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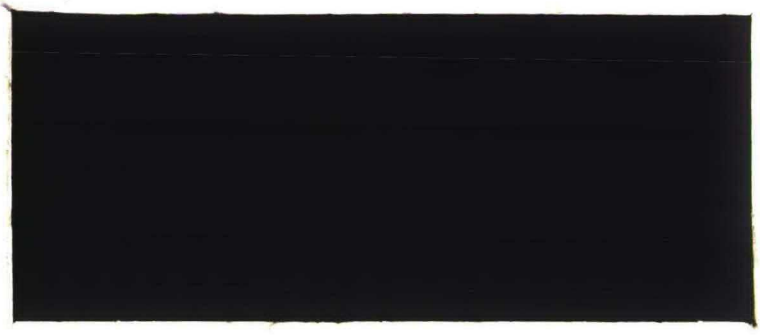

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RESEARCH MEMORANDUM

INSIDER TRADING RESTRICTIONS AND THE STOCK MARKET

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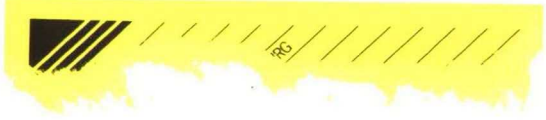

INSIDER TRADING RESTRICTIONS AND THE STOCK MARKET

by

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ABSTRACT

This paper examines the effect of introducing insider trading restrictions on daily stock price and trading volume behaviour of the Amsterdam Stock Exchange. From 1987 on, insiders are no longer allowed to trade two months before annual earnings announcements and three weeks before semi-annual earnings announcements. Our results indicate that, stocks became less liquid when insiders were not allowed to trade. Although the law may have increased the willingness of outsiders to trade before earnings announcements, this increase in liquidity is offset by the reduction in trading volume generated by insiders. We also find no evidence that the introduction of insider trading restrictions significantly reduced the stock market's speed of adjustment to earnings announcements.

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1. INTRODUCTION

On January 1, 1987, the Amsterdam Stock Exchange (ASE) adopted a Model Code, restricting insider trading before major announcements such as earnings, dividends and new equity issues. The main purpose of this study is to test whether the introduction of this regulation had any material impact on the behaviour of stock prices and trading volume on the ASE. Specifically, this paper tests for the "conventional wisdom" about insider trading, i.e., that it reduces outside investors' confidence and that it makes markets more informationally efficient.

Kyle (1985) develops a model that formalises this "conventional" intuition. In his model a monopolistic insider who has unique access to private information about the underlying asset trades against uninformed noise traders (who trade randomly) and against market makers who set prices on the basis of the aggregate order flow. The insider trades in such a way that his private information is incorporated gradually into prices, so that markets become more informationally efficient. Of course, it would be preferable (as Manove (1989) argues) that the insider directly communicated his information to the public, in the same way as the world would be a better place if there were only nice, altruistic people.[1] Kyle's model also captures Bagehot's (1971) intuition that market makers compensate themselves for bad trades

due to adverse selection of insiders by making the market less liquid (see also Amihud and Mendelsohn (1986)).

However, Grossman (1986) points out that if many traders are participating in a market because they have private information and are trying to earn a return on this information, then this will increase the liquidity of the market. Adamati and Pfleiderer (1988) show that a reduction in the number of informed traders may actually reduce market depth and liquidity because it reduces competition between informed traders. The resulting increase in transaction costs may influence the behaviour of "discretionary" traders, i.e., traders that have liquidity demands that need not be satisfied immediately. If transaction costs increase prior to earnings announcements, these traders may prefer to wait until after the public release of the earnings news, so that liquidity prior to such announcements will fall.

Moreover, the argument that insider trading makes markets more efficient depends crucially on the degree of competition between insiders (see e.g. Grossman and Stiglitz (1980) and Kyle (1989)). Under perfect competition, prices become so informationally efficient and trading profits so low that, when the degree of risk-aversion among informed traders is small, information traders have no incentive to collect information (so that markets "cannot" be efficient). Hence, insider trading restrictions may increase incentives for other

information traders (financial analysts etc.) to collect costly information (Fishman and Hagerty (1989)) so that it is an empirical issue whether insider trading makes markets more efficient. The Dutch regulatory environment provides an ideal experimental setting to perform such a test.

This paper is organised as follows. In section two we describe the 1987 Model Code and develop a set of testable hypotheses about price and volume behaviour. In section three we present the data. Section four studies the effect of the regulation on trading volume. Section five tests whether the Model Code made markets less efficient around earnings announcements. Section six summarizes our major conclusions.

2. THE 1987 MODEL CODE: HYPOTHESES

Under impulse of the initiative of the European Commission to create a unified European market by 1993, more and more countries have been following the recommendations of the EEC directive of 25 July 1977 to introduce some restrictions on insider trading. Hence, on January 1 1987 the Amsterdam Stock Exchange adopted a Model Code which restricts insider trading before the most common company-specific announcements. Insiders (as defined by the law) are no longer allowed to trade in the company's stock (1) during the two months preceding the announcement of annual earnings reports (2) 21 days

preceding the announcement of semi-annual earnings and dividends and (3) 1 month preceding the announcement of new equity issues. All insider transactions are registered in the company, but are not made public (unlike in the U.S. where the Official Summary of Insider Transactions is publicly available). The company official charged with recording the transactions is supposed to warn insiders that a "forbidden trading period" has started (Baron van Ittersum (1989)). In order to detect violations of the Code, a Stock Watch committee looks for abnormal movements in prices and trading volume. When the committee suspects a violation, it will conduct an investigation. In 1987, 1988 and 1989, 14, 18 and 10 (respectively) suspect cases were investigated. If a violation is found, the company's name is made public; in case of a serious violation the company is reprimanded. In 1987, 1988 and 1989, 3, 1 and 2 (respectively) offences were identified. In only one case a company was reprimanded by the Amsterdam Stock Exchange. Repeat offenders could be delisted from the stock exchange. On 2 February 1989 legislation was passed by the Dutch parliament which imposes heavy fines and jail terms (up to two years) for insiders who violate the Model Code.

The purpose of this paper is to test the consequences of restricting insider trading on the liquidity of equity markets and the speed of adjustment to information revealed in annual and semi-annual earnings

announcements. The law also restricted trading before dividend announcements and new issues. However, because dividends are typically announced the same day as earnings, no independent test of dividend announcements is possible. Announcements of new equity issues were also ignored because we want to focus on the behaviour of markets before predictable events: earnings are each year announced in the same calendar week.

Specifically, we want to test the following hypotheses:

Hypothesis 1 : After insider trading was restricted, markets became more liquid in the restricted period (prior to earnings announcements).

Hypothesis 2 : After insider trading was restricted, the speed of adjustment to annual and semi-annual earnings information was reduced.

Hypothesis 3 : These effects are more pronounced for small firms.

The first two hypotheses test the conventional wisdom that the increased willingness of outsiders to trade compensated for the loss of trading volume normally generated by insiders and that insider trading makes markets efficient. The third hypothesis tests whether small firms, which are generally perceived to offer more profit potential to insiders are more affected by restrictions on insider trading.

Note that testing these hypotheses is only meaningful if the Model Code deters insider trading. There exists a lot of evidence (Jaffe (1987), Finnerty (1976), Seyhun (1986)) that insiders (officers and directors) buy before price increases and sell prior to price declines in U.S. capital markets. One interpretation of these results is that exploitation of insider information is widespread and that insiders violate Rule 10b-5 of the Securities and Exchange Act of 1934. Considering that these violations carry heavy fines and jail sentences, it seems questionable whether the comparatively mild sanctions (before February 1989) are sufficient to enforce the Dutch Model Code. However, Givoly and Palmon (1986) find no association between purchase (sale) transactions with the release of subsequent good (bad) news. They argue that the price changes subsequent to insider trading transactions are mainly reflecting the publication of the trades themselves. One explanation for their results is that insider purchases (sales) are a sign of increased (decreased) managerial commitment to shareholder value maximization (i.e. a reduction in agency costs), and not activities related to inside information. Hence, the requirement to publish insider transactions (in the Official Summary) and the stiff legal penalties may be a sufficient deterrent to widespread exploitation of inside information in U.S. capital markets. Whether the Dutch Model Code with its mild sanctions has a similar effect is an interesting empirical issue.

3. DATA

All 136 stocks that were continuously listed on the Amsterdam Stock Exchange from January 1984 until June 1989 were considered. The daily stock prices were obtained from Data Stream Inc. and adjusted for dividends and other distributions. Data on daily trading volume were collected from Stockdata and the financial press (De Officiele Prijscourant and Het Financiele Dagblad). 11 firms were dropped because stock price data was not available on the Data Stream tape.

In addition we collected data on annual and semi-annual earnings announcements. Data for the year 1987 through 1989 were collected from the press releases of the Algemeen Nederlands Persbureau (ANP, the Dutch Press Agency). Because the ANP only saves the previous two years announcements, the remaining announcement dates are collected by searching the financial press (Het Financiele Dagblad). Because we were unable to find announcements for a number of companies, our final sample is reduced to approximately 114 firms. All earnings per share and dividend per share numbers were also collected independently from the "Financieel Economisch Lexicon".

The distribution of the 561 annual and 554 semi-annual earnings announcements is shown in Table 1. Most annual earnings are announced in March and April, while most semi-annual earnings announcements take place in August and September.

4. THE EFFECT OF INSIDER TRADING RESTRICTION ON TRADING VOLUME

4.1 Methodology

The purpose of this section of the paper is to test whether the Model Code increased liquidity before annual earnings and semi-annual earnings announcements. Because the regulation restricted insider trading 2 months (or 40 trading days) before an annual earnings announcement and 3 weeks (or 15 trading days) before a semi-annual announcement, we consider the following event periods: day -50 to day +10, for annual earnings announcements and day -25 to day +10 for semi-annual earnings announcements. The 10 extra days on both sides of the restricted trading period are added to test for potential shifts in trading behaviour. Beside event periods, we also define the estimation period as the 100 day period covering day -100 until day -51 and day +11 until day +60. To make trading volume comparable over time, the number of shares traded in each day was divided by the number of shares outstanding on that day (see e.g. Beaver (1968) and Morse (1981) for a similar procedure).

In order to compute the Model Code induced change in trading volume in the event period, we first need a model of expected "normal" (unrelated to earnings announcements) trading volume. The "abnormal" (earnings related) trading volume in the test period can then be compared before and after the introduction of the Model Code. In this paper, we assume that the normal trading

volume is generated by the Market Model, which assumes that the expected volume has a company specific component and a market component :

$$E(V_{it}) = a_i + b_i V_{Mt} \qquad (1)$$

a_i and b_i are constants estimated using data in the estimation period and V_{Mt} is the average trading volume of our portfolio of 114 securities on day t.

Ajinka and Jain (1989) argue that the Market Model specification, adjusted for serial correlation, outperforms other model specifications employed in the finance and accounting literature. Because insider trading may induce serial correlation in trading volume data, no adjustment for serial correlation was made : as we are trying to measure information induced abnormal trading volume, adjusting for serial correlation would imply overadjusting the model of normal, expected trading volume[2].

On the basis of this model, abnormal and average abnormal (earnings announcement related) trading volume will be computed on each day in the event period and compared before and after the 1987 regulation.

In order to test for statistically significant differences in trading volume behaviour for different subsamples, we need an estimate (for each subsample) of

the standard deviation of the average daily abnormal trading volume. This standard deviation is computed using data in the 100 day estimation period. A similar procedure (for security prices) is developed in Brown and Warner (1985). By using time series of average (abnormal) trading volume, the tests incorporate cross-sectional dependence in the security specific (abnormal) trading volume.

The event period is split up in four subperiods :

- The pre-restricted period : day -50 to day -41 for annual announcements and day -25 to day -16 for semi-annual announcements

- The restricted period : day -40 to day -1 for annual announcements and day -15 to day -1 for semi-annual announcements

- The announcement period: day 0 plus day 1

- The post-announcement period : day 2 to day 10

Figure 1 provides a schematic overview of the estimation and event-(sub) periods around annual earnings announcements

4.2. Results : annual earnings

Table II provides some descriptive statistics for our daily volume data (i.e. the fraction of shares traded) from January 1984 to June 1989, for three subperiods :

the entire year (panel A), the estimation period (panel B) and the event period (panel C). On average, .244 percent of the outstanding shares were traded per day (or 61 percent of the outstanding shares per year). After restrictions on insider trading were introduced (i.e. after 1986) trading volume seems to have declined from .268 percent per day to .216 percent per day. Panel B and Panel C show that this decline in average trading occurs also in the estimation period and the event period. For annual earnings announcements, daily trading volume is, on average, .036 percent larger in the event period than in the estimation period. The corresponding number for semi-annual earnings announcements is .04 percent. All panels show a rather dramatic decline in trading volume in 1987. Note that, the distribution of trading volume is positively skewed. Ajinka and Jain (1989), report similar results : the average daily trading volume in the U.S. is 0.159, and skewed to the left.

In order to deal with non-normality, the trading volume data were transformed by taking logs. Specifically, if on a given day n_t shares were traded and n_0 shares were outstanding, the transformed trading volume was computed as $\ln ((1 + n_t)/(n_0))$. Ajinka and Jain (1989) employ another measure, (i.e. $\ln (1 + n_t)/\ln (n_0)$). The problem with their adjustment method is that it not only normalises the data, but also changes the ranking. A numerical example will illustrate this. Assume that we

have three observations : trading volume of 100, 900 and 100 on stocks with, respectively, 100,000, 300,000 and 11,000 shares outstanding. Thus, the unadjusted trading volume is .1%, .3% and .9% respectively, which implies a skewed sample distribution. Taking logs (our method) transforms these numbers into -6.907, -5.809 and -4.71 (mean = median = -5.809). The Ajinka and Jain adjustment will create the following numbers : .4, .54, .49 (mean = .48, median = .49). So their transformation does not only normalise the data but also changes the ranking of the observations : firm 2 is now classified as the firm with the highest trading volume.

Table III shows the cumulative average abnormal trading volume around annual earnings announcements in the event period. The left-hand side of the tables is based on data prior to the restriction on insider trading, while the right-hand side shows the post-regulation results. Table IV summarizes the results of table III by computing the average daily abnormal trading volume around annual earnings announcements in each of the four subperiods : the pre-restricted period ($P_{-50,-41}$), the 40-day restricted period ($P_{-40,-1}$), the two-day announcement period ($P_{0,1}$) and the 9-day post-announcement period ($P_{2,10}$). Within the 40-day restricted period we examine three subperiods $P_{-30,-1}$; $P_{-20,-1}$; $P_{-10,-1}$. Although the regulation restricts insider trading during a 2 month period, it seems likely that risk-averse insiders will become more active as the earnings announcement date

approaches. Although by waiting an individual insider risks that information will get reflected in security prices (e.g. by the actions of other insiders), he also can minimize his trading risk[3]. Hence, we expect that the law should have a bigger impact in period $P_{-10,-1}$ than in period $P_{-40,-1}$.

From tables III and IV we can infer the following : first both before and after the introduction of insider trading regulation, trading volume increases significantly in the announcement period and in the post-announcement period, a result also reported by others on U.S. data (see e.g. Beaver (1968), Morse (1981), Bamber (1986) and Jain (1988)). The fact that trading volume increases when earnings are announced is typically explained as a "lack of consensus" effect : earnings announcements typically contain information that changes prices, which may create disagreement and hence increase trading volume (see e.g. Karpoff (1986)). Holthausen and Verrechia (1990) argue that besides the lack of consensus effect, an "informedness effect" could generate excess trading volume : if an announcement contains a lot of information, "agents' demands become more extreme as agents become more knowledgeable".

The fact that trading volume is significantly positive several days after earnings announcements is more puzzling. Karpoff (1986) suggests that this may be a result of market frictions that keep all demands from

instantaneously clearing. Alternatively, these trades may be executed by (1) speculative traders (insiders) who trade around earnings announcements or (2) (discretionary) liquidity traders (Adamati and Pfleiderer (1988)) who prefer to wait until the information asymmetry is reduced. Alternatively, if markets would tend to over or under-react to earnings news, the excess volume could merely reflect the activities of traders who want to exploit this inefficiency.

Second, table III shows that, before the regulation, abnormal trading volume was significantly positive (at at least the 10% significance level) on day -8, -6, -5, -4 and -2. After the regulation excess trading volume is only significantly positive ($t = 1.63$) on day -3. Table IV confirms this result : after the regulation, the trading volume fell significantly (at the 5% significance level or less) in the restricted period and its three subperiods. Note also that the decline is most pronounced in the 10 days period prior to the announcement. Apparently, the law discouraged insider trading in such a strong way that it led to a net reduction in trading volume. Note that <u>only</u> the trading volume in the restricted period is affected by the regulation.

Tables V and VI report the results for a subset of 28 "small" firms. Firms were ranked on the basis of equity market value at the beginning of each year. Next, each

year a portfolio containing the bottom 33% of firms was formed. In order to make a comparison possible, only the 28 firms that remained "small" from 1985 to 1989 are retained. Small firms are, on average more actively traded (at least relative to the number of shares outstanding) : .368 percent per day before 1987 and .299 percent per day afterwards (compared to .268 percent and .216 percent for the total sample). A similar negative correlation between trading volume and firm size is also reported by Ajinkya and Jain (1989) in U.S. data.

The results for the behaviour of abnormal volume of small firms are similar to the ones reported for the total sample, but, because of the small sample size, less significant.

Stocks are highly liquid during the announcement and afterwards. Although after the regulation, the abnormal trading volume actually increased (although not significantly) in the restricted period $P_{-40,-1}$, the trading volume decreased significantly (at the 10% level or lower) in the subperiods during which insider trading was more likely : $P_{-20,-1}$ and $P_{-10,-1}$. Specifically, table V shows that, after the introduction of the Model Code, the average abnormal trading volume is negative in 8 out of the 10 days prior to the announcement. Note that, although the results of table VI are less statistically significant than the ones reported in table IV, the size of the volume reduction per day in the 10

days prior to earnings announcements is much more important for small firms (.23) than for the total sample (.098).

4.3 Results : semi-annual earnings

Tables VII, VIII, IX and X are similar to tables III, IV, V and VI respectively, but are now based on 554 semi-annual earnings annoucements. Note that this time, the restricted period and subperiod covers day -15 to day -1 and day -10 to day -1 respectively.

The results for semi-annual earnings are similar to the ones reported for annual earnings. Excess trading volume is significantly positive in the announcement period and the post-announcement period. Moreover, there is no evidence that firms became more liquid in the restricted period after insider trading regulation was introduced : average daily abnormal trading volume falls (although not significantly) after 1986. As before, the decline is more pronounced for small firms (compare tables VIII and X). However, the volume declines are less important than observed before annual earnings announcements. One explanation for this difference is that, prior to the regulation, not much insider trading was going on before semi-annual earnings announcements, so that the regulation did not make much difference. The fact that (prior to 1987) the 10 day pre-announcement abnormal trading volume is smaller before semi-annual earnings announcements than before annual earnings annoucements

(0.065 vs. 0.155) is consistent with this hypothesis. Why insiders would be more active prior to annual earnings than prior to semi-annual earnings, remains to be explained. Interestingly, Morse (1981) does not find any abnormal trading volume behaviour prior to quarterly earnings announcements of 25 US companies in the period 1973 - 1976. An alternative explanation (also consistent with the data) is that the law was more effective (in increasing outsiders' willingness to trade) for semi-annual than for annual earnings announcements.

On the basis of these results hypothesis 1 is rejected. In contrast to the regulators' intentions, the Model Code reduced trading volume, or, at least, did not increase trading volume. In 11 of the 12 comparisons of trading volume (in the restricted period; see tables IV, VI, VIII and X) trading volume declined (although not always significantly) after the introduction of insider trading regulation. The reduction in insider trading and the resulting reduction in trading activity was apparently not compensated by an increased willingness (by uninformed traders) to trade.

5. THE EFFECT OF INSIDER TRADING RESTRICTIONS ON STOCK PRICE BEHAVIOUR

5.1 Methodology : the Ball and Brown approach

In order to test for the effect of the regulation on the speed of adjustment of stock prices to earnings news

(hypothesis 2), we adopted, as a first pass, the classic Ball and Brown (1968) approach. First, the sample was split in two subsamples : companies that experiences an increase in annual (semi-annual) earnings per share and companies that experienced a decrease in annual (semi-annual) earnings per share. If earnings follow a seasonal random walk, then this procedure divides the sample in companies with unexpected earnings increases and decreases. Although time series models or models based on analyst and managerial forecasts are better than naive random walk models (for an overview, see e.g. Foster (1986) Brown et al (1987)), no such data was available to us.

Table XI provides an overview of our sample. The results are based on 389 annual earnings increases, 160 annual earnings decreases, 254 semi-annual earnings increases and 137 semi-annual earnings decreases. Except for the 1987 semi-annual earnings announcements (announced mainly in the two months prior to the stock market crash) and the 1988 annual earnings reports, earnings increases are always twice as numerous as earnings decreases.

Next, for each subsample of annual (and semi-annual) earnings increases and decreases a standard event study was performed using the Market Model to compute "normal" returns, employing data in the estimation period. The market index is an equally weighted index of all securities in the sample. Estimates of α and ß were

obtained from simple OLS regressions, without adjustment for thin trading. Brown and Warner (1985) show that the failure to take into account nonsynchronous trading in estimating Market Model coefficients does not result in misspecification of event study methodologies : by construction, OLS residuals for a security sum to zero in the estimation period so that a bias in α is compensated for a bias in ß. As with the volume data, the standard-deviation of the average abnormal return in the estimation period is used to perform significance tests in the test period. Note that this method incorporates crossectional dependencies in security-specific returns, which may be important if events are clustered.

5.2 Results

The results for annual announcements are shown in figure 2 which is based on table XII, panel A (earnings increases) and panel B (earnings decreases). Before the introduction of insider trading restrictions, earnings increase announcements are preceded by significant (at the 10 percent level) stock price increases on day -10, -9, and day -7. The 1.89 percent cumulative excess return in the 10 days prior to the announcement is highly significant (t = 3.7). Although the announcement return (.65 percent) is significantly positive, the earnings news was largely anticipated. For earnings declines, the 10-day pre-announcement return (-.65 percent) is not significantly different from zero (t = -1.03). However,

the cumulative excess return of -3.2 percent in the restricted period (day -40 to day -1) is marginally significant (t = -1.59). Earnings declines are unexpected : stock prices fall by 3.68 percent in a two-day period. After day 1, excess returns are not significantly different from zero.

Interestingly, after the reform, earnings news was not preceded by abnormal positive or negative abnormal returns. Annual earnings decreases are actually preceded by a small (1 percent in 50 days) positive excess return and the market's response to earnings news is uniquely confined to a 2-day negative return of -2.22 percent. The significant (t = 2.29) positive excess return on day 2 of .5 percent is difficult to explain in an efficient market. In a similar way, the significant positive response to earnings increases is largely limited to the announcement day when stock prices increase by .52 percent.

It is tempting to relate the stock price behaviour to the volume behaviour reported above. From tables III and IV, we inferred that, before 1987, the abnormal trading volume is significantly positive in the 10 days prior to annual earnings announcements. After the introduction of the Model Code, the cumulative abnormal volume falls and becomes statistically insignificant. This suggests that the pre-announcement returns and pre-announcement volume patterns are closely related.

The results seem to be consistent with hypothesis 2 : the Model Code reduced the speed of adjustment to information. However, the small information content of earnings after 1986 suggests that our earnings expec tations model is misspecified. This in itself will reduce the efficiency of our test : each test is a joint hypothesis of the information content and the speed of adjustment to this information. If the earnings expectation model does not separate well unexpected earnings increases and decreases, the measured information content will biased toward zero, so that we erroneously conclude that the speed of adjustment has fallen.

When the analysis was repeated for small firms and around semi-annual earnings announcements (results are available upon request), the problem with the methodology became even more striking : for all periods and subsamples, the pre-announcement cumulative excess returns were zero, which suggests that the earnings expectations model is misspecified.

5.3 The weighted average anticipation time

As an alternative procedure individual stocks were ranked on the basis of cumulative excess returns from day -40 to day +1. The sample was divided into stocks with positive excess returns and negative excess returns. While this method guarantees a large "information content" of

earnings announcements, it also implicitely assumes that cumulative excess returns 40 days prior to earnings announcements are uniquely caused by the earnings news. For our purposes, it is sufficient to assume that the distribution of non-earnings related company-specific news is uniformally distributed across the sample period.

In order to measure the speed of adjustment in a period starting T days before the earnings announcement (day -T) until the announcement day (day 0), we compute the weighted average anticipation time as

$$WAAT = \frac{\sum_{t=-T}^{0} t^* AR_t}{CAR_{-T}} \qquad (2)$$

where CAR_{-T} is the cumulative average excess return from day -T until day 0 and AR_t is the average excess return on day t. The WAAT corresponds to a duration measure that standardises for the information content of the earnings announcements. If all the information was incorporated on day 0, the WAAT would be equal to 0. In the other extreme case, where the market anticipated all the information T days before the announcement, (i.e. all AR_t are 0 for $t < T$) the WAAT is equal to T. If the conventional hypothesis is true that insiders make markets efficient, we expect the WAAT to fall after 1987.

Table XIII shows the results for the total sample, and for various subperiods in the restricted period. In the total 40-day restricted period prior to annual earnings

announcements, the WAAT is approximately equal to 17 days. Note that if the cumulative average excess return was evenly distributed over the entire 40 day holding period, the WAAT should be equal to 20. Thus, the second half of the restricted period generally produces larger excess returns.

If the market had become less efficient, the WAAT should have declined after insider trading restrictions were reduced. Table XIII clearly does not support this hypothesis. In 9 out of the 12 pariwise comparisons, the anticipation time was longer after the introduction of insider trading restrictions.

Table XIV reports the results for small firms. Comparing table XIII and XIV, the average anticipation time seems shorter for small firms than for the total sample (e.g. 13 days vs. 17 days in the 40-day period prior to annual earnings announcements). This is to be expected as, for small firms, typically less information is available and/or revealed prior to earnings announcements. Again, the hypothesis that insider trading restrictions make markets less efficient is rejected : in 7 out of 12 pairwise comparisons the WAAT increases after the introduction of the Model Code.

6. SUMMARY AND CONCLUSIONS

The main findings of this paper can be summarized as follows : (1) after the introduction of restrictions on insider trading, trading volume fell before earnings announcements; this finding was more significant before annual earnings announcements than before semi-annual earnings announcements, and especially important for small firms during the restricted period, (2) after the introduction of restrictions on insider trading, the speed of adjustment to annual or semi-annual earnings announcements was not significantly effected.

These results are inconsistent with the conventional wisdom about insider trading, i.e. that it makes markets efficient and that it makes markets less liquid.

The volume results are consistent with Adamati and Pfleiderer (1988) who argue that competition between informed traders may actually increase liquidity trading (and volume) because it reduces liquidity traders' transaction costs. Of course, it would be ideal for liquidity traders that no informed traders would trade, but having a lot of information traders is better than having just a few.

The finding that market efficiency and the speed of adjustment to security prices are not reduced by the reduction in the number of informed investors, is consistent with the model proposed by Fishman and Hagerty

(1989). The law eliminated only a fraction of the (information) traders, i.e. the company executives, some of which possess information and some of which do not. Others, with higher information acquisition costs such as financial analysts, would face less competition and would be encouraged to spend more on information. As a result, their analysis would become more accurate, which may have offset the information reducing effect of the decline in "insider" trading.

The regulatory implications are clear : the argument that eliminating insiders will increase liquidity because of increased confidence of outside investors, ignores the liquidity enhancing role of insiders per se. Insiders make markets, influence prices, and generate volume. This is especially the case for relatively small firms.

FOOTNOTES

1. One could question whether it is in the interest of the current shareholders (which, as is standard in Finance, the insiders-managers are assumed to maximize) to make markets more efficient. To illustrate this point, assume that at time 0 insiders receive information which, without their trading activities would become available at T > 0. If insiders trade, their trading activity will speed up the adjustment of information. Consider the following three categories of current shareholders: (1) Investors who hold their stock until after time T; (2) Investors who would have sold their stock before time T, whether the insider traded or not and (3) Investors who sell their stock before time T because of the buying pressure of insiders. While the first category would be unaffected by insider trading, some of the shareholders in the second category will benefit if the trading speeds up the release of <u>good</u> information. However, if insider trading speeds up the adjustment to <u>bad</u> information (i.e. the insider sells short) the shareholders in the second category will be made worse off. Finally, the third category (which is only relevant when the insider acts on positive information) will be made worse off if the trades are only partially revealing. In short, insider trading on the basis of negative information will always hurt current shareholders, while the net effect of insider buying is unclear: it depends on the ratio of "normal"

versus "insider induced" trading volume and on the extent and speed of information revelation.

2. Of course, we also adjusted for serial correlation, but the results were not mutually affected.

3. Kyle (1985, 1989) developes a model of strategic insider trading.

4. Because it is not clear when exactly the news becomes publicly available, we have computed the "announcement day returns" as the sum of the return on day 0 and day +1.

REFERENCES

Admati Anat and Paul Pfleiderer, 1988, "A theory of intraday trading patterns: volume and price variability", *Review of Financial Studies*, 1, 3-40

Ajinkya, Bipin and Prem Jain, 1989, "The behaviour of daily stock market trading volume", *Journal of Accounting & Economics* 11, 331-359

Amihud J. and Mendelsohn, 1986, "Asset pricing and the bid-ask spread", *Journal of Financial Economics* 17, 223-249

Bagehot, Walter, "The only game in town", *Financial Analyst Journal*, 27, 12-14

Ball Ray and Paul Brown, 1968, "An empricial evaluation of accounting income numbers", *Journal of Accounting Research* 6, 159-178

Bamber L.S., 1986, "The information content of annual earnings release : a trading volume approach", *Journal of Accounting Research*, 24, 40-56

Baron van Ittersum, B.F., 1989, "Misbruik van voorwetenschap", *Actiona*, 39-53

Beaver, William, 1986, "The information content of annual earnings announcements", *Journal of Accounting Research*, 6, 67-92

Brown, L, P. Griffin, R. Hagerman and M. Zmijewski, 1987, "An evaluation of alternative proxies for the market's assessment of unexpected earnings", *Journal of Accounting and Economics* 9, 159-193

Brown Steve and Jerold Warner, 1985, "Using daily stock returns : the case of event studies", *Journal of Financial Economics*, 14, 3-32

Finnerty, Joseph, 1976, "Insiders and market efficiency", *Journal of Finance*, 31, 1141-1148

Fishman, Michael and Kathleen Hagerty, 1989, "Insider Trading and the Efficiency of Stock Prices", mimeo, Northwestern University

Foster George, 1986 "Financial statement analysis", Prentice-Hall

Givoly D. and D. Palmon, 1985, "Insider trading and the exploitation of inside information : some empirical evidence", *Journal of Business*, 58, 69-87

Grossman, S., 1986, "An analysis of the role of insider trading on futures markets", *Journal of Business*, 59, 119-146

Grossman, S and J. Stiglitz, 1960, "On the impossibility of Informationally Efficient Markets", *American Economic Review*, 70, 393-408.

Grossman, S., 1976, "On the efficiency of competitive stock markets where traders have diverse information", *Journal of Finance* 31, 573-585

Holthausen, Rober and Robert Verrechia, 1990, "The effect of informedness and consensus on price and volume behaviour", *The Accounting Review*, 65, 191-208

Jaffe J., 1974, "Special information and insider trading", *Journal of Business* 47, 410-428

Karpoff, Jonathan, 1986, "A theory of trading volume", *Journal of Finance*, 41, 1069-1087

Kyle, Albert, 1985, "Continuous auctions and insider trading", *Econometrica*, 53, 1315-1336

Kyle, Albert, 1989, "Informed Speculation with Imperfect Competition", *Review of Economic Studies*, 56, 317-356

Lakonishok, Josef and Theo Vermaelen, 1986, "Tax-induced trading around ex-dividend days", *Journal of Financial Economics*, 16, 287-319

Manove, Michael, 1989, "The harm from insider trading and informed speculation", *Quarterly Journal of Economics*, 104, 823-844

Morse, Dale, 1981, "Price and trading volume reaction surrounding earnings announcements", *Journal of Accounting Research*, 19, 374-383

Seyhun, N., 1986, "Insiders profits, cost of trading and market efficiency", *Journal of Financial Economics* 16, 189-212

Table I

MONTHLY DISTRIBUTION OF EARNINGS ANNOUNCEMENTS DATES

Month	Annual earnings	Semi-annual earnings
January	32	0
February	70	0
March	218	3
April	163	6
May	33	6
June	21	10
July	4	22
August	1	235
September	2	221
October	6	34
November	6	17
December	5	0
TOTAL	561	554

TABLE II

Average daily trading volume on the Amsterdam Stock Exchange
(Figures in percent of shares outstanding)

Panel A : Yearly Analysis

	1984	1985	1986	1987	1988	1989	PRE	POST	Total
Mean	0.187	0.315	0.302	0.192	0.198	0.300	0.268	0.216	0.244
Median	0.153	0.237	0.218	0.164	0.152	0.206	0.238	0.169	0.196
St. Dev.	0.168	0.339	0.263	0.200	0.171	0.326	0.214	0.176	0.182
Minimum	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Maximum	1.087	2.424	1.530	1.216	0.959	2.014	2.424	2.014	2.424

Panel B : Estimation Period Analysis

1. Annual Earnings

	1985	1986	1987	1988	1989	PRE	POST	Total
Mean	0.258	0.331	0.206	0.187	0.248	0.295	0.214	0.246
Median	0.182	0.256	0.145	0.147	0.153	0.217	0.154	0.177
St. Dev.	0.356	0.269	0.271	0.164	0.298	0.318	0.252	0.283
Minimum	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Maximum	3.33	1.23	2.165	0.988	2.096	3.33	2.165	3.33

2. Semi-annual earnings

	1984	1985	1986	1987	1988	PRE	POST	Total
Mean	0.148	0.282	0.253	0.177	0.183	0.228	0.180	0.209
Median	0.113	0.217	0.178	0.141	0.133	0.156	0.136	0.145
St. Dev.	0.218	0.281	0.262	0.186	0.222	0.249	0.285	0.233
Minimum	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Maximum	1.253	1.979	1.682	1.577	1.909	1.979	1.909	1.979

TABLE II

Panel C : Event Period Analysis

1. Annual earnings

	1985	1986	1987	1988	1989	PRE	POST	Total
Mean	0.319	0.359	0.218	0.218	0.298	0.339	0.244	0.282
Median	0.235	0.250	0.146	0.141	0.207	0.240	0.159	0.183
St. Dev.	0.344	0.323	0.423	0.242	0.366	0.334	0.353	0.349
Minimum	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Maximum	2.648	1.697	4.343	1.605	2.745	2.648	4.343	4.343

2. Semi-annual earnings

	1984	1985	1986	1987	1988	PRE	POST	Total
Mean	0.191	0.301	0.310	0.247	0.193	0.268	0.220	0.249
Median	0.104	0.205	0.204	0.142	0.137	0.173	0.139	0.154
St. Dev.	0.280	0.293	0.308	0.403	0.260	0.299	0.341	0.317
Minimum	0.000	0.003	0.011	0.001	0.000	0.000	0.000	0.000
Maximum	1.824	1.548	1.982	3.446	2.312	1.982	3.446	3.446

TABLE III

Average (AV) and cumulative average (CAV) abnormal daily trading volume around annual earnings announcements

Abnormal volume is computed using the Market Model (equation (1)) as a model of market equilibrium trading volume. Trading volume is defined as the natural logaritm of 1 plus the number of shares traded, divided by the number of shares outstanding. The cumulative average abnormal trading volume (CAV_t) is computed from 50 days prior to the earnings announcement until 10 days afterwards. The left panel of the table is based on data prior to the introduction of the Model Code.

	PRE-REGULATION			POST REGULATION		
DAY	AV	CAV	t[a)]	AV	CAV	t[a)]
-50	0.026	0.026	0.25	0.070	0.070	0.78
-40	0.083	0.019	0.81	0.017	0.049	0.18
-30	0.024	-0.713	0.23	-0.072	0.076	-0.80
-20	0.115	-0.384	1.13	0.018	-0.715	0.20
-10	0.047	-0.050	0.46	-0.026	-0.780	-0.29
-9	0.107	0.057	1.04	0.031	-0.758	0.34
-8	0.309	0.366	3.03**	0.132	-0.626	1.48
-7	0.162	0.528	1.59	0.035	-0.591	0.39
-6	0.203	0.731	1.99**	-0.011	-0.601	-0.12
-5	0.251	0.982	2.46**	0.128	-0.474	1.43
-4	0.170	1.152	1.66*	-0.012	-0.486	-0.13
-3	0.024	1.176	0.23	0.146	-0.340	1.63*
-2	0.173	1.349	1.69*	0.059	-0.281	0.66
-1	0.105	1.454	1.03	0.088	-0.193	0.98
0	0.475	1.928	4.66**	0.448	0.255	5.03**
1	0.839	2.767	8.23**	0.938	1.193	10.53**
2	0.483	3.250	4.74**	0.615	1.808	6.91**
3	0.374	3.625	3.67**	0.417	2.225	4.67**
4	0.243	3.868	2.39**	0.370	2.595	4.15**
5	0.418	4.286	4.10**	0.431	3.026	4.84**
6	0.341	4.627	3.35**	0.296	3.322	3.31**
7	0.265	4.892	2.60**	0.259	3.581	2.91**
8	0.282	5.174	2.77**	0.294	3.875	3.29**
9	0.198	5.373	1.94*	0.209	4.084	2.35**
10	0.109	5.482	1.07	0.151	4.235	1.69*

a) t-statistics * indicates value is significantly different from zero at 10% level

** indicates value is significantly different from zero at 5% level or less.

TABLE IV

Average abnormal daily trading volume around annual earnings announcements in specific sub-periods

Sub-period $P_{t1,t2}$ covers the period from day t1 until day t2, relative to the announcement date. Abnormal volume is computed using the Market Model (equation (1)) as a model of equilibrium trading volume. Trading volume is defined as the natural logaritm of 1 plus the number of shares traded divided by the number of shares outstanding. t-statistics are in parenthesis. ** indicates that the value is significantly different from zero at the 5% significance level. * indicates that the value is statistically significantly different from zero at the 10% significance level.

Period	Pre-regulation	Post regulation	Post-Pre
Pre-restricted			
$P_{-50,-41}$	-0.006 (0.18)	0.003 (-0.10)	0.009 (0.22)
Restricted			
$P_{-40,-1}$	0.038 (2.35)**	0.006 (-0.42)	-0.044 (-2.04)**
$P_{-30,-1}$	0.073 (3.92)**	-0.011 (-0.68)	-0.084 (-3.41)**
$P_{-20,-1}$	0.097 (4.26)**	0.027 (1.34)	-0.073 (-2.33)**
$P_{-10,-1}$	0.155 (4.81)**	0.057 (2.02)**	-0.098 (-2.29)**
Announcement			
$P_{0,1}$	0.656 (9.08)**	0.693 (10.98)**	0.036 (0.38)
Post-announcement			
$P_{+2,10}$	0.301 (8.87)**	0.331 (11.39)**	0.036 (0.806)

TABLE V

Average (AV) and cumulative average (CAV) abnormal daily trading volume around annual earnings announcements for a subsample of 28 small firms

Abnormal volume is computed using the Market Model (equation (1)) as a model of market equilibrium trading volume. Trading volume is defined as the natural logaritm of 1 plus the number of shares traded, divided by the number of shares outstanding. The cumulative average abnormal trading volume (CAV_t) is computed from 50 days prior to the earnings announcement until 10 days afterwards. The left panel of the table is based on data prior to the introduction of the Model Code.

	PRE-REGULATION			POST REGULATION		
DAY	AV	CAV	t[a]	AV	CAV	t
-50	0.095	0.095	0.38	0.180	0.180	0.80
-40	0.140	-1.882	0.56	0.047	0.833	0.21
-30	-0.440	-6.457	-1.77	-0.177	0.873	-0.78
-20	0.079	-8.602	0.319	- 0.343	-1.609	1.52
-10	-0.541	-10.286	-2.17**	-0.189	-2.689	-0.84
-9	-0.020	-10.306	-0.08	-0.185	-2.875	-0.82
-8	0.379	-9.927	1.52	-0.328	-3.203	-1.46
-7	-0.088	-10.015	-0.35	-0.244	-3.446	-1.08
-6	0.184	-9.831	0.74	-0.191	-3.638	-0.85
-5	0.527	-9.305	2.12**	0.148	-3.489	0.66
-4	0.124	-9.180	0.50	-0.313	-3.802	-1.39
-3	-0.166	-9.347	-0.67	0.135	-3.668	0.59
-2	0.095	-9.252	0.38	-0.014	-3.682	-0.06
-1	0.361	-8.891	1.45	-0.236	-3.919	-1.05
0	0.259	-8.632	1.04	0.404	-3.515	1.79*
1	1.205	-7.427	4.85**	1.171	-2.344	5.21**
2	0.383	-7.044	1.54	0.976	-1.367	4.34**
3	0.288	-6.756	1.15	0.649	-0.718	2.89**
4	0.296	-6.460	1.19	0.745	0.027	3.31**
5	0.936	-5.523	3.77**	0.774	0.801	3.44**
6	0.781	-4.743	3.14**	0.253	1.054	1.12
7	0.293	-4.456	1.18	0.333	1.388	1.48
8	0.527	-3.922	2.12**	0.155	1.542	0.68
9	0.460	-3.462	1.85*	0.321	1.864	1.43
10	0.247	-3.215	0.99	0.279	2.143	1.24

a) t-statistics * indicates value is significantly different from zero at 10% level

** indicates value is significantly different from zero at 5% level or less

TABLE VI

Average abnormal daily trading volume around annual earnings announcements in specific sub-periods for a subsample of 28 small firms

Sub-period $P_{t1,t2}$ covers the period from day t1 until day t2, relative to the announcement date. Abnormal volume is computed using the Market Model (equation (1)) as a model of equilibrium trading volume. Trading volume is defined as the natural logaritm of 1 plus the number of shares traded divided by the number of shares outstanding. t-statistics are in parenthesis. ** indicates that the value is significantly different from zero at the 5% significance level. * indicates that the value is statistically significantly different from zero at the 10% significance level.

Period	Pre-regulation	Post regulation	Post-Pre
Pre-restricted			
$P_{-50,-41}$	-0.202 (-2.57)**	0.088 (1.10)	0.29 (2.71)**
Restricted			
$P_{-40,-1}$	-0.17 (-4.33)**	-0.118** (-3.32)	0.054 (1.02)
$P_{-30,-1}$	-0.096 (-2.12)**	-0.165 (-4.02)**	-0.069 (-1.14)
$P_{-20,-1}$	-0.015 (-0.27)	-0.132 (2.63)**	-0.117 (-1.63)*
$P_{-10,-1}$	0.085 (1.08)	-0.141 (-1.98)*	-0.227 (-2.14)**
Announcement			
$P_{-1,0}$	0.732 (4.16)**	0.787 (4.94)**	0.055 (0.23)
Post-announcement			
$P_{2,P0}$	0.468 (5.66)**	0.498 (6.65)**	0.031 (0.27)

TABLE VII

Average (AV) and cumulative average (CAV) abnormal daily trading volume around annual announcements

Abnormal volume is computed using the Market Model (equation (1)) as a model of market equilibrium trading volume. Trading volume is defined as the natural logaritm of 1 plus the number of shares traded, divided by the number of shares outstanding. The cumulative average abnormal trading volume (CAV_t) is computed from 50 days prior to the earnings announcement until 10 days afterwards. The left panel of the table is based on data prior to the introduction of the Model Code.

	PRE-REGULATION			POST REGULATION		
DAY	AV	CAV	t[a]	AV	CAV	t
-25	-0.022	-0.022	-0.18	0.036	0.036	0.36
-20	-0.067	-0.509	-0.57	-0.054	-0.002	-0.53
-15	-0.001	-0.728	-0.00	0.054	0.051	0.54
-10	0.117	-0.511	0.99	-0.062	-0.551	-0.62
-9	0.046	-0.465	0.39	-0.120	-0.671	-1.20
-8	0.019	-0.445	0.16	0.074	-0.596	0.74
-7	-0.049	-0.494	-0.41	0.080	-0.516	0.80
-6	0.017	-0.478	0.14	0.127	-0.390	1.27
-5	0.023	-0.455	0.19	0.078	-0.312	0.78
-4	0.146	-0.308	1.24	-0.034	-0.345	-0.33
-3	0.060	-0.248	0.51	0.097	-0.249	0.97
-2	0.139	-0.109	1.18	0.220	-0.029	2.21**
-1	0.129	0.020	1.10	0.058	0.030	0.58
0	0.395	0.415	3.36**	0.237	0.267	2.38**
1	0.777	1.192	6.61**	1.017	1.284	10.21**
2	0.557	1.749	4.74**	0.507	1.791	5.09**
3	0.506	2.255	4.30**	0.452	2.243	4.54**
4	0.311	2.566	2.64**	0.294	2.537	2.95**
5	0.338	2.904	2.87**	0.202	2.740	2.03**
6	0.304	3.208	2.58**	0.123	2.862	1.23
7	0.373	3.582	3.17**	0.011	2.873	0.10
8	0.373	3.955	3.17**	0.106	2.979	1.06
9	0.167	4.122	1.42	0.091	3.071	0.91
10	0.112	4.234	0.95	0.078	3.148	0.78

a) t-statistics * indicates value is significantly different from zero at 10% level

** indicates value is significantly different from zero at 5% level or less

TABLE VIII

Average abnormal daily trading volume around semi-annual earnings announcements in specific sub-periods.

Sub-period $P_{t1,t2}$ covers the period from day t1 until day t2, relative to the announcement date. Abnormal volume is computed using the Market Model (equation (1)) as a model of equilibrium trading volume. Trading volume is defined as the natural logaritm of 1 plus the number of shares traded divided by the number of shares outstanding. t-statistics are in parenthesis. ** indicates that the value is significantly different from zero at the 5% significance level. * indicates that the value is statistically significantly different from zero at the 10% significance level.

Period	Pre-regulation	Post regulation	Post-Pre
Pre-restricted			
$P_{-25,-16}$	-0.072 (-1.94)*	-0.001 (-0.03)	0.072 (1.48)
Restricted			
$P_{-15,-1}$	0.050 (1.64)*	0.002 (0.08)	-0.048 (-1.19)
$P_{-10,-1}$	0.065 (1.74)*	0.052 (1.64)*	-0.013 (-0.26)
Announcement			
$P_{0,1}$	0.586 (7.03)**	0.627 (8.87)**	0.041 (0.38)
Post-announcement			
$P_{2,10}$	0.338 (9.05)**	0.207 (6.57)**	-0.13 (-2.54)*

TABLE IX

Average (AV) and cumulative average (CAV) abnormal daily trading volume around semi-annual announcements for a subsample of small firms

Abnormal volume is computed using the Market Model (equation (1)) as a model of market equilibrium trading volume. Trading volume is defined as the natural logaritm of 1 plus the number of shares traded, divided by the number of shares outstanding. The cumulative average abnormal trading volume (CAV_t) is computed from 50 days prior to the earnings announcement until 10 days afterwards. The left panel of the table is based on data prior to the introduction of the Model Code.

	PRE-REGULATION			POST REGULATION		
DAY	AV	CAV	t[a]	AV	CAV	t
-25	-0.126	-0.126	-0.57	-0.320	-0.320	-1.01
-20	-0.000	-0.503	-0.00	-0.395	-1.475	-1.24
-15	-0.019	-0.473	-0.08	-0.268	-2.119	-0.84
-10	0.127	-0.570	0.58	-0.410	-4.339	-1.29
-9	0.024	-0.546	0.10	-0.416	-4.755	-1.31
-8	-0.031	-0.577	-0.14	0.003	-4.752	0.01
-7	-0.006	-0.583	-0.02	0.106	-4.646	0.33
-6	-0.018	-0.601	-0.08	0.054	-4.591	0.17
-5	-0.049	-0.650	-0.22	0.380	-4.211	1.20
-4	0.279	-0.371	1.27	-0.113	-4.324	-0.35
-3	-0.050	-0.421	-0.22	0.233	-4.091	0.73
-2	0.398	-0.023	1.81*	0.584	-3.507	1.84*
-1	0.063	0.039	0.28	0.088	-3.419	0.27
0	0.639	0.679	2.91**	-0.003	-3.422	-0.01
1	1.193	1.872	5.43**	1.491	-1.932	4.70**
2	0.775	2.647	3.52**	0.769	-1.163	2.42**
3	0.641	3.288	2.91**	0.998	-0.165	3.15**
4	0.598	3.886	2.72**	0.451	0.286	1.42
5	0.456	4.342	2.07**	0.237	0.524	0.74
6	0.078	4.420	0.35	-0.033	0.490	-0.10
7	0.498	4.918	2.27**	0.296	0.786	0.93*
8	0.702	5.620	3.19**	0.319	1.105	1.00
9	0.808	5.284	1.30	0.901	1.885	1.58
10	0.183	6.107	0.83	-0.128	1.477	-0.40

a) t-statistics * indicates value is significantly different from zero at 10% level

** indicates value is significantly different from zero at 5% level or less

TABLE X

Average abnormal daily trading volume around semi-annual earnings announcements in specific sub-periods for a subsample of small firms.

Sub-period $P_{t1,t2}$ covers the period from day t1 until day t2, relative to the announcement date. Abnormal volume is computed using the Market Model (equation (1)) as a model of equilibrium trading volume. Trading volume is defined as the natural logaritm of 1 plus the number of shares traded divided by the number of shares outstanding. t-statistics are in parentheses. ** indicates that the value is significantly different from zero at the 5% significance level. * indicates that the value is statistically significantly different from zero at the 10% significance level.

Period	Pre-regulation	Post regulation	Post-Pre
$P_{-25,-16}$	-0.045 (-0.65)	-0.185 (-1.84)	-0.131 (-1.15)
$P_{-15,-1}$	0.033 (0.54)	-0.105 (-1.28)	-0.137 (-1.38)
$P_{-10,-1}$	0.073 (1.05)	0.057 (0.50)	-0.022 (-0.18)
$P_{0,1}$	0.916 (5.85)**	0.741 (3.30)**	-0.172 (-0.63)
$P_{2,10}$	0.470 (6.42)**	0.379 (3.59)**	-0.092 (-0.72)

TABLE XI

Number of firms with earnings changes relative to that of the previous year

	1985	1986	1987	1988	1989
Annual Earnings					
Increases	83	80	72	67	87
Decreases	27	31	34	45	23
	110	111	106	112	110
Semi-annual Earnings					
Increases	67	65	51	71	
Decreases	29	30	50	28	
	96	95	101	99	

TABLE XII

Average (AAR) and cumulative (CAR) average abnormal returns from 50 days before annual earnings announcements until 10 days afterwards

Panel A : Earnings Increases

	PRE-REGULATION			POST REGULATION		
DAY	AAR	CAR	t[a]	AAR	CAR	t
-50	-0.006	-0.006	-0.034	0.124	0.124	0.971
-40	0.182	0.462	1.117	-0.001	0.532	-0.005
-30	0.184	1.181	1.129	-0.033	-0.130	-0.255
-20	-0.105	1.661	-0.641	0.051	-0.152	0.396
-15	-0.150	1.920	-0.917	0.076	-0.332	0.596
-10	0.292	1.929	1.788*	-0.071	-0.365	-0.557
-9	0.323	2.252	1.979**	0.080	-0.285	0.625
-8	0.039	2.290	0.236	0.250	-0.035	1.953*
-7	0.342	2.632	2.098**	-0.014	-0.049	-0.112
-6	0.138	2.770	0.847	0.030	-0.019	0.237
-5	0.177	2.947	1.083	-0.184	-0.203	-1.438
-4	0.135	3.082	0.828	-0.213	-0.416	-1.664*
-3	0.067	3.149	0.411	0.095	-0.321	0.742
-2	0.189	3.337	1.158	0.185	-0.136	1.448
-1	0.184	3.521	1.129	0.056	-0.079	0.440
0	0.647	4.168	3.969**	0.516	0.436	4.029**
1	-0.258	3.910	-1.583	0.064	0.500	0.500
2	-0.152	3.759	-0.929	-0.112	0.388	-0.875
3	0.067	3.826	0.411	-0.209	0.179	-1.635
4	-0.010	3.816	-0.061	-0.206	-0.027	-1.607
5	-0.164	3.652	-1.003	-0.072	-0.098	-0.560
6	-0.077	3.576	-0.469	0.150	0.052	1.174
7	-0.128	3.448	-0.782	-0.007	0.045	-0.052
8	-0.108	3.340	-0.663	-0.063	-0.017	-0.490
9	-0.213	3.127	-1.307	-0.238	-0.256	-1.862*
10	0.091	3.219	0.561	0.135	-0.121	1.055

a) t-statistics * indicates value is significantly different from zero at 10% level

** indicates value is significantly different from zero at 5% level or less

Panel B : Annual Earnings Decreases

	PRE-REGULATION			POST-REGULATION		
DAY	AAR	CAR	t[a]	AAR	CAR	t
-50	-0.044	-0.044	-0.136	0.244	0.244	1.204
-40	0.041	-1.418	0.127	0.222	0.826	1.094
-30	-0.563	-3.165	-1.736*	0.030	1.594	0.146
-20	0.131	-4.230	0.404	-0.401	1.271	-1.977**
-15	0.026	-4.950	0.080	-0.341	0.939	-1.680*
-10	0.105	-3.827	0.324	)0.184	0.928	-0.908
-9	-0.673	-4.499	-2.076**	-0.132	0.796	-0.652
-8	0.128	-4.371	0.395	0.204	1.000	1.003
-7	-0.002	-4.373	-0.006	-0.092	0.908	-0.452
-6	-0.017	-4.390	-0.051	0.072	0.980	0.355
-5	-0.298	-4.487	-0.918	0.156	1.136	0.768
-4	0.118	-4.570	0.363	0.149	1.285	0.732
-3	0.155	-4.415	0.477	-0.023	1.262	-0.113
-2	0.052	-4.363	0.160	0.223	1.485	1.100
-1	-0.295	-4.658	-0.910	0.288	1.773	1.420
0	-0.884	-5.542	-2.728**	-0.717	1.056	-3.532**
1	-2.793	-8.336	-8.620**	-1.515	-0.459	-7.465**
2	-0.128	-8.463	-0.395	0.465	0.006	2.292
3	0.498	-7.965	1.537	-0.153	-0.146	-0.752
4	-0.133	-8.098	-0.409	-0.246	-0.392	-1.210
5	0.575	-7.523	1.775*	-0.246	-0.638	-1.212
6	-0.022	-7.545	-0.068	-0.042	-0.680	-0.205
7	-0.119	-7.663	-0.366	0.089	-0.591	0.438
8	-0.193	-7.857	-0.597	0.250	-0.340	1.233
9	-0.035	-7.892	-0.108	0.308	-0.032	1.519
10	0.409	-7.483	1.262	-0.117	-0.149	-0.576

a) t-statistics * indicates value is significantly different from zero at 10% level

** indicates value is significantly different from zero at 5% level or less

TABLE XIII

The weighted average anticipation time (WAAT) of earnings announcements in the restricted period (total sample) for various subperiods, before and after restrictions on insider trading

		WAAT	
		Pre-regulation	Post-regulation
		Annual Earnings	
Subperiod			
$P_{-40, 0}$	Increases	17.195	16.915
	Decreases	17.508	16.832
$P_{-30, 0}$	Increases	11.099	13.230
	Decreases	11.303	13.343
$P_{-20, 0}$	Increases	5.392	7.640
	Decreases	6.632	7.769
$P_{-10, 0}$	Increases	4.371	3.964
	Decreaes	1.969	3.290
		Semi-Annual Earnings	
$P_{-15, 0}$	Increases	4.675	5.335
	Decreases	4.386	4.344
$P_{-10, 0}$	Increases	2.440	3.749
	Decreases	2.349	2.516

Subperiod $P_{t1, 0}$ covers the period from t1 days before the announcement date

TABLE XIV

The weighted average anticipation time (WAAT) of earnings announcements in the restricted period (small firms) for various subperiods, before and after restrictions on insider trading

		WAAT	
		Pre-regulation	Post-regulation
		Annual Earnings	
Subperiod			
$P_{-40, 0}$	Increases	12.686	14.594
	Decreases	13.41	12.225
$P_{-30, 0}$	Increases	9.363	11.977
	Decreases	9.177	12.176
$P_{-20, 0}$	Increases	7.182	6.206
	Decreases	5.39	5.729
$P_{-10, 0}$	Increases	2.326	3.844
	Decreaes	2.165	1.936
		Semi-Annual Earnings	
$P_{-15, 0}$	Increases	3.534	4.4
	Decreases	3.915	2.376
$P_{-10, 0}$	Increases	1.684	1.999
	Decreases	2.506	0.726

Subperiod $P_{t1, 0}$ covers the period from t1 days before the announcement date

Fig. 1 : Design of the study (annual earnings)

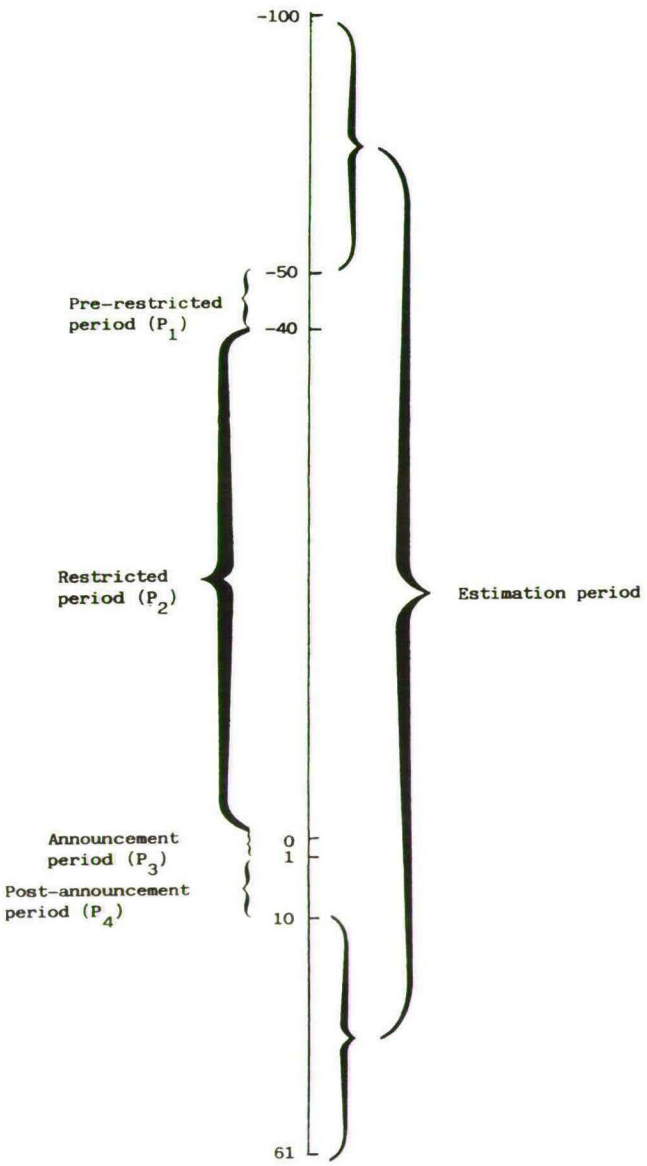
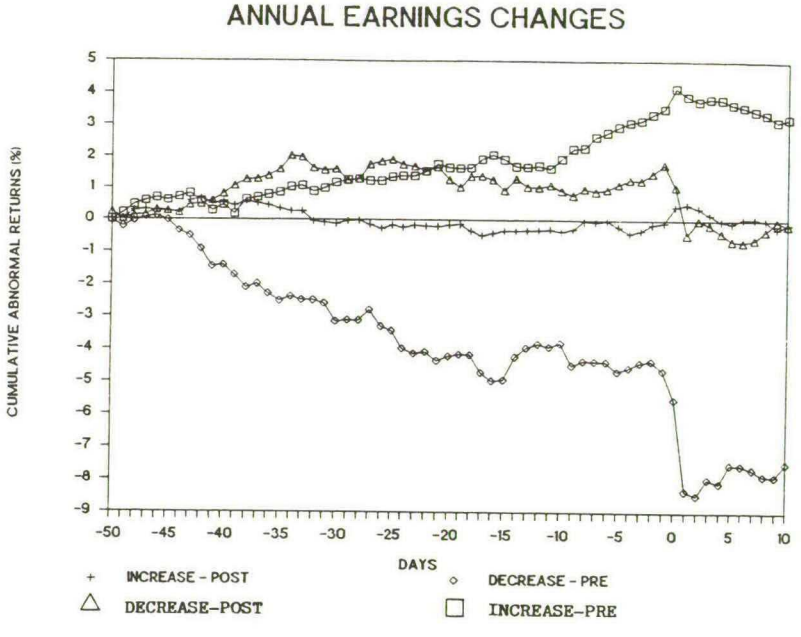


Fig. 2 : Cumulative excess returns around annual earnings announcements (total sample)



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