

# **Insider Trading, Traded Volume and Returns.**

Fabio C. Bagliano(\*) , Carlo A. Favero (\*\*) and Giovanna Nicodano (\*)

July 2001

## **ABSTRACT**

This paper studies traded volume and stock prices when there is insider trading in the Milan stock exchange, using the non-public file of suspect insider trading episodes. The first purpose is to obtain estimates of abnormal returns. These can be used by courts in order to decide on the penalty of the defendant and on the materiality of inside information. Abnormal returns on the announcement day also provide a measure of how pervasive insider trading is in the stock market. The second purpose of this paper is to assess whether insider trading changes the distribution of volume and returns in a way that can be used by supervisory authorities in order to detect its presence through statistical methods.

(\*) Università di Torino and (\*\*) Università Bocconi. Corresponding author: [giovanna.nicodano@unito.it](mailto:giovanna.nicodano@unito.it). This paper is part of a research project co-sponsored by Centro Baffi and CoNSoB. We are grateful to Nadia Linciano, Alfredo Macchiati and Giovanni Siciliano and to participants at the workshop “Market Abuses: Law, Economics, and Regulation” for useful suggestions, to CoNSoB for providing us with the investigation file, to Borsa Italiana and Maurizio Murgia for supplying stock market data, to Diego Bonsignore and Enrica Marasso for research assistance.

## **1. Introduction.**

This paper studies the distribution of traded volume and stock prices when there is insider trading in the stock market. Insider trading events are identified by using the non-public file of suspect insider trading episodes that are sent to courts by the Italian supervisory authority, CoNSoB.

The first purpose of this research is to obtain unbiased estimates of abnormal returns. These are used by courts for deciding on the penalty of the defendant (“disgorgement”), which is proportional to estimated insider trading profits, and for proving the materiality of inside information in litigation. The materiality of inside information is related to the sum of abnormal returns (CAR) over the days in which the inside information was available up to and including the announcement date. If CAR is statistically different from zero, then the information was able to affect prices – in other words, it was material. Insider trading profits are in turn estimated as the product of CAR during the holding period times the quantity purchased or sold by the insider (Mitchell and Netter, 1994).

Abnormal returns to insider trading are computed as the difference between the actual returns and an estimate of the portion of returns which is associated to factors different from the inside information. However the estimate of abnormal returns is usually based on a simple “market model”, with a market return as the sole regressor (Mitchell and Netter, 1994). This provides biased estimates of abnormal returns according to our results, supporting a specification similar to Meulbroek’s (1992). In this specification the other statistically significant explanatory variables are insiders’ trades and dummy variables for both news and announcement days.

Inside information is incorporated into prices by the time its public announcement occurs, if insider trading is unrestricted (Kyle, 1985). Thus there should be no abnormal behaviour on announcement dates. It is also argued that illegal insider trading affects trading volume and returns on and before the announcement dates depending on the expected enforcement of insider trading regulation (Bhattacharya et al., 2000). We suggest to decompose the total price run-up into different

components, and to relate their relative size across countries to the effectiveness of enforcement. In the US, the abnormal price movement which can be attributed to insider trading is 47.56 % of the abnormal price movement on the announcement day, which is equal to 18.5% on average (Meulbroek, 1992). Shares which can be traded only by local citizens in the Bolsa Mexicana do not show any abnormal behaviour when information is disclosed, as insider trading takes place in advance of public disclosure (Bhattacharya et al., 2000). Our results show abnormal returns on announcement dates (9.67% in absolute value on average) which are smaller than in the US but larger than in Mexico. Cumulative abnormal returns to insider trading are equal to 222% of abnormal returns associated with announcements. This suggests that insider trading in Italy is not so pervasive as in Mexico but more intense than in the US.

Insider trading is illegal in many developed countries, yet its detection is far from being straightforward since the insider's strategy consists in hiding behind other traders' trades. The usual methods for statistical detection rely on abnormal price or volume movements; however these are also observed in conjunction with public announcements which need not always be associated with insider trading activity. A first, obvious way to distinguish between the two sources is to see whether detected abnormal behaviour is neither preceding an announcement nor associated to rumours in the press. Typically, such an association exists because the insider can make a capital gain at the announcement date by trading in advance of a news release. Another way to identify insider trading is to detect a different pattern of the series when there is insider trading. The latter should have persistent effects which are discernible "long" before the announcement dates, whereas the impact of announcements-without-insider-trading should emerge only in the days immediately preceding and following the information release (He and Wang, 1995). Moreover, news have a marked effect on returns and none on traded volume when there is homogeneous information in the market before the news and the updating method is the same across investors (Kandel and Pearson, 1993). The second purpose of this research is to assess whether insider trading changes the time-series of volume and returns in a way that can be used by supervisory authorities in order to refine

existing detection methods. Our results indicate that it is not possible to use the changing pattern of auto-correlation for detection purposes, because estimates of the correlation parameter on insider trading dates are too unstable and imprecise. There is also no detectable difference between abnormal response to news and to insiders' trades in our sample.

Insiders are expected to trade in different markets in order to better conceal the information content of their orders. In principle, the investigator should use data on option trading and on orders placed at other markets, if there is double listing. But we do not use such data in this exploratory study.

In the US corporate insiders disclose their legal trading to the SEC which makes this information available to the public. There is a growing literature on whether the market effectively exploits the information content of official corporate insider's trades (Seyhun, 1988; Zaman, 1988; Lakonishok and Lee, 1998). We are not interested in this issue, since it has to do with the so-called informational efficiency of the stock market rather than with illegal insider trading.

This note is organised as follows. In the next section we describe the expected behaviour of the time series around public announcements with and without insider trading, and review previous empirical work on US data. In section 3 we describe the non-public investigation file and our sample, while section 4 presents empirical results. Concluding comments follow.

## **2. The Behaviour of Returns and Volume: Previous Results.**

### ***2.1. The Theoretical Predictions.***

Which is the pattern of volume and returns in a stock market? The answer depends on traders' preferences, on the initial distribution of information across market participants and on the way they process news. In what follows, we posit that a subset of agents trades for liquidity reasons - i.e. a preference shock - and that all agents use their information in a similar way. We usually refer to the case of risk-aversion, since it is known that stock prices include a risk premium.

If there is homogeneous information, the short-run time-series behaviour of expected returns is influenced by volume (or turnover), which is in turn determined by orders placed for liquidity reasons. Such a relationship can be expressed as follows, if liquidity orders are independently and identically distributed over time :

$$(1) \quad E(r_{t+1}|r_t, V_t) = (\theta_0 + \theta_1 V_t) r_t \quad \theta_1 < 0$$

Volume  $V$  either reduces a positive auto-correlation in returns  $r$ , or enhances a negative one (Campbell, Grossman and Wang, 1993). The economic reason for this is that risk-averse speculators and dealers accept to bear larger risk - which is associated to larger liquidity orders - by increasing the required return. If liquidity orders are i.i.d., conditional on low liquidity orders yesterday (and therefore low required returns), high liquidity orders (and therefore high required returns) tomorrow are expected.

Consider now the possibility that some public announcement is expected in the future. Will there be abnormal trading volume and abnormal returns before and after the announcement, when there is no insider trading? And what happens when there is insider trading? If there is homogeneous information before the announcement there is no motive for trade among agents who similarly update their forecasts. There can be a marked price variation - if some information was unexpected - but there should be no abnormal trading around public announcement, because there is no a priori reason to believe that orders related to liquidity motives are more frequent around announcements (Kandel and Pearson, 1993). Homogeneous information is most likely to exist when announcements refer to macroeconomic events.

When announcements involve-firm relevant events, an insider who knows it in advance may be trading in the market. In such a case, stock price approaches the value implied by the inside information over time<sup>1</sup> (Kyle, 1985). It would be wrong to conclude that all abnormal trading before or after public information is due to insider trading. Grundy and McNichols (1990)

---

<sup>1</sup> In the Kyle model, the insider is risk-neutral. While risk-neutrality is not in general interesting for stock markets (since prices include a risk-premium) an insider often enjoys highly precise information on the content of the announcement, which makes him behave as if he was risk-neutral.

consider the case of differential information (different signals with equal precision) across speculators, and show that a public announcement generates volume of trade because they correct their previous forecasts with different intensity. Their insight is however developed in a three-dates model, and does not allow to pin down the time-series behaviour of returns and volume. This is possible in a fully dynamic model in which some risk persists after the announcement (He and Wang, 1995). In such a case, excess volume is concentrated just prior to and after the announcement because differently informed speculators bet on the outcome of the news release and close their positions just afterwards. “New public information mainly generates trade in the current period.” On the contrary, “new private information not only generates trading in the current period, but also generates trading in future periods. This implies that when there is private information, independent arrival of new information can generate serially correlated volume” (Ibidem, p.957-958). High volume in this model is not always a symptom of new information arrival to market participants. High volume and large price changes are. Indeed, high volume of trade may not be accompanied by large price changes, when information is already in the economy and it is being revealed through prices by the speculators’ trades. When new exogenous information arrives, on the contrary, there is an abrupt change in the investors’ perception of the stock’s underlying value- and high volume is associated with large absolute price changes.

## ***2.2. The Empirical Evidence on Returns, Volume and Information.***

In this section we summarise some empirical evidence for the US stock exchange. We first report about the behaviour of aggregate series, without and with announcements. This is an interesting benchmark case, because speculators are unlikely to be differently informed about macroeconomic variables – which are mirrored in aggregate stock market figures. We then turn to results concerning abnormal patterns associated with announcements of firm-relevant events. In sum, for *samples* of earnings announcements there is no evidence of abnormal behaviour preceding day  $-1$ , whereas there is such evidence for samples of corporate control announcements. In the

latter, most abnormal behaviour is explained by rumours in the press. To us, this shows that insider trading is not pervasive in the US stock exchange. (Cumulative) abnormal returns and volume are instead found for *individual stocks* during days of illegal insider trading well before the announcement date after controlling for news in the press. This is consistent with the previously exposed insight according to which new private information not only generates trading in the current period, but also generates trading in future periods.

- No announcement: Campbell, Grossman and Wang (1993) estimate equation (1) for the US market. They measure  $r_t$  as daily aggregate return,  $V_t$  as daily aggregate detrended log turnover, and find  $\theta_1 < 0$  as expected. This relationship also holds for individual stock return, provided that the turnover figure in the regression is still the aggregate one.
- Following announcements of Consumer Price Index, money supply and other macroeconomic news: Jain (1988) finds a strong price effect of certain news, whereas there is no significant reaction in turnover. This is interesting for our purposes because it can only be associated with homogeneous information about the economy and a similar updating mechanism for speculators. The latter assumption is maintained throughout our study, and is supported by these findings.
- Associated with earnings announcements: Kandel and Pearson (1993) show that excess volume is concentrated on dates  $\{-1, 0, +1\}$ , where 0 is the announcement date. Normal volume is calculated as mean volume over a 30-day window prior to the announcement. Abnormal trading and excess absolute returns are also found by Morse (1981) in those same days only, whereas Penman (1982) finds some excess returns in day  $-3$  as well. However, he uses a different approach in that he estimates normal expected returns with a specific parametric model, namely the CAPM.
- Associated with take-over and merger announcements: one finding of the literature on take-overs is the price run-up during 10 or 20 days preceding the announcement. Both Comment (1986) and Gupta and Misra (1989) show that a large part of the excess return is due to other

kinds of publicly available information, such as rumours in the press. When companies which were not subject to rumours are examined, there is no excess return but in the day prior to the announcement. However, it is also shown that target companies which were in the press before the take-over announcement experienced abnormal trading well before the first rumour appeared in the press.<sup>2</sup>

- Associated with firm-relevant announcements and illegal insider trading: cumulative abnormal returns and volume are found for *individual stocks* during days of illegal insider trading, which typically takes place from 6 (median) to 13 (mean) days before the public announcement (Meulbroek, 1992). Average abnormal returns on insider trading and on public announcement days average 3.06 and 18.50 respectively, while the CAR on insider trading days averages 6.85% (Table V). Average abnormal volume in insider trading and news dates are equal to 0.93% and 1.46 % respectively (Table XIII).

### 3. Consob Investigations.

Our file of CoNSoB investigations includes events occurred from May 91 to March 99 and filed to courts before July 99. The analysis cannot be based on litigation data because very few cases have been settled by courts until now. We exclude from our analysis investigations that are dismissed by the supervisory authority. In recent years, CoNSoB must file to court all investigations, but we keep in our sample only those that the Authority classifies as relevant.

Table I reports that the total number of such insider trading investigations is 58, the total number of suspects is 311 and the number of companies involved in the deals (and not necessarily in the trading) is 111. Suspects are not always the ultimate investors who used the information, which may explain why the number of insiders per episodes (5.36) is much higher than Meulbroek's (2.5). The list of suspects includes funds, banks, foreign intermediaries, group holding

---

<sup>2</sup> There is also some evidence concerning announcements of new equity issues, using infra-day data and the announcement time from the Broad Tape. Barclay Litzenberger (1987) mostly focus on the stock price *following* the



companies, individual companies as well as investors with (member of the board, manager..) or without connections with the issuer of the traded stock. Table II lists the type of information involved. In the vast majority of episodes (76%), the information concerns corporate control transactions such as trades of control blocks in the company or its parent, stock issues or conversions mergers, restructuring. This figure is similar to Meulbroek's (79%), however her sample includes many cases of hostile take-overs while in Italy these are rare because corporate control is highly concentrated. Table III reports profits gained or losses avoided by insiders. The estimate is made by CoNSoB, which computes the amount paid (or obtained) by the suspects for buying (or selling) shares on the basis of actual transaction data and assumes that the closing transaction was performed on the announcement date by the insider, if the actual one is missing. In the case of (near) liquidation, the estimated gain is set equal to the amount of sales –which can be very large. When we exclude (include) these cases, the per-episode mean profit is equal to 1464.7 (5044) millions lira, with many cases involving small amounts.

In our econometric analysis we focus on events which took place after December 94. We drop previous observations because major market reforms were implemented in the early nineties<sup>3</sup>, apparently altering the time-series of returns and traded volume. Stocks trading either outside the main marketplace or too infrequently are dropped, thus remaining with 23 events listed in table IV. These events involve 22 stocks, which are non-voting in 5 cases only. The types of companies range from small stocks to both large private group-affiliated firms and privatising companies, with widely different turnover ratios.

Table IV also reports the mean and median number of insider trading days (19.4; 9), which is far higher than the estimate for the US (3.2;2), while news days (2.3; 1) are not dissimilar (0.7;0).

---

announcement. They show that for 15 minutes there is excess volume and excess negative return. There is also a small excess negative return in the hour before the release, and this is considered evidence of insider trading.

<sup>3</sup> 1991: changes in securities regulation, which prohibited off-exchange trading and dealers; 1991-1994: gradual transition from a call auction to continuous screen-based auction; 1992: creation of a block market; 1994: gradual change to cash settlement and creation of a stock index futures. These changes appear to have altered the returns - volume relationship for large liquid companies (Majnoni Massa,1996) and increased volatility of excess returns for less liquid stocks (Impenna et al., 1995).

Insiders in Italy also begin trading much earlier (39.3;17) than in the US (13.2; 6). This difference can be ascribed to SEC investigation method, if it focuses attention on the two weeks preceding announcements only. Alternatively, it may be that timely reporting requirements are enforced more strictly in the US, thus allowing less time for insider trading.

We collect “news” on these episodes consisting of articles in the financial daily *Il Sole-24 Ore* concerning the content of the future announcement. Daily data on prices, volume, turnover, the market index (mibtel) and aggregate traded volume have been provided by Borsa Italiana.

#### 4. Empirical Analysis of Returns and Volume.

##### 4.1. Implications for abnormal returns and volumes.

We estimate two equations for each episode (indexed by  $i=1..I$ ), one for return ( $R_i$ ) and one for traded quantity ( $V_i$ ), with the following specifications:

$$(2) \quad R_{it} = \alpha_i + \beta_i R_{mt} + (\rho_{1i} + \rho_{2i} \text{INSIDE}_{it}) R_{it-1} + \gamma_i \text{ANN}_{it} + \delta_i \text{INSIDE}_{it} + \sum_j \mu_{ji} \text{NEWS}_{jit} + \varepsilon_{it}$$

$$(3) \quad V_{it} = \alpha_i + \beta_i V_{mt} + (\rho_{1i} + \rho_{2i} \text{INSIDE}_{it}) V_{it-1} + \gamma_i \text{ANN}_{it} + \delta_i \text{INSIDE}_{it} + \sum_j \mu_{ji} \text{NEWS}_{jit} + \eta_{it}$$

The regressors are the return of a market index, which in our case is MIBTEL, insiders' trades as reported in the investigation file (INSIDE), and dummy variables identifying both the announcement (ANN) and news (NEWS). We follow Meulbroek (1992) in considering only newspaper articles concerning the inside information. Since their precision varies, we insert one dummy NEWS for each article in order to allow for different impacts. We also insert the lagged dependent variable - both by itself and interacted with the dummy INSIDE - so as to check whether there is a significant change in the auto-correlation of the series. We experimented with other specifications, including one which allows for dependence of returns on contemporaneous volume as in Campbell, Grossman and Wang (1993). However it is the specification above that dominates the others. We run the two regressions for each stock separately. The initial date is 150 days before the first news or insider trade, and the final date is the announcement day except when no quotation is available on that day, which occurs in two cases of our sample. OLS estimates show no

correlation of residuals, and coefficients' standard errors are corrected for heteroskedasticity when detected by appropriate specification tests.

Table V reports the mean and median coefficient estimates on the ANN, INSIDE, and lagged dependent variables. To allow comparability across stocks, the estimated effects of the ANN and INSIDE variables on volumes are expressed as percentage of the average volume traded in the stock over the estimation period. Since our sample is small, we cannot construct meaningful cross-sectional standard errors and we report the number of statistically significant cases. The individual coefficients are reported also in the last four columns of Table IV. Insider trades have a statistically significant effect in 13 regressions out of 21 both on returns and on volumes; in 20 on either returns, or volume or both. When the coefficient of insiders' trades in the returns equation is statistically significant, which occurs in 15 cases, it is possible to compute insiders' excess profits which can then be used to determine disgorgement.

News and announcement days have a statistical significant impact on both returns and volume in several episodes. Therefore the estimate of abnormal returns based on a simple "market model", with a market return as the sole explanatory variable, yields biased results in general. In other words, abnormal returns computed as:

$$(4) \quad AR_{it} = R_{it} - \alpha'_i - \beta'_i R_{mt}$$

where  $\alpha'_i$  and  $\beta'_i$  are the estimated parameter in the "market model":

$$(5) \quad R_{it} = \alpha_i - \beta_i R_{mt}$$

differ from those obtained from a more general model such as (2). This is not only a methodological point, because abnormal returns are commonly used (in the US) for estimating insider's profits and hence his or her penalty as well as for proving the materiality of information.

The return auto-correlation parameter is statistically significant in four cases, to our surprise. While it is generally accepted that returns are predictable over longer horizons, it is unusual to find

this result in daily data for individual stock returns<sup>4</sup>. Volume is predictable, consistent with the presumption - exposed in section 2 - that private and inside information get incorporated slowly in asset prices through trading.

#### ***4.2. Materiality of Information and Effects of Insider Trades: Comparison with Previous Literature.***

The average impact of insider trading on daily returns and daily volume are 1.1% and 156% respectively. The latter figure implies that volume almost doubles in insider trading days. Meulbroek (Table V, p. 1679) estimates the effect on daily returns as slightly higher (3%), however the median number of trading days in her sample (2) is smaller than in ours (19.4) suggesting that cumulatively insider trading is more visible in Milan than in US exchanges.<sup>5</sup> Conversely, announcements in our sample have a smaller effect on returns (9.67%) than in the US sample (18.50%).

Theoretical models show that inside information is incorporated into prices by the time its public announcement occurs, if insider trading is unrestricted (Kyle, 1985). Thus there should be no abnormal behaviour on announcement dates<sup>6</sup>. In a recent paper Bhattacharya et al. (2000) suggest that no return effect on announcement days in Mexico can be ascribed to non-existing enforcement of insider trading regulation. Insider trading is indeed not restricted since insiders anticipate no penalty, even if a law has been enacted. This argument can be extended to cross-country comparisons as follows. Consider the price run-up, averaged across episodes, associated with inside information in a given country:

$$APR = (1/I) \sum_i (\gamma_i + n \delta_i + \sum_j \mu_{ji})$$

---

<sup>4</sup> Portfolio returns are often positively correlated, see for instance Sias and Starks (2000).

<sup>5</sup> The average daily quantity traded by insiders significantly increases in the number of trading days available before the announcement. It is therefore not the case in our sample that insiders choose to trade more (and become more visible) when time is shorter. There is also a positive relation with average turnover in “normal” days, suggesting that insiders trade more when higher liquidity provides them with better camouflage.

<sup>6</sup> In the Kyle model insiders are risk neutral. This result carries over to a risk averse setting if inside information is infinitely precise.

This can be decomposed into three components: insider trading, news and announcements. The larger is the proportion associated with the announcement,  $\{(1/I)\sum_i [\gamma_i / (\gamma_i + n\delta_i + \sum_j \mu_{ji})]\}$ , the stricter is insider trading (and disclosure) regulation in that country. Another similar indicator (available in Meulbroek) is  $\{(1/I)\sum_i [n\delta_i / (\gamma_i)]\}$  which -according to our reasoning<sup>7</sup>- increases across countries as enforcement gets weaker. Going back to the data, we see that the latter indicator is much larger in Italy (222%, when attention is restricted to statistically significant estimates) than in the US (47.56%). This result can be tentatively ascribed to tougher enforcement of insider trading regulation and/or of disclosure requirements in the US.

In our sample inside information appears as material in all episodes. Indeed, the announcement effect on returns is below statistical significance in five cases, but in those cases the insider trading effect and/or the news effects are statistically significant. It follows that the inside information is able to significantly alter prices, which implies “materiality”.

In section 2 we report that there is no significant reaction to macroeconomic announcements in the US (Jain, 1988) which is consistent with absence of private information among investors since everyone would like to trade in the same direction. In our sample there is an almost seven-fold increase in volume on announcement dates, consistent with the presumption that investors who bought (sold) on both private and inside information sell (buy) to the newly informed ones after the announcement.

#### 4.3. Detection.

Section 2 argues that insider trading is associated with abnormal patterns of individual volume and returns and that, a priori, these can be distinguished from pure news and announcements effects because the former appear and persist before release dates while the latter closely surround the release time. It may also be the case that the effect of announcements and news on traded volume is negligible compared to that on absolute returns, if there is no private

---

<sup>7</sup> Meulbroek relates the size of this indicator to “stock price accuracy” in insider trading days. The cross-country evidence we are referring to would therefore be interpreted as infinite stock price accuracy in Mexico, average in Italy and moderate in the US.

information and the method for updating information is similar across investors. Figure 1 shows that both news and insider trading usually significantly affect both returns and volume. We also expected the ratio between absolute price changes and absolute volume changes to be higher in the case of news than for insiders' trades, but we detected no systematic ordering. Moreover news often are released long before the announcement date (see Table IV). So there is no obvious statistical way to distinguish between the two.

We also check whether the serial dependence of volume (and returns) is increased by insider trading. However the latter does not change in a systematic way the auto-correlation parameter, as shown by the high number of insignificant estimates of the coefficient  $\rho_{2i}$  in Table V. These results rule out the possibility to refine along these lines existing detection methods, which rely on simple measures of abnormal returns and volume.

### **Concluding comments.**

The information concerns corporate control transactions in over 75% of insider trading episodes both in our sample and in Meulbroek's (1992). The mean number of insider trading days is far higher in Italy than in the US, while that of news days is not dissimilar. Insiders in Italy also begin trading much earlier than in the US. Our estimates of abnormal returns on the announcement date indicate that the "price surprise" in Italy is smaller than in the US. Conversely, the average price run up is larger in Italy than in the US.

Our results confirm the robustness of the specification for returns used by Meulbroek (1992), which outperforms other alternatives. This suggests that abnormal returns are estimated with systematic errors if a pure market model is used, because both announcement and news dates are statistically significant explanatory variables.

On the basis of our estimates, inside information can be shown to be "material" in twenty-one insider trading episodes occurred at the Milan stock exchange. Moreover, unbiased measures of

disgorgement can be constructed in fifteen cases out of twenty-one on the basis of a statistically-significant estimate of insider trades.

The small size of our sample prevents us from testing micro-structural theories of insider trading. The empirical analysis could however deliver further insights concerning insider trading in illiquid shares as well as in shares subject to tender offers, if a larger sample becomes available. Rational insiders adjust the size and timing of their trades depending on the liquidity of the stock, so as to minimise the informational leakage. Therefore insider's expected profits should be lower if orders from liquidity-motivated traders are lower (Kyle, 1985). Within the sample of insider trading cases, one should not expect the abnormal behaviour of the series to be systematically related to turnover. One could therefore look for differences in the abnormal behaviour of the series across two sub-samples, one with high turnover and another one with low turnover stocks, expecting to find none. Inside information on tender offers is usually more precise than in other instances, so risk-averse insider trading should be more aggressive for that subset of episodes. We leave these enquiries for further work.

### **References.**

- Barclay M.J. and R.H. Litzenberger, Announcement effects of new equity issues and the use of intraday price data, *The Journal of Financial Economics*, 1987, 71-99
- Bhattacharya U., H. Daouk, B. Jorgenson and C. Kehr, When an event is not an event: the curious case of an emerging market, *Journal of Financial Economics*, 55, 2000, 69-101
- Campbell J., Grossman S. and J. Wang, Trading Volume and the Serial Correlation in Stock Returns, *Quarterly Journal of Economics*, 1993, 108, 905-940
- Comment, R., Price and volume activity before tender offers, Presented at AFA Meetings, 1986
- Grundy B.D. and M. McNichols, Trade and the Revelation of Information through Prices and Direct Disclosure, *The Review of Financial Studies*, 2(4), 1990, 495-592
- Gupta A. And L. Misra, Public Information and Pre-Announcement trading in Takeover Stocks, *Journal of Economics and Business*, 41, 1989, 225-233
- He H. and J. Wang, Differential Information and the Dynamic Behavior of Stock Trading Volume, *The Review of Financial Studies*, 8(4), 1995, 919-972

- Impenna C., P.Maggio and F. Panetta, Innovazioni strutturali nel mercato azionario: gli effetti della contrattazione continua, Banca d'Italia, *Temi di discussione*, 248, 1995
- Jain P.C., Response of Hourly Stock Prices and Trading Volume to Economic News, *Journal of Business*, 1988, 61(2), 219-231
- Lakonishok J. and I.Lee, Are Insiders' Trades Informative?, NBER WP 6656, 1998
- Kandel E. and N.D. Pearson, Differential Interpretation of Public Signals and Trade in Speculative Markets, *Journal of Political Economy*, 103(4), 1995, 831-872
- Kyle A., Continuous Auctions and Insider Trading, *Econometrica*, 1985
- Majnoni G., and M. Massa, Share prices and Trading Volume: Indications of Stock Exchange Efficiency, Banca d'Italia, *Temi di discussione*, 263, 1996
- Michaeli R. and J.L.Vila, Trading Volume with private Valuation: Evidence from the Ex-Dividend Day, *Review of Financial Studies*, 9(2), 1996,
- Meulbroek L.K., An Empirical Analysis of Illegal Insider Trading, *Journal of Finance*, 47(5), 1992, 1661-1701
- Mitchell M.L. and J.M. Netter, The Role of Financial Economics in Securities Fraud Cases: Applications at the Securities and Exchange Commission, *Business Lawyer*, 49, 1994, 545-590
- Morse D., Price and Trading Volume Reaction Surrounding Earnings Announcements: A Closer Examination, *Journal of Accounting Research*, 19(2), 1981, 375-383
- Penman S.H., Insider Trading and the Dissemination of Firms' Forecast Information, *Journal of Business*, 1982,55(4), 479-503
- Seyhun N., The Information Content of Aggregate Insider Trading, *Journal of Business*. 61, 1988, 1-24
- Sias R.W. and L. Starks, Institutions, Individuals, and Return Autocorrelations, University of Texas at Austin, 2000
- Wang J., A Model of Competitive Stock Trading Volume, *Journal of Political Economy*, 102, 1994, 127-668
- Zaman M.A., Market Efficiency and Insider Trading: New Evidence, *Journal of Business*, 61(1), 1988, 25-44



**Table I – Investigation activity by Consob (91-7/99).**

*This table report the number of Consob investigations which were filed to courts before July 1999. Investigations refer to insider trading events in the first row and to market manipulation in the last one. They are listed by the year in which the violation occurred. Each deal which the violation refers to may involve more than one company (such as during a merger). The suspect insiders sometimes are unknown (tipically in cases involving some foreign country), in which case the numbers refer to intermediaries used by insiders.*

	91	92	93	94	95	96	97	98	99	TOT
# InsiderTrading	5	9	10	11	4	8	6	3	2	58
# Insiders	15	21	44	50	28	63	64	10	16	311
# Companies	11	20	21	19	8	13	10	6	3	111
# Manipulation	0	0	0	3	4	3	7	1	0	18

**TABLE II- Type of inside information.**

*This table shows that the the most likely type of inside information concerns a corporate control transaction (in bold) and in particular a major share acquisition or sale.*

Stock Conversion	4
Stock Issue	2
<b>Control Block Transaction/Tender Offer</b>	<b>25</b>
Sale/acq of another company	3
<b>Friendly Merger</b>	<b>8</b>
<b>Restructuring</b>	<b>2</b>
Losses	3
(Near) Liquidation	5
Others	6
<b>TOTAL</b>	<b>58</b>

**Table III- Profit gained (loss avoided) by insiders.**

*Profits reported in this table are estimated by Consob. These are the insider's holding period gains, calculated from actual buy and sell prices – when available. If the insider's position is still open after the public announcement, Consob assumes that the insider closed it at the first price prevailing after the announcement. In the case of (near) liquidation, the estimated gain is set equal to the amount of sales. When this occurs, we report the statistics with these cases in parenthesis. Figures are in millions Lira.*

	#	Total	Mean	Min	Max
1991	5	719	143.5	13	431
1992	9	3088	343.1	23	2100
1993	8(10)	7324 (78033)	915.5 (9754.125)	10	5200 (44000)
1994	11	30188	2744.4	11	15000
1995	3	2628	867	28	2400
1996	6(7)	15945 (79445)	2657.5 (11349)	53	9800 (63500)
1997	5(6)	19483 (111483)	3896.6 (18580.5)	165	13000 (92000)
1998	3	2039	679.6	96	1200
1999	2	1870	935	470	1400

TABLE IV

*This table describes our sample. The first column reports letters instead of company names, which is allowed only after January 1998. The following columns report the types of traded stock (voting or non-voting); the type of inside information; the number of days with insider trading, with news, with insider trading on news dates; the number of days between the first trade and the announcement date ( $t=0$ ), as well as the time between the first news in the press and the announcement. The next column shows whether there was a suspension of trade on a news date or at the announcement date ( $t=0$ ) etc. Turnover is computed as average traded volume over market capitalization during the first thirty days of the sample. A turnover of 55.5 means that 0.0558 of market cap was traded on average. The sign (\*\*) in the first column denotes that the episode had both insider trading and market manipulation. The sign § in the third column denotes that there was insider trading on the announcement date as well.*

*The last four columns summarise the estimates of the effect of announcement and of insiders' trades on returns and on the quantity traded, once market movements and news in the press are allowed for. Details on the specification can be found in table V. A star denotes statistical significance at 5% level, and a double star at 1%.*

STOCK		INFORM ATION on	TRADE DAYS	NEWS	TRADE & NEWS	1 <sup>st</sup> TRADE -ANN	1 <sup>st</sup> NEW S - ANN	NO TRADE ON	TURN OVER	ANN on Returns	ANN on Volume	Insider on Return	Insider on Volume
A(♦)	V	Block	9	1	0	50	1		55.8	0.046**	5.80**	0.019**	1.170**
B	NV	Block	6	1	0	40	1		44.8	0.093**	-1.08	0.026**	2.533*
C	V	Block	52	1	0	138	1	News and 0	2.94	NA	NA	0.002	0.588**
D	V	Losses	3	2	0	2	40		14.2	0.297	34.70**	-0.011	7.905**
E	V	Liquid	96	9	2	187	289	0	24.36	NA	NA	-0.006*	1.073**
F	V	Acq/Sale	8§	1	0	17	54		2.61	0.036**	2.85**	0.009**	0.924**
G(♦)	V	Block	10§	0	-	28	-		5.27	0.026	3.56**	0.008*	1.348**
H	V	Tender	18	1	0	46	2	News and -1	100.1	0.182**	17.23**	0.006*	0.932**
I	V	Block	1	2	1	20	17	Many days	2.76	0.068**	4.52**	0.045**	2.500**
J	V	Merger	10	0	0	10	0	-1	113	0.190**	14.25**	0.010	1.013**
K	V	Block	31§	4	2	31	49	Many days	39.3	0.0002	-2.87**	0.008*	2.870**
L	V	Sale	14	1	0	161	182		137.7	0.068**	3.12**	0.012	1.978**
M	NV	Sale	6	1	0	8	182		317.5	0.028	3.65**	-0.012	4.157*
N(♦)	V	Merger	32	0	-	41	-		52	0.066**	14.78**	0.005*	0.974**
O	V	Merger	1	1	0	1	46		339.5	0.047**	3.09**	0.023**	1.492**
P	V	Losses	3§	1	1	2	1		460.9	0.100**	4.81**	0.026**	0.536**
Q	NV	Convers	9§	3	1	14	132		451.8	0.163**	6.97**	0.013*	1.055*
R	V	Liquid	64	1	0	84	16	Many days	260				
S	V	Tender (Auction)	2	3	0	0	126		709.8				
T	V	Tender	1	2	0	2	145		117	0.189**	-0.47	0.028**	-0.207
U	NV	Convers	13	12	0	12	141		399.4	-0.0002	0.92**	0.0001	0.015
V	NV	Idem	2	Idem	0	5	Idem		246.7	0.001*	0.90	0.007**	-0.169
Z	V	Tender	3	2	0	6	156		22.8	0.240**	12.65**	0.012**	0.133**
Mean			19.4	2.3		39.3	79.1		175.3	0.097	6.809	0.011	1.563
Median			9	1		17	47.5		106.5	0.068	3.648	0.009	1.055

---

**TABLE V - Econometric Estimates**

---

*This table reports estimates of the equations:*

$$R_{it} = \mathbf{a}_i + \mathbf{b}_i R_{mt} + (\mathbf{r}_{1i} + \mathbf{r}_{2i} \text{INSIDE}_{it}) R_{it-1} + \mathbf{g} \text{ANN}_{it} + \mathbf{d}_i \text{INSIDE}_{it} + \mathbf{S}_i \mathbf{m}_i \text{NEWS}_{jit} + \mathbf{e}_i$$

$$V_{it} = \mathbf{a}_i + \mathbf{b}_i V_{mt} + (\mathbf{r}_{1i} + \mathbf{r}_{2i} \text{INSIDE}_{it}) V_{it-1} + \mathbf{g} \text{ANN}_{it} + \mathbf{d}_i \text{INSIDE}_{it} + \mathbf{S}_i \mathbf{m}_i \text{NEWS}_{jit} + \mathbf{h}_i$$

*The dependent variables are stock return and traded volume, and the regressors are the return of a market index ( $R_{mt}$ ), aggregate trading volume ( $V_{mt}$ ) the lagged dependent variable, dummy variables identifying announcement (ANN), news (NEWS) and insider trading (INSIDE) dates. Regressions are performed on each stock individually. The initial date is 150 days before first NEWS or TRADE, and the final date is ANN except when no quotation is available on that day.*

*The numbers below are the mean and the median of estimated parameters in our sample.*

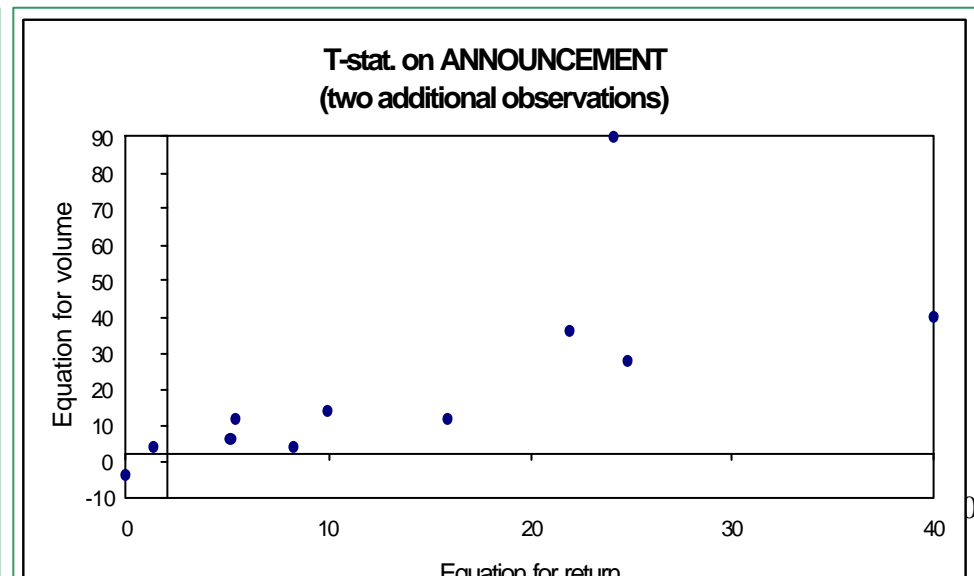
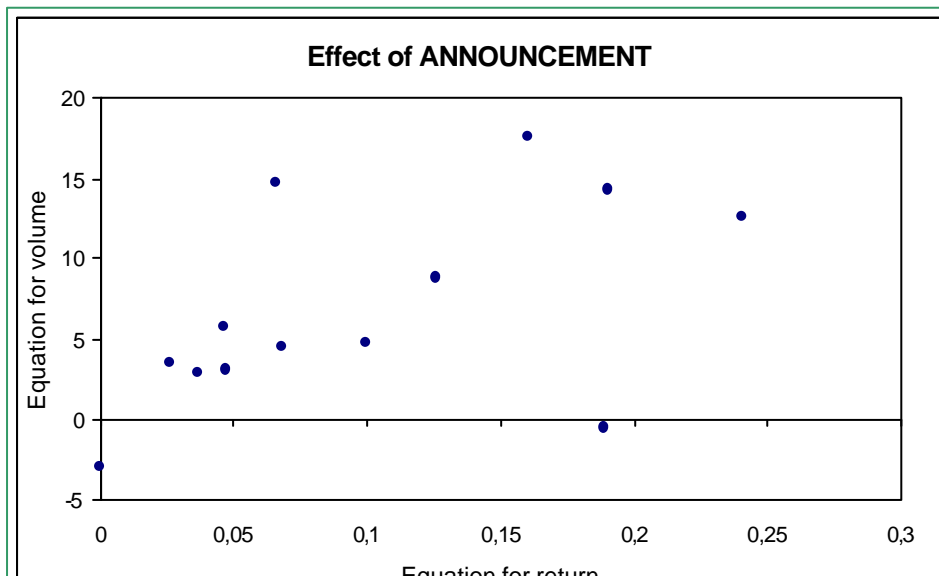
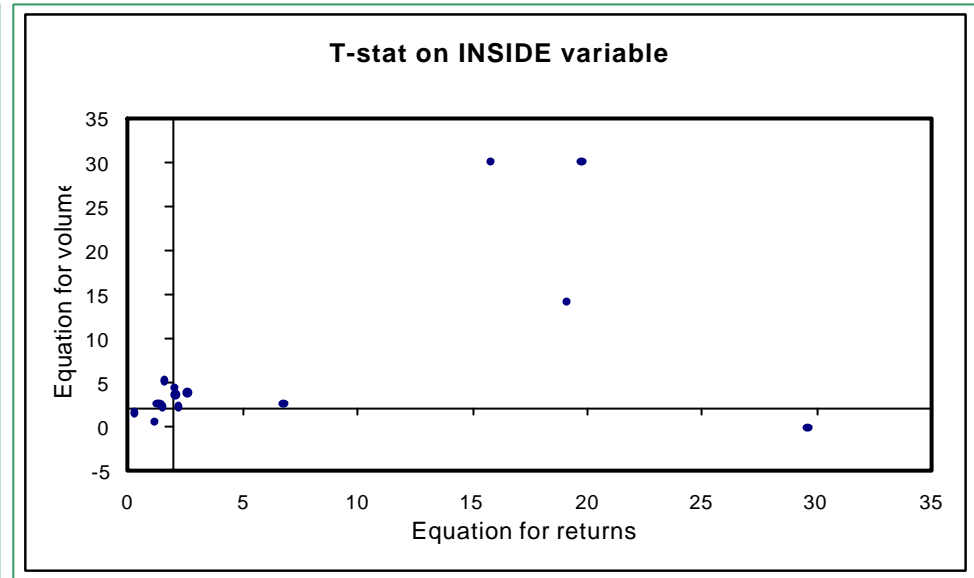
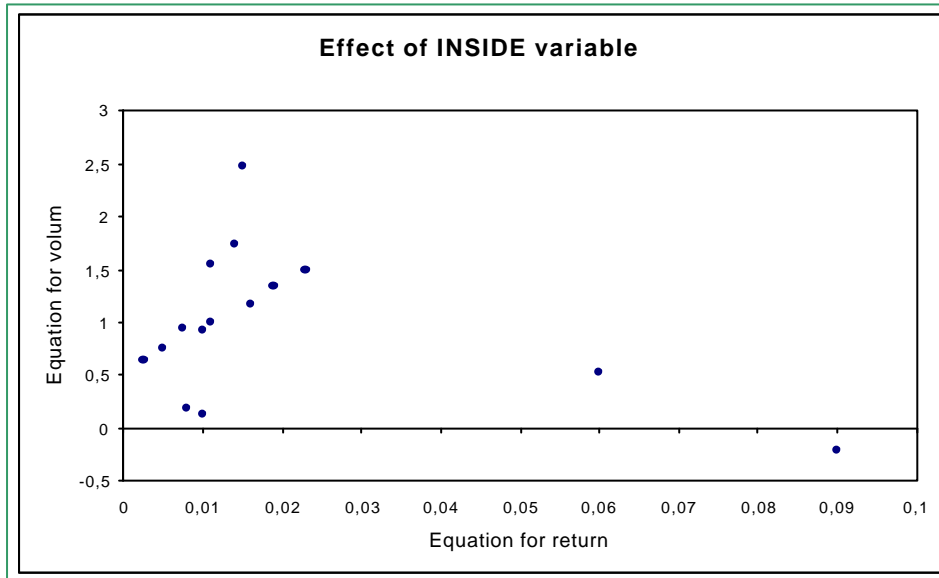
---

Estimated coefficient :		<b>g</b>	<b>d</b>	<b>r<sub>1</sub></b>	<b>r<sub>2</sub></b>
Equation For Returns	Mean	9.67%	1.10%	0.0664	0.41547619
	Median	6.80%	9%	0.079	0.436
	n. of coeff.	14	15	5	2
	stat. signif	(out of 19)	(out of 21)	(out of 21)	(out of 19)
	(5%)				
Equation For Volumes	Mean	680.93%	156.29%	0.307316	-0.33705
	Median	364.8%	105.50%	0.084	-0.11
	n. of coeff.	16	18	20	6
	stat. signif	(out of 19)	(out of 21)	(out of 21)	(out of 19)
	(5%)				

---

**Figure 1 - Effect of insider trading and announcements on returns and volumes**

*The left-hand side panels report the point estimates of  $d_i$  (upper) and of  $g_i$  (lower) in the return and volume equations. The right-hand side panels report the t-statistics associated with estimates of  $d_i$  (upper) and of  $g_i$  (lower). Points to the right of the vertical axis represent statistical – significant estimates in the return equation. Points above the horizontal axis represent statistical significant estimates in the volume equation.*



**Figure 2- Effects of news on returns and volumes**

*This table represents the point estimates of  $\alpha_j$  in the return and volume equations (left-hand side) and to the T-statistics associated to them (right-hand side). Points to the right of the vertical axis represent statistical-significant estimates in the return equation. Points above the horizontal axis represent statistical significant estimates in the volume equation.*

