

DO WHAT INSIDERS DO:
Abnormal performances after the release of
insiders' relevant transactions

Emanuele Bajo
University of Bologna

Barbara Petracci
University of Bologna

September 28, 2005

Abstract

Every country with a developed security market considers market egalitarianism and equal access fundamental principles and, therefore, has a legislation which prevents corporate insiders from trading in their own company's shares when they own private information. This research intends to establish if insider trading is really a phenomenon extraneous to the Italian stock market as the scarce jurisprudence in subject seems to suggest or if our rules are not effective.

Considering the market reaction after changes in managerial ownership, we can say that insiders have private information and that thanks to their exploitation in their trading activities they are able to obtain significant abnormal returns between the first and the third month following the change operation.

1 Introduction

Every country with a developed security market considers market egalitarianism and equal access fundamental principles, therefore it has a legislation that prevents corporate insiders from trading in their own company's shares when they own private information.

The aim of our paper is to study the real motivation for insiders to trade relevant stakes and, at the same time, to verify the informational content of such transactions. Several can be the reasons for ownership change: shareholders might want to vary their holdings in order to diversify their portfolios to reduce risk (Diversification); alternatively, they might be willing to convert part of their assets in cash in response to the sudden arising of a payment obligation (Liquidity Needs); again, they might decide to purchase shares in order to obtain companies' control (Control Needs) or to trade on the occasion of a specific firm event such as the attempt of a take-over, the execution of a buy-back plan or the conversion of savings shares. In addition to these possible motivations, we postulate two more hypotheses in order to explain the specific reasons for insider trading:

Hypothesis 1. Information asymmetry

Insiders buy and sell shares as a consequence of a different valuation of fundamental stock's value

Hypothesis 2. Private information

Insiders vary their ownership in order to exploit private information in their possession.

According to the last two hypotheses, insiders would be able to earn excess profits by either recognizing a temporary stock market mispricing or by taking advantage of some specific and undisclosed firm events. Although many empirical analyses have been carried out in the past in order to test the real profitability of insider trading and its information content, results are contradictory. Kerr (1980), Holderness and Sheehan (1985) verify the strong-form efficiency of the US stock market, while Seyhun (1986), Madura and Wiant (1995) find insider's positive abnormal returns.

The aim of our research is to establish if the illegal insider trading phenomenon is really extraneous to the Italian stock market, as the scarce jurisprudence on the subject would suggest, or if our laws are not effective. Because of the greater information set that insiders have thanks to the role played in their companies, they can do better than the market: they can obtain higher profits or limit losses as they trade shares whose prices do not reflect all the available information. The hypothesis to test is if an insider ownership increase is followed by a positive market reaction and if an opposite reaction is likely to occur after a negative change on holding. This can be caused by the information asymmetries between insiders and market, which give the first greater valuation ability about the shares' fair value (Information Asymmetry Hypothesis) or by insiders' superior knowledge of future events (Private Information Hypothesis).

The rest of the paper is organized as follows. The first section presents a brief overview of previous researches. The second one describes the principal features of the Italian insider trading laws and their enforcement. Sections three and four explain the procedures of collecting data, the rules of sample selection and the methodology used to value insider performances. Section five shows and interprets the empirical results, while the final section draws the conclusions.

2 Review

Every attempt at investigating the phenomenon of insider trading is based on the Efficient Capital Market Hypothesis, formulated by Fama in 1970. If insiders earn more than average profits thanks to their transactions, the strong efficient market hypothesis turns out false. Since its first formulation, this theory has been the object of several analyses which have produced mixed evidences. Kerr (1980), Holderness and Sheehan (1985), Lin and Howe (1990) assert the strong-form efficiency of the US stock market, while Jaffe (1974), Seyhun (1986), Madura and Wiant (1995) find insider's positive abnormal returns. These mixed results are not always easily explainable, though they are likely to be determined by differences in methodologies, in the selected period and in the kind of stock market under analysis.

Empirical researches on insider trading can be divided into five principal areas. The first one includes studies of both legal and illegal insiders' transactions around specific firm events, such as take-overs (Eysell and Arshadi (1993)), CEO substitution (Niehaus and Roth (1999)), equity issues (Gombola et al. (1999)), announcement of companies' budget (Penman (1985)), dividend announcements (John and Lang (1991)). The second and the third area are respectively represented by studies on how stock price formation can be influenced by the quality of information (Meulbroek (1992), Veronesi (2000)) and on the information content of insider's trades (Rozeff and Zaman (1988)). The fourth area of interest is related to the features that a possible insider trading regulation should have (Haddock and Macey (1987)), while the last area is concerned with the role of trading volumes about the stock price autocorrelation.

Most researchers focused their attention on the first area of study, which can be further split into two different approaches: the first one dealing with the set of all transactions carried out by insiders; the second one only with the illegal transactions recorded by the Securities and Exchange Commissions of the different countries. As for the first approach, Rogoff (1964) and Glass (1966) show that US insiders can and do identify profitable as well as unprofitable situations within their corporations. Lorie and Niederhoffer (1968) also find that transactions carried out by US officers, directors and stakeholders anticipate market price movements. In fact, when securities are bought (sold) by insiders they tend to perform better (worse) than the stock market in the six months following the transaction.

The results of this research are confirmed by other studies such as the ones by Pratt and De Vere (1970), Jaffe (1974) and Finnerty (1976). Jaffe partic-

ularly investigates the link between observed insider information and insider trading and the one between insider trading and information-dissemination activities. He points out that the transactions carried out by managers and main shareholders produce profits which can either remunerate costs connected with forecasting techniques' elaboration or come from the use of inside information. As for insiders, the use of inside information is more likely than that of personal systems of analysis, which is typical of financial analysts.

On the contrary, after analysing the timing and frequency of corporate transactions around the news announcements, Elliot, More, and Richardson (1984), Givoly and Palmon (1985) reach different conclusions and state that corporate insiders do not trade using inside information. Givoly and Palmon (1985) underline the absence of any correlation between insider trading and new events. As the price movements which take place in the month following the transaction and in its same direction seem to occur independently of the information release they claim that investors consider insiders' activity a signal of overvalued or undervalued securities, therefore they tend to replicate insiders' behaviour.

The second approach tries to demonstrate that private information guarantees insiders abnormal performances, as shown by the analyses of illegal insider transactions detected and prosecuted by the Securities and Exchange Commissions of different countries. Such evidence of abnormal performances caused by the exploitation of private information has made several researchers highlight the need to ban or at least to regulate insider trading (Meulbroek (1992), Cornell and Sirri (1992), Chakravarty and McConnell (1999)). Meulbroek especially examines the pre-announcement stock price effects of illegal insider trading discovered by the Sec and points out how insider trading volume constitutes most abnormal firm volume.

Unfortunately, outside the U.S. borders, the abuse of inside information has been studied only in a small number of financial markets. Baesel and Stein (1979), Fowler and Rorke (1984) show that insiders can earn abnormal profits on the Toronto Stock Exchange. Similar conclusions have been formulated by Bhattacharya (2000) on the Mexican Stock Market, by Eckbo and Smith (1998) on the Oslo Stock Exchange, by King and Roell (1988), Pope, Morris, and Peel (1990) on the London Stock Exchange.

As regards the Italian Stock Exchange, we are acquainted with only two works, so far: an empirical research (Baccolini et al 1991) previous the introduction of the first Italian law against insider trading (Law n°157/91) and the development of an intertemporal model of individuals made by Nicodano in 2000. By using a similar methodology to the one applied in our study, the first work verifies the presence of abnormal returns on a sample of eighteen companies in the days preceding the release of price sensitive information such as acquisitions, unexpected earnings and changes in the ownership structure.

3 Italian Laws Regulating Insider Trading

In Europe the EU Commission adopted the first directive about insider trading on November 13th 1989 (Insider Dealing Directive n°89/592), almost sixty years after the American Securities Act (1933), the first law against this phenomenon. Because of the important changes that have taken in the European financial markets since its adoption, this directive needed to be updated, therefore the so-called Market Abuse Directive was approved in 2003. Its goals were to reinforce market integrity, establish a strong commitment to transparency and, above all, reduce the information asymmetries between insiders and outsiders, thus limiting the opportunistic behaviour of the first. This law, which had to be implemented by national parliaments within October 2004¹, applies to both categories of market abuse, insider trading and market manipulation. It involves a single administrative authority in every member state and it requires closer cooperation together with a higher degree of information sharing among national authorities.

Besides this directive, the ”*Regolamento dei Mercati Organizzati e Gestiti da Borsa Italiana S.p.A.*” requires listed companies to approve an internal code (the so-called Internal Dealing Code) to regulate informative duties about transactions made by “relevant persons”². Unfortunately our analysis concerning the period 1st January 1998 – 30th September 2002 is not based on this law but on the articles 180-187 of the Decreto Legislativo n°58/98, which has substituted the previous Law n°157/91.

The article 180 states that the so-called primary insiders³ who have inside information are forbidden to trade on their own account or on behalf of third parties, to suggest operations to third parties (Tuyautage) or to communicate the information to third parties (Tipping). The so-called tippees⁴ are only prohibited to trade on their own account or on behalf of third parties. Inside information means some precise, not public information, which could have a significant effect on the stock prices if made public. It can be either specific information related to the company (corporate information) or general information related to the whole market (market information).

Besides, the so-called Riforma Draghi considers the real use of inside information punishment condition and increases insider-trading penalties. Specifically, the insider who doesn’t respect the prohibition is subject to penal sanctions such as up to two years imprisonment and the payment of a fine that can vary from 5.000 Euro to 300.000 Euro. The Consob has the power to ask for data, news, acts and documents of every person who seems acquainted with the facts, to make inspections and the obligation to send all the documents to the public prosecutor, who plays a leading role in the judicial inquiry. As regards informa-

¹In Italy this directive was implemented on April 2005.

²The relevant persons are: managers, directors, auditors and any other person indicated by the company as in possession of price sensitive information and their relatives.

³The class of primary insiders includes shareholders and all those who have access to inside information by virtue of the practise of their employment, profession or duties.

⁴Tippees or secondary insiders are those who receive inside information from primary insiders.

tive duties, the article 117 of the Consob Regulation n°11971 states that persons who participate in the capital represented by voting shares of a listed company shall inform both the company and the Consob when their holding exceeds the thresholds of 2%, 5%, 7.5%, 10% and subsequent multiples of 5. Besides the article 121 states that the above communication must be made within five trading days from the date of the transaction triggering the requirement. Then the Consob must make this information public within three trading days from the receipt of the declaration.

[Insert Figure 1]

The timing for information disclosure to market fixed by the regulation seems to be only theoretical and unlikely to be respected. In order to demonstrate the above statement, the mean and median of the number of days between transaction date and shareholder communication to the Consob have been computed in our sample and they appear to be, respectively, equal to twelve and fourteen days, a much longer period than the five days stated by the art.121 of Consob regulation⁵. Besides, although the Consob has sent judicial authorities 103 reports of suspected crime since 1991, only seven plea bargains and two convictions are recorded. Such jurisprudence urged us to investigate in order to verify whether this balance is a real indicator of the efficiency of the Italian Stock Market or, rather, a symptom of weak enforcement of insider trading regulation.

4 Data and Sample Selection

Thanks to the CONSOB Database, we collected all the data concerning with changes in managerial ownership reported by the Commission from March 1998 to September 2002⁶. These reports provide an important set of information: type of the operation, real transaction date, type of financial instruments traded, name of investors and their relationship to the corporation, nature of the ownership (“direct” or “indirect” – through a trust, a family member, or the intermediary), their initial and final shareholding.

From this Database we first selected only the observations put in place by insiders. Our definition of “insider” includes CEOs, top-managers, members of the board, members of control family and close family members of these individuals. From this dataset we also dropped all the changes whose trade amount was lower than 2% and whose stocks were not traded on the Milan Stock Exchange. Then, we didn’t consider transactions having as an object preference or savings shares⁷, because of the small sample and ownership changes due to

⁵For this analysis, the sample is composed only of the observations related to the 2000-2002 period. We also report the minimum and maximum interval value, equal, respectively, to one and twenty-nine days.

⁶The art. 120 of the Decreto Legislativo n°58/98 states: “Those who have a shareholding higher than 2% must communicate it to the CONSOB”.

⁷In presence of changes both of ordinary shareholding and of preference shareholding, we have considered only the first one.

acquisitions, mergers and divestitures since they were due to specific economic reasons⁸. Finally, a breakdown of 65 exclusions was done as follows: we eliminated six operations on shares that are object of more operations of opposite sign made on the same day, fourteen operations related to tender offers⁹, six operations characterized by dilution effects caused by saving shares' conversion and one observation based on an intragroup transfer.

Eventually, after carrying out a multi-event study, we found that the estimation period of some particular events was influenced either by another event or by the prediction period of an earlier one. The first case is defined an event overlapping phenomenon and the second one is defined a period overlapping phenomenon. Because of the presence of both phenomena within our research, we eliminated 41 observations. The final sample consists of 129¹⁰ observations: 70 operations of shareholding increase and 59 opposite operations.

[Insert Table 1]

5 Methodology

In order to determine whether insiders are able to earn abnormal returns, we used a standard *event study* methodology. This approach suggests the analysis of the market response in the few days following the transaction date (in our case, the day of change in insider's stake) to study the announcement's signalling effect. First, to measure abnormal returns, we used the *Market Adjusted Model* based on the difference between return of the share considered, recorded on a definite day t , and market return recorded on that day.

$$AR_{i,t} = R_{i,t} - R_{m,t}$$

where $AR_{i,t}$ = Abnormal Return for security i on day t , $R_{i,t}$ = Return for security i on day t and $R_{m,t}$ = Market Return on day t . As the use of different pricing models is one of the most frequent event study methods to give robustness to empirical analyses, to measure abnormal returns we also used the *Market and Risk Adjusted Model* and the *Buy and Hold Model*. With regard to the first model, abnormal returns were calculated as follows:

$$AR_{i,t} = R_{i,t} - [\alpha_i + \beta_i R_{m,t}]$$

⁸Our sample is constituted by ownership changes put in place by insiders without any apparent motivations. The two informational hypotheses we postulated are the only natural reason. A speculative intent is supposed to exist on our insiders' transactions. When changes are driven by some other reason, such as acquisitions, it is not possible to assume any informational or speculative reason pushing insiders to trade.

⁹We have dropped these cases since, showing a specific firm project, they could be contaminated by other relevant information.

¹⁰These numbers are related to daily analysis. As regards weekly analysis, the sample is composed of 119 operations: 62 of shareholding increase and 57 opposite operations. Datas-tream provided time series of stock prices.

where $AR_{i,t}$ = Abnormal Return for security i on day t , $R_{i,t}$ = Return for security i on day t , $R_{m,t}$ = Market Return on day t , α_i and β_i are, respectively, the intercept and the slope for security i obtained with a *MarketModel*. The estimation of these parameters makes us consider an observation period previous to the analysis period. α_i and β_i are determined through an OLS (*Ordinary Least Square*) regression model of security returns on market returns during the fifty-two weeks previous to the analysis period (from -53 week to -1 week).

Buy and Hold methodology computes abnormal returns in the following manner:

$$AR_{i,H} = R_{i,H} - R_{m,H}$$

where $AR_{i,H}$ = Abnormal Return for security i , $R_{i,H}$ = Actual Return for security i , $R_{m,t}$ = Market Return and H the time horizon considered. The calculus of all returns is based on the time window of $[0, H]$, so to replicate the real return obtainable by an investor buying at the event date and selling at the horizon.

6 Results

An analysis of market reaction following a change of the stake owned by insiders is here reported. This work supports the idea that a change on insiders' ownership has information content and it conveys a signal to market because of the information asymmetry between insiders and private investors. In other words, as insiders could be better informed about the firm's future prospective, their transactions are likely to transmit market information about future stock prices.

As a further motivation, we suspect that Italian insiders fairly often modify their ownerships with the aim to exploit private information. We presume that insiders usually make their moves with a significant anticipation compared to the news announcement since, even though Italian insider trading regulation is not effectively enforced, trading on shares only few days before market announcements would be easily detected and prosecuted. No matter what the reason for the trading is, either a different estimate of the fundamental stock's value or rather an intent to take advantage of undisclosed information, we should observe an increase of company's market value following a rise of the owned stake and a decrease in the opposite situation. The following analysis is two-fold. First of all, we want to carry out a daily investigation in order to see if a change on holding might cause a market reaction (signaling effect). Then, we mean to consider a wider window (up to six months) in order to verify whether these transactions lead to a price adjustment towards the "fundamental level" (*information asymmetry hypothesis*) or anticipate market performances concerning news announcements (*private information hypothesis*).

This paragraph is organized as follows: in the first section we present a market reaction analysis based on an event study on 21 days around the event;

in the second section, we present a six-months study based on weekly data (post transaction performances).

6.1 Market reaction analysis

The aim of this analysis is to verify whether stock market may consider a change of insider's holdings a signal for future and considerable events about companies. Our database allows us to conduct such analysis using two different types of dates: transaction date and announcement date (the second one, only with regard to the period 2000-2002). The former is the day a change of holding occurred, the latter the day Consob reported the same change to the market. Although we could expect a market reaction only at the moment of the announcement, rumors or information dissemination might anticipate the market reaction up to the transaction date. An event study methodology was carried out setting as day 0 both insider trade date and announcement date.

[Insert Table 2]

6.1.1 Insider's trade date analysis

Through the analysis based on transaction date we do not find evidence of a strong and clear market reaction, at least on 2-3 days around the events. In Table 2, we can notice that both $CAR(-1, 0)$ and $CAR(-1, 1)$ are not statistically significant for positive change sub-sample, even if we do have a weak market response for negative change sub-sample. As for this last result, we must admit that the positive sign does not confirm our supposition. The level of its significance, though, is fairly low ($CAR(-1, 1)$ is not significant), therefore, we believe this cannot invalidate our suppositions.

We can have higher insights if we look at a larger period. In a window of 10 days following transaction, we can notice a positive cumulative market reaction for positive change sub-sample and negative returns for the opposite sub-sample. Both figures are strongly significant and the difference of abnormal returns between the two sub-samples is close to 7%. For the latter sub-sample, we also find a positive pattern on the pre-event period. This seems to confirm our hypothesis that a positive market reaction should follow positive changes of insiders' holding and an opposite effect should follow negative changes. The positive pre-event pattern found on sell sub-sample might be explained hypothesizing that a price run-up may push insiders to sell part of their shares (for a such an amount as to avoid a loss of company's control). Unfortunately, the narrow window does not allow us to strongly support this idea, which has to be verified with a longer pre-event period.

6.1.2 Announcement date analysis

Previously we have not found any robust evidence of a market response to insiders' transaction in a two-three days window around the trading, however this result is perfectly consistent with a market efficiency hypothesis, according to

which a market reaction should occur simultaneously with information disclosure. In this paper, we assume disclosure coincides with the day of publishing of holdings' changes on Consob's web site.

Thus, we have repeated an event study analysis on disclosure date in the same way as we have done on transaction date. In Table 2, we only find a weak market reaction on the event date (positive as supposed) for purchase sub-sample. We do not find any evidence for the remaining sub-sample and, taking a slightly larger window (2 or 3 days), we notice that also the previously cited reaction disappears. A possible explanation of this lack of market reaction could be related to our prior findings. From the analysis based on transaction date a post-event reaction emerged and we think it is probably due to a pre-announcement information dissemination (rumors). Considering the strong significance of this reaction, we can assume that information given by insiders' transactions at the time of disclosure has already been fully anticipated and, consequently, announcements do not have any informative power. Our pre-event window ($CAR(-10, -1)$) substantially confirms the evidence found on the analysis carried out on transaction date. Earlier we have found that after transaction prices tend to rise when insiders buy and decline in the opposite situation, as if there were an effect of information dissemination. This produces the outcome seen on this pre-event window and, at the same time, explains why we do not observe any reaction on the announcement date.

6.2 Post Transaction performances

In the previous analysis we have found some evidence of our hypothesis, namely, a positive market reaction consequently to a buying insiders' activity and a negative one consequently to the opposite trading direction. It has still to be verified whether these findings are confirmed in a larger period setting. In fact, we believe that only in a wide window it is possible to obtain a significant confirmation of our hypotheses.

According to our first hypothesis, if insiders were able to better perceive the real value of stocks, they would be willing to increase their holdings when shares are undervalued and to decrease them in the opposite situation. Assuming that in the long-run shares tend to converge to their fundamental value, we should observe a price increase following a buying insiders' activity and a price decrease subsequently to a selling activity. With regards to our second hypothesis (exploitation of private information), since insiders probably operate with large anticipation compared to public announcements, only long-run analysis would allow to capture the following market behavior. CAR analysis on one, three and six months is presented in Table 3 and, above all, in Table 4.

[Insert Tables 3 and 4]

We can immediately notice clear and strong statistically significant performances over the period analyzed for both sub-samples. As hypothesized, the buy (ownership increase) sub-sample is characterized by a strong positive market performance, whose greatest part takes place within the first three months

(*CARs* are close to 10%). The sell sub-sample shows a negative market performance, even though with a lower statistical significance. The difference between the two sub-samples is always extremely significant: one month and three months *CAR* are, respectively, close to 15% and 20%. This is a clear verification of this paper's hypothesis and a further evidence of our prior findings. Changes on insiders' holdings have an important information content, testified by market movements after transactions. Unfortunately, we are not able to verify whether market movements are driven by undisclosed information subsequently released (*private information exploitation hypothesis*) or are caused by a better insiders' estimation of the real value of stocks (*information asymmetry hypothesis*).

We proceeded further by focusing on the insiders' initial ownership. With the purpose to verify that holdings changes are not driven by company's control needs, but rather by speculative reasons, we split the sample into three sub-samples, using two critical stake thresholds: 29,99% and 50%. The former represents the highest stake that can be owned without launching a mandatory tender offer¹¹; the latter is the level of absolute majority. We believe that the initial ownership is an important variable to determine the information content of a change on insiders' holdings. As a matter of fact, it is reasonable to assume that insiders' changes are not driven by company's control needs when their initial ownership is reasonably high. For instance, suppose a majority shareholder who already holds 60% of the total shares. In case he decides to buy or sell 10% of his shares, he is likely to be pushed by speculation intent rather than by a strategy of company's control. More specifically, at least for high levels of holdings, we also believe that an increase of the stake is more informative than a decrease. For example, we can find more than one explanation for decreasing the stake owned: speculative reason but also the will of the majority shareholder to lower his stake on the company because unnecessary for control needs (diversification reasons). On the contrary, we cannot think of any economic reasons that might justify a holding increase when a shareholder already has the majority of shares. For this reason, we presume that initial ownership can represent an important variable and, furthermore, that an increase of holding carries more information than a reduction (at least for initial ownership over a 50% level). As a confirmation of our supposition, although a clear market performance consistent with our prediction can be observed in all the samples (split by initial share and by sign of holding change), this is statistically significant only for sub-sample with initial ownership higher than 50% and positive changes. Furthermore, if we look at the difference between purchase and selling sub-samples, all the figures are statistically significant at 1% level.

To sum up the main insights of *CAR* analysis, we can affirm that results are perfectly consistent with our hypotheses. A change on holdings put in place by an insider is able to trigger substantial market movements. However, these movements do not occur around the transaction or the announcement date, but

¹¹Italian law forces a shareholder who acquires more than 30% of total shares to launch a tender offer on the entirety of existent shares.

rather in a larger window of days, usually between the first and the third month after the trade. As supposed, the sign of market performances coincides with the sign of change of holding: an insiders' buying activity brings a positive signal to market, whereas an insiders' selling activity brings a negative one. We also stated that when the initial ownership is particularly high small shareholdings changes are more probably driven by speculative reasons than economic ones. Results also confirm this intuition.

The analyses presented so far have been all obtained by using a particular methodology (Market Adjusted Model) in order to compute abnormal returns and by using a specific market index ("Comit Adjusted" Index). With the aim to see if the results are in some way affected by the type of benchmark or methodology used, we also carried out some sensitivity analyses. With regards to the benchmark, results do not change, as Table 5 shows, even if we use three different indexes for market returns.

[Insert Table 5]

More useful insights come from Table 6 where a sensitivity analysis about the methodology is tested. Results based on the Market Adjust Model are compared to those obtained through a Market and Risk Adjusted and a Buy and Hold methodology. The Buy and Hold sample can be perfectly compared to our reference sample. As the Market and Risk Adjusted sample is characterized by a smaller size¹², a comparison will be made between two not completely coincident samples. As for the findings, the sign of market performances does not alter throughout different methodologies: an increase of ownership brings a positive long-term market performance and a decrease brings an opposite market behavior. With regards to the magnitude of CARs, although the Market and Risk Adjusted Model outcomes do not add any particular insight to our conclusions, the Buy and Hold Model evidences larger movements for "buy" sub-sample that, however, are not more statistically significant. Table 6 also reports the long-term effect of changes of insider's stake up to a 12-month period. One year post-event analysis basically validates the conclusions drawn on one, three and six months basis: in fact, cumulative abnormal returns show a monotonic trend both for the positive and the negative changes of our ownership sample.

[Insert Table 6]

6.2.1 Regression analysis

In order to complete the main conclusions drawn on the basis of event study analysis, we try now to develop a regression study and to try to verify what the determinants of long-term market abnormal performances are. We find eight possible explaining variables some of which should have the same influence on six months CAR both for positive changes and for negative ones while some others

¹²As explained on Paragraph 3, beta estimation for market and risk adjusted expected returns led to the exclusion of some observations.

should lead to a different effect according to the sign of the holding's change. In order to take into account these variables in the same regression model, we used a system of dummy variables to distinguish the sign of coefficients. For instance, we assume that the initial ownership is an important explanatory variable, but the expected sign of its coefficient is different in the two sub-samples (positive and negative change on holdings). In order to model that, we regressed the six months CAR to the initial ownership and the initial ownership multiplied by a dummy variable (D_C - dummy change)¹³. So we did for other variables with the same expected feature. The resulting regression model is the following:

$$CAR_{6M} = \alpha + \beta_1 \%Initial + \beta_2 D_C \%Initial + \beta_3 Delta_Voting + \beta_4 Rel_Delta + \beta_5 D_Pr_iv + \beta_6 D_C D_Pr_iv + \beta_7 LogMktCap + \beta_8 D_C LogMktCap + \beta_9 FirstSh + \beta_{10} D_C FirstSh + \beta_{11} MarketToBook + \beta_{12} D_InstInvestors + \beta_{13} D_C D_InstInvestors$$

The dependent variable is the six months CAR (CAR_{6M}), whilst D_C is the dummy used to differentiate the effects of the variables with a different expected sign in the two distinct sub-samples. D_C is equal to 1 for the observations with a negative change of holding and 0 for those with a positive one. The symbol above the coefficients represents the expected sign. Here an economic explanation of regressors follows:

%Initial: Insiders' initial ownership. Its effect on CAR depends on sub-sample. For positive change of holdings we expect a positive relationship and the opposite for negative change sub-sample. The higher is the initial holding, the stronger the signal to market will be that trading is more likely driven by speculative reasons rather than by company's control needs. As a consequence, a high level of initial ownership will lead to highly positive market performances for positive changes and strongly negative market performances for opposite holding's changes.

Delta_Voting: Magnitude of the change on insider's stake. The assumed sign is positive. In other words, we suppose that a positive change on holdings leads to positive market performances and vice versa.

Relative_Delta: Relative change of the insider's stake. This variable is computed as ratio between the magnitude of stake modification and the initial shareholding owned. In expected terms, a greater relative change should bring a higher market performance.

DPrivate: Dummy variable. It classifies insiders identifiable as private persons (rather than companies). With regard to the theory that insiders more often alter their stakes with the intention to exploit private information, it is more likely to observe higher CARs when insiders are represented by companies. As a manner of fact, it is probably less risky to try to take advantages of private information using a company as protection measure. However, the assumed sign is related to the sub-sample considered: we expect a negative sign for positive

¹³Note that the second coefficient ($D_C * InitialOwnership$) is not the coefficient of negative changes sub-sample, but just the difference between the two sub-samples. The coefficient for negative sub-sample would be the sum of both coefficients.

changes and a positive sign for the opposite sub-sample (we expect a higher market performance when dummy is equal to 0, even if the sign of this depends on the type of sub-sample considered).

Log_mktcap: Market capitalization's natural logarithm. As previously stated, it is realistic to assume that smaller firms experience more severe asymmetry information problems. In other words, the signal sent to market by these companies after insiders' transactions could be stronger. In our view, there is also another possible reason that supports a negative coefficient. If these transactions are mostly motivated by private information exploitation, it is more likely to find evidence for smaller firms characterized by a poorer media coverage. As before, the assumed sign is different in the two sub-samples: negative for the former sub-sample and positive for the latter.

First Sh.: Ratio between first shareholder's and insider's stake. The higher is the ratio, the lower is the insider's strength and presumably also his information set. Hence, we suppose a negative coefficient for the sub-sample with positive changes and negative for the opposite sub-sample (higher information set should lead to highly strong market performances for positive changes and strong negative performances for negative ones).

Market to Book: Market to Book value. This variable is assumed as proxy of possible under/overvaluation. According to the information asymmetry hypothesis, insiders might have a better understanding of the real value of the firm, consequently, they should sell their shares when overvalued and buy them when undervalued.

Inst. Investors: Dummy variable with value equal to 1 if institutional investors have voting shares. As the activity of monitoring practiced by this type of subjects is more effective than the one carried out by other shareholders, this variable is supposed to be linked with the dependent variable negatively for the sub-sample with positive changes; otherwise the expected sign is positive. (When insiders sell part of their holding, it is more likely that they do not exploit private information if institutional investors are present).

On Table 7 we can observe the main results of regression analysis. The first variable found statistically significant is the initial ownership (*%Initial*). As hypothesized, its influence on CAR is positive. What is not significant is β_2 coefficient, meaning that the sub-sample of negative changes is not statistically different from the opposite sub-sample. For positive changes of holding, though, the coefficient is significant on all the three regression models considered. As stated previously, this evidence is perfectly consistent with our expectations. When the insiders' initial ownership is considerably high, (it is more likely that) their transactions are more likely driven by speculative reasons.

The second significant variable is the magnitude of insiders' stake's change (*Delta_Voting*). Although the level of significance is low (below 10%), the sign of the coefficient is consistent with our expectations. A higher change of stake leads to stronger market performances. The two remaining significant variables are the dummy for the presence of institutional investors and the firm size (logarithm of market capitalization). As concerns the former, we must say that

evidence confirms our assumptions, although the difference between the two subsamples (coefficient β_{13}) is not statistically significant. As regards the latter, this is the only coefficient with an unexpected sign. We would have foreseen a negative relation for positive changes of insider's stake (and opposite for negative changes), but the *log_MktCap* is strongly and positively related to six months market performances. This result is contrary to our hypothesis, and the only possible explanation we can come up with is that, if the information asymmetry hypothesis holds, the price runs up following an insider transaction is higher for bigger firms for which the media coverage is higher. In other words, if Italian stock market suffers from a serious problem of information asymmetry between insiders and investors, an insider transaction can be reported more diffusely in the media when the firm is bigger, leading to a higher market response. Other variables, such as private insider dummy, market to book or the stake owned by insiders compared to the first shareholder (*First_Sh*), do not show any explanation power in any of the regression models.

[Insert Table 7]

6.3 Portfolio Strategy

In order to verify our hypothesis regarding the informational content of insiders' ownership changes, we also decide to set up a portfolio strategy. If our supposition is empirically confirmed, following insiders' trading activity should turn out a profitable portfolio strategy. Therefore, we try to imitate insiders, buying stocks when they increase their holdings and short selling them in the opposite situation¹⁴.

In order to have a feasible strategy, we set the day after the announcement date¹⁵ (Consob's web site publication) as operation date and we carry out this investment approach only for the sample characterized by the data availability¹⁶. Though we have an entering timing signal, that is the insider trading activity, we cannot postulate a strategy on exit. To deal with this problem, we set different stock holding periods, ranging from one day to six months. Doing so, we do not differentiate the holding timing among each stock. Finally, we suppose equally weighted portfolios. Whenever a new stock enters into portfolio, all remaining stocks are rebalanced in order to have the same weight. The exit of a stock follows the same approach. Table 8 reports the main results on portfolio strategies.

¹⁴Hence, this second portfolio is feasible only if short selling is allowed. In Italy we do not have such a trading restriction, even though we have to say that short selling some low liquid stocks might not be easy to implement.

¹⁵To give more strength to our results, we do not take the announcement date as operation date, since we do not know the exact time of the day when these information are released. Instead, using as starting date the following day, we are sure that all market is potentially informed and any investors might follow this strategy. The possible market reaction on the announcement date therefore, cannot be captured with this strategy.

¹⁶Announcement dates are available only for years 2000-2002.

6.3.1 Positive sample: long strategy

Starting from the portfolio based on the whole sample (54 observations of ownership increase), we can notice that a long strategy is profitable, but the maximum holding period coincides with one week. Abnormal returns are positive and strongly significant with both parametric and non-parametric tests¹⁷. We also try to use some information previously found in setting our portfolios. More precisely, we have found earlier that initial ownership and the magnitude of stake changes are relevant factors to determine the market extra performance, we replicate the same portfolio strategy using only the observations with, respectively, an initial ownership higher than 50% and a delta ownership higher than 5%.

As supposed, results based on these new strategies are more profitable and, somehow, different as regards the optimal holding period. The significance level showed in Table 8 is greater than the one found for the whole sample portfolio and the profitability of portfolios lasts for a one-month holding period. Therefore these analyses confirm our previous findings: the informational content of ownership changes and the signalling effect relative to the initial stake and the magnitude of changes. Furthermore, we might emphasise that the presence of profitability for a portfolio strategy based on public information (announcement date) is also an evidence of market inefficiency.

6.3.2 Negative sample: short strategy

In the previous section we found a less severe evidence of informational content for decreases of ownership. Nevertheless, under the hypothesis of short selling allowed, we try to repeat the same portfolio analysis for the negative sample. Hence, we build four different short portfolios, based on different holding periods. As we did before, we also set up portfolios using the information on initial and delta ownership. This leads to have twelve different portfolios.

As can be noticed in Table 8, this strategy seldom yields extra profits. Only in two out of twelve cases we get significant extra returns and the significance level is not as high as before. From such evidence, we can state that setting portfolios on announcements rather than transaction dates does not lead to a strongly profitable short strategy.

This result is not surprising, as previous findings have shown that an insider selling activity is not as strong a signal as a buying one. At the same time, the absence of profits does not contradict the previous evidence of some negative market extra performances following insiders selling activity since through this experiment we tried to test the profitability of a strategy based on public information rather than the possible extra profits for insiders.

[Insert Table 8]

¹⁷Abnormal returns are tested with a usual T test. The significance of portfolio returns is verified with a Monte Carlo simulation, trying to set up 1.000 portfolios randomly selected and replicating the same strategy of each tested portfolio, but using all stocks traded at the Milan Stock Exchange.

7 Conclusions

Legislators and market makers must focus their attention on the so-called insider trading. Although in the last years some laws have been adopted to prevent this behaviour in Italy, their enforcement has not been frequent nor effective. This condition has been the starting point of this research, which wants to verify the information content of insiders' trades, perhaps caused by the greater knowledge they have about the real prospective of firms. Thanks to the *Consob* (Italian Securities Exchange Commission) Database, we collected all the data related to changes in shareholders' stakes of Italian listed companies from March 1998 to September 2002. After choosing only the observations with a stake change greater than 2% and put in place by insiders, the whole sample selected is composed of 129 observations.

In order to prove that changes in insiders' holdings may have an information content, we carried out an event study analysis both on a daily and a weekly basis. The first analysis was focused on a window of 21 days both around transaction date and announcement date. We did not find any significant market reaction immediately around these dates. But we found statistically significant post-transaction market performances. This evidence had to be confirmed by an analysis on a larger period. Therefore, we also ran a weekly study in order to verify the post transaction behavior of stock prices. Our hypothesis says that insiders are more likely to trade on their shares with a speculation intent rather than for company's control reasons. The term "speculation" can have two meanings: insiders may vary their holdings in the view of an estimated temporary over or under valuation of current stock prices (*information asymmetry hypothesis*) or, in a stronger sense, they might take advantage of some undisclosed and, relevant information concerning (with) the company (*private information exploitation hypothesis*).

Results provide clear evidence in support of our thesis. An abnormal market performance occurs after an insider's transaction, usually, between the first and the third month after the dealing. As supposed, we find statistical evidence that the sign of market performances coincides with the sign of change of holdings, namely, a positive performance occurs after an increase of holdings and a negative one follows a decrease of the same. These results appear to be even stronger when the insiders' initial ownership is considerable high (over 50%). In this last case, the signal released to the market is stronger since adjustments of holdings are less likely to be motivated by economic reasons such as company's control necessity. In order to provide robustness to these findings, we also ran some sensibility analyses about both market index and methodology. Also these investigations, together with a regression study, confirm previous findings.

As a last analysis, we also tried to test the profitability of a possible portfolio strategy: go long after an ownership increase and go short in the opposite case. By setting as transaction date the day following the announcement (*Consob's* web site publication), we verified to our surprise that to trade on public information leads to extra-profits. Especially for long portfolios and using a holding period up to one month, it is possible to obtain a profitable portfolio rule.

References

- Baccolini, R., Ferretti, R. and Lusignani, G.: 1991, Informazioni Privilegiate e Dinamica delle Quotazioni alla Borsa di Milano, *Finanza, Imprese e Mercati*, n.2, pp.143-170.
- Baesel, J. and Stein, G.R.: 1979, The Value of Information: Inferences from the Profitability of Insider Trading, *Journal of Financial and Quantitative Analysis*, vol.4, pp.553-571.
- Brown, S. and Warner, J.: 1985, Using Daily Stock Returns: the Case of Event Studies, *Journal of Financial Economics*, vol.14, pp.3-31.
- Bhattacharya, U., Daouk, H., Hall, R.E. and Hausman J.A.: 1974, Estimation and Inference in Nonlinear Structural Models, *Annals of Economics and Social Measurement*, n.60, pp.401-424.
- Chakravarty, S. and McConnell, J.J.: 1999, Does Insider Trading Really Move Stock Prices?, *Journal of Financial and Quantitative Analysis*, vol.34, pp.191-209.
- Cornell, B. and Sirri, E.R.: 1992, The Reaction of Investors and Stock Prices to Insider Trading, *Journal of Finance*, vol.47, pp.1031-1059.
- Eckbo, B. and Smith, D.C.: 1998, The Conditional Performance of Insider Trades, *Journal of Finance*, vol.53, pp.467-498.
- Elliot, J., Morse, D. and Richardson, G.: 1984, The Association between Insider Trading and Information Announcements, *Rand Journal of Economics*, n.15, pp.521-536.
- Eysell, T.H. and Arshadi, N.: 1993, Insiders, Outsiders, or Trend Chasers? An Investigation of Pre-Takeover Transactions in the Shares of Target Firms, *Journal of Financial Research*, vol.16, pp.49-59.
- Fama, E.: 1970, Efficient Capital Markets: a Review of Theory and Empirical Work, *Journal of Finance*, vol.25, pp.383-417.
- Finnerty, J.: 1976, Insiders and Market Efficiency, *Journal of Finance*, vol.31, pp.1141-1148.
- Fowler, D. J. and Rorke, C.H.: 1984, Insider Trading Profits in the Canadian Equity Market, *Working Paper*, York University, Canada.
- Givoly, D. and Palmon, D.: 1985, Insider Trading and the Exploitation of Inside Information : Some Empirical Evidence, *Journal of Business*, vol.58, pp.69-87.
- Glass, G.A.: 1966, Extensive Insider Accumulation as an Indicator of Near-Term Stock Price Performance, *unpublished Ph.D. Dissertation*, Ohio State University Library.
- Gombola, M.J., Lee, H.W. and Liu, F.: 1999, Further Evidence on Insider Selling Prior to Seasoned Equity Offering Announcements: the Role of Growth Opportunities, *Journal of Business Finance and Accounting*, vol.26, pp.621-649.
- Gregory, A., Matatko, J., Tonks I. and Purkiss R.: 1994, UK Directors' Trading: the Impact of Dealings in Smaller Firms, *Economic Journal*, vol. 104, n.422, pp.37-53.
- Gregory, A., Matatko, J. and Tonks I.: 1997, Detecting Information from Directors' Trades: Signal Definition and Variable Size Effects, *Journal of Business*

Finance and Accounting, vol.24, pp.309-342.

Haddock, D.D. and Macey, J.R.: 1987, Regulation on Demand: A Private Interest Model, with an Application to Insider Trading Regulation, *Journal of Law and Economics*, vol.30, pp.311-352.

Holderness, C. and Sheehan, D.P.: 1985, Raiders or Saviors? The Evidence on Six Controversial Investors, *Journal of Financial Economics*, vol.14, pp.555-579.

Jaffe, J.: 1974, Special Information and Insider Trading, *Bell Journal of Economics and Management Science*, vol.5, pp.93-121.

John, K and Lang, H.P.: 1991, Insider Trading and Dividend Announcements: Theory and Evidence, *Journal of Finance*, vol.46, pp.1361-1389.

Kerr, H.S.: 1980, The Battle of Insider Trading vs. market Efficiency, *Journal of Portfolio Management*, pp.47-50.

King, M. and Roell, A.: 1988, Insider Trading, *Economic Policy*, vol.7, pp.163-193.

Lin, J. and Howe, J.S.: 1990, Insider Trading in the OTC Market, *Journal of Finance*, vol.55, pp.1273-1284.

Lorie, J. and Niederhoffer, V.: 1968, Predictive and Statistical Properties of Insider Trading, *Journal of Law and Economics*, vol.11, pp.35-51.

Madura, J. and Wiant, K.J.: 1995, Information Content of Bank Insider Trading, *Applied Financial Economics*, vol.5, pp.219-227.

Meulbroek, L.: 1992, An Empirical Analysis of Illegal Insider Trading and the Stock Market, *Journal of Finance*, vol.47, pp.1661-1699.

Niehaus, G. and Roth, G.: 1999, Insider Trading, Equity Issues and CEO Turnover in Firms Subject to Securities Class Action, *Financial Management*, vol.28, pp.52-72.

Penman, S.H.: 1985, Insider Trading and the Dissemination of Firms' Forecast Information, *Journal of Business*, vol.55, pp.479-503.

Pope, P.F., Morris, R. C. and Peel, D.A.: 1990, Insider Trading: Some Evidence on Market Efficiency and Directors' Share Dealings in Great Britain, *Journal of Business, Finance and Accounting* vol.17, pp.359-380.

Pratt, S. and De Vere, C.W.: 1970, Relationship between Insider Trading and Rates of Return for NYSE Common Stocks, 1960-1966, *unpublished Paper* required in Modern Developments in Investment Management by Lorie J. H. and Brealy R., New York.

Rogoff, D.: 1964, The Forecasting Properties of Insiders' Transactions, *unpublished D.B.A. Dissertation*, Michigan State University Library.

Rozeff, M. and Zaman, M.: 1988, Market Efficiency and Insider Trading: New Evidence, *Journal of Business*, vol.6, pp.25-44.

Seyhun, H. N.: 1986, Insiders Profits, Costs of Trading and Market Efficiency, *Journal of Financial Economics*, vol.16, pp.189-212.

Veronesi, P.: 2000, How does Information Quality Affect Stock Returns?, *Journal of Finance*, vol.55, pp.807-837.

Webb, G.P. : 1999, Evidence of Managerial Timing: the Case of Exchange Listing, *Journal of Financial Research*, vol.22, pp.247-263.

Table 1. Sample descriptive statistics (N=129). Number of observations by industry.

Industry	N° of Observations
Automobiles	5
Banks	13
Business Services	4
Chemichals	11
Communications Services	1
Construction-Raw Materials	8
Containers & Packaging	1
Distribution	1
Eletric Utilities	2
Eletronic/Eletrical Equipment	6
Engineering/Machinery	15
Entertainment	2
Financial Holdings	13
Food	4
Household Goods/Textiles	11
Industrial/Different	4
Insurance	7
Printing & Publishing	4
Real Estate	12
Steel-Other Metals-Oil and Gas	2
Transportation	3
Total	129
Number of companies	91
Number of declarents (insiders)	85

Table 2. Daily analysis. This table is split in two panels: the first is based on the transaction date and the second one is based on the announcement date. Both panels point out the values of AR(0) and of the different CARs used: CAR (-1,0) and CAR (-1,1) to measure the effect on the days immediately around the event, CAR (-10, -1) to measure the pre-event effect and CAR (0,10) to measure the post-event effect. A mean difference test on CARs recorded for positive and negative changes is also reported. T is the T-Student Statistics. To calculate abnormal returns the Benchmark used is a "Comit Adjusted" (adjusted for dividends). ARs are computed with a Market Adjusted Methodology.

PANEL A. TRANSACTION DATE

	Ownersh. Increase (N = 70)		Ownersh. Decrease (N = 59)		Difference	
	Mean	T	Mean	T	Mean	T
AR (0)	0.02%	(0.08)	0.88%	(1.83)	-0.86%	-(1.77)
CAR (-1, 0)	-0.19%	-(0.38)	0.90%	(1.62)	-1.09%	-(2.11)
CAR (-1, 1)	0.30%	(0.48)	0.17%	(0.26)	0.12%	(0.19)
CAR (-10, -1)	-0.08%	-(0.07)	3.25%	(2.63)	-3.33%	-(5.48)
CAR (0, 10)	3.18%	(2.68) ***	-3.67%	-(2.84) ***	6.85%	(11.29) ***

PANEL B. ANNOUNCEMENT DATE

	Ownersh. Increase (N = 54)		Ownersh. Decrease (N = 37)		Difference	
	Mean	T	Mean	T	Mean	T
AR (0)	0.69%	(2.20) **	0.18%	(0.25)	0.52%	(0.78)
CAR (-1, 0)	0.48%	(0.75)	0.41%	(0.53)	0.07%	(0.12)
CAR (-1, 1)	0.88%	(1.13)	0.25%	(0.27)	0.63%	(1.01)
CAR (-10, -1)	1.23%	(0.86)	-2.72%	-(1.57) *	3.96%	(5.29) ***
CAR (0, 10)	1.44%	(0.96)	0.43%	(0.24)	1.01%	(1.52) *

*, **, *** indicate that the coefficients are significantly different from zero at the 10%, 5% and 1% levels respectively

Table 3. Abnormal returns descriptive statistics. This table is split in two panels: ARs mean and median are computed both for positive and negative changes of shareholders' stake for 28 weeks around the date of ownership changes (set as week 0). T is the T-Student Statistics and Z is the Sign-Test. To calculate abnormal returns the Benchmark used is a "Comit Adjusted" (adjusted for dividends). ARs are computed with a Market Adjusted Methodology.

OWNERSHIP INCREASE

Week					Max	Min	PERCENTILES			
	Mean	T	Median	Z			5	25	75	95
-1	-0.41%	(-0.67)	-0.48%	(-0.76)	21.95%	-10.80%	-8.38%	-3.00%	1.58%	5.22%
0	0.29%	(0.48)	0.06%	(0.00)	13.89%	-8.04%	-6.09%	-2.50%	3.38%	6.62%
1	1.44%	(2.34) ***	-0.50%	(-1.02)	32.27%	-9.57%	-5.92%	-2.03%	2.98%	13.05%
2	2.68%	(4.36) ***	1.41%	(2.54) ***	35.82%	-13.06%	-5.12%	-1.68%	5.08%	15.78%
3	1.50%	(2.44) ***	-0.06%	(0.00)	57.84%	-11.54%	-8.49%	-2.52%	3.16%	11.45%
4	1.27%	(2.07) **	0.15%	(0.25)	31.73%	-15.44%	-6.59%	-2.52%	4.58%	17.55%
5	0.11%	(0.18)	-0.25%	(-0.25)	23.99%	-40.92%	-8.37%	-2.11%	3.37%	11.91%
6	-0.51%	(-0.83)	-0.13%	(-0.25)	16.89%	-16.80%	-11.25%	-3.83%	2.66%	9.10%
7	-0.38%	(-0.62)	-0.52%	(-0.76)	13.49%	-18.71%	-9.12%	-3.36%	3.53%	9.23%
8	-0.86%	(-1.40)	-0.41%	(-1.02)	9.62%	-19.01%	-8.20%	-3.80%	2.14%	6.04%
9	0.69%	(1.12)	0.00%	(0.00)	38.29%	-11.54%	-8.85%	-2.75%	2.87%	8.55%
10	1.21%	(1.97) **	0.04%	(0.25)	35.54%	-13.62%	-6.68%	-2.98%	4.82%	11.96%
11	0.55%	(0.89)	-0.01%	(0.00)	63.76%	-10.39%	-6.86%	-3.44%	2.08%	8.41%
12	1.41%	(2.30) **	0.48%	(0.76)	24.78%	-39.38%	-7.46%	-1.08%	4.80%	10.11%
13	0.46%	(0.75)	0.72%	(1.52) *	9.43%	-8.40%	-6.14%	-2.33%	3.04%	6.58%
14	-0.02%	(-0.04)	-0.51%	(-0.51)	13.64%	-31.14%	-8.13%	-2.20%	2.96%	9.67%
15	-0.26%	(-0.42)	-0.74%	(-1.52)	16.42%	-11.72%	-6.93%	-3.18%	1.88%	7.01%
16	-0.07%	(-0.11)	-0.85%	(-1.78)	14.55%	-25.05%	-6.07%	-3.13%	2.86%	10.51%
17	-0.34%	(-0.55)	-0.27%	(-0.25)	8.93%	-10.32%	-7.29%	-3.53%	2.73%	6.62%
18	-0.20%	(-0.33)	-0.59%	(-0.76)	14.85%	-10.97%	-7.66%	-2.95%	3.09%	6.67%
19	0.30%	(0.49)	-0.07%	(-0.25)	12.93%	-11.02%	-4.70%	-2.20%	2.55%	6.72%
20	-0.28%	(-0.45)	-0.70%	(-0.76)	15.81%	-16.15%	-7.32%	-3.19%	2.67%	6.87%
21	0.20%	(0.33)	-0.41%	(-0.76)	45.78%	-17.26%	-7.06%	-3.09%	2.24%	7.07%
22	0.19%	(0.31)	0.26%	(0.25)	25.18%	-24.61%	-8.86%	-2.53%	2.93%	8.80%
23	0.45%	(0.73)	-0.11%	(-0.25)	30.02%	-14.44%	-5.07%	-2.05%	2.03%	6.05%
24	0.64%	(1.03)	0.33%	(0.25)	19.83%	-11.46%	-4.79%	-2.02%	2.47%	7.14%
25	-0.36%	(-0.58)	-0.20%	(-0.25)	11.84%	-11.85%	-8.46%	-3.05%	2.47%	6.16%
26	-0.53%	(-0.86)	-0.76%	(-1.27)	14.54%	-11.06%	-7.39%	-3.73%	1.49%	8.70%

OWNERSHIP DECREASE

Week					Max	Min	PERCENTILES			
	Mean	T	Median	Z			5	25	75	95
-1	2.85%	(2.03)	0.55%	(0.40)	58.19%	-21.79%	-7.78%	-3.19%	4.52%	17.03%
0	-0.49%	(-0.35)	-0.48%	(-0.13)	24.38%	-17.59%	-11.12%	-4.16%	2.99%	8.31%
1	-2.76%	(-1.97) **	0.40%	(0.40)	12.26%	-79.91%	-12.61%	-3.39%	3.87%	10.61%
2	-1.15%	(-0.82)	-0.77%	(-1.72) **	16.90%	-20.85%	-11.40%	-4.19%	1.35%	7.10%
3	0.32%	(0.23)	-0.93%	(-1.46) *	35.86%	-8.24%	-7.66%	-3.48%	2.12%	8.05%
4	-2.28%	(-1.63) *	-1.71%	(-3.58) ***	23.71%	-40.28%	-12.26%	-4.14%	0.36%	6.04%
5	-1.27%	(-0.91)	-0.50%	(-0.66)	7.53%	-16.51%	-10.94%	-3.53%	2.52%	5.79%
6	1.17%	(0.83)	0.01%	(0.13)	35.32%	-13.12%	-7.75%	-1.97%	3.58%	11.40%
7	-0.59%	(-0.42)	-0.14%	(-0.93)	17.22%	-16.35%	-8.42%	-2.42%	1.97%	6.35%
8	0.30%	(0.21)	0.70%	(0.66)	19.42%	-12.98%	-6.93%	-3.12%	2.96%	8.21%
9	-0.37%	(-0.27)	-0.93%	(-1.19)	19.08%	-13.89%	-7.10%	-2.71%	2.00%	7.10%
10	0.63%	(0.45)	-0.98%	(-0.66)	23.12%	-7.95%	-6.73%	-3.40%	2.55%	11.42%
11	-0.45%	(-0.32)	-0.40%	(-0.66)	14.71%	-13.69%	-8.64%	-2.92%	2.72%	6.30%
12	-0.75%	(-0.54)	-0.36%	(-0.40)	12.47%	-12.94%	-9.73%	-3.59%	1.94%	5.53%
13	-1.45%	(-1.04)	-1.73%	(-2.25) **	12.80%	-12.55%	-9.45%	-3.86%	1.10%	4.41%
14	-1.18%	(-0.84)	-0.86%	(-1.72) **	5.12%	-10.15%	-8.74%	-3.49%	1.31%	4.56%
15	-0.32%	(-0.23)	-0.51%	(-0.93)	34.72%	-8.35%	-7.09%	-4.09%	1.62%	5.68%
16	-1.50%	(-1.07)	-1.60%	(-2.25) **	10.12%	-21.62%	-10.46%	-4.37%	1.47%	7.83%
17	1.06%	(0.76)	-0.07%	(-0.13)	28.66%	-12.52%	-6.71%	-2.50%	2.32%	17.05%
18	0.45%	(0.32)	-0.96%	(-1.46) *	53.42%	-17.30%	-6.56%	-2.89%	3.05%	9.96%
19	0.13%	(0.09)	-0.65%	(-0.13)	11.45%	-8.57%	-5.68%	-2.66%	2.46%	9.05%
20	-1.08%	(-0.78)	-1.16%	(-1.72) **	10.97%	-14.86%	-11.27%	-4.03%	2.07%	9.04%
21	-0.52%	(-0.37)	-1.19%	(-2.25) **	13.93%	-16.87%	-11.66%	-2.39%	2.67%	9.28%
22	0.50%	(0.36)	0.68%	(1.19)	20.59%	-10.56%	-7.09%	-2.08%	2.89%	7.86%
23	-1.36%	(-0.97)	-0.91%	(-1.19)	8.97%	-16.98%	-8.87%	-3.44%	1.37%	4.97%
24	-0.13%	(-0.10)	-0.19%	(-0.13)	11.21%	-8.15%	-6.74%	-3.05%	2.84%	5.99%
25	0.47%	(0.33)	0.41%	(0.93)	17.54%	-14.58%	-6.58%	-2.18%	2.27%	9.30%
26	0.80%	(0.57)	0.44%	(0.93)	28.14%	-8.98%	-7.85%	-2.26%	2.07%	9.34%

Table 4. CARs analysis. An analysis of market performances following a change of the stake owned by insiders is here reported. Three different CARs are used: CAR (0, 5) to measure the effect on the following month, CAR (0,13) and CAR (0, 26) to measure the effect respectively on the following 3 and 6 months. This table is split in two panels: the first is based on the sign of the change of the stake and the second is based on the value of the initial shareholding. A mean difference test on CARs recorded for positive and negative changes is also reported. T is the T-Student Statistics. To calculate abnormal returns the Benchmark used is a "Comit Adjusted" (adjusted for dividends). ARs are computed with a Market Adjusted Methodology.

	OWNERSHIP INCREASE (N = 62)			OWNERSHIP DECREASE (N = 57)			DIFFERENCE	
	Mean	T	Sign Test	Mean	T	Sign Test	Mean	T
CAR (0, 5)	7.29%	(4.85) ***	(1.52) *	-7.64%	-(2.23) **	-(1.19)	14.93%	(9.71) ***
CAR (0, 13)	9.87%	(4.29) ***	(1.78) **	-9.15%	-(1.75) **	-(0.93)	19.02%	(14.39) ***
CAR (0, 26)	9.59%	(3.00) ***	(1.78) **	-11.84%	-(1.63) *	-(2.52) *	21.43%	(18.05) ***
Initial Share < 29,99%								
	N = 19			N = 15				
CAR (0, 5)	2.81%	(1.01)	(0.69)	-5.43%	-(0.79)	(0.26)	8.24%	(4.40) ***
CAR (0, 13)	0.66%	(0.16)	(0.69)	-6.49%	-(0.62)	-(0.26)	7.15%	(3.82) ***
CAR (0, 26)	-2.02%	-(0.34)	(0.23)	-15.71%	-(1.08)	-(3.36) *	13.69%	(7.65) ***
30% = Initial Share < 50%								
	N = 4			N = 10				
CAR (0, 5)	-4.67%	-(0.41)	(0.00)	-17.06%	-(1.99) **	(0.00)	12.39%	(1.35) *
CAR (0, 13)	0.59%	(0.03)	(0.00)	-20.58%	-(1.58) *	(0.00)	21.17%	(3.22) ***
CAR (0, 26)	5.13%	(0.21)	(0.00)	-19.39%	-(1.07)	(0.00)	24.52%	(4.51) ***
Initial Share > 50%								
	N = 39			N = 32				
CAR (0, 5)	10.71%	(5.61) ***	(1.44) *	-5.73%	-(1.24)	-(1.77) **	16.43%	(9.05) ***
CAR (0, 13)	15.30%	(5.25) ***	(1.76) **	-6.83%	-(0.97)	-(1.06)	22.13%	(13.21) ***
CAR (0, 26)	15.70%	(3.88) ***	(2.08) **	-7.66%	-(0.78)	-(1.06)	23.36%	(15.26) ***

*, **, *** indicate that the coefficients are significantly different from zero at the 10%, 5% and 1% levels respectively

Table 5. Sensitivity to Benchmark. Both for positive changes and negative ones, a CARs analysis based on four different benchmarks for the Italian Stock Market is here reported. T is the T-Student Statistics. ARs are computed with a Market Adjusted Methodology.

Weeks	COMIT		COMIT 30		MIBTEL		MIB 30	
	Mean	T	Mean	T	Mean	T	Mean	T
OWNERSHIP INCREASE (N = 62)								
CAR (0, 5)	7.29%	(4.85) ***	7.36%	(2.69) ***	7.16%	(2.66) ***	7.36%	(2.69) ***
CAR (0, 13)	9.87%	(4.29) ***	10.83%	(2.70) ***	10.19%	(2.58) ***	10.84%	(2.70) ***
CAR (0, 26)	9.59%	(3.00) ***	10.58%	(1.93) **	9.83%	(1.82) **	10.58%	(1.93) **
OWNERSHIP DECREASE (N = 57)								
CAR (0, 5)	-7.64%	-(2.23) **	-4.40%	-(1.54) *	-4.51%	-(1.60) *	-4.40%	-(1.54) *
CAR (0, 13)	-9.15%	-(1.75) **	-6.11%	-(1.46) *	-6.29%	-(1.53) *	-6.11%	-(1.46) *
CAR (0, 26)	-11.84%	-(1.63) *	-8.45%	-(1.48) *	-9.00%	-(1.60) *	-8.45%	-(1.48) *

*, **, *** indicate that the coefficients are significantly different from zero at the 10%, 5% and 1% levels respectively

Table 6. Sensitivity to Methodology both for positive changes and negative ones. To verify the importance of the model used to calculate abnormal returns, we compare the results obtained thanks to three different methodologies: Market Adjusted Model, Market and Risk Adjusted Model and Buy and Hold Model. The smaller sample obtained thanks to the second methodology is due to the requirement to have a good fit on the beta's estimates (9 observations were excluded from sample for data missing and 27 for low fit). In addition to the previous results, also a one-year post-event CAR, (CAR [0,52]), is computed. T is the T-Student Statistics. N is the number of observations. To calculate abnormal returns the Benchmark used is a "Comit Adjusted" (adjusted for dividends).

Weeks	EXPECTED RETURN MODELS								
	Market Adjusted			Market and Risk Adjusted			Buy and Hold		
	Mean	T	N	Mean	T	N	Mean	T	N
OWNERSHIP INCREASE (N = 62)									
CAR (0, 5)	7.29%	(4.85) ***	62	7.32%	(2.20) **	46	12.66%	(2.42) ***	56
CAR (0, 13)	9.87%	(4.29) ***	62	10.91%	(2.24) **	46	21.43%	(1.85) **	56
CAR (0, 26)	9.59%	(3.00) ***	62	13.25%	(1.99) **	46	21.24%	(2.08) **	56
CAR (0, 52)	14.05%	(2.11) **	50	13.77%	(1.84) **	37	53.86%	(2.07) **	54
OWNERSHIP DECREASE (N = 57)									
CAR (0, 5)	-7.64%	-(2.23) **	57	-6.50%	-(1.86) **	42	-6.26%	-(3.13) ***	55
CAR (0, 13)	-9.15%	-(1.75) **	57	-8.71%	-(1.71) **	42	-7.55%	-(3.11) ***	55
CAR (0, 26)	-11.84%	-(1.63) *	57	-11.50%	-(1.65) **	42	-9.94%	-(3.31) ***	55
CAR (0, 52)	-16.95%	-(2.33) ***	42	-13.62%	-(1.60) *	29	-7.99%	-(1.48) *	47

*, **, *** indicate that the coefficients are significantly different from zero at the 1%, 5% and 10% levels respectively

Table 7. Regression Analysis

$$\begin{aligned}
 CAR_{6M} = & \alpha + \beta_1^+ \cdot \%Initial + \beta_2^- \cdot D_C \cdot \%Initial + \beta_3^+ \cdot Delta_Voting + \beta_4^+ \cdot Rel_Delta + \beta_5^- \cdot DPriv + \\
 & + \beta_6^+ \cdot D_C \cdot DPriv + \beta_7^- \cdot LogMktCap + \beta_8^+ \cdot D_C \cdot LogMktCap + \beta_9^- \cdot FirstSh + \beta_{10}^+ \cdot D_C \cdot FirstSh + \\
 & + \beta_{11}^- \cdot MarketToBook + \beta_{12}^- \cdot DInstInvestors + \beta_{13}^+ \cdot D_C \cdot DInstInvestors
 \end{aligned}$$

The dependent variable is six months CAR (0, 26). The explanatory variables are the following: %Initial is the stake owned by the insider before the change in holding; Delta_Voting is the amount of the change on stake; Rel_Delta is the relative change (respect to the initial shareholding); DPriv is a dummy variable that is 1 when the insider is a private rather than a company; LogMktcap is the natural logarithm of the market capitalization; FirstSh is the natural logarithm of the ratio between the stake owned by the first shareholder over the stake belonging to the insider; MarketToBook is the market to book value; DInstInvestors is a dummy variable that is 1 if institutional investors have voting shares in companies; Dc is a dummy variable that is 1 for negative shareholding changes and 0 otherwise.

Variables	Model 1		Model 2		Model 3	
<i>Constant</i>	- 45.75	-(2.89) ***	- 50.45	-(3.83) ***	- 17.03	-(2.62) ***
<i>%Initial</i>	0.39	(1.81) *	0.40	(2.84) ***	0.33	(2.55) **
<i>Dc %Initial</i>	- 0.01	-(0.20)	0.03	(0.17)	0.00	-(0.14)
<i>Delta_Voting</i>	0.73	(1.23)	0.67	(1.18)	1.08	(1.91) *
<i>Rel_Delta</i>	- 0.00	-(0.05)				
<i>DPriv</i>	13.46	(1.49)	11.47	(1.36)		
<i>Dc DPriv</i>	- 13.25	-(1.10)	- 10.64	-(0.97)		
<i>LogMktcap</i>	5.92	(3.01) ***	5.19	(2.97) ***		
<i>Dc LogMktcap</i>	- 3.03	-(1.26)	- 1.36	-(0.82)		
<i>FirstSh</i>	- 9.23	-(0.51)				
<i>Dc FirstSh</i>	9.93	(0.55)				
<i>MarketToBook</i>	- 0.87	-(0.69)				
<i>DInstInvestors</i>	13.53	(1.68) *	10.49	(1.38)	14.50	(1.95) *
<i>Dc DInstInvestors</i>	- 13.16	-(1.01)	- 10.48	-(0.83)	- 16.48	-(1.38)
<i>Adjusted R square</i>		0.170		0.187		0.140
<i>F</i>		2.791 ***		4.016 ***		4.827 ***
<i>N</i>		114		118		118

*, ** and *** indicate that the coefficients are significantly different from zero at the 10%, 5% and 1% levels respectively.

Table 8. Portfolio Strategy. For both samples (ownership increase and decrease), results for a possible portfolio strategy based on the announcement date are here reported. A long strategy following positive changes on insiders holdings and a short strategy in the opposite situation, taking as transaction date the day following the announcement date. For each sample, we analyzed different holding periods ranging from one day to six months. Portfolios are set taking the whole sample first and only observations with an initial insider ownership higher than 50% or a delta ownership change higher than 5% after. For each portfolio, the following information are reported: portfolio return, level of significance obtained with a Monte Carlo simulation replicating 1.000 ipotetical portfolios, market return, abnormal return and its relative T-test and, lastly, the number of days where the portfolio was not empty.

<i> Holding Period</i>	OWNERSHIP INCREASE: LONG STRATEGY						OWNERSHIP DECREASE: SHORT STRATEGY					
	<i>Portfolio Return</i>	<i>Sig</i>	<i>Market Return</i>	<i>Abnormal Return</i>	<i>T Test</i>	<i>Active Days</i>	<i>Portfolio Return</i>	<i>Sig</i>	<i>Market Return</i>	<i>Abnormal Return</i>	<i>T Test</i>	<i>Active Days</i>
Whole Sample												
1 day	32.54%	***	4.29%	28.25%	(3.01) ***	47	0.62%		2.06%	-1.44%	-(0.18)	35
1 week	18.77%	**	-25.55%	44.32%	(2.20) **	216	-2.16%		-13.91%	11.75%	(0.66)	167
1 month	-56.63%		-53.19%	-3.44%	-(0.10)	572	105.47%	***	35.65%	69.82%	(2.26) **	509
6 months	-40.08%		-54.82%	-14.75%	-(0.37)	832	64.47%		53.82%	10.65%	(0.27)	835
Initial Ownership > 50%												
1 day	24.58%	***	12.36%	12.22%	(1.60) *	31	-5.53%		4.26%	-9.78%	-(1.60)	20
1 week	18.97%	*	-11.25%	30.22%	(1.80) **	150	2.92%		-7.81%	10.73%	(0.81)	94
1 month	26.17%	**	-38.21%	64.38%	(2.15) **	477	78.79%	***	21.81%	56.97%	(2.29) **	331
6 months	-36.57%		-59.87%	23.30%	(0.59)	828	79.66%		51.06%	28.60%	(0.78)	716
Delta Ownership > 5%												
1 day	11.15%	*	1.24%	9.90%	(2.08) **	12	9.67%		5.65%	4.02%	(0.78)	14
1 week	31.93%	**	-3.54%	35.47%	(3.34) *	60	-20.91%		-15.37%	-5.54%	-(0.49)	67
1 month	32.85%	**	-7.08%	39.93%	(2.00) **	212	8.25%		5.35%	2.91%	(0.14)	242
6 months	-28.17%		-53.20%	25.03%	(0.70)	690	25.94%		53.73%	-27.79%	-(0.74)	743

*, **, *** indicate that the coefficients are significantly different from zero at the 10%, 5% and 1% levels res