

Former Insiders' Trading

Erik Johannesson

Submitted in partial fulfillment of the
requirements for the degree of
Doctor of Philosophy
under the Executive Committee
of the Graduate School of Arts and Sciences

COLUMBIA UNIVERSITY

2018

© 2018

Erik Johannesson

All rights reserved

ABSTRACT

Former Insiders' Trading

Erik Johannesson

Using detailed and unique data from Sweden, I show that former insiders trade profitably in the shares of companies with which they used to be affiliated. A trading strategy mimicking former insiders' trading behavior yields abnormal returns of 7.6% per year. These returns are primarily driven by post-separation purchases rather than by sales. They do not reflect general stock-picking skills: former insiders earn significantly lower abnormal returns when trading in companies with which they have no affiliation. I show that former insiders' informational advantage diminishes over time, but less so if they have ties to current insiders. The importance of such ties increases in the presence of value-relevant information. My results are consistent with former insiders benefiting from both a retained informational advantage and from inside information obtained post-separation when trading in inside stock.

Table of Contents

List of charts, graphs, and tables.....	ii
Acknowledgements.....	iii
1. Introduction.....	1
2. Institutional setting and data	5
2.1 The Swedish equity market and setting	5
2.2 Data overview	6
3. Abnormal returns to former insiders' trading	11
3.1 Risk measurement and counterfactuals.....	11
3.2 Former insiders and inside stock: buy, sell, and hedge portfolios	11
3.3 Informational advantage or general stock-picking skills?	13
4. Retained or obtained informational advantage	16
4.1 The distinction between obtained and retained information	16
4.2 The time-series pattern of abnormal returns	17
4.3 Decoupling the mechanisms of retained and obtained informational advantages	20
4.4 Future value-relevant information and the probability of buying	25
5. Discussion of findings and conclusions	29
References.....	56
Appendix A1: Notable U.S. court cases regarding transmission of inside information	60
Appendix A2: Ties to current insiders using calendar-time portfolios	61

List of charts, graphs, and tables

Exhibit 1: Variable definitions.....	31
Table 1: Sample description.....	32
Table 2: Quarterly returns for trading insiders (during and after tenure as insider)	34
Table 3: Descriptive statistics of former insiders, trades, and companies	36
Table 4: Raw and calendar-time abnormal returns for former insiders' purchases and sales of inside stock.....	39
Table 5: Former insiders' purchases of outside stock.....	40
Table 6: Former insiders' sales of outside stock.....	42
Table 7: Abnormal returns and time since declassification	45
Table 8: Correlations of main continuous variables	47
Table 9: Initial multivariate analyses of future abnormal returns.....	48
Table 10: Quintile analyses of Ties and AfterDays	49
Table 11: Multivariate analyses of the interaction effects of Ties and AfterDays on future abnormal returns	50
Table 12: Value-relevant information and the probability of a former insider buying inside stock	52
Table 13: Heatmaps of the association between Buy and future abnormal returns for 25 combinations of Ties and AfterDays quintiles.....	54
Table A1: Abnormal returns and ties to current insiders	64
Figure A1: Risk-adjusted returns on trades in inside stock and ties to current insiders	65

Acknowledgements

I would like to extend my deepest gratitude to my advisor Shivaram Rajgopal and my dissertation committee members Dan Amiram, Fabrizio Ferri, Urooj Khan, and Per Olsson, as well as to Alexander Ljungqvist, who has been truly instrumental to this project. I am grateful to Krister Modin at Euroclear; Anders Anderson, Erik Eklund, Carmine Palombo, and Paolo Sodini at the Swedish House of Finance for their help with the data on which this dissertation is based; and the Columbia Human Research Protection Office for their guidance on data handling. I owe special thanks to Seil Kim and April Klein for their help during this project's inception, and to Jim Ohlson for his comments and for everything he has taught me. I would also like to extend my deepest thanks to James Walsh and Linda Walsh for their help and support. Finally, I thank workshop participants at Baruch College, Columbia Business School, Euroclear Sweden, IESE Business School, Miami University, Pace University, the University of California-Irvine, the University of North Carolina at Chapel Hill, the University of Southern California, the University of Texas at Dallas, and Yale School of Management for constructive comments and suggestions. All remaining errors are my own.

1. Introduction

Insider trading laws—rules prohibiting corporate insiders from trading on material non-public information—aim to protect investors from “manipulative and deceptive practices [...] in connection with the purchase or sale of any security” (Securities Exchange Act of 1934: 17 CFR 240.10B-5). Academic research argues that allowing insider trading may result in benefits such as improved managerial decisions (Bhide 1993), increased efficiency of allocations in the securities markets through signaling (Manne 1966, 2005), and the elimination of expenditures on search and verification of information (Carlton and Fischel 1983). The empirical evidence of benefits associated with allowing insider trading, however, is mixed. For example, Bhattacharya and Daouk (2002) show that initial enforcement of insider trading legislation is followed by a *reduction* in the cost of capital. Beny (2007) provides evidence that countries in which insider trading laws are more stringent have more liquid stock markets and more dispersed stock ownership. As discussed at length in Bainbridge (2014), the collective evidence of the academic literature on capital market effects of insider trading regulation seems to suggest that the proposed benefits outweigh the proposed costs.

In most countries, insider trading legislation is centered around current insiders; once they have left the firm with which they were associated, former insiders are generally free to trade in its shares without further restrictions. Similarly, in most countries, current—but not former—insiders are required to disclose their trades in inside stock.¹ Previous literature shows that current insiders use their informational advantage to earn abnormal returns when trading in inside stock (e.g., Rozeff and Zaman 1998; Lakonishok and Lee 2001; Aboody, Hughes, and Liu 2005; Huddart and Ke 2007; Skaife, Veenman, and Wangerin 2013). Whether or not this extends to former

¹ For example, current U.S. insiders are required to disclose any changes in holdings of inside stock within two days, a requirement which no longer applies post-separation (Securities and Exchange Commission: Forms 3, 4, 5).

insiders has, to my knowledge, not been addressed in the literature thus far. Recently declassified insiders are likely more similar to current insiders than to typical retail investors, in terms of the information they possess or are able to obtain. It could therefore be argued that former insiders should be subject to similar monitoring and disclosure requirements as current insiders, following declassification, to ensure equal access to information in the capital markets.²

In this paper, I investigate whether former insiders continue to enjoy an informational advantage post-separation, a question which ought to be relevant to regulators, policymakers and authorities charged with enforcing insider trading laws. Specifically, I investigate the extent to which former insiders trade in what was previously considered inside stock and whether or not they earn abnormal returns on such trades. First, I document the prevalence and magnitude of abnormal returns that former insiders gain by trading in inside stock. Second, I try to distinguish between the mechanisms of having access to private information and possessing general stock-picking skills. Third, I attempt to establish the relative importance of *retained* and *obtained* informational advantages for former insiders' ability to earn abnormal returns on inside stock.³

Former insiders may depart with private information that is *directly* relevant to the value of the company with which they used to be affiliated. They may also continue to have ties to current insiders and may use these ties, in a tipper-tippee relationship, to obtain private information.⁴ Finally, former insiders may have developed firm-specific analytical abilities and/or

² Many proposed benefits of allowing insider trading are unlikely to apply to insider trading by former insiders. By contrast, the costs associated with insider trading, such as reduced investor confidence, are likely applicable to former-insider trading.

³ Under the current U.S. legal regime, the source of former insiders' private information matters—trades based on private information that insiders retain from the inside are easier for the SEC to prosecute than trades based on private information obtained after departure, all else equal. This provides additional motivation to investigate the time-series properties of any informational advantage that former insiders have.

⁴ For example, on January 23, 2017, Bloomberg News reported that the former CEO of the Swedish tech company Fingerprint Cards had been arrested for insider trading after authorities had grown suspicious of large-scale sales of the company's shares preceding a profit warning in December 2016. Fingerprint Cards' stock plummeted 18% upon

depart with private information that is *indirectly* relevant to the value of the company, such as information that allows them to better interpret and contextualize future public information. It is by no means clear, *ex ante*, what the dominating mechanism is.

Using detailed and unique data from Sweden, where individual investors' trades can be systematically traced in a way that is not possible in the U.S., I show that former insiders earn abnormal returns when trading in inside stock.⁵ A calendar-time portfolio strategy leads to annualized four-factor alphas of 6.0% for purchases and 1.7% for sales. The former is significantly different from zero, in both a statistical and an economic sense, and motivates a focus on former insiders' purchases. These results are consistent with the literature on current insiders, which largely finds open-market transactions to yield abnormal returns only for purchases, not for sales (e.g., Lakonishok and Lee 2001; Jeng, Metrick, and Zeckhauser 2003; Ravina and Sapienza 2010). The lack of results for insiders' sales is commonly attributed to sales driven by insiders' need for liquidity and portfolio diversification.

The granularity of my dataset, which accounts for 100% of each included company's ownership structure, allows me to compare former insiders' trades in inside stock to trades in stock of companies with which they were never affiliated ("outside stock"). I use these trades as person-specific counterfactuals to separate general stock-picking skills from other plausible mechanisms. Former insiders earn significantly larger abnormal returns on inside stock than on outside stock; in fact, they earn zero abnormal returns on outside stock. My results are hence more consistent with former insiders benefiting from a firm-specific informational advantage than with former insiders possessing superior stock-picking skills.

release of the profit warning. A current board member, suspected of having passed on inside information to the former CEO, was also arrested (Bloomberg News 2017).

⁵ The disclosure requirement may, in fact, have a deterrent effect on former insiders, implying that my results may be understated relative to what they would have been in the U.S. setting, all else being equal.

To separate *retained* informational advantages from *obtained* informational advantages, I investigate the role of time since declassification and of having ties to current insiders. Results show that the magnitude of abnormal returns on inside stock that former insiders earn reduces with time since declassification and does so gradually rather than immediately. Former insiders purchasing inside stock during the first, second, and third year after declassification earn abnormal returns of 10.4%, 6.1%, and 0.4%, respectively. In light of the gradual attenuation, I cautiously interpret these results as consistent with former insiders benefiting not only from a *retained* informational advantage, but also from *obtained* private information. This interpretation is reinforced by the positive association between abnormal returns and the number of remaining ties to current insiders that former insiders have at the time of trade. Specifically, the further away in time from the declassification date a trade takes place, the stronger the positive association between former insiders' ability to earn abnormal returns and the number of ties to the inside they have.

My study contributes to the academic literature on insider trading in two main ways. First, to my knowledge, this paper is the first to focus on how *former* insiders trade in inside stock post-separation. My findings suggest that regulators ought to consider extending insider trading laws and/or disclosure requirements to cover former insiders, potentially for years after separation. Second, my results on the importance for former insiders of retaining ties to current insiders contributes to the literature on information transfers through social networks. Previous literature has shown social networks to be an important mechanism through which information is shared between interlocked boards, financial intermediaries, and other market participants (Cohen, Frazzini, and Malloy 2010, Larcker et al. 2005, Conyon and Muldoon 2006, Faccio 2006, Fisman et al.). I add to this stream of literature by providing evidence consistent with former insiders remaining part of current insiders' networks for an extended period of time. The abnormal returns

I document can be viewed as a quantification of the value for former insiders of remaining in the same network as current insiders. Collectively, and more broadly, I contribute by emphasizing that being a corporate insider is significantly more binary than having access to inside information.⁶

2. Institutional setting and data

2.1 The Swedish equity market and setting

The Swedish stock market, dating back to the 18th century, is a fully developed and modern market catering to both domestic and international investors. The main stock exchange, Nasdaq Stockholm, is part of the Nasdaq Nordic group. At the end of 2016, there were approximately 360 listed companies in Sweden with a total market value of SEK 6,479 billion, approximately USD 720 billion (Statistics Sweden). Of these, 67 were available to U.S. investors as ADRs, either via U.S. exchanges or U.S. OTC markets. Notable companies include Ericsson (telecommunications), Electrolux (domestic appliances), H&M (clothing), Skanska (construction and building materials), and Volvo (trucks and other vehicles). The Stockholm 30 index is among the top four most-traded blue chip indices in Europe (Nasdaq.com 2017).

Insider trading regulation in Sweden closely resembles that of the U.S. The Market Abuse Act of 2005 (“*Lag (2005:377) om straff för marknadsmissbruk vid handel med finansiella instrument*,” MAA for brevity) states that certain corporate positions are automatically classified as insiders. These include board members, certain high-ranking officers, auditors, and shareholders owning more than 10% of a class of a company’s equity, along with their immediate family members (SFS 2000:1087). Any trading activity in inside stock by these persons must be promptly reported to the authorities. The explicit intent of this transparency is to deter corporate insiders

⁶ Throughout the paper, I refrain from taking a stand on whether the trading activities documented are legal. To prove *culpa* or *dolus* beyond reasonable doubt and show that a specific trade made by an individual former insider is unlawful is different from analyzing the trading behavior of former insiders in the aggregate.

from unlawful trading activities. In this regard, the Swedish regulatory environment is similar to its American counterpart (Securities Exchange Act of 1934).

As for former insiders, the MAA states that anybody who knowingly possesses inside information is legally considered an insider. If a current insider transmits inside information to an outsider, the latter automatically becomes an insider in the eyes of the law and is barred from trading on this information. There is no legal distinction between trading based on private information *retained* and private information *obtained*, which contrasts with the U.S. legal setting (discussed further in Section 4).

2.2 Data overview

My empirical analyses use Swedish stock-ownership data, obtained via Euroclear Sweden, which clears virtually all transactions in listed Swedish companies. My dataset comprises quarterly holding balances of every person and entity owning Swedish stock, regardless of insider classification and regardless of whether the stock is held directly or indirectly.⁷ It captures a quarterly snapshot of each listed company's ownership structure, down to the level of individual owners. This enables me to determine the net change in holdings for each shareholder of each listed company.

Ownership data from Euroclear have been used in previous studies in accounting and finance, due in part to the unique way in which they allow researchers to identify individual owners.⁸ Specifically, Swedish companies are mandated to maintain an up-to-date record of their complete ownership structure, no older than three months (Aktiebolagslag 2005:551). This record is referred to as the "Book of Equity Owners" and constitutes public information: anybody may

⁷ Indirect ownership via foreign brokerages is shown in aggregated form.

⁸ See, for example, Berkman, Koch, and Westerholm (2014), Kallunki, Nilsson, and Hellström (2009); Kallunki, Mikkonen, Nilsson, and Setterberg (2016). See Grinblatt and Keloharju (2000) for a detailed description of the Euroclear database.

visit the headquarters of a Swedish company and ascertain the current ownership structure, down to the level of individual investors.⁹ Euroclear collects and aggregates these public data into one database. Nearly all listed Swedish companies use Euroclear's services to comply with the mandated record-keeping. At their Stockholm headquarters, Euroclear provides dedicated computer terminals, which the public may use to determine whether a certain individual or entity owns a particular stock.

In contrast to its Swedish counterpart, the American setting provides little insight into companies' ownership structure. Generally, data on stock ownership are not public information in the U.S. There are a few notable exceptions in which stock-ownership information is public, primarily for persons or entities likely to possess or have access to private information. For example, corporate insiders—directors, officers, and investors owning more than 10% of a class of a company's equity—are required to file a Form 3 the first time they acquire inside stock. Subsequent changes to their holdings are to be reported on Form 4 (Securities and Exchange Commission: Forms 3, 4, 5). This is public information. In addition, institutional investment managers with equity assets of at least \$100 million are required to file a Form 13F every quarter to disclose any long equity positions they currently possess. However, apart from these and a few other exceptions, equity ownership is a private matter in the U.S.: not even the issuer knows who its owners are or what its ownership structure looks like. Researchers interested in individual-level ownership data are confined to corporate insiders or institutional investors, or data subsets of retail investors acquired from brokerages (see, for example, Barber and Odean 2000). In this regard, the Euroclear dataset holds a distinct advantage—it comprises 100% of the ownership structure due

⁹ Holders with fewer than 500 shares are not shown in the Book of Equity Owners.

to its completeness. An additional advantage is that it can be merged with other datasets via common identifiers.

One such dataset used in this paper comes from Sweden’s financial supervisory authority, Finansinspektionen (FI). FI maintains a registry of all corporate insiders in Sweden, dating back to the year 2000, and tracks their starting date, their ending date, and the name of the company for which they worked. The FI dataset also contains the position that each insider held, and in cases of multiple positions, their respective start date and end date. Most important, it also contains the same identifiers as the Euroclear dataset.

Reporting requirements for corporate insiders in Sweden and the U.S. are similar. In both countries, an insider must report any trading activity in insider stock to the authorities (FI and the SEC, respectively) within five days after the transaction took place (two days in the U.S.) (SFS 2000:1087, Securities and Exchange Commission: Forms 3, 4, 5). Transparency is comparable for current insiders, but it differs once the individual ceases to be an insider: in the U.S., former insiders’ trades can no longer be observed, whereas in Sweden, former insiders’ net trading behavior is still observable, albeit only quarterly.¹⁰ This disclosure may have a deterrent effect on former insiders, implying that my results may be understated relative to what they would have been in a U.S. setting, all else being equal.

In addition to the data sources described above, I use daily stock price data from the Swedish database FinBas and the book value of equity data from Compustat Global. I obtain the risk-free rate from the Swedish central bank, Riksbanken. Lastly, I use IBES for analyst forecasts of quarterly earnings.

¹⁰ Section 16 filers—a term which is typically used interchangeably with “insiders”—must still file Section 16 reports for transactions occurring within a period of less than six months of any opposite-way transaction that took place while they were still insiders (Eigenbrodt 2014).

Table 1 presents descriptive statistics for the final sample, which consists of the intersection of the Euroclear, FI, and FinBas datasets.¹¹ As expected, the former insiders in my sample sell inside stock more often than they buy inside stock (with 5438 sales and 3470 purchases, respectively). The imbalance presumably derives from previous endowments. The time-series spans Q1 2006 through Q4 2015 and contains data on 4,673 former insiders from 361 unique companies. Table 2, Panel A presents descriptive statistics regarding the quarterly (raw) returns to the trades that former insiders make. It shows that raw returns following an increase in insiders' holdings are significantly larger than zero, for both inside stock (i.e. stock of the company at which the person is/was an insider, depending on specification) and outside stock. By contrast, raw returns following a decrease in insiders' holdings are positive for outside stock and negative for inside stock. As a point of reference, the average quarterly return on the Swedish stock market over the relevant period was 2.25%, which closely mimics the average raw returns on the two portfolios containing outside stock. Although preliminary, this result indicates that any trading advantage that insiders have regarding inside stock does not necessarily apply to outside stock. This issue will be revisited in Section 3 below.

Table 2, Panel B augments Panel A and presents quarterly market-adjusted buy-and-hold abnormal returns for the former insiders in my sample. On average, increases in former insiders' stock holdings are followed by positive abnormal returns. This is true for both outside and inside stock. Table 2, Panel B also shows that former insiders' abnormal returns are smaller than those of current insiders. This result is expected, given that current insiders have larger informational endowments and thus greater potential to time their trades well, either by making profitable trades or by avoiding unprofitable trades. It is also worth noting that the use of performance-based equity

¹¹ Penny stocks—stocks with prices lower than a dollar—have been excluded due to their low liquidity.

awards may result in an endogenous relationship between holding increases during tenure and abnormal returns. This would be the case if performance-based stock were awarded in one quarter, and news of high performance were disclosed in the subsequent quarter.

Returning to former insiders, Table 2, Panel B shows that decreases in holdings are followed by significantly negative market-adjusted abnormal returns, consistent with insiders also timing their sales well. This result is slightly unexpected, given the lack of significant results in prior literature on current insiders' selling (Jeng et al. 2003), but reinforces the conclusion drawn from the preliminary results regarding purchases: former insiders seem to time their trades in inside stock well.

Table 3, Panels A-D show additional descriptive statistics of former insiders, of their purchases and sales of inside and outside stock, and of the companies in which they trade. Average abnormal returns, in dollar terms, amount to 23,479 (inside purchases) and 5,930 (inside sales), compared to 565 for outside purchases and 737 for outside sales. Based on the descriptive statistics in Table 3, the distribution of dollar abnormal returns is flatter for outside stock than for inside stock. Furthermore, the distribution of dollar abnormal returns pertaining to purchases of inside stock appears to be skewed to the right. A preliminary interpretation consistent with these empirics is that former insiders not only know when to buy but also when *not* to buy inside stock.

With respect to trade size, Table 3 shows that inside trades are larger than outside trades, on average. This may reflect former insiders' greater confidence in their trading decision, or, in the case of sales, a heightened demand for liquidity and/or portfolio diversification, following declassification.

3. Abnormal returns to former insiders' trading

3.1 Risk measurement and counterfactuals

My main tests are based on calendar-time portfolios, designed to mimic the trading behavior of former insiders with certain characteristics.¹² I use daily return data and rebalance the portfolios quarterly. To control for known covariances of returns, the daily raw portfolio returns are regressed on a portfolio representing market returns minus the risk-free rate, the size and book-to-market factors SMB and HML (Fama and French 1993), and the momentum factor UMD (Carhart 1997). SMB, HML, and UMD are not publicly available for the Swedish equity market, prompting me to create these factors myself.¹³

To assess whether any abnormal returns derive from an informational advantage or from stock-picking skills, I compare the returns that former insiders earn on inside stock to the returns that former insiders earn on outside stock. I define outside stock as stock of companies at which the former insider has never been an insider between 2000 and 2016 (the boundaries derive from data limitations). The primary advantage of this counterfactual is that it holds the individual former insider constant. Hence, any difference in returns earned on inside and outside stock cannot be attributed to differential skill levels.

3.2 Former insiders and inside stock: buy, sell, and hedge portfolios

I proceed by devising a trading strategy that mimics former insiders' observable change in ownership of inside stock from one quarter to another, separately for increases and decreases in holdings. This results in one Buy portfolio and one Sell portfolio. These portfolios are held for one quarter, after which the procedure is repeated and the portfolios are rebalanced.

¹² See Fama (1998), Loughran and Ritter (2000), and Mitchell and Stafford (2000) for the merits and drawbacks of the calendar-time portfolio approach to risk-adjustments relative to buy-and-hold abnormal returns.

¹³ Substituting the Fama-French European Factors, available on Kenneth French's website, do not materially change any of my results.

Assuming an equal dollar investment in each stock, the portfolio return on date t , R_{pt} , is calculated as $\sum_n(x_{ist} \times R_{ist})/\sum_n(x_{ist})$, where R_{ist} is the gross date t return on stock s for insider i , n is the number of stocks in the portfolio, and x_{ist} is the compounded daily return of stock s for insider i from the day of portfolio formation through day $t-1$. The variable x_{ist} equals 1 for all stocks the day after portfolio formation. Abnormal returns are calculated as the intercept from the OLS regression:

$$R_{pt} - R_{ft} = a + b_1(R_{mt} - R_{ft}) + b_2SMB_t + b_3HML_t + b_4UMD_t + e_t \quad (1)$$

where R_p is the daily portfolio return, R_f is the risk-free rate, and R_m is the value-weighted market index return. The remaining covariates represent factor-mimicking portfolios capturing the effects of size, book-to-market, and momentum. SMB is the small minus big (market value of equity) portfolio return, HML is the high minus low (book-to-market value of equity) portfolio return, and UMD is the up minus down (past yearly stock price movement) portfolio return. The calendar-time portfolio approach closely follows that of Barber et al. (2006), Barber et al. (2007), and Ljungqvist, Malloy, and Marston (2009).

Table 4 presents the results. Raw returns for the Buy, Sell and for the long-short (Buy-Sell) portfolios are positive on average (Columns 1-3), and they are distinctly larger for the Buy portfolio compared to the Sell portfolio. The risk-adjusted abnormal returns for the Buy portfolio (Column 4) amount to 6.0% on an annualized basis, assuming 252 trading days per year. The results are strongly indicative of former insiders earning abnormal returns when buying inside stock after their tenure has ended.

Although not statistically significant, the annualized raw returns of 5.2% for the Sell portfolio in Column 2 are inconsistent with former insiders strategically selling before large stock price declines. Adjusting for risk results in negative abnormal returns (Column 5), but these are

statistically insignificant and small in magnitude. I hypothesize that this is due to noise stemming from liquidity and diversification trades, as discussed in Section 1: the signal I seek to isolate does not seem strong enough to dominate the noise.

Columns 3 and 6 show results for the long-short portfolio Buy-Sell. The annualized raw return is 8.4% and is strongly statistically significant ($t = 4.63$). Adjusting for common risk factors yields an alpha of 7.6% ($t = 4.42$). These abnormal returns are both statistically and economically significant and provide further evidence consistent with former insiders earning abnormal returns when trading in the stock of companies with which they used to be affiliated.

Collectively, the results in Table 4 show that the abnormal returns that former insiders earn on inside stock are concentrated to purchases rather than to sales, consistent with prior literature on insider trading (Lakonishok and Lee 2001, Jeng, Metrick, and Zeckhauser 2003, Ravina and Sapienza 2010). What Table 4 does not show, however, is the source behind the abnormal returns documented; this is addressed next.

3.3 Informational advantage or general stock-picking skills?

I attempt to discern the extent to which the abnormal returns former insiders earn by trading in inside stock can be attributed to the following mechanisms, which are not mutually exclusive:

- i) *general stock-picking skills*
- ii) *an obtained informational advantage*
- iii) *a retained informational advantage.*

Point iii) above could be further decomposed into *retained stock-specific analytical abilities* and *retained stock-specific private information*: former insiders may have greater abilities to interpret the information received through public disclosure (e.g., Kim and Verrecchia 1991), or they may have access to private information prior to a value-relevant event (e.g., Glosten and Milgrom

1985). These two alternative mechanisms are inherently difficult to separate, and in this paper, I do not attempt to do so. I instead focus on the issue of whether former insiders *obtain* an informational advantage post-separation, which ought to be the more relevant issue for regulators and policymakers.

As a first step, I investigate the extent to which my data supports mechanism i) above, *general stock-picking skills*. If the abnormal returns documented in Table 4 resulted from general stock-picking skills, such skills would presumably manifest themselves not only for trades in inside stock but also for trades in outside stock. To test this, I create portfolios based on changes in holdings of former insiders' outside stock.¹⁴ This introduces a tradeoff between sample size and proximity in time: the more closely in time I require outside trades to occur in relation to inside trades, the smaller the sample size. I analyze the following three (sub)samples separately: the first subsample contains purchases (sales) of outside stock that occur *in the same quarter* as a purchase (sale) of inside stock, for a given former insider. The second subsample consists of purchases (sales) of outside stock that occur *in the period $[q-4, q+4]$* relative to a purchase (sale) of inside stock in quarter q . These two subsamples are hence conditioned on the existence of more or less concurrent inside and outside trades for each included former insider, and I omit any inside trades for which there are no corresponding outside trade, and vice versa. The third subsample consists of the full set of former insiders' outside trades, which I compare to the full set of former insiders' inside trades, regardless of timing.

I construct hedge portfolios by going long the portfolio consisting of inside stocks and short the portfolio with outside stocks. The hedge portfolios, constructed as in Table 4, hence compare the returns to purchases and sales in holdings of inside stock to those of outside stock. Results are

¹⁴ A similar identification strategy is employed by Rajgopal and White (2014), using SEC employees.

presented in Table 5 (purchases) and Table 6 (sales). Each table is further divided into three panels, showing results corresponding to the three (sub)samples described above. The first column in Tables 5 and 6 presents the average annualized return for outside stock, and the second column shows returns for inside stock. For ease of comparison, in the third column I replicate the results of Column 1, Table 4, which shows returns for a portfolio consisting of all inside trades, regardless of whether there was a concurrent outside trade.

Table 5, Column 1 shows that former insiders earn raw returns of 7.4% (Panel A) to 9.2% (Panel C) when they buy outside stocks. Columns 4 through 7, however, make it clear that former insiders earn larger returns on their purchases of inside stock than on their purchases of outside stock. The difference ranges from 4.4% to 7.2% with significance levels better than 1% in all specifications. This lends strong support to the interpretation that former insiders do not possess general stock-picking skills.

The results for former insiders' sales of inside and outside stock in Table 6 show that sales of outside stock, on average, are followed by higher returns than sales of inside stock, but the risk-adjusted difference is only significant in one of six specifications (see Columns 6 and 7). This is consistent with former insiders being as likely to sell inside stock that experiences negative future returns as to sell outside stock that experiences negative future returns.¹⁵ Table 6 hence fails to provide compelling evidence that former insiders earn greater returns selling inside stock than selling outside stock. This result contradicts the preliminary market-adjusted results in Table 2, Panel B, but is in line with results for *current* insiders' sales (Jeng et al. 2003, Johannesson and Kim 2018). To reiterate, I hypothesize that the lack of result for former insiders' sales is due to noise stemming from liquidity and portfolio diversification trades.

¹⁵ Or, conversely, as likely to sell inside stock that experiences positive future returns as to sell outside stock that experiences positive future returns.

Viewed collectively, the results in Tables 5 and 6 do not support the idea that former insiders are equally good at trading outside stock as they are at trading inside stock. Any superior stock-picking skills that former insiders possess do not seem to be general: the evidence presented is not consistent with former insiders earning abnormal returns on inside stock because they possess superior stock-picking skills that apply to the whole universe of stocks.

4. Retained or obtained informational advantage

4.1 The distinction between obtained and retained information

Additional motivation for exploring the mechanisms behind the abnormal returns that former insiders earn on inside stock derives from intricacies of the U.S. legal system. The purpose of this section is to show that trading based on transmitted private information is a contested area of the law, and that prosecution of former insiders seems to depend on the source and timing of the information transmitted, in the current U.S. legal regime.

In many countries, such as the U.K. and Sweden, trading on inside information is illegal, regardless of how the inside information was acquired. This is not the case in the U.S., where a breach of fiduciary trust is a prerequisite, a result of the seminal U.S. Supreme Court ruling in *Dirks v. SEC* (1983). *Dirks* implicitly assumes that former insiders are still considered bound by fiduciary trust regarding material private information they *retain* upon departure. Similar language is typically found in insiders' contracts, explicitly prohibiting them from trading on any private information retained until it has entered the public domain or become redundant. By contrast, private information that former insiders *obtain* after declassification, through a tipper-tippee relationship, would not automatically lead to assumptions of fiduciary trust or duty on the part of the tippee. Without any breach of fiduciary trust on the part of the tipper, the tippee is unlikely to

be successfully prosecuted for insider trading under the current U.S. legal paradigm (Bainbridge 2014).

A number of famous U.S. court cases shed light on the ambiguity of conditioning prosecution of insider trading on the breaching of fiduciary trust. See Appendix A1 for a brief overview. Suffice to say here that, even if detected by the monitoring systems that the exchanges and the SEC already have in place, trading based on transmitted inside information may be difficult to successfully prosecute. In light of this additional motivation, the empirical analyses below should also be of interest to legal scholars debating the adequacy, relevance, and necessity of the breach of fiduciary trust requirement for successful prosecution of insider trading.

4.2 The time-series pattern of abnormal returns

I proceed to investigate whether the abnormal returns that former insiders earn on inside stock derive from a *retained* or *obtained* informational advantage by first exploring the time-series pattern of the abnormal returns documented above. I partition former insiders' inside trades based on the time between declassification and the trade, the idea being that trades based on a *retained* informational advantage likely come earlier than trades based on *obtained* value-relevant information. It is well to note that if abnormal returns earned on inside stock vary with time since declassification, this would be inconsistent with the mechanism of general stock-picking skills, discussed in the previous section. Such skills presumably exhibit low time variation.

Table 7 shows abnormal returns for calendar-time portfolio strategies which mimic former insiders' trades in inside stock, grouped according to when they occur in relation to the quarter of declassification. Panel A shows purchases, Panel B shows sales, and Panel C shows results for the long-short portfolio. The first partition contains trades made in quarters 1-4 after declassification,

the second partition contains trades made in quarter 5-8, and so on.¹⁶ Figure 1 graphically depicts how the abnormal returns vary across partitions.

Table 7, Panel A shows that the abnormal returns documented in Table 4 likely are driven by purchases that occur relatively soon after declassification (10.4% and 6.1% annualized abnormal returns for purchases observed 1-4 and 5-8 quarters after declassification, respectively). The last three partitions, corresponding to purchases observed 9-20 quarters after declassification, fail to show significant abnormal returns. Since abnormal returns are not solely clustered in the immediate near-term after declassification, but rather exhibit a drift, I cautiously interpret the evidence as supportive of former insiders trading also on *obtained* value-relevant information. In a relative sense, it seems less plausible that undisclosed value-relevant information could be *retained* by a departing insider and still be value-relevant and undisclosed four to eight quarters later. This argument could be extended to three, two, and possibly even one quarter after declassification, but given the limited overall sample size, the resulting portfolios would be too small for such analyses. It is not clear to me whether this reasoning applies also to retained firm-specific abilities to contextualize public information. Concrete, alternative means through which former insiders could obtain private information would add further validity to the mechanism of *obtained* private information. This will be further investigated in Section 4.3.

Turning next to the results for sales of inside stock in Panel B, there are no significant abnormal returns for any partition. Table 7, Panel B does show small negative abnormal returns for two of the partitions, consistent with well-timed sales, but they do not meet the hurdle of statistical significance. Again, this result is not surprising given the evidence in Jeng et al. (2003) and Johannesson and Kim (2018), which show that current insiders' sales of inside stock are

¹⁶ Ideally, I would have created one calendar-time portfolio per quarter-since-declassification, but this would have resulted in too few observations per portfolio, making them exceedingly susceptible to outliers.

generally not followed by negative abnormal returns. Insiders' portfolios tend to be over-concentrated in inside stock (Bitler, Moskowitz, and Vissing-Jørgensen 2005; Becker 2006).¹⁷ Newly declassified former insiders would thus be inclined to sell inside stock shortly after declassification, for diversification reasons. Selling for diversification and/or liquidity reasons would dilute any signal coming from informed trades. An explanation that is consistent with the (lack of) results for the Sell portfolios' abnormal return pattern in Table 7 is that there are two offsetting forces, both of which deteriorate with time. If former insiders' informational advantage (either *retained* or *obtained*) is largest shortly after declassification and deteriorates with time, any information-based trades may be drowned by noise trades from newly declassified former insiders rebalancing their portfolios or selling for liquidity reasons. This implies that, with the passage of time, both the informational advantage and the non-informational, dilutive trades would diminish, possibly continuing to negate each other. Based on this reasoning, I note that an abnormal returns pattern consistent with the general stock-picking skills mechanism would show low abnormal returns shortly after declassification (because of information dilution) and increase with the passage of time, as fewer and fewer former insiders divest excess inside stock. This pattern is not observable in Table 7, adding to the evidence in Section 3.

Applying the above reasoning to former insiders who buy inside stock may help explain the buy signal's strength: a newly declassified former insider likely is more heavily concentrated in inside stock relative to a former insider declassified long ago. For diversification reasons, he or she may hence be less prone to invest in inside stock, *ceteris paribus*. This implies that purchases of inside stock made by newly declassified former insiders should be more informative of future abnormal returns than similar purchases made long after declassification.

¹⁷ E.g. due to equity compensation or firm-specific holding requirements.

Collectively, the evidence presented thus far is consistent with former insiders obtaining private value-relevant information after declassification, but I have not convincingly ruled out the alternative explanation of insiders retaining informational advantages, either due to retained private information or due to retained firm-specific analytical abilities. Evidence of potential alternative channels through which private information may be obtained would help disentangle the two mechanisms. This will be explored in Section 4.3. I conclude this subsection by summarizing my findings thus far: former insiders seem to earn abnormal returns, which are not only statistically but also economically significant, when trading in inside stock. Given the lack of results in Section 3 regarding general stock-picking skills, this points to former insiders benefiting from either firm-specific stock-picking skills or unequal access to information. My inability to rule out the latter ought to be of interest to regulators and policymakers.

4.3 Decoupling the mechanisms of retained and obtained informational advantages

The evidence of former insiders trading on an *obtained* informational advantage has thus far been indirect, in the sense that I have not been able to rule out this mechanism. For more direct support, I next investigate a plausible channel through which former insiders obtain private information, post-separation. In doing so, I also provide corroborating evidence on previous results using a different research design. Results in this section derive from quarterly market-adjusted buy-and-hold abnormal returns, which allow me to investigate cross-sectional variation in former insiders' ability to earn abnormal returns in ways that would not be feasible using calendar-time portfolios, due to the limited size of my sample.¹⁸

As a prelude to my multivariate tests, Table 8 shows correlation matrices for the subsamples containing former insiders' purchases of inside stock (Panel A) and sales of inside

¹⁸ I refrain from taking a stand in the debate over which methodology is superior, buy-and-hold abnormal returns or calendar-time abnormal returns. For an overview of the arguments, see Mitchell and Stafford (2000).

stock (Panel B). Pearson correlations are presented above the diagonal, and Spearman correlations below. The main continuous variables used in subsequent tests, defined in Exhibit 1, are included. My primary variables of interest are *Ties* (the number of persons, with whom the former insider concurrently served, who still remain insiders at the time of trade) and *AfterDays* (the number of days between declassification and the time at which I observe a change in holdings).

As expected, *Ties* is negatively correlated with *AfterDays*. *AfterDays*, per the analyses in Section 4.2, is in turn negatively correlated with abnormal returns. Intuitively, both the number of ties to remaining insiders and the ability to generate abnormal returns on inside stock—regardless of mechanism—likely deteriorates with time since declassification. The magnitude of the correlation, approximately 30%, indicates that the interaction effects between *Ties* and *AfterDays* are worth investigating.

I first proceed to a multivariate setting without interactions and analyze the effects of all main variables on next-quarter market-adjusted buy-and-hold abnormal returns. I estimate the following regression (indices i , j , and t represent former insiders, firms, and time, respectively), with results shown in Table 9.

$$\begin{aligned}
 BHAR_{i,j,t+1} = & a + b_1Ties_{i,j,t} + b_2AfterDays_{i,j,t} + b_3\#Insiderships_{i,j,t} + b_4HighPosition_{i,j,t} + \\
 & b_5TradeSize_{i,j,t} + b_6BM_{j,t} + b_7BHAR_lag_{j,t} + b_8MV_{j,t} + e_{i,j,t}
 \end{aligned} \tag{2}$$

Regarding purchases of inside stock, Table 9 shows that the coefficient on *Ties* is significantly positive ($t = 1.82$), implying that a former insider who has more ties at the time of trade earns higher abnormal returns in the quarter following purchase, all else equal. As expected, the coefficient on *AfterDays* is significantly negative ($t = 2.07$). *#Insiderships* (defined as the number of companies at which a given former insider has had an inside position, in the sample period) is strongly negative and implies that well-connected former insiders are less likely to earn abnormal

returns on inside stock. I speculate that this may be due to higher reputational costs and/or lower marginal utility of additional wealth. Omitting *#Insiderships* from Equation (2) renders *HighPosition* (defined as a dichotomous variable, indicating whether the former insider was a CEO, vice president, and/or board member at the company at which he or she was an insider) significantly negative, which lends further support in favor of this conjecture. Lastly, the strong positive effect of *TradeSize* (defined as the natural logarithm of the value of the trade, in Swedish krona) is consistent with insiders investing more if they are more confident in their private information and/or abilities.

Turning next to sales of inside stock, Table 9 shows that former insiders' sales are generally not followed by significantly negative abnormal returns. The intercept, although negative, is not statistically significant. Furthermore, any ability to time sales of inside stock deteriorates with time, as evidenced by a positive and strongly significant coefficient on *AfterDays* ($t = 4.81$). One interpretation is that the further away from the declassification date a former insider moves, the less likely he or she is to avoid selling prior to future positive abnormal returns. The coefficient on *Ties* is also significantly positive. This is inconsistent with former insiders receiving private information through these ties prior to a stock price decline, but consistent with former insiders selling stock soon after declassification, when the number of ties retained is presumably large. Finally, one can note the strong significance of the lagged BHAR variable ($t = 8.83$). Prior literature has shown that *current* insiders tend to sell after a stock-price run-up (Jeng et al. 2003). This explanation, coupled with residual returns momentum, would be consistent with the observed empirics. Together with the evidence in Section 4.2, the lack of support for negative abnormal returns following sales of inside stock suggests a future focus on purchases. The analysis of former

insiders' sales of inside stock seems too fraught with confounding factors for any inferences to be made.

As prefaced by the correlations in Table 8, investigating whether ties to the inside constitute a credible mechanism through which former insiders earn abnormal returns necessitates attention to the relationship between *AfterDays* and *Ties*. Before proceeding to a multivariate and interactive setting, I independently sort the sample of former insiders' purchases of inside stock on *AfterDays* and *Ties* into quintiles. Table 10 shows that average market-adjusted abnormal returns increase monotonically in *Ties* for the first three quintiles, but not for the last two. I interpret this as consistent with a decreasing marginal benefit of having ties to the inside for former insiders. The difference in average abnormal returns between the extreme quintiles is 3.0 percentage points ($t = 3.57$). The relation between average market-adjusted abnormal returns and the *AfterDays* quintiles exhibits strict monotonicity, with a difference in average abnormal returns between the extreme quintiles of -1.5 percentage points ($t = 1.81$).

I continue to investigate the effects of *Ties* and *AfterDays* on former insiders' ability to generate abnormal returns by using the quintiles described above in a multivariate setting. Unlike Equation 2, Equation 3 takes into consideration the interactive effects of *Ties* and *AfterDays*. The variables in 3a are defined as before; *AfterDays_Q* and *Ties_Q* are discrete variables with values ranging from 0 through 4 to indicate which *AfterDay* and *Tie* quintile an observation belongs to; *AfterDays_Q_i* and *Ties_Q_i* (i in $\{1, 2, 3, 4, 5\}$), are indicator variables for *AfterDays* and *Ties* quintiles, respectively. In total, Table 11 shows results for six specifications nested in Equations 3a, 3b, 3c, and 3d.

$$\begin{aligned}
 BHAR_{i,j,t+1} = & a + b_1AfterDays_{i,j,t} + b_2Ties_{i,j,t} + b_3AfterDays_{i,j,t} \times Ties_{i,j,t} + b_4BM_{j,t} + \\
 & b_5BHAR_{lag_{j,t}} + b_6MV_{j,t} + e_{i,j,t}
 \end{aligned} \tag{3a}$$

$$BHAR_{i,j,t+1} = a + b_1AfterDays_Q_{i,j,t} + b_2Ties_Q_{i,j,t} + b_3AfterDays_Q_{i,j,t} \times Ties_Q_{i,j,t} + b_4BM_{j,t} + b_5BHAR_lag_{j,t} + b_6MV_{j,t} + e_{i,j,t} \quad (3b)$$

$$BHAR_{i,j,t+1} = a + b_1Ties_{i,j,t} + b_2AfterDays_Q2_{i,j,t} + b_3AfterDays_Q3_{i,j,t} + b_4AfterDays_Q4_{i,j,t} + b_5AfterDays_Q5_{i,j,t} + b_6Ties_{i,j,t} \times AfterDays_Q2_{i,j,t} + b_7Ties_{i,j,t} \times AfterDays_Q3_{i,j,t} + b_8Ties_{i,j,t} \times AfterDays_Q4_{i,j,t} + b_9Ties_{i,j,t} \times AfterDays_Q5_{i,j,t} + b_{10}BM_{j,t} + b_{11}BHAR_lag_{j,t} + b_{12}MV_{j,t} + e_{i,j,t} \quad (3c)$$

$$BHAR_{i,j,t+1} = a + b_1Ties_Q_{i,j,t} + b_2AfterDays_Q2_{i,j,t} + b_3AfterDays_Q3_{i,j,t} + b_4AfterDays_Q4_{i,j,t} + b_5AfterDays_Q5_{i,j,t} + b_6Ties_Q_{i,j,t} \times AfterDays_Q2_{i,j,t} + b_7Ties_Q_{i,j,t} \times AfterDays_Q3_{i,j,t} + b_8Ties_Q_{i,j,t} \times AfterDays_Q4_{i,j,t} + b_9Ties_Q_{i,j,t} \times AfterDays_Q5_{i,j,t} + b_{10}BM_{j,t} + b_{11}BHAR_lag_{j,t} + b_{12}MV_{j,t} + e_{i,j,t} \quad (3d)$$

Table 11 supports that former insiders' ability to earn abnormal returns on inside stock is positively associated with the number of ties they retain and negatively associated with time passed since declassification. This result holds for specifications using the *AfterDays* and *Ties* quintiles as well as for specifications using the corresponding continuous variables. Furthermore, Columns 3-6 show evidence consistent with *Ties* becoming more important with the passage of time.¹⁹ The negative association between abnormal returns and *AfterDays* is positively modified by the number of ties to current insiders that the former insider has at the time of the trade. For example, Column 6 shows that in the lowest *AfterDays* quintile (i.e. the quintile with former insiders most recently declassified), the effect of having more ties to current insiders is close to zero. The consistently negative coefficients on the *AfterDays* quintile indicator variables show that having few ties becomes more and more "costly" with the passage of time. Finally, the interactions are consistently positive and with increasing statistical significance, supporting that the importance of having ties to the inside increases with time since declassification.

¹⁹ Appendix A2 corroborates these findings using calendar-time portfolios.

Returning to the part of this paper's motivation that derives from the intricacies of the U.S. legal system, the consistent evidence regarding *Ties* presented in Tables 9-11 lends more direct support for the alternative mechanism of information transmission, or tipping. If these trades had occurred in the U.S., the SEC would have had to establish a breach of fiduciary trust or misappropriation of private information on the part of the tipper, in order to successfully prosecute the tippee, which may be a non-trivial hurdle. Under the assumption that former insiders in the U.S. act similarly to former insiders in Sweden, removing the breach of fiduciary trust requirement established in *Dirks* would hence have real-world consequences. It is possible that removing the breach of fiduciary trust requirement may better align the legal regime with policy favored by the Supreme Court. As stated in Nagy (2008): "Taken together, Chiarella, Dirks, and O'Hagan evidence a Supreme Court willing to stretch fiduciary principles to no small degree, when doing so facilitates a desirable policy outcome."

4.4 Future value-relevant information and the probability of buying

To further corroborate my results, and to introduce a specific role for information, I next address how the existence of value-relevant information affects former insiders' propensity to trade. This extends the analysis in the previous subsection insofar that it recognizes that keeping ties to current insiders is a necessary but not sufficient condition for profitable trading: there must exist value-relevant information for the kept ties to transmit. Stated differently, proximity to the inside, in terms of both time since declassification and ties retained, ought to benefit former insiders particularly when there is undisclosed information with high value-relevance.

Based on the evidence in Elliott, Morse, and Richardson (1984), which shows that trading by current insiders occurs most frequently near unanticipated changes in earnings, I choose to focus on future disclosure of quarterly earnings, and I explore how former insiders trade in relation

to this information event.²⁰ A similar test design is employed in Brochet (2010), using current insiders. I hand-collect IBES identifiers for the companies in my sample, linking by ISIN codes, company name, and organization number. This results in a sample of approximately 250 out of the original 361 companies. For these, I construct a market-based measure of unexpected quarterly earnings, denoted *AnnRet*, which is defined as the market return in a three-day window surrounding the quarterly earnings announcement.²¹

Using the linear probability model outlined in Equation 4, I investigate the probability of observing an increase in insider holdings among former insiders, as a function of time since declassification, ties retained, and unexpected quarterly earnings. The focus is on the latter construct, and, in particular, how it modifies the relationship between the probability of buying and *AfterDays* and *Ties*, respectively.

$$P(\text{Buy}_{i,j,t} = 1) = a + b_1\text{AfterDays}_{i,j,t} + b_2\text{Ties}_{i,j,t} + b_3\text{AnnRet}_{j,t+1} + e_{i,j,t} \quad (4a)$$

$$P(\text{Buy}_{i,j,t} = 1) = a + b_1\text{AfterDays}_{i,j,t} + b_2\text{Ties}_{i,j,t} + b_3\text{AnnRet}_{j,t+1} + b_4\text{AfterDays}_{i,j,t} \times \text{AnnRet}_{j,t+1} + b_5\text{Ties}_{i,j,t} \times \text{AnnRet}_{i,j,t+1} + e_{i,j,t} \quad (4b)$$

Table 12, Columns 1 and 2, show that, regardless of specification, *AfterDays* is strongly negatively associated and *Ties* is strongly positively associated with the probability of former insiders purchasing inside stock, consistent with prior results. Furthermore, before including the interaction terms, Column 1 shows that the announcement return variable *AnnRet* is significantly positively associated with the probability of buying ($t = 2.09$). This is perhaps expected given the previous

²⁰ More recently, firm-specific policies restricting the timing of insider trades may prohibit such trading by current insiders (Bettis, Coles and Lemmon, 2000; Roulstone, 2003).

²¹ Inspection of the underlying analyst forecasts shows that there are relatively few forecasts per company-quarter, and that the forecasts that do exist, on average, are quite stale. This is why I focus on the stock market's reaction to the earnings disclosure.

results but seems to contradict the results in Brochet (2010) for current insiders.²² Interacting *AnnRet* with *AfterDays* and *Ties* do not yield the hypothesized results: Table 12, Column 2 shows that neither of the interactions are significant. This result is not consistent with former insiders using ties to obtain information about unexpected earnings. The association between having ties to the inside and the probability of purchasing inside stock does not seem to be affected by next-period earnings surprises.

I next extend the analysis of announcement returns to include any value-relevant news, without knowing exactly what they are, and relate them to the propensity of former insiders to buy inside stock. Specifically, I increase the return window from three days to one whole quarter, and investigate if the propensity to purchase inside stock is related to abnormal returns in the subsequent quarter.²³ Concretely, I estimate the following equations:

$$P(\text{Buy}_{i,j,t} = 1) = a + b_1\text{AfterDays}_{i,j,t} + b_2\text{Ties}_{i,j,t} + b_3\text{BHAR}_{j,t+1} + e_{i,j,t} \quad (4c)$$

$$P(\text{Buy}_t = 1) = a + b_1\text{AfterDays}_{i,j,t} + b_2\text{Ties}_{i,j,t} + b_3\text{BHAR}_{j,t+1} + b_4\text{AfterDays}_{i,j,t} \times \text{BHAR}_{j,t+1} + b_5\text{Ties}_{i,j,t} \times \text{BHAR}_{j,t+1} + e_{i,j,t} \quad (4d)$$

Results are presented in Table 12, Columns 3 and 4. As in the case of unexpected quarterly earnings in Columns 1-2, the effects of *AfterDays* and *Ties* continue to be significantly negative and positive, respectively, regardless of specification. Column 3 shows that next-quarter abnormal returns are positively associated with the probability that a former insider buys inside stock.

²² In Brochet (2010), Table 7, next-quarter earnings surprises pre-SOX is insignificantly positively associated with current insiders' purchases of inside stock. The *marginal* effect of shifting from pre- to post-SOX is negative and weakly significant. The *net* association between next-quarter earnings and insiders' purchases, post-SOX, is slightly negative but the significance level is not shown. Given the modest significance level of the marginal effect and that the main effect and the marginal effect are of opposing signs, it is likely that the net effect is indistinguishable from zero in a statistical sense.

²³ This test is akin to the perfect foresight measure in Francis and Schipper (1999) and to the tests concerning insiders' trading behavior prior to bad news in Ravina and Sapienza (2010).

Interestingly, Column 4 shows that this effect reduces to zero in the absence of ties to current insiders. The coefficient on $Ties_{i,j,t} \times BHAR_{j,t+1}$ is positive and strongly significant ($t = 4.51$), which I interpret as evidence consistent with ties being more important in the presence of value-relevant information, or, conversely, that value-relevant information is more valuable in the presence of ties to the inside.

In a simplistic, final test of how *Ties*, *AfterDays*, and value-relevant information interact, I return to the quintiles created and described in Section 4.3. For each of the 25 permutations of the *Ties* quintiles and the *AfterDays* quintiles, I calculate the Pearson correlation between next-quarter abnormal returns, $BHAR_{j,t+1}$, and the probability of buying in quarter t , with results presented in Table 13, Panel A. Similarly, Table 13, Panel B shows estimates of the coefficient on $BHAR_{j,t+1}$ in Equation 5, for each of the 25 quintile permutations.

$$P(\text{Buy}_{i,j,t} = 1) = a + b_1 BHAR_{j,t+1} + e_{i,j,t} \quad (5)$$

Informally, both panels show that the association between future abnormal returns and the probability of purchase increases as one moves from left to right and down to up in the matrices. I cautiously interpret this as additional evidence consistent with future value-relevant information becoming increasingly more important to former insiders' decision to buy inside stock as they have more ties to the inside.

The purpose of this section was to further shed light on potential mechanisms through which former insiders earn abnormal returns on inside stock. The indirect evidence of former insiders trading not only using an informational advantage *retained*, but also on private information *obtained*, presented in Section 3, has been complemented with more direct support. Evidence in this section is largely consistent with former insiders benefiting from keeping ties to

current insiders, and with the value of ties kept increasing in the presence of value-relevant information.

5. Discussion of findings and conclusions

This paper investigates the extent to which former insiders trade in the stock of companies with which they used to be affiliated. The inherent tension between the temptation to utilize any informational advantages and the prohibition to do so lends itself to interesting research. Using a comprehensive Swedish dataset, I show that former insiders, on average, earn abnormal returns which are both statistically and economically significant, when they trade in inside stock. A hedge portfolio of former insiders' purchases and sales in inside stock results in annualized risk-adjusted abnormal returns of 7.6%. The effect is primarily driven by the long portfolio containing inside stock purchases. It is well to note that in the Swedish setting, former insiders' trades are visible. This visibility may have a deterrent effect on former insiders, implying that my results may be understated relative to what they would have been in other settings, all else equal.

Using a multitude of counterfactuals, I try to discern the primary mechanisms behind the documented abnormal returns. A test in which I gauge former insiders' returns on inside stock against the return on their outside stock reveals that former insiders, on average, do not possess any significant general stock-picking skills. The seemingly deteriorating ability to earn abnormal returns, with respect to time since declassification, helps reinforce this conclusion. The relative longevity of the ability to earn abnormal returns on inside stock, up to eight quarters after declassification, is consistent with former insiders not only benefiting from a *retained* informational advantage, but also from an *obtained* informational advantage, when trading in inside stock after declassification. In the U.S., this distinction is important due to differences in assumptions regarding fiduciary trust vis-à-vis the issuer, the breach of which is required for

successful prosecution of illegal insider trading. I hope that the results in this paper may further the ongoing legal debate on this requirement.

Leaving the issue of *retained* versus *obtained* informational advantages aside, perhaps most important for regulators and policymakers is the fact that I manage to rule out the explanation of general stock-picking skills. Regardless of whether former insiders trade profitably in inside stock due to an informational advantage retained from the inside or obtained post-separation, this kind of trading belongs in a legal grey zone. The legalities of former insiders' trades in inside stock and whether former insiders should be allowed to trade in inside stock only after a quarantine period—or at all—remains a largely unexplored area. The results and conclusions presented in this paper can hopefully serve as motivation for future such research.

Exhibit 1: Variable definitions

- *TradeSize* is the natural logarithm of the value of the trade, in Swedish krona.
- *BM* is the book value of common equity divided by the market value of common equity at the beginning of the quarter.
- *BHAR_{t+1}* represents next-quarter quarterly market-adjusted abnormal returns.
- *MV* denotes the market value of equity at the beginning of the quarter.
- *AfterDays* is the number of days between declassification and the time at which I observe a change in holdings.
- *Ties* is the number of persons, with whom the former insider concurrently served, who still remain insiders at the time of trade.
- *#Insiderships* is defined as the number of companies at which a given former insider has had an inside position, in the sample period.
- *HighPosition* is a dichotomous variable, indicating whether the former insider was (is) a CEO, vice president, and/or board member at the company at which he or she was (is) an insider.

Table 1: Sample description**Panel A. Former insiders and trades in inside stock**

	Full sample of former insiders	Former insiders who trade in inside stock	Former insiders who sell inside stock	Former insiders who buy inside stock
Unique insiders	4673	3344	2760	1719
Total number of trades	NA	8908	5438	3470
Minimum observations/quarter	1037	166	87	49
Average observations/quarter	1231	234	143	91
Median observations/quarter	1254	227.5	138	92.5
Maximum observations/quarter	1345	356	234	131
Unique companies	361	337	327	292
Total number of quarters	39	38	38	38

Panel B. Former insiders and trades in outside stock

	Outside trades by former insiders who trade in inside stock	Outside sales by former insiders who trade in inside stock	Outside buys by former insiders who trade in inside stock
Unique insiders	2823	2692	2526
Total number of trades	126178	57349	68829
Minimum observations/quarter	1921	545	882
Average observations/quarter	3320	2504	1811
Median observations/quarter	3340.5	2823	1869
Maximum observations/quarter	4977	4977	2477
Unique companies	545	514	524
Total number of quarters	38	38	38

32

Table 1 shows descriptive statistics for my sample of former insiders' trades. Panel A shows statistics for former insiders who trade in stock of companies with which they were affiliated ("inside stock"), partitioned on negative net changes in holdings ("sales") and positive net changes in

holdings (“purchases”) in the last two columns. Panel B shows statistics for trades in stock of companies with which the former insiders were never affiliated (“outside stock”). Trades included in Panel B are conditioned on the former insiders also trading (Column 1), selling (Column 2), or buying (Column 3) inside stock. The sample period spans Q1, 2006 through Q4, 2015 and derives from the Swedish stock market.

Table 2: Quarterly returns for trading insiders (during and after tenure as insider)**Panel A. Quarterly raw returns for trading insiders (during and after tenure as insider)**

	Quarterly raw returns					
	Buy			Sell		
	<i>Inside stock</i>		<i>Outside stock</i>	<i>Inside stock</i>		<i>Outside stock</i>
	During	After		During	After	
min	-0.3656	-0.4288	-0.3732	-0.4089	-0.4187	-0.3729
max	0.5219	0.5022	0.4651	0.4539	0.4748	0.4456
mean	0.0446***	0.0304***	0.0259***	-0.011***	-0.0094***	0.0215***
median	0.0404***	0.0296***	0.0202***	-0.0251***	-0.0217***	0.0162***
N	11627	4047	290866	3970	5918	242583

Table 2, Panel A shows descriptive statistics for unadjusted quarterly stock returns following an observed purchase or sale of inside stock and outside stock. “Inside stock” indicates stock of companies at which the person was an insider, “outside stock” indicates stock of companies with which the insider was never affiliated. Columns 1 and 4 show statistics for unadjusted quarterly returns on trades in inside stock earned during tenure. Columns 2 and 5 show statistics for unadjusted quarterly returns on trades in inside stock after tenure. Columns 3 and 6 show statistics for unadjusted quarterly returns on trades in outside stock. The sample is based on Swedish insiders who i) are declassified as insiders during my sample period, and ii) who trade at least once in inside stock. The sample is based on the Swedish stock market and spans the period Q1, 2006 through Q4, 2015. Asterisks indicate statistical significance at the 10%, 5%, 1% level, per convention.

Panel B. Quarterly market-adjusted abnormal returns for trading insiders (during and after tenure as insider)

	Quarterly market-adjusted returns					
	Buy			Sell		
	<i>Inside stock</i>		<i>Outside stock</i>	<i>Inside stock</i>		<i>Outside stock</i>
	<u>During</u>	<u>After</u>		<u>During</u>	<u>After</u>	
min	-0.3047	-0.3653	-0.2931	-0.3518	-0.3628	-0.2931
max	0.4257	0.3945	0.3642	0.4032	0.4219	0.3774
mean	0.0318***	0.0151***	0.0071***	-0.0224***	-0.0226***	0.0072***
median	0.0224***	0.0081***	-0.0026***	-0.0316***	-0.0353***	-0.0023***
N	11627	4047	290866	3970	5918	242583

Table 2, Panel B augments Panel A and shows descriptive statistics for market-adjusted quarterly stock returns following an observed purchase or sale of inside stock and outside stock. “Inside stock” indicates stock of companies at which the person was an insider, “outside stock” indicates stock of companies with which the insider was never affiliated. Columns 1 and 4 show statistics for market-adjusted quarterly returns on trades in inside stock earned during tenure. Columns 2 and 5 show statistics for market-adjusted quarterly returns on trades in inside stock after tenure. Columns 3 and 6 show statistics for market-adjusted quarterly returns on trades in outside stock. The sample is based on Swedish insiders who i) are declassified as insiders during my sample period, and ii) who trade at least once in inside stock. The sample is based on the Swedish stock market and spans the period Q1, 2006 through Q4, 2015. Asterisks indicate statistical significance at the 10%, 5%, 1% level, per convention.

Table 3: Descriptive statistics of former insiders, trades, and companies

Panel A

Inside stock, purchases

	Mean	Std Dev	p5	p25	p50	p75	p95
<i>Former insider characteristics</i>							
Trade size (\$)	129,438	1,481,575	289	2,186	9,656	34,997	264,225
Abnormal returns (\$)	23,479	34,964	-1,572	83	855	4,186	38,418
Portfolio size (\$)	1,388,698	68,538,677	4,006	29,760	111,975	402,238	2,879,507
Days between declassification and transaction	798	547	64	319	712	1245.5	1769
<i>Firm characteristics</i>							
Market cap (\$)	5,859,230,807	9,698,677,006	22,240,202	161,578,443	852,863,532	6,803,421,298	28,073,729,481
Book-to-market	0.68	0.82	0.11	0.31	0.50	0.82	1.79

Panel B

Inside stock, sales

	Mean	Std Dev	p5	p25	p50	p75	p95
<i>Former insider characteristics</i>							
Trade size (\$)	188,593	1,358,187	612	6,066	21,758	75,143	487,060
Abnormal returns (\$)	5,930	161,652	-21,897	-1,368	14	2,042	29,255
Portfolio size (\$)	2,818,163	105,551,628	3,643	33,976	139,880	510,073	4,074,895
Days between declassification and transaction	756	536	59	276	666	1185	1717
<i>Firm characteristics</i>							
Market cap (\$)	2,970,688,376	8,034,224,236	7,245,089	54,897,932	225,402,817	1,371,410,158	18,648,392,151
Book-to-market	0.74	0.84	0.12	0.30	0.53	0.94	1.98

Table 3: Descriptive statistics of former insiders, trades, and companies, continued

Panel C

Outside stock, purchases

	Mean	Std Dev	p5	p25	p50	p75	p95
<i>Former insider characteristics</i>							
Trade size (\$)	24,754	129,807	37	1,400	5,846	17,520	84,643
Abnormal returns (\$)	565	19,409	-3,467	-239	6	521	5,243
Portfolio size (\$)	5,884,829	201,989,259	6,485	45,785	165,913	610,234	4,989,892
Days between declassification and transaction	NA	NA	NA	NA	NA	NA	NA
<i>Firm characteristics</i>							
Market cap (\$)	9,182,287,183	13,785,561,020	34,419,462	479,285,714	3,096,251,715	10,477,650,561	42,244,571,748
Book-to-market	0.72	0.96	0.09	0.27	0.50	0.87	2.02

Panel D

Outside stock, sales

	Mean	Std Dev	p5	p25	p50	p75	p95
<i>Former insider characteristics</i>							
Trade size (\$)	31,424	352,586	176	2,336	7,703	21,793	103,500
Abnormal returns (\$)	737	32,378	-4,378	-340	25	698	6,545
Portfolio size (\$)	4,777,990	178,833,532	3,142	33,929	142,701	534,915	4,554,223
Days between declassification and transaction	NA	NA	NA	NA	NA	NA	NA
<i>Firm characteristics</i>							
Market cap (\$)	9,318,441,278	14,066,723,619	33,088,128	399,421,497	2,791,304,708	10,635,977,316	40,995,997,937
Book-to-market	0.68	0.87	0.09	0.27	0.50	0.81	1.80

Table 3 shows additional descriptive statistics for former insiders who trade at least once in inside stock between Q1 2006 and Q3 2015. “Inside stock” indicates stock of companies at which the person was an insider, “outside stock” indicates stock of companies with which the insider was never affiliated. Panels A and B show statistics associated with former insiders’ trades in inside stock. Panels C and D show statistics associated with former insiders’ trades in outside stock. “Trade size” is denominated in US dollars and is self-explanatory; “Abnormal returns” refers to market-adjusted quarterly returns multiplied by trade size, in US dollars; “Portfolio size” is the dollar value of the former insider’s entire stock portfolio at the time of trade; “Days between declassification and transaction” refers to the passage of time between the departure from the inside of the former insider and the time of trade. The last two rows in each panel show characteristics of the firm whose stock the former insider trades, at the time of trade.

Table 4: Raw and calendar-time abnormal returns for former insiders' purchases and sales of inside stock

	(1)	(2)	(3)	(4)	(5)	(6)
	<i>Raw returns</i>			<i>Risk-adjusted returns</i>		
	Buy	Sell	Buy-Sell	Buy	Sell	Buy-Sell
Daily returns	0.0005**	0.0002	0.0003***	0.0002***	-0.0001	0.0003***
Annualized returns	0.137**	0.052	0.084***	0.060***	-0.017	0.076***
t-statistic	2.24	0.94	4.63	3.17	-1.01	4.42
Average stocks in portfolio	50.6	84.5	135.1	50.6	84.5	135.1
Quarters	38	38	38	38	38	38
Trading days	2381	2381	2381	2381	2381	2381

Table 4 shows average daily and annualized raw returns (Columns 1-3) and risk-adjusted returns (Columns 4-6) for a calendar-time portfolio trading strategy that mimics former insiders who trade in inside stock. Former insiders' net trades are observed quarterly, and the trading strategy's positions are taken accordingly and held for one quarter, resulting in approximately 63 daily portfolio returns. The portfolios are balanced each quarter. Columns 4-5 show results of daily portfolio returns minus the risk-free rate regressed on constructs aimed at capturing systematic risk. Specifically, the daily market return minus the risk-free rate, the size factor SMB, the book-to-market factor HML, and the momentum factor UMD: $R_{pt} - R_{ft} = a + b_1(R_{mt} - R_{ft}) + b_2SMB_t + b_3HML_t + b_4UMD_t + e_t$. Column 6 shows results of daily Buy-Sell hedge portfolio returns minus the risk-free rate risk-adjusted as above. The annualization assumes 252 trading days per year. The sample is based on Swedish insiders who i) are declassified as insiders during my sample period, and ii) who trade at least once in inside stock. The sample is based on the Swedish stock market and spans the period Q1, 2006 through Q4, 2015. "Inside stock" indicates stock of companies with which the person was affiliated, as an insider.

Table 5: Former insiders' purchases of outside stock

	<i>Raw returns</i>					<i>Risk-adjusted returns</i>	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Outside stock purchases	Inside stock purchases with matching outside	All inside stock purchases	Hedge 1 [(2) - (1)]	Hedge 2 [(3) - (1)]	Hedge 1 [(2) - (1)]	Hedge 2 [(3) - (1)]
<i>Panel A: outside stock purchases made in the same quarter as an inside stock purchase</i>							
Daily returns	0.00037	0.00061**	0.00054**	0.00024***	0.00018**	0.00026***	0.00022***
Annualized returns	0.092	0.153**	0.137**	0.061***	0.044**	0.066***	0.056***
t-statistic	1.63	2.40	2.24	3.01	2.36	3.05	3.35
Average stocks in portfolio	65.3	35.7	50.6	101	115.9	101	115.9
<i>Panel B: outside stock purchases made four quarters before or after an inside stock purchase</i>							
Daily returns	0.00031	0.00059**	0.00054**	0.00029***	0.00024***	0.00028***	0.00023***
Annualized returns	0.077	0.150**	0.137**	0.072***	0.060***	0.071***	0.058***
t-statistic	1.54	2.43	2.24	4.24	3.81	4.14	3.75
Average stocks in portfolio	126.6	43.1	50.6	169.7	177.2	169.7	177.2
<i>Panel C: all outside stock purchases</i>							
Daily returns	0.00029	0.00054**	0.00054**	0.00025***	0.00025***	0.00021***	0.00022***
Annualized returns	0.074	0.135**	0.137**	0.062***	0.063***	0.052***	0.054***
t-statistic	1.30	2.22	2.24	3.65	3.96	3.27	3.59
Average stocks in portfolio	169.8	45.6	50.6	215.4	220.4	215.4	220.4

Table 5 shows daily and annualized raw returns and risk-adjusted *returns for a calendar-time portfolio trading strategy that uses information on former insiders' inside and outside trades. "Inside trades" is defined as trades in inside stock (i.e. stock of companies at which the person in question used to be an insider). "Outside trades" is refers to trades in stock of companies with which the former insider was never affiliated. Former insiders' inside and outside net trades are observed quarterly, and the trading strategy's positions are taken accordingly and held for one quarter, resulting in

approximately 63 daily portfolio returns. The portfolios are rebalanced each quarter. Panels A, B, C represent three different ways to match inside stock purchases to outside stock purchases, with respect to when they occur relative to each other. Column 1, Panel A shows results for outside stock purchases for which an inside stock purchase occurred in the same quarter as the outside purchase; Column 1, Panel B shows results for outside stock purchases for which an inside stock purchase occurred four quarters before or after the outside stock purchase; Column 1, Panel C, shows results for outside stock purchases regardless of whether there was a corresponding inside purchase. Analogously, Column 2 shows results for inside purchases for which matching outside purchases exist (according to the criteria in Panels A, B, and C). Column 3 shows results for inside purchases regardless of concurrence with outside purchases and shows identical results as Table 4, Column 1. Columns 4 and 5 show results of hedge portfolios that go long in inside stock and short in outside stock. Columns 6 and 7 show results of daily hedge portfolio returns regressed on constructs aimed at capturing systematic risk. Specifically, the daily market return minus the risk-free rate, the size factor SMB, the book-to-market factor HML, and the momentum factor UMD. The annualization assumes 252 trading days per year. The sample is based on Swedish insiders who i) are declassified as insiders during my sample period, and ii) who trade at least once in inside stock. The sample is based on the Swedish stock market and spans the period Q1, 2006 through Q4, 2015.

Table 6: Former insiders' sales of outside stock

	<i>Raw returns</i>					<i>Risk-adjusted returns</i>	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Outside stock sales	Inside stock sales with matching outside stock sales	All inside stock sales	Hedge 1 [(2) - (1)]	Hedge 2 [(3) - (1)]	Hedge 1 [(2) - (1)]	Hedge 2 [(3) - (1)]
<i>Panel A: outside stock sales made in the same quarter as an inside stock sale</i>							
Daily returns	0.00034*	0.00031	0.00021	-0.00003	-0.00013*	0.00002	-0.00007
Annualized returns	0.086*	0.078	0.052	-0.008	-0.034*	0.005	-0.017
t-statistic	1.73	1.36	0.94	-0.41	-1.88	0.31	-1.18
Average stocks in portfolio	76.1	55.4	84.5	131.5	160.6	131.5	160.6
<i>Panel B: outside stock sales made four quarters before or after an inside stock sales</i>							
Daily returns	0.00033	0.00028	0.00021	-0.00005	-0.00012**	-0.00004	-0.00011**
Annualized returns	0.083	0.071	0.052	-0.013	-0.031**	-0.010	-0.027**
t-statistic	1.64	1.26	0.94	-0.95	-2.54	-0.79	-2.26
Average stocks in portfolio	137.2	68.8	84.5	206	221.7	206	221.7
<i>Panel C: all outside stock sales</i>							
Daily returns	0.00025	0.00026	0.00021	0.00000	-0.00004	-0.00002	-0.00006
Annualized returns	0.064	0.064	0.052	0.001	-0.011	-0.004	-0.015
t-statistic	1.48	1.15	0.94	0.07	-0.97	-0.33	-1.28
Average stocks in portfolio	181.9	75.2	84.5	257.1	266.4	257.1	266.4

Table 6 shows daily and annualized raw returns and risk-adjusted returns for a calendar-time portfolio trading strategy that uses information on former insiders' inside and outside trades. "Inside trades" is defined as trades in inside stock (i.e. stock of companies at which the person in question used to be an insider). "Outside trades" is refers to trades in stock of companies with which the former insider was never affiliated. Former insiders' inside and outside net trades are observed quarterly, and the trading strategy's positions are taken accordingly and held for one quarter, resulting in approximately 63 daily portfolio returns. The portfolios are rebalanced each quarter. Panels A, B, C represent three different ways to match inside stock sales to outside stock sales, with respect to when they occur relative to each other. Column 1, Panel A shows results for outside stock sales for which an inside stock sale occurred in the same quarter as the outside stock sale; Column 1, Panel B shows results for outside stock sales for which

an inside stock sale occurred four quarters before or after the outside stock sale; Column 1, Panel C, shows results for outside stock sales regardless of whether there was a corresponding inside stock sale. Analogously, Column 2 shows results for inside stock sales for which matching outside stock sales exist (according to the criteria in Panels A, B, and C). Column 3 shows results for inside stock sales regardless of concurrence with outside stock sales and shows identical results as Table 4, Column 2. Columns 4 and 5 show results of hedge portfolios that go long in inside stock and short in outside stock. Columns 6 and 7 show results of daily hedge portfolio returns regressed on constructs aimed at capturing systematic risk. Specifically, the daily market return minus the risk-free rate, the size factor SMB, the book-to-market factor HML, and the momentum factor UMD. The annualization assumes 252 trading days per year. The sample is based on Swedish insiders who i) are declassified as insiders during my sample period, and ii) who trade at least once in inside stock. The sample is based on the Swedish stock market and spans the period Q1, 2006 through Q4, 2015.

Figure 1: Risk-adjusted returns on trades in inside stock and time since declassification

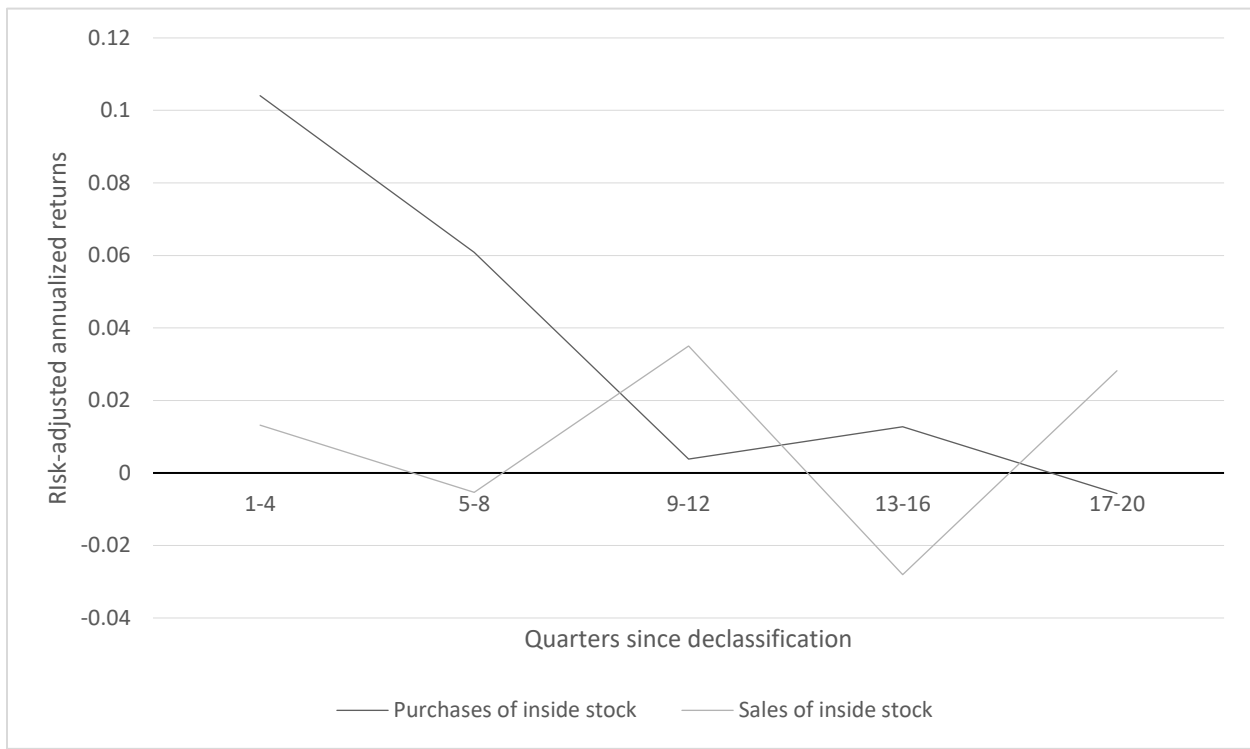


Figure 1 complements Table 7 below, and shows annualized risk-adjusted returns from a calendar-time portfolio strategy that mimics former insiders' purchasing and selling behavior in inside stock—stock of companies at which the person in question used to be an insider— (Y axis) in relation to the number of quarters that have passed since the former insiders left the company with which they were affiliated (X axis). Former insiders' net trades are observed quarterly, and the buy or sell trading strategy's positions are taken accordingly and held for one quarter, resulting in approximately 63 daily portfolio returns. The portfolios are rebalanced each quarter. The risk-adjusted returns derive from daily portfolio returns minus the risk-free rate regressed on constructs aimed at capturing systematic risk. Specifically, the daily market return minus the risk-free rate, the size factor SMB, the book-to-market factor HML, and the momentum factor UMD. The annualization assumes 252 trading days per year. The sample is based on Swedish insiders who i) are declassified as insiders during my sample period, and ii) who trade at least once in inside stock. The sample is based on the Swedish stock market and spans the period Q1, 2006 through Q4, 2015.

Table 7: Abnormal returns and time since declassification**Panel A. Purchases of inside stock**

	<i>Quarters since declassification</i>				
	1-4	5-8	9-12	13-16	17-20
Daily raw returns	0.0007***	0.0006**	0.0003	0.0004	0.0003
Annualized raw returns	0.18***	0.142**	0.084	0.103	0.078
t-statistic	2.72	2.12	1.19	1.38	1.10
Daily risk-adjusted returns	0.0004***	0.0002**	0.0000	0.0001	0.0000
Annualized risk-adjusted returns	0.104***	0.061**	0.004	0.013	-0.006
t-statistic	3.64	2.04	0.11	0.34	-0.15
Average stocks in portfolio	18.7	16.3	12.8	11.1	9.9

Panel B. Sales of inside stock

	<i>Quarters since declassification</i>				
	1-4	5-8	9-12	13-16	17-20
Daily raw returns	0.0003	0.0003	0.0004*	0.0002	0.0004
Annualized raw returns	0.083	0.071	0.106*	0.045	0.100
t-statistic	1.38	1.17	1.78	0.74	1.64
Daily risk-adjusted returns	0.0001	0.0000	0.0001	-0.0001	0.0001
Annualized risk-adjusted returns	0.013	-0.005	0.035	-0.028	0.028
t-statistic	0.56	-0.21	1.24	-0.91	0.8
Average stocks in portfolio	35.9	25.7	20.7	17.1	15.5

Panel C. Purchases of inside stock – Sales of inside stock

	<i>Quarters since declassification</i>				
	1-4	5-8	9-12	13-16	17-20
Daily raw returns	0.0004***	0.0003**	-0.0001	0.0002	-0.0001
Annualized raw returns	0.098***	0.071**	-0.023	0.059	-0.022
t-statistic	3.09	2.02	-0.54	1.26	-0.459
Daily risk-adjusted returns	0.0004***	0.0003*	-0.0001	0.0002	-0.0001
Annualized risk-adjusted returns	0.092***	0.065*	-0.031	0.041	-0.033
t-statistic	2.94	1.92	-0.77	0.91	-0.72
Average stocks in portfolio	54.6	42.0	33.5	28.2	25.4

Table 7 complements Figure 1 above, and shows daily and annualized raw returns and risk-adjusted returns for a calendar-time portfolio trading strategy that mimics former

insiders' purchasing and selling behavior in inside stock (stock of companies at which the person in question used to be an insider) in relation to the number of quarters that have passed since the former insiders left the company with which they were affiliated. Former insiders' inside net trades are observed quarterly, and the trading strategy's positions are taken accordingly and held for one quarter, resulting in approximately 63 daily portfolio returns. The portfolios are rebalanced each quarter. Panel A shows results for inside stock purchases and Panel B shows results for inside stock sales. Panel C shows the results for the hedge portfolio Purchases minus Sales. The risk-adjusted returns derive from daily portfolio returns minus the risk-free rate regressed on constructs aimed at capturing systematic risk. Specifically, the daily market return minus the risk-free rate, the size factor SMB, the book-to-market factor HML, and the momentum factor UMD. The annualization assumes 252 trading days per year. The sample is based on Swedish insiders who i) are declassified as insiders during my sample period, and ii) who trade at least once in inside stock. The sample is based on the Swedish stock market and spans the period Q1, 2006 through Q4, 2015.

Table 8: Correlations of main continuous variables**Panel A. The subsample of former insiders buying inside stock**

	TradeSize	BM	BHAR	BHAR_lag	MV	AfterDays	Ties
TradeSize	1	-0.100	0.039	0.056	0.103	-0.078	0.101
BM	-0.063	1	0.020	0.033	-0.156	0.017	0.028
BHAR	0.020	0.051	1	0.022	0.041	-0.025	0.075
BHAR_lag	0.090	0.045	-0.006	1	0.054	-0.004	0.008
MV	0.081	-0.171	0.052	0.116	1	0.070	0.589
AfterDays	-0.087	0.023	-0.038	0.003	0.068	1	-0.269
Ties	0.066	-0.019	0.056	-0.028	0.587	-0.314	1

Panel B. The subsample of former insiders selling inside stock

	TradeSize	BM	BHAR	BHAR_lag	MV	AfterDays	Ties
TradeSize	1	-0.165	0.035	0.035	0.119	-0.138	0.063
BM	-0.099	1	-0.001	-0.007	-0.138	0.024	0.067
BHAR	0.027	0.011	1	0.054	0.019	0.031	0.040
BHAR_lag	0.096	0.004	0.059	1	0.008	0.009	-0.008
MV	0.137	-0.100	0.044	0.063	1	0.059	0.562
AfterDays	-0.121	-0.011	0.020	-0.007	0.055	1	-0.270
Ties	0.064	-0.003	0.018	-0.048	0.590	-0.302	1

Table 8 shows Pearson (Spearman) correlations for the main continuous variables in my cross-sectional buy-and-hold abnormal returns tests above (below) the diagonal. Panel A shows correlations for the subsample containing former insiders who purchases inside stock, and Panel B shows correlations for the subsample containing former insiders who sell inside stock. “Inside stock” is defined as stock of companies at which the person in question used to be an insider. *TradeSize* is defined as the natural logarithm of the value of the observed trade (in Swedish krona); *BM* denotes the ratio between book-value of equity and market value of equity of the company for which a trade is observed; *BHAR* is the quarterly stock-specific raw return minus the return on a Swedish benchmark index; *BHAR_lag* denotes the previous quarter’s quarterly BHAR; *MV* is the natural logarithm of firm market value; *AfterDays* shows how many days have passed between the day on which the former insider was declassified as an insider and the day on which I observe a purchase (Panel A) or sale (Panel B) of inside stock. *Ties* is the number of current insiders, at the time the trade is observed, with whom the former insider was a concurrent insider. The sample is based on Swedish insiders who i) are declassified as insiders during my sample period, and ii) who trade at least once in inside stock. The sample is based on the Swedish stock market and spans the period Q1, 2006 through Q4, 2015.

Table 9: Initial multivariate analyses of future abnormal returns

Parameter	<i>Purchases</i>		<i>Sales</i>	
	Estimate	t-statistic	Estimate	t-statistic
Intercept	-0.03892	-1.07	-0.03576	-1.13
Ties	0.00130*	1.82	0.00194***	3.22
AfterDays	-0.00001**	-2.07	0.00002***	4.81
#Insiderships	-0.01203***	-3.27	-0.00549**	-2.21
HighPosition	0.00472	0.77	-0.00301	-0.70
TradeSize	0.00343***	3.17	0.00175**	2.00
BM	0.00141	0.38	0.00065	0.23
BHAR_lag	0.0154*	1.76	0.0813***	8.83
MV	0.00188	1.31	0.00117	0.94
Quarter FE	Yes		Yes	
N	3678		5491	
Adjusted R ²	0.079		0.049	

$$BHAR_{i,j,t+1} = a + b_1Ties_{i,j,t} + b_2AfterDays_{i,j,t} + b_3\#Insiderships_{i,j,t} + b_4HighPosition_{i,j,t} + b_5TradeSize_{i,j,t} + b_6BM_{j,t} + b_7BHAR_lag_{j,t} + b_8MV_{j,t} + e_{i,j,t}$$

Table 9 shows results of robust OLS regressions of next-quarter market-adjusted BHAR, separate for purchases and sales of inside stock. “Inside stock” is defined as stock of companies at which the person in question used to be an insider. *TradeSize* is defined as the natural logarithm of the value of the observed trade (in Swedish krona); *BM* denotes the ratio between book-value of equity and market value of equity of the company for which a trade is observed; *BHAR* is the quarterly stock-specific raw return minus the return on a Swedish benchmark index; *BHAR_lag* denotes the previous quarter’s quarterly BHAR; *MV* is the natural logarithm of firm market value; *AfterDays* shows how many days have passed between the day on which the former insider was declassified as an insider and the day on which I observe a purchase (Column 1) or sale (Column 2) of inside stock. *Ties* is the number of current insiders, at the time the trade is observed, with whom the former insider was a concurrent insider; *#Insiderships* is defined as the number of companies at which a given former insider has had an inside position, in the sample period; *HighPosition* is a dichotomous variable, indicating whether the former insider was a CEO, vice president, and/or board member at the company at which he or she was an insider. The sample is based on Swedish insiders who i) are declassified as insiders during my sample period, and ii) who trade at least once in inside stock. The sample is based on the Swedish stock market and spans the period Q1, 2006 through Q4, 2015.

Table 10: Quintile analyses of Ties and AfterDays**Panel A. Quarterly market-adjusted BHAR for the *Ties* quintiles**

<i>Ties</i>						
	1	2	3	4	5	5-1
BHAR _{t+1}	-0.009	0.009	0.026***	0.020***	0.020***	0.030***
t-statistic	1.38	1.57	5.10	4.21	4.04	3.57
n	845	676	786	798	713	

Panel B. Quarterly market-adjusted BHAR for the *AfterDays* quintiles

<i>AfterDays</i>						
	1	2	3	4	5	5-1
BHAR _{t+1}	0.018***	0.017***	0.016***	0.009	0.004	-0.015*
t-statistic	3.05	3.16	2.98	1.14	0.72	-1.81
n	763	762	765	763	765	

Table 10 consist of two panels, each showing descriptive statistics for next-quarter abnormal returns, for five mutually exclusive and collectively exhaustive partitions of the main sample for subsequent tests. This main sample consists of former insiders who purchase inside stock after declassification as insiders (it is slightly smaller than in Tables 2 and 3 due to additional data requirements). “Inside stock” is defined as stock of companies at which the person in question used to be an insider. In Panel A, the sample has been sorted into quintiles based on *Ties* (the number of current insiders, at the time the trade is observed, with whom the former insider was a concurrent insider). In Panel B, the same sample has been sorted into quintiles base on *AfterDays* (the number of days that have passed between the day on which the former insider was declassified as an insider and the day on which I observe a purchase of inside stock). Observations in Quintile 1 have the lowest number of ties (Panel A) and are most recently declassified (Panel B). $BHAR_{t+1}$ in this table represents the average stock-specific quarterly raw return minus the return on a Swedish benchmark index. The last column in both panels shows the difference in average abnormal return when moving from the lowest quintile to the highest. The sample is based on Swedish insiders who i) are declassified as insiders during my sample period, and ii) who trade at least once in inside stock. The sample is based on the Swedish stock market and spans the period Q1, 2006 through Q4, 2015.

Table 11: Multivariate analyses of the interaction effects of Ties and AfterDays on future abnormal returns

Dependent variable: next-quarter market-adjusted BHAR.

	(1)		(2)		(3)		(4)		(5)		(6)	
	Estimate	t	Estimate	t	Estimate	t	Estimate	t	Estimate	t	Estimate	t
Intercept	0.013235	0.41	-0.026221	-0.77	0.008475	0.24	0.002822	0.08	0.032173	0.95	0.032097	0.95
AfterDays	-0.000008*	-1.76			-0.000027***	-3.05						
Ties	0.001377**	2.07			-0.000198	-0.20			-0.000415	-0.35		
AfterDays_Q			-0.002577	-1.33			-0.009602***	-3.06				
Ties_Q			0.007019***	2.94			-0.000591	-0.17			0.000337	0.08
Ties x AfterDays					0.000002**	1.96						
Ties_Q x AfterDays_Q							0.002550**	2.01				
AfterDays_Q2									-0.017353	-1.08	-0.012843	-0.82
AfterDays_Q3									-0.021866	-1.35	-0.014772	-0.97
AfterDays_Q4									-0.027885*	-1.76	-0.026099*	-1.77
AfterDays_Q5									-0.044105***	-2.85	-0.028627**	-2.02
Ties x AfterDays_Q2									0.001951	1.28		
Ties x AfterDays_Q3									0.001640	1.02		
Ties x AfterDays_Q4									0.001641	1.01		
Ties x AfterDays_Q5									0.004488***	2.60		
Ties_Q x AfterDays_Q2											0.005835	1.06
Ties_Q x AfterDays_Q3											0.003639	0.66
Ties_Q x AfterDays_Q4											0.007272	1.29
Ties_Q x AfterDays_Q5											0.010854*	1.92
BM	-0.002794	-0.79	-0.000635	-0.18	0.000457	0.12	-0.000668	-0.18	-0.002866	-0.81	-0.003192	-0.90
BHAR_lag	0.007153	0.71	0.014843*	1.70	0.017904**	2.03	0.016846*	1.91	0.007366	0.73	0.007694	0.76
MV	0.000319	0.24	0.001881	1.34	0.001455	1.02	0.001687	1.19	0.000183	0.14	-0.000056	-0.04
Quarter FE	Yes		Yes		Yes		Yes		Yes		Yes	
N	3526		3526		3526		3526		3526		3526	
Adjusted R ²	0.0786		0.0776		0.0803		0.0794		0.0848		0.0808	

$$BHAR_{i,j,t+1} = a + b_1AfterDays_{i,j,t} + b_2Ties_{i,j,t} + b_3AfterDays_{i,j,t} \times Ties_{i,j,t} + b_4BM_{j,t} + b_5BHAR_lag_{j,t} + b_6MV_{j,t} + e_{i,j,t}$$

$$BHAR_{i,j,t+1} = a + b_1AfterDays_Q_{i,j,t} + b_2Ties_Q_{i,j,t} + b_3AfterDays_Q_{i,j,t} \times Ties_Q_{i,j,t} + b_4BM_{j,t} + b_5BHAR_lag_{j,t} + b_6MV_{j,t} + e_{i,j,t}$$

$$BHAR_{i,j,t+1} = a + b_1Ties_{i,j,t} + b_2AfterDays_Q2_{i,j,t} + b_3AfterDays_Q3_{i,j,t} + b_4AfterDays_Q4_{i,j,t} + b_5AfterDays_Q5_{i,j,t} + b_6Ties_{i,j,t} \times AfterDays_Q2_{i,j,t} + b_7Ties_{i,j,t} \times AfterDays_Q3_{i,j,t} + b_8Ties_{i,j,t} \times AfterDays_Q4_{i,j,t} + b_9Ties_{i,j,t} \times AfterDays_Q5_{i,j,t} + b_{10}BM_{j,t} + b_{11}BHAR_lag_{j,t} + b_{12}MV_{j,t} + e_{i,j,t}$$

$$BHAR_{i,j,t+1} = a + b_1Ties_Q_{i,j,t} + b_2AfterDays_Q2_{i,j,t} + b_3AfterDays_Q3_{i,j,t} + b_4AfterDays_Q4_{i,j,t} + b_5AfterDays_Q5_{i,j,t} + b_6Ties_Q_{i,j,t} \times AfterDays_Q2_{i,j,t} + b_7Ties_Q_{i,j,t} \times AfterDays_Q3_{i,j,t} + b_8Ties_Q_{i,j,t} \times AfterDays_Q4_{i,j,t} + b_9Ties_Q_{i,j,t} \times AfterDays_Q5_{i,j,t} + b_{10}BM_{j,t} + b_{11}BHAR_lag_{j,t} + b_{12}MV_{j,t} + e_{i,j,t}$$

Table 11 shows results of robust OLS regressions of six different specifications, nested in the equations above. The underlying sample consists of former insiders who purchase inside stock after declassification as insiders. This sample is sorted into two sets of five mutually exclusive and collectively exhaustive partitions, based on *AfterDays* and *Ties*, respectively. *AfterDays* is the number of days that have passed between the day on which the former insider was declassified as an insider and the day on which I observe a purchase of inside stock. *Ties* is the number of current insiders, at the time the trade is observed, with whom the former insider was a concurrent insider. “Inside stock” is defined as stock of companies at which the person in question used to be an insider. *AfterDays_Q* and *Ties_Q* are based on the quintile sorting and range from 1 through 5. Variables ending with the suffix *Qi*, *i* in {2, 3, 4, 5}, are quintile indicator variables. *BM* denotes the ratio between book-value of equity and market value of equity of the company for which a trade is observed; *BHAR* is the quarterly stock-specific raw return minus the return on a Swedish benchmark index; *BHAR_lag* denotes the previous quarter’s quarterly BHAR. The sample is based on Swedish insiders who i) are declassified as insiders during my sample period, and ii) who trade at least once in inside stock. The sample is based on the Swedish stock market and spans the period Q1, 2006 through Q4, 2015.

Table 12: Value-relevant information and the probability of a former insider buying inside stock

	(1)		(2)		(3)		(4)	
	Estimate	t-statistic	Estimate	t-statistic	Estimate	t-statistic	Estimate	t-statistic
Intercept	0.080830***	19.51	0.0806***	19.38	0.08037***	24.37	0.08029***	24.35
AfterDays	-0.00002***	-6.07	-0.00002***	-6.03	-0.00001***	-6.21	-0.00001***	-6.15
Ties	0.00112***	3.61	0.00115***	3.71	0.00106***	4.01	0.00104***	3.94
AnnRet	0.03878**	2.09	0.08122	1.37				
AnnRet×AfterDays			0.00000	-0.11				
AnnRet×Ties			-0.00502	-1.05				
BHAR _{t+1}					0.02603***	3.34	-0.00450	-0.22
BHAR _{t+1} ×AfterDays							-0.00003*	-1.86
BHAR _{t+1} ×Ties							0.00861***	4.51
N	37332		37332		50068		50068	
Adjusted R ²	0.0020		0.0020		0.0017		0.0023	

$$P(\text{Buy}_{i,j,t} = 1) = a + b_1 \text{AfterDays}_{i,j,t} + b_2 \text{Ties}_{i,j,t} + b_3 \text{AnnRet}_{j,t+1} + e_{i,j,t}$$

$$P(\text{Buy}_{i,j,t} = 1) = a + b_1 \text{AfterDays}_{i,j,t} + b_2 \text{Ties}_{i,j,t} + b_3 \text{AnnRet}_{j,t+1} + b_4 \text{AfterDays}_{i,j,t} \times \text{AnnRet}_{j,t+1} + b_5 \text{Ties}_{i,j,t} \times \text{AnnRet}_{j,t+1} + e_{i,j,t}$$

$$P(\text{Buy}_{i,j,t} = 1) = a + b_1 \text{AfterDays}_{i,j,t} + b_2 \text{Ties}_{i,j,t} + b_3 \text{BHAR}_{j,t+1} + e_{i,j,t}$$

$$P(\text{Buy}_t = 1) = a + b_1 \text{AfterDays}_{i,j,t} + b_2 \text{Ties}_{i,j,t} + b_3 \text{BHAR}_{j,t+1} + b_4 \text{AfterDays}_{i,j,t} \times \text{BHAR}_{j,t+1} + b_5 \text{Ties}_{i,j,t} \times \text{BHAR}_{j,t+1} + e_{i,j,t}$$

Table 12 shows results of four linear probability models, estimated using robust OLS regressions, that address the likelihood of a former insider purchasing inside stock. “Inside stock” is defined as stock of companies at which the person in question used to be an insider. The underlying sample contains observations of former insiders’ quarterly net changes in holdings of inside stock (negative change, no change, positive change). For each model specification, the dependent variable is the indicator Buy_t , which takes on the value of 1 if the former insider purchased inside stock and 0 otherwise. *AfterDays* is the number of days that have passed between the day on which the former insider was declassified as an insider and the day on which I observe a purchase of inside stock. *Ties* is the number of current insiders, at the time the trade is observed, with whom the former insider was a concurrent

insider. *AnnRet* is defined as the market return in a three-day window surrounding the quarterly earnings announcement. The sample is based on Swedish insiders who i) are declassified as insiders during my sample period, and ii) who trade at least once in inside stock. The sample is based on the Swedish stock market and spans the period Q1, 2006 through Q4, 2015.

Table 13: Heatmaps of the association between Buy and future abnormal returns for 25 combinations of Ties and AfterDays quintiles

Panel A. Pearson correlations between $Buy_{ij,t}$ and $BHAR_{j,t+1}$

		Ties quintiles				
		1	2	3	4	5
AfterDays quintiles	1	0.010	0.036	-0.004	0.044	0.015
	2	0.012	0.023	0.040	0.029	0.074
	3	-0.057	0.000	0.016	0.036	0.036
	4	0.000	0.007	-0.019	0.032	0.042
	5	-0.040	-0.007	0.020	0.015	0.021

Panel B. Estimates of β in the linear probability model $P(Buy_{ij,t} = 1) = Intercept + \beta \times BHAR_{j,t+1}$

		1	2	3	4	5
		AfterDays quintiles	1	0.059 (1.250)	0.051 (1.230)	0.029 (0.731)
2	-0.017 (-0.337)		0.023 (0.698)	0.122*** (2.867)	0.073* (1.884)	0.211*** (4.637)
3	-0.095*** (-2.868)		0.03 (0.971)	0.062 (1.458)	0.120*** (2.905)	0.109** (2.016)
4	-0.003 (-0.112)		0.051 (1.199)	-0.045 (-0.992)	0.138*** (3.268)	0.054 (0.916)
5	-0.061** (-2.472)		0.015 (0.445)	0.086* (1.718)	0.111** (2.137)	0.095 (1.310)

Table 13, shows two heatmaps, one based on Pearson correlations (Panel A) and one based on covariates from a robust OLS regression (Panel B). The underlying sample consists of former insiders who may or may not purchase inside stock after declassification as insiders. This sample is sorted into two sets of five mutually exclusive and collectively exhaustive partitions, based on *AfterDays* and *Ties*, respectively. *AfterDays* is the number of days that have passed between the day on which the former insider was declassified as an insider and the day on which I observe a purchase of

inside stock. *Ties* is the number of current insiders with whom the former insider was a concurrent insider. “Inside stock” is defined as stock of companies at which the person in question used to be an insider. Panel A, shows a heatmap of Pearson correlations between *Buy* (a binary variable indicating whether a former insider purchased inside stock in a given quarter) and next-quarter BHAR (the quarterly stock-specific raw return minus the return on a Swedish benchmark index). Correlations are calculated for each of the 25 *AfterDays*×*Ties* quintile combinations. Similarly, Panel B shows estimates of β in the linear probability model $P(\text{Buy}_{i,j,t} = 1) = a + \beta \times \text{BHAR}_{j,t+1} + e_{i,j,t}$, estimated using robust OLS regressions for each of the 25 *AfterDays*×*Ties* quintile combinations (t-statistics are presented in parentheses).

References

Aboody, D., J. Hughes, and J. Liu. (2005), Earnings Quality, Insider Trading, and Cost of Capital. *Journal of Accounting Research*, 43: 651–673.

Aktiebolagslag 2005:551

http://www.riksdagen.se/sv/dokument-lagar/dokument/svensk-forfattningssamling/aktiebolagslag-2005551_sfs-2005-551 (11/13/2016).

Bainbridge, S., M. (2014). *Research Handbook on Insider Trading* (Edward Elgar Publishing)

Barber, B.M., R. Lehavy, M. McNichols, and B. Trueman. (2006), Buys, holds, and sells: The distribution of investment banks' stock ratings and the implications for the profitability of analysts' recommendations. *Journal of Accounting and Economics* (1): 87-117.

Barber, B.M., R. Lehavy, and B. Trueman. (2007). Comparing the stock recommendation performance of investment banks and independent research firms. *Journal of Financial Economics* 85 (2): 490-517.

Barber, B.M., and T. Odean (2000). "Trading is Hazardous to Your Wealth: The Common Stock Investment Performance of Individual Investors". *Journal of Finance* 55 (2): 773-806.

Becker, B. (2006). Wealth and executive compensation. *The Journal of Finance* 61 (1): 379-397.

Beny, L. (2007). Insider Trading Laws and Stock Markets Around the World: An Empirical Contribution to the Theoretical Law and Economics Debate. *Journal of Corporation Law* (32).

Berkman, H., P. D. Koch, and P. J. Westerholm. (2014), Informed Trading through the Accounts of Children. *The Journal of Finance*, 69: 363–404.

Bettis, J. C., J. L. Coles, and M. L. Lemmon. (2000). Corporate policies restricting trading by insiders. *Journal of Financial Economics* 57: 191-220.

Bhattacharya, U and H. Daouk. (2002). The World Price of Insider Trading. *The Journal of Finance*: 57: 75–108.

Bhide, A. (1993). The hidden costs of stock market liquidity. *Journal of Financial Economics* 34 (1): 31-51.

Bitler, M.P., Moskowitz, T.J., Vissing-Jørgensen, A., 2005. Testing agency theory with entrepreneur effort and wealth. *The Journal of Finance* 60 (2): 539-576.

Bloomberg News

<https://www.bloomberg.com/news/articles/2017-01-23/fingerprint-s-former-ceo-board-member-both-taken-into-custody> (01/23/2017).

Brochet, F. (2010). Information Content of Insider Trades before and after the Sarbanes-Oxley Act. *The Accounting Review*, vol. 85, no. 2: 419-446.

Carhart, M. M. (1997). On Persistence in Mutual Fund Performance. *Journal of Finance* 52, 57-82.

Carlton, D., and D. Fischel. (1983). The Regulation of Insider Trading. *Stanford Law Review*, 35: 857-895.

Chiarella v. United States, 445 U.S. 222 (1980).

Conyon, M., and M. Muldoon. (2006). The small world of corporate boards. *Journal of Business Finance and Accounting* 33: 1321-1343.

Cohen, L., A., Frazzini, and C. Malloy. (2010). Sell-Side School Ties. *The Journal of Finance*, 65: 1409-1437.

Dirks v. SEC, 463 US 646 (1983).

Eigenbrodt, S. P. (2014). *A Practical Guide to Section 16: Reporting and Compliance*. Aspen Publishers.

Elliott, J., D. Morse, and G. Richardson. (1984). The Association between Insider Trading and Information Announcements. *The RAND Journal of Economics* 15: 521-536.

Faccio, M. (2006). Politically connected firms. *American Economic Review* 96, 369-386.

Fama, E.F. (1998). Market Efficiency, Long-Term Returns, and Behavioral Finance. *Journal of Financial Economics* 49, 283-306.

Fama, E.F. and K.R. French. (1993). Common Risk Factors in the Returns on Stocks and Bonds. *Journal of Financial Economics* 33, 3-56.

Fisman, D., R. Fisman, J. Galef, R. Khurana, and Y. Wang. (2012). Estimating the value of connections to Vice-President Cheney. *The BE Journal of Economic Analysis & Policy*, 12(3).

Francis, J., and K. Schipper. (1999). Have financial statements lost their relevance? *Journal of Accounting Research*, 37, 319–352.

Glosten, L. R., and P. R. Milgrom. (1985). Bid, ask and transaction prices in a specialist market with heterogeneously informed traders. *Journal of Financial Economics* 14: 71–100.

Grinblatt, M., and M. Keloharju. (2000). The investment behavior and performance of various investor types: a study of Finland's unique data set. *Journal of Financial Economics* 55: 43-67.

Huddart, S. J. and B. Ke. (2007). Information Asymmetry and Cross-sectional Variation in Insider Trading. *Contemporary Accounting Research*, 24: 195–232

Jeng, L.A., A. Metrick, and R. Zeckhauser. (2003). Estimating the returns to insider trading: A performance-evaluation perspective. *The Review of Economics and Statistics* 85 (2): 453-471.

Johannesson, E. and S. Kim (2018). “Invested in vested stock. Abnormal returns on silently retained equity”. Working paper.

Kallunki, J-P., H. Nilsson, and J. Hellström. (2009.) Why do insiders trade? Evidence based on unique data on Swedish insiders. *Journal of Accounting and Economics* 48: 37-53.

Kallunki, J-P., J. Mikkonen, H. Nilsson and H. Setterberg. (2016) Tax noncompliance and insider trading. *Journal of Corporate Finance* 36: 157-173.

Kim, O., and R. E. Verrecchia. (1991). Market reaction to anticipated announcements. *Journal of Financial Economics* 30: 273–309.

Lakonishok, J., and I. Lee. (2001). Are insider trades informative? *Review of Financial Studies* 14 (1): 79-111.

Larcker D. F., S. Richardson, A. Seary, and I. Tuna. (2005). Back Door Links between Directors and Executive Compensation. SSRN eLibrary.

Ljungqvist, A., C. Malloy and F. Marston. (2009). Rewriting History. *The Journal of Finance*, 64: 1935–1960.

Loughran, T. and J. Ritter. (2000). Uniformly least powerful tests of market efficiency. *Journal of Financial Economics*, 55 (3): 361-389.

Manne, H. G. (1966) *Insider Trading and the Stock Market*, Free Press, New York.

Manne, H. G. (2005) Insider trading: Hayek, virtual markets, and the dog that did not bark. *Journal of Corporation Law* 31:167-185

Mitchell, M.L. and E. Stafford (2000): Managerial Decisions and Long-Term Stock Price Performance, *Journal of Business* 73, 287-329.

Nagy, D., M. (2009). Insider Trading and the Gradual Demise of Fiduciary Principles. *Iowa Law Review* 94: 1315.

Nasdaq.com. Nordic Main Market. <http://business.nasdaq.com/list/listing-options/European-Markets/nordic-main-market> (02/18/2017).

Rajgopal, S. and R. White. (2014). Stock Picking Skills of SEC Employees. Columbia Business School.

Ravina, E. and Sapienza, P. (2010). What Do Independent Directors Know? Evidence from Their Trading. *The Review of Financial Studies*, vol. 23, no. 3: 962–1003.

Roulstone, D. T. (2003). The Relation Between Insider-Trading Restrictions and Executive Compensation. *Journal of Accounting Research* 41: 525-552.

Rozeff, M. S., and M. A. Zaman. (1998) Overreaction and Insider Trading: Evidence from Growth and Value Portfolios. *Journal of Finance* vol. 53, no. 2: 701–16.

Salman v. United States, 15–628 U.S. (2016).

Securities Exchange Act of 1934: 17 CFR 240.10B-5. <https://www.gpo.gov/fdsys/pkg/CFR-2011-title17-vol3/pdf/CFR-2011-title17-vol3-sec240-10b-5.pdf> (01/20/2017)

Securities and Exchange Commission. Forms 3, 4, 5. <https://www.sec.gov/fast-answers/answersform345htm.html> (01/20/2017).

Securities and Exchange Commission v. Texas Gulf Sulphur Co., 401 F. 2d 833 (1968).

SFS 2000:1087 Lag om anmälningsskyldighet för vissa innehav av finansiella instrument. https://www.riksdagen.se/sv/dokument-lagar/dokument/svensk-forfattningssamling/lag-20001087-om-anmalningsskyldighet-for-vissa_sfs-2000-1087 (01/10/2017).

Skaife, H., D. Veenman, D. Wangerin. (2013) Internal Control over Financial Reporting and Managerial Rent Extraction: Evidence from the Profitability of Insider Trading, *Journal of Accounting and Economics* 55 (1), 91-110.

Statistics Sweden. Aktieägarstatistik. <http://www.scb.se/hitta-statistik/statistik-efter-amne/finansmarknad/aktieagarstatistik/aktieagarstatistik/> (12/05/2016).

United States v. O'Hagan, 521 U.S. 642 (1997).

United States v. Newman, 773 F.3d 438 (2014).

APPENDIX

Appendix A1: notable U.S. court cases regarding transmission of inside information

- i) In *Chiarella v. United States* (1980), the Supreme Court ruled that a printer employee who traded on information obtained via his profession did not violate any laws since “a duty to disclose under section 10(b) does not arise from the mere possession of nonpublic market information.”²⁴
- ii) In *United States v. O’Hagan* (1997), the Supreme Court ruled that a partner of a law firm, who overheard private information and subsequently traded on it, was found liable of unlawful insider trading. The Court argued that although the defendant did not breach fiduciary trust vis-à-vis the company in whose securities he traded, the trades constituted illegal insider trading since the defendant did owe fiduciary duty to his law firm not to trade based on private information obtained as a result of his employment. *O’Hagan* established a complementary view on insider-trading liability, known as the “misappropriation theory.”²⁵
- iii) In *United States v. Newman* (2014), a district court ruled that a person trading on received inside information must have known that the information was inside information and also that the insider who provided him or her with said information did so without the consent of the principal.²⁶

²⁴ Justice Powell in *Chiarella v. United States*, 445 U.S. 222 (1980).

²⁵ *United States v. O’Hagan*, 521 U.S. 642 (1997).

²⁶ *United States v. Newman*, 773 F.3d 438 (2014).

iv) In *Salman v. United States* (2016), the U.S. Supreme Court held that the benefit a tipper has to receive as predicate for an insider-trader prosecution of a tippee need not be pecuniary, and that giving a “gift” of a tip to a family member presumably benefits the tipper. The legality of gratuitous tipping outside the “friends and family” relationship remains unclear, as does the question of whether tippees must be aware of any upstream breaches of fiduciary trust for criminal liability.

Appendix A2: ties to current insiders using calendar-time portfolios

In this test, I revisit the issue of whether the ability of former insiders to earn abnormal returns is positively associated with the number of connections to remaining insiders the former insider has at the time of trade. In contrast to the test of this association in the main text, this test is conducted using a calendar-time portfolio strategy. As before, the underlying idea is that the more connections to the inside the former insider retains, the higher the probability that he or she receives private information. The number of remaining ties to the inside ought not to be correlated with the former insider’s ability to contextualize public information through retained private information. I again define *Ties* as persons who were insiders at the time the former insider was an insider, and who are still insiders at the time of the former insider’s trade.

To control for the passage of time since declassification, I first partition my sample of former insider purchases into two subsamples, based on whether the trade occurs in quarters 1-10 or 11-20 since declassification.²⁷ The effect of *Ties* on abnormal returns is examined separately for these subsamples. Unfortunately, the small sample size precludes me from partitioning the trades, with respect to *Ties*, with enough precision to show meaningful variation. This is particularly true for the subsample comprising trades made 1-10 quarters after declassification,

²⁷ The double-sorting nature of this test does not permit me to do finer partitioning, the number of observations per portfolio would be too small.

when almost all of the former insiders in my sample have a large number of ties. Creating calendar-time portfolios for each of the 2,381 trading days in my sample period requires that I allow for no fewer than four ties to current insiders. With this constraint, the average daily portfolio contains only 6.6 stocks, making the trading strategy highly susceptible to outliers.²⁸ There are similar concerns with the subsample of trades occurring 11-20 quarters after declassification.

I circumvent these problems by instead looking at the *marginal effect* on abnormal returns of sequentially altering the trade inclusion criterion; the number of ties to the inside. In principle, this could be done in two ways: either by fixing the lower bound—i.e. zero ties to the inside—and investigating how abnormal returns are affected by gradually allowing for more ties, or, analogously, by fixing the upper bound and requiring more ties for inclusion. Succinctly, the idea is to study the marginal effect of the number of ties to the inside on abnormal returns by fixing the lower (upper) bound and altering the upper (lower) bound of the inclusion criterion. The former alternative suffers from the same small-sample problem, described above, and I hence opt for the latter. The upper bound is set to the sample median number of ties to the inside, 10.²⁹ Table A1 shows results for former-insider purchases made 1-10 quarters after declassification (Panel A) and for former-insider purchases made 11-20 quarters after declassification (Panel B). Figure A1 contrasts the marginal effect of ties to the inside on abnormal returns for trades made close to and long since declassification.

Table A1, Panel A shows that both raw and risk-adjusted returns are significant and stable. The marginal effect of sequentially excluding former insiders with fewer than one, two, three, four,

²⁸ Imposing the condition of zero ties to the inside for the same subsample results in portfolios for only 1880 out of 2,381, with an average of 2.8 shares. An additional concern is that former insiders with zero ties to the inside soon after declassification may not be representative for the full sample of former insiders.

²⁹ If the upper bound is “too large” (e.g. the maximum number of ties), the marginal effect of gradually omitting trades of insiders with very few ties becomes too diluted. Altering the upper bound around the median, however, do not change the conclusions of this section.

and five ties to the inside is negligible. I conjecture that this is due to the fact that most former insiders likely have numerous ties to the inside in the subsample period (1-10 quarters after declassification), preventing me from establishing whether *Ties* is a mechanism through which former insiders earn abnormal returns on inside stock.

Panel B shows an almost monotonic increase in both raw and abnormal returns when excluding former insiders with increasingly less few ties to the inside; excluding former insiders with the lowest number of ties to the inside leads to significant abnormal returns also for trades that take place further from declassification. The evidence is consistent with ties to current insiders being a valid mechanism through which former insiders' ability to earn abnormal returns operates, at least for trades occurring further from the declassification date. Though not dispositive, this test is consistent with the findings of Section 4: having ties to current insiders seem to become more important for former insiders' ability to earn abnormal returns the further away from the declassification date the trade occurs

Table A1: Abnormal returns and ties to current insiders

Panel A: Purchases of inside stock 1-10 quarters after declassification

	<i>Number of ties to current high-information insiders</i>					
	0-10	1-10	2-10	3-10	4-10	5-10
Daily raw returns	0.00050	0.00053	0.00052	0.00051	0.00053	0.00052
Annualized raw returns	0.127	0.133	0.130	0.129	0.133	0.131
t-value	2.11	2.15	2.11	2.07	2.12	2.07
Daily risk-adjusted returns	0.00024	0.00026	0.00025	0.00024	0.00025	0.00023
Annualized risk-adjusted returns	0.061	0.065	0.062	0.060	0.062	0.058
t-value	2.39	2.57	2.47	2.33	2.41	2.24
Average stocks in portfolio	29.7	27.5	27.2	26.5	25.5	23.7

Panel B: Purchases of inside stock 11-20 quarters after declassification

	<i>Number of ties to current high-information insiders</i>					
	0-10	1-10	2-10	3-10	4-10	5-10
Daily raw returns	0.00040	0.00046	0.00048	0.00053	0.00058	0.00056
Annualized raw returns	0.100	0.115	0.122	0.134	0.146	0.142
t-value	1.54	1.72	1.81	1.96	2.11	2.00
Daily risk-adjusted returns	0.00008	0.00013	0.00015	0.00018	0.00023	0.00020
Annualized risk-adjusted returns	0.016	0.025	0.029	0.037	0.044	0.037
t-value	0.76	1.17	1.34	1.65	1.95	1.62
Average stocks in portfolio	23.8	22.2	21.3	19.6	17.8	15.1

Table A1 shows daily and annualized raw returns (minus the risk-free rate) and risk-adjusted returns for a calendar-time portfolio trading strategy that uses information on former insiders' inside purchases, in relation to the number of ties that the former insider has to current high-information insiders. "High-information insiders" is defined as CEOs, Vice Presidents and board members. "Inside trades" is defined as trades in formerly inside stock. Panel A shows results for purchases that occur 1 to 10 quarters after the former insider was declassified, and Panel B shows results for purchases that occur 11 to 20 quarters after the former insider was declassified. Each column represents the allowed number of ties the former insider may have to be included in the analysis. Conditional on inclusion, former insiders' inside net trades are observed quarterly, and the trading strategy's positions are taken accordingly and held for one quarter, resulting in approximately 63 daily portfolio returns. The portfolios are reconfigured each quarter. The risk adjustment is made by regressing daily portfolio returns minus the risk-free rate on constructs aimed at capturing systematic risk. Specifically, the daily market return minus the risk-free rate, the size factor SMB, the book-to-market factor HML, and the momentum factor UMD. The annualization assumes 252 trading days per year.

Figure A1: Risk-adjusted returns on trades in inside stock and ties to current insiders

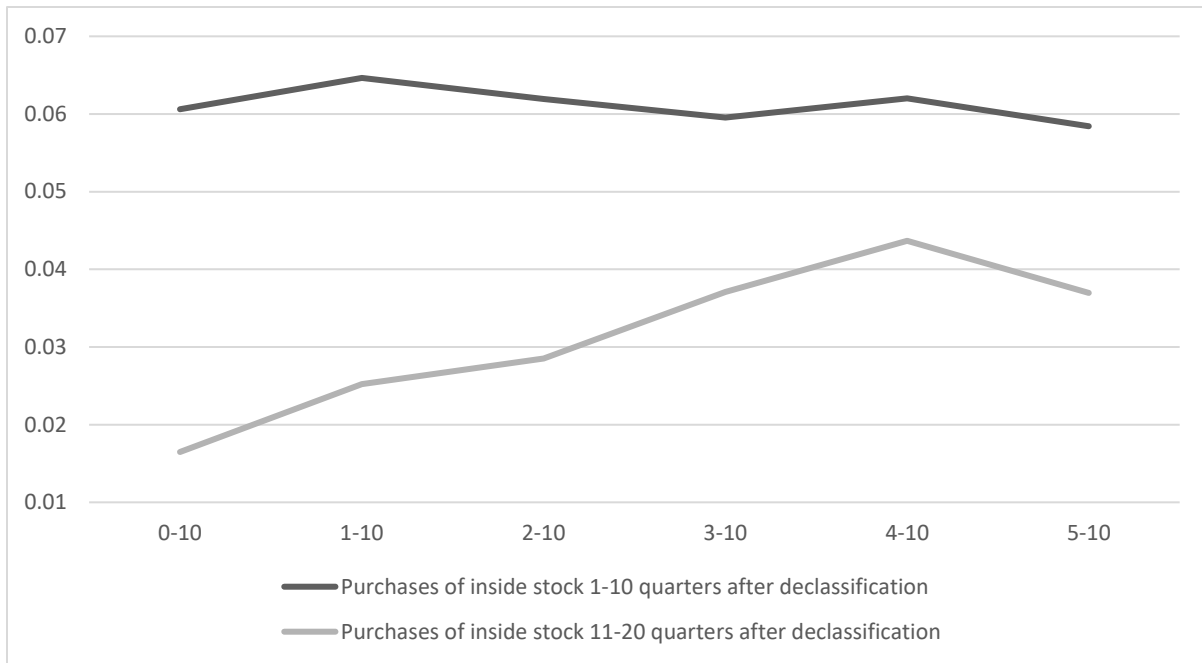


Figure A1 shows annualized risk-adjusted returns from a calendar-time portfolio strategy that mimics former insiders’ purchasing behavior in inside stock (Y axis) in relation to the number of ties that the former insider has to current high-information insiders (X axis). “High-information insiders” is defined as CEOs, Vice Presidents and board members. “Inside trades” is defined as trades in formerly inside stock. The darker line shows results for purchases that occur 1 to 10 quarters after the former insider was declassified, and the lighter line shows results for purchases that occur 11 to 20 quarters after the former insider was declassified. Each X axis tick marker represents the allowed number of ties the former insider may have to be included in the analysis. Conditional on inclusion, former insiders’ inside net trades are observed quarterly, and the trading strategy’s positions are taken accordingly and held for one quarter, resulting in approximately 63 daily portfolio returns. The portfolios are reconfigured each quarter. The risk adjustment is made by regressing daily portfolio returns minus the risk-free rate on constructs aimed at capturing systematic risk. Specifically, the daily market return minus the risk-free rate, the size factor SMB, the book-to-market factor HML, and the momentum factor UMD. The annualization assumes 252 trading days per year.