An empirical analysis of legal insider trading in the Netherlands

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Abstract

In this paper, we employ a registry of legal insider trading for Dutch listed firms to investigate short-term stock market reactions around legal insider trades. Regulations stipulate that insiders are not allowed to trade shares of their own company based on private and price-sensitive information. It has been shown nevertheless that insiders have superior knowledge either on the future prospects of their firm or on the mispricing of the stock by the market. Using standard event study methodology, we examine stock price behavior before and after insider trading to analyze the information content of the trades. The main findings are: (1) trading by insiders indeed provides new information to the market; (2) trades made by top executives of a company carry more information than those made by other insiders; (3) trades following exercises of employee stock options seem to be motivated more by liquidity needs than superior information; (4) insiders choose the right timing to carry on their transactions. We further test for the cross-sectional determinants of the cumulative abnormal returns before and after insider trades, and investigate how recent regulatory changes about the speed of notification and releases of price-sensitive information affect stock market price reactions.
1 Introduction

Since the 1990s, countries worldwide have put into practice regulations against trading based on private information, from what it seems a consensus within the regulatory bodies that insider trading should be banned (Bhattacharya and Daouk (2002)). The economic literature on insider trading, however, has not reached a consensus on whether it should be prohibited or not. The strongest trend against insider trading is based on moral criteria like justice and equality\(^1\). Indeed, uninformed traders always loose when trading against informed traders, leading to discrimination\(^2\). This, in the end, could discourage uninformed traders to invest money in the stock market, reducing liquidity. On the other side, economists are typically less concerned about equality, but more about efficiency and costs. On this respect, studies assessing the implications from banning (illegal) insider trading give conflicting conclusions\(^3\).

The current principles of law in the Netherlands stipulate, on one hand, that trading based on private and price-sensitive information is illegal, but on the other hand, firms must disseminate any price-sensitive news as soon as possible, thus reducing the possibility for insiders to trade according to the information. In addition, insiders are obliged to follow a “code of conduct” specific for each company that includes among other things the blockout periods (e.g. periods before earnings announcements during

\(^1\)See Manne (2005).
\(^2\)Jeng, Metrick, and Zeckhauser (2003) estimate the individual cost of trading against an insider in the U.S. to be about 10 cents per $10,000 worth of transaction.
\(^3\)On one hand, allowing insiders to trade freely increases the efficiency of financial markets because private information is quickly released into the market. This brings prices closer to the fundamental value of the firms. This idea was first studied by Manne (1966). On the other hand, models of asymmetry of information \textit{a la} Kyle (1985) and Glosten and Milgrom (1985) predict that liquidity of a market lowers when informed traders arrive in the market, thus investors will ask for higher returns to compensate for this cost. In an empirical paper, Bhattacharya and Daouk (2002) measure the world price of insider trading in terms of cost of equity, and conclude that the risk adjusted cost of equity lowers of about 7\% after the first prosecution of illegal insider trading (but to a much less extent after the introduction of insider trading regulation; the authors admit that this figure might be driven by emerging countries and may be inflated by endogeneous biases in their regression). On the theoretical side, two papers propose a framework for a welfare analysis: Bhattacharya and Nicodano (2001) and DeMarzo, Fishman, and Hagerty (1998).
which insider are not allowed to trade). Still, insiders are assumed to have more
in-depth knowledge about the prospects of their company. This is what we try to
capture in this study.

More specifically, we try to measure the short-term effects of insider trading on
their company’s stock price. Are insiders trading upon special information, or mostly
for liquidity reasons? In addition, even if insiders trade based on liquidity needs,
they might choose the right timing for their trade. The stock price effect of insider
trading (whether it is a signal of new information or merely a market reaction) will be
measured by abnormal returns, estimated by the standard event study methodology.
Using the national registry of insider trading from the AFM (the Authority for the
Financial Markets, the Dutch regulatory body in charge of the supervision of financial
markets) combined with daily stock return data, we measure cumulative abnormal
returns relative to the event of insider trading. We are able to differentiate between
trades in shares and trades related to exercise of employee stock options. We also
have information about trades initiated by the firm in its own stocks.

In addition to using very recent data, our study differs from other insider trading
studies, first, by the fact that we distinguish between trades that follow the exercise
of employee stock options, that are assumed to be mainly driven by liquidity reasons,
from trades in shares only, which are most presumably information driven. Second,
the Dutch insider trading registry includes also trades made by firms in their own
stock, allowing us to extend the definition of insiders to include the firm itself. Third,
other studies do not examine specifically the price movements before the trades. We
link this measure to the ability by insiders to time the market, i.e. to choose the
optimal moment for trading.

Our main results can be summarized as follows. Trades in shares indeed reveal
information to the market. Moreover, insiders that are higher in the hierarchy of the
firm seem to be more informed than lower insiders. Separating trades following the
exercise of options from trades in shares lead us to conclude, as opposed to most of
the empirical literature, that sells as well as purchases of shares are more informative
than trades due to option exercises. In addition, the timing ability of insiders seem
to be very good for most of the trades. We also provide some evidence that small
trades as well as trades made by insiders from small firms are most likely information
driven.

The next section presents the related literature. Then, in Section 3, we explain
the essentials of insider trading regulations in the Netherlands. Section 4 presents a
description of the data used and the methodology. Section 5 presents the results and
Section 6 concludes.

2 Review of literature

Insider trading may help in predicting future stock returns. For example, Seyhun
(1998) shows that not only insider trading in a given company helps to predict future
excess returns for this company, but also that aggregate insider trading helps to
predict market returns (see also Chowdhury, Howe, and Lin (1993)). This suggests
that insiders use their special knowledge about their company when they trade.

Empirical proxies employed to measure of the intensity of insider trading are the
number of insiders that traded in a given month (e.g. Eckbo and Smith (1998)) or
the number of shares traded in a given month (e.g. Seyhun (1998)), or quarter (Ke,
Huddart, and Petroni (2003)). The use of these measures has the disadvantage of
using low frequency data, making it impossible to analyze very short term abnormal
returns around insider trades, as well as reducing the sample size. Our study follows
a methodology more closely related to the standard event study methodology and
uses daily data.
Other papers address the medium term behavior of stock prices around insider trading. Jeng, Metrick, and Zeckhauser (2003), Eckbo and Smith (1998) as well as Biesta, Doeswijk, and Donker (2003) study the profits made by insiders based on a holding period of six months (this is motivated by the short swing rule of the SEC regulations). They use several methods of performance measurement from the mutual funds literature. The former paper also estimate the cost for uninformed investors to trade against insiders.

A fairly important strand of literature studies the determinants of the market reaction to insider trading. A recent study by Huddart and Ke (2007) demonstrates convincingly that firms that are less transparent have insiders that make more profits from their trades. The author computes the 6-month cumulative abnormal returns to insider trading and compares them against six measures of asymmetry of information between management and shareholders. In a cross-sectional regression, the proxies for information asymmetry are very significant and the $R^2$'s are also seemingly high.

In a related paper, Frankel and Li (2004) study whether asymmetry of information between insiders and non-insiders is related to financial statement informativeness, analysts following and news announcements. They use the profitability of insider trading as well as a measure of intensity of insider trading to proxy for information asymmetry. Overall, they find that insider trading profitability is reduced when more analysts follow the stock. They find also that there is a reduction in the intensity of insider trading when financial statements are informative, but the intensity is high when there are news announcements, either good or bad.

Piotroski and Roulstone (2004) use as measure of information asymmetry the stock price synchronicity (defined as the extent to which the stock return variance is explained by the industry index and the market index – the higher the synchronicity, the lower the stock return is due to firm-specific information). They find that insider trading is reversely related to stock price synchronicity, and they argue that this is
consistent with the fact that insider trading reveals firm-specific information to the market.

In a paper studying the reasons that motivate insiders to trade, Jenter (2005) argues that insiders are mostly contrarian investors in their own firms and react to market mis-pricing. But a contemporary study by Piotroski and Roulstone (2005) show that insiders are both contrarians and trade on knowledge of future cash flows.

A strand of the insider trading literature studies the effect of regulation changes. Li and Zhang (2006) study insider transaction around accounting restatements by firms, and compares insider trading patterns before and after the Sarbanes-Oxley act of 2002 (act which increased criminal sanctions for illegal insider trading as well as reducing the reporting delay). Their methodology does not permit to test formally whether the Act has changed the behavior. In a similar manner, Garfinkel (1997) studies the impact of a new insider trading regulation (namely the Insider Trading and Securities Fraud Enforcement Act of 1988) on the behavior insider trading relative to earnings announcements. The study addresses also the change in timing of insider trading due to the act. The findings are that insiders that have to trade for liquidity reasons are more likely to postpone their trade after the announcement for the period after the Act became into force. This is true also for positive announcements, showing that the Act has purposes to regulate pre-event insider trading and not post-event insider trading. This paper concentrates on conditional insider trading (i.e. conditional on earnings announcements) and does not examine general behavior of insider trading before the Act and after the Act, by looking at the average abnormal return of profit for example.

Carter (2003) study the link between the reporting time and the informational content of insider trading. They find that there is a run-up in share price between the date of insider purchase transactions and the disclosure of the trade, and that this run-up is proportional to the length of the reporting interval. The authors study this
by measuring the information leakage between the transaction date and the reporting
date. Results are that the longer the reporting interval, the higher is the price run-up,
thus information leakage. The authors use a special database of U.S. insider trading
that specify the exact day of trade and the exact day of reporting. This allows them
to use daily returns. In the sample that they use, the maximum reporting time
according to the regulation was 10 days after the end of the trading month. This
makes a average interval of 22 days. In our sample, the median reporting time is
16 days, which is inside our event window for computing the cumulative abnormal
returns. This means that our measure of the effect of insider trading includes for
most of the trades, the transaction date and the reporting date.

More closely related to the present study, Friederich, Gregory, Matatko, and
Tonks (2002) examine short term abnormal returns to insider trades from mid-cap
firms from the London Stock Exchange. They control for possible bias in abnormal
returns due to the bid ask spread, by using end of day bid ask spread instead of
closing price. Overall, they find that the down turn in prices (adjusted for market
risk) 20 days before insider buys is 2.85%. After the buy trade, the average run-up
in prices is 1.96%. There are no significant abnormal returns outside the $[-20, 20]$ window. For directors’ sells, the run-up in price 20 days before the event is 1.23% and
the down-turn after is 1.46%. Since they study mid-cap firms, the authors adjust
their results for thin trading (although the estimate of the abnormal returns are not
qualitatively different).

In a similar approach, Del Brio, Miguel, and Perote (2002), investigate the in-
formation content of insider trading for the Spanish market, using the event study
methodology with daily data. Their results show that there is no significant cumu-
luative abnormal return either to insider buys or sells. The only significant abnormal
return is at the trading day of insider sells. They use a methodology that ensures
that, for a given firm, the estimation window is not contaminated by other insider
trading events. This has the disadvantage of reducing both the estimation window length and the sample size. On the other hand, they use a benchmark model that takes into account the conditional heteroskedasticity of the residuals.

Fidrmuc, Goergen, and Renneboog (2006) use the same methodology with U.K. data in addition of using data relative to the position of the insider in the firm, the shareholder structure as well as a database of news announcements. After obtaining the cumulative abnormal returns four days after trades by insiders, they use cross-sectional regression to determine whether these variables could explain the market reaction to insider trading. They find that the hierarchy of insider in the firm has a positive impact on the abnormal returns. Also, the size of the trade has a non-linear effect on the abnormal returns, presumably because large trades would attract more scrutiny from outside monitors. Thus medium size trades are more likely to be information driven (this supposition is also called the “stealth trading hypothesis”, see Barclay and Warner (1993)). Furthermore, they condition abnormal return on firm-specific news announcements. Their main findings are that two important events significantly affect the information content of insider trading: CEO replacement and M&A related announcements. This result is important because not controlling for these types of news announcements might bias the results. Fortunately, our database of Dutch insider trading is free from these biases (see Section 4, below).

Finally, Biesta, Doeswijk, and Donker (2003) also computed the effect of insider trading for the Dutch market 20 days after insider trading. Despite a small sample size (registries of insider trading in the Netherlands exist since 1999, see next section on regulations) they find that in average, insider purchases earn a cumulative abnormal return of 2.2%, and that sells are followed by a downturn of 1.9%.

The literature on insider trading brings us to make four main predictions that are going to be testable hypotheses. The first is the information hypothesis, according to which buys of shares earn positive abnormal returns and sells are followed by negative
abnormal returns. Second, the hierarchy hypothesis presumes that top executive and directors are more knowledgeable on their firm’s future prospects and thus earn more abnormal returns after buys than other insiders. The third hypothesis tests whether trades of shares are more informative than trades following exercise of stock options. Finally, we test the timing hypothesis that assumes insider to choose the right moment for trading (measured by the abnormal returns obtained before the trade was executed.

3 Insider trading regulations in the Netherlands

Since March 2002, the Authority for the Financial Markets (AFM) supervises conduct on Dutch financial markets. The AFM is responsible for the market supervision and the application of the different laws regulating conduct of financial institutions and financial markets. One of its duties is to supervise insider trading and to maintain a public registry of all transactions made by corporate insiders of listed companies. Insider trading is regulated in the Netherlands since 1987 (see Kabir and Vermaelen (1996)).

Dutch laws on insider trading mainly implement EU directives, in particular the Directives 89/589/EEC and its successor 2003/6/EC. The principles of law concerning insider trading are similar to those found in the U.S. or in the U.K.: it is forbidden for all market participants to trade according to private and price-sensitive information. Private information means information that is not publicly available to the market. Price-sensitive information means an information that is likely to affect the price of the company’s stock. Examples of such information are bad financial results or merger negotiation.

Besides this idea of prohibition of trade, there is the obligation for insiders to
report their trades when they are done legally (i.e. not based on private and price-sensitive information). Here, insiders are defined as directors, managers, members of the supervisory board, employees and member of staff that are in contact with potentially private, price-sensitive information, as well as their spouse/partner and children living with them. The law stipulates that every listed company should have a written set of rules of conduct that specified among other things when an insider is allowed to trade. The company has also to present a list of all insiders of its company. The notification of trades to the AFM has to be done by those insiders on the list, as well as trades made by the company itself (whether it is trading in its own shares or in shares of another listed company it owns). The notification has to include trades in shares or in any other standardized instruments for which the value depends on the value of the share. This includes employee stock options.

These rules apply to all Dutch companies that are listed in the Netherlands (i.e. in Euronext Amsterdam), as well as companies from countries outside of the European Union that are cross-listed in Amsterdam. Non-Dutch companies from the European Union that are listed in Amsterdam have to register only to their country’s AFM. This means that the insider trading database contains Dutch companies and non-European companies.

3.1 Act of the Supervision of Securities Trade 1995

More precisely, from April 1999 until September 2006, there were two main acts that regulated insider trading. The first is called the Act of the Supervision of the Securities Trade 1995 (or Wte 1995). In 1999, some provisions concerning the notification of insiders’ trades and the disclosure of these trades in the public registry where added\(^4\). At that time, the rules specified that the reporting by insiders should be no later than

ten days after the end of the month in which the trade occurred\textsuperscript{5}.

In September 2002, some exceptions were added to the notification of trades made by issuing companies in their own stock: these companies did not have to report trades that were made according to a share sell- of buy-back program or because of issuing new shares. Notification had to be done before the end of the next working day\textsuperscript{6}.

In October 2005, some new adjustments in the Act came into effect\textsuperscript{7}. The legal reporting delay was brought to five working days after the date of the transaction. However, notification can be delayed until the moment that the value of the transactions reaches or exceeds the amount of €5,000 in the calendar year in question. The implication is that if this €5,000 threshold is not reached in a particular calendar year, no notification need be sent. Also, insiders did not have to report acquisitions of shares or other instruments as part of a regular employee compensation scheme. The exception extends to the sale of shares acquired by exercising employee stock options as part of a scheme, if the exercise was made at the day of expiry or five working days prior to expiry and if there was a written note made by the insider at least four months in advance that revealed its intention to sell the shares so obtained.

3.2 Act of the Disclosure of Major Holdings 1996

The second set of rules concerning insider trading are those arising from the Act of the Disclosure of Major Holdings and Capital Interests in Securities-Issuing Institutions 1996 (or Wmz 1996). This act obliged all major shareholders to disclose the level of their holding. In October 2002, a new provision in this act came into effect and concerned the disclosure of the holding and voting rights by directors and members of the supervisory board (D&MSB). This category of insiders had still to notify the

\textsuperscript{5}Id., Section 4.
\textsuperscript{6}Cf. Section 44 of Further Regulations on Market Conduct Supervision of the Securities Trade 2002.
\textsuperscript{7}The Market Abuse Decree modified the Wte 1995.
AFM of their trades but the information was disclosed to the public by the AFM through a different registry. They had to report their trades as soon as possible, without delay. This Act expired in October 2006 and was replaced by another one with similar provisions. Table 1 summarizes the main provisions of the law and tracks the changes made in time.

Before to explain more precisely the data and methodology used, the next section presents a review of literature on insider trading.

4 Data and methodology

We have access to two different insider trading databases. The first includes trades from what we call “Other insiders” from listed companies. The registry is based on Sections 46b and 47a of Wte 1995. This dataset includes trades from 1999 until the end of 2006. The second one includes only top executives such as directors and members of the supervisory board, as prescribed by Article 2a of Wmz 1996. We call this database “D&MSB” (for Directors and Members of the Supervisory Board). Entries in this dataset go from September 2002 until October 2006 (which represents the end of the application of the Wmz 1996 which was replaced by Wmz 2006).

There are two breaking points in the dataset called “Other insiders”. First, the regulations for D&MSB came into effect, and these top managers had to notify their transaction to a new registry. Before this date, they were part of the “Other insiders” registry. We are able to identify these top managers, and as a consequence, our empirical analysis of the “Other insiders” will exclude them. Likewise, our analysis of directors and board members will include the trades made by this group of insiders for the entire period.

The AFM treats some insider trading information as confidential. If a company
Table 1: Summary of the insider trading regulations

<table>
<thead>
<tr>
<th>Directors and Members of Supervisory Boards</th>
</tr>
</thead>
<tbody>
<tr>
<td>Date</td>
</tr>
<tr>
<td>---------</td>
</tr>
<tr>
<td>Sep 2002</td>
</tr>
<tr>
<td>Nov 2006</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Other Insiders</th>
</tr>
</thead>
<tbody>
<tr>
<td>Date</td>
</tr>
<tr>
<td>---------</td>
</tr>
<tr>
<td>Apr 1999</td>
</tr>
<tr>
<td>Oct 2005</td>
</tr>
<tr>
<td>Oct 2005</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Firms</th>
</tr>
</thead>
<tbody>
<tr>
<td>Date</td>
</tr>
<tr>
<td>---------</td>
</tr>
<tr>
<td>Apr 1999</td>
</tr>
<tr>
<td>Sep 2002</td>
</tr>
</tbody>
</table>

*Note that between April 1999 and September 2002, all insiders had to notify their trades according to this provision, including directors and members of supervisory boards.*
insider quits his position (or simply quits the list in this company’s insiders), the AFM erases all the entry in the database that are notified by him. Similarly for firms: once a firm stops being listed, all the insider trading entries related to financial instruments issued by this firm are erased from the database. This means that the entries in our database concern companies and insiders that were active at least until December 2006. This feature of our database, although reducing the sample size, prevents many biases due to events for which we cannot control. As noted in the literature section, Fidrmuc, Goergen, and Renneboog (2006) document that some events have a big influence of insider trading, such as resignation of a top executive of mergers and acquisitions. In our database, a top executive that resigns and sells all his holdings in the company is not included. Another example is a company that is taken over and eventually is delisted; this company is not included either.

From both databases, we keep only trades of shares and employee stock options, and firms that are listed in the Netherlands\(^8\) that have price history available from Datastream. We drop also listed investment funds. We have a total of 127 firms in the “normal insiders” database and 126 firms for the D&MSB database, among which 96 companies overlap.

If, at a given date, two or more insiders from the same company report trades, we group them into one trade. The “side” of the trade (i.e. whether it is a buy or a sell) is determined by aggregating the trades. If more shares are sold than bought, it is classified as a sell, and \textit{vice versa}. This brings us to the concept of “firm-day”. It means a date in which a given company has insider trading.

In the “normal insiders” database, we have 2,567 firm-days that are insider trading made by companies and 1,128 firm-days for individuals (typically, companies do not trade during the same day as their employees, so the two categories are mutually

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\(^8\)The law prescribes that insiders of companies listed in any Member States of the European Union that reside in the Netherlands should notify the AFM, event if the company is not listed in the Netherlands.
Table 2: All Insiders – Statistics

<table>
<thead>
<tr>
<th>Trade type</th>
<th>Nbr firm-days</th>
</tr>
</thead>
<tbody>
<tr>
<td>Buy shares</td>
<td>1,610</td>
</tr>
<tr>
<td>Sell shares</td>
<td>1,109</td>
</tr>
<tr>
<td>Exercise option and sell shares</td>
<td>431</td>
</tr>
<tr>
<td>Exercise option and keep shares</td>
<td>66</td>
</tr>
</tbody>
</table>

Note: This table shows the number of firm-days for each trade type category, as well as the number of firms. Trades can be made either by an individual or on the account of a company.

Table 3: All Insiders – Insider trades made by firms and individuals

<table>
<thead>
<tr>
<th>Trade type</th>
<th>Individuals</th>
<th>Firms</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nbr of firm-days</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Buy shares</td>
<td>441</td>
<td>1,169</td>
</tr>
<tr>
<td>Sell shares</td>
<td>467</td>
<td>642</td>
</tr>
</tbody>
</table>

Note: This table shows how many firm-days are in the database for which there is insider trading of shares. The data are taken from the database “Other insiders”.

exclusive. They cannot be added when aggregating for a given day). In the D&MSB database, we have 965 firm-days for individuals trading shares.

For the exercise of employee stock options, we have 556 firm-days in the “normal insiders” database and 359 firm-days in the D&MSB database.

We have four types of insider trades. They are: (1) buy shares; (2) sell shares; (3) exercise stock option and keep the shares; and (4) exercise stock option and sell the shares. Table 2 shows some descriptive statistics on the number of elements in each category.

Trade types that concern shares can be done by individuals or on the account of a company. Table 3 shows the number of elements in each trade type that is done by firms and the number that is done by individuals.

The main hypotheses of this paper are tested using the standard event study methodology, as described in Campbell, Lo, and MacKinlay (1997). We measure the
cumulative abnormal returns for an event window of 20 trading days (i.e. approximately one calendar month) prior to the trade up to 20 trading days after the event, thus for an event window of 41 days. The event is thus a transaction made an insider in his company’s shares or an exercise of an employee stock option (the event date is the day of the transaction – not the date at which the trade was made public). We use as benchmark the market model estimated using the AEX index and 250 trading days prior to the event. The significance levels are two-sided tests computed with the $J_2$ statistic of Campbell, Lo, and MacKinlay (1997) (Chap. 4). This test has been chosen because it has a higher power when firms are heterogeneous (i.e. when they have different idiosyncratic variance).

5 Results

We start the description of our empirical results by discussing the market reactions around trades by all insiders. Figure 1 shows the average cumulative abnormal return (or average CAR) around buying and selling of shares by insiders. The horizontal axis represents the number of days before and after the trade. Day zero is the event day, i.e. the transaction day. The curves are normalized to have a average CAR of zero at day −1. The graph shows price movements before and after the trade. The markers show the two-sided significance of the average CAR (that is, significantly different from zero).

For the event of buying shares, the average CAR curve has a “V” shape, with the spike of the “V” at day zero (the trade day). We see prices going down by 0.8% from day −15 until day −1. This number represents an annualized 13% of risk-adjusted abnormal return, meaning that it is economically significant. At the event day, there is no significant reaction of the market. After the event, we see prices increasing by 1.7% until day 19. This makes 22% on an annual basis, which is also economically
Figure 1: Buy and sell of shares

Note: $N = 1,980$. 
significant. These results suggest that the market does positively react on insider buys but the effect is only statistically significant starting from day 5 onwards. The time delay for the significant impact may stem from the notification lag allowed in the legislation. We also observe that buys by insiders take place at the bottom of the graph suggesting that insiders may time their buys.

Looking at the same graph (Figure 1) but for the selling of shares, we see that only the left part of the inverse “V” shape is present. There is a statistically significant run-up in prices before the sale, but not as regular as the downward price before the buy. The magnitude of this run-up is larger than the price drop before a buy, reaching 1%, 15 days before the sell transaction. Surprisingly, the price continues to be abnormally high four days after the sell, after which the average CAR turns not statistically different from zero. Reporting lags might again drive this pattern.

To gain further insights, we break down the average CAR for buys of shares into the three categories of insiders, namely the directors and members of supervisory boards (D&MSB), the ordinary insiders and firms. The results can be seen in Table 4 and Figures 2 to 3. We see that the price downturn before buying shares is the largest for D&MSB. For ordinary insiders, the downturn is lower but still statistically and economically significant. But for firms buying their own shares, there is no abnormal price movement before the transaction day.

Concerning the price movement after the buys of shares, Table 4 shows that it is mostly due to trades by D&MSB. Ordinary insiders have a positive but insignificant average CAR. As for firms, the average CAR is not as large as for D&MSB, but still economically significant.

A similar breakdown in insider categories for selling of shares (see Table 4), the price run-up is large for D&MSB, 20 days before the trade, but insignificant 10 days before. For ordinary insiders, the run-up is mostly significant 10 days and 5 days
Table 4: Average cumulative abnormal returns by transaction type and event window size

<table>
<thead>
<tr>
<th>Panel A: D&amp;MSB - Buy shares (N=535)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>[-20,-1]</strong></td>
</tr>
</tbody>
</table>
| 1.28 | (5.37)***  
| 1.26 | (5.61)***  
| 0.50 | (4.11)***  
| 0.16 | (2.15)**  
| 0.31 | (1.93)  
| 1.19 | (2.09)**  
| 1.42 | (1.70)*  
| 2.10 | (2.07)***  
| 2.22 |  
| **[-15,-1]** |  
| **[-10,-1]** |  
| **[-5,-1]** |  
| **[0]** |  
| **[0.5]** |  
| **[0.10]** |  
| **[0.15]** |  
| **[0.20]** |  
| **Panel B: D&MSB - Sell shares (N=287)** |  
| **[-20,-1]** |  
| -2.06 | (-3.23)***  
| -1.74 | (-3.01)***  
| -0.30 | (-0.48)  
| -0.09 | (0.37)  
| -0.24 | (-0.17)  
| -1.14 | (-2.21)**  
| -1.03 | (-1.78)*  
| -1.57 | (-2.35)**  
| -1.79 | (-3.08)***  
| **Panel C: Ordinary insiders - Buy shares (N=829)** |  
| **[-20,-1]** |  
| 0.75 | (5.95)***  
| 1.04 | (6.73)***  
| 0.54 | (5.46)***  
| 0.48 | (5.19)***  
| 0.23 | (2.32)**  
| 0.67 | (1.07)  
| 0.90 | (1.28)  
| 1.00 | (0.76)  
| 1.23 | (0.62)  
| **Panel D: Ordinary insiders - Sell shares (N=695)** |  
| **[-20,-1]** |  
| -0.39 | (-0.95)  
| -0.84 | (-2.13)**  
| -0.87 | (-1.97)**  
| -0.75 | (-2.66)**  
| 0.22 | (2.30)**  
| -0.36 | (-0.58)  
| -0.80 | (-1.69)*  
| -0.86 | (-1.31)  
| -0.92 | (-1.47)  
| **Panel E: Firms - Buy shares (N=1138)** |  
| **[-20,-1]** |  
| 0.00 | (-0.52)  
| 0.19 | (-0.27)  
| 0.13 | (-0.30)  
| 0.07 | (-0.03)  
| -0.24 | (-2.91)***  
| 0.09 | (-0.15)  
| 0.41 | (0.79)  
| 0.89 | (2.05)**  
| 1.23 | (2.50)**  
| **Panel F: Firms - Sell shares (N=524)** |  
| **[-20,-1]** |  
| -0.32 | (-0.53)  
| -0.54 | (-1.20)  
| -0.50 | (-1.47)  
| -0.43 | (-2.00)**  
| 0.47 | (5.71)***  
| 0.44 | (3.09)**  
| 0.44 | (2.94)**  
| 0.67 | (3.17)***  
| 1.03 | (2.69)**  
| 0.79 |  

Note: This table shows the average cumulative abnormal returns for firms within the transaction type category. $\overline{CAR}(0, x)$ means average cumulative abnormal returns computed from day zero (trade day) until day $x$, inclusively. Probability values that average CAR is different from zero are italic underneath. The probability values are computed with the $J_2$ statistic, see (Campbell, Lo, and MacKinlay, 1997, Chap. 4). A probability value of zero actually means that it is lower than 0.0001. $N$ is the number of firm-days in the sample.

before the event, although small. Concerning sells by firms, there is not much price movement before, except within 5 days prior to the trade. Patterns are also quite different across insider categories after the trade. At day zero, there is a negative but insignificant abnormal return for D&MSB. For ordinary insiders and firms, on the contrary, the abnormal return at day zero is positive and significant. While we see a clear drop in prices after the sell by D&MSB, the drop is insignificant for ordinary insiders and positive for firms.
Figure 2: Directors and members of supervisory board – Shares

Figure 3: Other insiders – Shares

Figure 4: Firms – Shares
While most papers focus on buying and selling of shares by insiders, we also look at abnormal returns surrounding exercise of employee stock options, both by D&MSB and other insiders. We separate the exercise into two different signals: a “keep” signal where the insider exercises its options but keeps the shares; and a “sell” signal where the insider sells the shares after obtaining them by exercising the stock option. Table 5 and Figures 5 to 6 show the average CAR before and after the exercise day.

We see that there is no statistically significant price movement around keep signals by D&MSB. But there is a large and significant run-up in prices before a sell signal, for the same category of insiders. Similarly, concerning ordinary insiders, there is no clear price movement around keep signals, but a large and significant run-up in prices before a sell signal. Furthermore, we observe further positive abnormal returns after sell signals by directors and board members whereas this does not hold for other insiders. This suggests that, while all insiders seem to have some ability to time the stock price when they choose their exercise date for sells, other diversification motives may play a role in case of sell signals by directors and other board members.
Overall, the results are in line with the existing literature for price movements around buys and sells of shares for D&MSB and ordinary insiders: the insiders time their trades so that the sell after a run-up in prices and they buy after a downturn. After the trade, the market reaction is stronger for top managers than for ordinary insiders. What is new in these results is the price movements around trades made by firms and exercises of employee stock options. When firms trade on their own shares, there is a positive response by the market be it a buy or a sell. Even more surprisingly, the response is even immediate after a sell of shares. Also new in the literature is the stock price movements around exercise of employee stock options. The market does not seem to react after the exercise, be it a keep of a sell, but when insiders seem to time the market when they decide to exercise the option and sell the stocks.

From the tables and graphs above, it is clear that in general insiders are able to time the market and buy their stock when the stock has underperformed for some time, and sell when the price is high. We formally test this hypothesis. Results are in Table 6. We test whether the average CAR for days $-20$ to $-1$ is statistically
Table 6: Abnormal returns before and after trade day

<table>
<thead>
<tr>
<th>Insider category</th>
<th>Shares/options</th>
<th>Buy/sell/keep</th>
<th>Test statistic</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>D&amp;MSB</td>
<td>Shares</td>
<td>buy</td>
<td>-5.7186 ***</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>D&amp;MSB</td>
<td>Shares</td>
<td>sell</td>
<td>5.149 ***</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>D&amp;MSB</td>
<td>Options</td>
<td>keep</td>
<td>0.3073</td>
<td>0.379</td>
</tr>
<tr>
<td>D&amp;MSB</td>
<td>Options</td>
<td>sell</td>
<td>1.2208</td>
<td>0.111</td>
</tr>
<tr>
<td>Ordinary</td>
<td>Shares</td>
<td>buy</td>
<td>-4.2666 ***</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Ordinary</td>
<td>Shares</td>
<td>sell</td>
<td>2.8904 ***</td>
<td>0.002</td>
</tr>
<tr>
<td>Ordinary</td>
<td>Options</td>
<td>keep</td>
<td>1.5033 *</td>
<td>0.066</td>
</tr>
<tr>
<td>Ordinary</td>
<td>Options</td>
<td>sell</td>
<td>7.804 ***</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Firms</td>
<td>Shares</td>
<td>buy</td>
<td>-1.0372</td>
<td>0.150</td>
</tr>
<tr>
<td>Firms</td>
<td>Shares</td>
<td>sell</td>
<td>-2.4244 ***</td>
<td>0.008</td>
</tr>
</tbody>
</table>

significant from average CAR for days 0 to 20. The results show that top managers as well as ordinary insiders buy shares at a peak price and sell shares at a trough. This is not true for option exercise, except for ordinary insiders that exercise their option and sell shares. Firms are also able to time the market but only for sells of shares, not for buys.

The ability to time the market suggests that insiders do not trade on price-sensitive information. Whether insiders cause the reversal in the price trend or simply time their trades so that they occur during peaks and troughs is still an open question.

Table 7 shows the CAR 20 days after the trade, along with their statistical significance, according to a breakdown by trade size and firm size.

6 Conclusion

This paper aimed at examining the cumulative abnormal returns around insider trading in the Netherlands. We concentrated on four main hypotheses. The results are supportive for the information hypothesis: trades made by directors and board members are followed by significant abnormal returns. For the other insiders, only pur-
chases seem to be information driven. As for firms, they have positive abnormal returns after purchases but no significant reaction follow sells.

The hierarchy hypothesis is backed by the data as the directors and board members earn higher abnormal returns than other insiders.

We also tested the liquidity hypothesis of option exercises. According to this hypothesis, trades following the exercise of options are less likely to be information driven, thus earning lower or no abnormal returns. This turned out to be true for most cases, except when “other insiders” keep their shares after exercise. This event triggered some marginally significant positive abnormal returns.

New in this literature is the timing hypothesis. Results are that insiders have a good timing ability as they choose to buy shares just after a downturn of the stock price. This hypothesis is also true for sells following exercise of options.

Finally, cumulative abnormal return after insider trades and their significance are broken down by trade value and firm size. Mostly, small firms and small trades are those who earn highest abnormal returns.

Table 7: One month post event cumulative abnormal returns by trade size and by firm size

<table>
<thead>
<tr>
<th></th>
<th>Buys shares</th>
<th></th>
<th>Sells shares</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>D&amp;MSB</td>
<td>Other</td>
<td>Firms</td>
<td>D&amp;MSB</td>
</tr>
<tr>
<td>All</td>
<td>3.49% ***</td>
<td>1.51%</td>
<td>1.70% ***</td>
<td>-2.26% ***</td>
</tr>
<tr>
<td>Small value</td>
<td>7.75% ***</td>
<td>3.94% **</td>
<td>1.28% ***</td>
<td>-2.11% *</td>
</tr>
<tr>
<td>Medium value</td>
<td>1.89% ***</td>
<td>0.15%</td>
<td>3.96% ***</td>
<td>-2.66% ***</td>
</tr>
<tr>
<td>Large value</td>
<td>1.55% **</td>
<td>0.87%</td>
<td>-0.04%</td>
<td>-2.06% **</td>
</tr>
<tr>
<td>All</td>
<td>2.71% ***</td>
<td>1.22%</td>
<td>1.74% ***</td>
<td>-2.03% ***</td>
</tr>
<tr>
<td>Small firms</td>
<td>6.93% *</td>
<td>3.22%</td>
<td>6.00% ***</td>
<td>-1.60% *</td>
</tr>
<tr>
<td>Medium firms</td>
<td>1.27% ***</td>
<td>1.74% **</td>
<td>2.59% ***</td>
<td>-1.59% *</td>
</tr>
<tr>
<td>Large firms</td>
<td>-0.41%</td>
<td>0.04%</td>
<td>1.00%</td>
<td>-3.03% *</td>
</tr>
</tbody>
</table>

Note: *, ** and *** stand for statistically different from zero at the 10%, 5% and 1% level, respectively.
Further research is needed to understand and characterize more deeply insider trading. With the same dataset, a study similar to Carter (2003) could be done to estimate the effect of reporting delay on the abnormal returns earned, as part of the determinants of the speed of adjustment of prices to insider trading. Also, the effect of changes in the regulations on the behaviour of insider trading in the Netherlands should be studied. This could be done in conjunction with the study of the change to the Sarbanes-Oxley Act in the U.S. in 2002. In this same country, it should be worth reproducing the current methodology to see whether the behaviour of U.S. insiders is similar to Dutch insiders as with trades relative to option exercises and the timing hypothesis. Finally, related to the market microstructure, an interesting question would be whether the market detects informed trading from insider. This could be done by examining the bid-ask spread and other liquidity measures during days of insider trading.

References


