



# The performance of corporate legal insiders on the French stock market

Stanislas Nivellement de La Brunière, Jean-Come Haye, Paolo Mazza

## ► To cite this version:

Stanislas Nivellement de La Brunière, Jean-Come Haye, Paolo Mazza. The performance of corporate legal insiders on the French stock market. International Review of Law and Economics, 2020, 61, pp.105880. 10.1016/j.irle.2019.105880 . hal-02998232

**HAL Id: hal-02998232**

**<https://hal.science/hal-02998232>**

Submitted on 21 Jul 2022

**HAL** is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.



Distributed under a Creative Commons Attribution - NonCommercial 4.0 International License

Stanislas DE LA BRUNIERE<sup>a</sup>, Jean-Come HAYE<sup>a</sup>, Paolo MAZZA<sup>b,1</sup>

<sup>a</sup> IESEG School of Management, Lille, France

<sup>b</sup> IESEG School of Management, LEM-CNRS 9221, Lille, France

## ABSTRACT

This paper aims to examine the performance of legal insiders on the French market, from January 2011 to December 2017. We focus on purchase transactions in order not to face the many reasons that can force investors to close their position. Our results suggest that insiders generate an excess return over the SBF120 index on the short run. An outsider mimicking insiders' actions can generate similar profits. This implies that their informational advantage is rather short-lived. However, both of them fail to beat simulated random investors in general. Our findings highlight that the outperformance is rather stock-specific: insiders beat random investors for some stocks. We also disentangle management from non-management insiders and show that non-management insiders generate a lower average excess return than management insiders. Our simulation setup however shows that none of the groups is able to beat random investors for all the stocks, even if management insiders outperform the simulated series in more cases than non-management insiders.

Keywords: Insider, French stock market, simulation, trader's behavior, position

JEL Classification: K00, K22, G14, G18, C12, C15.

---

---

<sup>1</sup> Corresponding Author: Paolo Mazza, [p.mazza@ieseg.fr](mailto:p.mazza@ieseg.fr) ; IESEG School of Management, 3 Rue de la Digue, 59000 Lille (France)

Declaration of interests: none.

## 1. Introduction

Since corporate insiders are legally required to release all their transactions, many investors and speculators are meticulously following what insiders are doing. As a result, countless financial professionals, who are outsiders, analyze corporate insiders' recent transactions in order to infer information on price movements. As a consequence, outsiders are prone to process this information and make decisions upon it.

This paper contributes to the broad literature on insiders' performance. The literature has partly tried to provide answers to this question. [Lorie & Niederhoffer \(1968\)](#) show that the analysis of insider transactions' data can be valuable and profitable in the U.S. stock market. [Jaffe \(1974\)](#), [Finnerty \(1976\)](#) and [Madden \(1979\)](#) further demonstrate that insider traders were able to make positive, mainly large, trading profits, and that outsiders could also earn profits by simply mimicking the trading of insiders following the public release of insider open-market transactions data. Moreover, after the end of the 80s, the majority of studies ([Seyhun, 1986](#); [Benesh & Pari, 1987](#); [Rozeff & Zaman, 1988](#); [Seyhun, 1988](#); [Seyhun, 1990](#); [Lin & Howe, 1990](#); [Lakonishok & Lee, 1998](#)) demonstrate two main elements compared to previous research. First, insiders are still able to make abnormal profits, but these profits are not particularly large. Second, outsiders mimicking them are not able to earn abnormal returns, net of transaction costs. More recently, researchers have presented similar findings concerning the U.S. stock markets ([Tavakoli, McMillan & McKnight, 2012](#); [Cohen, Malloy & Pomorski, 2012](#); [Knewton & Nofsinger, 2014](#), [Tamersoy & al, 2014](#)): Insiders are still able to make abnormal returns from their transactions, but these abnormal returns are very small. In addition, research studies conducted on the German stock market ([Klinge, Seifert & Stehle, 2005](#); [Betzer & Theissen, 2005](#); [Stotz, 2006](#); [Dymke & Walter, 2008](#); [Linnertova & Deev, 2015](#)), on the Canadian stock market ([Morris & Boubacar, 2018](#)), on the Australian stock market ([Foley & al, 2016](#)), and on the British stock market ([Pope, Morris & Peel, 1990](#)) tend to confirm the same evidence: Corporate legal insiders are able to make abnormal returns. However, it is interesting to note that some studies present opposite findings. Indeed, [Eckbo & Smith \(1998\)](#), focusing on the Oslo Stock exchange from January 1985 to December 1992, find evidence of zero or even negative abnormal returns, over a 6-month holding period or less. They also show that stock markets are becoming more and more efficient as a whole on the short term, making it more difficult for insiders to benefit from private knowledge and/or information, and almost impossible for outsiders to display any abnormal return simply by mimicking them.

Overall, some key findings emerge from all these studies. First, it seems that there is information content in corporate insider trading transactions, as insiders are able to earn abnormal profits. Second, individual investors who only observe and then mimic the behavior of corporate insiders cannot really benefit from this strategy and earn abnormal returns. Third, all insiders' transactions do not carry the same type of

information: some of them can be useful and other irrelevant, depending, for instance, on the nature of the transaction, i.e., buy or sell trade.

In addition, the common law and regulations define the insider trading activity as an act of exploiting and abusing one's role in an organization, in order to gain information and knowledge, to lucratively trade in financial markets. As such, insider trading activity is construed in a limited and narrow meaning to signify situations where an individual is making transactions using privileged, private, and/or price sensitive knowledge for financial purpose. However, it can also more generally refer to all buys and sells of a corporate insider, regardless of whether she is using such type of private information or not. Our paper is based on the broader interpretation, considering all buys and sells. As a consequence, any distinction between legal and illegal insider purchase activities will be dismissed, assuming that illegal insider trading is either rare or efficiently addressed by the authorities. It is also almost impossible to precisely discover whether or not an insider is trading using private and restricted information; it seems natural that any corporate insider would know her company better than any other outsider and that they would have access to private information, even unconsciously.

In this paper, we aim to contribute to and extend the existing literature by focusing for the first time on corporate insiders' transactions on the French stock market. In addition, it uses a different methodology for analyzing insiders' transactions, focusing only on purchases, and leaving out sale transactions which may be considered as misleading and which lack real interpretation. Furthermore, this paper classifies corporate insiders' transactions in different groups based on the position of the insiders in the organization, i.e., management versus non-management. We also contribute significantly to the debate by comparing insider trading to random traders and assess their performance. To the best of our knowledge, our study is the first to focus on the French stock market and analyzing the outperformance of insiders as compared to any random investor.

The remainder of the paper is as follows. Section 2 details the theoretical background, the hypothesis development and the relation to the existing literature. Section 3 is devoted to data and descriptive statistics. Section 4 presents and discusses the empirical analyses. The final section concludes.

## **2. Background and hypothesis development**

The Efficient Market Hypothesis (EMH) presented in the works of Eugene Fama relies on the assumption that all available and accessible public and private information is completely reflected in a security's market price. As a consequence, no one can expect to obtain superior trading returns than others even if that person has access to a monopolistic source of information. Therefore, this theory assumes that

following insider trading activity is irrelevant and useless. One possible way to ascertain the value of the strong-form hypothesis of the EMH is to figure out whether or not insiders can make excess returns from their market transactions. In other words, one way to negate the efficiency of the stock markets would be to demonstrate an advantage of insiders over outsiders. Many studies on the U.S. stock market ([Lorie & Niederhoffer, 1968](#); [Jaffe, 1974](#); [Finnerty, 1976](#); [Madden, 1979](#); [Seyhun, 1986](#); [Benesh & Pari, 1987](#); [Rozeff & Zaman, 1988](#); [Seyhun, 1988](#); [Seyhun, 1990](#); [Lin & Howe, 1990](#); [Lakonishok & Lee, 1998](#); [Tavakoli, McMillan & McKnight, 2012](#); [Cohen, Malloy & Pomorski, 2012](#); [Knewton & Nofsinger, 2014](#); [Tamersoy & al, 2014](#)), the Canadian stock market ([Morris & Boubacar, 2018](#)), the German stock market ([Klinge, Seifert & Stehle, 2005](#); [Betzer & Theissen, 2005](#); [Stotz, 2006](#); [Dymke & Walter, 2008](#); [Linnertova & Deev, 2015](#)), the Australian stock market ([Foley & al, 2016](#)), the Polish stock market ([Wisniewski & Bohl, 2005](#)) or the British stock market ([Pope, Morris & Peel, 1990](#)) show that corporate insiders from different countries are able to generate abnormal returns, therefore reevaluating the strong form of the Efficient-Market Hypothesis.

In addition, there is a well-known and common belief that corporate insiders have a monopolistic and dominant access to private information, and the capacity to trade profitably their firm's stock thanks to this knowledge. Different research studies have demonstrated that corporate insiders use several types of private information or undisclosed knowledge to trade, and therefore to make money on a personal level. First of all, [Seyhun & Bradly \(1997\)](#) show that corporate insiders tend to profit from trading their own company's stock when it is currently filing for bankruptcy. Insiders intend to sell their shares just before their firms are declaring bankruptcy, and then buy back shares when stock prices have fallen largely and when they believe that their firm will survive. Insiders also benefit from other type of information. These forms of information may be related to takeover announcements ([Seyhun, 1990](#)), new issue releases ([Karpoff & Lee, 1991](#)), the listing and/or the delisting of public firms ([Lamba & Khan, 1999](#)), current or next dividend announcements ([John & Lang, 1991](#); [Chen, Davidson & Leung, 2011](#)), stock buybacks ([Lee, Mikkelsen & Partch, 1992](#)), securities class action litigation and settlement ([Summers & Sweeney, 1998](#); [Davis, Taghipour & Walker, 2016](#); [Davis, Taghipour & Walker, 2017](#)) or some other types of corporate events ([Seyhun, 1992](#); [Rozeff & Zaman, 1998](#); [Ma, Sun & Tang, 2009](#)). These events tremendously impact the firm's stock price. For instance, securities' prices most of the time drop before and after a class action litigation is announced, and have a tendency to soar when a settlement is announced. Aggregate results from [Summers & Sweeney \(1998\)](#) and [Davis, Taghipour & Walker \(2017\)](#) demonstrate that insiders significantly lessen their shareholdings before the class action litigation, and repurchase shares before a settlement is announced, taking personal financial advantage from their information set. Overall, even if it is legally forbidden, the use of private information and/or price sensitivity knowledge is often used by corporate insiders during special corporate events or before press releases to generate abnormal returns.

However, many of these experts do not consider that outsiders can earn abnormal returns by only following and mimicking their behavior, as it would embody a significant counterexample to the EMH. Its semi-strong form, which claims that past price movements and volume data do not affect stock price, and that all available public information is completely reflected in a security's market price at any time, then accepts that insiders can possess private information, and that they can use it to beat the market. However, the same semi-strong form states that outsiders cannot earn abnormal profits only by imitating insiders' actions. From the literature, on the one hand, [Benesh & Pari \(1987\)](#) examine the achievable return of outsiders mimicking insiders and find that outsiders can only earn modest abnormal profits. [Rozeff & Zaman \(1988\)](#) reach a similar conclusion that outsiders can profit from mimicking insiders, but that their returns are low. On the other hand, [Seyhun \(1986\)](#) examines the achievable returns of outsiders during the period from 1975 to 1981. To do so, he mimics the behavior of insiders, following their trades the first day the insiders' reports are available and received by the Security and Exchange Commission (SEC) in the U.S.. He finally finds that outsiders' abnormal returns are negative, net of all trading costs. Finally, [Lin & Howe \(1990\)](#) state that outsiders are simply precluded from earning abnormal returns. Therefore, according to these several studies, the semi-strong form of the EMH appears much harder to disprove. As such, financial markets seem to display some efficiency, preventing outsiders from making easy abnormal gains by simply mimicking insiders, in line with Eugene Fama's EMH theory.

The primary objective this paper will be to assess the validity of the strong and the semi-strong forms of the market efficiency theory. Using different holding periods, we first determine whether or not insiders are able to beat the market index, and so to earn aggregate abnormal returns from their trading activities, demonstrating if the market is consistent with the strong form. Second, we assess whether or not outsiders are able to earn abnormal returns just by mimicking insiders' transactions, and so assess whether the market is consistent with the semi-strong form.

All insiders do not have access to the same information. Even if they did, insiders are human being and are subject to behavioural biases affecting their judgements. As such, insiders may act differently. Since we cannot conjecture to what extent an insider process the information, several studies have analysed the differences among insiders' groups based on the positions in the company. For instance, [Wang & al \(2012\)](#) and [Knewton & Nofsinger \(2013\)](#) examine the difference of abnormal returns between CFO insiders and CEO insiders. Both studies discovered that CFOs' returns were larger than CEOs' returns. [Wang & al \(2012\)](#) argue that CFOs should be better informed about future earnings of their firms. [Knewton & Nofsinger \(2013\)](#) further mention that the difference of returns among CEOs and CFOs can be explained by the fact that CEOs face much more exposure and monitoring from market participants and regulators, and therefore their capacity to make regular and energetic transactions is weakened. In addition, [Tavakoli, McMillan and McKnight \(2014\)](#) show that only a minority of corporate insiders, mainly directors and officers, may be able to forestall market

fluctuations, and so to time the market with more accuracy compared to other categories of insiders. In their study, they demonstrate that there is a hierarchy of information among corporate insiders. Indeed, directors appear to be the most informed about their companies' prospects, closely followed by officers. On their part, 10% owners and other types of insiders do not seem to have predictive power on the company's future price. Similarly, [Davis, Taghipour & Walker \(2016\)](#) demonstrate that all insiders do not hold the same type of private knowledge concerning their firms. More precisely, the authors make the distinction between managing and non-managing insiders, and argue that there is a clear information asymmetry between both groups. As such managerial insiders possess much more private data on their company.

Therefore, the second objective of this paper is to examine the ability of the different groups of insiders – management and non-management, and directors and officers – to beat the market for the purpose of deciphering whether some insiders possess better trading/investing capabilities than other insiders, and whether corporate managers' transactions can rely on stronger and more reliable information.

Throughout this paper, we solely focus on analyzing the information content of corporate insiders' purchase transactions. Corporate insiders may have several reasons to sell the shares and close their positions using an open market transaction. Indeed, as outlined by [Ferreira \(1995\)](#), it can be for diverse purposes: desire for personal portfolio diversification, meeting some liquidity requirements and/or taking advantage from non-public data or knowledge. In addition, an insider could sell because she simply thinks that the market value of his company is currently overvalued. As an example, Peter Lynch (one of the most famous asset managers) explains in his book *"One Up On Wall Street"* that insider selling usually means nothing: "There are many reasons that officers might sell. They may need the money to pay their children's tuition or to buy a new house or to satisfy a debt. They may decide to diversify into other stocks." (pp. 144). On the other hand, there are much less reasons illustrating why insiders purchase shares in their firms. [Ferreira \(1995\)](#) argues that the main motive is to make money and/or to increase corporate control. More precisely, insiders can make money by either benefiting from non-public information or by either deciding to buy stocks in their company because they think it is undervalued. On its side, Peter Lynch also embraces this idea, arguing that there is only one reason explaining why insiders buy: it is because "they think that the stock price is undervalued and will eventually go up" (pp. 144). Therefore, using a basic logical reasoning, we can conjecture that the interpretation of the clear majority of buys will be useful, while not all sales transactions can provide relevant information.

### **3. Data**

Insider trading data comes from the insiders' trading database provided by Bloomberg. It covers the period from January 2011 to December 2017. The 120 biggest French large capitalization stocks composing

the SBF 120 index were chosen for the analysis in order to be representative of the French market, while guaranteeing sufficient market activity. All these stocks were traded on Euronext Paris from January 2011 to December 2017. The data on insider activities is collected on a daily basis for each individual company.

The following information is associated to each record in the database: the company's name, the company's Bloomberg code, the insider's name, the insider's type (director, officer, 10% owner or other), the transaction's date, the direction of the transaction (either a buy or a sale), the transaction's price, the transaction's volume in stocks, and thus the total transaction's size in euros.

The database contains more than 5,400 daily transactions made by corporate insiders in the 120 firms. Following [Lakonishok & Lee \(1998\)](#) and [Lamba & Khan \(1999\)](#), we exclude from our database all transactions of less than 100 shares. Moreover, following [Seyhun \(1988\)](#), [Lin & Howe \(1990\)](#), [Pope, Morris & Peel \(1990\)](#), [Lin & Howe \(1990\)](#) and [Lakonishok & Lee \(1998\)](#), we include only open-market purchase and sale transactions. Therefore, stock options, acquisitions of shares through bonus or rights issues, or grant and award transactions are excluded from our database, since they are not associated to a specific trading decisions from the insider.

In addition, we exclude from our primary database all transactions that present a daily absolute variation of more 5% between the firms' end of day price and the insiders' purchase price. It sometimes occurs that insiders purchase or sell stocks with a big discount or premium over the end of day price implying the impossibility for an outsider to mimic it. This is again consistent with the existing literature.

[Cohen, Malloy, and Pomorski \(2012\)](#) show in their study that corporate insiders' transactions can be divided into two different classes: first, there are predictable and identifiable "routine" insider trading, which are useless and do not bring any added value, and second, there are all the other insiders' transactions, which are assumed to present valuable and helpful information. More specifically, a "routine" insider trade can present one or many of the following traits:

- (a) An insider buying or selling in the same calendar month, for several years. For instance, we will not take into consideration the transactions of an insider that has purchased stocks at around the same date for a few years.
- (b) An insider buying or selling large quantities of stock for several days or weeks successively without interruption in less than a month. In this case, we considered the first transaction to be useful, and the following to be "routine" and so useless if there is not a whole month (or 20 trading days) separating two transactions in the same direction.



After filtering out these records, our dataset is composed of 2,867 corporate insider transactions: 1,044 purchase transactions and 1,823 sale transactions. This represents a total amount of transactions of 17.9 billion euros from January 2011 to December 2017.

Table 1 presents, the repartition of the number of transactions and of the amounts of transactions for both buy and sell insider transactions. If we analyze the amounts of the transactions, sales are worth 5 times more than buys. Therefore, there is a wide difference between the numbers and amounts of buys and sales.

If we analyze separately buy and sell transactions, we can see again a difference between the number of transactions and the amount of transactions. Firstly, considering the number of transactions, we notice that buys and sales are to some extent appropriately distributed from one year to another. Indeed, taking buy and sell transactions separately, none of the years represents more than 20% of the total number of transactions, and only one year (2011 in the Sell column) represents less than 10% of the total number of transactions. However, the amount of buy transactions varies from 3.1% in 2013 to 40.4% in 2015, and sell transactions fluctuate from 2.4% in 2011 to 25.0% in 2017.

	2011	2012	2013	2014	2015	2016	2017	Total
<i>Number of Transactions (in %)</i>								
Buy % Total	6.2%	4.7%	4.4%	4.7%	5.7%	6.7%	4.0%	<b>36.4%</b>
Buy % Buy	17.0%	12.8%	12.2%	13.0%	15.7%	18.3%	10.9%	<b>100.0%</b>
Sell % Total	5.8%	8.5%	8.0%	9.0%	11.5%	10.4%	10.4%	<b>63.6%</b>
Sell % Sell	9.2%	13.3%	12.5%	14.2%	18.2%	16.3%	16.3%	<b>100.0%</b>
<b>Total</b>	12.0%	13.1%	12.4%	13.8%	17.3%	17.1%	14.3%	<b>100.0%</b>
<i>Amount of Transactions (in %)</i>								
Buy % Total	1.8%	3.1%	0.2%	1.0%	7.6%	4.6%	0.4%	<b>18.9%</b>
Buy % Buy	9.5%	16.7%	1.3%	5.3%	40.4%	24.5%	2.4%	<b>100.0%</b>
Sell % Total	2.0%	12.2%	14.2%	8.1%	14.2%	10.2%	20.3%	<b>81.1%</b>
Sell % Sell	2.4%	15.1%	17.6%	10.0%	17.5%	12.5%	25.0%	<b>100.0%</b>
<b>Total</b>	3.8%	15.4%	14.5%	9.1%	21.8%	14.8%	20.7%	<b>100.0%</b>

**Table 1.** Number of transactions & amount of transactions per year

Table 2 displays, on a month by month basis, the repartition of the number of transactions and of the amounts of transactions for both buy and sell directions. The distribution of the number of transactions seems rather flat. However, considering the amount of transactions, we can see wide variations from one month to another. For instance, March represents about 45% of the monetary amount of buy transactions, but only 12.5% of the number of buy transactions. In addition, August represents only 1.1% of the amount of sell transactions, but 6.9% of the number of sell transactions.

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
<i>Number of Transactions (in %)</i>												
Buy % Total	2.0%	2.5%	4.6%	1.9%	3.7%	4.4%	2.0%	2.3%	4.5%	2.3%	3.1%	3.1%
Buy % Buy	5.6%	7.0%	12.5%	5.2%	10.2%	12.2%	5.4%	6.3%	12.5%	6.4%	8.4%	8.4%
Sell % Total	3.3%	5.2%	8.2%	4.6%	6.4%	6.7%	3.8%	4.4%	5.9%	4.1%	4.7%	6.2%
Sell % Sell	5.3%	8.2%	12.9%	7.3%	10.0%	10.6%	6.0%	6.9%	9.3%	6.4%	7.4%	9.8%
<b>Total</b>	5.4%	7.7%	12.8%	6.5%	10.1%	11.2%	5.8%	6.7%	10.4%	6.4%	7.7%	9.3%
<i>Amount of Transactions (in %)</i>												
Buy % Total	0.2%	0.5%	8.5%	0.8%	0.4%	0.5%	1.5%	0.3%	0.7%	4.4%	0.2%	0.9%
Buy % Buy	1.0%	2.5%	44.8%	4.5%	2.1%	2.6%	7.9%	1.8%	3.5%	23.2%	1.3%	5.0%
Sell % Total	13.0%	1.8%	4.2%	3.4%	10.9%	2.9%	8.5%	0.9%	14.1%	10.4%	7.1%	3.8%
Sell % Sell	16.1%	2.2%	5.2%	4.2%	13.5%	3.6%	10.5%	1.1%	17.4%	12.8%	8.7%	4.7%
<b>Total</b>	13.2%	2.3%	12.7%	4.2%	11.3%	3.4%	10.0%	1.2%	14.8%	14.8%	7.3%	4.7%

**Table 2.** Month by Month Number of Transactions & Amount of Transaction

The main aim of this paper is to decipher whether insiders, who are purchasing or selling their firm's security, are able to make abnormal market returns and to beat their index. A classic approach, often used in previous studies for computing aggregate abnormal returns, would be to recycle a long-short strategy: meaning that when an insider purchases shares it is analyzed as a bullish move (going long), and when an insider sells shares it is analyzed as a bearish move (going short). However, when an insider is selling stocks of her own firm – for whatever reasons – she is absolutely not shorting the market, and it does not necessarily mean that she has bearish views on the stock. She might just be willing to get the funds back in order to select better investment opportunities. The literature has highlighted this fact. For instance, [Madden \(1979\)](#) and [Seyhun \(1985\)](#) examine purchased stocks separately from sold stocks, understanding that these two forms of transaction were different. In line with this and consistent with the literature evidence presented here above, we only focus on buy transactions in the empirical section.

## 4. Empirical findings

### 4.1. Global insiders' returns

While focusing on global insiders' returns, our objective is twofold. First, we aim to evaluate the excess returns of insiders' trading activity. Second, we aim to assess the excess returns of outsiders' trading activity. Considering our second objective, an outsider will be defined as an individual mimicking the actions of an insider, with a delay of time of five market days. This delay represents the amount of time necessary for an insider to first send his transaction's declaration to the AMF (Autorité des Marchés Financiers, the French equivalent of the SEC), and second, the time required for the AMF to release it. We compute the excess returns of insiders (i) and outsiders (o) that purchase their firm's stocks as:

$$ER_{i,k,t} = R_{i,k,t} - R_{m,t}$$

$$ER_{o,k,t} = R_{o,k,t} - R_{m,t}$$

where  $ER_{i,k,t}$  represents the excess return of insider  $i$  on stock  $k$ , at time  $t$ ;  $R_{i,k,t}$  represents the return of insider  $i$  on stock  $k$ , at time  $t$ ;  $R_{m,t}$  represents the return on the value-weighted market index, at time  $t$ ; and  $ER_{o,k,t}$  represents the excess return of outsider  $o$  on stock  $k$ .

We test for 3-, 6-, 9-, 12-, 18-, and 24-month holding periods, consistent with [Madden \(1979\)](#) and [Rozeff & Zaman \(1988\)](#).

Table 3 presents the excess annualized returns of insiders and outsiders for purchase transactions, for different holding periods. We do not observe huge discrepancies between insiders and outsiders. These similarities are not surprising. Indeed, the delay of time between the insider's purchase, and the outsider mimicking the insiders' transaction is only five market days, and it is rather rare that markets' prices shift heavily in a so short period of time. The short term performance (11.3% for insiders for the 3-month period) is better than the long term performance (0.3% for insiders for the 24-month period), suggesting that insiders tend to benefit from short term information.

	3-Month	6-Month	9-Month	12-Month	18-Month	24-Month
Number of transactions	1,044	1,044	1,044	1044	1003	946
<i>Insiders' excess returns</i>						
Average	11.3%	5.2%	1.9%	1.8%	0.9%	0.3%
Median	2.8%	0.9%	-0.9%	0.0%	-0.4%	-1.6%
Min	-144.2%	-78.5%	-69.3%	-54.3%	-64.1%	-111.5%
Max	1374.7%	273.4%	180.6%	340.0%	315.4%	254.2%
Standard Deviation	71.4%	34.4%	25.8%	26.0%	22.0%	19.0%
<i>Outsiders' excess returns</i>						
Average	10.3%	5.0%	1.9%	1.8%	0.9%	0.3%
Median	4.4%	0.6%	-0.3%	-0.1%	-0.4%	-1.7%
Min	-139.3%	-78.6%	-69.9%	-54.5%	-63.0%	-111.5%
Max	1374.1%	273.3%	177.9%	385.5%	315.3%	254.2%
Standard Deviation	70.1%	34.1%	26.0%	26.6%	22.3%	19.2%
t-test 1: $H_0: \mu_i - \mu_o = 0$ (p-value) $H_1: \mu_i - \mu_o \neq 0$	0.7272	0.9260	0.9975	0.9874	0.9961	0.9982
t-test 2: $H_0: \mu_i = 0$ (p-value) $H_1: \mu_i \neq 0$	0.0000	0.0000	0.0184	0.0232	0.1845	0.6711
t-test 3: $H_0: \mu_o = 0$ (p-value) $H_1: \mu_o \neq 0$	0.0000	0.0000	0.0190	0.0250	0.1871	0.6756

**Table 3** : Insiders' and Outsiders' Performance.

This table presents different some statistics for the insiders' and outsiders' excess returns separately. The average, the median, the minimum value, the maximum value and the standard deviation are depicted. Three t-test are also conducted. t-test 1 compares the means of both groups,  $\mu_i$  and  $\mu_o$ . The homoscedasticity hypothesis has been tested using an F-test and we do not reject the null, i.e., the variances of the insiders' and outsiders' excess returns

distribution are equal. t-test 2 and 3 test whether the means of both groups are significantly different from zero. P-values of these tests are reported.

We mostly observe positive excess returns for outsiders and insiders. As such, both groups seem to beat the market on average, at least on the short run. We test this further by conducting several t-tests. t-Test 1 compares the means of the insiders' and outsiders' groups. The p-values clearly show that we do not reject the null hypothesis of mean equality in all cases. This indicates that outsiders are able to reproduce the performance of insiders for all the periods. t-Tests 2 and 3 test whether the means of the two groups significantly differ from zero. The p-values show that the null is rejected for the first four periods, i.e., till 12 months. This suggests that both groups are able to beat the market, at the 5% significance level, for all the periods below one year. For 18 and 24 months however, the p-value do not display any significance, even at the 10% level. This emphasizes the fact that the outperformance of insiders is rather short-lived and that index-investing is performing better on the longer run. All in all, these results show that an outsider can benefit from tracking insiders' actions to outperform the index on the short run and generate excess returns as large as the ones of insiders. Whether or not an outsider mimicking an insider performs better than a random investor remains however still unknown. Our next analysis precisely addresses this issue.

#### *4.2 Testing Insiders' Market Timing Ability*

The objective of this analysis is to investigate whether or not legal insiders beat a random investor. The random investor trades the same stocks, has the same number of transactions throughout the period but at different times. As such, we are able to assess the market timing ability of corporate legal insiders. We run simulations in order to compare insiders' returns to random simulations of buy trades.

Our simulation setup is established as follows. For each stock, we count the number of insider transactions,  $n$ . We then compute the total return in euros and the average return per trade for different holding periods. We then generate 100 samples of  $n$  randomly drawn buy trades and compute the same statistics for the same holding periods. We then generate  $p$ -value counters, i.e., the number of times a random investor beats the insider, for each stock separately. Since the differences between outsiders and insiders are not large, we only focus on insiders. This assumption is not strong since a random investor able to beat the insider is obviously able to beat the mimicking outsider. We include in this analysis stocks that display at least five buying trades from insiders recorded from January 2010 to December 2017. This amounts to 56 different stocks and 893 transactions. The different holding periods are the same as in the previous section. Finally, we compute the percentage of stocks for which random investors beat insiders at the 95% confidence threshold. The results are presented in Table 4.<sup>2</sup>

---

<sup>2</sup> The list of the corresponding stocks can be found easily on the Internet. It is also available upon request.

	Average Return (%)					Total return (euros)				
	1m	3m	6m	9m	12m	1m	3m	6m	9m	12m
AC	9	42	56	0	1	23	37	68	0	0
AF	0	0	0	0	0	0	0	0	0	0
AIR	100	100	100	100	96	100	100	100	100	96
ALO	0	0	0	0	0	0	0	0	0	0
AKE	100	100	100	100	100	100	100	100	100	100
ATO	100	100	100	100	100	100	100	100	100	100
CS	0	0	0	0	0	0	0	0	0	0
BNP	100	100	100	100	100	100	100	100	100	100
BOL	0	0	0	0	0	0	0	0	0	0
BVI	0	0	0	0	0	0	0	0	0	0
CA	0	0	0	0	0	0	0	0	0	0
CO	100	100	100	100	100	100	100	100	100	100
COV	100	100	100	100	100	100	100	100	100	100
BN	100	100	100	100	100	100	100	100	100	100
FGR	100	100	99	100	100	100	100	100	100	100
ERA	100	100	100	100	100	100	100	100	100	100
ETL	0	0	0	0	0	0	0	0	0	0
EO	0	47	98	95	91	100	100	100	100	100
GFC	100	100	100	100	100	100	100	100	100	100
GNFT	0	0	0	0	0	0	0	0	0	0
GET	0	0	0	0	0	0	0	0	0	0
RMS	100	100	100	100	100	100	100	100	100	100
ILD	100	100	100	100	100	100	100	100	100	100
NK	100	100	100	100	100	100	100	100	100	100
ING	100	100	100	100	100	100	100	100	100	100
IPN	0	15	32	19	29	18	20	44	45	53
IPS	0	0	0	0	0	0	0	0	0	0
DEC	0	0	0	0	0	0	0	0	0	0
KORI	0	0	0	0	0	0	0	0	0	0
MMB	0	0	0	0	0	0	0	0	0	0
LR	100	100	100	100	99	100	100	100	100	100
MMT	0	0	0	0	0	0	0	0	0	0
ML	100	100	100	100	100	100	100	100	100	100
NEX	0	0	0	0	0	1	3	0	0	0
NXI	0	24	78	99	100	100	100	100	100	100
RI	100	100	100	100	100	100	100	100	100	100
UG	0	0	0	0	0	0	0	0	0	0
PUB	100	100	100	100	100	100	100	100	100	100
RNO	100	100	100	100	100	100	100	100	100	100
RXL	0	0	0	0	0	0	0	0	0	0
SAF	0	0	0	77	76	0	13	62	85	51
SAN	100	100	100	100	100	100	100	100	100	100
SU	100	100	100	100	100	100	100	100	100	100
SCR	0	0	0	0	0	0	0	0	0	0
SK	100	100	100	100	100	100	100	100	100	100
SESG	0	0	0	0	0	0	0	0	0	0
BB	100	100	100	100	100	100	100	100	100	100
GLE	4	100	100	100	100	100	100	100	100	100
SOP	100	100	100	100	100	100	100	100	100	100
TCH	0	0	0	0	0	0	0	0	0	0
FP	0	0	84	100	100	100	100	100	100	100
UBI	0	0	0	0	0	0	0	0	0	0
VIE	0	0	0	0	0	0	0	0	0	0
VCT	100	100	100	100	100	100	100	100	100	100
VIV	0	0	0	0	0	0	0	0	0	0
MF	100	100	100	100	100	100	100	100	100	100
% of >95%	46%	48%	50%	52%	52%	54%	54%	54%	54%	54%

**Table 4.** This table presents the percentages of outperformance of the random investors over the insiders. The first column contains the Bloomberg ticker of the security. The other columns correspond to different holding periods for two distinct statistics: the average return in percentage and the total return in euros. A reading of 100 indicates that the random investors have outperformed the legal insiders in 100% of the cases. The last line of the table contains the percentages of values above the 95% confidence threshold.

These results are interesting in several ways. First of all, it is clear that the outperformance, if any, is stock-specific. We indeed observe that the occurrence of 0s and 100s is line-specific in the table. Second, the results are consistent across the different holding periods under scrutiny. For instance, for the stock “BNP”, corresponding to BNP Paribas, the outcome suggests that the random simulations outperform the insiders’ series in 100% of the cases, indicating that the legal insiders have a poor market timing ability. On the contrary, if we look at “CS”, i.e., AXA SA, we observe that it is actually the opposite: None of the simulations beats the insiders’ average and total returns. This specific case also demonstrates that the outperformance is not explained by industry-specific variables since AXA and BNP are both financials. Similar examples can easily be found in the sample. Third, when there is variability across holding periods, we most of the time observe increasing percentages, suggesting that more and more simulations beat the insiders’ initial series. This also indicates that the informational advantage is rather short-lived. These results also suggest that it might be profitable to follow insiders on some stocks, given the impossibility to outdo their performance. Yet, this would require a pre-analysis before deciding to trade in order to evaluate to which category the stock does belong. The last line of the table, which contains the percentage of stocks for which the simulations outperform the initial series in more than 95% of the cases, shows that roughly 50% of the stocks are related to insiders outperforming random investors. This clearly emphasizes their inability to beat the market in general. Over the short-run however, 46% of the random series beat the insiders, reinforcing our finding that insiders profit from short-lived information. Yet,  $p$ -value counters are not satisfying since we cannot accept the alternative hypothesis that insiders beat random investors.

Part of the explanation may come from corporate insiders’ groups: Insiders may hold different positions in the organization, meaning that they also have access to different sources of information. As a result, their information set, on which they ground their trading decisions, may be of better quality depending on the position in the company, i.e., management or non-management. The next section investigates this hypothesis.

#### *4.2. Following the Best Insiders*

In this section, we examine whether or not some insiders, based on their position, possess better trading or investing capabilities. This analysis is motivated by previous studies, notably [Wang & al \(2012\)](#), [Knewton & Nofsinger \(2013\)](#), [Tavakoli, McMillan and McKnight \(2014\)](#) and, [Davis, Taghipour & Walker \(2016\)](#) as discussed in Section 2.

There are three main types of corporate insiders, who are required to publish their trade transactions to the AMF: (a) Management insiders: either directors or officers. They have managerial functions within the organization, and they can be CEOs, CFOs, board’s chairmen, presidents, vice-presidents, directors or officers.

(b) Large stockholders: investors who own at least 10 percent of the equity and are not members of the management team. (c) Other insiders: physical persons or legal entities who are required to release their transactions, but are neither large shareholders nor members of the management. Our main a priori hypothesis is that management insiders have better insight about their firms' information and valuation, and therefore we suppose that they will present larger returns compared to non-management insiders (large shareholders and other insiders). Our second hypothesis, in line with the first one, is related to replication strategies: An investor following management insiders' trades should obtain a higher return than those following the other insiders. Table 5 presents the number of transactions for each insiders' group. We will not investigate the "10% owners" category since the sample does not present enough observations.

	<b>Management</b>	Directors	Officers	<b>Non-Management</b>	Others	10% Owners	<b>Total</b>
Buy	<b>845</b>	596	249	<b>199</b>	196	3	<b>1,044</b>
Sell	<b>1,548</b>	395	1,153	<b>275</b>	273	2	<b>1,823</b>
<b>Total</b>	<b>2,393</b>	991	1,402	<b>474</b>	469	5	<b>2,867</b>
% Buy	<b>29%</b>	21%	9%	<b>7%</b>	7%	0%	<b>36%</b>
% Sell	<b>54%</b>	14%	40%	<b>10%</b>	10%	0%	<b>64%</b>
<b>Total</b>	<b>83%</b>	35%	49%	<b>17%</b>	16%	0%	<b>100%</b>

**Table 5.** *Number of Transactions per Insider Category*

Table 6 presents the performance of the three main categories of insiders: Directors, officers and others. The three groups present very different performances. Over the short run, in line with previous results, directors and officers tend to beat the index, i.e., the t-test of zero-mean for the excess returns produces a p-value lower than 5%, suggesting that there is an informational advantage for management insiders. The results however indicate that this advantage is rather short-lived for directors since we do not reject the null hypothesis for periods beyond 6 months, while the null hypothesis is rejected for officers for all the periods, excepted for the 24-month period, whose p-value is significant only at the 10% significance level. The outperformance against the index of the others' category is not significant for all the periods, showing that these insiders have a lower informational advantage than management insiders.

These results are not surprising and tend to confirm our first hypothesis, that management insiders are more aware of their firms' intrinsic value, and have access to better sources of information. However, if we analyze the results of the comparison of the mean excess returns between officers and directors, we observe that the three-month difference is not statistically significant, even if the values are quite different (10.5% for directors and 18.5% for officers). This might be explained by the fact that the mean is driven by few outlier returns. Considering the median, the differences are indeed much less important. After that period, officers display an excess return which is bigger than the one displayed by directors, at the 5% significance level.

	3-Month	6-Month	9-Month	12-Month	18-Month	24-Month
<i>Director' excess returns</i>						
Average	10.5%	3.8%	0.6%	0.2%	-0.2%	-0.7%
Median	5.7%	0.8%	-1.1%	-1.8%	-0.4%	-1.6%
Min	-144.2%	-75.0%	-64.9%	-52.7%	-52.5%	-63.9%
Max	552.5%	184.3%	115.7%	161.4%	94.2%	88.7%
Standard Deviation	56.3%	31.5%	23.7%	21.3%	16.5%	14.2%
T-test: $H_0: \mu = 0$ ; $H_1: \mu \neq 0$ (p-value)	0.0000	0.0031	0.5156	0.8005	0.7597	0.2398
<i>Officers' excess returns</i>						
Average	18.5%	9.6%	6.4%	7.5%	5.5%	3.6%
Median	4.8%	4.7%	1.8%	4.9%	2.1%	-1.1%
Min	-100.5%	-78.5%	-59.0%	-54.3%	-50.8%	-111.5%
Max	1374.7%	273.4%	180.6%	340.0%	315.4%	254.2%
Standard Deviation	104.8%	42.0%	31.0%	36.6%	33.0%	29.3%
T-test: $H_0: \mu = 0$ ; $H_1: \mu \neq 0$ (p-value)	0.0058	0.0004	0.0013	0.0014	0.0118	0.0687
<i>Others' excess returns</i>						
Average	4.4%	3.1%	-0.2%	-0.4%	-1.2%	-0.9%
Median	-1.7%	-0.2%	-5.1%	-1.5%	-2.8%	-3.1%
Min	-138.1%	-74.9%	-69.3%	-52.2%	-64.1%	-39.4%
Max	439.5%	150.1%	92.4%	80.9%	69.2%	56.0%
Standard Deviation	58.1%	31.7%	24.2%	21.6%	18.6%	15.1%
T-test: $H_0: \mu = 0$ ; $H_1: \mu \neq 0$ (p-value)	0.2940	0.1760	0.9163	0.7842	0.3716	0.4487
T-test (p-value) $H_0: \mu_{dir} - \mu_{off} = 0$ $H_1: \mu_{dir} - \mu_{off} \neq 0$	0.2553	0.0502	0.0090	0.0036	0.0127	0.0371

**Table 6.** *Management and non-management insiders' excess returns.* This table presents some statistics about the three main categories of insiders, i.e., directors, officers and others. The average, the median, the minimum value, the maximum value and the standard deviation are depicted, as well as the p-values of the t-test of zero-means. The bottom panel depicts the results of a t-test (with unequal variances) for the comparison of the means of the directors' and officers' groups. The homoscedasticity hypothesis has been tested using an F-test and we reject the null, i.e., the variances of the directors' and officers' excess returns distributions are unequal.

Clearly, the “others” category seems to have much less informational advantage than directors and officers. As such, it might be possible for an outsider to beat a random investor by following only the best insiders. We conduct simulations similar to the previous section, considering separately the different corporate insiders' groups. Table 7 presents the results. For the sake of space, we only present the p-value counters, i.e., the percentage of stocks for which the random investors beat the corporate insiders at the 95% confidence threshold.<sup>3</sup> Again, no clear outperformance for each category. The pattern is more or less similar to the one presented in Table 4: many 100s and many 0s, showing that the outperformance is stock-specific. Yet, we observe some differences in the percentages, in line with the findings presented in Table 6. Insiders from the “others” category seem to have even more difficulties to beat the random investor than officers and

<sup>3</sup> Detailed results are available on request.



directors, at least on the short run: 52% of the random series beat the “others” while only 43% of them beat the “officers” for the 1-month holding period.

	1m	3m	6m	9m	12m
Directors	47%	45%	49%	49%	49%
Officers	43%	49%	43%	43%	46%
Others	52%	52%	52%	48%	48%

**Table 7.** *Percentage of stocks for which the simulated random investors beat the insiders’ group at a 95% confidence threshold.*

## 5. Concluding remarks

Insider trading has received significant attention from the research community in the past decades. Research studies have mostly focused on insiders’ performance in different markets, assessing whether or not their trading actions were financially profitable. This paper contributes to that strand of research. It aims to analyze whether corporate insiders are able to generate aggregate abnormal returns by purchasing their companies’ stocks on the French market, from January 2011 to December 2017. To the best of our knowledge, our study is the first to focus on this specific market.

We contribute to the literature in different ways. First, we focus solely on purchase transactions, seeking to discover whether insiders are able to profit from their transactions, and to beat their benchmark index, ruling out any decision forcing them to sell. Second, we examine both insiders’ and outsiders’ returns, assessing whether in either case they are able to profit from their transactions, and to beat the market. Third, we simulate random traders and assess whether or not insiders are able to beat them. Fourth, we split insiders in different groups – management and non-management – in order to see whether some insiders have better insight about their firms’ stocks compared to other ones. Finally, we conduct simulations in order to check whether each insiders’ group is able to beat the random investors.

Investigating firms belonging to French SBF 120 index, our results are generally supportive to the view that insiders and outsiders are able to first profit from their trading activities – they are able to generate statistically significant positive excess returns, on the short run. The profits tend to vanish when longer holding periods are considered. Our simulation results however point that the insiders are not able to statistically beat the random investors in general, for the global sample of stocks. Our results indicate however that insiders’ performance is clearly stock-specific and not industry-specific, and that insiders beat random investors in some cases.

Furthermore, when disentangling management and non-management insiders, our results show that there are statistically significant differences among the groups. Officers seem to be the best insiders, since they produce a statistically significant outperformance over both the directors' and the others' category, for most periods. Non-management insiders should have access to less information and generate a lower return on average on the short run. The differences are less important on the longer run. The simulation setup also highlights that none of the groups is able to statistically beat the random investors for all stocks on aggregate, showing again that the relationship is stock-specific. The percentage of stocks for which random investors beat the corporate insiders are however lower in the case of management insiders.

Future avenues of research may be related to the stock-specific feature of the insiders' performance. The stocks in our sample belong to different sectors and to different industries, have heterogeneous market capitalizations, display dissimilar balance sheet structures, show unrelated levels of sales, operating income, and earnings, present distinct margins and returns on capital, etc. One can investigate the stock-specific determinants of insiders' performance in order to identify stock categories which are worth tracking to outperform the market. This avenue is the agenda for further research on the field.

## References

- Benesh, G. A., & Pari, R. A. (1987). Performance of stocks recommended on the basis of insider trading activity. *Financial Review*, 22(1), 145-158.
- Betzer, A., & Theissen, E. (2009). Insider trading and corporate governance: The case of Germany. *European Financial Management*, 15(2), 402-429.
- Cheng, L. T., Davidson III, W. N., & Leung, T. Y. (2011). Insider trading returns and dividend signals. *International Review of Economics & Finance*, 20(3), 421-429.
- Cohen, L., Malloy, C., & Pomorski, L. (2012). Decoding inside information. *The Journal of Finance*, 67(3), 1009-1043.
- Davis, F., Taghipour, B., & Walker, T. J. (2017). Insider trading surrounding securities class action litigation and settlement announcements. *Managerial Finance*, 43(1), 124-140.
- Dymke, B. M., & Walter, A. (2008). Insider trading in Germany—Do corporate insiders exploit inside information?. *Business Research*, 1(2), 188-205.
- Eckbo, B. E., & Smith, D. C. (1998). The conditional performance of insider trades. *The Journal of Finance*, 53(2), 467-498.
- Ferreira, E. J. (1995). Insider trading activity, different market regimens, and abnormal returns. *Financial review*, 30(2), 193-210.
- Finnerty, J. E. (1976). Insiders and market efficiency. *The Journal of Finance*, 31(4), 1141-1148.
- Foley, S., Kwan, A., McInish, T. H., & Philip, R. (2016). Director discretion and insider trading profitability. *Pacific-Basin Finance Journal*, 39, 28-43.

- Jaffe, J. F. (1974). Special information and insider trading. *The Journal of Business*, 47(3), 410-428. John, K., & Lang, L. H. (1991). Insider trading around dividend announcements: Theory and evidence. *The Journal of Finance*, 46(4), 1361-1389.
- Karpoff, J. M., & Lee, D. (1991). Insider trading before new issue announcements. *Financial Management*, 18-26.
- Klinge, M., Seifert, U., & Stehle, R. (2005). Abnormal returns in the vicinity of insider transactions: Unbiased estimates for Germany, Working Paper, Humboldt University of Berlin
- Knewton, H.S., & Nofsinger, J.R. (2014). Why are CFO insider trades more informative?. *Managerial Finance*, 40(2), 157-175.
- Lakonishok, J., & Lee, I. (2001). Are insider trades informative?. *The Review of Financial Studies*, 14(1), 79-111.
- Lamba, A. S., & Khan, W. A. (1999). Exchange listings and delistings: The role of insider information and insider trading. *Journal of Financial Research*, 22(2), 131-146.
- Lee, D. S., Mikkelsen, W. H., & Partch, M. M. (1992). Managers' trading around stock repurchases. *The Journal of Finance*, 47(5), 1947-1961.
- Lin, J. C., & Howe, J. S. (1990). Insider trading in the OTC market. *The Journal of Finance*, 45(4), 1273-1284.
- Linnertová, D., & Deev, O. (2015). Insider Trading Activities and Returns of German Blue Chips. *Acta Universitatis Agriculturae et Silviculturae Mendelianae Brunensis*, 63(6), 1995-2003.
- Lorie, J. H., & Niederhoffer, V. (1968). Predictive and statistical properties of insider trading. *The Journal of Law and Economics*, 11(1), 35-53.
- Ma, Y., Sun, H. L., & Tang, A. P. (2009). Do insiders have inside tracks: An examination of Wall Street Journal's Inside Track columns?. *International Review of Economics and Finance*, 3(18), 520-530.
- Madden, G. P. (1979). The performance of common stocks after intensive trading by insiders. *Financial Review*, 14(1), 27-35.
- Madden, G. P. (1979). The Timeliness of Contemporaneous Trades by Insiders. *Financial Review*, 14(4), 68-68.
- Morris, T., & Boubacar, H. (2018). Abnormal returns on Canadian insider purchases before press releases. *Management Research Review*, 41(10), 1220-1250.
- Pope, P. F., Morris, R. C., & Peel, D. A. (1990). Insider trading: Some evidence on market efficiency and directors' share dealings in Great Britain. *Journal of Business Finance & Accounting*, 17(3), 359-380.
- Rozeff, M. S., & Zaman, M. A. (1988). Market efficiency and insider trading: New evidence. *Journal of Business*, January, 25-44.
- Rozeff, M. S., & Zaman, M. A. (1998). Overreaction and insider trading: Evidence from growth and value portfolios. *The Journal of Finance*, 53(2), 701-716.
- Seyhun, H. N. (1986). Insiders' profits, costs of trading, and market efficiency. *Journal of financial Economics*, 16(2), 189-212.
- Seyhun, H. N. (1988). The information content of aggregate insider trading. *Journal of Business*, 1-24.

- Seyhun, H. N. (1990). Overreaction or fundamentals: Some lessons from insiders' response to the market crash of 1987. *The Journal of Finance*, 45(5), 1363-1388.
- Seyhun, H. N. (1992). Why does aggregate insider trading predict future stock returns?. *The Quarterly Journal of Economics*, 107(4), 1303-1331.
- Seyhun, H. N., & Bradley, M. (1997). Corporate bankruptcy and insider trading. *The Journal of Business*, 70(2), 189-216.
- Stotz, O. (2006). Germany's new insider law: The empirical evidence after the first year. *German Economic Review*, 7(4), 449-462.
- Summers, S. L., & Sweeney, J. T. (1998). Fraudulently misstated financial statements and insider trading: An empirical analysis. *Accounting Review*, 131-146.
- Tamersoy, A., Khalil, E., Xie, B., Lenkey, S. L., Routledge, B. R., Chau, D. H., & Navathe, S. B. (2014). Large-scale insider trading analysis: patterns and discoveries. *Social Network Analysis and Mining*, 4(1), 201.
- Tavakoli, M., McMillan, D., & McKnight, P. J. (2012). Insider trading and stock prices. *International Review of Economics & Finance*, 22(1), 254-266.
- Tavakoli, M., McMillan, D., & McKnight, P. J. (2014). The Credit Crunch and Insider Trading. *Financial Markets, Institutions & Instruments*, 23(2), 71-100.
- Wang, W., Shin, Y. C., & Francis, B. B. (2012). Are CFOs' trades more informative than CEOs' trades?. *Journal of Financial and Quantitative Analysis*, 47(4), 743-762.
- Wisniewski, T. P., & Bohl, M. T. (2005). The information content of registered insider trading under lax law enforcement. *International Review of Law and Economics*, 25(2), 169-185.