34901
Minimum	-0.05620	-0.04181	-0.02969	-0.04044	-0.04934	-0.03356	-0.02688	-0.03127	-0.06766	-0.06682	-0.07702	-0.04049	-0.02887	-0.06373	-0.05922
Maximum	0.04558	0.05660	0.03025	0.03106	0.03565	0.05172	0.04618	0.03955	0.03511	0.03239	0.01699	0.04653	0.02535	0.05015	0.02231
Conf. Level 95%	0.00579	0.00514	0.00350	0.00465	0.00470	0.00476	0.00509	0.00503	0.00536	0.00687	0.00517	0.00494	0.00387	0.00626	0.00457

Table 3.5: Summary statistics of *Abnormal Returns* calculated through the *Market model* for added firms over the *Event window* $(-7, 7)$.

	-7	-6	-5	-4	-3	-2	-1	0	1	2	3	4	5	6	7
Mean	0.00085	-0.00006	0.00001	0.00069	-0.00508	0.00274	-0.01100	-0.00074	-0.00594	-0.00499	0.00883	-0.00090	0.00468	0.00412	0.00594
Standard Error	0.00430	0.00266	0.00367	0.00347	0.00205	0.00295	0.00577	0.00322	0.00403	0.00442	0.00378	0.00340	0.00336	0.00311	0.00467
Median	0.00131	0.00058	-0.00101	-0.00296	-0.00117	-0.00136	-0.00670	-0.00075	0.00022	-0.00433	0.00437	-0.00443	0.00038	-0.00232	0.00164
Sample Variance	0.00085	0.00033	0.00062	0.00055	0.00019	0.00040	0.00153	0.00048	0.00075	0.00090	0.00066	0.00053	0.00052	0.00045	0.00100
Kurtosis	13.45725	1.36173	5.13242	7.40800	-0.12568	-0.19450	27.62337	0.08668	3.49486	6.98529	1.64021	14.79031	12.63618	-0.11151	28.44568
Skewness	2.48882	-0.32217	1.71511	2.28131	-0.45898	0.41496	-4.70241	0.17242	-1.52635	-1.66861	1.29581	2.97526	2.65043	0.52361	4.79876
Minimum	-0.06197	-0.05186	-0.05039	-0.03119	-0.03885	-0.04069	-0.24160	-0.04789	-0.10827	-0.13500	-0.02770	-0.03498	-0.03952	-0.04346	-0.03341
Maximum	0.14624	0.04249	0.08784	0.10161	0.02393	0.04773	0.03245	0.04599	0.03525	0.04844	0.08361	0.11723	0.11695	0.05354	0.19367
Conf. Level 95%	0.00865	0.00536	0.00739	0.00698	0.00412	0.00594	0.01162	0.00648	0.00812	0.00890	0.00762	0.00685	0.00676	0.00627	0.00940

Table 3.6: Summary statistics of *Abnormal Returns* calculated through the *Market model* for deleted firms over the *Event window* $(-7, 7)$.

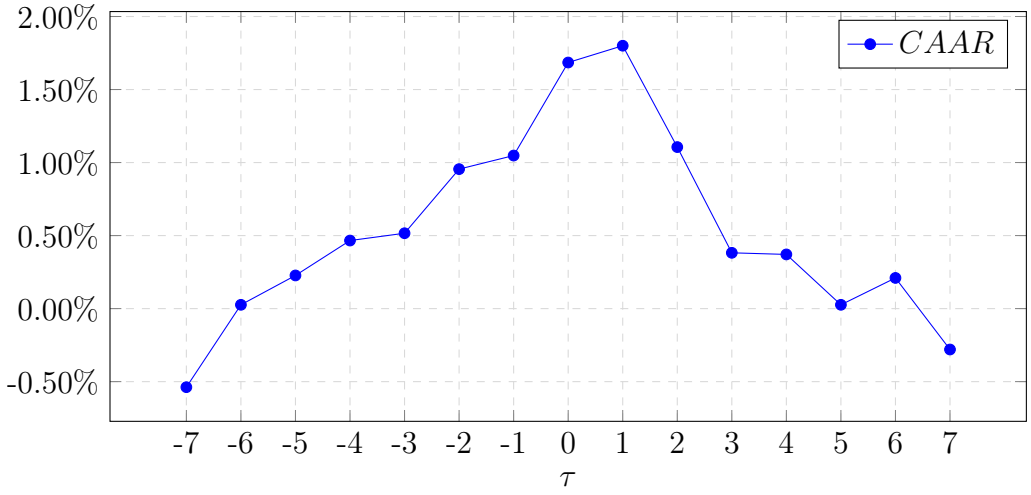


Figure 3.1: *CAARs* calculated over the expanding time window length from -7 to 7 days after the announcements for added firms (*CMRM*).

for the *Market model* it is 0.861%. The *AAR* minimum value for both the *CMRM* and the *Market model* is reached the day before the announcement. In the *CMRM* the lowest value of *AAR* is -0.948% whereas in the *Market model* it is -1.100%.

Cumulative (Average) Abnormal Returns As we said previously, by aggregating the *ARs* we can also obtain the *CAARs*. The *CARs* over the expanding time window length (from -7 to 7 days after the AD) has been calculated in Tables (A.14) and (A.15) respectively for inclusions and deletions using the *CMRM* to calculate *Normal returns*. In Tables (A.16) and (A.17) we can see the *CARs* calculated using the *Market model* to calculate *Normal returns*.

We aggregated the *CARs* across sample firms. In this way we obtained the *Cumulative Average Abnormal Returns* (*CAARs*) which are shown in Table (3.7) for the *CMRM* and in Table (3.8) for the *Market model*.

Figures (3.1), (3.2) and (3.3), (3.4) shows us the *CAAR* over the expanding time window length from -7 to 7 days after the AD both for the *CMRM* and the *Market model*. The *CAAR* can be seen as the magnitude of the economic impact.

Figures (3.1) and (3.3) show that for both the *CMRM* and the *Market model* the announcement of inclusion in the EURO STOXX 50 index has a positive impact on stock return. In fact, the *CAARs* computed through the *CMRM* reaches the maximum value of 1.800% ($CAAR(-7, 1)$) whereas in the *Market model* the highest *CAAR* reaches the maximum value of 1.099% ($CAAR(-7, 0)$).

This means that starting 7 days before the announcement, on average the shares price increases overall by up to 1.800% (1.099%) on the announcement day (the day following that of the announcement) for the *CMRM* (*Market model*).

Figures (3.2) and (3.4) instead show that on average the stock return is negative

τ (day)	-7	-6	-5	-4	-3	-2	-1	0	1	2	3	4	5	6	7
							Panel A: Added firms								
AAR_τ	-0.538%	0.564%*	0.201%	0.239%	0.049%	0.440%	0.092%	0.638%**	0.115%	-0.694%*	-0.724%**	-0.012%	-0.344%	0.184%	-0.490%*
t-statistic	-1.626	1.738	0.902	0.908	0.187	1.410	0.344	2.414	0.367	-1.835	-2.172	-0.042	-1.496	0.486	-1.912
p-value	0.1112	0.0894	0.3720	0.3689	0.8525	0.1656	0.7329	0.0201	0.7152	0.0734	0.0354	0.9667	0.1420	0.6293	0.0625
$CAAR(-7,\tau)$	-0.538%	0.026%	0.227%	0.466%	0.516%	0.955%*	1.048%*	1.685%**	1.800%**	1.106%	0.382%	0.371%	0.026%	0.210%	-0.280%
t-statistic	-1.626	0.058	0.450	0.864	0.897	1.735	1.803	2.447	2.328	1.258	0.412	0.405	0.028	0.214	-0.288
p-value	0.1112	0.9541	0.6553	0.3921	0.3750	0.0899	0.0785	0.0186	0.0247	0.2153	0.6822	0.6877	0.9776	0.8318	0.7746
							Panel B: Deleted firms								
AAR_τ	-0.151%	0.717%**	0.174%	0.310%	-0.768%***	0.357%	-0.948%	-0.277%	-0.328%	-0.716%	0.383%	-0.090%	0.681%*	0.455%	0.319%
t-statistic	-0.308	2.215	0.385	0.842	-2.897	0.948	-1.602	-0.704	-0.823	-1.256	0.944	-0.253	1.860	1.174	0.575
p-value	0.7591	0.0319	0.7017	0.4043	0.0058	0.3481	0.1163	0.4852	0.4146	0.2155	0.3501	0.8011	0.0694	0.2466	0.5684
$CAAR(-7,\tau)$	-0.151%	0.566%	0.740%	1.050%	0.282%	0.639%	-0.309%	-0.585%	-0.913%	-1.630%	-1.247%	-1.337%	-0.656%	-0.201%	0.119%
t-statistic	-0.308	0.949	0.958	1.267	0.340	0.770	-0.326	-0.521	-0.717	-1.046	-0.849	-0.940	-0.498	-0.140	0.094
p-value	0.7591	0.3476	0.3431	0.2116	0.7352	0.4455	0.7456	0.6051	0.4772	0.3012	0.4005	0.3520	0.6209	0.8893	0.9252

Table 3.7: *AARs* and *CAARs* calculated by using the *CMRM* to obtain *Normal returns* for additions and deletions sample.
*** : significant at the 0.01 level.
** : significant at the 0.05 level.
* : significant at the 0.10 level.

τ (day)	-7	-6	-5	-4	-3	-2	-1	0	1	2	3	4	5	6	7
Panel A: Added firms															
AAR_τ	-0.196%	0.221%	0.026%	-0.174%	0.134%	0.199%	0.028%	0.861%***	-0.116%	-0.591%*	-0.605%**	-0.054%	-0.495%**	0.071%	-0.400%*
t-statistic	-0.691	0.876	0.153	-0.764	0.584	0.852	0.113	3.488	-0.443	-1.754	-2.391	-0.224	-2.605	0.232	-1.782
p-value	0.4932	0.3857	0.8790	0.4492	0.5621	0.3988	0.9103	0.0011	0.6598	0.0865	0.0212	0.8240	0.0126	0.8178	0.0818
$CAAR(-7,\tau)$	-0.196%	0.025%	0.051%	-0.123%	0.011%	0.210%	0.238%	1.099%*	0.983%	0.392%	-0.214%	-0.268%	-0.763%	-0.692%	-1.091%
t-statistic	-0.691	0.073	0.151	-0.299	0.024	0.436	0.454	1.840	1.592	0.538	-0.275	-0.352	-0.983	-0.923	-1.400
p-value	0.4932	0.9420	0.8807	0.7664	0.9814	0.6653	0.6521	0.0727	0.1186	0.5931	0.7845	0.7266	0.3312	0.3610	0.1687
Panel B: Deleted firms															
AAR_τ	0.085%	-0.006%	0.001%	0.069%	-0.508%**	0.274%	-1.100%*	-0.074%	-0.594%	-0.499%	0.883%**	-0.090%	0.468%	0.412%	0.594%
t-statistic	0.201	-0.023	0.002	0.202	-2.509	0.938	-1.928	-0.231	-1.491	-1.142	2.359	-0.267	1.409	1.340	1.287
p-value	0.8420	0.9819	0.9983	0.8407	0.0158	0.3535	0.0602	0.8181	0.1430	0.2596	0.0227	0.7906	0.1659	0.1870	0.2047
$CAAR(-7,\tau)$	0.085%	0.079%	0.080%	0.149%	-0.358%	-0.085%	-1.185%	-1.258%	-1.852%*	-2.351%*	-1.468%	-1.558%	-1.090%	-0.678%	-0.084%
t-statistic	0.201	0.147	0.140	0.228	-0.526	-0.112	-1.507	-1.375	-1.706	-1.778	-1.180	-1.405	-1.002	-0.612	-0.073
p-value	0.8420	0.8841	0.8889	0.8208	0.6014	0.9114	0.1387	0.1758	0.0949	0.0822	0.2440	0.1668	0.3215	0.5435	0.9423

Table 3.8: *AARs* and *CAARs* calculated by using the *Market model* to obtain *Normal returns* for additions and deletions sample.
*** : significant at the 0.01 level.
** : significant at the 0.05 level.
* : significant at the 0.10 level.

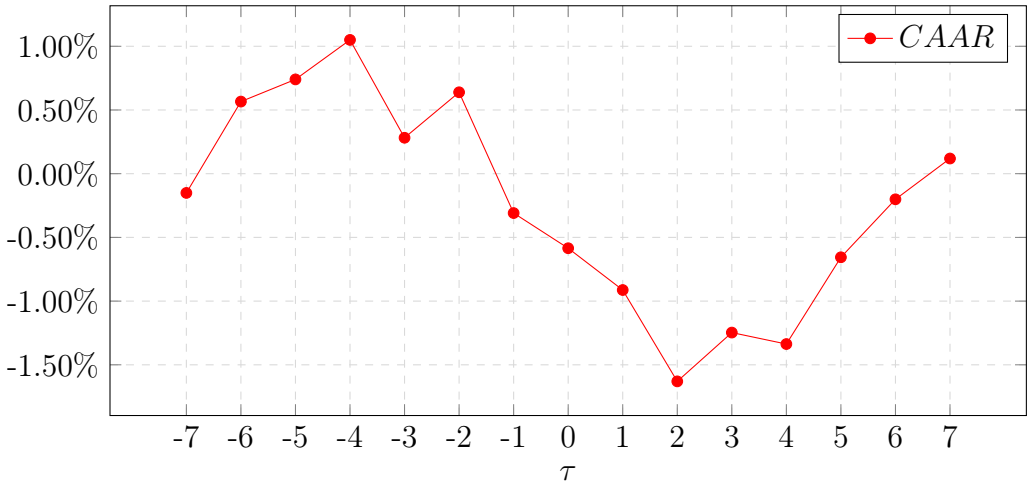


Figure 3.2: *CAARs* calculated over the expanding time window length from −7 to 7 days after the announcements for deleted firms (*CMRM*).

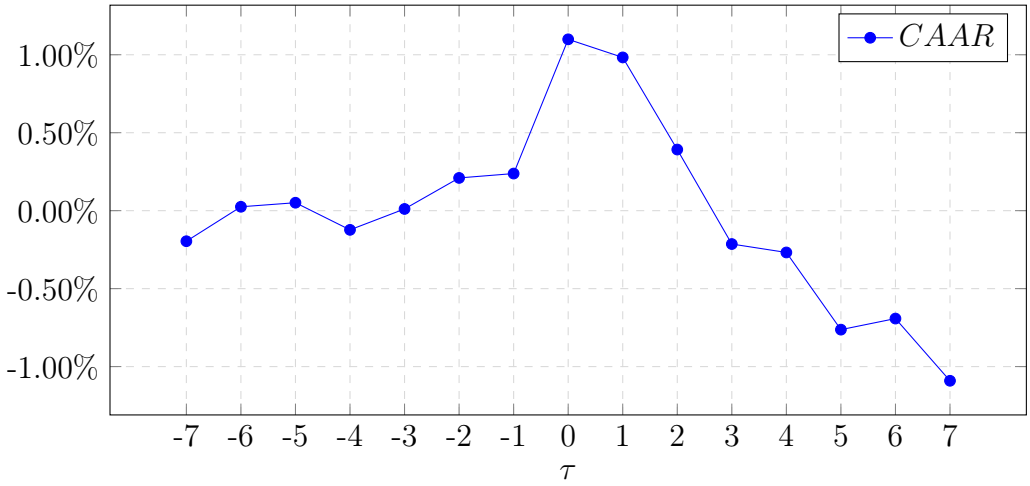


Figure 3.3: *CAARs* calculated over the expanding time window length from −7 to 7 days after the announcements for added firms (*Market model*).

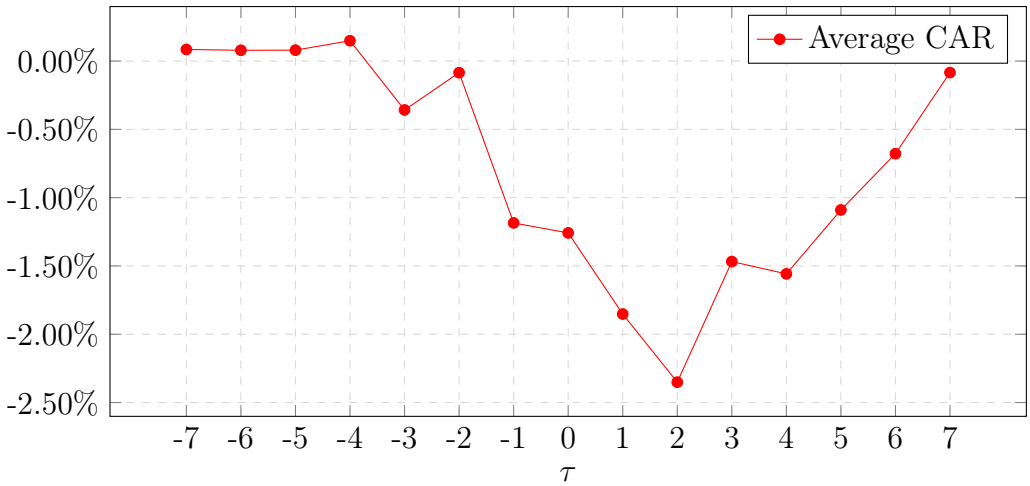


Figure 3.4: *CAARs* calculated over the expanding time window length from −7 to 7 days after the announcements for deleted firms (*Market model*).

for both the $CMRM$ and the *Market model* around the date of the announcement of deletion from the index. The higher drop occurs two days after the announcement of deletion from the index ($t = 2$) for both the $CMRM$ and the *Market model*. In fact in the $CMRM$ (*Market model*) the $CAAR$ reaches a minimum value of -1.630% (-2.351%) over the time window $(-7, 2)$. This means that over the *Event window* $(-7, 7)$ on average the stock price grows down to -1.630% (-2.351%) for the $CMRM$ (*Market model*) on the two days after the announcement.

It is important to evaluate the statistical significance because we will verify if they are statistically different from zero.

The statistic test for the $CAARs$ was calculated on the basis of the Tables (A.14), (A.15), (A.16) and (A.17). We can see the statistical significance in Tables (3.7) and (3.8).

As regards the index additions, the results are shown in the Tables (A.14) and (A.16) respectively for the $CMRM$ and the *Market model*.

In the $CAARs$ of the index additions calculated through the $CMRM$ (see Table 3.7), we find significant estimates over the time windows $(-7, -2)$, $(-7, -1)$, $(-7, 0)$ and $(-7, 1)$. Through the $CMRM$, we find $CAAR(-7, -2)$ of 0.955% and $CAAR(-7, -1)$ of 1.048% significant at the 0.1 level (p-values are 0.0899 and 0.0785 respectively). We also found $CAAR(-7, 0)$ of 1.685% and $CAAR(-7, 1)$ of 1.800% to be significant at the 0.05 level (p-values are 0.0186 and 0.0247 respectively). No significant $CAARs$ were found for the deletions instead. This means that by using the $CMRM$ to calculate *Normal returns*, the estimates are not statistically different from zero.

In this research we find $CAAR(-7, 0)$ of 1.099% for the firms added to the EURO STOXX 50 (see Table 3.8). This estimate is significant at the 0.1 level (p-value = 0.0727). Regarding index deletions, significant $CAARs$ were found of -1.852% in the window $(-7, 1)$ (p-value = 0.0949) and -2.351% in the time window $(-7, 2)$ (p-value = 0.0822).

We definitively choose the *Market model* because it allows us to have significant estimates even for deletions from the index. Furthermore, this approach is widely used and very well known in the literature. For example, it was used by Shleifer (1986), Lynch and Mendenhall (1997), Denis et al. (2003), Elliott et al. (2006) and Sui (2006). Moreover, the OLS parameters estimates used to calculate the *Normal returns* in the *Market model* were almost all highly significant (see Tables A.8 and A.9)

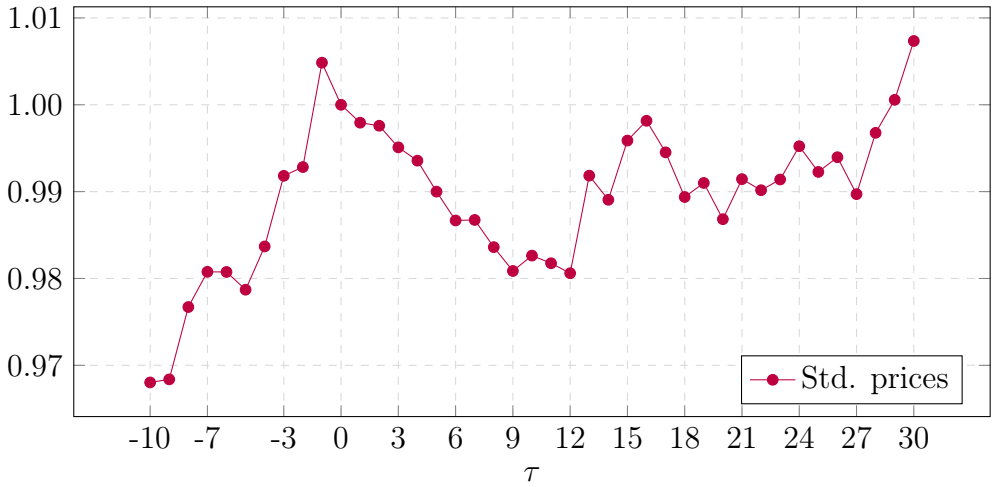


Figure 3.5: Mean standardized prices for additions.

3.2 Determinants

3.2.1 Price pressure hypothesis

Figures (3.5) and (3.6) show us the mean price levels of added and deleted firms from 10 days prior to the change day up to 30 subsequent days, using the adjusted close price of the change day as benchmark (that is, it is standardized to 1). The data that can be extrapolated from these figures are included in the figures relating to the test of the hypothesis of the flat curve, but it has been chosen to generate a specific figure for better clarity.

As we said earlier, if the price pressure hypothesis holds, then there must be a reversal in prices of the added or deleted firms as a result of the change of index composition. This reversal does not (necessarily) have to be permanent. In Figure (3.5) we can see the price development of the added firms.

We notice that the prices start to rise from 10 days before the change day until the day before (the mean standardized prices increases from 0.96803 to 1.00485). On the change day, prices drop slightly (from 1.00485 to 1) and continue with this trend up to 12 days after the announcement, where the mean standardized prices drops to 0.98060. Hence, it is evident that there is a price reversal following inclusion in the index and this is an evidence of the price pressure hypothesis.

Regarding the deletions from the index, we can see the price trend of deleted firms in Figure (3.6). Before the change day, we have an opposite price trend compared to the price data collected for the additions. In fact, prices already decreases after the 8th day before the change day and maintains this trend up to 5 days after the change day (the mean standardized prices goes from 1.04767 to 0.98886). Subsequently, prices have a positive trend up to 17 days after the change day (where the mean standardized

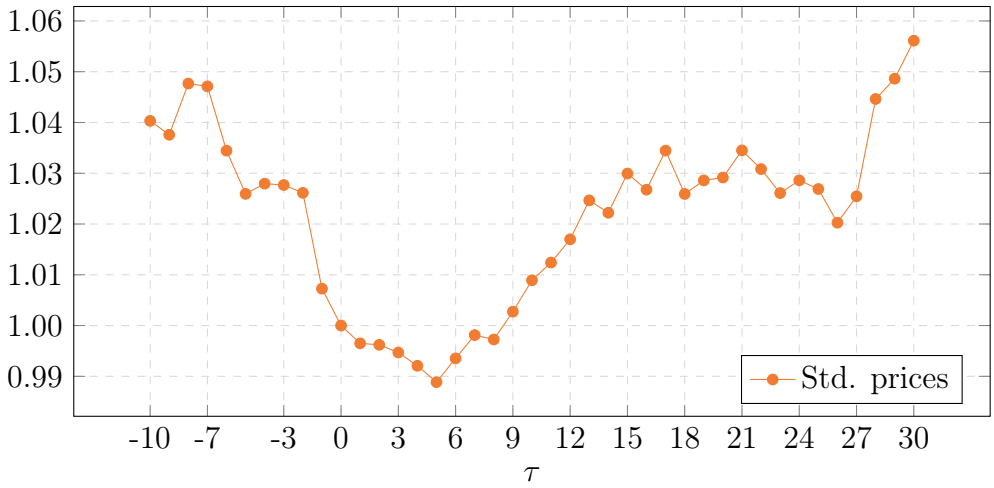


Figure 3.6: Mean standardized prices for deletions.

prices reaches 1.03447) and after this period the prices does not follow any trend. Also in this case, it is possible to notice a price reversal because initially (before the change day) prices decrease and then increase. Hence, the price pressure hypothesis also holds for the deletions.

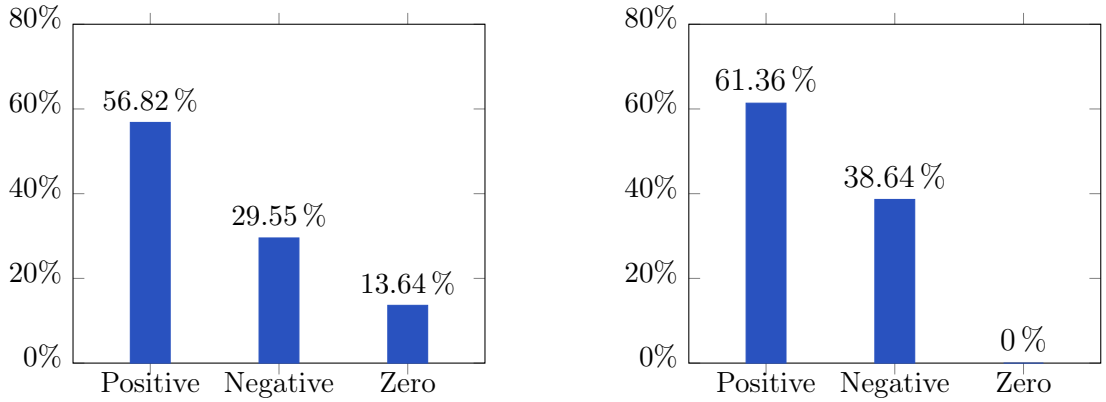
3.2.2 Downward-sloping long-run demand curves

Figures (3.5) and (3.6) seen previously also shown us the results of the investigation of the downward-sloping long-run demand curves hypothesis. Recall that the proof of a downward-sloping long-run demand curve is a permanent price effect after the index composition changes.

The addition effect is not present because as shown in Figure (3.5) we see that prices do not remain stable at a higher level. The mean standardized prices are at a higher level 30 days after the change day but their increase is very small (1.00735 i.e. +0.735% compared to the prices on the change day) and is preceded by numerous decreases. Instead, the deletion effect is present as shown in Figure (3.5) it is possible to see that the decrease detected around the change day is overcompensated 30 days after the change day. In fact, the average standardized prices reach 1.05612 (+5.612%) 30 days after the change day.

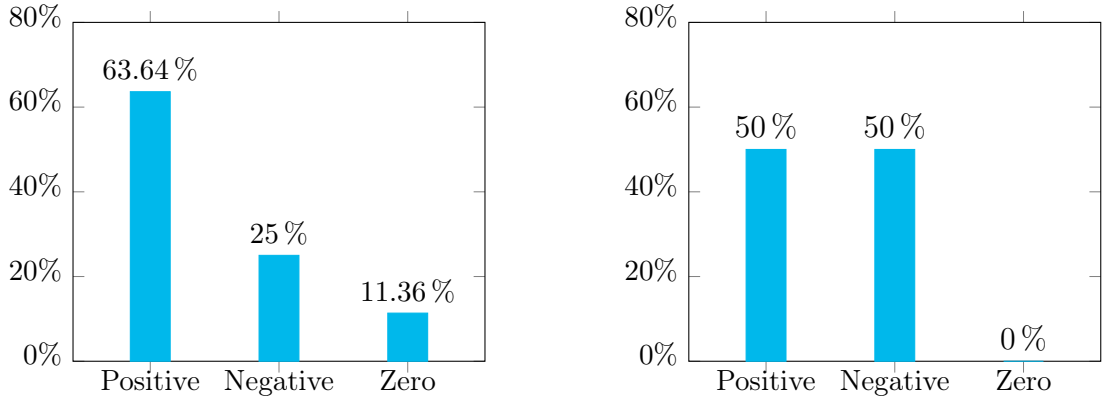
3.2.3 Information hypothesis (Investor awareness)

To determine whether there is an informational effect to the addition or deletion announcement we will look at the *Raw change in EPS forecast* (ΔFE), *Change in EPS forecast standardized by price* (ΔPFE), and *Change in EPS forecast standardized by pre-announcement median EPS forecast* (ΔEFE). The change is calculated from the



(a) EURO STOXX 50 added firms (b) Benchmark

Figure 3.7: Frequencies of positive, negative or zero changes in current-year EPS forecasts for EURO STOXX 50 added firms and benchmark firms.



(a) EURO STOXX 50 added firms (b) Benchmark

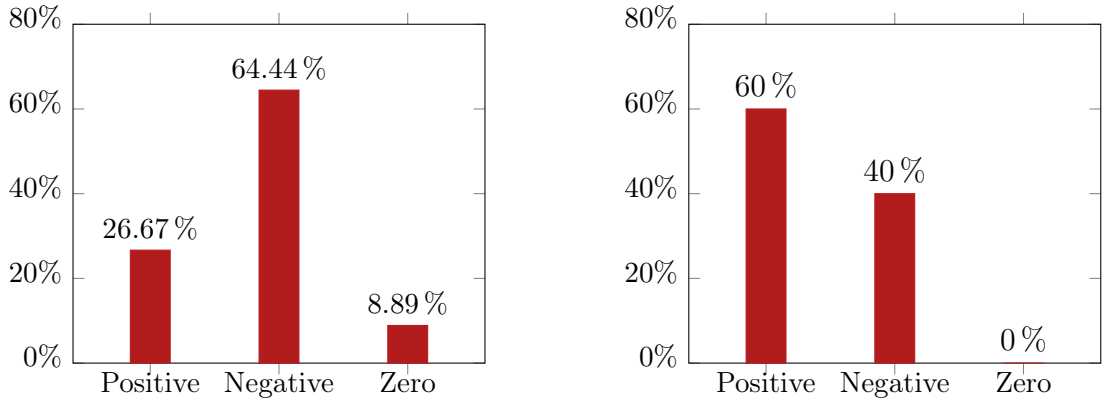
Figure 3.8: Frequencies of positive, negative or zero changes in one-year-ahead EPS forecasts for EURO STOXX 50 added firms and benchmark firms.

difference between post-inclusion EPS forecasts and pre-inclusion EPS forecasts.

Figures (3.7a) and (3.8a) show the bar charts on the percentage of positive, negative or unchanged raw changes in current-year and one-year-ahead EPS forecasts for firms added to the EURO STOXX 50 index. Figures (3.7b) and (3.8b) show the bar charts of changes in EPS forecasts of the benchmark firms used to compare changes in the current-year and one-year-ahead EPS forecasts.

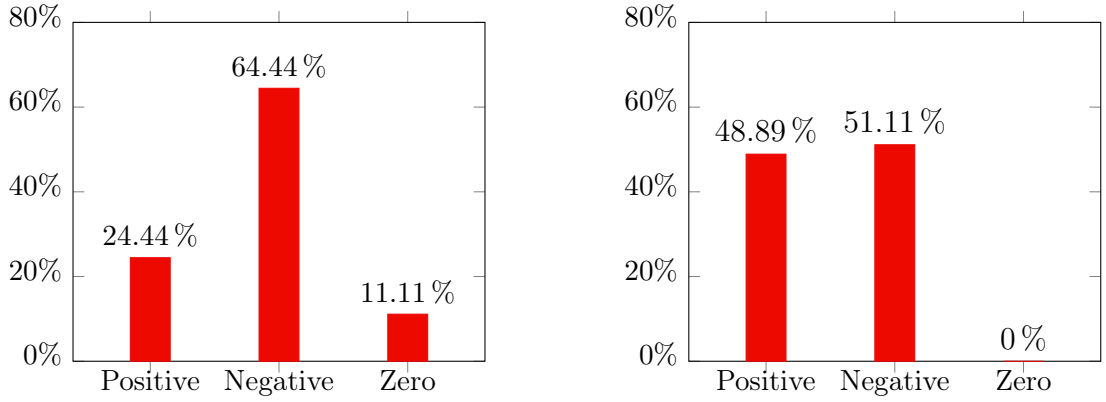
Figure (3.7) shows that 56.818% of the current-year forecasts have changed to positive (upwards), 29.545% have changed to negative (downwards) and 13.636% have remained unchanged. Recall that these data refer to additions to the index. If we compare this data with the benchmark, we see that the added firms have a lower probability of having an upward revision of the current-year EPS forecasts than the firms in the benchmark. We would have expected the opposite result.

From Figure (3.8a) it emerges that 63.636% of the one-year-ahead EPS forecasts



(a) EURO STOXX 50 deleted firms (b) Benchmark

Figure 3.9: Frequencies of positive, negative or zero changes in current-year EPS forecasts for EURO STOXX 50 deleted firms and benchmark firms.



(a) EURO STOXX 50 deleted firms (b) Benchmark

Figure 3.10: Frequencies of positive, negative or zero changes in one-year-ahead EPS forecasts for EURO STOXX 50 deleted firms and benchmark firms.

have changed upwards whereas 25% have changed downwards. On the other hand, benchmark companies (Figure 3.8b) had 50% of positive changes in one-year-ahead EPS forecasts and 50% negative. Consistent with our expectations, added firms are more likely to receive an upward revision of the one-year-ahead EPS forecasts than the benchmark firms.

The bar charts on the percentage of raw changes in current-year and one-year-ahead EPS forecasts for deleted firms are shown in Figures (3.9) and (3.10).

Figure (3.9a) shows that 26.667% of the current-year forecasts have changed upwards and 64.444% have changed downwards. The benchmark companies, on the other hand, had 60% of the positive changes and 40% of the negative ones (see Figure 3.9b). This means that decreases in EPS forecasts exceed increases, and deleted firms are more likely to receive a downward revision of current-year EPS forecasts than benchmark firms. Clearly index deletions makes analysts more pessimistic about the future profitability

of the firm.

The same observations apply to the one-year-ahead EPS forecasts of the companies removed from the index. Indeed, Figure (3.10a) shows us that 24.444% of the current-year forecasts have changed upwards and 64.444% have changed to negative (downward). Figure (3.10b) shows instead that the benchmark firms had 48.889% of the positive changes and 51.111% of the negative ones.

Tables (A.18) and (A.19) show the ΔFE, ΔPFE and ΔEFE of added and deleted firms for the current-year and one-year-ahead the announcement year. Tables (A.20) and (A.21) instead show the ΔFE, ΔPFE and ΔEFE referring to the benchmark used to make comparisons with firms added and deleted from the index.

To check if changes in forecasts for added or deleted firms differ from those of their benchmarks, the changes in EPS forecasts of the firms added or deleted with those of the benchmark were compared. The result is visible in the Tables (A.22) and (A.23) in which, for the three change in the EPS forecasts measures, the difference between the value obtained in added or deleted firms and the benchmark was calculated.

In Tables (3.9) and (3.10) the mean of the median changes in the EPS forecasts (which were shown in Tables A.18 and A.19 for the added and deleted firms respectively) were calculated. In Tables (A.20) and (A.21) the mean for the benchmarks firms was computed. The tables are divided into two panels: Panel A shows us the changes in current-year EPS forecasts, whereas Panel B shows the changes in one-year-ahead EPS forecasts.

The first line of Panel A of Table (3.9) shows us that the mean (of the median) changes in current-year *EPS forecasts* for the added companies is positive (€0.1408) and significant at the 0.10 level (p-value = 0.0611). In column 3 of Panel A we can also see the mean changes in current-year *EPS forecasts* for the benchmark, which is positive (€0.23373) and significant at the 0.005 level (p-value = 0.0042). In column 4 we can see the mean difference with the benchmark which is negative (€−0.09293) but not significant (p-value = 0.3886). Paradoxically the current-year *EPS forecasts* of the added firms grew less than the benchmark forecasts after the AD, but this difference is not significant.

The results of changes in one-year-ahead *EPS forecasts* (Panel B) are very similar to those of current-year *EPS forecasts* (Panel A). The mean changes in one-year-ahead *EPS forecasts* for added firms (column 2) is smaller (€0.09591) than that of the current-year and the same goes for the mean changes *EPS forecasts* for the benchmark (€0.12479) (column 3). They are significant at the 0.01 (p-value = 0.0073) and 0.1 (p-value = 0.0894) level. The mean difference with the benchmark (column 4) is smaller than that of the current-year and still negative (€−0.02888) but not significant (p-value = 0.6621).

Comparison with Benchmark				
	1	2	3	4
Sample	Sample size	Mean Δ EPS Forecast for index addition firms	Mean Δ EPS Forecast for Benchmark	Mean Difference (col. 2 - col. 3)
Panel A: Changes in Current-Year EPS Forecasts				
EPS forecast change	44	0.14080*	0.23373***	-0.09293
t-statistic		(1.923)	(3.020)	(-0.871)
p-value		0.0611	0.0042	0.3886
EPS forecast change standardized by price	44	0.185%**	0.051%	0.134%
t-statistic		(2.110)	(0.781)	(1.344)
p-value		0.0407	0.4392	0.1860
EPS forecast change standardized by EPS	44	2.462%*	1.146%	1.316%
t-statistic		(1.814)	(0.939)	(0.870)
p-value		0.0767	0.3532	0.3890
Panel B: Changes in One-Year-Ahead EPS Forecasts				
EPS forecast change	44	0.09591***	0.12479*	-0.02888
t-statistic		(2.817)	(1.738)	(-0.440)
p-value		0.0073	0.0894	0.6621
EPS forecast change standardized by price	44	0.184%**	0.031%	0.153%*
t-statistic		(2.317)	(0.575)	(1.989)
p-value		0.0253	0.5682	0.0530
EPS forecast change standardized by EPS	44	2.328%**	1.377%**	0.951%
t-statistic		(2.206)	(2.034)	(0.916)
p-value		0.0328	0.0482	0.3647

Table 3.9: Averages of the median changes in the EPS forecasts of the added firms and benchmark and difference between them.
*** : significant at the 0.01 level.
** : significant at the 0.05 level.
* : significant at the 0.10 level.

Comparison with Benchmark				
	1	2	3	4
Sample	Sample size	Mean Δ EPS Forecast for index addition firms	Mean Δ EPS Forecast for Benchmark	Mean Difference (col. 2 - col. 3)
Panel A: Changes in Current-Year EPS Forecasts				
EPS forecast change	45	0.20156	0.22626***	-0.02471
t-statistic		(0.836)	(2.971)	(-0.098)
p-value		0.4078	0.0048	0.9224
EPS forecast change standardized by price	45	-0.467%	0.072%	-0.539%
t-statistic		(-1.263)	(1.090)	(-1.467)
p-value		0.2132	0.2818	0.1496
EPS forecast change standardized by EPS	43	-15.010%*	1.669%	-16.678%*
t-statistic		(-1.725)	(1.265)	(-1.887)
p-value		0.0919	0.2127	0.0660
Panel B: Changes in One-Year-Ahead EPS Forecasts				
EPS forecast change	45	-0.04956	0.11796	-0.16751
t-statistic		(-0.514)	(1.665)	(-1.529)
p-value		0.6097	0.1030	0.1335
EPS forecast change standardized by price	45	-0.317%	0.051%	-0.368%**
t-statistic		(-1.571)	(0.914)	(-2.026)
p-value		0.1234	0.3655	0.0488
EPS forecast change standardized by EPS	44	40.015%	1.612%**	38.402%
t-statistic		(0.935)	(2.216)	(0.902)
p-value		0.3548	0.0320	0.3723

Table 3.10: Averages of the median changes in the EPS forecasts of the deleted firms and benchmark and difference between them.
*** : significant at the 0.01 level.
** : significant at the 0.05 level.
* : significant at the 0.10 level.

The mean changes current-year of *EPS forecasts standardized by price* (second line of Panel A) is smaller both for the added firms (0.185%) and for the benchmark (0.051%). Their difference is positive (0.134%) but not significant (p-value = 0.186). Very similar results were obtained for changes in one-year-ahead of *EPS forecasts standardized by price* (second line of Panel B), with the exception that the mean difference is significant at the 0.1 level (p-value = 0.053) although continues to be very low (0.153%).

Higher values are obtained in mean changes current-year and one-year-ahead of *EPS forecasts standardized by EPS* (third line of Panel A and B). The mean difference (column 4) is higher (1.316% for current-year forecasts and 0.951% for one-year-ahead forecasts) but is still not significant (p-values are 0.389 and 0.3647 respectively).

The means of the median changes in EPS forecasts for deleted firms are shown in Table (3.10). The mean changes in current-year *EPS forecasts* for deleted firms (first line of Panel A) is negative (€ −0.02471) but highly insignificant (p-value = 0.9224). The mean changes of the one-year-ahead *EPS forecasts* (Panel B) is even more negative (€ −0.16751) but still insignificant (p-value = 0.1335) The mean changes in current-year *EPS forecasts standardized by price* (second line) is very low both in current-year forecasts (−0.539%) and in one-year-ahead forecasts (−0.368%). Only the second result is statistically significant at the 0.05 level (the p-values are 0.1496 and 0.0488 respectively). Higher (absolute) values are obtained in the mean changes in current-year *EPS forecasts standardized by EPS* (third line). The mean difference for current-year forecasts is highly negative (−16.678%) and significant at the 0.1 level (p-value = 0.066). The mean difference for one-year-ahead forecasts is instead highly positive (38.402%) but not significant (p-value = 0.3723).

Thus, to summarize, no significant EPS forecasts measures changes were obtained for additions. The only exception is the mean difference of the one-year-ahead *EPS forecasts standardized by price*, where it reached a significance level of 0.1 (p-value = 0.0530). However, this increase is very small (0.153%). Contrary to what we expected, as regards the deletions we were able to obtain significant estimates for two measures in changes in EPS forecasts. The mean difference of the current-year *EPS forecast change standardized by EPS* was significant at 0.1 level (p-value = 0.066) and achieved a highly negative value (−16.678%). The mean difference of the current-year *EPS forecast change standardized by price* is slightly negative (−0.368%) and was significant at the 0.05 level (p-value = 0.0488).

3.2.4 Liquidity hypothesis

In this paragraph we will show the results on the three liquidity measures used in this research:

- *Percentage spread*;
- *Volume*;
- *Share turnover*.

In Tables (A.24) and (A.25) it is possible to see the *Percentage spread* for each added and deleted firms calculated over the time windows $(-60, -10)$, $(1, 4)$ and $(10, 60)$, and its variation over the short and long window. Please note that day 0 is the day of the index composition change, and that the short window compares the average of liquidity proxies from $(-60, -10)$ to $(1, 4)$ whereas the long window compares them from $(-60, -10)$ to $(10, 60)$. We can also see the (percentage) change in the *percentage spread* over the short and long window.

Similarly, the same calculations were made for *Volume* and *Share turnover* in Tables (A.26) and (A.28) for additions and (A.27) and (A.29) for deletions from the index.

In Tables (3.11) and (3.12) it is possible to see the average variation of the three liquidity proxies over the short and long window, and their statistical significance. Regarding the additions to the index, Table (3.11) shows us that all liquidity proxies indicate a liquidity improvement in both the short and long window. In fact, the *Percentage spread* is reduced by approximately -6.689%, *Volume* and *Share turnover* increase by 29.036% and 21.956%. The increase in *Volume* and *Share turnover* was 99% significant whereas the *Percentage spread* was not statistically significant. The same conclusion is held over the long window. In fact, the *Percentage spread* is reduced by approximately -7.635%, *Volume* and *Share turnover* increase by 21.072% and 12.365%. Over the long window, all the changes in the three liquidity proxies were statistically significant. The increase in volume was significant at 99% whereas *Percentage spread* and *Share turnover* were significant at 95%.

The average variation of the three liquidity proxies for deletions sample is shown in Table (3.12). Over the short window, *Percentage spread* increases by approximately 9.524% whereas *Volume* decreases by -3.265%. Both liquidity proxies therefore indicate a decrease in liquidity. *Share turnover*, on the other hand, remains almost unchanged. In fact, there is a very small increase (0.370%) which is in contrast with the other two liquidity proxies because it indicates a very small improvement in liquidity. Nevertheless, we should not rely on these estimates because none of them are statistically significant. All three liquidity proxies indicate that liquidity is decreasing over the long window. In fact, the *Percentage spread* increased by 9.529%, *Volume* and *Share turnover* decreased by -11.936% and -3.026%. However, only the change in *Volume* was significant (95%).

	Short window	Long window
%Δ Percentage spread (n = 44)	-6.689%	-7.635%**
t-statistic	(-1.002)	(-2.402)
p-value	0.3220	0.0207
%Δ in Volume (n = 39)	29.036%***	21.072%***
t-statistic	(3.018)	(4.311)
p-value	0.0045	0.0001
%Δ Share turnover (n = 43)	21.956%***	12.365%**
t-statistic	(2.951)	(2.533)
p-value	0.005	0.015

Table 3.11: Variation and statistical significance of the three liquidity proxies over the short and long window for added firms.
*** : significant at the 0.01 level.
** : significant at the 0.05 level.
* : significant at the 0.10 level.

	Short window	Long window
%Δ Percentage spread (n = 45)	9.524%	9.529%
t-statistic	0.969	1.395
p-value	0.3377	0.1700
%Δ in Volume (n = 36)	-3.265%	-11.936%**
t-statistic	-0.371	-2.263
p-value	0.7130	0.0300
%Δ Share turnover (n = 44)	0.370%	-3.026%
t-statistic	0.051	-0.512
p-value	0.9596	0.6114

Table 3.12: Variation and statistical significance of the three liquidity proxies over the short and long window for deleted firms.
*** : significant at the 0.01 level.
** : significant at the 0.05 level.
* : significant at the 0.10 level.

3.3 Market efficiency hypothesis

If market is informatively efficient in semi-strong form (see Fama (1970)), the share price should reflects all the publicly available information and all investors have access to the same type of information. The semi-strong form of the efficient market hypothesis predicts that the publicly available information is unable to predict the returns of stocks. As we find significant *AARs* after the announcement date of additions (see Panel A of Table 3.8), we can state that the market is not informatively efficient in semi-efficient form for the added companies. Regarding deletions, we also find significant *AARs* prior to the announcement date (see Panel B of Table 3.8) but this is not enough to reject the efficient market hypothesis. Instead, we find that the downward-sloping long-run demand curves hypothesis holds for deletions (Figure 3.6) and this is sufficient to reject the efficient market hypothesis. Furthermore, we find that the price pressure hypothesis holds for both additions and deletions (Figures 3.5 and 3.6) and this is further confirmation of our results.

Chapter 4

Discussion

In this research we were able to identify the share price effect following the announcement of change in composition of the EURO STOXX 50 index. This means that inclusion or deletion announcement have economic value. The shares price effect was measured by the *AARs* and we preferred to use the *Market Model* to estimate *Normal Returns*.

As for the index addition announcements, a highly significant *AAR* of 0.861% (p-value = 0.0011) was found on the AD. Subsequently, significant *AARs* of −0.591% and −0.605% were found on the second and third days after the AD (p-value s are 0.0865 and 0.0212, respectively). A significant *AAR* was also found on the fifth day following the announcement (−0.495%, p-value = 0.0126) and in the seventh (−0.400%, p-value 0.0818). These results indicate that the addition announcements are associated with an increase in the shares price of the firms concerned, which occurs on the AD. Nevertheless, prices subsequently tend to fall two days after the AD.

Regarding index deletions, a negative (−0.508%) and significant (p-value 0.0158) *AAR* was found in the three days preceding the AD. Significant and negative *AAR* was also found the day before the AD (−1.100%, p-value = 0.0602) and on the third day following the AD (0.883%, p-value = 0.0227). Therefore, the shares price of the firms that will be eliminated falls before the AD. All these results are available in Table (3.8).

This is likely due to the fact that Qontigo publishes the ranking of each firm on a monthly basis according to the index valuations criteria, and therefore investors may know in advance which firm will be deleted. If this is true, it is curious that this effect did not occur for index additions. We conclude that the market is not informationally efficient in the semi-efficient form as we find significant *AARs* after the announcement date of additions (see Panel A of Table 3.8) and the price pressure hypothesis holds (Figure 3.5). The efficient market hypothesis does not even hold for deletions because we find that both the price pressure hypothesis and the downward-sloping long-run demand curves hypothesis (Figure 3.6) hold.

Calculating the $CAARs$ was useful to evaluate the overall impact on shares price generated by the event in the *Event window* we initially chose $(-7, 7)$. In this research we found a $CAAR(-7, 0)$ of 1.099% for the firms added to the EURO STOXX 50 (see Panel A of Table 3.8). This estimate is significant at the 0.1 level (p-value = 0.0727). Regarding index deletions (Panel B of Table 3.8), significant $CAARs$ were found of -1.852% in the window $(-7, 1)$ (p-value = 0.0949) and of -2.351% in the window $(-7, 2)$ (p-value = 0.0822). Therefore the shares price impact generated by index additions begins 7 days prior to the AD and ends on the AD (i.e. $CAAR(-7, 0)$). For deletions, however, the impact of the event begins 7 days prior to the AD and ends the day after the AD (i.e. $CAAR(-7, 1)$) or the next day after the AD ($CAAR(-7, 1)$).

However, not many $AARs$ and $CAARs$ were significant. The low significance is presumably due to the low number of observations of the analyzed samples. It would be interesting to investigate whether more significance estimates can be obtained using other models to estimate *Normal returns*, not mentioned in this research. However, if this problem depends on the sample size, then it will tend to resolve itself over time as the number of added and deleted firms will increase more and more as the time goes on and therefore more observations will be available.

The effects on shares price found in previous studies can therefore also be found on a more relevant index for the European market, the EURO STOXX 50, as we found significant $AARs$ and $CAARs$. Surprisingly, this research found that the effect on share prices is negative a few days after the inclusion announcement. The impact on prices for both additions and deletions is much lower than in the studies that analyzed the inclusion or deletion effect in the S&P 500 (see for example Lynch and Mendenhall (1997) and Sui (2006)). Perhaps this happened because the EURO STOXX 50 is less followed by investors and therefore the shares price effect could be much lower. Moreover, Europe's economy is likely to have a lower impact in the world than America's and therefore international investors may be less attracted to investing or inquiring about European corporate stocks.

We find evidence to support the price pressure hypothesis regarding the price movements caused by the index additions as there is a price reversal after the CD that lasts up to 12 days after (see Figure 3.5). In fact, the mean standardized price calculated among the added and deleted firms decreases by 2.94% (the mean standardized price is 0.9706) compared to the change day price.

It is interesting to note that the price of the day before the CD is higher than the change day price. This could be explained by fund managers concern of rebalancing the portfolios they manage and therefore they prefer to rebalance them the day before the CD rather than risk doing it too late.

The price pressure hypothesis is also held for the index deletions because, as the

Figure (3.6) shows, the mean standardized price of deleted firms decrease until day 5 and then a price reversal can be clearly seen that lasts until day 17, where the mean standardized price reaches increases by 3.447% compared to the change day price (the mean standardized price reaches 1.03447 on day 17).

In summary, the price pressure hypothesis is held for both additions and deletions from the index because in both cases a price reversal was found. While it is true that the literature generally supports the price pressure hypothesis for the S&P 500 (see Harris and Gurel (1986), Sui (2006), Elliott et al. (2006)), with a few exceptions (Jain, 1987), this result was not taken for granted as there are studies carried out on other indices that have rejected the price pressure hypothesis (see for example the study of Kaul et al. (2000) on Toronto Stock Exchange 300 and that of Parthasarathy (2010) on the Nifty index).

Regarding the downward-sloping long-run demand curves hypothesis, we have instead mixed conclusions with respect to the additions and deletions sample. In fact, the downward-sloping demand curves hypothesis is held for the deletions firms but is rejected for the additions firms. The downward-sloping long-run demand curve hypothesis is tested by verifying if it there is a permanent price effect after the index composition changes. In the additions sample the price is only slightly higher after 30 days following the change day (0.735%), and so we can consider this effect negligible. In the deletions sample, however, we found that 30 days after the change day the mean price increases by 5.612% compared to the change day price. This is enough to hold the downward-sloping demand curve hypothesis.

Contrary to these results, Jain (1987) and Lynch and Mendenhall (1997) found a permanent negative price effects for S&P 500 deletions. They also found a permanent positive price effects for additions. On the other hand, Sui (2006) rejected the downward-sloping lon-run demand curve hypothesis. Studies carried out on other indices also obtained mixed results. For example, Parthasarathy (2010) rejected the downward-sloping demand curve hypothesis for additions in the Nifty index whereas Kaul et al. (2000) found that the downward-sloping demand curves hypothesis holds for additions.

However, these studies used a different methodology and therefore it would be better to consider these comparisons for informational purposes only.

To evaluate the informational value of an addition or deletion announcement, we used the changes in current-year and one-year-ahead EPS forecasts, possibly standardized by the pre-announcement price and pre-announcement median EPS forecasts. The results on the information hypothesis analysis indicate that there could actually be a negative information value in the year in which the announcement of deletions is disclosed. When the change is standardized by the *pre-inclusion EPS forecasts*, the current-year EPS forecasts are on average negative and 16.678% smaller than the current constituents

of the EURO STOXX 50, used as a benchmark (see Table 3.10). The p-value of this difference is 0.066. Significant differences were also found for the change in one-year-ahead *EPS forecasts standardized by the pre-announcement price*, but their value is really very small for both additions (0.153%) and deletions (−0.368%) (see Panel B of Tables 3.9 and 3.10). These conclusions combined with the fact that all other mean differences were not significant (Tables 3.9 and 3.10) suggest that it is better to take these results with caution. The information effect of the addition announcements in the EURO STOXX 50 is lower than in the S&P 500 as Denis et al. (2003) and Chen et al. (2004) had achieved much higher and significant mean differences. Our results are closer to those of Tu and Chang (2012) which conclude that would appear to be no significant information effect associated with the MSCI Taiwan Index additions.

The results of this research also showed the additions to the EURO STOXX 50 index are associated with a significant and large impact on liquidity (see Table 3.11). In fact, there is a significant increase in *Volume* (29.036%) and *Share turnover* (21.956%) already in the short window. These estimates are significant at the 0.01 level. A decrease in *Percentage spread* is also found (−6.689%) which is negatively correlated with liquidity, but it is not significant. Over the long window, the positive effects on *Volume* (21.072%) and *Share turnover* (12.365%) are still consistent but are smaller compared to the short window. The significance of *Share turnover* drops to the 0.05 level. The effect on *Percentage spread* is instead even greater than the short window (−7.635%). As for the index deletions (see Table 3.12), almost no change in the liquidity proxies was significant. The only exception is the decrease in *Volume* over the long window (−11.936%), which is significant at the 0.05 level. However, as all other liquidity proxies are not statistically significant, we found that the effect on liquidity is inconclusive in both the short and long window for deletions.

A possible explanation for this phenomenon could be that once the firm is in the EURO STOXX 50 index, it attracts the attention of investors and therefore they become aware. When the company is deleted, investors do not suddenly become unaware on its stock and this could explain the lack of significance of changes in liquidity measures.

Our results on index additions are consistent with those found in recent literature regarding S&P 500 index additions. Older studies, such as that of Shleifer (1986) and Lynch and Mendenhall (1997) are an exception. Kotait (2016) examined the effects of additions and deletions from both American, foreign and global indices. The author attributed the *Abnormal Returns* found in all indices to increased liquidity. Sadeghi (2011) was inconclusive on the liquidity effect as regards the DJIM index. Kot et al. (2015) found that liquidity decreases (decreased) for both added and deleted firms in the Hang Seng Index.

Therefore, the price pressure hypothesis holds for both additions and deletions, and

the downward-sloping long-run demand curves hypothesis holds for deletions. Additions to the EURO STOXX 50 index are associated with a large increase in liquidity. Surprisingly, there does not appear to be any informational effect regarding the inclusion and deletions announcement.

Chapter 5

Conclusion

The purpose of this research was to verify whether there is an effect on the shares price after the EURO STOXX 50 composition changes. 90 companies were analyzed, of which 44 belonged to the sample of additions and 46 to the sample of deletions.

We found that the share price effect is present in both addition and deletion announcements from the EURO STOXX 50. The share price effect of the announcements of index composition changes was measured by the AARs and the CAARs. We found a significant AAR of 0.861% on the AD for addition announcements. Significant negative AARs were found on the second, third and seventh days after the AD. They amount to -0.591%, -0.605% and -0.400%. However, the price impact on announcements was in general much less than the S&P 500 and, indeed, is even negative days after the AD.

Regarding index deletions, a significant negative AAR was found in the three days preceding the announcement (-0.508%) and the day before the announcement (-1.100%). This means that the shares price of the companies that will be deleted fell before the AD.

Furthermore, a significant $CAAR(-7, 0)$ of 1.099% was found for firms that were added to the index and for deletions a significant $CAAR(-7, 1)$ of -1.852% and $CAAR$ $(-7, 2)$ of -2.351% were found.

These results can be useful for developing models through which to build trading strategies on companies that are deemed likely to be added to the index, in order to earn excess returns on the day of the announcement compared to the market. In fact, we also find that the market is not informationally efficient in the semi-efficient form (we conclude this by looking at $AARs$ and price movements).

We were also able to find explanations for price movements. We found evidence to support the price pressure hypothesis for both index additions and deletions, as in both cases we found a price reversal a few days after the change day. The downward-sloping long-run demand curves hypothesis was instead maintained for companies deleted from the index.

We used the changes in EPS forecasts to evaluate if there is an information effect from the addition or deletion announcements. We conclude that there does not appear to be any informational value in the EURO STOXX 50 addition or deletion announcements as only a few changes in EPS forecasts measures were found to be significant, and significant ones reached very low values.

This research also showed that the additions in the EURO STOXX 50 index were associated with a significant and consistent impact on liquidity. In fact, there was a significant increase in *Volume* and *Share turnover* in both the short and long window. Over the short window, *Volume* increases by 29.036% and *Share turnover* by 21.956% whereas over the long window, *Volume* increases by 21.072% and *Share turnover* by 12.365%. The results were instead inconclusive as regards index deletions as only the decrease in *Volume* over the long window (−11.936%) was significant.

In summary, the contribution of this research is to verify whether the findings for the S&P 500 also apply to the European EURO STOXX 50 index. Furthermore, this research estimates the economic value of the information content of a future inclusion or deletion from the index and investigated its determinants. It was shown that the share price effect is present but is of a reduced extent compared to the S&P 500 for both additions and deletions.The explanations of price movements in the literature helped to find the determinants of the shares price effect. In fact, the price pressure hypothesis was held for both additions and deletions, and the downward-sloping long-run demand curves hypothesis was held for deletions. Additions to the EURO STOXX 50 were associated with a large increase in liquidity. Surprisingly, there does not appear to be any informational effect regarding the inclusion and deletions announcement.

5.1 Limitations and future research

A limitation of this research is the small sample size as there have been relatively few additions and deletions since the index was implemented, and consequently little data is available on which analyzes can be performed. This may have negatively affected the significance of our estimates.

Furthermore, the sample with which the share price effect was measured was not exactly the same as that used to study the possible determinants (*Price pressure hypothesis*, *Downward-sloping long-run demand curves*, *Information hypothesis* and *Liquidity hypothesis*).

If there was missing data in the measure used to evaluate the impact of a determinant, companies with missing data for that measure were removed from the sample used to investigate that determinant, but they remained in the samples of the other determinants or in the sample used to measure the share price effect if they have no

missing data in those measures.

For example, if a firm had missing data on volume then it was not used to estimate *Volume* when we tested the liquidity hypothesis, but it contributed to estimate the share price effect if adjusted close price data was available.

This choice was made to keep the sample size as high as possible in order to not erode the statistical significance. It would be interesting to repeat the analyzes while maintaining the same sample as the one used to measure the share price effect. However, we expect to find only slightly different results with reduced significance.

Further tests could be carried out to test the efficient market hypothesis. For example, one could try to build a trading strategy to check if it is possible to earn abnormal trading profit net of trading costs.

We could extend our analysis on the Price pressure hypothesis and the Downward-sloping long-run demand curves by eliminating the price movement caused by the price of the EURO STOXX 50. To do this, we should recalculate the ARs by choosing an event window that uses the change day rather than the announcement day as reference. We expect this approach to provide more reliable estimates.

A further development of this research could be the use other models than the *Market model* to estimate *Normal returns*. There could be a model that is better suited to the data and thus allows to obtain more significant estimates to evaluate the share price effect.

It would also be interesting to study the effects on the fundamentals of the companies involved, and then investigate the change in the balance sheet following the addition or deletion announcement to verify whether the fundamentals have an explanatory power to the price movements.

This research aims to provide a good starting point to further explore this topic and we hope it will arouse the interest of new researchers in order to expand the literature on the EURO STOXX 50.

Appendices

Appendix A

Tables

A.1 Summary statistics of daily log returns

	Mean	Std. Err.	Median	S. Var.	Min.	Max.	C. L. 95%
Banco Santander	0.00056	0.00141	0.00000	0.00022	-0.05223	0.04175	0.00280
BASF	0.00321	0.00183	0.00000	0.00037	-0.03190	0.07069	0.00363
HypoVereinsbank	0.00108	0.00253	0.00000	0.00070	-0.06025	0.07376	0.00501
Dresdner Bank	0.00228	0.00242	0.00000	0.00064	-0.04781	0.08029	0.00479
Muenchener Ruck.	-0.00041	0.00251	0.00000	0.00069	-0.05964	0.12025	0.00497
Sanofi	-0.00060	0.00256	0.00000	0.00072	-0.06147	0.06989	0.00507
Suez(Rompus)	-0.00078	0.00146	0.00000	0.00023	-0.04089	0.04488	0.00290
Danone	0.00380	0.00231	0.00000	0.00059	-0.04372	0.08135	0.00459
Intesa Sanpaolo	0.00299	0.00307	0.00341	0.00103	-0.09887	0.15347	0.00608
Saint Gobain	0.00041	0.00214	0.00178	0.00050	-0.08932	0.07507	0.00424
Lafarge	-0.00143	0.00179	0.00000	0.00035	-0.04525	0.08975	0.00354
Iberdrola	0.00018	0.00095	0.00000	0.00010	-0.03876	0.03111	0.00188
Crédit Agricole	-0.00053	0.00123	0.00075	0.00017	-0.03599	0.03534	0.00245
Arcelormittal	0.00047	0.00179	0.00051	0.00035	-0.06561	0.04613	0.00355
Schneider Electric	-0.00015	0.00133	0.00014	0.00019	-0.03560	0.04765	0.00263
Vinci	-0.00108	0.00155	-0.00009	0.00026	-0.05060	0.05230	0.00307
Volkswagen	0.00265	0.00139	0.00206	0.00021	-0.03308	0.05121	0.00276
Deutsche Boerse	0.00072	0.00196	0.00067	0.00042	-0.09183	0.05569	0.00389
Alstom	0.00009	0.00244	0.00026	0.00065	-0.08930	0.08146	0.00483
Anheuser-Busch Inbev	0.00221	0.00193	0.00164	0.00041	-0.06232	0.04761	0.00382
CRH	0.00186	0.00289	0.00000	0.00092	-0.07535	0.06977	0.00574
WFD Unibail-Rodamco	0.00102	0.00141	0.00134	0.00022	-0.04434	0.03826	0.00279
BMW	0.00227	0.00181	0.00208	0.00036	-0.05598	0.07324	0.00359
Volkswagen Pref.	0.00063	0.00211	0.00194	0.00049	-0.10354	0.06783	0.00419
Inditex	0.00117	0.00135	0.00018	0.00020	-0.04145	0.05844	0.00267
ASML Holding	0.00153	0.00142	0.00142	0.00022	-0.04033	0.04399	0.00282
Essilorluxottica	0.00258	0.00105	0.00146	0.00012	-0.02793	0.03041	0.00208
Airbus	0.00298	0.00158	0.00154	0.00028	-0.04238	0.07668	0.00314
Deutsche Post	0.00128	0.00117	-0.00011	0.00015	-0.03187	0.04090	0.00232
Nokia	0.00067	0.00161	0.00087	0.00029	-0.03962	0.07004	0.00320
Fresenius	0.00161	0.00157	0.00104	0.00027	-0.04528	0.04077	0.00312
Safran	0.00057	0.00162	0.00000	0.00029	-0.04342	0.09568	0.00322
Adidas	0.00394	0.00130	0.00260	0.00018	-0.03519	0.05889	0.00257
Ahold Delhaize	0.00063	0.00109	0.00072	0.00013	-0.03960	0.02455	0.00217
CRH	0.00149	0.00179	0.00166	0.00035	-0.09369	0.05242	0.00355

Amadeus It Group	0.00210	0.00105	0.00321	0.00012	-0.04274	0.03306	0.00208
Kering	0.00091	0.00172	0.00092	0.00033	-0.08031	0.05428	0.00342
Deutsche Boerse	0.00102	0.00119	0.00039	0.00016	-0.03024	0.06376	0.00237
Adyen	0.00635	0.00251	0.00813	0.00070	-0.06849	0.08766	0.00498
Prosus	0.00406	0.00248	0.00223	0.00068	-0.06305	0.06704	0.00492
Vonovia	0.00380	0.00184	0.00011	0.00037	-0.06388	0.07049	0.00366
Kone 'B'	0.00404	0.00156	0.00369	0.00027	-0.04299	0.06302	0.00310
Pernod-Ricard	0.00172	0.00166	0.00019	0.00030	-0.03998	0.05747	0.00329
Infineon Technologies	0.00357	0.00204	0.00359	0.00046	-0.06242	0.07536	0.00405

Table A.1: Summary statistics of log returns on daily returns over the *Estimation window* $(-120, -11)$ for additions sample.

	Mean	Std. Err.	Median	S. Var.	Min.	Max.	C. L. 95%
Akzo Nobel	0.00202	0.00206	0.00000	0.00047	-0.05827	0.07777	0.00408
AIB Group	-0.00289	0.00194	-0.00346	0.00042	-0.06519	0.05196	0.00385
Relx	-0.00200	0.00206	0.00000	0.00047	-0.07105	0.05617	0.00409
Stellantis	0.00222	0.00191	0.00000	0.00040	-0.04058	0.04897	0.00379
Deutsche Lufthansa	-0.00160	0.00180	-0.00194	0.00036	-0.04472	0.05534	0.00357
Pharol SGPS	-0.00083	0.00195	0.00000	0.00042	-0.05472	0.05712	0.00387
Schneider Electric	0.00193	0.00209	0.00000	0.00048	-0.04048	0.06701	0.00415
Saint Gobain	-0.00201	0.00229	-0.00248	0.00058	-0.06632	0.06494	0.00454
Electrabel	-0.00071	0.00206	-0.00097	0.00047	-0.06543	0.08813	0.00409
Ceconomy	0.00142	0.00278	0.00183	0.00085	-0.10734	0.07331	0.00552
Kpn Kon	-0.00959	0.00445	-0.01064	0.00218	-0.20450	0.11309	0.00882
Kering	-0.00543	0.00294	-0.00131	0.00095	-0.12470	0.08661	0.00583
HypoVereinsbank	0.00602	0.00371	0.00579	0.00151	-0.08627	0.10106	0.00734
Volkswagen	-0.00114	0.00128	-0.00029	0.00018	-0.03650	0.03459	0.00253
Ahold Delhaize	0.00092	0.00144	0.00051	0.00023	-0.03983	0.07024	0.00286
AIB Group	-0.00142	0.00172	-0.00112	0.00033	-0.06165	0.05335	0.00341
Lafarge	-0.00030	0.00147	0.00156	0.00024	-0.05222	0.03821	0.00291
Endesa	-0.00007	0.00031	0.00025	0.00001	-0.02544	0.00885	0.00062
ABN Amro Holding	0.00043	0.00144	-0.00029	0.00023	-0.06149	0.05260	0.00285
Alcatel-Lucent	0.00184	0.00281	0.00000	0.00087	-0.08935	0.06920	0.00556
Ageas (Ex-Fortis)	0.00883	0.00400	0.00690	0.00176	-0.12899	0.15624	0.00794
Renault	0.00809	0.00404	0.00918	0.00179	-0.11182	0.13092	0.00800
Volkswagen	-0.00883	0.00293	-0.00393	0.00095	-0.17448	0.04746	0.00581
Aegon	-0.00091	0.00237	-0.00157	0.00062	-0.05765	0.13152	0.00470
Alstom	-0.00141	0.00192	-0.00124	0.00040	-0.07009	0.05538	0.00380
Crédit Agricole	-0.00489	0.00267	-0.00332	0.00078	-0.12564	0.05376	0.00529
Deutsche Boerse	-0.00058	0.00219	0.00000	0.00053	-0.12423	0.05669	0.00435
Telecom Italia	-0.00053	0.00178	-0.00061	0.00035	-0.04792	0.06615	0.00353
Nokia	0.00249	0.00322	0.00000	0.00114	-0.06778	0.10256	0.00639
Arcelormittal	-0.00096	0.00187	-0.00051	0.00039	-0.04404	0.05386	0.00372
CRH	-0.00115	0.00137	-0.00174	0.00021	-0.04816	0.03713	0.00271
Repsol YPF	-0.00075	0.00130	-0.00060	0.00019	-0.04319	0.04564	0.00258
RWE	-0.00328	0.00165	-0.00201	0.00030	-0.07376	0.05046	0.00328
Assicurazioni Generali	-0.00140	0.00279	-0.00038	0.00085	-0.18354	0.07491	0.00553
Unicredit	-0.00527	0.00450	-0.00460	0.00223	-0.27165	0.12621	0.00892
Carrefour	-0.00065	0.00161	0.00102	0.00029	-0.05874	0.03746	0.00319
Saint Gobain	-0.00177	0.00106	-0.00190	0.00012	-0.03933	0.02620	0.00210
E ON N	-0.00014	0.00104	-0.00156	0.00012	-0.02322	0.03178	0.00206
Deutsche Bank	-0.00161	0.00175	-0.00087	0.00034	-0.07005	0.06949	0.00347
Wfd Unibail-Rodamco	-0.00196	0.00128	-0.00109	0.00018	-0.03721	0.03553	0.00254
Orange	0.00042	0.00206	0.00000	0.00046	-0.05034	0.10664	0.00407

BBV Argentaria	-0.00043	0.00367	-0.00190	0.00148	-0.08420	0.10443	0.00726
Telefonica	0.00012	0.00306	0.00000	0.00103	-0.09904	0.16385	0.00606
Fresenius	0.00259	0.00258	0.00000	0.00073	-0.06738	0.11516	0.00511
Société Générale	-0.00033	0.00435	-0.00358	0.00208	-0.10056	0.11915	0.00861
Nokia	-0.00008	0.00331	0.00000	0.00121	-0.20432	0.12964	0.00656

Table A.2: Summary statistics of log returns on daily returns over the *Estimation window* $(-120, -11)$ for deletions sample.

A.2 CMRM: *Normal Returns* for each sample firm

Added Firms	Normal return	Deleted Firms	Normal return
Banco Santander	0.056%	Akzo Nobel	0.202%
BASF	0.321%	AIB Group	-0.289%
HypoVereinsbank	0.108%	Relx	-0.200%
Dresdner Bank	0.228%	Stellantis	0.222%
Muenchener Ruck.	-0.041%	Deutsche Lufthansa	-0.160%
Sanofi	-0.060%	Pharol SGPS	-0.083%
Suez(Rompus)	-0.078%	Schneider Electric	0.193%
Danone	0.380%	Saint Gobain	-0.201%
Intesa Sanpaolo	0.299%	Electrabel	-0.071%
Saint Gobain	0.041%	Ceconomy	0.142%
Lafarge	-0.143%	Kpn Kon	-0.959%
Iberdrola	0.018%	Kering	-0.543%
Crédit Agricole	-0.053%	HypoVereinsbank	0.602%
Arcelormittal	0.047%	Volkswagen	-0.114%
Schneider Electric	-0.015%	Ahold Delhaize	0.092%
Vinci	-0.108%	AIB Group	-0.142%
Volkswagen	0.265%	Lafarge	-0.030%
Deutsche Boerse	0.072%	Endesa	-0.007%
Alstom	0.009%	ABN Amro Holding	0.043%
Anheuser-Busch Inbev	0.221%	Alcatel-Lucent	0.184%
CRH	0.186%	Ageas (Ex-Fortis)	0.883%
WFD Unibail-Rodamco	0.102%	Renault	0.809%
BMW	0.227%	Volkswagen	-0.883%
Volkswagen Pref.	0.063%	Aegon	-0.091%
Inditex	0.117%	Alstom	-0.141%
ASML Holding	0.153%	Crédit Agricole	-0.489%
Essilorluxottica	0.258%	Deutsche Boerse	-0.058%
Airbus	0.298%	Telecom Italia	-0.053%
Deutsche Post	0.128%	Nokia	0.249%
Nokia	0.067%	Arcelormittal	-0.096%
Fresenius	0.161%	CRH	-0.115%
Safran	0.057%	Repsol YPF	-0.075%
Adidas	0.394%	RWE	-0.328%
Ahold Delhaize	0.063%	Assicurazioni Generali	-0.140%
CRH	0.149%	Unicredit	-0.527%
Amadeus It Group	0.210%	Carrefour	-0.065%
Kering	0.091%	Saint Gobain	-0.177%
Deutsche Boerse	0.102%	E ON N	-0.014%
Adyen	0.635%	Deutsche Bank	-0.161%
Prosus	0.406%	Wfd Unibail-Rodamco	-0.196%
Vonovia	0.380%	Orange	0.042%
Kone 'B'	0.404%	BBV Argentaria	-0.043%

Pernod-Ricard	0.172%	Telefonica	0.012%
Infineon Technologies	0.357%	Fresenius	0.259%
		Société Générale	-0.033%
		Nokia	-0.008%

Table A.3: Average *Normal return* for each added or deleted firm computed over the *Estimation window* $(-120, -11)$ through $CMRM$.

A.3 CMRM: *Abnormal Returns* calculation

	-7	-6	-5	-4	-3	-2	-1	0	1	2	3	4	5	6	7
Banco Santander	-2.559%	2.767%	-0.271%	-0.269%	-0.812%	2.299%	1.520%	0.048%	1.492%	-2.126%	2.219%	1.265%	-0.765%	0.451%	0.146%
BASF	-3.574%	1.319%	1.204%	-0.655%	0.014%	-2.003%	-2.609%	-0.552%	1.746%	-1.234%	1.272%	-1.456%	-2.864%	0.263%	-0.670%
HypoVereinsbank	-1.800%	1.773%	2.316%	1.150%	0.977%	1.498%	-1.895%	0.521%	2.260%	2.801%	-0.108%	0.738%	-0.615%	0.735%	-1.951%
Dresdner Bank	-4.628%	2.125%	2.825%	1.879%	0.748%	1.578%	-2.522%	-0.106%	4.767%	4.529%	-2.919%	0.901%	0.108%	1.657%	-1.111%
Muenchener Ruck.	-1.419%	0.920%	2.346%	2.850%	-0.404%	3.809%	-0.928%	-1.212%	1.402%	1.649%	1.100%	-1.284%	-1.843%	0.041%	-0.504%
Sanofi	-3.149%	-1.999%	2.931%	1.212%	1.830%	0.034%	1.902%	0.726%	3.054%	3.829%	0.036%	-2.087%	-2.209%	-0.140%	0.708%
Suez(Rompus)	-1.474%	-1.639%	0.113%	2.314%	1.143%	1.301%	0.650%	1.941%	-6.179%	-1.728%	0.078%	2.408%	0.461%	0.321%	0.941%
Danone	-2.011%	-0.380%	0.276%	-0.707%	1.890%	0.577%	0.568%	0.870%	0.732%	-3.372%	-1.975%	1.531%	-0.065%	-1.646%	-2.700%
Intesa Sanpaolo	-0.719%	3.001%	-0.096%	-1.111%	-0.912%	1.329%	0.707%	-0.299%	2.852%	-1.273%	-2.474%	-0.299%	0.497%	0.099%	-1.492%
Saint Gobain	-0.919%	1.997%	-0.156%	-0.794%	-0.041%	-1.919%	0.078%	-0.753%	-1.784%	0.624%	-0.645%	-3.431%	-2.581%	-8.421%	3.261%
Lafarge	2.249%	-0.477%	-1.071%	4.201%	-2.700%	-2.040%	1.370%	-1.512%	-3.415%	-0.141%	-1.772%	1.611%	1.092%	2.673%	1.929%
Iberdrola	-0.083%	1.081%	0.300%	-0.724%	0.305%	-0.018%	-0.407%	0.688%	-1.050%	-1.192%	-0.145%	0.634%	0.113%	-0.280%	-0.084%
Crédit Agricole	0.940%	-0.290%	1.179%	0.684%	1.016%	0.053%	-0.765%	0.295%	1.203%	0.813%	-0.945%	-0.329%	2.422%	-0.087%	1.265%
Arcelormittal	-1.316%	5.950%	0.167%	-2.741%	2.260%	1.681%	2.025%	0.511%	0.076%	-2.021%	0.664%	-3.222%	-3.038%	3.244%	-1.212%
Schneider Electric	1.709%	1.224%	0.957%	-1.578%	0.815%	0.851%	2.676%	0.710%	0.725%	-1.668%	-0.160%	-4.376%	-1.471%	1.662%	-0.632%
Vinci	1.335%	-0.067%	0.746%	-2.926%	0.959%	0.481%	2.628%	2.023%	0.352%	-1.669%	-0.274%	-3.736%	-1.053%	0.830%	0.068%
Volkswagen	0.244%	0.184%	-0.208%	1.548%	-1.762%	0.487%	0.202%	4.198%	1.565%	0.241%	1.009%	4.979%	-1.352%	-1.882%	-3.626%
Deutsche Boerse	2.354%	0.998%	1.347%	0.217%	4.571%	-0.282%	-0.168%	1.113%	-0.120%	-0.167%	-1.422%	-0.283%	-0.130%	-1.095%	-0.744%
Alstom	-2.675%	4.240%	-2.877%	2.310%	2.707%	2.594%	-1.745%	3.359%	1.130%	-2.948%	-6.385%	-1.565%	0.662%	-5.115%	0.740%
Anheuser-Busch Inbev	0.798%	2.708%	-0.136%	-0.475%	0.778%	-1.253%	0.491%	1.504%	-2.760%	-0.476%	-0.563%	-0.495%	0.498%	2.455%	0.919%
CRH	3.489%	1.682%	-2.214%	1.420%	-5.527%	0.306%	-2.144%	1.505%	-2.446%	-3.320%	-1.491%	3.221%	0.275%	4.858%	2.244%
WFD Unibail-Rodamco	0.382%	-0.812%	-0.394%	0.320%	-0.849%	1.161%	1.082%	1.225%	-0.322%	-0.701%	-0.800%	-0.517%	-1.487%	-6.327%	0.792%
BMW	-2.325%	-0.370%	-1.210%	-0.323%	0.351%	0.037%	-1.818%	0.644%	2.985%	1.588%	1.014%	-0.555%	-0.488%	1.924%	0.506%
Volkswagen Pref.	-4.471%	4.109%	3.795%	-1.573%	2.394%	1.349%	0.116%	3.139%	-1.497%	-4.311%	-5.170%	0.789%	5.148%	-2.908%	-3.800%
Inditex	1.173%	-0.993%	0.331%	-0.565%	-1.673%	1.583%	1.924%	3.980%	1.556%	-1.318%	-2.994%	-1.438%	3.240%	0.760%	-1.400%
ASML Holding	-1.482%	1.720%	-1.119%	1.636%	1.181%	-1.715%	-0.287%	-3.357%	-2.305%	2.679%	2.883%	1.786%	0.686%	0.458%	0.635%
Essilorluxottica	-2.045%	-0.112%	0.906%	0.088%	1.017%	-2.083%	-0.113%	-1.335%	-0.860%	2.672%	0.624%	1.664%	0.889%	-0.671%	0.086%
Airbus	1.063%	-2.953%	1.360%	-1.278%	-2.215%	6.023%	5.050%	-0.886%	2.112%	-1.559%	-0.209%	1.100%	-0.273%	0.994%	1.160%
Deutsche Post	0.888%	1.338%	0.832%	0.070%	-2.173%	0.407%	0.132%	-0.206%	2.720%	-0.880%	1.083%	1.681%	-1.256%	0.492%	0.902%
Nokia	3.887%	1.297%	-0.947%	0.734%	0.092%	-1.027%	-0.955%	3.596%	-1.484%	1.350%	0.944%	0.550%	-0.994%	1.627%	-1.451%
Fresenius	-3.039%	-6.853%	-1.569%	-0.140%	1.261%	6.651%	-2.485%	1.147%	-2.854%	0.458%	2.356%	-2.014%	0.634%	1.097%	-1.056%
Safran	-2.695%	-3.494%	-3.853%	2.546%	-0.705%	4.009%	-0.221%	3.555%	-2.411%	-1.748%	2.059%	-2.503%	-0.267%	0.228%	0.987%
Adidas	-2.138%	-0.511%	-0.875%	-1.473%	0.488%	-0.362%	-0.600%	-2.837%	-0.748%	-2.672%	1.514%	-1.095%	0.691%	-1.842%	-1.257%
Ahold Delhaize	0.261%	0.099%	-0.318%	0.560%	-0.409%	0.098%	0.167%	-1.290%	0.378%	2.343%	-0.267%	-0.313%	-0.086%	-2.201%	-3.107%
CRH	0.196%	0.126%	-0.492%	2.165%	0.254%	2.153%	-0.657%	-0.280%	-0.992%	1.172%	1.171%	-1.452%	-0.181%	-1.936%	-3.338%

Amadeus It Group	0.398%	-0.868%	0.650%	-0.841%	-1.075%	-1.185%	0.177%	0.380%	1.186%	2.427%	-0.357%	-0.087%	-1.993%	2.308%	-1.782%
Kering	3.282%	-2.020%	0.043%	-1.487%	-0.023%	0.293%	1.321%	1.104%	0.304%	0.760%	-0.417%	1.014%	-0.588%	1.350%	-1.922%
Deutsche Boerse	-0.636%	1.494%	-1.162%	-1.097%	-2.870%	0.608%	4.239%	2.606%	0.300%	0.371%	-0.866%	0.117%	-0.613%	-0.985%	0.782%
Adyen	-4.401%	0.165%	2.012%	3.243%	-1.625%	-3.595%	-0.777%	-0.353%	-0.248%	-7.096%	-2.299%	1.514%	-2.595%	1.622%	0.988%
Prosus	4.156%	2.017%	1.510%	3.411%	0.095%	-2.125%	-3.553%	3.362%	-1.005%	-4.607%	-3.814%	0.166%	-1.378%	1.356%	-0.974%
Vonovia	-0.380%	0.158%	-0.750%	0.792%	-1.215%	0.389%	-0.214%	0.843%	1.829%	-5.962%	-1.610%	2.032%	-0.716%	1.290%	0.149%
Kone 'B'	0.047%	0.101%	0.764%	-0.073%	-0.101%	-0.872%	-1.236%	0.345%	0.421%	-4.032%	-0.518%	0.389%	-0.319%	2.869%	-0.979%
Pernod-Ricard	-1.384%	1.998%	-0.002%	0.303%	-0.648%	-1.164%	-1.557%	-1.611%	2.341%	0.275%	-3.239%	0.813%	-1.655%	0.818%	0.144%
Infineon Technologies	-1.190%	2.068%	-0.357%	-4.296%	2.763%	-2.644%	2.682%	-1.289%	-1.935%	-2.918%	-8.019%	1.112%	0.308%	5.158%	-5.119%

Table A.4: *Abnormal Returns* calculation for added firms ($CMRM$).

	-7	-6	-5	-4	-3	-2	-1	0	1	2	3	4	5	6	7
Akzo Nobel	0.149%	4.254%	2.227%	0.016%	-2.180%	-0.535%	-0.984%	-0.539%	1.141%	0.131%	2.852%	-1.935%	0.343%	-2.511%	-0.090%
AIB Group	0.289%	0.706%	-1.392%	1.552%	0.289%	-0.551%	0.035%	-0.305%	-0.138%	4.719%	1.830%	1.648%	1.159%	-0.422%	0.764%
Relx	-1.246%	-1.267%	0.200%	-0.294%	-1.298%	1.201%	1.681%	-1.282%	2.170%	2.132%	-0.280%	-0.282%	1.638%	4.396%	0.200%
Stellantis	-0.527%	-1.141%	2.808%	-0.521%	0.375%	-0.521%	-1.726%	-2.366%	-2.413%	0.093%	-1.812%	-0.062%	-2.651%	2.686%	-0.702%
Deutsche Lufthansa	0.160%	1.633%	1.006%	1.480%	1.640%	1.502%	2.442%	-0.289%	3.948%	2.964%	-1.984%	1.505%	2.019%	-1.536%	-0.699%
Pharol SGPS	-0.899%	0.033%	0.737%	1.678%	-0.288%	-0.465%	-0.869%	-1.133%	0.768%	0.058%	-1.655%	2.854%	0.609%	1.075%	-0.959%
Schneider Electric	-1.814%	-0.624%	2.027%	2.720%	-2.601%	3.113%	-3.836%	1.396%	-0.609%	1.460%	1.433%	4.224%	-0.657%	-0.972%	1.126%
Saint Gobain	-1.211%	-5.153%	7.100%	0.865%	-0.064%	-5.327%	0.551%	0.201%	-5.186%	-2.265%	4.495%	-1.997%	3.766%	0.272%	-0.876%
Electrabel	2.034%	-0.091%	-0.214%	-0.051%	0.477%	-0.051%	-0.827%	-3.263%	0.873%	-3.089%	0.504%	0.027%	1.231%	1.260%	0.744%
Ceconomy	-3.173%	1.037%	1.711%	3.917%	2.471%	-0.142%	-3.312%	-3.873%	3.479%	-0.142%	-2.390%	2.327%	-1.480%	-1.039%	-2.667%
Kpn Kon	-4.817%	0.691%	9.024%	6.786%	-1.910%	-2.246%	-23.638%	-4.645%	-8.265%	-18.694%	2.749%	6.582%	10.943%	-8.609%	22.010%
Kering	17.037%	-0.573%	-2.940%	5.862%	-5.826%	-2.800%	1.930%	-1.697%	-3.646%	3.501%	-0.956%	4.068%	-0.311%	5.679%	-0.334%
HypoVereinsbank	-0.356%	-0.765%	-2.253%	-3.989%	-0.947%	-0.602%	-2.786%	3.297%	2.329%	7.021%	3.002%	-2.688%	5.035%	-3.563%	-1.190%
Volkswagen	2.766%	1.681%	1.042%	-0.041%	-0.439%	-1.198%	-0.358%	-0.200%	0.747%	0.739%	0.895%	0.731%	-1.282%	0.832%	1.409%
Ahold Delhaize	0.732%	0.858%	-0.407%	-4.284%	1.216%	4.875%	0.934%	-0.092%	2.924%	-1.488%	2.388%	-1.970%	1.098%	0.203%	0.594%
AIB Group	0.555%	0.399%	-0.372%	-4.019%	0.271%	0.239%	0.720%	0.036%	1.627%	-3.885%	-0.132%	-2.474%	-0.140%	1.099%	-0.645%
Lafarge	2.204%	1.440%	-0.350%	-2.090%	-0.545%	1.230%	0.943%	0.574%	0.321%	-2.310%	-0.401%	-3.896%	-1.469%	3.260%	0.262%
Endesa	0.032%	0.007%	0.107%	-0.242%	-3.842%	-1.828%	2.594%	2.654%	-3.860%	-2.772%	0.409%	-0.046%	0.514%	-0.100%	-0.608%
ABN Amro Holding	1.061%	0.331%	-0.069%	0.569%	-0.043%	0.644%	-0.412%	0.195%	-0.227%	-0.122%	-0.201%	-0.016%	-0.122%	0.116%	-0.254%
Alcatel-Lucent	-2.115%	4.442%	-1.523%	4.554%	0.329%	5.047%	-4.651%	3.552%	-3.921%	-4.595%	-5.355%	-3.305%	1.246%	-1.327%	-1.631%
Ageas (Ex-Fortis)	3.918%	0.297%	1.918%	-2.092%	-3.345%	-2.580%	-0.757%	-6.614%	-2.369%	-5.513%	4.626%	0.589%	3.313%	0.603%	-0.664%
Renault	4.271%	1.799%	-0.868%	-1.340%	-3.692%	-3.997%	1.630%	-4.498%	-5.303%	-2.252%	-3.515%	4.169%	3.126%	-1.558%	5.890%
Volkswagen	0.322%	-1.229%	-1.157%	0.267%	-1.680%	-1.916%	-0.383%	5.009%	1.650%	3.029%	-2.393%	-3.717%	0.677%	2.614%	1.893%
Aegon	-3.207%	-0.141%	-2.540%	-2.463%	0.286%	0.963%	-1.367%	-0.993%	5.347%	1.446%	1.037%	0.823%	-1.866%	0.969%	0.253%
Alstom	0.041%	0.879%	2.793%	-0.773%	-0.847%	2.515%	0.335%	4.424%	1.111%	-5.645%	-6.191%	-3.360%	3.937%	-0.343%	-4.558%
Crédit Agricole	-1.158%	1.085%	3.000%	5.190%	-0.934%	3.799%	-0.526%	4.269%	-1.615%	-7.179%	-5.181%	-4.348%	3.635%	2.402%	-7.596%
Deutsche Boerse	-3.882%	-1.876%	-0.746%	0.854%	2.331%	-3.586%	1.126%	-3.610%	-0.052%	-0.972%	4.244%	1.859%	-0.019%	-1.276%	1.220%
Telecom Italia	-4.867%	0.690%	-1.943%	-1.763%	-2.923%	1.179%	-0.246%	2.568%	1.431%	-5.578%	6.473%	1.613%	2.897%	-4.567%	1.193%
Nokia	-3.826%	-1.305%	0.456%	0.730%	-5.683%	4.556%	-3.090%	-2.214%	-2.779%	2.501%	0.408%	1.340%	0.678%	-2.621%	-0.979%
Arcelormittal	-0.096%	2.316%	1.722%	-0.935%	-2.150%	-0.257%	-0.066%	-1.345%	4.003%	0.492%	0.588%	1.461%	0.916%	0.336%	2.135%
CRH	-3.519%	1.935%	-1.181%	2.437%	0.905%	-1.243%	2.146%	-1.744%	-0.541%	0.601%	2.869%	3.065%	-0.478%	-0.101%	0.386%
Repsol YPF	-1.459%	-3.252%	-9.149%	3.757%	-2.391%	5.178%	1.178%	-3.430%	-3.597%	-1.608%	1.227%	-3.589%	-0.649%	0.288%	1.304%
RWE	-0.215%	-4.327%	-7.574%	2.252%	0.036%	4.156%	-0.692%	-4.469%	-1.785%	-0.869%	2.292%	-4.019%	-0.012%	5.310%	-1.009%
Assicurazioni Generali	0.948%	4.515%	-0.203%	-2.736%	-0.927%	-1.846%	2.660%	1.464%	1.187%	0.832%	-0.639%	-0.645%	1.531%	2.613%	1.562%
Unicredit	1.862%	6.948%	8.258%	-3.264%	1.077%	0.252%	2.705%	3.968%	1.905%	1.209%	-0.069%	-1.024%	1.563%	2.568%	-0.999%

Carrefour	2.764%	1.256%	0.087%	-1.615%	-0.113%	-1.013%	0.673%	1.358%	0.750%	2.371%	-0.107%	-0.670%	1.701%	-0.965%	-1.566%
Saint Gobain	0.776%	0.288%	0.385%	1.073%	1.037%	1.151%	3.188%	0.932%	-1.761%	-1.194%	0.190%	-0.347%	0.285%	-1.643%	-0.400%
E ON N	-4.009%	0.681%	-1.119%	0.978%	0.554%	-2.647%	0.095%	3.154%	0.126%	-0.949%	1.089%	-0.712%	-1.489%	-0.603%	0.437%
Deutsche Bank	-0.533%	1.113%	0.736%	0.947%	0.910%	3.396%	2.401%	0.428%	-0.642%	-0.765%	-1.244%	0.220%	-3.734%	-0.948%	-0.741%
Wfd Unibail-Rodamco	-0.618%	-0.090%	0.850%	0.805%	0.318%	-1.188%	-2.210%	0.782%	-1.742%	0.917%	1.581%	0.155%	-0.096%	5.409%	3.552%
Orange	-0.407%	2.172%	-0.841%	-1.415%	-1.848%	-0.936%	-2.602%	-1.750%	0.415%	1.124%	-1.164%	0.413%	-1.062%	4.626%	-1.046%
BBV Argentaria	-1.511%	2.406%	0.885%	1.470%	-0.233%	2.614%	-5.777%	0.450%	-3.259%	1.996%	5.138%	-1.216%	-1.393%	1.162%	-0.076%
Telefonica	-0.867%	2.903%	-1.985%	-1.358%	-0.969%	-1.330%	-2.367%	-1.965%	0.482%	1.899%	-0.919%	0.595%	-1.226%	1.981%	-2.187%
Fresenius	-1.059%	2.577%	-0.385%	-0.385%	-0.918%	0.020%	-1.920%	-0.517%	1.737%	-1.585%	-1.733%	0.700%	-1.662%	0.653%	-0.492%
Société Générale	-1.964%	4.134%	-0.271%	0.784%	-1.197%	3.075%	-4.092%	-2.592%	-2.338%	0.265%	5.473%	-1.055%	-3.795%	1.285%	0.578%
Nokia	0.507%	-0.696%	-1.610%	-1.607%	-0.007%	4.530%	-4.089%	1.988%	0.497%	-0.987%	-1.860%	-1.741%	3.042%	1.956%	0.155%

Table A.5: *Abnormal Returns* calculation for deleted firms ($CMRM$).

A.4 Log returns of EURO STOXX 50 on the event date of each sample company

	-7	-6	-5	-4	-3	-2	-1	0	1	2	3	4	5	6	7
Banco Santander	-0.01418	0.00460	0.02477	0.01908	0.00380	0.00621	-0.00242	-0.01600	0.00971	0.00996	0.00762	0.01975	-0.00109	0.00025	-0.00410
BASF	-0.01418	0.00460	0.02477	0.01908	0.00380	0.00621	-0.00242	-0.01600	0.00971	0.00996	0.00762	0.01975	-0.00109	0.00025	-0.00410
HypoVereinsbank	-0.01418	0.00460	0.02477	0.01908	0.00380	0.00621	-0.00242	-0.01600	0.00971	0.00996	0.00762	0.01975	-0.00109	0.00025	-0.00410
Dresdner Bank	-0.01418	0.00460	0.02477	0.01908	0.00380	0.00621	-0.00242	-0.01600	0.00971	0.00996	0.00762	0.01975	-0.00109	0.00025	-0.00410
Muenchener Ruck.	-0.01418	0.00460	0.02477	0.01908	0.00380	0.00621	-0.00242	-0.01600	0.00971	0.00996	0.00762	0.01975	-0.00109	0.00025	-0.00410
Sanofi	-0.01418	0.00460	0.02477	0.01908	0.00380	0.00621	-0.00242	-0.01600	0.00971	0.00996	0.00762	0.01975	-0.00109	0.00025	-0.00410
Suez(Rompus)	-0.01418	0.00460	0.02477	0.01908	0.00380	0.00621	-0.00242	-0.01600	0.00971	0.00996	0.00762	0.01975	-0.00109	0.00025	-0.00410
Danone	0.01068	0.00769	0.00336	0.01025	0.00463	-0.00046	0.00748	-0.00297	0.00394	-0.00608	-0.00219	-0.00295	-0.00078	-0.00025	-0.00703
Intesa Sanpaolo	0.01068	0.00769	0.00336	0.01025	0.00463	-0.00046	0.00748	-0.00297	0.00394	-0.00608	-0.00219	-0.00295	-0.00078	-0.00025	-0.00703
Saint Gobain	0.00616	0.01909	0.00041	-0.01784	0.00242	-0.02523	0.00183	-0.01404	0.01213	-0.02703	-0.02419	-0.02676	-0.00460	-0.06620	0.01254
Lafarge	0.02434	-0.01791	-0.01783	0.03280	-0.04780	-0.02326	0.01567	-0.02622	-0.05040	0.00974	-0.00891	0.04159	-0.02060	0.02883	0.03107
Iberdrola	0.00826	0.00372	-0.01106	-0.01093	0.00927	0.00593	-0.00751	0.01714	-0.00042	0.01593	-0.00104	-0.00913	0.00792	-0.01203	-0.01492
Crédit Agricole	0.01414	-0.00121	0.00208	0.00897	0.00588	-0.00277	-0.00978	0.00779	0.00721	0.01037	0.00327	0.00129	-0.00181	-0.00592	0.00552
Arcelormittal	-0.00015	0.00301	0.00055	-0.01671	0.00548	0.01245	0.01134	0.00033	0.00658	-0.02078	0.00488	-0.02226	-0.00626	0.01462	0.00317
Schneider Electric	-0.00015	0.00301	0.00055	-0.01671	0.00548	0.01245	0.01134	0.00033	0.00658	-0.02078	0.00488	-0.02226	-0.00626	0.01462	0.00317
Vinci	-0.00015	0.00301	0.00055	-0.01671	0.00548	0.01245	0.01134	0.00033	0.00658	-0.02078	0.00488	-0.02226	-0.00626	0.01462	0.00317
Volkswagen	0.00817	0.00562	-0.00166	0.00636	0.00393	-0.00123	-0.00027	0.00787	-0.00437	0.00264	-0.00112	0.00694	0.00055	-0.00921	-0.00318
Deutsche Boerse	0.00636	0.00393	-0.00123	-0.00027	0.00787	-0.00437	0.00264	-0.00112	0.00694	0.00055	-0.00921	-0.00318	0.00471	-0.00483	-0.00207
Alstom	-0.01417	0.01935	-0.00971	0.00517	0.00052	0.01810	0.00185	-0.00037	0.01536	-0.01400	-0.02834	-0.02755	0.03039	-0.00704	-0.00586
Anheuser-Busch Inbev	0.01543	0.03030	0.01185	0.00817	-0.00438	-0.00405	0.00933	-0.01021	-0.02165	-0.00442	-0.00168	0.01621	0.01466	0.00087	0.01225
CRH	0.01543	0.03030	0.01185	0.00817	-0.00438	-0.00405	0.00933	-0.01021	-0.02165	-0.00442	-0.00168	0.01621	0.01466	0.00087	0.01225
WFD Unibail-Rodamco	-0.01778	-0.00928	-0.01045	0.00725	-0.01437	-0.01813	0.01433	0.00591	0.01306	-0.00902	-0.03526	-0.02840	0.01233	0.00155	0.01182
BMW	-0.01167	0.00636	-0.01755	-0.01043	0.00750	0.00896	-0.00525	0.00244	0.03459	-0.00003	0.01137	0.00268	-0.00965	0.00939	0.01067
Volkswagen Pref.	0.01120	0.00757	0.01744	-0.00987	-0.01192	0.02206	-0.00007	0.02772	0.00159	-0.03757	-0.05244	-0.01297	0.03359	0.00567	-0.04236
Inditex	0.01120	0.00757	0.01744	-0.00987	-0.01192	0.02206	-0.00007	0.02772	0.00159	-0.03757	-0.05244	-0.01297	0.03359	0.00567	-0.04236
ASML Holding	-0.02718	0.01048	0.00248	-0.00647	0.00575	-0.02064	0.00130	-0.02401	0.00497	0.00401	0.02387	0.00250	0.00038	-0.00289	0.00265
Essilorluxottica	-0.02718	0.01048	0.00248	-0.00647	0.00575	-0.02064	0.00130	-0.02401	0.00497	0.00401	0.02387	0.00250	0.00038	-0.00289	0.00265
Airbus	-0.00831	-0.02321	0.01931	0.00826	-0.03115	0.01597	0.00826	-0.00640	0.00116	0.02385	-0.00117	0.00408	0.01400	-0.00370	-0.00253
Deutsche Post	-0.00482	0.01351	0.00487	-0.00163	-0.02592	-0.00242	0.00571	-0.01348	0.01919	-0.00750	0.00179	0.00575	0.01048	-0.00183	0.01879
Nokia	-0.00246	0.01323	-0.00838	0.02138	0.01008	-0.00097	-0.00944	0.00259	0.00076	0.00165	0.01205	0.01798	-0.00061	-0.00236	-0.00679
Fresenius	-0.02252	-0.03219	-0.05503	0.04598	-0.01480	0.03412	0.00177	-0.00517	-0.02506	0.00317	0.02202	-0.02786	0.00556	0.01115	0.01111
Safran	-0.02252	-0.03219	-0.05503	0.04598	-0.01480	0.03412	0.00177	-0.00517	-0.02506	0.00317	0.02202	-0.02786	0.00556	0.01115	0.01111
Adidas	-0.00264	0.01121	0.00495	-0.00697	0.00756	-0.00395	0.01070	-0.00252	-0.00187	0.02042	-0.00067	-0.00244	0.00698	-0.00263	-0.00989
Ahold Delhaize	-0.00264	0.01121	0.00495	-0.00697	0.00756	-0.00395	0.01070	-0.00252	-0.00187	0.02042	-0.00067	-0.00244	0.00698	-0.00263	-0.00989
CRH	-0.00264	0.01121	0.00495	-0.00697	0.00756	-0.00395	0.01070	-0.00252	-0.00187	0.02042	-0.00067	-0.00244	0.00698	-0.00263	-0.00989

Amadeus It Group	0.00450	0.00213	0.00328	0.00044	0.00368	0.00300	0.01021	0.00810	-0.00596	0.00273	0.00390	0.00484	-0.01477	0.00439	-0.00740		
Kering	0.00450	0.00213	0.00328	0.00044	0.00368	0.00300	0.01021	0.00810	-0.00596	0.00273	0.00390	0.00484	-0.01477	0.00439	-0.00740		
Deutsche Boerse	-0.00627	-0.01175	0.00436	0.00644	-0.00151	0.01356	0.00451	0.00168	-0.00344	0.00876	0.00977	0.00301	-0.00005	0.00113	0.00508		
Adyen	-0.00436	0.02185	-0.00061	0.00809	-0.00769	-0.00466	-0.01306	0.00155	0.01820	-0.01010	-0.01329	0.01627	-0.01419	0.01744	-0.00364		
Prosus	-0.00436	0.02185	-0.00061	0.00809	-0.00769	-0.00466	-0.01306	0.00155	0.01820	-0.01010	-0.01329	0.01627	-0.01419	0.01744	-0.00364		
Vonovia	-0.00436	0.02185	-0.00061	0.00809	-0.00769	-0.00466	-0.01306	0.00155	0.01820	-0.01010	-0.01329	0.01627	-0.01419	0.01744	-0.00364		
Kone 'B'	-0.00436	0.02185	-0.00061	0.00809	-0.00769	-0.00466	-0.01306	0.00155	0.01820	-0.01010	-0.01329	0.01627	-0.01419	0.01744	-0.00364		
Pernod-Ricard	-0.00436	0.02185	-0.00061	0.00809	-0.00769	-0.00466	-0.01306	0.00155	0.01820	-0.01010	-0.01329	0.01627	-0.01419	0.01744	-0.00364		
Infineon Technologies	-0.00510	0.00877	-0.00367	-0.00291	0.00457	-0.00560	-0.01334	0.01911	0.00030	0.00137	-0.00214	-0.00957	0.02521	0.00605	0.00891		

Table A.6: EURO STOXX 50 log returns of the corresponding to the *Event window* of each sample company added in the index.

	-7	-6	-5	-4	-3	-2	-1	0	1	2	3	4	5	6	7
Akzo Nobel	-0.01418	0.00460	0.02477	0.01908	0.00380	0.00621	-0.00242	-0.01600	0.00971	0.00996	0.00762	0.01975	-0.00109	0.00025	-0.00410
AIB Group	-0.01418	0.00460	0.02477	0.01908	0.00380	0.00621	-0.00242	-0.01600	0.00971	0.00996	0.00762	0.01975	-0.00109	0.00025	-0.00410
Relx	-0.01418	0.00460	0.02477	0.01908	0.00380	0.00621	-0.00242	-0.01600	0.00971	0.00996	0.00762	0.01975	-0.00109	0.00025	-0.00410
Stellantis	-0.01418	0.00460	0.02477	0.01908	0.00380	0.00621	-0.00242	-0.01600	0.00971	0.00996	0.00762	0.01975	-0.00109	0.00025	-0.00410
Deutsche Lufthansa	-0.01418	0.00460	0.02477	0.01908	0.00380	0.00621	-0.00242	-0.01600	0.00971	0.00996	0.00762	0.01975	-0.00109	0.00025	-0.00410
Pharol SGPS	-0.01418	0.00460	0.02477	0.01908	0.00380	0.00621	-0.00242	-0.01600	0.00971	0.00996	0.00762	0.01975	-0.00109	0.00025	-0.00410
Schneider Electric	-0.01418	0.00460	0.02477	0.01908	0.00380	0.00621	-0.00242	-0.01600	0.00971	0.00996	0.00762	0.01975	-0.00109	0.00025	-0.00410
Saint Gobain	0.02645	0.00301	-0.00336	0.00411	-0.00571	-0.02405	0.00404	0.00997	-0.00684	-0.00915	-0.00185	0.01226	0.00616	0.01771	-0.01597
Electrabel	0.01068	0.00769	0.00336	0.01025	0.00463	-0.00046	0.00748	-0.00297	0.00394	-0.00608	-0.00219	-0.00295	-0.00078	-0.00025	-0.00703
Ceconomy	0.01068	0.00769	0.00336	0.01025	0.00463	-0.00046	0.00748	-0.00297	0.00394	-0.00608	-0.00219	-0.00295	-0.00078	-0.00025	-0.00703
Kpn Kon	0.00616	0.01909	0.00041	-0.01784	0.00242	-0.02523	0.00183	-0.01404	0.01213	-0.02703	-0.02419	-0.02676	-0.00460	-0.06620	0.01254
Kering	0.02434	-0.01791	-0.01783	0.03280	-0.04780	-0.02326	0.01567	-0.02622	-0.05040	0.00974	-0.00891	0.04159	-0.02060	0.02883	0.03107
HypoVereinsbank	0.00826	0.00372	-0.01106	-0.01093	0.00927	0.00593	-0.00751	0.01714	-0.00042	0.01593	-0.00104	-0.00913	0.00792	-0.01203	-0.01492
Volkswagen	0.01414	-0.00121	0.00208	0.00897	0.00588	-0.00277	-0.00978	0.00779	0.00721	0.01037	0.00327	0.00129	-0.00181	-0.00592	0.00552
Ahold Delhaize	-0.00015	0.00301	0.00055	-0.01671	0.00548	0.01245	0.01134	0.00033	0.00658	-0.02078	0.00488	-0.02226	-0.00626	0.01462	0.00317
AIB Group	-0.00015	0.00301	0.00055	-0.01671	0.00548	0.01245	0.01134	0.00033	0.00658	-0.02078	0.00488	-0.02226	-0.00626	0.01462	0.00317
Lafarge	-0.00015	0.00301	0.00055	-0.01671	0.00548	0.01245	0.01134	0.00033	0.00658	-0.02078	0.00488	-0.02226	-0.00626	0.01462	0.00317
Endesa	0.00817	0.00562	-0.00166	0.00636	0.00393	-0.00123	-0.00027	0.00787	-0.00437	0.00264	-0.00112	0.00694	0.00055	-0.00921	-0.00318
ABN Amro Holding	0.00636	0.00393	-0.00123	-0.00027	0.00787	-0.00437	0.00264	-0.00112	0.00694	0.00055	-0.00921	-0.00318	0.00471	-0.00483	-0.00207
Alcatel-Lucent	-0.01417	0.01935	-0.00971	0.00517	0.00052	0.01810	0.00185	-0.00037	0.01536	-0.01400	-0.02834	-0.02755	0.03039	-0.00704	-0.00586
Ageas (Ex-Fortis)	0.01543	0.03030	0.01185	0.00817	-0.00438	-0.00405	0.00933	-0.01021	-0.02165	-0.00442	-0.00168	0.01621	0.01466	0.00087	0.01225
Renault	0.01543	0.03030	0.01185	0.00817	-0.00438	-0.00405	0.00933	-0.01021	-0.02165	-0.00442	-0.00168	0.01621	0.01466	0.00087	0.01225
Volkswagen	-0.01778	-0.00928	-0.01045	0.00725	-0.01437	-0.01813	0.01433	0.00591	0.01306	-0.00902	-0.03526	-0.02840	0.01233	0.00155	0.01182
Aegon	-0.01167	0.00636	-0.01755	-0.01043	0.00750	0.00896	-0.00525	0.00244	0.03459	-0.00003	0.01137	0.00268	-0.00965	0.00939	0.01067
Alstom	0.01120	0.00757	0.01744	-0.00987	-0.01192	0.02206	-0.00007	0.02772	0.00159	-0.03757	-0.05244	-0.01297	0.03359	0.00567	-0.04236
Crédit Agricole	0.01120	0.00757	0.01744	-0.00987	-0.01192	0.02206	-0.00007	0.02772	0.00159	-0.03757	-0.05244	-0.01297	0.03359	0.00567	-0.04236
Deutsche Boerse	-0.02718	0.01048	0.00248	-0.00647	0.00575	-0.02064	0.00130	-0.02401	0.00497	0.00401	0.02387	0.00250	0.00038	-0.00289	0.00265
Telecom Italia	-0.02718	0.01048	0.00248	-0.00647	0.00575	-0.02064	0.00130	-0.02401	0.00497	0.00401	0.02387	0.00250	0.00038	-0.00289	0.00265
Nokia	-0.00831	-0.02321	0.01931	0.00826	-0.03115	0.01597	0.00826	-0.00640	0.00116	0.02385	-0.00117	0.00408	0.01400	-0.00370	-0.00253
Arcelormittal	-0.00482	0.01351	0.00487	-0.00163	-0.02592	-0.00242	0.00571	-0.01348	0.01919	-0.00750	0.00179	0.00575	0.01048	-0.00183	0.01879
CRH	-0.00246	0.01323	-0.00838	0.02138	0.01008	-0.00097	-0.00944	0.00259	0.00076	0.00165	0.01205	0.01798	-0.00061	-0.00236	-0.00679
Repsol YPF	-0.02252	-0.03219	-0.05503	0.04598	-0.01480	0.03412	0.00177	-0.00517	-0.02506	0.00317	0.02202	-0.02786	0.00556	0.01115	0.01111
RWE	-0.02252	-0.03219	-0.05503	0.04598	-0.01480	0.03412	0.00177	-0.00517	-0.02506	0.00317	0.02202	-0.02786	0.00556	0.01115	0.01111
Assicurazioni Generali	-0.00264	0.01121	0.00495	-0.00697	0.00756	-0.00395	0.01070	-0.00252	-0.00187	0.02042	-0.00067	-0.00244	0.00698	-0.00263	-0.00989
Unicredit	-0.00264	0.01121	0.00495	-0.00697	0.00756	-0.00395	0.01070	-0.00252	-0.00187	0.02042	-0.00067	-0.00244	0.00698	-0.00263	-0.00989

Carrefour	-0.00264	0.01121	0.00495	-0.00697	0.00756	-0.00395	0.01070	-0.00252	-0.00187	0.02042	-0.00067	-0.00244	0.00698	-0.00263	-0.00989				
Saint Gobain	0.00450	0.00213	0.00328	0.00044	0.00368	0.00300	0.01021	0.00810	-0.00596	0.00273	0.00390	0.00484	-0.01477	0.00439	-0.00740				
E ON N	0.00450	0.00213	0.00328	0.00044	0.00368	0.00300	0.01021	0.00810	-0.00596	0.00273	0.00390	0.00484	-0.01477	0.00439	-0.00740				
Deutsche Bank	0.00450	0.00213	0.00328	0.00044	0.00368	0.00300	0.01021	0.00810	-0.00596	0.00273	0.00390	0.00484	-0.01477	0.00439	-0.00740				
Wfd Unibail-Rodamco	-0.00627	-0.01175	0.00436	0.00644	-0.00151	0.01356	0.00451	0.00168	-0.00344	0.00876	0.00977	0.00301	-0.00005	0.00113	0.00508				
Orange	-0.00436	0.02185	-0.00061	0.00809	-0.00769	-0.00466	-0.01306	0.00155	0.01820	-0.01010	-0.01329	0.01627	-0.01419	0.01744	-0.00364				
BBV Argentaria	-0.00436	0.02185	-0.00061	0.00809	-0.00769	-0.00466	-0.01306	0.00155	0.01820	-0.01010	-0.01329	0.01627	-0.01419	0.01744	-0.00364				
Telefonica	-0.00436	0.02185	-0.00061	0.00809	-0.00769	-0.00466	-0.01306	0.00155	0.01820	-0.01010	-0.01329	0.01627	-0.01419	0.01744	-0.00364				
Fresenius	-0.00436	0.02185	-0.00061	0.00809	-0.00769	-0.00466	-0.01306	0.00155	0.01820	-0.01010	-0.01329	0.01627	-0.01419	0.01744	-0.00364				
Société Générale	-0.00436	0.02185	-0.00061	0.00809	-0.00769	-0.00466	-0.01306	0.00155	0.01820	-0.01010	-0.01329	0.01627	-0.01419	0.01744	-0.00364				
Nokia	-0.00510	0.00877	-0.00367	-0.00291	0.00457	-0.00560	-0.01334	0.01911	0.00030	0.00137	-0.00214	-0.00957	0.02521	0.00605	0.00891				

Table A.7: EURO STOXX 50 log returns of the corresponding to the *Event window* of each sample company deleted from the index.

A.5 Market Model: parameters estimation

A.6 Market Model: *Normal Returns*

	Intercept	Slope	Standard Error	R^2	Average error	Variance of errors	p-value (test F)	Significance
Banco Santander	0.00018	0.73989	0.01266	0.27829	0.00018	0.00016	0.00048	***
BASF	0.00291	0.57204	0.01830	0.09930	0.00291	0.00033	0.00000	***
HypoVereinsbank	0.00061	0.92401	0.02476	0.13582	0.00061	0.00060	0.00000	***
Dresdner Bank	0.00159	1.36444	0.02094	0.32393	0.00159	0.00043	0.00000	***
Muenchener Ruck.	-0.00115	1.43740	0.02157	0.33379	-0.00115	0.00046	0.00000	***
Sanofi	-0.00103	0.83705	0.02545	0.10878	-0.00103	0.00064	0.00000	***
Suez(Rompus)	-0.00110	0.63880	0.01382	0.19434	-0.00110	0.00019	0.00013	***
Danone	0.00380	-0.31321	0.02394	0.03601	0.00380	0.00056	0.00000	***
Intesa Sanpaolo	0.00299	0.28379	0.03204	0.01683	0.00299	0.00101	0.00000	***
Saint Gobain	0.00103	0.77170	0.01973	0.23432	0.00103	0.00038	0.00000	***
Lafarge	0.00013	0.52844	0.01416	0.43309	0.00013	0.00020	0.02281	**
Iberdrola	-0.00032	0.27320	0.00878	0.22516	-0.00032	0.00008	0.00000	***
Crédit Agricole	-0.00007	0.88006	0.00969	0.44515	-0.00007	0.00009	0.00415	***
Arcelormittal	0.00005	1.10384	0.01479	0.38624	0.00005	0.00021	0.00000	***
Schneider Electric	-0.00045	0.77107	0.01132	0.34399	-0.00045	0.00013	0.00462	***
Vinci	-0.00150	1.08754	0.01148	0.50351	-0.00150	0.00013	0.00001	***
Volkswagen	0.00262	0.47393	0.01365	0.13405	0.00262	0.00018	0.00751	***
Deutsche Boerse	0.00083	1.26622	0.01503	0.47082	0.00083	0.00022	0.00000	***
Alstom	0.00069	1.14854	0.02069	0.35064	0.00069	0.00042	0.00000	***
Anheuser-Busch Inbev	0.00124	0.34892	0.01943	0.08659	0.00124	0.00037	0.07671	*
CRH	-0.00044	0.83023	0.02697	0.21781	-0.00044	0.00071	0.00000	***
WFD Unibail-Rodamco	0.00041	0.69162	0.01196	0.34855	0.00041	0.00014	0.09992	*
BMW	0.00266	0.69546	0.01413	0.45313	0.00266	0.00020	0.73413	
Volkswagen Pref.	0.00210	0.89426	0.01780	0.35978	0.00210	0.00031	0.00004	***
Inditex	0.00208	0.55638	0.01151	0.34243	0.00208	0.00013	0.59919	
ASML Holding	0.00171	0.55917	0.01316	0.22961	0.00171	0.00017	0.10850	
Essilorluxottica	0.00271	0.39548	0.00982	0.21135	0.00271	0.00009	0.11753	
Airbus	0.00280	0.54443	0.01579	0.10475	0.00280	0.00024	0.00000	***
Deutsche Post	0.00107	0.73125	0.00936	0.42545	0.00107	0.00009	0.23434	
Nokia	0.00055	1.07286	0.01447	0.27498	0.00055	0.00021	0.00000	***
Fresenius	0.00196	0.84116	0.01214	0.46350	0.00196	0.00014	0.02816	**
Safran	0.00092	0.84073	0.01285	0.43508	0.00092	0.00016	0.01190	**
Adidas	0.00400	0.38502	0.01235	0.18221	0.00400	0.00015	0.28302	
Ahold Delhaize	0.00069	0.36340	0.01011	0.22843	0.00069	0.00010	0.00456	***
CRH	0.00163	0.96129	0.01204	0.59369	0.00163	0.00014	0.02173	**
Amadeus It Group	0.00234	0.67271	0.00997	0.18760	0.00234	0.00010	0.00001	***
Kering	0.00126	0.97300	0.01679	0.14554	0.00126	0.00028	0.00000	***
Deutsche Boerse	0.00111	0.63458	0.01130	0.19322	0.00111	0.00013	0.00015	***
Adyen	0.00548	0.32288	0.02557	0.06849	0.00548	0.00064	0.02928	**
Prosus	0.00252	0.56722	0.02317	0.21657	0.00252	0.00053	0.03990	**
Vonovia	0.00245	0.49726	0.01624	0.30189	0.00245	0.00026	0.29902	
Kone 'B'	0.00305	0.36285	0.01450	0.22409	0.00305	0.00021	0.00589	***
Pernod-Ricard	0.00029	0.52680	0.01334	0.41830	0.00029	0.00017	0.03321	**
Infineon Technologies	0.00257	1.01366	0.01746	0.34190	0.00257	0.00030	0.00000	***

Table A.8: *OLS* parameters estimates used to calculate the *Normal returns* in the *Market model* (added firms).

*** : significant at the 0.01 level.

** : significant at the 0.05 level.

* : significant at the 0.10 level.

	Intercept	Slope	Standard Error	R^2	Average error	Variance of errors	p-value (test F)	Significance
Akzo Nobel	0.00178	0.46974	0.02110	0.05296	0.00178	0.00044	0.00000	***
AIB Group	-0.00336	0.91961	0.01800	0.22755	-0.00336	0.00032	0.00000	***
Relx	-0.00231	0.60301	0.02077	0.08685	-0.00231	0.00042	0.00000	***
Stellantis	0.00176	0.90041	0.01775	0.22493	0.00176	0.00031	0.00000	***
Deutsche Lufthansa	-0.00184	0.45974	0.01833	0.06625	-0.00184	0.00033	0.00000	***
Pharol SGPS	-0.00098	0.29770	0.02032	0.02364	-0.00098	0.00041	0.00000	***
Schneider Electric	0.00157	0.69634	0.02079	0.11235	0.00157	0.00042	0.00000	***
Saint Gobain	-0.00312	0.47728	0.02334	0.06291	-0.00312	0.00053	0.00000	***
Electrabel	-0.00071	0.22188	0.02147	0.02277	-0.00071	0.00045	0.00007	***
Ceconomy	0.00142	0.16868	0.02922	0.00722	0.00142	0.00084	0.00000	***
Kpn Kon	-0.00800	1.98074	0.03758	0.35710	-0.00800	0.00139	0.00000	***
Kering	-0.00282	0.88406	0.02304	0.44678	-0.00282	0.00052	0.00380	***
HypoVereinsbank	0.00316	1.54599	0.02841	0.47064	0.00316	0.00079	0.00000	***
Volkswagen	-0.00059	1.04895	0.00863	0.58987	-0.00059	0.00007	0.00128	***
Ahold Delhaize	0.00066	0.68134	0.01335	0.22751	0.00066	0.00017	0.00024	***
AIB Group	-0.00195	1.36439	0.01090	0.63914	-0.00195	0.00012	0.00000	***
Lafarge	-0.00074	1.13379	0.00967	0.60841	-0.00074	0.00009	0.00012	***
Endesa	-0.00008	0.11120	0.00302	0.14815	-0.00008	0.00001	0.00000	***
ABN Amro Holding	0.00051	0.97779	0.01045	0.52337	0.00051	0.00011	0.00184	***
Alcatel-Lucent	0.00272	1.68208	0.01946	0.56695	0.00272	0.00037	0.00000	***
Ageas (Ex-Fortis)	0.00494	1.40657	0.03462	0.32666	0.00494	0.00118	0.00000	***
Renault	0.00346	1.67539	0.03134	0.45647	0.00346	0.00096	0.00000	***
Volkswagen	-0.00977	1.06958	0.02779	0.19154	-0.00977	0.00076	0.00000	***
Aegon	-0.00023	1.20870	0.01121	0.79894	-0.00023	0.00012	0.00181	***
Alstom	0.00044	1.12762	0.01118	0.69371	0.00044	0.00012	0.00174	***
Crédit Agricole	-0.00231	1.57364	0.01542	0.69884	-0.00231	0.00023	0.00000	***
Deutsche Boerse	-0.00027	0.95350	0.01959	0.28115	-0.00027	0.00038	0.00000	***
Telecom Italia	-0.00025	0.85762	0.01517	0.34531	-0.00025	0.00023	0.00010	***
Nokia	0.00192	1.78361	0.02897	0.27169	0.00192	0.00082	0.00000	***
Arcelormittal	-0.00124	0.93157	0.01688	0.26968	-0.00124	0.00028	0.00000	***
CRH	-0.00129	1.15011	0.01080	0.43866	-0.00129	0.00011	0.00000	***
Repsol YPF	-0.00043	0.75250	0.00928	0.54200	-0.00043	0.00008	0.81960	
RWE	-0.00300	0.67593	0.01487	0.27112	-0.00300	0.00022	0.00688	***
Assicurazioni Generali	-0.00114	1.68464	0.01456	0.75422	-0.00114	0.00021	0.00000	***
Unicredit	-0.00490	2.37605	0.03085	0.57630	-0.00490	0.00093	0.00000	***
Carrefour	-0.00051	0.92261	0.00964	0.67748	-0.00051	0.00009	0.23496	
Saint Gobain	-0.00146	0.85498	0.00938	0.29635	-0.00146	0.00009	0.00000	***
E ON N	0.00012	0.71625	0.00970	0.21673	0.00012	0.00009	0.00001	***
Deutsche Bank	-0.00112	1.34574	0.01576	0.26995	-0.00112	0.00024	0.00000	***
Wfd Unibail-Rodamco	-0.00190	0.42670	0.01295	0.07618	-0.00190	0.00016	0.00001	***
Orange	-0.00147	0.69212	0.01576	0.47068	-0.00147	0.00024	0.92708	
BBV Argentaria	-0.00436	1.44382	0.02303	0.64447	-0.00436	0.00052	0.00000	***
Telefonica	-0.00217	0.83892	0.02672	0.31243	-0.00217	0.00070	0.00003	***
Fresenius	0.00021	0.87523	0.01961	0.47884	0.00021	0.00038	0.01485	**
Société Générale	-0.00524	1.80326	0.02443	0.71525	-0.00524	0.00059	0.00000	***
Nokia	-0.00045	0.36893	0.03458	0.01724	-0.00045	0.00117	0.00000	***

Table A.9: *OLS* parameters estimates used to calculate the *Normal returns* in the *Market model* (deleted firms).
*** : significant at the 0.01 level.
** : significant at the 0.05 level.
* : significant at the 0.10 level.

	-7	-6	-5	-4	-3	-2	-1	0	1	2	3	4	5	6	7
Banco Santander	-0.01031	0.00358	0.01851	0.01430	0.00299	0.00478	-0.00161	-0.01166	0.00737	0.00755	0.00582	0.01479	-0.00062	0.00036	-0.00285
BASF	-0.00520	0.00554	0.01708	0.01383	0.00508	0.00647	0.00153	-0.00624	0.00847	0.00861	0.00727	0.01421	0.00229	0.00305	0.00057
HypoVereinsbank	-0.01249	0.00486	0.02349	0.01824	0.00411	0.00635	-0.00163	-0.01418	0.00958	0.00981	0.00765	0.01886	-0.00040	0.00084	-0.00318
Dresdner Bank	-0.01776	0.00786	0.03538	0.02762	0.00676	0.01006	-0.00172	-0.02025	0.01484	0.01518	0.01198	0.02853	0.00010	0.00192	-0.00401
Muenchener Ruck.	-0.02153	0.00546	0.03445	0.02628	0.00431	0.00778	-0.00463	-0.02415	0.01281	0.01317	0.00981	0.02724	-0.00271	-0.00079	-0.00704
Sanofi	-0.01290	0.00282	0.01970	0.01494	0.00215	0.00417	-0.00305	-0.01442	0.00710	0.00731	0.00535	0.01550	-0.00194	-0.00082	-0.00446
Suez(Rompus)	-0.01016	0.00183	0.01472	0.01108	0.00132	0.00286	-0.00265	-0.01133	0.00510	0.00526	0.00376	0.01151	-0.00180	-0.00095	-0.00373
Danone	0.00045	0.00139	0.00274	0.00059	0.00235	0.00394	0.00145	0.00472	0.00256	0.00570	0.00448	0.00472	0.00404	0.00387	0.00600
Intesa Sanpaolo	0.00602	0.00517	0.00394	0.00590	0.00430	0.00286	0.00511	0.00215	0.00411	0.00126	0.00237	0.00215	0.00277	0.00292	0.00099
Saint Gobain	0.00578	0.01576	0.00134	-0.01274	0.00290	-0.01844	0.00244	-0.00981	0.01039	-0.01983	-0.01764	-0.01962	-0.00252	-0.05006	0.01070
Lafarge	0.01299	-0.00934	-0.00929	0.01746	-0.02513	-0.01216	0.00841	-0.01373	-0.02651	0.00527	-0.00458	0.02210	-0.01076	0.01536	0.01655
Iberdrola	0.00193	0.00069	-0.00334	-0.00331	0.00221	0.00130	-0.00238	0.00436	-0.00044	0.00403	-0.00061	-0.00282	0.00184	-0.00361	-0.00440
Crédit Agricole	0.01238	-0.00113	0.00176	0.00782	0.00510	-0.00251	-0.00868	0.00678	0.00628	0.00906	0.00280	0.00106	-0.00166	-0.00528	0.00479
Arcelormittal	-0.00012	0.00337	0.00065	-0.01840	0.00609	0.01379	0.01257	0.00041	0.00731	-0.02289	0.00543	-0.02453	-0.00686	0.01618	0.00355
Schneider Electric	-0.00056	0.00187	-0.00002	-0.01333	0.00377	0.00915	0.00830	-0.00019	0.00463	-0.01647	0.00331	-0.01761	-0.00527	0.01082	0.00200
Vinci	-0.00166	0.00178	-0.00090	-0.01967	0.00446	0.01204	0.01084	-0.00113	0.00566	-0.02410	0.00381	-0.02571	-0.00830	0.01440	0.00195
Volkswagen	0.00649	0.00528	0.00184	0.00563	0.00448	0.00204	0.00249	0.00635	0.00055	0.00387	0.00209	0.00591	0.00288	-0.00174	0.00112
Deutsche Boerse	0.00888	0.00580	-0.00073	0.00049	0.01079	-0.00471	0.00417	-0.00059	0.00962	0.00152	-0.01084	-0.00320	0.00680	-0.00529	-0.00179
Alstom	-0.01559	0.02291	-0.01046	0.00663	0.00129	0.02148	0.00281	0.00027	0.01832	-0.01539	-0.03187	-0.03096	0.03559	-0.00740	-0.00604
Anheuser-Busch Inbev	0.00663	0.01182	0.00538	0.00409	-0.00029	-0.00017	0.00450	-0.00232	-0.00631	-0.00030	0.00066	0.00690	0.00636	0.00154	0.00552
CRH	0.01237	0.02472	0.00940	0.00635	-0.00408	-0.00380	0.00730	-0.00892	-0.01841	-0.00411	-0.00183	0.01302	0.01173	0.00028	0.00973
WFD Unibail-Rodamco	-0.01188	-0.00601	-0.00682	0.00543	-0.00953	-0.01213	0.01032	0.00450	0.00944	-0.00583	-0.02397	-0.01923	0.00894	0.00148	0.00859
BMW	-0.00546	0.00708	-0.00955	-0.00460	0.00788	0.00889	-0.00099	0.00435	0.02672	0.00264	0.01056	0.00452	-0.00405	0.00919	0.01008
Volkswagen Pref.	0.01211	0.00887	0.01770	-0.00673	-0.00856	0.02182	0.00203	0.02689	0.00352	-0.03150	-0.04480	-0.00951	0.03213	0.00717	-0.03579
Inditex	0.00831	0.00629	0.01179	-0.00341	-0.00455	0.01436	0.00204	0.01751	0.00297	-0.01882	-0.02710	-0.00514	0.02077	0.00524	-0.02149
ASML Holding	-0.01349	0.00756	0.00309	-0.00191	0.00492	-0.00983	0.00244	-0.01172	0.00448	0.00395	0.01505	0.00311	0.00192	0.00009	0.00319
Essilorluxottica	-0.00804	0.00685	0.00369	0.00015	0.00499	-0.00545	0.00323	-0.00678	0.00468	0.00430	0.01215	0.00370	0.00286	0.00157	0.00376
Airbus	-0.00172	-0.00984	0.01331	0.00730	-0.01416	0.01149	0.00730	-0.00068	0.00343	0.01579	0.00216	0.00502	0.01042	0.00079	0.00142
Deutsche Post	-0.00246	0.01094	0.00463	-0.00013	-0.01789	-0.00071	0.00524	-0.00880	0.01510	-0.00442	0.00238	0.00527	0.00873	-0.00027	0.01481
Nokia	-0.00210	0.01474	-0.00844	0.02349	0.01136	-0.00049	-0.00958	0.00332	0.00136	0.00231	0.01347	0.01984	-0.00011	-0.00198	-0.00674
Fresenius	-0.01698	-0.02512	-0.04433	0.04064	-0.01049	0.03066	0.00345	-0.00239	-0.01912	0.00463	0.02048	-0.02147	0.00663	0.01134	0.01131
Safran	-0.01801	-0.02614	-0.04534	0.03958	-0.01152	0.02961	0.00241	-0.00342	-0.02014	0.00359	0.01944	-0.02250	0.00559	0.01030	0.01027
Adidas	0.00298	0.00831	0.00590	0.00131	0.00691	0.00248	0.00812	0.00303	0.00328	0.01186	0.00374	0.00306	0.00668	0.00298	0.00019
Ahold Delhaize	-0.00027	0.00476	0.00249	-0.00185	0.00343	-0.00075	0.00458	-0.00023	0.00001	0.00811	0.00044	-0.00020	0.00322	-0.00027	-0.00291
CRH	-0.00091	0.01241	0.00639	-0.00507	0.00890	-0.00216	0.01192	-0.00079	-0.00016	0.02126	0.00098	-0.00071	0.00834	-0.00090	-0.00787

Amadeus It Group	0.00537	0.00377	0.00455	0.00264	0.00482	0.00436	0.00921	0.00779	-0.00167	0.00418	0.00497	0.00559	-0.00760	0.00529	-0.00264			
Kering	0.00564	0.00333	0.00445	0.00169	0.00485	0.00419	0.01120	0.00915	-0.00453	0.00392	0.00506	0.00597	-0.01311	0.00553	-0.00593			
Deutsche Boerse	-0.00287	-0.00634	0.00388	0.00520	0.00015	0.00972	0.00398	0.00218	-0.00107	0.00667	0.00731	0.00302	0.00108	0.00183	0.00434			
Adyen	0.00407	0.01253	0.00528	0.00809	0.00299	0.00397	0.00126	0.00597	0.01135	0.00221	0.00118	0.01073	0.00089	0.01110	0.00430			
Prosus	0.00005	0.01491	0.00217	0.00711	-0.00185	-0.00013	-0.00489	0.00340	0.01284	-0.00321	-0.00502	0.01175	-0.00553	0.01241	0.00046			
Vonovia	0.00028	0.01331	0.00214	0.00647	-0.00138	0.00013	-0.00405	0.00321	0.01150	-0.00258	-0.00416	0.01054	-0.00461	0.01112	0.00064			
Kone 'B'	0.00147	0.01098	0.00283	0.00599	0.00026	0.00136	-0.00169	0.00361	0.00966	-0.00061	-0.00177	0.00896	-0.00210	0.00938	0.00173			
Pernod-Ricard	-0.00200	0.01180	-0.00003	0.00455	-0.00376	-0.00217	-0.00659	0.00111	0.00988	-0.00503	-0.00671	0.00886	-0.00719	0.00948	-0.00162			
Infineon Technologies	-0.00260	0.01146	-0.00115	-0.00038	0.00720	-0.00311	-0.01096	0.02194	0.00287	0.00395	0.00040	-0.00714	0.02812	0.00869	0.01159			

Table A.10: *Normal returns* calculation for added firms using the *Market model* over the *Estimation window* $(-120, -11)$

	-7	-6	-5	-4	-3	-2	-1	0	1	2	3	4	5	6	7
Akzo Nobel	-0.00488	0.00394	0.01341	0.01074	0.00356	0.00469	0.00064	-0.00574	0.00634	0.00646	0.00536	0.01105	0.00127	0.00189	-0.00015
AIB Group	-0.01640	0.00087	0.01941	0.01419	0.00013	0.00235	-0.00559	-0.01808	0.00557	0.00580	0.00365	0.01480	-0.00436	-0.00313	-0.00713
Relx	-0.01086	0.00047	0.01263	0.00920	-0.00002	0.00144	-0.00377	-0.01196	0.00355	0.00370	0.00229	0.00960	-0.00296	-0.00216	-0.00478
Stellantis	-0.01101	0.00590	0.02406	0.01894	0.00518	0.00735	-0.00042	-0.01265	0.01051	0.01073	0.00862	0.01954	0.00078	0.00198	-0.00193
Deutsche Lufthansa	-0.00836	0.00028	0.00955	0.00693	-0.00009	0.00102	-0.00295	-0.00919	0.00263	0.00274	0.00167	0.00724	-0.00234	-0.00172	-0.00372
Pharol SGPS	-0.00520	0.00039	0.00639	0.00470	0.00015	0.00087	-0.00170	-0.00575	0.00191	0.00198	0.00129	0.00490	-0.00131	-0.00091	-0.00220
Schneider Electric	-0.00830	0.00478	0.01882	0.01486	0.00422	0.00590	-0.00011	-0.00957	0.00834	0.00851	0.00688	0.01533	0.00082	0.00175	-0.00128
Saint Gobain	0.00950	-0.00168	-0.00473	-0.00116	-0.00585	-0.01460	-0.00119	0.00164	-0.00639	-0.00749	-0.00400	0.00273	-0.00018	0.00533	-0.01074
Electrabel	0.00166	0.00100	0.00004	0.00157	0.00032	-0.00081	0.00096	-0.00136	0.00017	-0.00205	-0.00119	-0.00136	-0.00088	-0.00076	-0.00227
Ceconomy	0.00322	0.00272	0.00199	0.00315	0.00220	0.00134	0.00268	0.00092	0.00208	0.00039	0.00105	0.00092	0.00129	0.00138	0.00023
Kpn Kon	0.00420	0.02981	-0.00719	-0.04334	-0.00321	-0.05797	-0.00438	-0.03581	0.01602	-0.06154	-0.05591	-0.06100	-0.01712	-0.13912	0.01683
Kering	0.01870	-0.01866	-0.01858	0.02618	-0.04508	-0.02338	0.01103	-0.02600	-0.04738	0.00578	-0.01070	0.03394	-0.02103	0.02266	0.02465
HypoVereinsbank	0.01593	0.00891	-0.01394	-0.01374	0.01748	0.01232	-0.00846	0.02965	0.00250	0.02779	0.00155	-0.01096	0.01540	-0.01544	-0.01991
Volkswagen	0.01424	-0.00186	0.00159	0.00881	0.00558	-0.00350	-0.01086	0.00758	0.00697	0.01029	0.00283	0.00076	-0.00249	-0.00681	0.00520
Ahold Delhaize	0.00055	0.00271	0.00103	-0.01073	0.00439	0.00914	0.00838	0.00088	0.00514	-0.01350	0.00398	-0.01451	-0.00361	0.01061	0.00282
AIB Group	-0.00215	0.00216	-0.00120	-0.02475	0.00552	0.01504	0.01353	-0.00150	0.00703	-0.03030	0.00471	-0.03232	-0.01049	0.01799	0.00238
Lafarge	-0.00091	0.00267	-0.00012	-0.01968	0.00547	0.01338	0.01212	-0.00036	0.00672	-0.02430	0.00479	-0.02598	-0.00784	0.01583	0.00286
Endesa	0.00083	0.00055	-0.00026	0.00063	0.00036	-0.00021	-0.00011	0.00080	-0.00056	0.00022	-0.00020	0.00070	-0.00002	-0.00110	-0.00043
ABN Amro Holding	0.00672	0.00435	-0.00069	0.00024	0.00820	-0.00377	0.00308	-0.00059	0.00730	0.00104	-0.00850	-0.00260	0.00512	-0.00422	-0.00151
Alcatel-Lucent	-0.02111	0.03527	-0.01361	0.01142	0.00360	0.03317	0.00583	0.00211	0.02855	-0.02083	-0.04496	-0.04362	0.05383	-0.00913	-0.00714
Ageas (Ex-Fortis)	0.02665	0.04757	0.02161	0.01644	-0.00121	-0.00076	0.01807	-0.00942	-0.02550	-0.00127	0.00258	0.02775	0.02556	0.00616	0.02217
Renault	0.02931	0.05423	0.02331	0.01715	-0.00388	-0.00333	0.01909	-0.01365	-0.03281	-0.00395	0.00064	0.03062	0.02801	0.00491	0.02398
Volkswagen	-0.02878	-0.01969	-0.02095	-0.00201	-0.02514	-0.02916	0.00556	-0.00345	0.00420	-0.01941	-0.04748	-0.04014	0.00342	-0.00811	0.00288
Aegon	-0.01434	0.00746	-0.02144	-0.01284	0.00884	0.01060	-0.00658	0.00272	0.04158	-0.00026	0.01351	0.00301	-0.01189	0.01112	0.01267
Alstom	0.01307	0.00898	0.02011	-0.01070	-0.01300	0.02532	0.00036	0.03170	0.00224	-0.04193	-0.05869	-0.01419	0.03832	0.00683	-0.04733
Crédit Agricole	0.01532	0.00961	0.02515	-0.01785	-0.02106	0.03241	-0.00242	0.04132	0.00020	-0.06143	-0.08483	-0.02272	0.05055	0.00662	-0.06897
Deutsche Boerse	-0.02619	0.00972	0.00209	-0.00644	0.00521	-0.01995	0.00097	-0.02317	0.00446	0.00355	0.02249	0.00211	0.00009	-0.00303	0.00226
Telecom Italia	-0.02356	0.00873	0.00187	-0.00580	0.00468	-0.01795	0.00087	-0.02085	0.00401	0.00318	0.02022	0.00190	0.00007	-0.00273	0.00203
Nokia	-0.01290	-0.03949	0.03635	0.01665	-0.05365	0.03039	0.01665	-0.00950	0.00398	0.04446	-0.00017	0.00920	0.02688	-0.00468	-0.00259
Arcelormittal	-0.00573	0.01134	0.00330	-0.00276	-0.02538	-0.00350	0.00408	-0.01380	0.01663	-0.00823	0.00043	0.00412	0.00852	-0.00294	0.01627
CRH	-0.00412	0.01393	-0.01092	0.02330	0.01031	-0.00240	-0.01214	0.00169	-0.00041	0.00061	0.01257	0.01940	-0.00199	-0.00400	-0.00909
Repsol YPF	-0.01738	-0.02465	-0.04184	0.03417	-0.01157	0.02524	0.00090	-0.00432	-0.01929	0.00195	0.01614	-0.02140	0.00375	0.00796	0.00793
RWE	-0.01822	-0.02475	-0.04019	0.02808	-0.01300	0.02006	-0.00180	-0.00649	-0.01993	-0.00085	0.01189	-0.02183	0.00076	0.00454	0.00452
Assicurazioni Generali	-0.00559	0.01774	0.00720	-0.01288	0.01159	-0.00779	0.01689	-0.00538	-0.00428	0.03326	-0.00228	-0.00525	0.01062	-0.00557	-0.01780
Unicredit	-0.01119	0.02173	0.00686	-0.02147	0.01305	-0.01429	0.02052	-0.01089	-0.00934	0.04361	-0.00651	-0.01070	0.01168	-0.01116	-0.02840

Carrefour	-0.00295	0.00983	0.00406	-0.00694	0.00646	-0.00415	0.00936	-0.00283	-0.00223	0.01833	-0.00113	-0.00276	0.00593	-0.00294	-0.00963
Saint Gobain	0.00239	0.00036	0.00134	-0.00108	0.00169	0.00111	0.00727	0.00547	-0.00655	0.00088	0.00188	0.00267	-0.01409	0.00229	-0.00778
E ON N	0.00334	0.00164	0.00247	0.00044	0.00276	0.00227	0.00743	0.00592	-0.00415	0.00208	0.00291	0.00358	-0.01046	0.00326	-0.00518
Deutsche Bank	0.00493	0.00174	0.00329	-0.00053	0.00384	0.00292	0.01262	0.00978	-0.00914	0.00256	0.00413	0.00538	-0.02100	0.00479	-0.01108
Wfd Unibail-Rodamco	-0.00457	-0.00691	-0.00003	0.00085	-0.00254	0.00389	0.00003	-0.00118	-0.00337	0.00184	0.00227	-0.00061	-0.00192	-0.00141	0.00027
Orange	-0.00448	0.01365	-0.00189	0.00413	-0.00679	-0.00469	-0.01051	-0.00040	0.01113	-0.00846	-0.01067	0.00979	-0.01129	0.01060	-0.00398
BBV Argentaria	-0.01065	0.02718	-0.00525	0.00732	-0.01547	-0.01109	-0.02322	-0.00213	0.02191	-0.01895	-0.02356	0.01913	-0.02485	0.02081	-0.00961
Telefonica	-0.00582	0.01616	-0.00268	0.00462	-0.00862	-0.00608	-0.01313	-0.00087	0.01310	-0.01064	-0.01332	0.01148	-0.01407	0.01246	-0.00522
Fresenius	-0.00361	0.01933	-0.00033	0.00729	-0.00653	-0.00387	-0.01123	0.00156	0.01613	-0.00864	-0.01143	0.01444	-0.01222	0.01547	-0.00298
Société Générale	-0.01310	0.03415	-0.00635	0.00935	-0.01912	-0.01365	-0.02880	-0.00245	0.02758	-0.02346	-0.02921	0.02409	-0.03084	0.02620	-0.01180
Nokia	-0.00233	0.00279	-0.00180	-0.00152	0.00124	-0.00251	-0.00537	0.00661	-0.00034	0.00006	-0.00124	-0.00398	0.00886	0.00178	0.00284

Table A.11: *Normal returns* calculation for deleted firms using the *Market model* over the *Estimation window* $(-120, -11)$

A.7 Market Model: *Abnormal Returns*

	-7	-6	-5	-4	-3	-2	-1	0	1	2	3	4	5	6	7
Banco Santander	-0.01472	0.02465	-0.02065	-0.01643	-0.01055	0.01877	0.01737	0.01270	0.00811	-0.02825	0.01693	-0.00158	-0.00647	0.00471	0.00488
BASF	-0.02733	0.01085	-0.00184	-0.01717	-0.00174	-0.02329	-0.02441	0.00392	0.01220	-0.01774	0.00865	-0.02556	-0.02773	0.00278	-0.00406
HypoVereinsbank	-0.00443	0.01396	0.00075	-0.00565	0.00674	0.00972	-0.01624	0.02047	0.01409	0.01928	-0.00765	-0.01040	-0.00467	0.00760	-0.01525
Dresdner Bank	-0.02623	0.01567	-0.00484	-0.00654	0.00300	0.00800	-0.02122	0.02147	0.03511	0.03239	-0.03889	-0.01723	0.00326	0.01694	-0.00482
Muenchener Ruck.	0.00693	0.00332	-0.01140	0.00181	-0.00875	0.02990	-0.00507	0.01162	0.00079	0.00291	0.00078	-0.04049	-0.01613	0.00079	0.00159
Sanofi	-0.01919	-0.02341	0.00901	-0.00342	0.01555	-0.00443	0.02148	0.02108	0.02284	0.03038	-0.00559	-0.03698	-0.02076	-0.00118	0.01094
Suez(Rompus)	-0.00535	-0.01900	-0.01436	0.01128	0.00934	0.00937	0.00838	0.02996	-0.06766	-0.02332	-0.00376	0.01180	0.00563	0.00338	0.01236
Danone	-0.01676	-0.00139	0.00381	-0.00386	0.02035	0.00563	0.00803	0.00778	0.00856	-0.03563	-0.02043	0.01439	-0.00089	-0.01653	-0.02920
Intesa Sanpaolo	-0.01022	0.02783	-0.00192	-0.01402	-0.01044	0.01342	0.00495	-0.00215	0.02740	-0.01101	-0.02412	-0.00215	0.00519	0.00106	-0.01293
Saint Gobain	-0.01457	0.00462	-0.00250	0.00521	-0.00290	-0.00034	-0.00125	0.00268	-0.02782	0.02648	0.01159	-0.01428	-0.02287	-0.03375	0.02231
Lafarge	0.00806	0.00313	-0.00285	0.02312	-0.00330	-0.00968	0.00385	-0.00283	-0.00907	-0.00811	-0.01458	-0.00743	0.02024	0.00994	0.00131
Iberdrola	-0.00259	0.01030	0.00652	-0.00375	0.00103	-0.00130	-0.00151	0.00271	-0.00987	-0.01577	-0.00066	0.00934	-0.00053	0.00099	0.00374
Crédit Agricole	-0.00351	-0.00230	0.00950	-0.00151	0.00453	0.00251	0.00050	-0.00437	0.00522	-0.00146	-0.01278	-0.00489	0.02535	0.00388	0.00733
Arcelormittal	-0.01257	0.05660	0.00150	-0.00854	0.01698	0.00349	0.00815	0.00516	-0.00607	0.00316	0.00168	-0.00722	-0.02304	0.01673	-0.01519
Schneider Electric	0.01750	0.01022	0.00945	-0.00260	0.00422	-0.00080	0.01831	0.00714	0.00248	-0.00036	-0.00506	-0.02630	-0.00959	0.00565	-0.00847
Vinci	0.01394	-0.00352	0.00728	-0.01067	0.00405	-0.00831	0.01436	0.02028	-0.00322	0.00633	-0.00763	-0.01273	-0.00330	-0.00718	-0.00235
Volkswagen	-0.00141	-0.00080	-0.00127	0.01249	-0.01946	0.00547	0.00217	0.03827	0.01775	0.00119	0.01065	0.04653	-0.01375	-0.01443	-0.03473
Deutsche Boerse	0.01539	0.00490	0.01492	0.00241	0.03565	0.00261	-0.00512	0.01244	-0.01009	-0.00247	-0.00266	0.00109	-0.00737	-0.00493	-0.00492
Alstom	-0.01108	0.01957	-0.01822	0.01656	0.02587	0.00454	-0.02017	0.03341	-0.00693	-0.01400	-0.03190	0.01539	-0.02887	-0.04366	0.01353
Anheuser-Busch Inbev	0.00356	0.01747	-0.00453	-0.00664	0.01027	-0.01015	0.00262	0.01957	-0.01908	-0.00226	-0.00408	-0.00964	0.00083	0.02521	0.00588
CRH	0.02437	-0.00605	-0.02969	0.00971	-0.04934	0.00872	-0.02688	0.02582	-0.00419	-0.02723	-0.01122	0.02104	-0.00712	0.05015	0.01457
WFD Unibail-Rodamco	0.01672	-0.00109	0.00390	-0.00121	0.00206	0.02476	0.00152	0.00877	-0.01164	-0.00017	0.01699	0.01508	-0.02279	-0.06373	0.00035
BMW	-0.01552	-0.00851	-0.00028	0.00363	-0.00211	-0.00625	-0.01492	0.00436	0.00541	0.01551	0.00184	-0.00781	0.00144	0.01231	-0.00276
Volkswagen Pref.	-0.05620	0.03285	0.02088	-0.00837	0.03313	-0.00771	-0.00025	0.00513	-0.01787	-0.01098	-0.00628	0.01803	0.01997	-0.03562	-0.00159
Inditex	0.00459	-0.01505	-0.00731	-0.00107	-0.01101	0.00264	0.01837	0.02346	0.01375	0.00681	-0.00168	-0.00808	0.01279	0.00353	0.00865
ASML Holding	0.00020	0.01116	-0.01275	0.01979	0.00842	-0.00579	-0.00378	-0.02032	-0.02601	0.02437	0.01530	0.01628	0.00646	0.00602	0.00468
Essilorluxottica	-0.00983	-0.00539	0.00795	0.00331	0.00776	-0.01279	-0.00178	-0.00399	-0.01069	0.02501	-0.00333	0.01553	0.00861	-0.00570	-0.00032
Airbus	0.01533	-0.01672	0.00326	-0.01710	-0.00501	0.05172	0.04618	-0.00520	0.02067	-0.02840	-0.00128	0.00895	-0.01017	0.01213	0.01315
Deutsche Post	0.01262	0.00372	0.00497	0.00211	-0.00256	0.00606	-0.00264	0.00802	0.01339	-0.00309	0.00973	0.01282	-0.02000	0.00647	-0.00450
Nokia	0.04164	-0.00110	-0.00036	-0.01548	-0.00977	-0.00911	0.00070	0.03331	-0.01554	0.01186	-0.00336	-0.01367	-0.00916	0.01892	-0.00710
Fresenius	-0.01181	-0.04181	0.03025	-0.04044	0.02470	0.03746	-0.02670	0.01546	-0.00782	0.00155	0.00468	0.00294	0.00131	0.00123	-0.02026
Safran	-0.00838	-0.00823	0.00739	-0.01356	0.00504	0.01105	-0.00405	0.03955	-0.00340	-0.02050	0.00172	-0.00196	-0.00770	-0.00745	0.00017
Adidas	-0.02043	-0.00949	-0.01072	-0.01210	0.00191	-0.00216	-0.01017	-0.02746	-0.00682	-0.03464	0.01534	-0.01007	0.00416	-0.01747	-0.00882
Ahold Delhaize	0.00352	-0.00314	-0.00503	0.00808	-0.00689	0.00236	-0.00227	-0.01204	0.00441	0.01595	-0.00248	-0.00230	-0.00345	-0.02111	-0.02753
CRH	0.00435	-0.00966	-0.00983	0.02821	-0.00487	0.02518	-0.01701	-0.00053	-0.00828	-0.00806	0.01221	-0.01232	-0.00867	-0.01697	-0.02402

Amadeus It Group	0.00071	-0.01035	0.00405	-0.00895	-0.01347	-0.01412	-0.00534	-0.00189	0.01562	0.02218	-0.00644	-0.00436	-0.01024	0.01988	-0.01308
Kering	0.02809	-0.02262	-0.00311	-0.01565	-0.00417	-0.00034	0.00293	0.00280	0.00848	0.00458	-0.00832	0.00508	0.00814	0.00887	-0.01238
Deutsche Boerse	-0.00248	0.02230	-0.01449	-0.01515	-0.02784	-0.00263	0.03943	0.02489	0.00509	-0.00194	-0.01496	-0.00083	-0.00620	-0.01067	0.00450
Adyen	-0.04173	-0.00452	0.02120	0.03070	-0.01289	-0.03356	-0.00267	-0.00315	-0.00748	-0.06682	-0.01782	0.01077	-0.02049	0.01147	0.01194
Prosus	0.04558	0.00932	0.01699	0.03106	0.00686	-0.01706	-0.02657	0.03429	-0.01883	-0.03879	-0.02905	-0.00603	-0.00419	0.00521	-0.00613
Vonovia	-0.00028	-0.00793	-0.00584	0.00525	-0.00697	0.00756	0.00571	0.00901	0.01059	-0.05324	-0.00814	0.01359	0.00125	0.00558	0.00465
Kone 'B'	0.00304	-0.00593	0.00885	-0.00268	0.00277	-0.00604	-0.00663	0.00387	-0.00140	-0.03566	0.00063	-0.00102	0.00294	0.02336	-0.00748
Pernod-Ricard	-0.01011	0.00991	0.00173	0.00020	-0.00099	-0.00775	-0.00725	-0.01549	0.01525	0.00950	-0.02395	0.00100	-0.00764	0.00043	0.00479
Infineon Technologies	-0.00573	0.01279	0.00115	-0.03901	0.02400	-0.01976	0.04134	-0.03127	-0.01866	-0.02957	-0.07702	0.02182	-0.02148	0.04645	-0.05922

Table A.12: *Abnormal Returns* calculation for added firms (*Market model*).

	-7	-6	-5	-4	-3	-2	-1	0	1	2	3	4	5	6	7
Akzo Nobel	0.00839	0.04062	0.01087	-0.00856	-0.02334	-0.00803	-0.00847	0.00237	0.00709	-0.00313	0.02518	-0.02839	0.00418	-0.02498	0.00126
AIB Group	0.01640	0.00331	-0.03622	-0.00156	-0.00013	-0.01076	0.00305	0.01214	-0.00984	0.03850	0.01177	-0.00121	0.01306	-0.00398	0.01188
Relx	-0.00360	-0.01514	-0.01263	-0.01414	-0.01496	0.00857	0.01858	-0.00286	0.01615	0.01562	-0.00709	-0.01442	0.01735	0.04412	0.00478
Stellantis	0.00795	-0.01508	0.00624	-0.02192	0.00079	-0.01034	-0.01462	-0.00879	-0.03241	-0.00758	-0.02452	-0.01795	-0.02507	0.02710	-0.00286
Deutsche Lufthansa	0.00836	0.01446	-0.00109	0.00626	0.01489	0.01240	0.02576	0.00471	0.03525	0.02529	-0.02311	0.00620	0.02092	-0.01524	-0.00487
Pharol SGPS	-0.00461	-0.00088	0.00015	0.01125	-0.00386	-0.00634	-0.00782	-0.00641	0.00494	-0.00223	-0.01866	0.02281	0.00656	0.01082	-0.00822
Schneider Electric	-0.00791	-0.00908	0.00339	0.01427	-0.02830	0.02716	-0.03632	0.02546	-0.01250	0.00802	0.00938	0.02885	-0.00546	-0.00953	0.01448
Saint Gobain	-0.02362	-0.05186	0.07372	0.00780	0.00319	-0.04069	0.00470	-0.00164	-0.04749	-0.01717	0.04694	-0.02471	0.03583	-0.00462	-0.00003
Electrabel	0.01797	-0.00262	-0.00288	-0.00279	0.00374	-0.00041	-0.00993	-0.03197	0.00785	-0.02955	0.00552	0.00093	0.01248	0.01265	0.00900
Ceconomy	-0.03353	0.00907	0.01654	0.03744	0.02393	-0.00134	-0.03438	-0.03823	0.03412	-0.00039	-0.02353	0.02377	-0.01467	-0.01035	-0.02549
Kpn Kon	-0.06197	-0.03248	0.08784	0.10161	-0.02548	0.02592	-0.24160	-0.02023	-0.10827	-0.13500	0.07381	0.11723	0.11695	0.04343	0.19367
Kering	0.14624	0.00750	-0.01625	0.02700	-0.01861	-0.01005	0.00284	0.00360	0.00549	0.02379	-0.00429	0.00130	0.01249	0.02869	-0.03341
HypoVereinsbank	-0.01347	-0.01055	-0.00258	-0.02013	-0.02093	-0.01232	-0.01339	0.00933	0.02680	0.04844	0.03449	-0.00990	0.04096	-0.01417	0.01402
Volkswagen	0.01228	0.01752	0.00769	-0.01036	-0.01111	-0.00963	0.00613	-0.01073	-0.00065	-0.00404	0.00497	0.00541	-0.01148	0.01398	0.00774
Ahold Delhaize	0.00768	0.00679	-0.00418	-0.03119	0.00869	0.04053	0.00187	-0.00088	0.02502	-0.00046	0.02082	-0.00427	0.01551	-0.00766	0.00405
AIB Group	0.00628	0.00041	-0.00395	-0.01687	-0.00423	-0.01407	-0.00775	0.00043	0.00782	-0.00997	-0.00745	0.00616	0.00766	-0.00842	-0.01025
Lafarge	0.02265	0.01143	-0.00369	-0.00152	-0.01123	-0.00138	-0.00299	0.00580	-0.00381	0.00090	-0.00910	-0.01329	-0.00716	0.01647	-0.00054
Endesa	-0.00059	-0.00055	0.00126	-0.00312	-0.03885	-0.01814	0.02597	0.02567	-0.03811	-0.02801	0.00422	-0.00123	0.00509	0.00003	-0.00572
ABN Amro Holding	0.00431	-0.00061	0.00043	0.00587	-0.00820	0.01064	-0.00678	0.00296	-0.00914	-0.00183	0.00691	0.00287	-0.00591	0.00581	-0.00060
Alcatel-Lucent	0.00180	0.01099	0.00022	0.03596	0.00153	0.01914	-0.05050	0.03526	-0.06591	-0.02328	-0.00675	0.01241	-0.03952	-0.00230	-0.00734
Ageas (Ex-Fortis)	0.02136	-0.03576	0.00641	-0.02853	-0.02340	-0.01621	-0.01680	-0.04789	0.01065	-0.04502	0.05252	-0.01302	0.01641	0.00870	-0.01998
Renault	0.02149	-0.02814	-0.02390	-0.02247	-0.02495	-0.02855	0.00530	-0.02324	-0.01214	-0.01048	-0.02770	0.01916	0.01134	-0.01240	0.04301
Volkswagen	0.02318	-0.00142	0.00055	-0.00415	-0.00050	0.00116	-0.01821	0.04470	0.00347	0.04088	0.01472	-0.00585	-0.00548	0.02542	0.00722
Aegon	-0.01864	-0.00977	-0.00486	-0.01270	-0.00689	-0.00188	-0.00800	-0.01355	0.01098	0.01381	-0.00405	0.00431	-0.00767	-0.00234	-0.01105
Alstom	-0.01408	-0.00161	0.00641	0.00155	0.00311	-0.00158	0.00158	0.01113	0.00746	-0.01593	-0.00463	-0.02083	-0.00036	-0.01168	0.00033
Crédit Agricole	-0.03179	-0.00365	-0.00004	0.06486	0.00683	0.00069	-0.00773	-0.00352	-0.02124	-0.01525	0.02813	-0.02565	-0.01909	0.01251	-0.01189
Deutsche Boerse	-0.01321	-0.02906	-0.01013	0.01440	0.01752	-0.01649	0.00971	-0.01352	-0.00557	-0.01385	0.01937	0.01590	-0.00086	-0.01031	0.00936
Telecom Italia	-0.02563	-0.00236	-0.02183	-0.01236	-0.03444	0.02922	-0.00386	0.04599	0.00978	-0.05950	0.04399	0.01371	0.02837	-0.04346	0.00937
Nokia	-0.02287	0.02893	-0.02930	-0.00686	-0.00069	0.01766	-0.04506	-0.01015	-0.02928	-0.01696	0.00675	0.00670	-0.01760	-0.01904	-0.00471
Arcelormittal	0.00380	0.01085	0.01296	-0.00756	0.00292	-0.00004	-0.00570	-0.00061	0.02243	0.01219	0.00449	0.00952	-0.00032	0.00534	0.00412
CRH	-0.03223	0.00427	-0.00204	-0.00009	-0.00241	-0.01118	0.03245	-0.02028	-0.00615	0.00425	0.01497	0.01010	-0.00395	0.00183	0.01180
Repsol YPF	0.00204	-0.00862	-0.05039	0.00265	-0.01309	0.02579	0.01013	-0.03073	-0.01743	-0.01878	-0.00462	-0.01524	-0.01098	-0.00583	0.00436
RWE	0.01278	-0.02179	-0.03882	-0.00885	0.01008	0.01821	-0.00840	-0.04148	-0.00120	-0.01112	0.00776	-0.02164	-0.00416	0.04528	-0.01789
Assicurazioni Generali	0.01367	0.02601	-0.01063	-0.01588	-0.02226	-0.01207	0.00832	0.01863	0.01475	-0.02634	-0.00551	-0.00260	0.00330	0.03031	0.03202
Unicredit	0.02454	0.04249	0.07046	-0.01644	-0.00755	0.01153	0.00126	0.04530	0.02312	-0.03679	0.00055	-0.00480	-0.00132	0.03157	0.01314

Carrefour	0.02994	0.00208	-0.00384	-0.00986	-0.00825	-0.00663	-0.00328	0.01577	0.00908	0.00473	-0.00059	-0.00459	0.01043	-0.00736	-0.00667
Saint Gobain	0.00360	0.00075	0.00073	0.01004	0.00691	0.00864	0.02285	0.00208	-0.01283	-0.01459	-0.00174	-0.00792	0.01517	-0.02050	0.00201
E ON N	-0.04357	0.00503	-0.01380	0.00920	0.00264	-0.02888	-0.00662	0.02548	0.00526	-0.01171	0.00783	-0.01085	-0.00457	-0.00943	0.00941
Deutsche Bank	-0.01188	0.00778	0.00246	0.00838	0.00366	0.02943	0.00979	-0.00711	0.00110	-0.01182	-0.01818	-0.00480	-0.01795	-0.01587	0.00205
Wfd Unibail-Rodamco	-0.00357	0.00405	0.00657	0.00524	0.00376	-0.01773	-0.02409	0.00704	-0.01602	0.00537	0.01157	0.00020	-0.00101	0.05354	0.03328
Orange	0.00083	0.00848	-0.00610	-0.01787	-0.01127	-0.00425	-0.01510	-0.01668	-0.00656	0.02011	-0.00055	-0.00525	0.00109	0.03608	-0.00606
BBV Argentaria	-0.00489	-0.00355	0.01366	0.00695	0.01271	0.03681	-0.03498	0.00620	-0.05493	0.03848	0.07450	-0.03172	0.01049	-0.00962	0.00842
Telefonica	-0.00273	0.01298	-0.01705	-0.01808	-0.00095	-0.00711	-0.01043	-0.01867	-0.00816	0.02975	0.00425	-0.00541	0.00193	0.00747	-0.01654
Fresenius	-0.00439	0.00903	-0.00093	-0.00855	-0.00006	0.00667	-0.00539	-0.00414	0.00382	-0.00462	-0.00331	-0.00485	-0.00181	-0.00635	0.00064
Société Générale	-0.00688	0.00686	0.00331	-0.00184	0.00681	0.04406	-0.01245	-0.02380	-0.05129	0.02578	0.08361	-0.03498	-0.00745	-0.01368	0.01725
Nokia	0.00731	-0.00984	-0.01439	-0.01463	-0.00139	0.04773	-0.03560	0.01320	0.00523	-0.01001	-0.01745	-0.01352	0.02148	0.01770	-0.00137

Table A.13: *Abnormal Returns* calculation for deleted firms (*Market model*).

A.8 CARs calculation (CMRM and *Market Model*)

	-7	-6	-5	-4	-3	-2	-1	0	1	2	3	4	5	6	7
Banco Santander	-0.02559	0.00208	-0.00063	-0.00332	-0.01144	0.01155	0.02675	0.02723	0.04215	0.02089	0.04307	0.05572	0.04807	0.05258	0.05404
BASF	-0.03574	-0.02254	-0.01051	-0.01706	-0.01692	-0.03695	-0.06304	-0.06856	-0.05110	-0.06344	-0.05072	-0.06528	-0.09392	-0.09129	-0.09799
HypoVereinsbank	-0.01800	-0.00027	0.02288	0.03439	0.04416	0.05915	0.04020	0.04541	0.06800	0.09602	0.09494	0.10232	0.09617	0.10352	0.08401
Dresdner Bank	-0.04628	-0.02503	0.00322	0.02202	0.02950	0.04528	0.02006	0.01899	0.06666	0.11195	0.08276	0.09177	0.09285	0.10943	0.09831
Muenchener Ruck.	-0.01419	-0.00499	0.01847	0.04697	0.04294	0.08103	0.07175	0.05963	0.07365	0.09014	0.10114	0.08830	0.06987	0.07028	0.06523
Sanofi	-0.03149	-0.05148	-0.02217	-0.01004	0.00825	0.00859	0.02761	0.03487	0.06541	0.10370	0.10406	0.08319	0.06109	0.05970	0.06678
Suez(Rompus)	-0.01474	-0.03113	-0.03000	-0.00686	0.00457	0.01758	0.02408	0.04349	-0.01829	-0.03557	-0.03480	-0.01071	-0.00610	-0.00289	0.00652
Danone	-0.02011	-0.02391	-0.02115	-0.02822	-0.00932	-0.00355	0.00213	0.01083	0.01815	-0.01557	-0.03532	-0.02001	-0.02066	-0.03711	-0.06411
Intesa Sanpaolo	-0.00719	0.02282	0.02186	0.01076	0.00163	0.01492	0.02200	0.01901	0.04753	0.03480	0.01005	0.00707	0.01204	0.01303	-0.00189
Saint Gobain	-0.00919	0.01078	0.00922	0.00128	0.00087	-0.01832	-0.01754	-0.02507	-0.04292	-0.03667	-0.04313	-0.07743	-0.10324	-0.18745	-0.15484
Lafarge	0.02249	0.01772	0.00700	0.04902	0.02201	0.00161	0.01530	0.00018	-0.03397	-0.03538	-0.05310	-0.03699	-0.02607	0.00066	0.01995
Iberdrola	-0.00083	0.00998	0.01297	0.00573	0.00879	0.00860	0.00454	0.01142	0.00092	-0.01099	-0.01245	-0.00610	-0.00498	-0.00778	-0.00862
Crédit Agricole	0.00940	0.00650	0.01830	0.02514	0.03530	0.03584	0.02819	0.03114	0.04317	0.05130	0.04185	0.03856	0.06278	0.06191	0.07456
Arcelormittal	-0.01316	0.04633	0.04801	0.02060	0.04320	0.06001	0.08025	0.08536	0.08612	0.06591	0.07255	0.04033	0.00995	0.04239	0.03028
Schneider Electric	0.01709	0.02933	0.03890	0.02312	0.03127	0.03977	0.06653	0.07363	0.08088	0.06420	0.06260	0.01884	0.00413	0.02075	0.01443
Vinci	0.01335	0.01269	0.02015	-0.00911	0.00047	0.00529	0.03156	0.05179	0.05531	0.03862	0.03587	-0.00149	-0.01202	-0.00372	-0.00304
Volkswagen	0.00244	0.00428	0.00220	0.01767	0.00005	0.00492	0.00694	0.04892	0.06457	0.06698	0.07707	0.12686	0.11334	0.09452	0.05826
Deutsche Boerse	0.02354	0.03352	0.04699	0.04916	0.09487	0.09205	0.09037	0.10150	0.10031	0.09864	0.08442	0.08158	0.08028	0.06933	0.06190
Alstom	-0.02675	0.01564	-0.01312	0.00998	0.03705	0.06299	0.04553	0.07912	0.09042	0.06094	-0.00291	-0.01856	-0.01194	-0.06309	-0.05568
Anheuser-Busch Inbev	0.00798	0.03507	0.03371	0.02895	0.03673	0.02420	0.02911	0.04415	0.01656	0.01179	0.00616	0.00121	0.00620	0.03075	0.03993
CRH	0.03489	0.05171	0.02956	0.04376	-0.01152	-0.00846	-0.02989	-0.01484	-0.03930	-0.07250	-0.08741	-0.05521	-0.05245	-0.00388	0.01856
WFD Unibail-Rodamco	0.00382	-0.00430	-0.00824	-0.00504	-0.01353	-0.00191	0.00891	0.02116	0.01794	0.01093	0.00293	-0.00224	-0.01711	-0.08038	-0.07246
BMW	-0.02325	-0.02695	-0.03905	-0.04228	-0.03877	-0.03840	-0.05658	-0.05014	-0.02029	-0.00440	0.00574	0.00018	-0.00470	0.01454	0.01960
Volkswagen Pref.	-0.04471	-0.00363	0.03433	0.01860	0.04254	0.05603	0.05719	0.08857	0.07360	0.03049	-0.02121	-0.01332	0.03816	0.00908	-0.02892
Inditex	0.01173	0.00180	0.00512	-0.00053	-0.01726	-0.00143	0.01781	0.05761	0.07317	0.05999	0.03004	0.01566	0.04806	0.05565	0.04165
ASML Holding	-0.01482	0.00238	-0.00881	0.00755	0.01936	0.00222	-0.00066	-0.03423	-0.05727	-0.03048	-0.00165	0.01621	0.02307	0.02765	0.03400
Essilorluxottica	-0.02045	-0.02157	-0.01251	-0.01163	-0.00146	-0.02229	-0.02343	-0.03678	-0.04538	-0.01866	-0.01242	0.00422	0.01311	0.00639	0.00726
Airbus	0.01063	-0.01890	-0.00530	-0.01808	-0.04023	0.02001	0.07050	0.06164	0.08276	0.06717	0.06508	0.07608	0.07336	0.08330	0.09490
Deutsche Post	0.00888	0.02226	0.03058	0.03128	0.00955	0.01363	0.01494	0.01289	0.04009	0.03129	0.04212	0.05893	0.04637	0.05128	0.06030
Nokia	0.03887	0.05184	0.04237	0.04971	0.05063	0.04036	0.03081	0.06677	0.05193	0.06543	0.07487	0.08038	0.07043	0.08670	0.07220
Fresenius	-0.03039	-0.09892	-0.11461	-0.11601	-0.10340	-0.03689	-0.06174	-0.05028	-0.07882	-0.07424	-0.05068	-0.07081	-0.06447	-0.05351	-0.06406
Safran	-0.02695	-0.06189	-0.10042	-0.07496	-0.08201	-0.04192	-0.04413	-0.00858	-0.03269	-0.05017	-0.02958	-0.05460	-0.05728	-0.05499	-0.04512
Adidas	-0.02138	-0.02650	-0.03525	-0.04998	-0.04510	-0.04872	-0.05472	-0.08310	-0.09057	-0.11729	-0.10215	-0.11310	-0.10619	-0.12461	-0.13718
Ahold Delhaize	0.00261	0.00360	0.00042	0.00603	0.00193	0.00292	0.00459	-0.00831	-0.00453	0.01890	0.01623	0.01309	0.01223	-0.00978	-0.04085
CRH	0.00196	0.00322	-0.00170	0.01995	0.02249	0.04402	0.03744	0.03464	0.02472	0.03643	0.04814	0.03362	0.03181	0.01245	-0.02093

Amadeus It Group	0.00398	-0.00470	0.00180	-0.00661	-0.01736	-0.02921	-0.02744	-0.02364	-0.01178	0.01249	0.00892	0.00805	-0.01188	0.01120	-0.00662				
Kering	0.03282	0.01261	0.01305	-0.00183	-0.00206	0.00088	0.01409	0.02513	0.02817	0.03576	0.03159	0.04173	0.03585	0.04935	0.03012				
Deutsche Boerse	-0.00636	0.00857	-0.00305	-0.01401	-0.04272	-0.03664	0.00575	0.03181	0.03481	0.03852	0.02986	0.03104	0.02490	0.01505	0.02287				
Adyen	-0.04401	-0.04236	-0.02224	0.01020	-0.00606	-0.04200	-0.04977	-0.05330	-0.05578	-0.12674	-0.14973	-0.13459	-0.16054	-0.14432	-0.13444				
Prosus	0.04156	0.06173	0.07683	0.11094	0.11189	0.09064	0.05511	0.08873	0.07868	0.03261	-0.00553	-0.00387	-0.01765	-0.00409	-0.01383				
Vonovia	-0.00380	-0.00222	-0.00971	-0.00180	-0.01395	-0.01006	-0.01220	-0.00377	0.01451	-0.04510	-0.06121	-0.04089	-0.04805	-0.03515	-0.03366				
Kone 'B'	0.00047	0.00148	0.00912	0.00839	0.00738	-0.00134	-0.01370	-0.01025	-0.00604	-0.04636	-0.05153	-0.04764	-0.05083	-0.02214	-0.03193				
Pernod-Ricard	-0.01384	0.00614	0.00612	0.00914	0.00267	-0.00897	-0.02454	-0.04065	-0.01725	-0.01450	-0.04689	-0.03875	-0.05530	-0.04712	-0.04568				
Infineon Technologies	-0.01190	0.00878	0.00521	-0.03775	-0.01012	-0.03657	-0.00975	-0.02264	-0.04200	-0.07118	-0.15137	-0.14025	-0.13717	-0.08559	-0.13678				

Table A.14: *CARs* calculated over the expanding time window length from -7 to 7 days after the AD by using the $CMRM$ to obtain *Normal returns* for added firms.

	-7	-6	-5	-4	-3	-2	-1	0	1	2	3	4	5	6	7
Akzo Nobel	0.00149	0.04403	0.06630	0.06646	0.04466	0.03931	0.02946	0.02408	0.03548	0.03679	0.06531	0.04596	0.04939	0.02428	0.02338
AIB Group	0.00289	0.00995	-0.00396	0.01156	0.01445	0.00893	0.00929	0.00623	0.00486	0.05205	0.07036	0.08684	0.09843	0.09421	0.10184
Relx	-0.01246	-0.02513	-0.02313	-0.02608	-0.03906	-0.02704	-0.01023	-0.02305	-0.00135	0.01997	0.01717	0.01435	0.03074	0.07469	0.07669
Stellantis	-0.00527	-0.01668	0.01140	0.00619	0.00994	0.00473	-0.01253	-0.03619	-0.06032	-0.05939	-0.07750	-0.07813	-0.10464	-0.07778	-0.08480
Deutsche Lufthansa	0.00160	0.01794	0.02800	0.04280	0.05920	0.07422	0.09864	0.09575	0.13523	0.16487	0.14503	0.16008	0.18026	0.16490	0.15792
Pharol SGPS	-0.00899	-0.00865	-0.00128	0.01550	0.01262	0.00797	-0.00072	-0.01205	-0.00437	-0.00379	-0.02033	0.00821	0.01429	0.02504	0.01545
Schneider Electric	-0.01814	-0.02438	-0.00410	0.02310	-0.00291	0.02822	-0.01014	0.00382	-0.00227	0.01233	0.02665	0.06889	0.06232	0.05261	0.06387
Saint Gobain	-0.01211	-0.06364	0.00737	0.01602	0.01538	-0.03790	-0.03238	-0.03037	-0.08223	-0.10488	-0.05993	-0.07990	-0.04224	-0.03952	-0.04828
Electrabel	0.02034	0.01942	0.01729	0.01677	0.02155	0.02103	0.01277	-0.01986	-0.01114	-0.04203	-0.03700	-0.03672	-0.02441	-0.01182	-0.00438
Ceconomy	-0.03173	-0.02136	-0.00425	0.03492	0.05963	0.05821	0.02509	-0.01363	0.02115	0.01973	-0.00417	0.01911	0.00430	-0.00609	-0.03277
Kpn Kon	-0.04817	-0.04126	0.04898	0.11684	0.09774	0.07528	-0.16110	-0.20755	-0.29020	-0.47715	-0.44965	-0.38383	-0.27440	-0.36050	-0.14040
Kering	0.17037	0.16464	0.13525	0.19386	0.13560	0.10760	0.12690	0.10993	0.07347	0.10848	0.09892	0.13960	0.13649	0.19328	0.18995
HypoVereinsbank	-0.00356	-0.01121	-0.03375	-0.07363	-0.08310	-0.08912	-0.11698	-0.08401	-0.06073	0.00948	0.03951	0.01263	0.06297	0.02734	0.01544
Volkswagen	0.02766	0.04447	0.05489	0.05449	0.05009	0.03811	0.03453	0.03253	0.03999	0.04739	0.05634	0.06364	0.05082	0.05915	0.07323
Ahold Delhaize	0.00732	0.01589	0.01182	-0.03101	-0.01885	0.02990	0.03924	0.03832	0.06756	0.05267	0.07655	0.05685	0.06783	0.06987	0.07581
AIB Group	0.00555	0.00954	0.00582	-0.03438	-0.03166	-0.02927	-0.02207	-0.02172	-0.00545	-0.04430	-0.04562	-0.07036	-0.07176	-0.06077	-0.06722
Lafarge	0.02204	0.03645	0.03294	0.01204	0.00659	0.01889	0.02832	0.03406	0.03727	0.01417	0.01016	-0.02880	-0.04349	-0.01089	-0.00827
Endesa	0.00032	0.00039	0.00145	-0.00097	-0.03939	-0.05768	-0.03174	-0.00520	-0.04380	-0.07152	-0.06744	-0.06790	-0.06276	-0.06376	-0.06984
ABN Amro Holding	0.01061	0.01392	0.01323	0.01892	0.01849	0.02494	0.02082	0.02277	0.02049	0.01927	0.01726	0.01710	0.01588	0.01704	0.01450
Alcatel-Lucent	-0.02115	0.02327	0.00804	0.05358	0.05686	0.10734	0.06082	0.09635	0.05714	0.01119	-0.04236	-0.07541	-0.06295	-0.07622	-0.09253
Ageas (Ex-Fortis)	0.03918	0.04215	0.06133	0.04041	0.00696	-0.01883	-0.02640	-0.09254	-0.11623	-0.17136	-0.12509	-0.11920	-0.08607	-0.08004	-0.08668
Renault	0.04271	0.06070	0.05202	0.03862	0.00170	-0.03827	-0.02197	-0.06695	-0.11999	-0.14250	-0.17765	-0.13596	-0.10470	-0.12028	-0.06139
Volkswagen	0.00322	-0.00906	-0.02063	-0.01796	-0.03476	-0.05393	-0.05776	-0.00767	0.00883	0.03912	0.01520	-0.02197	-0.01520	0.01094	0.02986
Aegon	-0.03207	-0.03348	-0.05887	-0.08350	-0.08064	-0.07101	-0.08468	-0.09460	-0.04113	-0.02667	-0.01630	-0.00807	-0.02673	-0.01704	-0.01452
Alstom	0.00041	0.00919	0.03712	0.02939	0.02092	0.04607	0.04942	0.09366	0.10477	0.04833	-0.01358	-0.04718	-0.00781	-0.01124	-0.05682
Crédit Agricole	-0.01158	-0.00072	0.02927	0.08117	0.07184	0.10982	0.10457	0.14726	0.13111	0.05932	0.00752	-0.03596	0.00039	0.02441	-0.05155
Deutsche Boerse	-0.03882	-0.05758	-0.06504	-0.05649	-0.03318	-0.06904	-0.05777	-0.09388	-0.09440	-0.10412	-0.06169	-0.04309	-0.04328	-0.05604	-0.04384
Telecom Italia	-0.04867	-0.04177	-0.06119	-0.07883	-0.10806	-0.09627	-0.09873	-0.07305	-0.05874	-0.11452	-0.04979	-0.03366	-0.00468	-0.05035	-0.03842
Nokia	-0.03826	-0.05131	-0.04675	-0.03945	-0.09628	-0.05072	-0.08162	-0.10376	-0.13155	-0.10654	-0.10246	-0.08905	-0.08227	-0.10848	-0.11827
Arcelormittal	-0.00096	0.02219	0.03941	0.03006	0.00857	0.00599	0.00533	-0.00811	0.03192	0.03684	0.04272	0.05733	0.06649	0.06985	0.09120
CRH	-0.03519	-0.01584	-0.02765	-0.00329	0.00577	-0.00666	0.01480	-0.00264	-0.00805	-0.00204	0.02665	0.05730	0.05251	0.05150	0.05536
Repsol YPF	-0.01459	-0.04711	-0.13859	-0.10102	-0.12493	-0.07315	-0.06137	-0.09568	-0.13165	-0.14772	-0.13546	-0.17134	-0.17783	-0.17495	-0.16191
RWE	-0.00215	-0.04542	-0.12115	-0.09864	-0.09828	-0.05672	-0.06364	-0.10833	-0.12618	-0.13486	-0.11194	-0.15213	-0.15225	-0.09915	-0.10924
Assicurazioni Generali	0.00948	0.05463	0.05259	0.02523	0.01596	-0.00250	0.02410	0.03874	0.05060	0.05892	0.05253	0.04607	0.06138	0.08751	0.10313
Unicredit	0.01862	0.08811	0.17069	0.13805	0.14882	0.15134	0.17839	0.21806	0.23711	0.24920	0.24851	0.23827	0.25389	0.27957	0.26958

Carrefour	0.02764	0.04021	0.04108	0.02493	0.02379	0.01366	0.02039	0.03398	0.04147	0.06518	0.06411	0.05741	0.07442	0.06477	0.04912		
Saint Gobain	0.00776	0.01064	0.01449	0.02521	0.03558	0.04710	0.07898	0.08830	0.07069	0.05874	0.06065	0.05718	0.06002	0.04359	0.03959		
E ON N	-0.04009	-0.03328	-0.04447	-0.03469	-0.02915	-0.05562	-0.05467	-0.02313	-0.02187	-0.03137	-0.02048	-0.02760	-0.04249	-0.04852	-0.04415		
Deutsche Bank	-0.00533	0.00580	0.01316	0.02263	0.03173	0.06569	0.08970	0.09398	0.08756	0.07991	0.06747	0.06967	0.03233	0.02285	0.01543		
Wfd Unibail-Rodamco	-0.00618	-0.00708	0.00142	0.00947	0.01264	0.00077	-0.02133	-0.01351	-0.03093	-0.02176	-0.00595	-0.00441	-0.00537	0.04872	0.08424		
Orange	-0.00407	0.01764	0.00923	-0.00492	-0.02340	-0.03276	-0.05878	-0.07628	-0.07213	-0.06089	-0.07253	-0.06840	-0.07902	-0.03276	-0.04323		
BBV Argentaria	-0.01511	0.00895	0.01780	0.03250	0.03017	0.05632	-0.00145	0.00305	-0.02953	-0.00957	0.04180	0.02964	0.01572	0.02733	0.02657		
Telefonica	-0.00867	0.02035	0.00050	-0.01307	-0.02276	-0.03606	-0.05973	-0.07938	-0.07456	-0.05557	-0.06476	-0.05880	-0.07106	-0.05124	-0.07312		
Fresenius	-0.01059	0.01518	0.01133	0.00748	-0.00169	-0.00149	-0.02069	-0.02586	-0.00849	-0.02434	-0.04167	-0.03466	-0.05128	-0.04475	-0.04968		
Société Générale	-0.01964	0.02170	0.01899	0.02684	0.01487	0.04562	0.00470	-0.02123	-0.04460	-0.04195	0.01279	0.00224	-0.03571	-0.02286	-0.01708		
Nokia	0.00507	-0.00190	-0.01800	-0.03407	-0.03414	0.01117	-0.02972	-0.00984	-0.00486	-0.01473	-0.03334	-0.05075	-0.02033	-0.00076	0.00079		

Table A.15: *CARs* calculated over the expanding time window length from -7 to 7 days after the AD by using the $CMRM$ to obtain *Normal returns* for deleted firms.

	-7	-6	-5	-4	-3	-2	-1	0	1	2	3	4	5	6	7
Banco Santander	-0.01472	0.00993	-0.01073	-0.02715	-0.03770	-0.01893	-0.00157	0.01113	0.01924	-0.00901	0.00792	0.00634	-0.00013	0.00457	0.00945
BASF	-0.02733	-0.01648	-0.01831	-0.03548	-0.03723	-0.06052	-0.08493	-0.08101	-0.06881	-0.08655	-0.07790	-0.10346	-0.13119	-0.12840	-0.13247
HypoVereinsbank	-0.00443	0.00953	0.01027	0.00462	0.01136	0.02108	0.00484	0.02531	0.03940	0.05868	0.05103	0.04064	0.03597	0.04356	0.02832
Dresdner Bank	-0.02623	-0.01056	-0.01540	-0.02194	-0.01894	-0.01094	-0.03215	-0.01069	0.02443	0.05682	0.01793	0.00070	0.00396	0.02090	0.01608
Muenchener Ruck.	0.00693	0.01025	-0.00114	0.00067	-0.00809	0.02181	0.01675	0.02836	0.02916	0.03207	0.03284	-0.00765	-0.02378	-0.02299	-0.02140
Sanofi	-0.01919	-0.04260	-0.03359	-0.03701	-0.02146	-0.02590	-0.00442	0.01666	0.03950	0.06988	0.06429	0.02732	0.00656	0.00539	0.01633
Suez(Rompus)	-0.00535	-0.02436	-0.03872	-0.02744	-0.01811	-0.00874	-0.00036	0.02960	-0.03807	-0.06138	-0.06515	-0.05335	-0.04772	-0.04434	-0.03198
Danone	-0.01676	-0.01815	-0.01434	-0.01820	0.00215	0.00778	0.01581	0.02358	0.03214	-0.00349	-0.02392	-0.00953	-0.01042	-0.02695	-0.05614
Intesa Sanpaolo	-0.01022	0.01761	0.01569	0.00168	-0.00876	0.00466	0.00960	0.00746	0.03485	0.02384	-0.00028	-0.00243	0.00276	0.00382	-0.00911
Saint Gobain	-0.01457	-0.00995	-0.01244	-0.00723	-0.01013	-0.01047	-0.01172	-0.00904	-0.03686	-0.01038	0.00121	-0.01307	-0.03594	-0.06969	-0.04738
Lafarge	0.00806	0.01119	0.00834	0.03146	0.02816	0.01848	0.02234	0.01951	0.01043	0.00232	-0.01226	-0.01969	0.00056	0.01049	0.01180
Iberdrola	-0.00259	0.00771	0.01423	0.01048	0.01151	0.01022	0.00871	0.01141	0.00154	-0.01423	-0.01489	-0.00555	-0.00608	-0.00509	-0.00134
Crédit Agricole	-0.00351	-0.00581	0.00369	0.00218	0.00671	0.00922	0.00972	0.00535	0.01057	0.00911	-0.00368	-0.00856	0.01678	0.02066	0.02799
Arcelormittal	-0.01257	0.04403	0.04552	0.03699	0.05397	0.05745	0.06560	0.07077	0.06469	0.06785	0.06953	0.06231	0.03927	0.05600	0.04080
Schneider Electric	0.01750	0.02772	0.03717	0.03456	0.03879	0.03799	0.05630	0.06344	0.06591	0.06556	0.06049	0.03419	0.02461	0.03026	0.02179
Vinci	0.01394	0.01041	0.01770	0.00703	0.01108	0.00277	0.01713	0.03742	0.03420	0.04053	0.03290	0.02016	0.01686	0.00968	0.00733
Volkswagen	-0.00141	-0.00220	-0.00347	0.00901	-0.01044	-0.00497	-0.00279	0.03548	0.05323	0.05442	0.06507	0.11159	0.09784	0.08341	0.04868
Deutsche Boerse	0.01539	0.02029	0.03521	0.03762	0.07326	0.07588	0.07076	0.08320	0.07311	0.07064	0.06798	0.06907	0.06170	0.05676	0.05184
Alstom	-0.01108	0.00849	-0.00973	0.00683	0.03271	0.03725	0.01707	0.05048	0.04355	0.02955	-0.00235	0.01304	-0.01583	-0.05949	-0.04596
Anheuser-Busch Inbev	0.00356	0.02104	0.01651	0.00987	0.02014	0.00998	0.01261	0.03218	0.01310	0.01084	0.00676	-0.00288	-0.00205	0.02317	0.02904
CRH	0.02437	0.01833	-0.01136	-0.00165	-0.05100	-0.04228	-0.06916	-0.04334	-0.04753	-0.07476	-0.08599	-0.06495	-0.07207	-0.02191	-0.00735
WFD Unibail-Rodamco	0.01672	0.01563	0.01953	0.01831	0.02037	0.04513	0.04665	0.05542	0.04378	0.04361	0.06060	0.07568	0.05289	-0.01084	-0.01049
BMW	-0.01552	-0.02403	-0.02432	-0.02068	-0.02279	-0.02904	-0.04396	-0.03960	-0.03419	-0.01868	-0.01684	-0.02465	-0.02321	-0.01089	-0.01365
Volkswagen Pref.	-0.05620	-0.02335	-0.00247	-0.01084	0.02229	0.01458	0.01433	0.01946	0.00160	-0.00938	-0.01566	0.00237	0.02234	-0.01329	-0.01488
Inditex	0.00459	-0.01047	-0.01778	-0.01884	-0.02986	-0.02722	-0.00885	0.01461	0.02836	0.03518	0.03350	0.02542	0.03821	0.04174	0.05039
ASML Holding	0.00020	0.01136	-0.00139	0.01840	0.02682	0.02103	0.01725	-0.00308	-0.02909	-0.00471	0.01059	0.02687	0.03333	0.03935	0.04404
Essilorluxottica	-0.00983	-0.01522	-0.00727	-0.00396	0.00381	-0.00899	-0.01077	-0.01475	-0.02544	-0.00044	-0.00376	0.01176	0.02037	0.01467	0.01435
Airbus	0.01533	-0.00139	0.00188	-0.01522	-0.02023	0.03149	0.07766	0.07246	0.09312	0.06473	0.06345	0.07240	0.06223	0.07436	0.08752
Deutsche Post	0.01262	0.01634	0.02132	0.02342	0.02086	0.02693	0.02429	0.03231	0.04569	0.04260	0.05234	0.06515	0.04515	0.05162	0.04712
Nokia	0.04164	0.04054	0.04018	0.02470	0.01493	0.00583	0.00653	0.03984	0.02430	0.03616	0.03280	0.01913	0.00997	0.02889	0.02179
Fresenius	-0.01181	-0.05361	-0.02336	-0.06380	-0.03910	-0.00164	-0.02833	-0.01287	-0.02068	-0.01913	-0.01445	-0.01150	-0.01019	-0.00896	-0.02922
Safran	-0.00838	-0.01661	-0.00922	-0.02278	-0.01774	-0.00669	-0.01073	0.02881	0.02541	0.00491	0.00664	0.00468	-0.00302	-0.01047	-0.01030
Adidas	-0.02043	-0.02991	-0.04063	-0.05274	-0.05083	-0.05299	-0.06316	-0.09063	-0.09744	-0.13208	-0.11674	-0.12681	-0.12264	-0.14011	-0.14893
Ahold Delhaize	0.00352	0.00038	-0.00466	0.00343	-0.00347	-0.00111	-0.00338	-0.01542	-0.01101	0.00494	0.00246	0.00016	-0.00330	-0.02441	-0.05194
CRH	0.00435	-0.00531	-0.01514	0.01307	0.00820	0.03338	0.01637	0.01584	0.00756	-0.00050	0.01171	-0.00060	-0.00927	-0.02625	-0.05026

Amadeus It Group	0.00071	-0.00964	-0.00559	-0.01454	-0.02801	-0.04213	-0.04748	-0.04937	-0.03374	-0.01156	-0.01800	-0.02236	-0.03260	-0.01272	-0.02580
Kering	0.02809	0.00546	0.00235	-0.01330	-0.01747	-0.01781	-0.01489	-0.01209	-0.00360	0.00098	-0.00734	-0.00226	0.00588	0.01476	0.00238
Deutsche Boerse	-0.00248	0.01982	0.00533	-0.00982	-0.03766	-0.04029	-0.00086	0.02403	0.02912	0.02718	0.01222	0.01139	0.00518	-0.00549	-0.00099
Adyen	-0.04173	-0.04625	-0.02505	0.00565	-0.00724	-0.04080	-0.04348	-0.04662	-0.05410	-0.12092	-0.13874	-0.12797	-0.14846	-0.13699	-0.12505
Prosus	0.04558	0.05490	0.07189	0.10295	0.10981	0.09275	0.06617	0.10046	0.08163	0.04284	0.01378	0.00776	0.00357	0.00878	0.00265
Vonovia	-0.00028	-0.00821	-0.01405	-0.00880	-0.01577	-0.00821	-0.00250	0.00651	0.01710	-0.03614	-0.04428	-0.03069	-0.02944	-0.02386	-0.01921
Kone 'B'	0.00304	-0.00289	0.00596	0.00328	0.00605	0.00001	-0.00662	-0.00275	-0.00415	-0.03981	-0.03918	-0.04020	-0.03726	-0.01390	-0.02138
Pernod-Ricard	-0.01011	-0.00021	0.00153	0.00173	0.00074	-0.00701	-0.01426	-0.02976	-0.01450	-0.00500	-0.02895	-0.02796	-0.03560	-0.03516	-0.03038
Infineon Technologies	-0.00573	0.00705	0.00821	-0.03081	-0.00681	-0.02657	0.01477	-0.01650	-0.03516	-0.06472	-0.14174	-0.11992	-0.14140	-0.09495	-0.15417

Table A.16: *CARs* calculated over the expanding time window length from −7 to 7 days after the AD by using the *Market model* to obtain *Normal returns* for added firms.

	-7	-6	-5	-4	-3	-2	-1	0	1	2	3	4	5	6	7
Akzo Nobel	0.00839	0.04901	0.05989	0.05133	0.02799	0.01996	0.01149	0.01386	0.02094	0.01781	0.04299	0.01461	0.01879	-0.00620	-0.00493
AIB Group	0.01640	0.01971	-0.01651	-0.01807	-0.01820	-0.02896	-0.02591	-0.01377	-0.02361	0.01490	0.02666	0.02546	0.03852	0.03454	0.04642
Relx	-0.00360	-0.01874	-0.03136	-0.04550	-0.06046	-0.05189	-0.03331	-0.03617	-0.02001	-0.00439	-0.01148	-0.02590	-0.00855	0.03557	0.04035
Stellantis	0.00795	-0.00713	-0.00089	-0.02282	-0.02202	-0.03237	-0.04698	-0.05577	-0.08819	-0.09577	-0.12029	-0.13823	-0.16330	-0.13620	-0.13906
Deutsche Lufthansa	0.00836	0.02281	0.02172	0.02799	0.04288	0.05528	0.08104	0.08575	0.12100	0.14629	0.12319	0.12939	0.15031	0.13507	0.13021
Pharol SGPS	-0.00461	-0.00550	-0.00534	0.00591	0.00205	-0.00429	-0.01211	-0.01852	-0.01358	-0.01582	-0.03448	-0.01166	-0.00510	0.00572	-0.00249
Schneider Electric	-0.00791	-0.01699	-0.01361	0.00066	-0.02763	-0.00047	-0.03679	-0.01133	-0.02383	-0.01581	-0.00643	0.02241	0.01696	0.00742	0.02190
Saint Gobain	-0.02362	-0.07548	-0.00176	0.00604	0.00924	-0.03145	-0.02675	-0.02839	-0.07588	-0.09305	-0.04611	-0.07082	-0.03498	-0.03960	-0.03963
Electrabel	0.01797	0.01535	0.01246	0.00967	0.01342	0.01301	0.00308	-0.02890	-0.02105	-0.05059	-0.04507	-0.04415	-0.03167	-0.01902	-0.01002
Ceconomy	-0.03353	-0.02446	-0.00792	0.02952	0.05345	0.05211	0.01773	-0.02050	0.01362	0.01322	-0.01031	0.01346	-0.00121	-0.01157	-0.03705
Kpn Kon	-0.06197	-0.09445	-0.00661	0.09499	0.06951	0.09543	-0.14617	-0.16640	-0.27467	-0.40966	-0.33586	-0.21862	-0.10167	-0.05824	0.13543
Kering	0.14624	0.15374	0.13749	0.16449	0.14588	0.13583	0.13867	0.14227	0.14775	0.17154	0.16725	0.16855	0.18104	0.20973	0.17632
HypoVereinsbank	-0.01347	-0.02403	-0.02660	-0.04673	-0.06767	-0.07999	-0.09338	-0.08405	-0.05725	-0.00881	0.02569	0.01578	0.05674	0.04257	0.05660
Volkswagen	0.01228	0.02980	0.03749	0.02712	0.01601	0.00638	0.01251	0.00179	0.00114	-0.00290	0.00207	0.00747	-0.00400	0.00998	0.01772
Ahold Delhaize	0.00768	0.01447	0.01029	-0.02090	-0.01221	0.02832	0.03019	0.02931	0.05433	0.05387	0.07469	0.07042	0.08592	0.07826	0.08231
AIB Group	0.00628	0.00669	0.00275	-0.01413	-0.01836	-0.03243	-0.04018	-0.03975	-0.03193	-0.04190	-0.04935	-0.04319	-0.03553	-0.04395	-0.05421
Lafarge	0.02265	0.03408	0.03039	0.02887	0.01764	0.01626	0.01327	0.01908	0.01527	0.01617	0.00706	-0.00622	-0.01338	0.00309	0.00254
Endesa	-0.00059	-0.00113	0.00012	-0.00300	-0.04186	-0.06000	-0.03402	-0.00835	-0.04646	-0.07447	-0.07026	-0.07149	-0.06640	-0.06637	-0.07209
ABN Amro Holding	0.00431	0.00371	0.00413	0.01001	0.00181	0.01245	0.00567	0.00863	-0.00051	-0.00234	0.00457	0.00744	0.00153	0.00733	0.00673
Alcatel-Lucent	0.00180	0.01279	0.01302	0.04897	0.05050	0.06965	0.01915	0.05441	-0.01151	-0.03479	-0.04154	-0.02913	-0.06865	-0.07096	-0.07829
Ageas (Ex-Fortis)	0.02136	-0.01440	-0.00800	-0.03652	-0.05992	-0.07613	-0.09293	-0.14082	-0.13017	-0.17519	-0.12268	-0.13570	-0.11930	-0.11060	-0.13057
Renault	0.02149	-0.00666	-0.03055	-0.05302	-0.07797	-0.10652	-0.10121	-0.12446	-0.13659	-0.14707	-0.17478	-0.15562	-0.14428	-0.15668	-0.11367
Volkswagen	0.02318	0.02175	0.02231	0.01816	0.01766	0.01883	0.00061	0.04532	0.04879	0.08966	0.10439	0.09854	0.09306	0.11847	0.12569
Aegon	-0.01864	-0.02841	-0.03327	-0.04597	-0.05285	-0.05474	-0.06273	-0.07628	-0.06530	-0.05149	-0.05554	-0.05123	-0.05890	-0.06125	-0.07230
Alstom	-0.01408	-0.01568	-0.00927	-0.00772	-0.00461	-0.00619	-0.00461	0.00651	0.01398	-0.00195	-0.00658	-0.02741	-0.02777	-0.03944	-0.03911
Crédit Agricole	-0.03179	-0.03544	-0.03548	0.02938	0.03620	0.03689	0.02916	0.02564	0.00440	-0.01085	0.01728	-0.00837	-0.02746	-0.01495	-0.02683
Deutsche Boerse	-0.01321	-0.04227	-0.05240	-0.03799	-0.02047	-0.03696	-0.02725	-0.04076	-0.04633	-0.06018	-0.04081	-0.02492	-0.02577	-0.03608	-0.02672
Telecom Italia	-0.02563	-0.02800	-0.04983	-0.06219	-0.09663	-0.06742	-0.07127	-0.02528	-0.01550	-0.07500	-0.03101	-0.01731	0.01106	-0.03240	-0.02303
Nokia	-0.02287	0.00606	-0.02324	-0.03009	-0.03078	-0.01311	-0.05817	-0.06832	-0.09759	-0.11455	-0.10781	-0.10111	-0.11871	-0.13775	-0.14246
Arcelormittal	0.00380	0.01465	0.02761	0.02005	0.02297	0.02293	0.01724	0.01663	0.03906	0.05125	0.05574	0.06526	0.06494	0.07028	0.07440
CRH	-0.03223	-0.02796	-0.03000	-0.03009	-0.03250	-0.04368	-0.01123	-0.03152	-0.03767	-0.03342	-0.01846	-0.00836	-0.01231	-0.01048	0.00132
Repsol YPF	0.00204	-0.00658	-0.05697	-0.05432	-0.06740	-0.04162	-0.03148	-0.06221	-0.07964	-0.09842	-0.10304	-0.11828	-0.12927	-0.13510	-0.13074
RWE	0.01278	-0.00901	-0.04784	-0.05668	-0.04661	-0.02839	-0.03679	-0.07827	-0.07946	-0.09058	-0.08283	-0.10447	-0.10863	-0.06335	-0.08124
Assicurazioni Generali	0.01367	0.03968	0.02905	0.01317	-0.00909	-0.02115	-0.01284	0.00579	0.02055	-0.00579	-0.01131	-0.01391	-0.01061	0.01969	0.05171
Unicredit	0.02454	0.06703	0.13749	0.12105	0.11350	0.12503	0.12630	0.17160	0.19472	0.15793	0.15847	0.15367	0.15235	0.18392	0.19706

Carrefour	0.02994	0.03202	0.02819	0.01833	0.01008	0.00345	0.00017	0.01593	0.02501	0.02974	0.02915	0.02456	0.03499	0.02763	0.02096
Saint Gobain	0.00360	0.00435	0.00509	0.01513	0.02204	0.03067	0.05352	0.05560	0.04277	0.02818	0.02644	0.01852	0.03369	0.01319	0.01520
E ON N	-0.04357	-0.03855	-0.05234	-0.04314	-0.04050	-0.06938	-0.07600	-0.05052	-0.04526	-0.05697	-0.04914	-0.05998	-0.06455	-0.07398	-0.06457
Deutsche Bank	-0.01188	-0.00409	-0.00163	0.00675	0.01041	0.03984	0.04963	0.04252	0.04362	0.03180	0.01362	0.00883	-0.00912	-0.02500	-0.02294
Wfd Unibail-Rodamco	-0.00357	0.00048	0.00705	0.01229	0.01604	-0.00169	-0.02578	-0.01874	-0.03476	-0.02939	-0.01782	-0.01762	-0.01863	0.03492	0.06820
Orange	0.00083	0.00931	0.00320	-0.01466	-0.02593	-0.03018	-0.04528	-0.06197	-0.06853	-0.04842	-0.04897	-0.05422	-0.05313	-0.01705	-0.02311
BBV Argentaria	-0.00489	-0.00844	0.00522	0.01217	0.02488	0.06169	0.02671	0.03291	-0.02202	0.01646	0.09096	0.05924	0.06973	0.06011	0.06853
Telefonica	-0.00273	0.01025	-0.00680	-0.02488	-0.02583	-0.03294	-0.04337	-0.06203	-0.07020	-0.04044	-0.03619	-0.04161	-0.03967	-0.03220	-0.04874
Fresenius	-0.00439	0.00464	0.00371	-0.00484	-0.00490	0.00177	-0.00362	-0.00776	-0.00394	-0.00856	-0.01187	-0.01672	-0.01854	-0.02489	-0.02425
Société Générale	-0.00688	-0.00002	0.00329	0.00145	0.00826	0.05232	0.03987	0.01607	-0.03522	-0.00944	0.07418	0.03920	0.03175	0.01808	0.03532
Nokia	0.00731	-0.00252	-0.01691	-0.03154	-0.03293	0.01480	-0.02080	-0.00760	-0.00237	-0.01239	-0.02984	-0.04335	-0.02187	-0.00417	-0.00554

Table A.17: *CARs* calculated over the expanding time window length from −7 to 7 days after the AD by using the *Market model* to obtain *Normal returns* for deleted firms.

A.9 Information value: change in EPS forecasts (sample firms)

	ΔFE		ΔPFE		ΔEFE	
	CY	CY+1	CY	CY+1	CY	CY+1
Banco Santander	0.000	0.000	0.000%	0.000%	0.000%	0.000%
BASF	-0.020	0.030	-0.092%	0.138%	-1.709%	2.239%
HypoVereinsbank	-0.440	-0.310	-0.851%	-0.600%	-19.556%	-11.232%
Dresdner Bank	-0.030	-0.040	-0.070%	-0.093%	-1.714%	-1.961%
Muenchener Ruck.	-0.040	-0.130	-0.022%	-0.070%	-0.885%	-2.549%
Sanofi	-0.070	-0.080	-0.168%	-0.192%	-7.527%	-6.667%
Suez(Rompus)	-0.030	0.030	-0.096%	0.096%	-2.113%	1.840%
Danone	-0.020	-0.040	-0.058%	-0.116%	-1.418%	-2.614%
Intesa Sanpaolo	0.010	-0.010	0.226%	-0.226%	4.348%	-3.333%
Saint Gobain	0.000	0.010	0.000%	0.026%	0.000%	0.232%
Lafarge	-0.110	-0.060	-0.153%	-0.083%	-1.732%	-0.832%
Iberdrola	-0.005	0.000	-0.240%	0.000%	-2.674%	0.000%
Crédit Agricole	0.020	0.030	0.111%	0.167%	1.117%	1.395%
Arcelormittal	1.060	0.430	1.023%	0.415%	6.830%	2.425%
Schneider Electric	0.020	0.100	0.041%	0.205%	0.601%	2.653%
Vinci	0.010	-0.050	0.019%	-0.096%	0.333%	-1.462%
Volkswagen	0.000	0.000	0.000%	0.000%	0.000%	0.000%
Deutsche Boerse	0.240	0.210	0.315%	0.276%	5.117%	3.992%
Alstom	0.010	0.000	0.017%	0.000%	0.270%	0.000%
Anheuser-Busch Inbev	0.050	0.110	0.178%	0.391%	2.058%	3.873%
CRH	-0.070	0.070	-0.408%	0.408%	-4.545%	4.167%
WFD Unibail-Rodamco	0.150	0.370	0.111%	0.274%	1.647%	3.978%
BMW	0.960	0.830	2.323%	2.008%	34.164%	20.750%
Volkswagen Pref.	2.710	0.190	1.952%	0.137%	16.385%	1.019%
Inditex	0.000	0.000	0.000%	0.000%	0.000%	0.000%
ASML Holding	0.040	0.020	0.101%	0.051%	1.140%	0.488%
Essilorluxottica	0.010	0.060	0.015%	0.089%	0.356%	1.954%
Airbus	0.720	0.960	2.094%	2.792%	36.181%	36.502%
Deutsche Post	0.040	0.050	0.190%	0.237%	2.721%	3.185%
Nokia	0.000	0.030	0.000%	0.493%	0.000%	11.111%
Fresenius	0.110	0.060	0.177%	0.096%	4.435%	2.098%
Safran	0.210	0.060	0.311%	0.089%	5.966%	1.554%
Adidas	0.530	0.560	0.357%	0.377%	12.156%	11.024%
Ahold Delhaize	-0.030	0.060	-0.141%	0.281%	-2.439%	4.580%
CRH	0.020	0.030	0.074%	0.111%	1.176%	1.508%
Amadeus It Group	0.000	-0.030	0.000%	-0.038%	0.000%	-1.083%
Kering	0.060	0.280	0.013%	0.061%	0.282%	1.148%
Deutsche Boerse	0.040	-0.010	0.030%	-0.008%	0.673%	-0.156%
Adyen	-0.650	0.050	-0.046%	0.004%	-7.674%	0.399%
Prosus	-0.010	0.070	-0.012%	0.085%	-0.376%	1.892%
Vonovia	0.040	-0.030	0.078%	-0.058%	1.860%	-1.299%
Kone 'B'	0.040	0.010	0.059%	0.015%	2.312%	0.505%
Pernod-Ricard	0.500	0.230	0.342%	0.158%	8.562%	3.423%
Infineon Technologies	0.120	0.070	0.353%	0.206%	12.000%	5.691%

Table A.18: Variation in EPS forecasts (ΔFE, ΔPFE and ΔEFE) of added firms for the current-year (CY columns) and one-year-ahead (CY+1 columns) the announcement year.

	ΔFE		ΔPFE		ΔEFE	
	CY	CY+1	CY	CY+1	CY	CY+1
	CY	CY+1	CY	CY+1	CY	CY+1
Akzo Nobel	0.030	0.050	0.069%	0.115%	1.017%	1.515%
AIB Group	1.630	-2.500	0.050%	-0.076%	0.760%	-1.031%
Relx	-0.020	-0.020	-0.244%	-0.244%	-4.545%	-4.255%
Stellantis	-0.080	0.040	-1.146%	0.573%	-8.791%	3.200%
Deutsche Lufthansa	-0.170	-0.110	-1.352%	-0.875%	-16.667%	-9.649%
Pharol SGPS	-0.020	-0.030	-0.298%	-0.447%	-4.762%	-7.143%
Schneider Electric	0.000	0.040	0.000%	0.130%	0.000%	1.970%
Saint Gobain	0.390	0.380	1.022%	0.996%	13.176%	11.411%
Electrabel	-0.120	-0.220	-0.049%	-0.091%	-0.745%	-1.296%
Ceconomy	-0.100	-0.190	-0.683%	-1.297%	-9.346%	-13.103%
Kpn Kon	0.010	-0.010	0.291%	-0.291%	6.667%	-3.846%
Kering	-0.170	-0.410	-0.222%	-0.536%	-2.185%	-4.550%
HypoVereinsbank	-0.100	-0.070	-0.790%	-0.553%	-111.111%	-6.931%
Ahold Delhaize	-0.010	0.020	-0.109%	0.219%	-1.587%	2.632%
AIB Group	10.500	3.370	0.214%	0.069%	2.061%	0.598%
Lafarge	0.270	0.130	0.248%	0.120%	3.557%	1.493%
Endesa	0.010	0.000	0.060%	0.000%	0.383%	0.000%
ABN Amro Holding	-0.010	0.050	-0.030%	0.151%	-0.398%	1.901%
Alcatel-Lucent	0.000	-0.010	0.000%	-0.272%	0.000%	-2.632%
Ageas (Ex-Fortis)	1.300	-0.100	4.833%	-0.372%	66.667%	-5.263%
Renault	-1.350	-0.530	-4.665%	-1.831%	-	-
Volkswagen	0.050	0.000	0.066%	0.000%	2.119%	0.000%
Aegon	0.100	0.000	2.382%	0.000%	18.868%	0.000%
Alstom	-0.090	-0.270	-0.315%	-0.944%	-2.990%	-7.692%
Crédit Agricole	-0.320	-0.380	-3.864%	-4.589%	-18.824%	-18.182%
Deutsche Boerse	-0.160	-0.140	-0.338%	-0.296%	-3.471%	-2.800%
Telecom Italia	0.000	0.000	0.000%	0.000%	0.000%	0.000%
Nokia	0.250	0.190	8.295%	6.304%	-	1900.000%
Arcelormittal	-0.900	-0.350	-3.909%	-1.520%	-134.328%	-15.487%
CRH	-0.060	-0.100	-0.331%	-0.552%	-5.263%	-6.369%
Repsol YPF	-0.020	-0.090	-0.186%	-0.839%	-2.500%	-10.465%
RWE	-0.080	-0.270	-0.427%	-1.442%	-4.211%	-17.763%
Assicurazioni Generali	-0.040	-0.020	-0.341%	-0.171%	-2.667%	-1.266%
Unicredit	-0.120	-0.210	-1.206%	-2.111%	-6.857%	-9.091%
Carrefour	-0.030	0.010	-0.135%	0.045%	-1.840%	0.546%
Saint Gobain	-0.060	0.000	-0.163%	0.000%	-1.869%	0.000%
E ON N	-0.010	-0.020	-0.105%	-0.211%	-1.515%	-2.817%
Deutsche Bank	-0.050	-0.080	-0.499%	-0.798%	-10.204%	-8.989%
Wfd Unibail-Rodamco	0.190	-0.130	0.155%	-0.106%	1.591%	-1.056%
Orange	0.000	-0.020	0.000%	-0.202%	0.000%	-1.786%
BBV Argentaria	-0.120	-0.020	-4.551%	-0.758%	-48.000%	-5.128%
Telefonica	-0.050	-0.050	-1.622%	-1.622%	-10.870%	-10.000%
Fresenius	-0.040	-0.070	-0.095%	-0.166%	-1.194%	-1.847%
Société Générale	-1.330	-0.140	-10.243%	-1.078%	-332.500%	-8.000%
Nokia	-0.030	0.050	-0.786%	1.310%	-13.043%	23.810%

Table A.19: Variation in EPS forecasts (ΔFE, ΔPFE and ΔEFE) of deleted firms for the current-year (CY columns) and one-year-ahead (CY+1 columns) the announcement year.

A.10 Information value: change in EPS forecasts (benchmark)

ΔFE		ΔPFE		ΔEFE	
CY	CY+1	CY	CY+1	CY	CY+1
-0.011	-0.007	-0.033%	0.014%	-0.119%	0.410%
-0.011	-0.007	-0.033%	0.014%	-0.119%	0.410%
-0.011	-0.007	-0.033%	0.014%	-0.119%	0.410%
-0.011	-0.007	-0.033%	0.014%	-0.119%	0.410%
-0.011	-0.007	-0.033%	0.014%	-0.119%	0.410%
-0.011	-0.007	-0.033%	0.014%	-0.119%	0.410%
-0.011	-0.007	-0.033%	0.014%	-0.119%	0.410%
0.036	0.045	0.106%	0.051%	2.197%	1.987%
0.036	0.045	0.106%	0.051%	2.197%	1.987%
-0.007	0.004	-0.087%	-0.123%	-2.382%	-3.518%
-0.108	-0.085	-0.718%	-0.531%	2.168%	-6.830%
-0.067	-0.057	-0.254%	-0.588%	1.719%	8.054%
0.081	0.034	-0.184%	-0.169%	0.737%	-2.794%
0.416	0.403	0.131%	0.153%	-1.493%	2.070%
0.416	0.403	0.131%	0.153%	-1.493%	2.070%
0.416	0.403	0.131%	0.153%	-1.493%	2.070%
0.390	0.394	0.167%	0.133%	1.756%	1.852%
0.390	0.394	0.170%	0.136%	1.756%	1.852%
-0.333	-0.300	-0.553%	-0.894%	-4.536%	-3.845%
0.092	0.189	0.116%	0.149%	-7.918%	7.400%
0.092	0.189	0.116%	0.149%	-7.918%	7.400%
0.232	0.190	1.540%	1.217%	-3.510%	14.746%
0.255	0.232	0.393%	0.341%	5.704%	3.734%
0.126	-0.122	-0.146%	-0.341%	-0.678%	-2.807%
0.126	-0.122	-0.146%	-0.341%	-0.678%	-2.807%
0.277	0.196	-0.140%	-0.092%	-0.586%	-0.297%
0.277	0.196	-0.140%	-0.092%	-0.586%	-0.297%
0.451	1.803	0.233%	0.802%	8.973%	9.390%
-0.300	-0.247	-0.099%	-0.110%	-1.471%	-1.172%
-0.105	-0.163	-0.182%	-0.136%	-1.836%	-1.226%
0.136	0.102	0.002%	-0.064%	-0.218%	-0.836%
0.136	0.102	0.002%	-0.064%	-0.218%	-0.836%
0.161	0.202	0.041%	-0.031%	-0.220%	-0.035%
0.161	0.202	0.041%	-0.031%	-0.220%	-0.035%
0.161	0.202	0.041%	-0.031%	-0.220%	-0.035%
-0.181	-0.313	-0.040%	-0.062%	-0.029%	-0.224%
-0.181	-0.313	-0.040%	-0.062%	-0.029%	-0.224%
-0.170	-0.278	-0.113%	-0.120%	-0.456%	-0.650%
1.530	-0.153	-0.056%	0.081%	2.243%	0.606%
1.530	-0.153	-0.056%	0.081%	2.243%	0.606%
1.530	-0.153	-0.056%	0.081%	2.243%	0.606%
1.530	-0.153	-0.056%	0.081%	2.243%	0.606%
1.530	-0.153	-0.056%	0.081%	2.243%	0.606%
-0.703	2.372	2.134%	1.278%	51.004%	18.536%

Table A.20: Variation in EPS forecasts (ΔFE, ΔPFE and ΔEFE) referring to the benchmark used to make comparisons with added firms.

ΔFE		ΔPFE		ΔEFE	
CY	CY+1	CY	CY+1	CY	CY+1
-0.011	-0.007	-0.033%	0.014%	-0.119%	0.410%
-0.011	-0.007	-0.033%	0.014%	-0.119%	0.410%
-0.011	-0.007	-0.033%	0.014%	-0.119%	0.410%
-0.011	-0.007	-0.033%	0.014%	-0.119%	0.410%
-0.011	-0.007	-0.033%	0.014%	-0.119%	0.410%
-0.011	-0.007	-0.033%	0.014%	-0.119%	0.410%
-0.011	-0.007	-0.033%	0.014%	-0.119%	0.410%
0.160	0.165	0.852%	0.814%	23.169%	15.188%
0.036	0.045	0.106%	0.051%	2.197%	1.987%
0.036	0.045	0.106%	0.051%	2.197%	1.987%
-0.007	0.004	-0.087%	-0.123%	-2.382%	-3.518%
-0.108	-0.085	-0.718%	-0.531%	2.168%	-6.830%
-0.067	-0.057	-0.254%	-0.588%	1.719%	8.054%
0.416	0.403	0.131%	0.153%	-1.493%	2.070%
0.416	0.403	0.131%	0.153%	-1.493%	2.070%
0.416	0.403	0.131%	0.153%	-1.493%	2.070%
0.390	0.394	0.167%	0.133%	1.756%	1.852%
0.390	0.394	0.170%	0.136%	1.756%	1.852%
-0.333	-0.300	-0.553%	-0.894%	-4.536%	-3.845%
0.092	0.189	0.116%	0.149%	-7.918%	7.400%
0.092	0.189	0.116%	0.149%	-	-
0.232	0.190	1.540%	1.217%	-3.510%	14.746%
0.255	0.232	0.393%	0.341%	5.704%	3.734%
0.126	-0.122	-0.146%	-0.341%	-0.678%	-2.807%
0.126	-0.122	-0.146%	-0.341%	-0.678%	-2.807%
0.277	0.196	-0.140%	-0.092%	-0.586%	-0.297%
0.277	0.196	-0.140%	-0.092%	-0.586%	-0.297%
0.451	1.803	0.233%	0.802%	-	9.390%
-0.300	-0.247	-0.099%	-0.110%	-1.471%	-1.172%
-0.105	-0.163	-0.182%	-0.136%	-1.836%	-1.226%
0.136	0.102	0.002%	-0.064%	-0.218%	-0.836%
0.136	0.102	0.002%	-0.064%	-0.218%	-0.836%
0.161	0.202	0.041%	-0.031%	-0.220%	-0.035%
0.161	0.202	0.041%	-0.031%	-0.220%	-0.035%
0.161	0.202	0.041%	-0.031%	-0.220%	-0.035%
-0.181	-0.313	-0.040%	-0.062%	-0.029%	-0.224%
-0.181	-0.313	-0.040%	-0.062%	-0.029%	-0.224%
-0.181	-0.313	-0.040%	-0.062%	-0.029%	-0.224%
-0.170	-0.278	-0.113%	-0.120%	-0.456%	-0.650%
1.530	-0.153	-0.056%	0.081%	2.243%	0.606%
1.530	-0.153	-0.056%	0.081%	2.243%	0.606%
1.530	-0.153	-0.056%	0.081%	2.243%	0.606%
1.530	-0.153	-0.056%	0.081%	2.243%	0.606%
1.530	-0.153	-0.056%	0.081%	2.243%	0.606%
-0.703	2.372	2.134%	1.278%	51.004%	18.536%

Table A.21: Variation in EPS forecasts (ΔFE, ΔPFE and ΔEFE) referring to the benchmark used to make comparisons with deleted firms.

A.11 Information value: differences in changes in EPS forecasts of sample firms to those of the benchmark

ΔFE		ΔPFE		ΔEFE	
CY	CY+1	CY	CY+1	CY	CY+1
0.011	0.007	0.033%	-0.014%	0.119%	-0.410%
-0.009	0.037	-0.059%	0.124%	-1.590%	1.828%
-0.429	-0.303	-0.818%	-0.613%	-19.437%	-11.642%
-0.019	-0.033	-0.037%	-0.107%	-1.595%	-2.371%
-0.029	-0.123	0.011%	-0.084%	-0.766%	-2.959%
-0.059	-0.073	-0.135%	-0.205%	-7.408%	-7.077%
-0.019	0.037	-0.063%	0.082%	-1.994%	1.430%
-0.056	-0.085	-0.164%	-0.167%	-3.615%	-4.601%
-0.026	-0.055	0.120%	-0.277%	2.151%	-5.320%
0.007	0.006	0.087%	0.149%	2.382%	3.750%
-0.002	0.025	0.565%	0.448%	-3.901%	5.998%
0.062	0.057	0.014%	0.588%	-4.393%	-8.054%
-0.061	-0.004	0.295%	0.336%	0.381%	4.190%
0.644	0.027	0.892%	0.262%	8.322%	0.355%
-0.396	-0.303	-0.090%	0.052%	2.093%	0.583%
-0.406	-0.453	-0.112%	-0.249%	1.826%	-3.532%
-0.390	-0.394	-0.167%	-0.133%	-1.756%	-1.852%
-0.150	-0.184	0.145%	0.140%	3.361%	2.141%
0.343	0.300	0.571%	0.894%	4.806%	3.845%
-0.042	-0.079	0.062%	0.243%	9.976%	-3.526%
-0.162	-0.119	-0.524%	0.259%	3.373%	-3.233%
-0.082	0.180	-1.429%	-0.943%	5.157%	-10.767%
0.705	0.598	1.929%	1.667%	28.460%	17.016%
2.584	0.312	2.098%	0.478%	17.062%	3.826%
-0.126	0.122	0.146%	0.341%	0.678%	2.807%
-0.237	-0.176	0.241%	0.142%	1.726%	0.785%
-0.267	-0.136	0.155%	0.181%	0.942%	2.252%
0.269	-0.843	1.861%	1.990%	27.208%	27.112%
0.340	0.297	0.289%	0.347%	4.192%	4.356%
0.105	0.193	0.182%	0.629%	1.836%	12.337%
-0.026	-0.042	0.175%	0.161%	4.654%	2.934%
0.074	-0.042	0.310%	0.153%	6.184%	2.390%
0.369	0.358	0.315%	0.408%	12.376%	11.059%
-0.191	-0.142	-0.182%	0.312%	-2.219%	4.615%
-0.141	-0.172	0.033%	0.142%	1.397%	1.543%
0.181	0.283	0.040%	0.024%	0.029%	-0.859%
0.241	0.593	0.053%	0.123%	0.311%	1.372%
0.210	0.268	0.144%	0.112%	1.130%	0.495%
-2.180	0.203	0.010%	-0.078%	-9.917%	-0.208%
-1.540	0.223	0.044%	0.004%	-2.619%	1.286%
-1.490	0.123	0.134%	-0.140%	-0.382%	-1.905%
-1.490	0.163	0.116%	-0.067%	0.069%	-0.101%
-1.030	0.383	0.399%	0.076%	6.319%	2.816%
0.823	-2.302	-1.781%	-1.072%	-39.004%	-12.845%

Table A.22: Variation in EPS forecasts (ΔFE, ΔPFE and ΔEFE) of added firms to those of the benchmark.

ΔFE		ΔPFE		ΔEFE	
CY	CY+1	CY	CY+1	CY	CY+1
0.041	0.057	0.102%	0.101%	1.136%	1.105%
1.641	-2.493	0.083%	-0.090%	0.879%	-1.441%
-0.009	-0.013	-0.211%	-0.258%	-4.426%	-4.666%
-0.069	0.047	-1.113%	0.560%	-8.672%	2.790%
-0.159	-0.103	-1.319%	-0.888%	-16.548%	-10.060%
-0.009	-0.023	-0.265%	-0.460%	-4.643%	-7.553%
0.011	0.047	0.033%	0.117%	0.119%	1.560%
0.230	0.215	0.171%	0.182%	-9.993%	-3.776%
-0.156	-0.265	-0.156%	-0.142%	-2.942%	-3.283%
-0.136	-0.235	-0.789%	-1.348%	-11.543%	-15.090%
0.017	-0.014	0.378%	-0.168%	9.048%	-0.328%
-0.062	-0.325	0.496%	-0.005%	-4.354%	2.280%
-0.033	-0.013	-0.536%	0.035%	-112.830%	-14.985%
-0.426	-0.383	-0.240%	0.066%	-0.095%	0.562%
10.084	2.967	0.083%	-0.084%	3.553%	-1.472%
-0.146	-0.273	0.117%	-0.033%	5.050%	-0.577%
-0.380	-0.394	-0.106%	-0.133%	-1.373%	-1.852%
-0.400	-0.344	-0.201%	0.015%	-2.154%	0.049%
0.333	0.290	0.553%	0.622%	4.536%	1.213%
1.208	-0.289	4.716%	-0.520%	74.585%	-12.663%
-1.442	-0.719	-4.781%	-1.980%	-	-
-0.182	-0.190	-1.474%	-1.217%	5.629%	-14.746%
-0.155	-0.232	1.989%	-0.341%	13.164%	-3.734%
-0.216	-0.148	-0.169%	-0.603%	-2.312%	-4.885%
-0.446	-0.258	-3.719%	-4.248%	-18.146%	-15.375%
-0.437	-0.336	-0.198%	-0.204%	-2.884%	-2.503%
-0.277	-0.196	0.140%	0.092%	0.586%	0.297%
-0.201	-1.613	8.062%	5.502%	-	1890.610%
-0.600	-0.103	-3.810%	-1.411%	-132.857%	-14.315%
0.045	0.063	-0.149%	-0.416%	-3.427%	-5.144%
-0.156	-0.192	-0.188%	-0.775%	-2.282%	-9.629%
-0.216	-0.372	-0.429%	-1.377%	-3.992%	-16.927%
-0.201	-0.222	-0.382%	-0.140%	-2.446%	-1.231%
-0.281	-0.412	-1.247%	-2.080%	-6.637%	-9.056%
-0.191	-0.192	-0.177%	0.076%	-1.620%	0.582%
0.121	0.313	-0.123%	0.062%	-1.840%	0.224%
0.171	0.293	-0.065%	-0.149%	-1.486%	-2.593%
0.131	0.233	-0.459%	-0.737%	-10.175%	-8.764%
0.360	0.148	0.268%	0.014%	2.048%	-0.406%
-1.530	0.133	0.056%	-0.283%	-2.243%	-2.392%
-1.650	0.133	-4.494%	-0.840%	-50.243%	-5.734%
-1.580	0.103	-1.566%	-1.703%	-13.112%	-10.606%
-1.570	0.083	-0.039%	-0.247%	-3.437%	-2.453%
-2.860	0.013	-10.187%	-1.160%	-334.743%	-8.606%
0.673	-2.322	-2.920%	0.032%	-64.048%	5.273%

Table A.23: Variation in EPS forecasts (ΔFE, ΔPFE and ΔEFE) of deleted firms to those of the benchmark.

	Mean (-60, -10)	Mean (1, 4)	Mean (10, 60)	Short window (%Δ)	Long window (%Δ)
Banco Santander	0.0036435	0.0033138	0.0042146	-9.049%	15.674%
BASF	0.0028520	0.0026420	0.0032328	-7.364%	13.351%
HypoVereinsbank	0.0039522	0.0044141	0.0036521	11.687%	-7.593%
Dresdner Bank	0.0044343	0.0032388	0.0033204	-26.962%	-25.120%
Muenchener Ruck.	0.0025918	0.0038442	0.0028356	48.325%	9.407%
Sanofi	0.0044124	0.0010726	0.0042352	-75.690%	-4.016%
Suez(Rompus)	0.0019001	0.0006108	0.0008062	-67.852%	-57.570%
Danone	0.0021684	0.0017439	0.0022217	-19.575%	2.460%
Intesa Sanpaolo	0.0035625	0.0023730	0.0046098	-33.389%	29.399%
Saint Gobain	0.0023739	0.0045321	0.0013724	90.909%	-42.188%
Lafarge	0.0023120	0.0030495	0.0023990	31.900%	3.766%
Iberdrola	0.0011577	0.0008368	0.0009807	-27.719%	-15.289%
Crédit Agricole	0.0016292	0.0008001	0.0008126	-50.890%	-50.123%
Arcelormittal	0.0008901	0.0004992	0.0006392	-43.920%	-28.188%
Schneider Electric	0.0005467	0.0002775	0.0005845	-49.237%	6.918%
Vinci	0.0004632	0.0002755	0.0003922	-40.530%	-15.341%
Volkswagen	0.0014107	0.0010961	0.0011818	-22.300%	-16.231%
Deutsche Boerse	0.0024503	0.0025820	0.0021154	5.376%	-13.666%
Alstom	0.0008931	0.0004073	0.0008080	-54.389%	-9.530%
Anheuser-Busch Inbev	0.0009242	0.0008848	0.0007465	-4.261%	-19.230%
CRH	0.0026682	0.0029704	0.0033417	11.327%	25.241%
WFD Unibail-Rodamco	0.0013519	0.0005171	0.0009507	-61.747%	-29.678%
BMW	0.0018455	0.0019758	0.0015794	7.061%	-14.417%
Volkswagen Pref.	0.0025239	0.0036525	0.0029705	44.715%	17.695%
Inditex	0.0005325	0.0014616	0.0006502	174.466%	22.090%
ASML Holding	0.0007318	0.0006252	0.0007387	-14.560%	0.947%
Essilorluxottica	0.0007274	0.0005761	0.0009629	-20.801%	32.366%
Airbus	0.0007490	0.0005140	0.0006038	-31.375%	-19.383%
Deutsche Post	0.0028145	0.0030103	0.0026130	6.958%	-7.158%
Nokia	0.0010198	0.0009259	0.0008735	-9.206%	-14.344%
Fresenius	0.0024579	0.0025203	0.0021650	2.538%	-11.920%
Safran	0.0005746	0.0004488	0.0005820	-21.891%	1.286%
Adidas	0.0021851	0.0013856	0.0018756	-36.591%	-14.165%
Ahold Delhaize	0.0009054	0.0016076	0.0007721	77.559%	-14.716%
CRH	0.0010789	0.0006314	0.0009161	-41.477%	-15.090%
Amadeus It Group	0.0005054	0.0004933	0.0004772	-2.388%	-5.566%
Kering	0.0012560	0.0012491	0.0006915	-0.552%	-44.948%
Deutsche Boerse	0.0035835	0.0041503	0.0039509	15.820%	10.253%
Adyen	0.0011814	0.0006337	0.0006486	-46.360%	-45.105%
Prosus	0.0011544	0.0013989	0.0011290	21.179%	-2.202%
Vonovia	0.0022082	0.0018065	0.0023666	-18.190%	7.177%
Kone 'B'	0.0007600	0.0007488	0.0006840	-1.478%	-10.000%
Pernod-Ricard	0.0007911	0.0007431	0.0010112	-6.063%	27.823%
Infineon Technologies	0.0025765	0.0026195	0.0023439	1.667%	-9.029%

Table A.24: Variation of *Percentage spread* of added firms over the short and long window.

	Mean (-60, -10)	Mean (1, 4)	Mean (10, 60)	Short window (%Δ)	Long window (%Δ)
Akzo Nobel	0.0032518	0.0015604	0.0024857	-52.014%	59.295%
Relx	0.0044738	0.0024569	0.0032243	-45.083%	31.236%
Stellantis	0.0040635	0.0024324	0.0026414	-40.141%	8.593%
Deutsche Lufthansa	0.0034669	0.0043188	0.0034404	24.570%	-20.339%
Pharol SGPS	0.0034608	0.0040421	0.0033801	16.799%	-16.380%
Schneider Electric	0.0039516	0.0015020	0.0030939	-61.991%	105.987%
Saint Gobain	0.0045164	0.0033619	0.0023651	-25.562%	-29.650%
Electrabel	0.0038414	0.0037962	0.0022923	-1.175%	-39.616%
Ceconomy	0.0120916	0.0069370	0.0141218	-42.630%	103.573%
Kpn Kon	0.0046047	0.0049902	0.0038804	8.372%	-22.239%
Kering	0.0020201	0.0042075	0.0017972	108.286%	-57.287%
HypoVereinsbank	0.0047332	0.0045415	0.0033429	-4.051%	-26.392%
Volkswagen	0.0029599	0.0028130	0.0027371	-4.963%	-2.698%
Ahold Delhaize	0.0013532	0.0009452	0.0011199	-30.150%	18.484%
AIB Group	0.0039785	0.0024352	0.0041992	-38.792%	72.441%
Lafarge	0.0004719	0.0002693	0.0003632	-42.931%	34.872%
Endesa	0.0003317	0.0014710	0.0013984	343.460%	-4.930%
ABN Amro Holding	0.0004025	0.0007943	0.0019155	97.318%	141.157%
Alcatel-Lucent	0.0015649	0.0018024	0.0011087	15.175%	-38.489%
Ageas (Ex-Fortis)	0.0022248	0.0018344	0.0014473	-17.546%	-21.101%
Renault	0.0007360	0.0005143	0.0005492	-30.122%	6.788%
Volkswagen	0.0025567	0.0031544	0.0025331	23.377%	-19.698%
Aegon	0.0004997	0.0007126	0.0005005	42.607%	-29.761%
Alstom	0.0004422	0.0009753	0.0007216	120.552%	-26.008%
Crédit Agricole	0.0006042	0.0007146	0.0011008	18.274%	54.051%
Deutsche Boerse	0.0037747	0.0049879	0.0049261	32.142%	-1.239%
Telecom Italia	0.0112485	0.0120435	0.0009805	7.067%	-91.859%
Nokia	0.0007556	0.0007690	0.0009126	1.767%	18.673%
Arcelormittal	0.0005032	0.0008400	0.0006392	66.930%	-23.907%
CRH	0.0010115	0.0014609	0.0011849	44.427%	-18.897%
Repsol YPF	0.0004032	0.0004971	0.0005394	23.276%	8.510%
RWE	0.0036956	0.0039620	0.0042450	7.206%	7.144%
Assicurazioni Generali	0.0009356	0.0008901	0.0010156	-4.863%	14.098%
Unicredit	0.0010485	0.0009519	0.0009939	-9.215%	4.407%
Carrefour	0.0006715	0.0003769	0.0005228	-43.876%	38.734%
Saint Gobain	0.0009624	0.0003023	0.0003122	-68.593%	3.306%
E ON N	0.0028095	0.0028703	0.0041149	2.167%	43.361%
Deutsche Bank	0.0030341	0.0027682	0.0027920	-8.767%	0.861%
Wfd Unibail-Rodamco	0.0009323	0.0004782	0.0010535	-48.709%	120.316%
Orange	0.0004702	0.0007711	0.0007531	63.997%	-2.331%
BBV Argentaria	0.0004272	0.0004495	0.0004398	5.239%	-2.167%
Telefonica	0.0003843	0.0004913	0.0004078	27.832%	-16.998%
Fresenius	0.0047423	0.0047101	0.0044166	-0.681%	-6.231%
Société Générale	0.0004887	0.0003061	0.0004615	-37.370%	50.788%
Nokia	0.0005903	0.0005133	0.0005151	-13.058%	0.355%

Table A.25: Variation of *Percentage spread* of deleted firms over the short and long window.

	Mean (-60, -10)	Mean (1, 4)	Mean (10, 60)	Short window (%Δ)	Long window (%Δ)
Banco Santander	72754.516	79129.725	103630.936	8.763%	42.439%
Sanofi	44844.290	67463.850	49928.128	50.440%	11.337%
Danone	73561.980	84987.900	94720.437	15.532%	28.763%
Intesa Sanpaolo	63344.436	54565.550	84839.482	-13.859%	33.934%
Saint Gobain	58290.549	77936.450	48855.082	33.703%	-16.187%
Lafarge	58591.220	84882.200	70003.549	44.872%	19.478%
Iberdrola	87212.920	65536.650	59512.638	-24.854%	-31.762%
Crédit Agricole	47958.106	91615.600	88355.880	91.033%	84.236%
Arcelormittal	207215.392	256226.450	223318.835	23.652%	7.771%
Schneider Electric	141870.075	197493.325	150905.302	39.207%	6.369%
Vinci	151027.406	168627.600	133689.494	11.654%	-11.480%
Volkswagen	3216.671	8030.625	3294.100	149.656%	2.407%
Deutsche Boerse	1153.180	2022.200	1045.465	75.359%	-9.341%
Alstom	104826.871	129045.900	124079.169	23.104%	18.366%
Anheuser-Busch Inbev	66439.108	128423.475	79693.669	93.295%	19.950%
CRH	32483.988	50392.175	30990.280	55.129%	-4.598%
WFD Unibail-Rodamco	45401.776	121768.550	62824.327	168.202%	38.374%
BMW	632.712	1126.100	1295.284	77.980%	104.719%
Volkswagen Pref.	268.525	60.650	226.745	-77.414%	-15.559%
Inditex	91891.606	170056.850	123206.716	85.062%	34.078%
ASML Holding	62324.160	125038.600	94516.251	100.626%	51.653%
Essilorluxottica	36572.404	70877.300	44132.339	93.800%	20.671%
Airbus	74308.977	99176.425	128096.980	33.465%	72.384%
Deutsche Post	514.063	29.550	568.322	-94.252%	10.555%
Nokia	86402.841	117308.900	142934.634	35.770%	65.428%
Fresenius	520.953	51.600	423.949	-90.095%	-18.620%
Safran	73761.663	123760.250	96752.867	67.784%	31.170%
Adidas	888.847	272.125	799.846	-69.384%	-10.013%
Ahold Delhaize	72030.959	84557.175	90450.908	17.390%	25.572%
CRH	32542.825	37110.800	40965.822	14.037%	25.883%
Amadeus It Group	51116.408	76426.100	75798.067	49.514%	48.285%
Kering	101138.610	112316.100	134970.647	11.052%	33.451%
Deutsche Boerse	56.237	24.125	57.518	-57.101%	2.279%
Adyen	120481.320	220460.075	148675.310	82.983%	23.401%
Prosus	111523.512	133865.825	157791.933	20.034%	41.488%
Vonovia	162.031	131.025	181.996	-19.136%	12.322%
Kone 'B'	44449.647	69599.750	54613.294	56.581%	22.866%
Pernod-Ricard	60612.537	64991.225	88324.822	7.224%	45.720%
Infineon Technologies	708.371	294.650	382.720	-58.405%	-45.972%

Table A.26: Variation of *Volume* of added firms over the short and long window.

A.12 Liquidity proxies: *Percentage spread*

A.13 Liquidity proxies: *Volume*

A.14 Liquidity proxies: *Share turnover*

	Mean (-60, -10)	Mean (1, 4)	Mean (10, 60)	Short window (%Δ)	Long window (%Δ)
Stellantis	54403.529	30495.800	42398.884	-43.945%	-22.066%
Pharol SGPS	33409.090	20025.125	56882.502	-40.061%	70.261%
Schneider Electric	32947.632	41728.550	34491.742	26.651%	4.687%
Saint Gobain	52872.034	51318.775	44708.302	-2.938%	-15.441%
Kering	71641.292	45241.675	41681.229	-36.850%	-41.820%
Ahold Delhaize	129801.351	120748.175	89189.153	-6.975%	-31.288%
AIB Group	55194.992	112547.750	59998.792	103.909%	8.703%
Lafarge	141509.598	145685.875	138127.094	2.951%	-2.390%
Endesa	152883.286	67606.975	26565.659	-55.779%	-82.624%
Alcatel-Lucent	84873.273	84070.800	58313.106	-0.945%	-31.294%
Ageas (Ex-Fortis)	38096.624	72459.275	33710.018	90.199%	-11.514%
Renault	65413.227	79344.350	90428.404	21.297%	38.242%
Volkswagen	668.606	260.150	296.835	-61.091%	-55.604%
Aegon	61157.980	65018.150	46361.514	6.312%	-24.194%
Alstom	73920.965	55932.925	50391.651	-24.334%	-31.830%
Crédit Agricole	138022.443	68806.050	57994.976	-50.149%	-57.981%
Deutsche Boerse	1564.425	1353.475	757.469	-13.484%	-51.582%
Telecom Italia	73868.888	67886.150	52235.654	-8.099%	-29.286%
Nokia	119106.787	66177.200	60215.494	-44.439%	-49.444%
Arcelormittal	96375.612	74871.975	108754.680	-22.312%	12.845%
CRH	25304.253	18497.050	17192.896	-26.901%	-32.055%
Repsol YPF	132433.712	151449.650	123408.943	14.359%	-6.815%
RWE	324.273	1063.625	236.016	228.003%	-27.217%
Assicurazioni Generali	113225.796	95443.225	130955.306	-15.705%	15.659%
Unicredit	262372.266	187004.850	227743.612	-28.725%	-13.198%
Carrefour	65658.392	70778.300	60555.120	7.798%	-7.772%
Saint Gobain	69547.069	68203.525	68421.886	-1.932%	-1.618%
E ON N	278.198	151.700	259.337	-45.470%	-6.780%
Deutsche Bank	890.082	525.900	848.912	-40.916%	-4.625%
Wfd Unibail-Rodamco	75392.325	62068.175	60052.108	-17.673%	-20.347%
Orange	70222.616	80092.550	79687.392	14.055%	13.478%
BBV Argentaria	58601.825	76955.700	86580.259	31.320%	47.743%
Telefonica	55746.206	52611.500	60369.414	-5.623%	8.293%
Fresenius	164.810	155.150	214.814	-5.861%	30.340%
Société Générale	82148.920	79496.525	103456.067	-3.229%	25.937%
Nokia	143461.625	55992.000	75895.633	-60.971%	-47.097%

Table A.27: Variation of *Volume* of deleted firms over the short and long window.

	Mean (-60, -10)	Mean (1, 4)	Mean (10, 60)	Short window (%Δ)	Long window (%Δ)
Banco Santander	2.30650	2.49744	3.11808	8.278%	35.187%
BASF	0.85691	0.66577	0.63214	-22.306%	-26.230%
HypoVereinsbank	0.31762	0.16973	0.23472	-46.564%	-26.101%
Muenchener Ruck.	0.14892	0.18269	0.13304	22.674%	-10.665%
Sanofi	1.56360	2.39049	1.73934	52.883%	11.240%
Suez(Rompus)	5.49355	3.74605	5.26292	-31.810%	-4.198%
Danone	3.42999	3.64991	4.16083	6.412%	21.307%
Intesa Sanpaolo	2.62763	2.42361	3.29937	-7.764%	25.565%
Saint Gobain	4.47736	6.57290	3.85069	46.803%	-13.996%
Lafarge	4.74700	7.47152	6.72662	57.395%	41.703%
Iberdrola	6.20980	5.64998	5.24543	-9.015%	-15.530%
Crédit Agricole	1.63509	2.83671	2.63431	73.490%	61.111%
Arcelormittal	3.59363	3.65436	3.31635	1.690%	-7.716%
Schneider Electric	5.96637	8.97229	6.59925	50.381%	10.607%
Vinci	5.97227	6.43597	5.08544	7.764%	-14.849%
Volkswagen	0.21682	0.42808	0.18168	97.435%	-16.207%
Deutsche Boerse	0.06226	0.03525	0.05413	-43.387%	-13.064%
Alstom	6.04819	8.38369	12.38555	38.615%	104.781%
Anheuser-Busch Inbev	1.48655	2.55848	1.49340	72.109%	0.461%
CRH	2.76773	3.75936	2.46128	35.828%	-11.072%
WFD Unibail-Rodamco	3.74244	10.42183	5.28649	178.477%	41.258%
BMW	0.02504	0.03812	0.03821	52.264%	52.608%
Volkswagen Pref.	0.20420	0.15516	0.17402	-24.014%	-14.781%
Inditex	2.47561	4.35062	3.07663	75.740%	24.278%
ASML Holding	5.00594	9.33884	6.32655	86.555%	26.381%
Essilorluxottica	2.25784	4.48254	2.92182	98.532%	29.408%
Airbus	2.53051	2.90425	3.75595	14.769%	48.427%
Deutsche Post	0.04442	0.04100	0.03858	-7.685%	-13.134%
Nokia	3.86417	4.64787	5.81268	20.281%	50.425%
Fresenius	0.01303	0.00986	0.00827	-24.320%	-36.533%
Safran	2.62048	4.38008	3.40455	67.148%	29.921%
Adidas	0.01875	0.01111	0.01109	-40.742%	-40.870%
Ahold Delhaize	3.90121	3.12144	3.54925	-19.988%	-9.022%
CRH	1.43895	1.50470	1.59335	4.569%	10.730%
Amadeus It Group	1.56887	2.15150	2.54625	37.137%	62.298%
Kering	1.70916	1.92768	2.73936	12.785%	60.275%
Deutsche Boerse	0.00232	0.00079	0.00219	-65.972%	-5.556%
Adyen	2.84449	4.61131	3.03812	62.113%	6.807%
Prosus	0.81816	1.05206	1.10155	28.588%	34.637%
Vonovia	0.00526	0.00393	0.00568	-25.241%	7.950%
Kone 'B'	1.43874	2.09268	1.69424	45.452%	17.759%
Pernod-Ricard	1.59069	1.84438	2.23996	15.948%	40.817%
Infineon Technologies	0.01595	0.00651	0.00882	-59.199%	-44.739%

Table A.28: Variation of *Share turnover* of added firms over the short and long window.

	Mean (-60, -10)	Mean (1, 4)	Mean (10, 60)	Short window (%Δ)	Long window (%Δ)
Akzo Nobel	7.38825	10.45893	8.44001	41.562%	14.236%
Relx	8.72047	7.28902	9.40545	-16.415%	7.855%
Stellantis	20.09774	11.96990	17.38429	-40.442%	-13.501%
Deutsche Lufthansa	0.67145	0.44548	0.74007	-33.654%	10.221%
Pharol SGPS	5.55171	2.88224	7.06953	-48.084%	27.340%
Schneider Electric	3.64121	3.98896	3.48539	9.550%	-4.279%
Saint Gobain	4.48030	4.87682	4.17302	8.850%	-6.858%
Electrabel	1.07858	2.31573	1.37780	114.702%	27.742%
Ceconomy	0.75385	0.41493	0.33020	-44.959%	-56.198%
Kpn Kon	15.88075	13.74677	23.30019	-13.438%	46.720%
Kering	7.37642	6.11447	4.91505	-17.108%	-33.368%
HypoVereinsbank	0.21622	0.29699	0.27649	37.356%	27.873%
Ahold Delhaize	12.48485	10.33700	7.93104	-17.204%	-36.475%
AIB Group	3.16304	7.82226	4.50390	147.302%	42.392%
Lafarge	6.62227	7.66685	6.90943	15.774%	4.336%
Endesa	9.03207	4.10020	1.69049	-54.604%	-81.283%
ABN Amro Holding	15.49320	3.55966	0.28315	-77.024%	-98.172%
Alcatel-Lucent	9.40003	12.15625	13.58262	29.321%	44.495%
Ageas (Ex-Fortis)	5.74605	10.16941	4.78433	76.981%	-16.737%
Renault	7.83045	8.70210	9.57176	11.132%	22.238%
Volkswagen	0.02848	0.01407	0.01406	-50.609%	-50.645%
Aegon	8.71480	9.06975	6.46647	4.073%	-25.799%
Alstom	8.21615	8.79773	7.62752	7.079%	-7.164%
Crédit Agricole	6.88184	6.13551	4.60072	-10.845%	-33.147%
Deutsche Boerse	0.04553	0.01412	0.02001	-68.988%	-56.039%
Telecom Italia	6.88987	6.93363	5.42987	0.635%	-21.191%
Nokia	10.20055	6.77798	6.12086	-33.553%	-39.995%
Arcelormittal	5.93317	4.33205	5.39093	-26.986%	-9.139%
CRH	1.90196	1.39230	1.31307	-26.797%	-30.962%
Repsol YPF	6.70150	10.91833	7.69762	62.924%	14.864%
RWE	0.04781	0.09976	0.10901	108.668%	128.032%
Assicurazioni Generali	6.53789	5.41802	6.99497	-17.129%	6.991%
Unicredit	20.70763	14.38075	16.93230	-30.553%	-18.232%
Carrefour	3.89863	4.02229	3.46680	3.172%	-11.076%
Saint Gobain	3.39482	3.31713	3.84955	-2.289%	13.395%
E ON N	0.01329	0.00777	0.01335	-41.560%	0.402%
Deutsche Bank	0.04217	0.02505	0.04855	-40.601%	15.112%
Wfd Unibail-Rodamco	4.38483	3.43246	3.10564	-21.720%	-29.173%
Orange	2.60730	3.29828	3.02690	26.502%	16.093%
BBV Argentaria	3.17483	5.13572	4.12321	61.764%	29.872%
Telefonica	3.02878	3.53803	3.68105	16.814%	21.536%
Fresenius	0.00711	0.00731	0.01088	2.881%	53.163%
Société Générale	6.74880	8.17460	8.26651	21.127%	22.488%
Nokia	6.76502	2.88539	3.30798	-57.348%	-51.102%

Table A.29: Variation of *Share turnover* of deleted firms over the short and long window.

Notes

1. The announcement is currently available on https://www.moodys.com/research/Moodys-Passive-investing-to-overtake-active-in-just-four-to–PR_361541 or https://web.archive.org/web/20210306175808/https://www.moodys.com/research/Moodys-Passive-investing-to-overtake-active-in-just-four-to–PR_361541.

2. According to the Taiwan Stock Exchange Corporation, individuals made up more than 70% of the total market trading volume between 1999 and 2007.

3. Notice that the prefix "Dow Jones" was removed from the name of all STOXX indexes on March 1, 2010.

4. See the press release of Andreas von Brevern available here: https://www.stoxx.com/fi/web/stoxxcom/press-releases-details?articleId=672975509 or here: https://web.archive.org/web/20200125002452/https://www.stoxx.com/fi/web/stoxxcom/press-releases-details?articleId=672975509 for more information.

5. Data sources are: https://www.stoxx.com/index-details?symbol=SX5E&stoxxindex=sx5e&searchTerm=Blue+Chip and https://www.stoxx.com/fi/web/stoxxcom/press-releases; whereas for the most recent announcements (to date): https://qontigo.com/post-type/press-releases/.

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