An empirical analysis of insider trading in Belgium

Masterproef voorgedragen tot het bekomen van de graad van
Master in de Toegepaste Economische Wetenschappen

Debby Van Geyt

onder leiding van

Prof. Dr. Philippe Van Cauwenberge
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Confidentiality clause

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Debby Van Geyt
Declaration of confidentiality with regard to the insider trading data

Under the following guarantees of confidentiality, the Belgian insider trading data were obtained from the supervisory authority for the Belgian financial sector, the Banking, Finance, and Insurance Commission:

- The information from the database containing transactions of managers shall be used exclusively for the purpose of academic research.

- The information from the database containing transactions of managers shall be treated as strictly confidential by the persons entrusted with academic research on this subject. They will not communicate this information to a third party.

- Academic research will not be aimed at the analysis of transactions of individual managers and other persons enforced with a duty of notification. Moreover, in publications resulting from an inquiry, only rough data will be included so that the identity of individual managers and other persons enforced with a duty of notification cannot be discovered.

- In publications regarding academic research on this topic, the conditions under which access to the information in the database was obtained shall be indicated.
Preface

I would like to thank my supervisor prof. dr. Philippe Van Cauwenberge for suggesting the topic of insider trading and for his aid and assistance. I also want to thank Kelly De Brabanter and Katrien Kestens for their help with regard to the empirical analysis.

Further, I would also like to express my gratitude to the Banking, Finance, and Insurance Commission for assembling a database on insider trading and putting this at the disposal of this study.

Finally, I would also like to render thanks to my family for their support and to the University of Ghent for a valuable and instructive academic training.
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<td>Abnormal return</td>
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<tr>
<td>B/M</td>
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<td>CAR</td>
<td>Cumulative abnormal return</td>
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<td>CBFA</td>
<td>Banking, Finance, and Insurance Commission</td>
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<td>CESR</td>
<td>Committee of European Securities Regulators</td>
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Abstract
This paper studies the profitability of insider trading in the Belgian Stock market or Euronext Brussels. A sample of 1,567 insider trades is used, consisting of 928 purchase transactions and 639 sale transactions. The question is addressed whether insiders can earn abnormal returns and whether these depend on the firm size and the trade value. Moreover, it is also investigated if outsiders, mimicking insiders, are also able to outperform the market. The main findings are that sales made by insiders as well as by outsiders are profitable. Purchase transactions on the other hand, yield negative abnormal returns irrespective of the type of investor executing the trade. Small sales and sale transactions in small companies are the most profitable.

1. Introduction
Corporate insiders find themselves in a position to receive relevant information in a more timely manner than outsider investors do. They are informed about future projects, the results of research and development activities, sales figures, etc. before the market. This creates an information asymmetry. Extensive research has already analysed the profitability of trades made by corporate insiders, answering the questioning whether trading on superior information yields abnormal returns. This inquiry is however unique as it is the first to investigate this subject for the Belgian stock market. It is aimed at an evaluation of the performance of both insiders and outsiders, thereby focussing on the economic consequences of insider dealing.

Obviously, insider trading is also of interest to other academic fields. First, there is the legislation on insider dealing. Previous studies have for example investigated the consequences of lax law enforcement (Eckbo & Smith, 1998; Wisniewski & Bohl, 2005), the effectiveness of insider trading laws (Bris, 2005), and the pro’s and con’s of prohibiting insider trading (Leland, 1992). Here, we limit ourselves to an overview of the Belgian legislation on insider dealing.

The ethical downside of informed trading is also left uncovered. From ethical point of view opponents argue that it is firstly unfair, because trading should normally take place on a “level playing field”. Disparities in information tilt the field toward one player and away from another. Secondly, it is also unethical because it involves a violation of property rights by misappropriation. Thirdly, insider trading is regarded as harmful to uninformed investors who engage in trades with corporate insiders. Moreover, it erodes investors’ confidence in the market, causing investors’ not to participate in the market and thereby harming the market as a whole (Singh, 2007).
The main economic counter-argument in favour of insider trading is the more efficient pricing of shares since new and useful information will be brought into the prices. Consequently, prices will be a more accurate reflection of firm-value and economic decision-makers will be faced with reduced risk and improved performances, ameliorating resource allocation (Leland, 1992).

The notion of accurate share prices is reflected in the efficient market hypothesis (Fama, 1970). Both the strong and the semi-strong form will be evaluated. The former claims that all information is reflected into the stock prices, while the later postulates that the prices only efficiently adjust to information that is publically available. This study will use a sample of insider trades reported to the Banking, Finance, and Insurance Commission (CBFA) to investigate if trades made by insiders yield abnormal returns and whether outsiders can benefit from imitating these transactions. Transactions made by insiders are also split into three equal-sized groups based on firm size and three equal-sized groups based on trade value to test the influence of these variables on the abnormal returns.

In particular, this study tests the null hypothesis that insiders are not able to beat the market and that the abnormal returns have an expected value of zero. To evaluate these abnormal returns a traditional event-study framework is adopted. This is a frequently applied method to examine security price behaviour around events. The significance of this market reaction, measured by the abnormal returns, will be tested using a bootstrap method and a non-parametric sign test. Any tests performed will be one-tailed test. A positive market reaction is expected following purchase transactions and when the overall sample is analysed.¹ For sale transactions abnormal returns are expected to be negative.

For the calculation of the abnormal gains, stock-specific returns are adjusted for the return on a control portfolio. The formation of these portfolios is based on market capitalisation and market-to-book ratios, implicitly indicating that these factors are important risk factors on the Belgian stock market.

In general, the results indicate that insiders are able to earn excess returns by decreasing their holding in a company’s share. This is a finding consistent with the majority of previous research (e.g. Wisniewski & Bohl, 2005; Aktas, de Bodt, de Smedt, & Riachi, 2007). In contrast, the pattern of abnormal returns surrounding a buy transaction deviates strongly from what is previously found. Instead of outperforming the market after an increase in ownership, insiders appear to invest in shares that subsequently do worse than the market. The lowest abnormal gains are

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¹ When analyzing the profitability of the overall sample, the abnormal returns of sale transactions are multiplied by minus 1 to match the purchase transactions.
found in the subsamples of large purchases and purchases in corporations with a high market capitalisation. Insiders executing small sales and sale transactions in small companies perform best. The performance of outside investors trading on a strategy of buying shares previously bought by insiders and selling shares previously sold by insiders was very similar to the performance of corporate insiders.

The remainder of this paper is organised as follows. In section 2 the Belgian insider trading regulation is discussed. In section 3 a summary is given of previous research related to this study. Section 4 and 5 discuss the data which are used and their accompanying descriptive statistics. The next section describes the applied methodology. The results of the empirical study are disclosed and interpreted in section 7 and finally, conclusions are presented in section 8.

2. Analysis of the Belgian legislation on insider trading

Insider trading regulation is concerned with preventing illegal insider transactions. A distinction between legal and illegal insider trades is made based on the moment the trade takes place. Security transactions by insiders after material information has been made public are legal. At that moment, insiders no longer have a direct information advantage over other investors. Trading on relevant, non-public information however is illegal. It benefits certain investors compared to others, thereby harming investors’ confidence and market integrity. Consequently, legislation has developed itself throughout the years in order to prevent corporate insiders to trade in their own company’s shares when they are in possession of private information.

The Belgian legislation on insider dealing is founded in legal initiatives taken on the level of the European Union. Initially, there was Directive 89/592/EEC of November 13th 1989 on the coordination of insider trading regulations. Before this directive came into effect some member states of the European Union had no rules prohibiting insider dealing, while others had very divergent regulations. Directive 89/592/EEC was the first to provide guidance on this matter to member states. It was converted into Belgian law by the articles 181 until 189 of the Law of December 4th 1990 on financial transactions and financial markets.

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2 European legislation was obtained from the official website on European Union law: http://eur-lex.europa.eu.
3 Directives of the European Union need to be converted into law by the member states. They require member states to achieve a particular result, without dictating the means of achieving that result.
4 Belgian legislation was obtained from the official website of the Belgian Federal Public Service of Justice: http://just.fgov.be.
However, because of changes in the financial markets and in Community legislation there grew a need for a new directive. On January 28th 2003 Directive 2003/6/EC on insider dealing and market manipulation came into effect. This directive defines inside information as “information of a precise nature which has not been made public, relating, directly or indirectly, to one or more issuers of financial instruments or to one or more financial instruments and which, if it were made public, would be likely to have a significant effect on the prices of those financial instruments or on the price of related derivative financial instruments”. As an illustration, appendix 1 includes examples of what might be considered as “inside information” according to the Committee of European Securities Regulators (CESR). This is an official body advising the European Commission on new legislation and implementation measures concerning EU directives in the field of securities.

In Directive 2003/6/EC two important injunctions on the use of inside information are formulated. In particular, the directive prohibits any person who possesses inside information to use that information by acquiring or disposing of financial instruments to which that information relates, or by trying to do so. It also prohibits these persons to disclose their inside information, unless this is part of their job description, or to make recommendations or induce another person on the basis of that information to acquire or dispose of financial instruments to which that information relates.

The prohibitions stated by the European Directive were translated into Belgian legislation by the articles 25 and 40 of the Law of 2 August 2002 on the supervision of the financial sector and on financial services. An offender of these legal provisions is penalized by a prison term between three months and one year and a fine between 50 Euros and 10,000 Euros. Furthermore, the offender may be ordered to pay an amount corresponding to a maximum of triple the capital gain that was obtained, directly or indirectly, from the infringement (art. 40, § 6).

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5 An exception is made for transactions conducted in the discharge of an obligation that has become due to acquire or dispose of financial instruments where that obligation results from an agreement concluded before the person concerned possessed inside information.

6 The prohibitions do not apply to transactions carried out in pursuit of monetary, exchange-rate or public debt-management policy by a Member State of the European Economic Area, by the European System of Central Banks, by a national central bank or by any other officially designated body, or by any person on their behalf.
Next to the prohibitions, additional preventive guidelines are formulated by Directive 2003/6/EC. First, to help accomplish full and proper market transparency and in order to examine if transactions were conducted on the basis of inside information, this directive enforces a duty to report on persons discharging managerial responsibilities within an issuer of financial instruments as well as on persons closely related to them. Specifically, these persons must notify the competent authority the existence of transactions on their own account in stock of the company to which they relate.

A second preventive measure requires an issuer of financial instruments to draw up a list of persons employed by the issuer, and which have, on a regular or occasional manner, access to prior knowledge that directly or indirectly relates to the issuer.

Thirdly, the directive also requires any person professionally arranging transactions in financial instruments who reasonable suspects that a transaction might constitute insider dealing to notify the competent authority without delay.

The aforementioned guidelines were converted into Belgian legislation by the Royal Decree of 24 August 2005, which added a new article, art. 25bis, to the Law of 2 August 2002. For Belgian financial market participants, the following rules apply: the list of persons having access to inside information must be kept at the disposal of the CBFA for a time period of five years. This authority can request the issuer to submit this list. Normally this will take place as part of an investigation regarding misuse of inside information. Also the reporting of questionable transactions will be addressed to the CBFA. This report includes a description of the transaction and the grounds of the suspicion. Regulations on the notification duty are of special interest to our research and will therefore be discussed in detail. Moreover, differences in reporting standards have proven to impact research result (cfr. section 3). Consequently, the most important differences with the US legislation will be highlighted, as the US market is the most widely studied. The relevant regulation for the US stock market is included in section 16 of the 1934 Securities Exchange Act.

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7 The modalities of these obligations were specified by the Royal Decree of 5 March 2006 on market abuse.
8 The content of section 16 of the Securities Exchange Act 1934 can be found on the website www.law.uc.edu.
2.1. **Responsible authority**

In Belgian, notification of insider transactions is addressed to the CBFA. This body is responsible for the public disclosure of the insider transaction. When a transaction is reported, the CBFA only checks the origin, the content of the notification is part of the responsibility of the person reporting. Outside investors can consult the insider trading data on the CBFA-website.\(^9\)

Under the US system, corporate insiders have to file their transactions to the Securities and Exchange Commission (SEC). The latter is also responsible for publishing the information concerning insider transactions. This is done by means of the SEC’s online Insider Trading Report (Fidrmuc, Goergen, & Renneboog, 2006).

2.2. **Persons submitted to the reporting requirement**

Under the Belgian law, persons who fulfil an executive function in the issuing institution, like directors and commissioners, as well as persons closely related to them, e.g. spouses, partners, children and other relatives, have to report their personal transactions in certain categories of securities.

In the US, filing is required for directors, officers, and principal stockholders of the issuer of securities. The SEC has defined the term officer to include: company president, principal financial officer, principal accounting officer, any vice president in charge of a principal business unit, division or function (such as sales, administration, or finance), and any other person who performs a policy making function for the company (Bettis, Coles, & Lemmon, 2000). A principal stockholders is specified as a person who is the beneficial owner of more than 10 percent of any class of the issuer’s equity securities.

2.3. **Transactions that have to be notified**

In Belgium, the CBFA has to be notified by the aforementioned persons about transactions for their own account concerning shares emitted by the issuer which they are part of or, concerning derivatives or other financial instruments arising out of this.

The US insiders have to notify changes in their ownership of any class of the issuer’s equity securities and also the purchase or sale of a security-based swap agreement involving such equity securities.

\(^9\) www.cbfa.be
2.4. **Information that has to be notified**

When reporting an insider trade to the CBFA, the following data must be included: the name of the person conducting the trade, the reason for the notification duty, i.e. the relationship to the corporation, the name of the issuer involved, a description of the financial instrument, the type of transaction, the date and place of the transaction, and the price and volume of the trade.

Under the US system, the required information is quite similar. It contains the name and address of reporting person, the issuer name and ticker or trading symbol, the relationship of reporting person to the issuer (officer, director, or the like), the filing date, the type of security traded, the transaction date, the transaction code (for example, open-market transaction, private transaction, transaction under an employee stock ownership plan), the number of equity securities traded, the per-share price of equity securities and the ownership form (direct or indirect) (Jeng, Metrick, & Zeckhauser, 2003).

2.5. **Terms of notification**

Belgian insiders normally have to report their transactions after at most five days following the execution. However, as long as the total sum of the transactions during the current calendar year is below 5,000 Euros, the reporting may be delayed until 31 January of the next calendar year at the latest. In case of overrunning of this limit, all transactions carried out so far have to be notified within five days after the latest transaction. Afterwards everything is reset to zero and reporting of subsequent insider trades within the same calendar year can be postponed until the limit is reached again.

In the US, before August 2002, under the Securities and Exchange Act of 1934, insiders were obliged to report their transactions by the tenth day of the calendar month after the month in which the trade occurred. However, since the Sarbanes-Oxley Act came into effect the reporting terms are reduced to no more than two days following the transaction (Wisniewski & Bohl, 2005).

2.6. **Short-swing prohibition**

A final important difference between the Belgian and US legislation is the prohibition of short-swing-trading on the US market introduced by Section 16(b) of the Securities Exchange Act. To prevent the unfair use of information which may have been obtained by a principal stockholder, officer, or director by reason of his relationship to the issuer, this rule implies that insiders must
disgorge to the issuer any profit realized as a result of a purchase and sale or a sale and purchase of equity securities within a six months period, irrespective of their intention. In practice, this means that if an officer, director, or beneficial owner purchases/sells relevant stock he must wait at least six months before respectively reselling/rebuying this stock in order not to incur a liability. Legal action can be taken by the issuer, or by the owner of any security of the issuer in the name and in behalf of the issuer if the issuer fails or refuses to so. This is possible until two years after the date such a profit was realized. No comparable prohibition on short-term trading is operative in Belgium.

3. Overview of previous research
Insider trading is a well documented aspect of securities markets. Many aspects have been researched, mostly on the US market, and many, sometimes conflicting, conclusions have been formulated. In this section the results of previous research concerning the abnormal returns of corporate insiders and determinants that influence these returns will be highlighted. Furthermore, also the question is addressed whether outsiders can learn something from transactions conducted by insiders.

3.1. Abnormal returns of insiders
The possibility of insiders to gain abnormal profits is linked to the degree of efficiency of the financial markets. If traders can outperform the market by using inside information, this contrasts with the strong definition of market efficiency. The later postulates that all relevant information is reflected in security prices, regardless of what information is publicly available. In general, most studies on the US market have suggested that insiders earn a positive abnormal return, supporting the semi-strong form of efficient markets that only public information is reflected in the stock prices (Jaffe, 1974; Finnerty, 1976; Seyhun, 1986; Rozeff & Zaman, 1988; Lakonishok & Lee, 2001). Regarding other countries similar results are found for securities markets in Spain (Del Brio, Miguel, & Perote, 2002), Poland (Wisniewski & Bohl, 2005), Hong Kong (Cheuk, Fan, & So, 2006), the Netherlands (Aktas et al., 2007), and the UK (Fidrmuc et al., 2006). A notable exception however is the Oslo Stock Exchange studied by Eckbo & Smith (1998) were zero or negative abnormal profits were found.
In case of significant abnormal returns, the magnitude may differ between studies. This finding is partly due to differences in methodology and time intervals (cfr. section 3.3). But also reporting speed and other regulations, e.g. other definitions of who is considered an insider, can have a significant influence.\footnote{Reporting requirements: Spain: within fifteen days following the trade (Del Brio et al., 2002), Poland: 24-hours disclosure deadline (Wisniewski & Bohl, 2005), Hong Kong: maximum five business days after the transaction (Cheuk et al., 2006) and UK: insiders must inform their company as soon as possible and no later than five business days after the transaction. In turn, a company must inform the authorities without delay, no later than the end of the business day (Fidrmuc et al., 2006). In contrast, most US studies are conducted under the regime of disclosure within 10 days of the end of the calendar month following the transaction month, consequently 40 days can pass between the transaction date and the reporting date (Wisniewski & Bohl, 2005). Abnormal returns are therefore generally higher on securities markets outside the US.}

### 3.2. Differences between insider sales and purchases

A first difference between the buying and selling activity of insiders is the absolute number of buys and sells. As executive compensation schemes knew a rapid rise of the usage of equity-based compensation in the 1980s and early 1990s, managers grew a stronger incentive to diversify their portfolios since a larger part of their wealth was now determined by the stocks they own. As a consequence, insiders appear to be net sellers (e.g. Jenter, 2005; Wisniewski & Bohl, 2005; Aktas et al., 2007). An important exception to this observation are the Hong Kong insiders, they carry out far more buying than selling transactions (Cheuk et al., 2006). The authors attributes this to the large presence of owner-managers among insiders. These sell less frequently for fear of losing corporate control. But if owner-managers do sell this conveys an unequivocally negative signal to the market.

This leads to the second difference, the informational content of insider activities. Lin & Howe (1990) and Del Brio et al. (2002) also find that insider sales are more information-based than insider purchases.\footnote{Wisniewski & Bohl (2005) also concluded that, on average, sales were more profitable than purchases. The abnormal returns respectively being -15,4% and 9,9%. However, after controlling for several trade and firm attributes this difference became insignificant.} On the contrary, Lakonishok & Lee (2001), Jeng et al. (2003), and Fidrmuc et al. (2006) conclude that the informativeness of insider trades is coming from purchases, while insider sales have a lower or no predictive ability. This finding is attributed to the mixed motivation of selling transactions. On the one hand, they may be interpreted as negative news about the firm’s prospects. On the other hand, they could as well be driven by diversification or liquidity needs of the seller. Buy transactions are more likely to reflect only the insider’s superior knowledge.
3.3. **Short-term and long-term event-windows**

Research on the profitability of insider trading can be divided into two categories with regard to the applied time-frame. Some studies look at the abnormal gains realized in the near future, while others apply a long-term event-window.

Short-term studies of, for example, Seyhun (1986), Lakonishok & Lee (2001), Cheuk et al. (2006), and Aktas, de Bodt, & Van Hoppens (2008), evaluate abnormal returns only a few days surrounding an insider trade event. These studies observe only small abnormal price movements after an insider trade. However, it must be emphasised that since, as mentioned above, trades are a combination of uninformative transactions and transactions that do contain information, these low returns could still be considered as economically significant.

In long-term studies, overwhelming evidence is found that portfolios that are long on stocks purchased by insiders and short on stocks sold by insiders outperform the market over a time horizon ranging from one month to several months (e.g. Jaffe, 1974; Finnerty, 1976; Seyhun, 1986; Jeng et al., 2003; Wisniewski & Bohl, 2005).

The difference between short-term and long-term returns is partly explained by the prohibition of trading on obvious short-term information, which is operative in the researched countries. Moreover, in a US context, insiders cannot make more than two round-trip transactions per year without incurring a penalty, due to the short-swing rule. Therefore, it is more likely that they trade based on long-term information (Aktas et al., 2007).

3.4. **The influence of firm characteristics on abnormal returns**

A first important firm characteristic is the firm size. A higher potential for information asymmetry is expected in small firms. These firms experience less extensive analyst coverage and it is easier for managers of small companies to know a significant proportion of relevant information. In general, research indicates that the abnormal gains are higher in small firms as compared to large firms (e.g. Seyhun, 1986; Cheuk et al., 2006). The Polish stock market appears to be an exception to this. Here, firm size is irrelevant for the magnitude of the insider trading profits (Wisniewski & Bohl, 2005). The authors attribute this to the absence of large multinationals on the Warsaw Stock Exchange and the mean company capitalisation being roughly than times smaller than in the US.

Linked to the less efficient pricing of small firms and the main motivation of buy transactions being to gain profit, insiders have the tendency to purchase small stocks and sell large stocks (Rozell & Zaman, 1988; Fidrmuc et al., 2006).
A second determinant of the profitability of insider trades is the book-to-market ratio (B/M). Research indicates that high B/M stocks outperform low B/M stocks. This relationship is also called the value premium (Lakonishok & Lee, 2001; Scott & Xu, 2004). Giving that low B/M ratios signify overvaluation and predict bad future performance, selling predominantly occurs in these growth firms. By contrast, high B/M ratios indicate undervaluation and positive future performance. Consequently, buying is concentrated in these value firms (Jenter, 2005; Cheuk et al., 2006). These relations are consistent with the contrarian nature of insiders, implying that insiders include the perceived mispricing of the security as a determinant in their trade decision (Jenter, 2005; Piotroski & Roulstone, 2005). They buy securities that historically performed bad and sell shares that have performed well.

Another value characteristic is the price-earnings ratio (P/E). Here, a negative relationship between P/E ratios and future stock returns is found (Cheuk et al., 2006). The reasoning is similar to B/M ratios. A low P/E ratio is associated with a high future stock return, while a high P/E is associated with a low future stock return. Therefore, it is likely that insiders, who are more able to assess the value of their firms, buy when the P/E of the stock is low, and sell when the P/E is high.

Several studies have adjusted for the above mentioned firm attributes and found that abnormal returns may be partly or wholly attributed to these effects, consequently lowering or fading out the abnormal returns insiders and outsiders can possibly earn (e.g. Roz EFF & Zaman, 1988; Lakonishok & Lee, 2001; Wisniewski & Bohl, 2005). For example, Lakonishok & Lee (2001) find positive abnormal returns of 0.93% around insider purchases in small firms and negative abnormal returns of -0.06% in large firms, indicating the market reaction seems to depend on the firm size.

Another variable that could also be considered a firm attribute of influence is the industry to which the company belongs. Cheuk et al. (2006) was the first study to investigate this. They conclude that on the Hong Kong market significant positive abnormal returns exist for companies in the finance and industrial industries. Negative returns exist in the sectors of properties, consolidated enterprises, and industrials. On the whole, their results show that abnormal profits are mainly associated with insider transactions in the finance, industrial, consolidated enterprises, and properties industries. Transactions in the utility and hotel sector do not appear to be profitable on the Hong Kong market.
The study of Aboody & Lev (2000) specifically concentrates on the relationship between R&D activities and insider gains. They argue that R&D activities are associated with high information asymmetry for two reasons. Firstly, an asset created from R&D expenditures is likely to be more unique than a tangible asset. Secondly, considerable information can be derived from the price of traded tangible and financial assets concerning their values at the firm level. No such direct price-based information on firm-specific changes in the value and productivity exists for assets arising from R&D expenditures and the necessary information to determine the value is harder to obtain. Aboody & Lev (2000) observe substantially larger insider gains in firms with R&D as opposed to no-R&D firms. Moreover, insiders also take advantage of information on planned changes in R&D budgets. The statistically and economically significant R&D related gains were later confirmed by Huddart & Ke (2002).

A possible inverse relationship between abnormal returns on insider trade and ownership concentration in the firm is investigated by Del Brio & Perote (2007). The reasoning is that, due to high supervisory costs, shareholders of companies characterized by highly diffuse ownership concentration are less motivated to control managers, resulting in less effective control over insiders. Therefore, a diffuse ownership concentration encourages bigger information asymmetries and by consequence larger abnormal gains. Del Brio & Perote (2007) find evidence supporting this hypothesis.

A final firm characteristic of influence are the corporate policies on insider dealing. Certain companies appear to have explicit blackout periods during which the company prohibits trading by insiders (Bettis et al., 2000). For example, insider trading might only be allowed during a trading window which is open for a period of three through twelve trading days following a quarterly earnings announcement. The results in the study of Bettis et al. (2000) show that these corporate trading prohibitions significantly reduce the insider trading activity during the blackout periods compared to periods in which trading is allowed. Moreover, the profitability of insider activity appears higher during the allowed trading period than during blackout periods. This is consistent with the authors’ hypothesis that insiders must obtain permission to trade during the blackout periods, and that this permission is granted only if the trade is liquidity motivated.

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12 Ownership concentration was measured as the percentage of outstanding shares possessed by the five largest shareholders.
3.5. The influence of trade characteristics on abnormal returns

Several trade characteristics appear to be of influence on the realized abnormal returns. Some studies have investigated the influence of the trade size. On the one hand, one might expect that the highest-volume trades reflect the strongest believe in future performance and the highest quality of information. On the other hand, insiders might also conduct several smaller transactions instead of one large transaction in order not to alert the market. Moreover, large transactions may also be motivated by a quest for corporate control. These last two factors militate against finding the highest-volume trades having the highest abnormal returns.

A first measure of the trade size is the value of the trade. The above mentioned positive relation is found in Givoly & Palmon (1985), Seyhun (1986), and Aktas et al. (2008). Wisniewski & Bohl (2005) and Aktas et al. (2007), respectively researching the Polish and Dutch stock markets do not find a significant relationship.

An alternative measure for the trade size is the proportion of the firm traded. This variable is calculated as the number of shares trades during the transaction divided by the total number of outstanding shares. Seyhun (1986), Jeng et al. (2003), and Cheuk et al. (2006) confirm the positive relation between the relative trade size and the information contained in a transaction.

A possible effect on insider returns may also result from the person executing the transaction. Firstly, it is possible that, when insiders expect high returns, they delegate their transaction to a third person, like relatives or friends, in order to better camouflage the trade. This positive relation is corroborated by Wisniewski & Bohl (2005) and Del Brio & Perote (2007). Jeng et al. (2003) on the other hand do not find supporting evidence.

Secondly, the informational content of transactions may also depend on the position the insider occupies within the corporation. The information hierarchy hypothesis postulates that directors who are more familiar with the day-to-day operations of the company trade on more valuable information than other directors. Support for this hypothesis is found by Seyhun (1986) and Lin & Howe (1990). In contrast, Jeng et al. (2003) and Fidrmuc et al. (2006) do not find higher abnormal returns for higher positioned directors. As a possible explanation the authors indicate that these directors are subject to greater market scrutiny, and therefore trade more cautiously and at less informative moments.

13 Seyhun (1986) initially does not find a relationship between abnormal returns and the dollar value of a trade. Only after taking the natural log, and putting less weight on extremely large dollar value transactions, a significant relation is found.
14 Aktas et al. (2007) do find that for long-term event-windows smaller transactions appear to be more informative.
15 Results of the studies are not directly comparable because of different methodologies in calculating the returns.
Bajo & Petracci (2004) investigate the importance of the initial ownership as a variable to determine the information content of a change in insiders’ holdings. They assumed that changes are not driven by a need for corporate control when the initial ownership is already reasonably high. For instance, when a majority shareholder safely holds the control of the company, a holding increase is likely to be driven by superior information. Bajo & Petracci (2004) find supporting evidence.

Seyhun (1986) specifically investigate the influence of the net number of insiders executing a trade on the magnitude of insiders’ abnormal profits. A positive relationship is found, similar to a finding by Jaffe (1974). Still, it must be noted that in the first study, after also including the natural log of the proportion of the firm traded, the net number of insiders variable is no longer significant. This suggests that the significance of the net number of insiders is largely due to a proxy effect of the proportion of the firm traded.

### 3.6. Abnormal returns of outsiders

Some studies address the question whether outsiders can profit from mimicking insiders’ behaviour. However, mixed results are found on this research topic. Seyhun (1986) and Rozeff & Zaman (1988) show that, net of transaction costs, outsiders do not benefit by imitating insiders. Also Lin & Howe (1990) conclude that outsiders cannot make abnormal returns, since insiders themselves cannot gain excess returns in OTC markets after including transaction costs. More recently, Del Brio et al. (2002) find that outsiders cannot outperform the Spanish stock market. On the other hand, Jaffe (1974), Wisniewski & Bohl (2005), Cheuk et al. (2006), and Aktas et al. (2007), argue that outsiders mimicking insiders can earn excess returns since there are still significant abnormal gains after the reporting date, the moment outsiders cognizance of the occurrence of insider trades. Moreover, examining the determinants of outsiders’ excess returns, Toutkoushian (1996) states that the excess return outsiders can earn from replicating any particular insider transactions does not only depend on the likelihood that the transaction was motivated by an insider having private information, but also by the extent to which potential excess returns have already been captured by other outsiders receiving information in a more timely manner. Furthermore, the later study also proves that replicating purchases is less profitable than the replication of sales.

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16 Net number of insiders was defined as the absolute difference between the number of buyers and sellers.
4. Data

4.1. Insider trading data

The insider trading data used in this study were obtained upon request from the CBFA. The database compromised 3,440 insider trades reported to the CBFA from January 2006 through February 2009. Several filters were applied to clean up the initial data. First, transactions were dropped if they were executed following 16 October 2008 because share prices and other required data were only collected until 10 March 2009 and returns have to be computed up to 100 trading days following an insider trading event. Secondly, transactions involving companies which were not listed 100 trading days following an insider trade were eliminated as well as transactions of companies with missing data to form the control portfolios (see section 4.2).\(^{17}\)

Next, trades not involving share, but for example options, warrants, or scripts, were also filtered out. In addition, transactions other than ordinary sales and purchases, like conversions, subscriptions, and options being exercised, were deleted. The final sample also excluded trades that did not take place on Euronext Brussels. When transactions were reported before they were executed, they were also removed from the sample. Finally, based on figure 1, trades with more than 15 trading days between the execution date and the communication to investors were deleted.

For illustration, the transactions constituting figure 1 had a mean number of days between the transaction date and the announcement date of 13. This is much longer than the normal legal period of five days. Moreover, only 52.92% of these transactions was reported after at most five days following the insider trade event. Several explanations are possible. First, there is the exception which allows reporting to be postponed in case of limited insider trading activity by a particular person in a particular stock. Secondly, the CBFA-website reporting insiders’ transactions is not updated daily. Furthermore, it is possible that adjustments have to be made to the reporting after the initial filling of a transaction, prolonging the period between the trade and the reporting.

In conclusion, the set of applied filters resulted in a final sample of 1,567 transactions between May 2006 and October 2008 (cfr. table 1).

\(^{17}\) Companies disappeared from the First Market of Euronext Brussels because of mergers and acquisitions or because they transferred to Euronext Alternext.
TABLE 1  Filters used to obtain the final sample of 1,567 transactions

<table>
<thead>
<tr>
<th>Initial sample</th>
<th>3,440</th>
</tr>
</thead>
<tbody>
<tr>
<td>Deletion of</td>
<td></td>
</tr>
<tr>
<td>- Transactions executed after 16 October 2006</td>
<td>238</td>
</tr>
<tr>
<td>- Transactions involving companies not listed 100 trading days following the insider trade</td>
<td>222</td>
</tr>
<tr>
<td>- Transactions involving companies with missing data to form control portfolios</td>
<td>279</td>
</tr>
<tr>
<td>- Transactions not involving shares</td>
<td>687</td>
</tr>
<tr>
<td>- Transactions not reflecting ordinary sales and purchases</td>
<td>57</td>
</tr>
<tr>
<td>- Transactions that did not take place on Euronext Brussels</td>
<td>176</td>
</tr>
<tr>
<td>- Transactions reported before they were executed</td>
<td>1</td>
</tr>
<tr>
<td>- Transactions with more than 15 trading days between the transaction and reporting date</td>
<td>213</td>
</tr>
<tr>
<td>Final sample</td>
<td>1,567</td>
</tr>
</tbody>
</table>

\[18\] The histogram is based on a sample of 1,780 transactions, resulting from the first seven elimination steps mentioned in table 1. The accompanying frequency table is provided in appendix 2.
4.2. **Other required data**
In order to be able to compute abnormal returns, information is needed on security prices inclusive of dividends and on market capitalisation and market-to-book ratios. The latter two variables are used to form benchmark portfolios.

For the construction of these portfolios, all companies listed on Euronext Brussels were considered, irrespective of whether they had experienced insider trades. An overview of these corporations was collected from the official Euronext-website.\(^\text{19}\) Starting from an original sample of 174 listed companies, excluding strips and preference shares, 40 companies were deleted due to missing data with regard to share prices and/or market-to-book ratios. This resulted in a final set of 134 companies for the construction of benchmark portfolios.\(^\text{20}\)

The data on market capitalisation and market-to-book ratios were mainly collected from Datastream. Market capitalisation was defined as the share price multiplied by the number of ordinary shares in issue, while market-to-book ratio was calculated as the market value of the ordinary equity divided by the balance sheet value of the ordinary equity in the company. For share certificates listed on Euronext Brussels, information on this book value of equity was collected by hand from the annual reports of the respective companies, because only their market capitalisation was included in Datastream.

Further, time series of share prices adjusted for capital actions were also gathered from Datastream. Stock prices including dividends were not available in this database. Therefore, information on dividends issued by companies listed on Euronext Brussels was copied manually from the website of the Belgian financial magazine “De Tijd”.\(^\text{21}\) The dividends were first converted into Euro when necessary, then adjusted for capital actions and finally added to the adjusted prices.

5. **Descriptive statistics**
The total sample of 1,567 insider trades compromises of 928 purchases and 639 sales. As in Cheuk et al. (2006), discussing Hong Kong, there were more buyers than sellers on the Belgian stock market. A potential explanation might by the ownership structure of Belgian listed

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\(^\text{19}\) www.euronext.com
\(^\text{20}\) In appendix 3 an overview of the sample of listed companies is provided. Companies were first filtered out based on the availability of stock prices and secondly based on market-to-book values.
\(^\text{21}\) www.tijd.be
companies which is characterised by a high percentage of firms having a single controlling owner (Faccio & Lang, 2002). This potentially results in more control induced trades.

Table 2 presents some descriptive statistics on the insiders’ transactions. Panel A indicates that 614 trades were linked to members of a corporate body, 522 were executed by persons related to them, 282 transactions were performed by executives, and 11 by persons related to them. Finally, 138 trades could be linked to persons related to another related person.

More insight on company and trade characteristics is provided by panel B. On average, 25,365 shares were traded per transaction. In case of insider purchase, the average was 22,276 shares, the median being 2,124 shares. On the other hand, insider sales had a mean of 29,210 shares traded per transaction and a median of 2,400 shares. The trade value ranges from € 18.65 to € 86,738,750.00, with an average of € 943,932.00 and a median of € 83,556.10. A comparison by type of transaction shows that the average trade value in case of insider sales (€ 1,273,589.45) is much higher than for insider purchases (€ 716,937.27). Also market capitalisation is higher for sale transactions, indicating a tendency of Belgian insiders to sell in large stocks and buy in small stocks.

6. Methodology

To measure market reaction around insider trading days a standard event-study methodology was adopted. The application requires several steps. First, the event must be determined, in this case the execution or reporting of an insider trade, denoted as day 0. Next, the event window must be chosen, 100 trading days. Then, normal returns must be estimated and abnormal and cumulative abnormal returns must be calculated and their significance must be tested.

For the measurement of abnormal returns several approaches are possible. A number of studies uses the market model, which is based on a linear relationship between the stock return on a share experiencing insider trading and the return on a market portfolio (e.g. Finnerty, 1976; Seyhun, 1986; Cheuk et al., 2006). The procedure usually involves the estimation of the parameters α and β by an ordinary least square regression over an observation period that excludes the test period. Prediction errors in the test period are then defined as the abnormal returns. The market adjusted model is also frequently applied (e.g. Lakonishok & Lee, 2001; Aktas et al., 2007). This method consists of calculating the difference between the daily return of the share considered and the market return recorded on that day.

A controlling shareholder is denoted as “alone” if no other owner controls at least 10% of the voting rights.
### TABLE 2  Summary statistics

#### Panel A  Capacity of the insider

<table>
<thead>
<tr>
<th></th>
<th>Overall sample</th>
<th>Purchase s</th>
<th>Sales</th>
</tr>
</thead>
<tbody>
<tr>
<td>Member of a corporate body</td>
<td>614</td>
<td>337</td>
<td>277</td>
</tr>
<tr>
<td>Person related to a member of a corporate body</td>
<td>522</td>
<td>415</td>
<td>107</td>
</tr>
<tr>
<td>Executive</td>
<td>282</td>
<td>36</td>
<td>246</td>
</tr>
<tr>
<td>Person related to an executive</td>
<td>11</td>
<td>8</td>
<td>3</td>
</tr>
<tr>
<td>Person related to another related person</td>
<td>138</td>
<td>132</td>
<td>5</td>
</tr>
</tbody>
</table>

#### Panel B  Company and trade characteristics

<table>
<thead>
<tr>
<th></th>
<th>Mean</th>
<th>Min</th>
<th>Q1</th>
<th>Median</th>
<th>Q3</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of shares traded per transaction</td>
<td>25,365</td>
<td>1</td>
<td>500</td>
<td>2,270</td>
<td>12,000</td>
<td>3,771,250</td>
</tr>
<tr>
<td>Number of shares traded per purchase</td>
<td>22,276</td>
<td>3</td>
<td>500</td>
<td>2,124</td>
<td>12,601</td>
<td>2,580,759</td>
</tr>
<tr>
<td>Number of shares trades per sale</td>
<td>29,210</td>
<td>1</td>
<td>500</td>
<td>2,400</td>
<td>10,000</td>
<td>3,771,250</td>
</tr>
<tr>
<td>Trade value per transaction (in €)</td>
<td>943,932.00</td>
<td>18.65</td>
<td>14,949.75</td>
<td>83,556.10</td>
<td>432,953.65</td>
<td>86,738,750.00</td>
</tr>
<tr>
<td>Trade value per purchase (in €)</td>
<td>716,937.27</td>
<td>34.47</td>
<td>11,539.53</td>
<td>81,281.25</td>
<td>409,500.00</td>
<td>41,647,000.00</td>
</tr>
<tr>
<td>Trade value per sale (in €)</td>
<td>1,273,589.45</td>
<td>18.65</td>
<td>23,350.00</td>
<td>90,702.34</td>
<td>505,650.58</td>
<td>86,738,750.00</td>
</tr>
<tr>
<td>Market capitalisation (in millions of €)</td>
<td>5,972.84</td>
<td>4.51</td>
<td>173.03</td>
<td>808.60</td>
<td>5,932.10</td>
<td>42,612.44</td>
</tr>
<tr>
<td>Market capitalisation for purchase transactions (in millions of €)</td>
<td>4,824.76</td>
<td>4.51</td>
<td>114.49</td>
<td>576.00</td>
<td>1,873.14</td>
<td>42,612.44</td>
</tr>
<tr>
<td>Market capitalisation for sale transactions (in millions of €)</td>
<td>7,640.17</td>
<td>5.50</td>
<td>263.24</td>
<td>1,448.37</td>
<td>8,778.85</td>
<td>40,832.57</td>
</tr>
</tbody>
</table>
This paper however replicates the methodology used in Wisniewski & Bohl (2005) and uses a control portfolio approach to compute the daily abnormal returns. The advantage of this method is that no observation period is required. Moreover, previous research has provided evidence that the market model does not provide a complete control for non-market effect. The prediction errors incorporate for example size, P/E, and period of listing effects (Rozeff & Zaman, 1988). However, as in Wisniewski & Bohl (2005), additional research using market-adjusted returns might be conducted to test the robustness of the conclusions based on the control portfolio approach.

To construct the portfolios, the listed companies used in this study were first ranked based on their market capitalisation and divided into three equal groups. Within these groups shares were subsequently split into three groups according to their market-to-book ratios. This resulted into nine control portfolios. The procedure was executed at 1 January of each year. Consequently, all transactions for a specific security during a period from 1 January until 31 December of a particular year were linked to the same portfolio. Moreover, the corresponding portfolio did not change during the calculation of abnormal returns following an insider trading event. For example, a security belonged to portfolio 1 in 2006 and to portfolio 2 in 2007 and a transaction took place on 30 November 2006. Abnormal returns were calculated until 100 days following the event day. Therefore, part of the abnormal returns were computed in 2007. In this case, the returns on control portfolio 1, formed in 2006, were used to calculate all abnormal returns.

For the calculation of the portfolio returns, the daily returns of the securities belonging to a particular portfolio were averaged. Abnormal returns \( AR_{i,t} \) were then calculated by deducting the return of the control portfolios from the return on a security that experienced an insider trade:

\[
AR_{i,t} = r_{i,t} - r_{cp(i),t} \quad \text{for } t = 0, 100
\]  

(1)

with \( r_{i,t} \) the return on security \( i \) on day \( t \), and \( r_{cp(i),t} \) the return on the control portfolio corresponding with security \( i \) on day \( t \).

Next, the average abnormal returns were computed by aggregating the abnormal returns per event day \( t \) and dividing them by the total number of events:

\[
\overline{AR}_t = \frac{1}{N} \sum_{i=0}^{N} AR_{i,t} \quad \text{for } t = 0, 100
\]  

(2)

were \( \overline{AR}_t \) is the average abnormal return on day \( t \) and \( N \) is the total number of events.
Finally, these average abnormal returns were summed over the time interval in question in order to obtain the average cumulative abnormal returns:

\[ CAR(t_1, t_2) = \sum_{t_1}^{t_2} \overline{AR}_t \]  \hspace{1cm} (3)

where \( t_1 \) and \( t_2 \) are, respectively, the beginning day and ending day of the summation.

The statistical significance of the observed average cumulative abnormal returns was evaluated using a bootstrap-based test. This involves repeatedly sampling from the actual data in order to empirically estimate the true distribution of a test statistic. The first step in generating an empirical distribution of CARs is randomly selecting \( n \) combinations of a firm and a trading date from the sample of listed companies used in this study and the universe of trading dates in the period from May 2006 through October 2008. The parameter \( n \) was equal to 1,567 when the profitability of the entire sample of insider trades was tested, 928 when the purchases were evaluated, and 639 for the sale transactions. When testing the subsamples based on firm size and trade value \( n \) was equal to one third of the previous numbers.

Next, the average cumulative abnormal return for the resulting sample was computed using the method described above. This procedure was repeated 2000 times and the resulting CARs were ranked from the lowest to the highest to obtain the empirical distribution. As an illustration, figure 2 shows the empirical distribution obtained by this bootstrap method for the overall sample. Similar distributions were found for the other subsamples. To evaluate the significance of the CARs, the bootstrap p-value was calculated as \( S/2000 \) for \( CAR > 0 \) and \( (1 - S/2000) \) for \( CAR < 0 \), where \( S \) stands for the number of simulated values above the actual profitability.

To test the robustness of the conclusions based on the bootstrap test, the sign test was applied as an alternative non-parametric test free from assumptions concerning the underlying distribution of abnormal returns. Under the null hypothesis of no abnormal event day return, positive and negative abnormal returns are equally probable. The sign test statistic is given by:

\[ z_{sign} = \frac{p - 0.5}{\left[ p(1 - p) / N \right]^{1/2}} \sim N(0,1) \]

where \( p \) is defined as the proportion of stocks for which the cumulative abnormal return was positive in a sample of size \( N \). More specifically, for the overall sample it denoted how many of the 1,567 insider trades had a positive cumulative abnormal return. When looking at insider purchases and sales, \( p \) was respectively the portion of cumulative abnormal returns above zero in a sample of 928 purchases and 639 sales.
7. Empirical results

7.1. Trade performance of insiders

Figure 3 shows the average cumulative abnormal returns for insiders relative to the insider trading day up to 100 days following the insider trade. A remarkable observation is that buy trades are only profitable for approximately 20 trading days following an insider trade. Afterwards the abnormal returns for purchases are negative and show a clear downward trend. In other words, Belgian insiders appear to buy shares that subsequently are not able to outperform their peers. This is contradictory to the expectations. In the case of sell trades a downward movement persisting for approximately 70 trading days is observed. This movement is consistent with the assumptions because insiders gain when stock prices go down after they sell.
Table 3 reports the cumulative abnormal returns over an event-window of 100 trading days following an insider trade and provides more insight on the significance of these CARs. The null hypothesis of zero abnormal returns is rejected based on the bootstrap test in both the purchase and the sale subsample. The distribution free sign test only coincides with the bootstrap test for the purchases. For both the sales and the overall sample significance levels differ between both methods. It must however be noted that Kramer (2001) prefers the use of bootstrap tests in event studies. The author argues that although the sign test demonstrates less bias than conventional Z test statistics, still significant bias remains, especially in a sample with a small number of firms.

For buy transactions, the significant CAR of -2.11% does not have the expected sign. Possible explanation for the negative sign might be that these transactions are mainly driven by the objective to obtain or maintain corporate control and less by a profit objective. This is consistent with the observation that Belgian insiders appear to be net buyers as opposed to the majority of insiders in previous research (e.g. Jenter, 2005; Wisniewski & Bohl, 2005; Aktas et al., 2007). Selling transactions on the Belgian stock market prove to be profitable since the abnormal return has the expected negative sign. Consequently, informativeness of insider transactions on the Belgian stock market is coming from sale transactions.
Overall, the magnitude of the CARs is rather low. However, this could still be economically significant as mixed motivations initiate insider trades. Moreover, highly concentrated ownership structures are typical for listed companies in continental Europe as opposed to widely held ownership in the UK and Ireland (Faccio & Lang, 2002). Potentially, the inverse relationship between ownership concentration and abnormal performance documented by Cheuk et al. (2006) also applies to the Belgian data, restricting the potential of gaining excess returns.

### TABLE 3  CAR (1,100) for insiders and significance tests

<table>
<thead>
<tr>
<th>Event period</th>
<th>CAR (1,100)</th>
<th>Bootstrap p-values</th>
<th>Sign test</th>
</tr>
</thead>
<tbody>
<tr>
<td>Purchases</td>
<td>-2.1164</td>
<td>0.0035***</td>
<td>-2.8353**</td>
</tr>
<tr>
<td>Sales</td>
<td>-1.9809</td>
<td>0.0170**</td>
<td>-0.6727</td>
</tr>
<tr>
<td>Overall sample</td>
<td>-0.4456</td>
<td>0.3455</td>
<td>-1.7448**</td>
</tr>
</tbody>
</table>

CARs are expressed in percent. For calculating the CAR for the overall sample the abnormal returns of insider sales were normalized by multiplying them by minus one to match the purchases.

*** significant at the 1% level  
**  significant at the 5% level  
*  significant at the 10% level

In panel A of table 4 the average daily cumulative abnormal returns are split into three groups based on the firm size. An inverse relationship between firm size and abnormal performance is observed in each category. This is consistent with Seyhun (1986) and (Cheuk et al., 2006), and indicates a higher potential for information asymmetry in small firms. The CARs in these small firms are much higher than those reported in table 3, implying that the modest gains are mainly caused by transactions in medium and large corporations. An increase in ownership in the latter two categories is accompanied by significant negative returns of respectively -3.43% and -6.16%. On the contrary, sale transactions in medium sized companies are profitable.

In panel B insider gains are grouped by trade value. Contrary to findings by Givoly & Palmon (1985), Seyhun (1986), and Aktas et al. (2008), trades on the Belgian stock market appear to be more informative when they are smaller. This is consistent with the conjecture that insider try not to alert the market by conducting several smaller trades. Moreover, corporate control is an important motivation for Belgian insiders and this is characterised by larger trades. On the whole, sales are again more profitable than purchases. The largest market reaction is observed following small sales. Insiders executing large and medium-sized buy transactions perform significantly worse than their benchmarks.
TABLE 4  CAR (1,100) for insiders grouped by firm size and trade value

Panel A  Firm size

<table>
<thead>
<tr>
<th></th>
<th>Purchases</th>
<th>Sales</th>
<th>Overall sample</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>CAR(1,100)</td>
<td>Bootstrap p-values</td>
<td>CAR(1,100)</td>
</tr>
<tr>
<td>Smallest 1/3</td>
<td>3.2500</td>
<td>0.0015***</td>
<td>-5.4726</td>
</tr>
<tr>
<td>Middle 1/3</td>
<td>-3.4299</td>
<td>0.0035***</td>
<td>-2.1451</td>
</tr>
<tr>
<td>Largest 1/3</td>
<td>-6.1562</td>
<td>0.0000***</td>
<td>1.6751</td>
</tr>
</tbody>
</table>

Panel B  Trade value

<table>
<thead>
<tr>
<th></th>
<th>Purchases</th>
<th>Sales</th>
<th>Overall sample</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>CAR(1,100)</td>
<td>Bootstrap p-values</td>
<td>CAR(1,100)</td>
</tr>
<tr>
<td>Smallest 1/3</td>
<td>0.8323</td>
<td>0.1740</td>
<td>-5.4525</td>
</tr>
<tr>
<td>Middle 1/3</td>
<td>-3.0237</td>
<td>0.0075***</td>
<td>-1.4940</td>
</tr>
<tr>
<td>Largest 1/3</td>
<td>-4.1513</td>
<td>0.0015***</td>
<td>1.0039</td>
</tr>
</tbody>
</table>

CARs are expressed in percent. For the calculation of CARs for the overall sample the abnormal returns of insider sales were normalized by multiplying them by minus one to match the purchases.

*** significant at the 1% level
** significant at the 5% level
* significant at the 10% level

7.2.  **Trade performance of outsiders**

Similar to figure 3, concerning abnormal returns for insiders, figure 4 also shows a negative trend for both purchases and sales. Because it is assumed that insider trades become public knowledge from the moment they are reported on the CBFA-website, cumulative abnormal returns are calculated relative to the reporting date. The pattern of CARs for sell trades indicates outsiders can realise profits when they invest in the long-term, not if they invest in the short run. Imitating purchase transactions on the other hand is clearly an inferior investment strategy on the Belgian stock market. In contrast to corporate insiders experiencing positive returns on short-term investments (cfr. figure 3), there are no short-term gains for outsiders who buy securities. This indicates that if insider purchase on short-term information, the notification term of five days is insufficiently strict, since figure 3 shows a negative slope after approximately seven days following an insider purchase.
Table 5 reports the cumulative abnormal returns for outsiders who mimic stock transactions made by insiders. Bootstrap p-values for the whole sample as well as for the buy and sell subsamples are above conventional rejection levels. Results for the sign test are comparable for the purchases and for the overall sample. For sale transactions, the CAR is not significant according to the sign test. Similar to the results for insiders, the figures indicate non-profitable buy trades for outsiders. Replication of sale transactions on the other hand yields abnormal profits of 1.91%. The magnitude of the CARs for sales and purchases made by uninformed investors is comparable to insiders’ CARs. In the long-term, insiders do not have a significant information advantage.

**TABLE 5** CAR (1,100) for outsiders and significance tests

<table>
<thead>
<tr>
<th>Event period</th>
<th>CAR (1,100)</th>
<th>Bootstrap p-values</th>
<th>Sign test</th>
</tr>
</thead>
<tbody>
<tr>
<td>Purchases</td>
<td>-2.4592</td>
<td>0.0010***</td>
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<td>0.0715*</td>
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CARs are expressed in percent. For calculating the CAR for the overall sample the abnormal returns of insider sales were normalized by multiplying them by minus one to match the purchases.

*** significant at the 1% level
**  significant at the 5% level
*   significant at the 10% level

FIGURE 4 Cumulative abnormal returns over days 0 to 100 relative to the reporting date.
8. Conclusions

The previous study investigates the profits made by Belgian insiders on self-reported security transactions. Overall, evidence was found against the strong as well as the semi-strong form of the efficient market hypothesis. The first form was refuted because a significant market reaction was found following insider trades. Evidence against the second form was provided by outsiders earning significant excess returns. Most remarkable was the evidence of significant negative abnormal returns after purchase transactions by corporate insiders. This finding is attributed to the ownership structure in Belgian listed companies. However, further research is necessary to investigate the significance of this relation.

A second suggestion for additional research is gaining a better understanding of the underlying drivers of the abnormal profits. This could provide valuable information to outsiders applying an investment strategy of mimicking insiders’ transactions in helping them select insider trades which are more profitable than others to replicate. Previous research has already indicated that the magnitude of abnormal profits is related to firm and trade characteristics like book-to-market ratios, firm size, trade value, type of insider, etc. This study already observed an inverse relationship between abnormal gains and the firm and trade size. However, other determinants might also be of influence on the Belgian data.

Further, it might also be investigated whether alternative event windows would lead to other conclusions. The results already seemed to indicate that positive abnormal gains on insider purchases could be found when applying a short-term event window. The significance of these returns was however not tested within the scope of this inquiry.

Moreover, abnormal returns may also be examined in a period preceding the insider trade. This can provide more insight on whether Belgian insiders are contrarian.
References


Appendix 1

This is a non-exhaustive and indicative list of examples, which constitutes a starting point to the assessment of whether the information is inside information. However the evaluation, in concrete cases, of whether the threshold to «inside information» has been crossed depends considerably on the specific circumstances in each single case. For this reason, this list should not be envisaged as comprehensive and therefore it should not become a legal rule.

Information, which directly concerns the issuer:
- Changes in control and control agreements;
- Changes in management and supervisory boards;
- Changes in auditors or any other information related to the auditors activity;
- Operations involving the capital or the issue of debt securities or warrants to buy or subscribe securities;
- Decisions to increase or decrease the share capital
- Mergers, splits and spin-off;
- Purchase or disposal of equity interests or other major assets or branches of corporate activity;
- Restructurings or reorganizations that have an effect on the issuer’s assets and liabilities, financial position or profits and losses;
- Decisions concerning buy-back programmes or transactions in other listed financial instruments;
- Changes in the class rights of the issuer’s own listed shares;
- Filing of petitions in bankruptcy or the issuing of orders for bankruptcy proceedings;
- Significant legal disputes;
- Revocation or cancellation of credit lines by one or more banks;
- Dissolution or verification of a cause of dissolution;
- Relevant changes in the assets’ value:
  - Insolvency of relevant debtors;
  - Reduction of real properties’ values;
  - Physical destruction of uninsured goods;
  - New licences, patents, registered trademarks;
Appendix 1.2

- Decrease or increase in value of financial instruments in portfolio;
- Decrease in value of patents or rights or intangible assets due to market innovation;
- Receiving acquisition's bids for relevant assets;
- Innovative products or processes;
- Serious product liability or environmental damages cases;
- Changes in expected earnings or losses;
- Relevant orders received from customers, their cancellation or important changes;
- Withdrawal from or entering into new core business areas;
- Relevant changes in the investment policy of the issuer;
- Ex-dividend date, dividend payment date and amount of the dividend; changes in dividends policy payments

The following list comprehends examples, which would usually only concern the issuer indirectly. [...] 
- Data and statistics published by public institutions disseminating statistics;
- The coming publication of rating agencies’ reports, research, recommendations or suggestions concerning the value of listed financial instruments;
- Central bank decisions concerning interest rate;
- Government’s decision concerning taxation, industry regulation, debt management, etc.
- Decisions concerning changes in the governance rules of market indices, and especially as regards their composition;
- Regulated and unregulated markets’ decisions concerning rules governing the markets;
- Competition and market authorities’ decisions concerning listed companies;
- Relevant orders by government bodies, regional or local authorities or other public organizations;
- Relevant orders to trade financial instruments;
- A change in trading mode (e.g., information relating to knowledge that an issuer’s financial instruments will be traded in another market segment: e.g. change from continuous trading to auction trading); a change of market maker or dealing conditions.

### Frequency table accompanying figure 1

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## Appendix 3

### Listed companies used for the formation of the control portfolios

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112. Solvac Nom(Retail) BE0003545531
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Listed companies deleted from the sample because of missing data regarding stock prices

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10. KBC Groep Nv (D) BE038099595
11. Metris BE0003859767
12. Montea C.V.A. BE0003853703
13. Nyrstar (D) BE0003876936
14. Oncomethylome BE0003844611
15. Punch Telematix BE0003855724
16. Suez Environnement FR0010613471
17. Thenergo (D) BE0003895159
18. Thrombogenics BE0003846632
19. Tigenix Nv BE0003864817
20. Transics Int. BE0003869865
21. VGP BE0003878957

Appendix 3.2
Listed companies deleted from the sample because of missing data regarding market-to-book values

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2. Arcelormittal   LU0323134006  12. Leasinvest-Sicafi  BE0003770840
5. Cegedel         LU0093533643  15. Mopoli Fond  NL0000488161
7. Envipco Hold. Cert NL0000349439  17. RTL Group  LU0061462528
10. Global Graphics FR0004152221