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# Insider trading with options: Evidence from rank-and-file employees☆

Matteo Vacca

*Hanken School of Economics, Finland*

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ABSTRACT

Using trading data from Finland, I document that some rank-and-file employees purchase options written on their employers' stocks. These purchases are associated with subsequent weekly excess returns of approximately 60 basis points in the underlying stocks. The association is most pronounced before earnings announcements, extends to firms in the employer's supply chain, is not explained by industry knowledge or trading skill, and weakens upon job separation. The results suggest that some rank-and-file employees attempt to exploit informational advantages by trading in the option market, raising questions about firms' disclosure policies and the alignment of employee incentives with market efficiency.

> *"Since an investor can usually get more action for a given investment in options than he can by investing directly in the underlying stock, he may choose to deal in options when he feels he has an especially important piece of information."*
>
> [Black (1975)]

Recent work documents two empirical regularities. First, informed trading is common in the option market and often remains undetected (e.g., Augustin et al., 2019). Second, rank-and-file employees have access to price-relevant information (e.g., Green et al., 2019). I bridge these two literatures by analyzing the role that rank-and-file employees play in the option market. My approach differs from earlier studies of informed option trading, which predominantly focus on institutional investors and on large trades subsequently investigated by regulators.[1]

This paper leverages account-level trading data on tens of thousands of Finnish employees to examine their open-market purchases of own-company call options.[2] Despite these purchases being difficult to rationalize in the absence of private information (e.g., Lambert et al., 1991) and local laws sanctioning the misuse of non-public material information, between 3% and 9% of all retail demand in the market for single-name equity derivatives in Finland can be attributed to executives, managers, and rank-and-file employees trading directly with their personal accounts. The corresponding figure for the underlying stocks is substantially lower (between 0.4% and 1.6%). In line with Black's argument – reported in the opening quote – that informed investors may have a relative preference for trading options rather than equities, this difference cannot simply be explained by employees being active

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*E-mail address:* matteo.vacca@hanken.fi.

[1] See, for example, Ahern (2017), Kacperczyk and Pagnotta (2019), Lowry et al. (2019), Akey et al. (2022).

[2] Throughout the paper, the term "employee(s)" encompasses all individuals within a firm: executives (primary insiders), managers (other managers not subject to disclosure requirements), and rank-and-file employees. Section 1.2 contains a more detailed description of this classification. Moreover, "open-market purchases" are positive changes in the end-of-day balance of a given instrument, resulting from one or more purchases made on the open market by the account holder.

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traders of derivatives in general, as four in five employees who purchase own-company call options refrain from buying call options written on other stocks.

I find strong evidence consistent with an information advantage story. Open-market purchases of own-company call options by employees predict future stock returns at short horizons. Remarkably, the average market-adjusted weekly stock return following an own-company call option purchase is over 60 basis points (corresponding to an annualized stock return of approximately 40%).

Rank-and-file employees make the vast majority of own-company option purchases and are responsible for most of the return predictability. Strikingly, lower-ranked employees outperform higher-ranked employees (including primary insiders) at short horizons when buying own-company options. Although this gap is not statistically significant (see Section 5.1), further analysis suggests that rank-and-file employees often trade on private information, particularly before key corporate events. In contrast, higher-ranked employees exhibit more cautious trading behavior.

My event-based tests overcome prior critiques that evidence on lower-ranked employees' information advantage must be anchored to specific events rather than inferred ex post (Kasznik, 2003). On the one hand, I show that own-company call option purchases made just before earnings announcements are associated with weekly stock returns of approximately 150 basis points. The effect is driven by earnings announcements containing positive and unexpected news. Most of the trades before earnings announcements are made by rank-and-file employees, and none by primary insiders. On the other hand, I find that purchases of own-company call options concentrate in the days before large positive non-earnings news, with no analogous buildup before negative news. Such a strong predictive power before the release of firm-specific information aligns with the narrative that informed option trading ahead of corporate events is common but goes largely undetected (Augustin and Subrahmanyam, 2020).

On the contrary, when employees buy call options written on other stocks, their trades do not contain price-relevant information. I also examine trades by former employees who buy options written on their former employer's shares and find that these purchases do not predict stock returns. This suggests that former employees do not retain substantial firm-specific information after leaving the company and are unable to extract this information from their former colleagues.

Moreover, some current employees could also exploit confidential inside information by trading the derivatives of their firm's supply chain partners. To investigate this hypothesis, I examine derivative trades by employees at major suppliers and customers of Nokia, a large Finnish multinational that pioneered mobile phones. I find that their purchases of Nokia options predict stock returns at short horizons. In contrast, purchases by employees at other firms do not contain price-relevant information. The results are unlikely to be driven by industry-specific knowledge but rather are consistent with informed option trading propagating through economic links (Cohen and Frazzini, 2008). More generally, these findings suggest that retail order flow is only informed in the presence of a plausible information advantage.

Furthermore, many employees are unlikely to trade using only their personal accounts. In the insider trading literature, the practice of tipping refers to the act of passing non-public information to another person (the tippee) who then trades on that information. My granular data allow me to identify some of this information transmission by exploiting repeated correlated trading. This analysis shows that tipping is likely to represent at least an additional 4% of total activity in the retail option market. Consistent with tipping being an important driver of retail demand for options, I also find that own-company option buys are associated with significant increases in buying activity from other retail traders.

Finally, I examine what drives employees to buy own-company options. To answer this question, I use a logit model to examine which characteristics predict open-market purchases of options written on employers' stocks. The results reveal that the microfoundations of own-company option trading reflect a number of characteristics, such as habit, familiarity with the stock market, and the probability of detection.

This paper contributes to three strands of literature. First, I add to previous work on informed trading using equity derivatives by shedding light on the trading behavior of individuals who have access to price-relevant information but are not primary insiders. Public disclosures of own-company option buys are notably rare, with no derivative transactions preceding 1859 M&A announcements in the US and only 322 insider call option purchases reported in Canada between 1995 and 2000 (Chen and Zhao, 2005; Augustin et al., 2019).[3] Additionally, very few insiders hedge employer-specific risks using put options (Bettis et al., 2001). However, recent work suggests that rank-and-file employees, who are not subject to disclosure requirements, may also have access to price-relevant information (e.g., Huddart and Lang, 2003; Babenko and Sen, 2016; Green et al., 2019). My results provide the first evidence that rank-and-file employees use private information to trade on the option market. Option trades by these employees predict weekly stock returns and are fairly common, with almost 2% of individuals in my sample purchasing own-company call options on the open market. These purchases predict weekly stock returns. Moreover, I show that rank-and-file employees are privy to price-relevant information within the supply chain and exploit their advantage by trading derivatives of economically-linked firms.[4]

Second, I add to the literature examining the relationship between option markets and equity markets. Several papers analyze aggregate data to show that option markets contain price-relevant information in the United States (Pan and Poteshman, 2006; Roll et al., 2010; Johnson and So, 2012; Hu, 2014; Weinbaum et al., 2023), Taiwan (Lee and Wang, 2016), Korea (Woo and Kim, 2021), and internationally (Cao et al., 2024). More generally, stock and option trades involving relatively small amounts have an informational component (Ge et al., 2016; Bartlett et al., 2024). In contrast to previous work focusing on the informativeness

[3] A separate stream of literature examines the information content of grants of unlisted stock options to CEOs (e.g., Fich et al., 2011).

[4] Previous work suggests primary insiders may use their private information to trade stocks of their firm's supply chain partners as a way to circumvent insider trading restrictions (e.g., Deuskar et al., 2025).

of institutional investors' trades in single-name options (Aragon and Martin, 2012; Lowry et al., 2019), my paper examines retail trading. In particular, I show that employees, leveraging their information advantage as suggested by Black (1975), contribute to the information content in the option market by trading own-company options. My results show that informed traders in Finland represent up to 15% of the total retail demand for options.

Third, I contribute to the literature on insider trading in general. Recent studies examine in detail insider trading cases involving purchases of single-name options and suggest inside information is embedded in option markets (e.g., Ahern, 2017; Akey et al., 2022; Bondarenko and Muravyev, 2023). However, prosecutors generally focus on large and infrequent trades and most informed trading likely remains undetected (e.g., Patel and Putniņš, 2020). Hvide and Nielsen (2024) document undetected insider trading in stocks by high-ranking Norwegian managers who are not subject to disclosure requirements. I add to this literature by focusing on rank-and-file employees—by far the largest group within a company—and exploring the sources of their information advantage, such as earnings news and economic links.[5] Unlike stocks, options are particularly well-suited for detecting information-based trading advantages due to their embedded leverage and the inherently speculative nature of the transactions in my sample (Black, 1975; Chakravarty et al., 2004; Boyer and Vorkink, 2014).

## 1. Institutional setting and data

In this section, I introduce the institutional setting, explain how I identify employment relationships, and discuss some summary statistics.

### 1.1. Insider trading regulations in Finland

Insider trading laws were introduced in Finland in 1989. Similar to many other countries in Europe, the laws are modeled after US insider trading regulations. Specifically, according to the 1989 Securities Markets Act (SMA), any individual who obtains non-public information that is likely to have a material effect on the value of publicly listed securities is prohibited from exploiting this information to obtain financial benefits. The Finnish Financial Supervisory Authority regulates financial markets in Finland and seeks to enforce the law by monitoring insider trading.

While the misuse of inside information is prohibited for all investors, the requirement to publicly disclose insider trades applies only to investors specified in the SMA. Generally, these individuals are employed by the issuing company, holding positions such as managing directors, board members, and auditors, or regularly obtain inside information and have the right to make decisions on the future development of the company's business operations.

In addition to the above laws against insider trading, primary insiders face further restrictions in their trading activity in three ways: first, by formal guidelines issued by the Finnish Association of Securities Dealers; second, by official recommendations from the stock exchange; third, by additional constraints on the trading by primary insiders that are issued directly by the firms. Section A of the Appendix provides more details about insider trading regulations and enforcement in Finland (see also Kasanen, 1999).

Previous work examining insider trading regulations around the world provides an opportunity to contextualize the Finnish legal setting. Specifically, Bhattacharya and Daouk (2002) report that Finland introduced and enforced insider trading laws earlier than several other developed nations, such as Austria, Belgium, Germany, and Italy. Moreover, Denis and Xu (2013) use data from the Global Competitiveness Report to develop a country-level measure of insider trading restrictions. This measure is based on corporate leaders' responses worldwide to the following survey question: *Insider trading is not common in the domestic market (1=strongly disagree, 7=strongly agree)*. Finland's average score was 5.53, surpassing many Western European countries (e.g., France, Germany, and the Netherlands), and closely trailing the US score of 5.64. More generally, Finland scores well on several related measures examined in previous papers, such as how much respect the government has for property rights (Chen et al., 2017), the country-level accounting transparency (Jin and Myers, 2006), and the efficiency of the legal system (Fernandes and Ferreira, 2009).

### 1.2. Trading data and employment relationships

The trading data come from Euroclear Finland, which serves as the official registry of stock and option holdings in Finland Grinblatt and Keloharju (see, e.g., 2000). This data set includes daily records of holdings and changes in holdings of all securities registered with Euroclear Finland or its predecessor the Finnish Central Securities Depository, covering the period from January 1995 to December 2014. A granular trade type identifier allows me to identify and separate different kinds of transactions, such as those on the open market and other trade categories.

The data from Euroclear Finland do not contain information about employment relationships. However, the data set allows me to observe the assignment of equity-linked compensation from employers to their employees. I combine this with data from Alexander

[5] While evidence on short-term information advantage is scarce, previous work shows that rank-and-file employees possess a nuanced understanding of their employers' value creation processes over medium-term horizons—typically ranging from one month to several quarters (e.g., Huddart and Lang, 2003; Agrawal et al., 2021). However, employees do not necessarily view these insights as material non-public information and frequently share them publicly, including through social media platforms (Huang et al., 2015, 2020; Green et al., 2019). Accordingly, the existing evidence on the financial consequences of this understanding is inconclusive. Taiwanese employees lose an estimated 5% in annual returns by heavily investing in their employer's stock rather than diversifying (Lee et al., 2008). Norwegian employees generate significantly negative alphas during the first two weeks, with some evidence of informativeness appearing over medium-term horizons (Hvide and Nielsen, 2024).

Incentives (Keloharju and Lehtinen, 2018; Vacca, 2023), which provides identifying information on hundreds of employee and executive stock option plans issued in Finland. This allows me to infer the employment relationships of over 40,000 individuals, representing nearly 2% of Finland's working population.

Although the coverage is extensive, it is important to emphasize that I can only identify relatively short stints of employment relationships. For this reason, the results presented below should not be interpreted as capturing all instances of informed option trading in Finland. Rather, I focus on a very clean sample of option trades by current employees.

Section B of the Appendix provides a detailed description of the identification procedure.[6] Section B of the Appendix also underlines that the procedure yields information about an individual's standing within the company, allowing me to classify each individual either as a primary insider, as a manager, or as a rank-and-file employee.

### 1.3. Options in Finland

There are two main types of single-name equity derivatives listed in Finland: listed options and listed warrants. Throughout the paper, I collectively refer to these derivatives as "options" and focus on employees' open-market purchases. These purchases are instances where employees buy own-company options directly from the market (with either a market or a limit order) at prevailing market prices by trading through their personal brokerage accounts.

Below, I provide detailed information about both types of securities. Importantly, while the results in the main body of this paper use pooled data, Section D of the Appendix shows that my main results also hold separately for both types of derivatives, alleviating concerns about the external validity of my findings.

#### 1.3.1. Listed options in Finland

Listed options in Finland are generally issued by firms as part of their compensation packages. In fact, contrary to most other countries, employee stock options (ESOs) in Finland are transferable and often listed on the exchange.

The main advantage of examining these instruments is that they are widely available across multiple firms, as ESOs represent an important part of corporate compensation in Finland. Specifically, I am able to identify 2659 open-market purchases of own-company listed options by 738 employees at 43 firms.[7] Importantly, employee stock options are granted several years before listing, so that listing activity is well separated from the excess returns I document.

While listed options cannot be written by other market participants, there is an active secondary market for these securities, and approximately half of all open-market option sales are made by investors without ties to the underlying firm. Moreover, all ESOs are call options, and investors usually have little to no choice about the moneyness and maturity of the option they buy.

#### 1.3.2. Listed warrants in Finland

Listed warrants are the second type of single-name equity derivative in Finland. These are bank-issued instruments with payoff structures akin to call and put options. The issuing bank ensures liquidity on the instruments by keeping a relatively low bid–ask spread (often of just one or two cents). Contrary to listed options, employees do not own warrants unless they buy them first and the degree of salience of a warrant issuance is similar for both employees and the general population.

Generally, bank-issued warrants are written only on the most liquid stocks. Notably, during the first half of my sample period, a significant proportion of these warrants were written on Nokia shares.[8] This characteristic of the market, together with the short nature of the employment relationships I identify, restricts my ability to examine purchases of own-company listed warrants to Nokia employees. Specifically, I identify 1953 own-company warrant trades made by 202 Nokia employees between December 2000 and January 2004.[9]

### 1.4. Summary statistics on own-company call option purchases by employees

My main analyses focus on purchases of call options. The advantages of this approach are twofold. First, Ge et al. (2016) find that such purchases are the strongest predictor of weekly stock returns. Second, call option purchases in my sample are clearly speculative and are difficult to rationalize in the absence of inside information.[10]

My primary sample consists of own-company call option buys by current employees, as defined in Section B of the Appendix. I identify 4091 purchases by 890 employees at 43 firms. Panel A of Table 1 provides additional information on these transactions. The median (average) purchase value is €1600 (€7,002). Traders in my sample are mainly rank-and-file employees: the median (average) employee rank within the company is 352 (1628). Most employees who buy own-company options are males in their thirties and forties. As discussed in detail in Section 2, these purchases are associated with an average market-adjusted weekly stock return of 64 basis points. The stock returns are slightly skewed to the right, with over one-quarter of the trades having a value above 3%.[11]

Table F1 shows how own-company call option buys are distributed among different employees. Table F2 presents the definitions of the main variables used in this paper.

[6] I also examine contemporaneous trading to uncover the sharing of information with individuals outside the firm, as described in more detail in Section C of the Appendix and in Section 4.

[7] The first ESOs were introduced in Finland in 1988. By 2001, over 80% of listed companies had issued one or more series of employee stock options. For additional details on these instruments, see Ikäheimo et al. 2006, Liljeblom et al. 2011.

[8] For instance, on March 11, 2002, the Nasdaq OMX Group reported 51 covered warrants with non-zero trading volume (see http://www.omxgroup.com/HEXArchive/history/kl02/kl_20020311.html). Out of these 51 warrants, 39 had a security identifier starting with NOK.

**Table 1**
Summary statistics.

| Panel A: Purchases of call options by employees | | | | | | | |
|---|---|---|---|---|---|---|---|
| | N | Average | SD | Skewness | P25 | P50 | P75 |
| Value of the option purchase (€) | 4088 | 7002 | 68789 | 47.74 | 640 | 1600 | 3960 |
| Employee rank | 4091 | 1628 | 2468 | 1.94 | 85 | 352 | 2230 |
| Age | 3939 | 40 | 8 | 0.77 | 35 | 38 | 44 |
| Female | 3943 | 0.03 | 0.18 | 5.10 | 0.00 | 0.00 | 0.00 |
| Market-adjusted weekly stock return | 4091 | 0.64 | 5.27 | 0.33 | −1.98 | 0.09 | 3.27 |
| **Panel B: Purchases of call options by employees at customer and supplier firms** | | | | | | | |
| | N | Average | SD | Skewness | P25 | P50 | P75 |
| Value of the option purchase (€) | 1260 | 2603 | 4265 | 5.48 | 500 | 1310 | 2800 |
| Employee rank | 1260 | 345 | 446 | 2.54 | 4 | 87 | 673 |
| Age | 1260 | 41 | 8 | 0.49 | 34 | 39 | 45 |
| Female | 1260 | 0.02 | 0.13 | 7.20 | 0.00 | 0.00 | 0.00 |
| Market-adjusted weekly stock return | 1260 | 0.58 | 4.75 | 1.14 | −1.88 | −0.03 | 2.76 |
| **Panel C: Purchases of call options resulting from tipping** | | | | | | | |
| | N | Average | SD | Skewness | P25 | P50 | P75 |
| Value of the option purchase (€) | 9608 | 2626 | 4329 | 7.84 | 668 | 1400 | 3000 |
| Age | 9608 | 41 | 13 | 0.43 | 32 | 39 | 51 |
| Female | 9608 | 0.08 | 0.27 | 3.08 | 0.00 | 0.00 | 0.00 |
| Market-adjusted weekly stock return | 9608 | 0.67 | 4.21 | 0.32 | −1.79 | 0.09 | 3.07 |

This table reports summary statistics on informed purchases of call options. Panel A covers 4091 open-market own-company call option buys made by 890 employees in 43 firms. Panel B covers 1260 open-market purchases of call options written on a customer or supplier firm by 111 employees in 7 firms within the Nokia cluster, as discussed in Section 3. Panel C covers 9608 open-market call option buys resulting from tipping, identified using the methodology described in Section C of the Appendix. Information on the euro value is missing for some trades. Similarly, data on age and/or gender is missing for some individuals.

## 2. Own-company option trading by employees

This section examines whether open-market buys of own-company call options are associated with positive stock returns. Additionally, it analyzes the prevalence of own-company option trading and its relationship with purchases of own-company shares.

### 2.1. Stock returns after own-company call option buys

I now examine the stock returns associated with employees' purchases of own-company call options. Formally, for each trade by an employee, I compute:

$$Return_{j,t} = \frac{P_{j,t+\tau} - P_{j,t}}{P_{j,t}},$$

where $P_{j,t}$ is the price of stock $j$ at the option-trade time $t$ and $\tau$ is the event window (e.g., five trading days).

In my analysis, I primarily focus on short horizons because previous studies find that option markets mainly contain information about short-term stock returns (e.g., Pan and Poteshman, 2006; Johnson and So, 2012; Ge et al., 2016). Following the approach detailed in Brown and Warner (1985) to examine stock returns over short horizons, I define abnormal stock returns by using the difference between actual and market returns. Moreover, I follow Deuskar et al. (2025) and cluster standard errors at the stock-trade date level.[12]

Fig. 1 shows that purchases of own-company call options are associated with particularly high short-horizon stock returns, both in absolute terms and relative to purchases of call options written on non-employer stocks. Specifically, after an employee buys an own-company option on the open market, the stock price of the underlying asset increases on average by over 60 basis points in 5 days. Instead, when an employee buys an option written on an unrelated firm, the purchase does not predict stock returns.

Next, I examine specifically the role of rank-and-file employees. The data show that rank-and-file employees account for the vast majority of own-company call option purchases. Moreover, Fig. 2 shows that most of the predictability comes from trades by rank-and-file employees. Their trades are particularly informative, being associated with weekly stock returns in excess of 70 basis points. One reason for trades by higher-ranked employees being less informative is that individuals under more intensive

[9] Own-company option purchases by Nokia employees account for over half of the pooled sample. Importantly, Section E of the Appendix shows that all my main results continue to hold and remain statistically significant when excluding Nokia.

[10] Lambert et al. (1991) are among the first to show that risk-averse employees want to diversify their exposure to employer-specific risk.

[11] I do not observe the time of day at which trades occur. Thus, throughout the paper, I compute close-to-close stock returns based on the closing price on the day of the trade.

[12] My main results remain significant when clustering by stock-month or two-way clustering by stock and trade date.

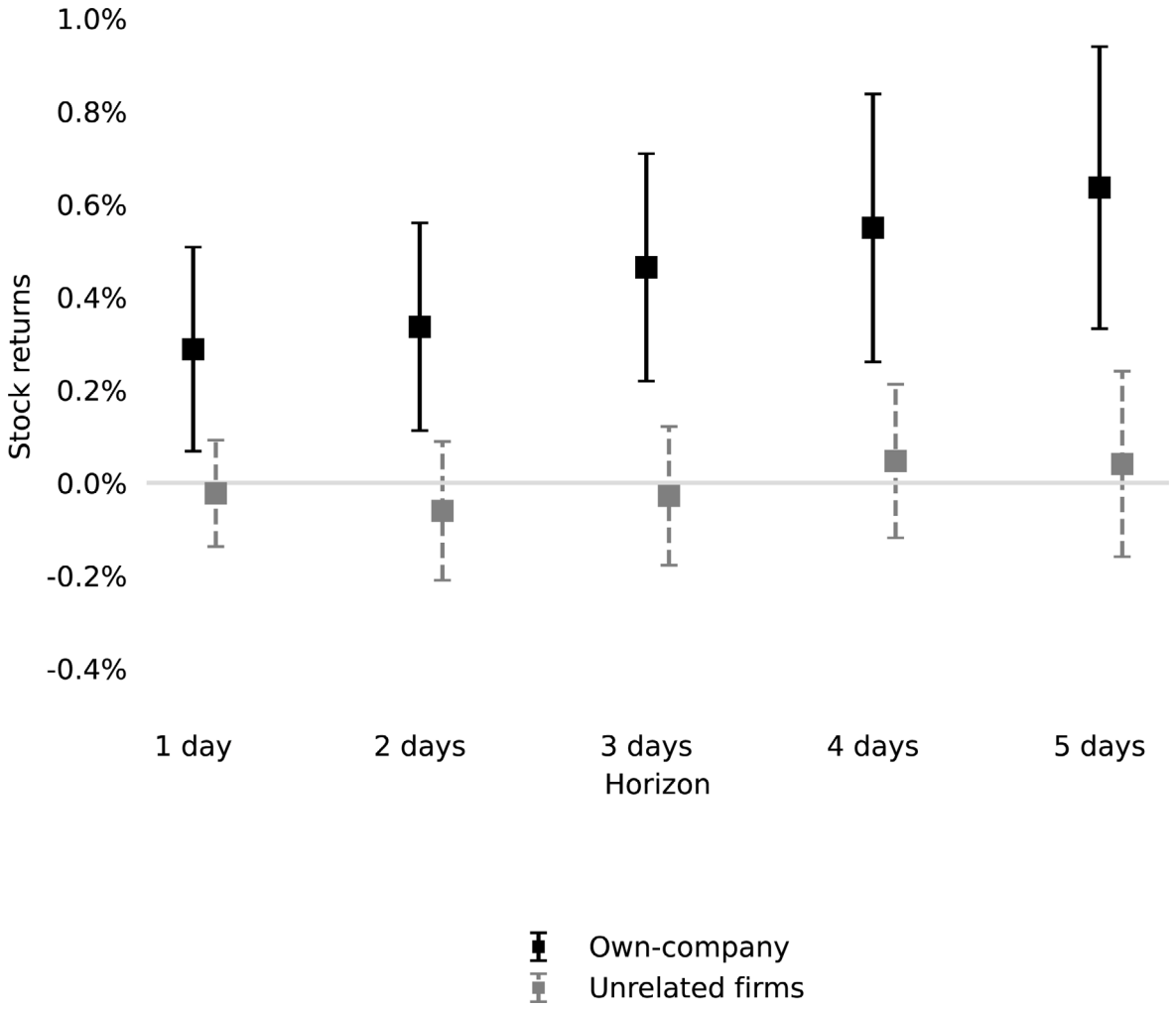


**Fig. 1.** Average Market-Adjusted Stock Returns at Various Horizons.
This figure shows the average market-adjusted stock returns after employees' own-company call option buys and after other call option buys. 95% confidence intervals are based on standard errors that are clustered at the stock-trade date level. Employees' trades along the supply chain are examined separately in Table 4.

regulatory scrutiny may base their own-company option trades on lower-frequency information. Supporting this hypothesis, Fig. 3 shows that higher-ranked employees close out their positions much more slowly than other employees. Primary insiders exhibit a median holding period of more than 80 days, compared with roughly 35 days for rank-and-file traders. These holding-period disparities, however, do not translate into statistically significant return differentials.[13]

Table 2 confirms these results in a regression setting. The evidence is equally strong across instrument classes: when I restrict the sample to bank-issued warrants, whose supply is independent of the employer, the coefficients are virtually unchanged (Table D1). Results are also robust when I examine employer-issued ESOs in isolation (Table D2) and when I examine separately Nokia and other companies (Tables E1 and E2).

Importantly, these short-horizon results already dismiss various alternative explanations, including the notion that increased employee ownership leads to greater effort. They further imply that variation in call option purchases does not reflect differential exposure to risk factors, as such effects would be expected to materialize and persist over longer horizons. Below, I provide a number of additional results consistent with an information advantage story.

[13] Section 5.1 provides a more detailed comparison of the trades of higher-ranked and lower-ranked employees.

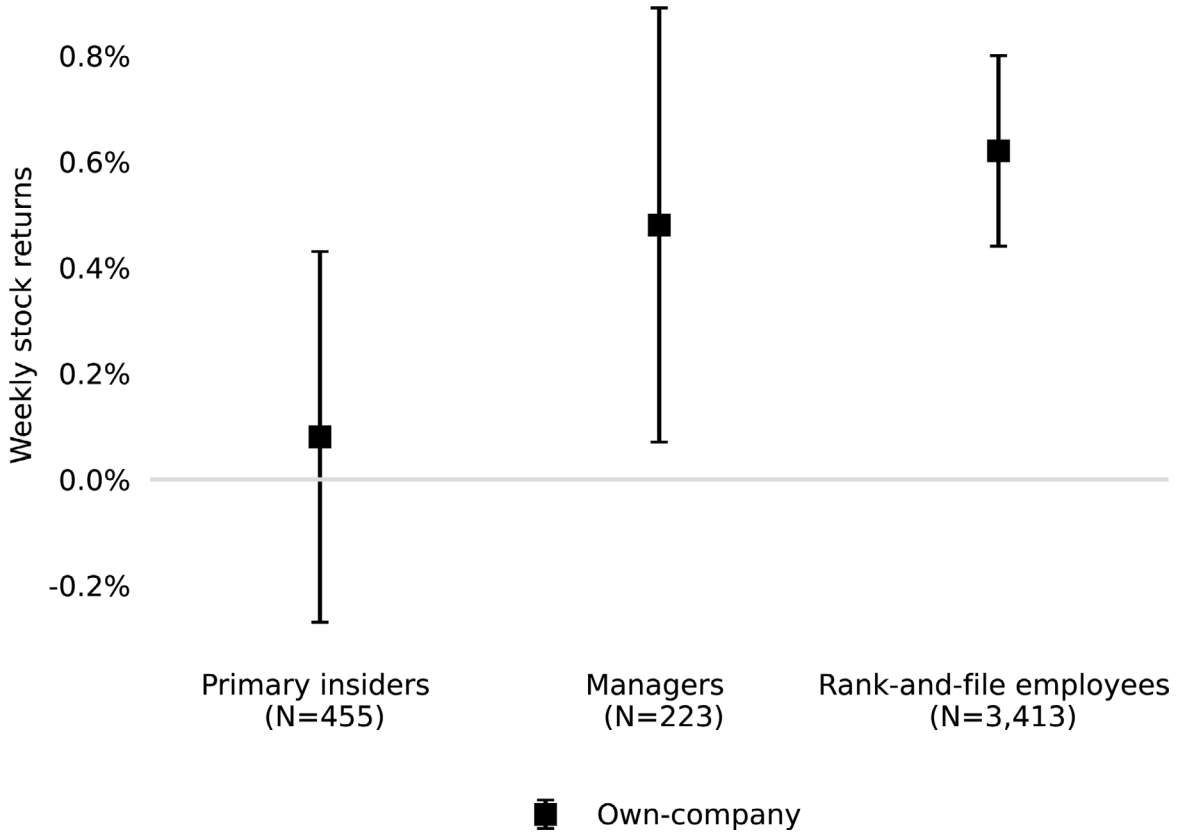


**Fig. 2.** Weekly Market-Adjusted Stock Returns Along the Corporate Hierarchy.
This figure shows the average market-adjusted stock returns after own-company call option buys for different employee ranks. Employees are assigned to the three categories using the procedure described in Section B of the Appendix. 95% confidence intervals are based on standard errors that are clustered at the stock-trade date level.

**Table 2**
Weekly stock returns after own-company call option buys.

| Panel A: All employees | | |
|---|---|---|
| | Average | N |
| Own-company | 0.64 | 4091 |
| Unrelated firm | 0.04 | 3250 |
| Difference | 0.59*** | |
| *p*-value | 0.000 | |
| **Panel B: Only rank-and-file employees** | | |
| | Average | N |
| Own-company | 0.71 | 3413 |
| Unrelated firm | −0.10 | 2587 |
| Difference | 0.81*** | |
| *p*-value | 0.000 | |

Market-adjusted stock returns are calculated for a horizon of 1 week (5 trading days) following open-market option buys by employees. All returns and differences between returns are multiplied by 100. *p*-values are based on standard errors that are clustered at the stock-trade date level. ***, **, and * denote significance at the 1%, 5%, and 10% level, respectively (two-sided test). Employees' trades along the supply chain are examined separately in Table 4.

### *2.2. Employees trading options before earnings announcements*

Motivated by the need to connect insider trades to specific information events, I focus on earnings announcements as recurring, material disclosures, which allow a direct test of whether employees trade on earnings-related private information (Kasznik,

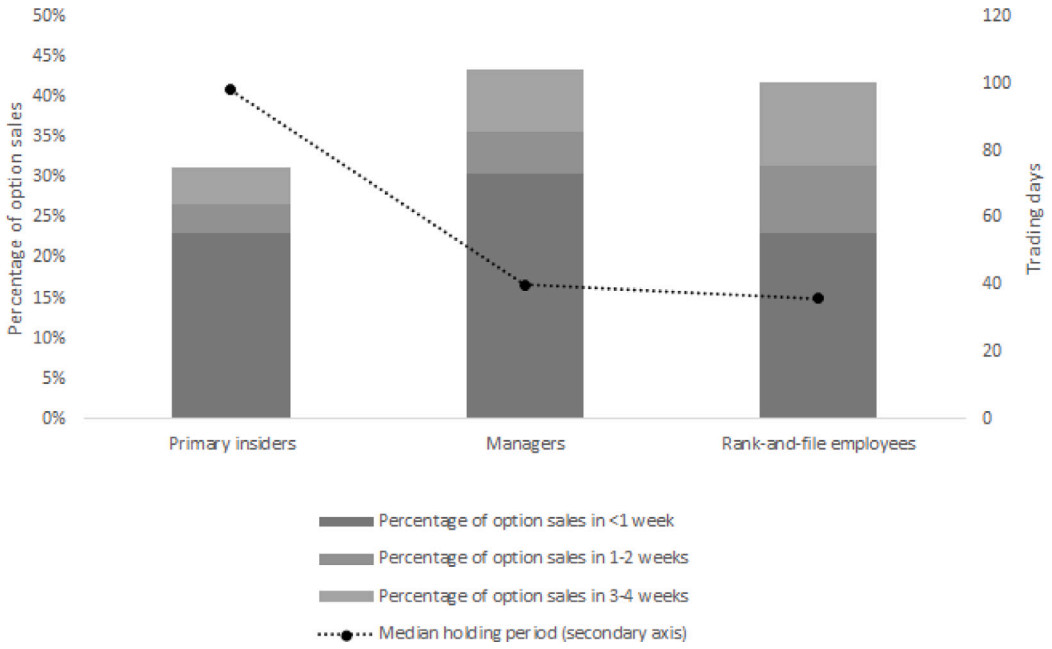


**Fig. 3.** Corporate Hierarchy and Holding Period.
For each employee rank, the bars indicate the proportion of own-company call option buys that reach an initial sale within the specified time windows. The overlaid line (secondary axis) reports the median holding period for closed trades.

2003). Corporate events represent an important opportunity for traders who have an information advantage (Augustin and Subrahmanyam, 2020). Previous work shows that option markets contain price-relevant information before mergers, takeovers, and earnings announcements (Truong and Corrado, 2014; Chan et al., 2015; Augustin et al., 2019). In particular, I focus on earnings announcements to ensure an adequate number of relevant observations, as listed firms have to periodically disclose their earnings news. Moreover, liquidity tends to increase before earnings announcements, so that the probability of observing informed trading is higher (Kacperczyk and Pagnotta, 2019). Generally, retail investors lose money when trading options before earnings news (de Silva et al., 2025). However, to the extent that own-company call option buys in my sample are based on employees' private information about their employer, I expect these purchases to be highly informative when executed just before an information event.

Fig. 4 compares the average weekly market-adjusted stock returns following own-company call option buys and other option purchases in the month before and after an earnings announcement. I find compelling evidence of informed option trading around earnings announcements. Own-company option buys in the week before earnings news are highly informative (one-week returns of around 150 basis points, corresponding to an annualized return of over 120%, and the informativeness attenuates with distance from the announcement). 281 of these 332 own-company call option buys are by rank-and-file employees.

To assess whether employee trading effectively reflects the information content of earnings announcements, I link pre-announcement purchases of own-company call options to earnings news using standardized unexpected earnings (SUE), defined as realized EPS minus EPS from four quarters ago, scaled by its eight-quarter rolling standard deviation. Panel A of Fig. 5 shows that predictability is particularly strong among positive surprises. To separate expected from unexpected components, I also examine absolute SUE. Panel B of Fig. 5 indicates a stronger effect for highly surprising earnings news relative to less surprising announcements. Collectively, these results show that employee call option purchases are more informative prior to positive and unexpected earnings news, consistent with trading on information about earnings surprises rather than event timing or generalized optimism.

This additional evidence from call option purchases made before earnings news shows that some employees actively engage in informed option trading around corporate events. Employees who trade own-company options contribute to the informativeness of option-based measures around earnings announcements and other corporate events (see, among others, Roll et al., 2010; Johnson and So, 2018; Augustin et al., 2019).

The evidence reported in Fig. 4 also suggests that employees help process newly-released information. In fact, in the days following an earnings announcement, the difference in stock returns remains positive and large (over 80 basis points).[14] Away from earnings windows, returns converge toward the baseline. The informativeness of open-market own-company option buys and other option buys is more similar when far away from information events, further supporting an information advantage story.

[14] Fig. F1 further shows that this post-earnings announcement predictability is stronger for more sophisticated employees (proxied by an above-median number of option trades in the prior 12 months), consistent with greater ability to interpret and act on earnings news. However, stock return differences between the two groups are not significant for all periods considered. Fig. D1 shows that the post-earnings announcement result holds for both types of derivatives.

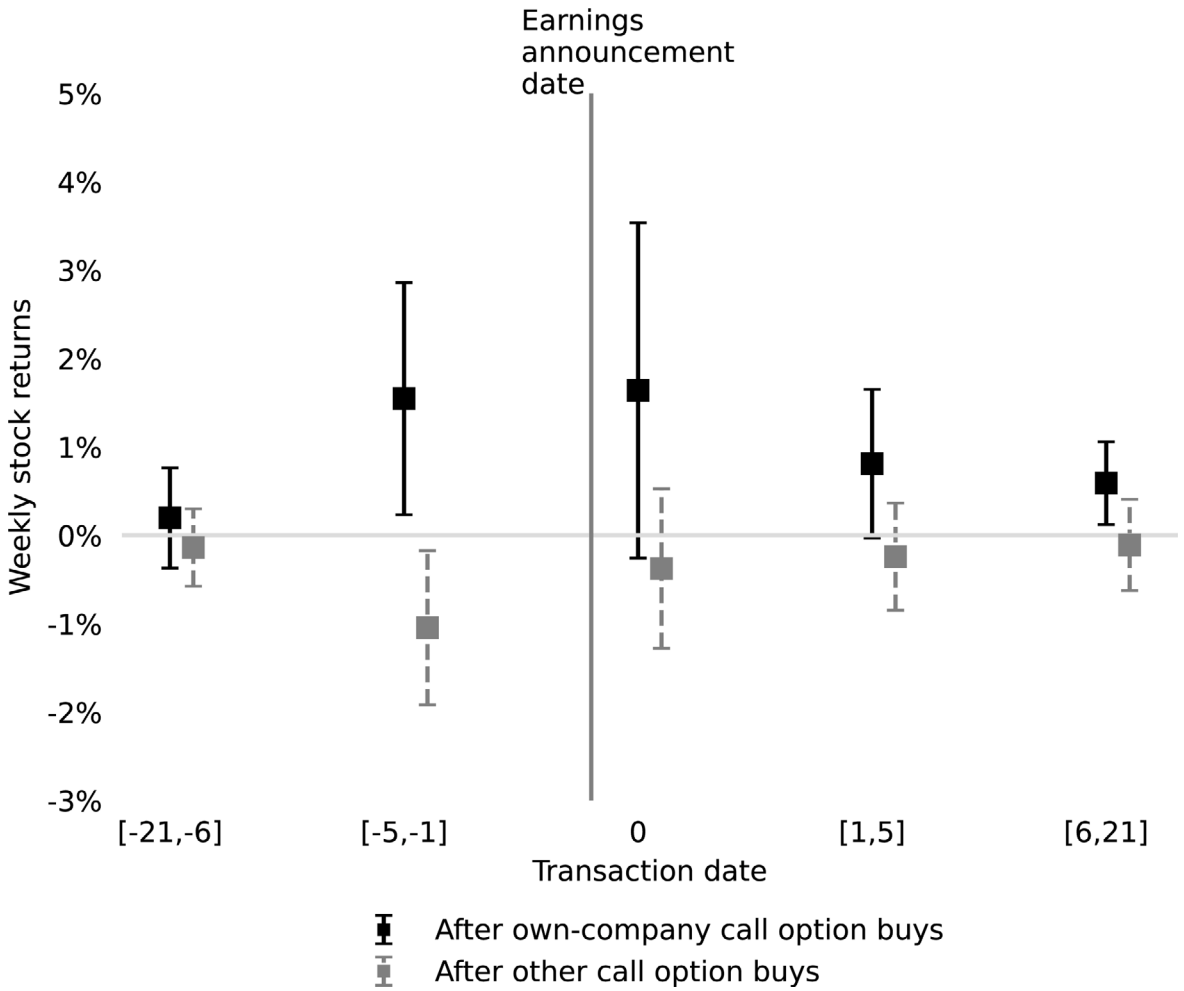


**Fig. 4.** Own-Company Call Option Buys Around Earnings Announcements.
This figure shows the average market-adjusted stock returns after own-company call option buys for trades initiated in the month before and after an earnings announcement. Market-adjusted stock returns are calculated for a horizon of 1 week (5 trading days) following option buys by employees. 95% confidence intervals are based on standard errors that are clustered at the stock-trade date level.

### *2.3. Evidence on other information events*

Next, I examine whether the patterns documented around earnings announcements extend to other material firm news. Events such as product launches are difficult to catalog systematically, and M&A announcements are rare in my sample. I therefore proxy for major information releases using discontinuous price movements. Following prior work that treats large stock returns as information events (e.g., Conrad et al., 2006; Savor, 2012; Jiang and Zhu, 2017), I define a jump as any firm day with an absolute market adjusted abnormal return greater than 10%. Jumps are infrequent and typically reflect the arrival of unexpected firm specific news. To avoid overlap with the earnings analysis in Fig. 4, I remove any jump dates that occur from five trading days before through the earnings announcement day.

I then examine open-market call option purchases that occur shortly before these non-earnings information events. The window runs from five trading days before up to and including the jump date. I split the sample by the sign of the jump, positive versus negative, and by trade type, purchases of call options on the employee's own-company shares versus purchases of call options on other firms. Because trades that precede large subsequent returns mechanically generate extreme ex-post alphas, I focus on trading frequency rather than performance.

Fig. 6 shows that the frequency patterns are asymmetric. Own-company call option buying increases before positive information events but not before negative events. Specifically, there are 68 own-company call option purchases in the window preceding negative jumps, compared with 54 call option purchases on other firms. In contrast, there are 142 own-company call option buys immediately before positive jumps, compared with 63 call option buys on other firms. These results suggest that employees' purchases of own-company call options are more likely to occur before positive non-earnings information events.

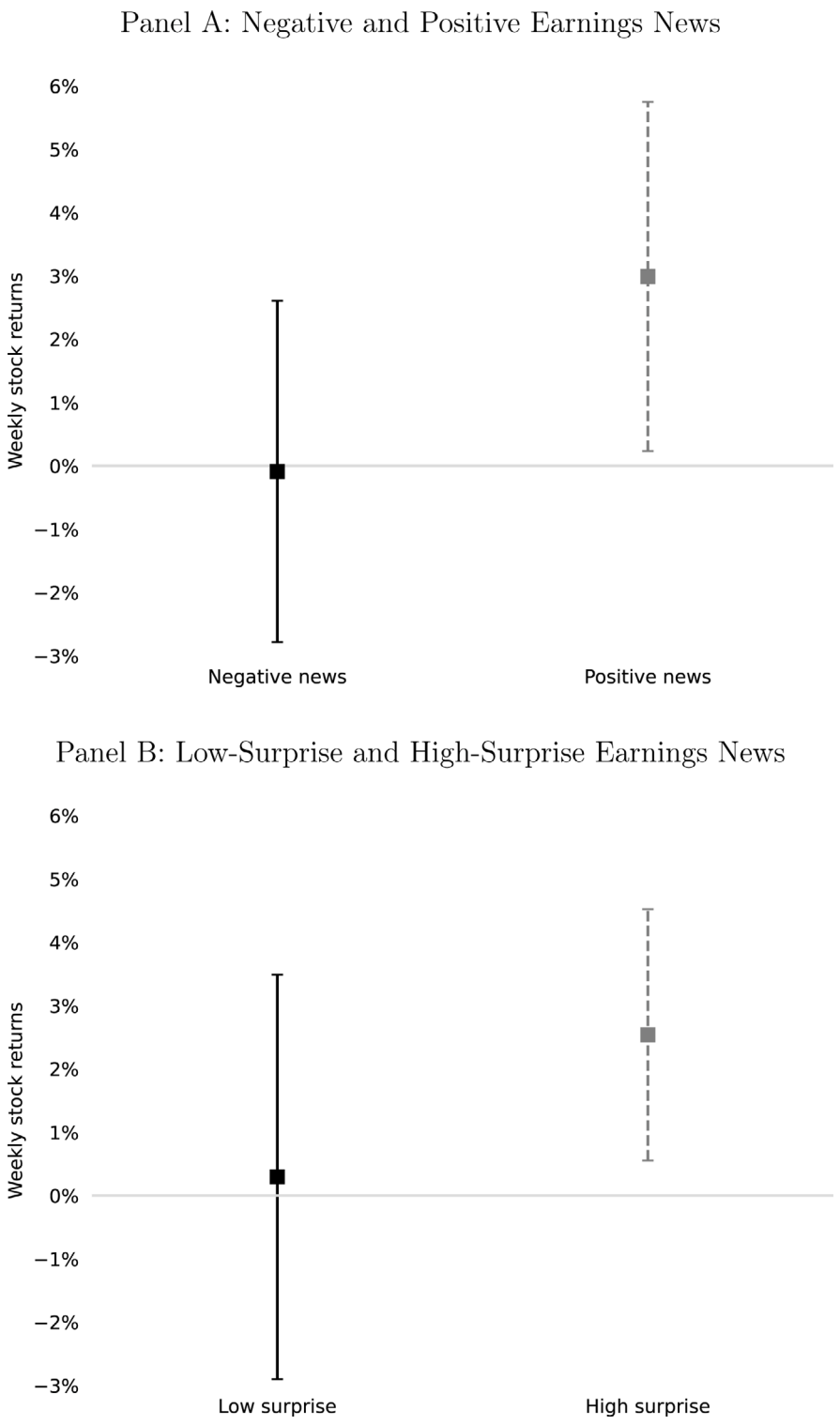


**Fig. 5.** Own-Company Call Option Buys Before Earnings Announcements.
This figure shows the average market-adjusted stock returns after own-company call option buys for purchases that occur in the five days preceding an earnings announcement. The unit of analysis is an earnings announcement before which an own-company call option purchase occurs. In Panel A, the sample is split at the median of standardized unexpected earnings (SUE). In Panel B, the sample is split at the median of the absolute value of SUE. 95% confidence intervals are based on standard errors that are clustered at the firm level.

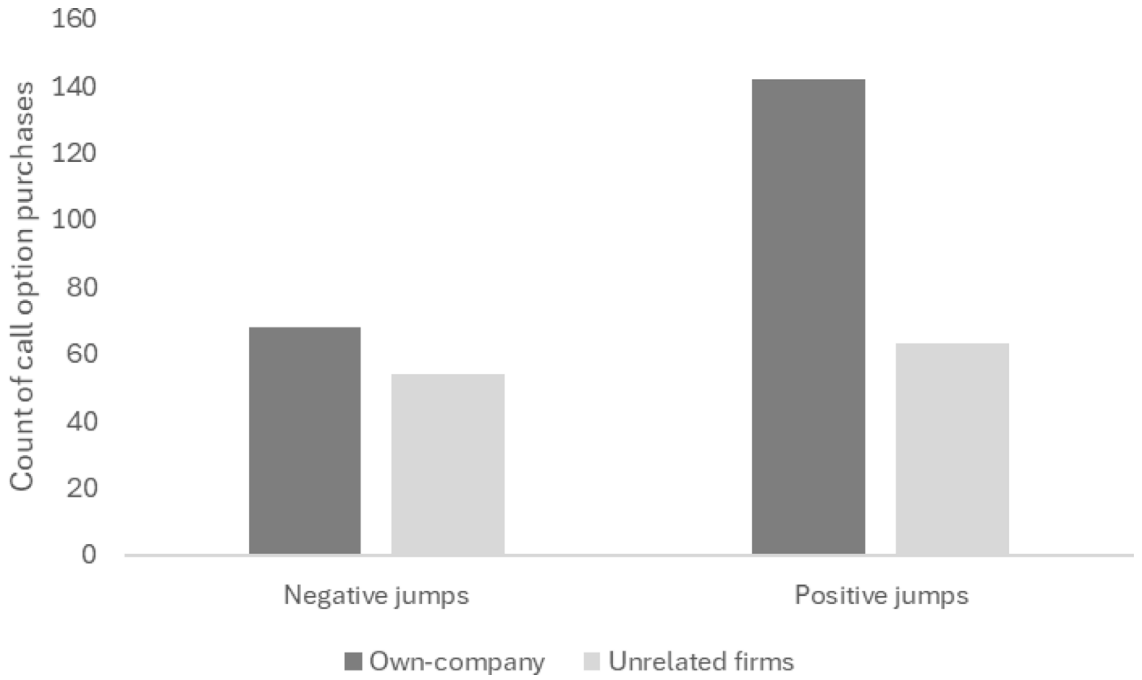


**Fig. 6.** Own-Company Call Option Buys Before Non-Earnings Information Events.
This figure reports counts of call option purchases executed in the five trading days before and including the event day for firm dates with large price jumps that are not within earnings windows. I split events by sign of the jump and trades by whether the call purchase is on the trader's own firm or on other firms. The earnings window from five trading days before through the announcement day is excluded.

### *2.4. The prevalence of own-company option trading*

A number of papers, such as Cremers and Weinbaum (2010) and Xing et al. (2010), suggest informed traders primarily exploit their information advantage in the option market. To examine this proposition, I present some back-of-the-envelope calculations regarding the prevalence of employees' trading in Finland across different markets. More specifically, I examine the degree of employees' trading in stocks and options relative to other retail traders.

Fig. 7 shows that own-company trading by current employees constitutes a significant component of retail investors' demand for options, representing 8.6% of retail accounts and 3.3% of open-market retail purchases. The corresponding figures for stocks are much lower (1.6% and 0.4%, respectively). In other words, potentially informed trading by employees is around five to eight times more common in the option market than in the stock market. These calculations indicate that aggregate retail option volumes are more likely to convey price-relevant information than aggregate retail stock volumes.[15]

It is important to underline that the estimates presented above represent a lower bound for the actual frequency of own-company trading in Finland. In fact, there are many employment relationships that I cannot observe. Nevertheless, to the extent that employees' trades are the only source of inside information, the evidence presented in Fig. 7 suggests that aggregate retail option volumes contain substantially more information than aggregate retail stock volumes.

Naturally, these back-of-the-envelope calculations depend on the assumption that own-company call option buys are not significantly less informative than own-company stock buys. Column (1) of Table F4 confirms these assumptions.[16] More strikingly, Column (2) of Table F4 shows that trades by employees who buy own-company options but not own-company stocks contain the most price-relevant information. The average one-week market-adjusted stock return associated with the over 1000 own-company option purchases made by 371 employees who never buy own-company stocks on the open market is 100 basis points. This finding indicates that highly informed traders tend to favor trading derivatives, consistent with the intuition offered by Black (1975).

### *2.5. Call option buys by former employees*

Do the option trades of former employees contain price-relevant information? The answer to this question is not obvious ex ante. On the one hand, these individuals might retain firm-specific information after they leave the company. They could also be able to

[15] Table F3 shows how the percentages are computed. Table D3 shows that the frequency of own-company trading is relatively high in both listed warrants and listed options.

[16] I include firm-year fixed effects, which effectively control for a firm's amount of private information during a given year, and drop singletons when including fixed effects in linear regressions (see Correia, 2015).

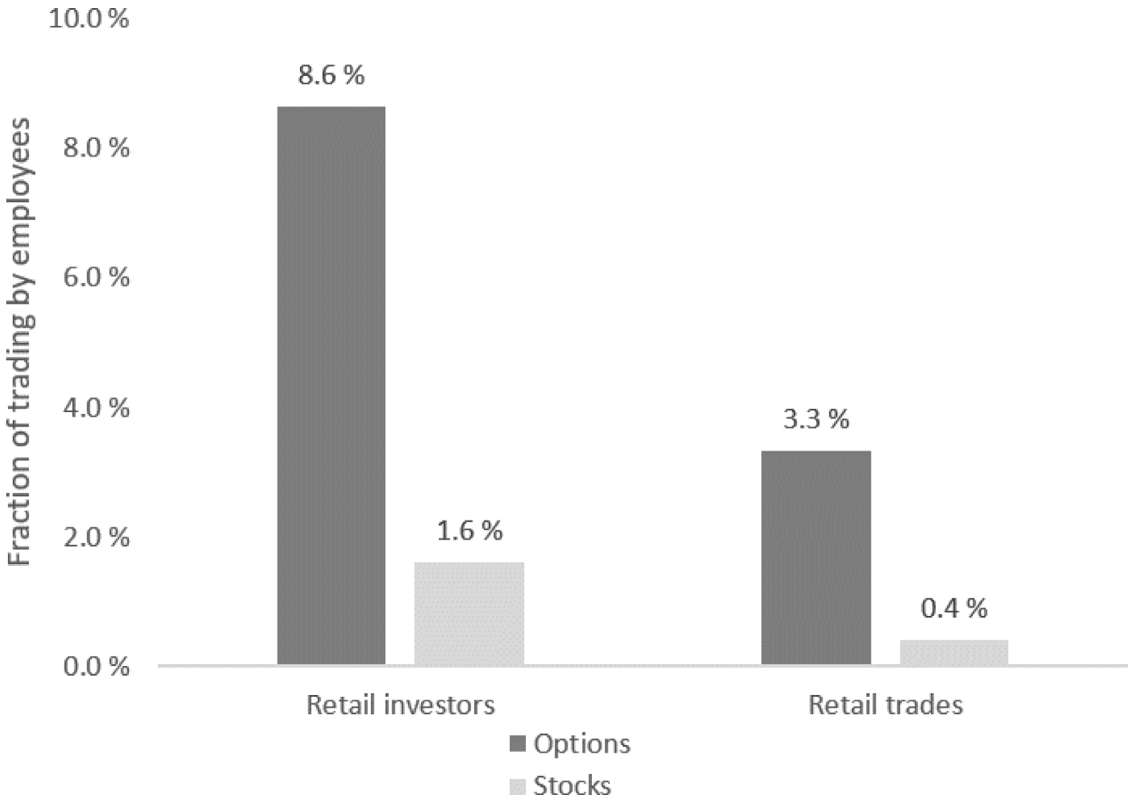


**Fig. 7.** Own-Company Trading in Options and Stocks.
This figure shows the percentage of retail demand attributed to employees. The first (second) column shows the fraction of retail option (stock) investors who are employees. The third (fourth) column shows the fraction of retail option (stock) trades made by employees. Table F3 shows how these percentages are computed.

extract some valuable information from former colleagues within their professional network. On the other hand, company-specific information that can be exploited over very short horizons is likely to become stale quickly. Additionally, it is worth noting the exceptional rarity of insider trading cases brought forth by the SEC for transactions that occur after leaving the firm.[17]

In Table 3, I compare the information content of option buys by current and former employees, identified using the methodology illustrated in Panel B of Fig. B1. My results show that option buys by former employees do not contain price-relevant information over short horizons. Market-adjusted stock returns after own-company call option purchases by former employees are negative. As shown in Tables D4, D5, E3, and E4, this result is robust by type of derivative and by employer firm.

To the best of my knowledge, this is the first direct evidence that the information advantage of insiders tends to decrease after they leave the company. This evidence has important implications for regulatory bodies, allowing them to potentially refine their focus on transactions that are more likely to contain price-relevant information.

## 3. Economic links

Below, I further leverage the Finnish institutional setting to provide compelling evidence that informed option trading extends along the supply chain. Previous work shows that primary insiders exploit their information advantage to trade stocks of their firm's supply chain partners as a way to circumvent insider trading restrictions (e.g., Deuskar et al., 2025). The results below show that not only primary insiders but also rank-and-file employees trade along the supply chain, most likely to enjoy an even lower probability of detection, and that these trades contain price-relevant information.

### *3.1. The Nokia cluster*

Employees could potentially exploit confidential inside information not just through own-company option trading, but also by purchasing the derivatives of their company's supply chain partners. To examine whether informed option trading spreads through economic links, I analyze derivative trades by employees in Nokia's key supplier and customer firms.

[17] For one such example, see v. Cherif (1991).

**Table 3**
Trades by former employees are not informative.

| Panel A: All employees | | |
|---|---|---|
| | Average | N |
| Current employee | 0.64 | 4091 |
| Former employee | −0.11 | 2275 |
| Difference | 0.76*** | |
| *p*-value | 0.000 | |
| **Panel B: Only rank-and-file employees** | | |
| Current employee | 0.71 | 3413 |
| Former employee | −0.03 | 1756 |
| Difference | 0.75*** | |
| *p*-value | 0.000 | |

Market-adjusted stock returns are calculated for a horizon of 1 week (5 trading days) following open-market option buys by current and former employees, identified using the methodology described in Section 1.2. All returns and differences between returns are multiplied by 100. *p*-values are based on standard errors that are clustered at the stock-trade date level. ***, **, and * denote significance at the 1%, 5%, and 10% level, respectively (two-sided test).

Unlike in the United States, investigating the financial implications of economic links in small countries often presents challenges due to the typically sparse customer–supplier relationships among publicly listed companies. However, I am able to leverage my institutional setting by examining the so-called Nokia cluster. This ICT cluster includes Nokia's suppliers, customers, and partners, and is recognized for driving innovation and growth in the Finnish economy. The term gained popularity in the early 2000s, when Nokia was the world's largest mobile phone manufacturer and a leading supplier of digital mobile and fixed networks.

The Nokia cluster is a great example of tight industry linkages and has been studied extensively by economists and policymakers (e.g., Hertog et al., 2001; Hira, 2012). As discussed by Ali-Yrkkö et al. (2000), Nokia's local suppliers were involved in the manufacturing of components and ICT equipment, whereas its key local customers were telecommunications service providers.[18]

### 3.2. Summary statistics on call option purchases along the supply chain

I identify 1260 purchases of Nokia call options by 111 employees working in the Nokia cluster, which comprises Nokia's customer and supplier firms. Panel B of Table 1 provides summary statistics for these observations. Compared to purchases of own-company options, trades along the supply chain are relatively more common among primary insiders. Nevertheless, the majority of observations consist of option purchases by rank-and-file employees.

### 3.3. Informed option trading along the supply chain

Panel A of Table 4 shows that open-market purchases of Nokia call options by individuals at customer and supplier firms are associated with market-adjusted weekly stock returns of approximately 60 basis points. These purchases contain significantly more price-relevant information than similar transactions by individuals working at other firms outside of the Nokia cluster. Panel B of Table 4 reveals that this result is even stronger when focusing solely on rank-and-file employees. Due to data availability, prior studies have only indicated that purchases by primary insiders contain price-relevant information along the supply chain Ben-David et al. (e.g., 2019). In contrast, my findings reveal that option purchases by rank-and-file employees in customer and supplier firms also predict short-term stock returns.[19] Tables D6 and D7 show that this result is robust by type of derivative.

One may be worried that the results in Table 4 merely reflect employees' industry-specific knowledge rather than an information advantage. While this would contradict previous evidence from Norway showing that employees who invest in professionally close stocks tend to underperform (Døskeland and Hvide, 2011), I nevertheless examine this possibility using two separate empirical strategies. First, I examine purchases of call options written on firms that operate in the same industry as the employer. Table F5 shows that these purchases do not contain price-relevant information.

Second, I focus on trades that occur within the Nokia cluster. To properly identify the differential effect of direct economic links vis-à-vis industry knowledge, I analyze stock returns after employees of customer and supplier firms of Nokia purchase options written on firms operating within the Nokia cluster. To properly identify the differential effect of direct economic links vis-à-vis industry knowledge, I exclude own-company trades, as well as trades by Nokia employees (who are the only individuals having

[18] Using information from Ali-Yrkkö et al. (2000), Lovio (2006), I identify the following supplier and customer firms for which I have access to employment information in my sample: Aspocomp, Comptel, Efore, Elcoteq Network, Elisa Communications, F-secure, JOT Automation Group, Novo Group, Perlos, PKC Group, PMJ Automec, Sonera, Tecnomen, and Tietoenator.

[19] The purchase of put options in economically-linked firms may be motivated by hedging motives (especially if put options written on employer stocks are not available). For this reason, I restrict my analysis to call options.

**Table 4**
Price-relevant information along the supply chain.

| Panel A: All purchases | | |
|---|---|---|
| | Average | N |
| Employee in customer/supplier firm | 0.58 | 1260 |
| Employee in other firm | 0.15 | 1767 |
| Difference | 0.43** | |
| *p*-value | 0.019 | |

| Panel B: Purchases by rank-and-file employees | | |
|---|---|---|
| | Average | N |
| Employee in customer/supplier firm | 0.65 | 820 |
| Employee in other firm | −0.09 | 996 |
| Difference | 0.74*** | |
| *p*-value | 0.003 | |

Market-adjusted stock returns are calculated for a horizon of 1 week (5 trading days) following open-market purchases of Nokia call options by non-Nokia employees. In Panel B, I only include trades by rank-and-file employees. All returns and differences between returns are multiplied by 100. *p*-values are based on standard errors that are clustered at the stock-trade date level. ***, **, and * denote significance at the 1%, 5%, and 10% level, respectively (two-sided test).

direct economic links to all firms in the cluster).[20] Effectively, the empirical tests reported in Table F6 allow me to examine how the informativeness of option trades varies in the presence of direct economic links. Column (1) of Table F6 shows that option trades in economically-linked firms are more informative. However, the effect is not statistically significant. When including investor fixed effects in Columns (2) and (3), both the magnitude of the coefficient and its *t*-statistic increase.

In conclusion, my results are consistent with certain employees having access to price-relevant information along the supply chain. This effect is unlikely to be driven by industry-specific knowledge but rather arises as a consequence of direct economic links between the employer and the other firm. Some rank-and-file employees trade derivatives written on economically-linked firms and their call option purchases contain price-relevant information. More broadly, this analysis addresses selection concerns about my sample. Although companies may issue ESOs when employees have superior information or are more optimistic than other investors, the information asymmetry in a supplier or customer firm is unlikely to influence the decision to issue new ESOs.

## 4. Tipping

A broader question of general interest is whether retail accounts that do not belong to current employees are also informed. Individuals who have access to private information may disseminate it to other individuals (e.g., family members, friends) who can then use it to trade in their personal accounts. This form of indirect insider trading is usually called “tipping” (see, e.g., Ahern, 2017). Below, I describe my results on this type of informed trading.

### *4.1. Identifying tipping*

Tipping is a form of indirect insider trading where individuals with private information share it with others, who then trade on it. The trading data set does not include personal connections but does cover all trades by retail investors in Finland. This enables the detection of information flow from employees to anonymous retail investors through repeated correlated trading. Tipping is identified when the trading activities of an insider (tipper) and the recipient (tippee) are synchronized. This method is particularly useful in illiquid markets, such as equity derivatives, where coincidental trades are rare. A pattern of correlated trading between two accounts can indicate an information link, helping to identify informed accounts. The goal of this approach is to establish a lower bound for informed retail trading beyond direct employee activities, acknowledging that not all tipping will be detected.

The complete procedure used to identify trades by tippees is described in detail in Section C of the Appendix. The procedure involves several steps. I start by identifying correlated purchases by finding anonymous accounts that buy the same option on the same day as a current employee. Next, I require these purchases to be repeated at least a certain number of times. To exclude false positives, I filter out very active option traders and ensure that contemporaneous trades represent a significant fraction of all call option buys by the account during the employee’s tenure. The resulting output consists of a set of pairs linking anonymous retail traders with employees, indicating potential tipping activity.

[20] I refer to supply chain relationships also as “direct economic links”.

**Table 5**
Tipping.

| Panel A: Quantifying tipping | | |
|---|---|---|
| | N | % of all retail accounts/buys |
| Anonymous informed accounts | 783 | 7.6% |
| No. of option buys | 9608 | 7.8% |
| **Panel B: Stock returns when both trade** | | |
| | Average | N |
| After call option buys | 0.83*** | 3187 |
| *p*-value | 0.000 | |
| **Panel C: Stock returns when only tippee trades** | | |
| | Average | N |
| After call option buys | 0.59*** | 6421 |
| *p*-value | 0.000 | |

The procedure to identify tipping is described in Section C of the Appendix and yields a set of $a \times i$ pairs, where $a$ is an anonymous account and $i$ is an employee at firm $j$. To compute the relative frequency of tipping, I exclude firms for which I do not have any employment information, as well as periods in which I do not observe any employment relationship for a given firm. Market-adjusted stock returns are calculated for a horizon of 1 week (5 trading days) following open-market option purchases by matched accounts. Returns are multiplied by 100. *p*-values are based on standard errors that are clustered at the stock-trade date level. The null hypothesis is that there are no excess stock returns. ***, **, and * denote significance at the 1%, 5%, and 10% level, respectively (two-sided test).

### 4.2. Summary statistics on tipping

Using the procedure described in Section C of the Appendix and baseline parameters ($k = 2$ and $p = 0.1$), I identify 783 anonymous investors who execute 9608 open-market purchases of call options that are written on stocks for which these matching accounts are likely to be indirectly informed.

Panel C of Table 1 presents summary statistics for the 9608 call option purchases made by tippees. The average age of these traders is 41, with only 12 of the 783 accounts belonging to underage individuals, suggesting no overlap with the informed trading observed by Berkman et al. (2014). Additionally, women account for 8% of trades and 10% of the tippee population—percentages notably higher than those observed among employees who buy own-company options.

### 4.3. Tipping in the option market

Table 5 shows that correlated trading contains price-relevant information, confirming that I am able to detect accounts that are likely to have indirect access to price-relevant information. Instances of correlated trading between anonymous accounts and employees are associated with market-adjusted average stock returns of 83 basis points over five days.[21]

In contrast, the subsequent average return for purchases made only by the anonymous accounts stands at approximately 60 basis points. Drawing parallels from the mutual fund industry might help explain this disparity. Mutual fund managers often exude a high degree of conviction and enthusiasm when discussing their top investment picks (Antón et al., 2020). Similarly, employees, when armed with promising trading opportunities, might not only be inclined to capitalize on these insights but also to share them with their acquaintances. This dual approach – self-profiting and sharing – could be a manifestation of their confidence in the perceived value of the trading opportunity at hand. However, it must also be underlined that the difference in stock returns is not statistically significant (*p*-value of 0.17).

Table 5 also shows that matched accounts represent over 7% of all retail option activity. Therefore, after accounting for tipping, potentially informed trading constitutes an even larger fraction of retail option demand. In aggregate, trades by employees and tippees represent over 15% of retail investors and 10% of open-market purchases in the option market.

## 5. Option trading along the corporate hierarchy and economic significance

This section discusses two important additional results of my paper. I begin by explicitly examining how own-company option trading is distributed along the corporate hierarchy, presenting evidence that reconciles the lack of predictability for trades by primary insiders with the broader idea that this group possesses valuable firm-specific information. I then further discuss economic magnitudes and the scale of own-company option trading in Finland.

[21] Table F7 reports the results for more stringent parameters. Tables D8, D9, E5, and E6 show that these results are robust by type of derivative and by employer firm.

### 5.1. Higher-ranked and lower-ranked employees

Own-company call option purchases by higher-ranked employees in my sample do not exhibit short-horizon profitability in my setting, whereas previous work based on US disclosure data often finds evidence of informativeness for opportunistic, non-routine trades by primary insiders (e.g., Cohen et al., 2012). Four mechanisms jointly reconcile these patterns: pre-announcement trading constraints, sample composition and statistical power, investment horizons, and the choice of trading venue.

First, throughout most of my sample, Finnish practice imposed pre-announcement closed periods of at least 14 days for primary insiders, as detailed in Section A of the Appendix. These constraints bind exactly when information asymmetry is particularly high. Consistent with this intuition, the pre-earnings spike in informativeness in my data (see Fig. 4) is driven by lower-ranked employees: in the week before earnings, one-week market-adjusted returns after own-company call purchases average roughly 150 bps, and the vast majority of these trades are by rank-and-file employees.

Second, publicly disclosed insider option purchases are rare in most jurisdictions (e.g., Augustin et al., 2019). The same holds true in Finland, where own-company call option purchases by primary-insider account for approximately one-tenth of my sample. As a result, the estimate of one-week returns for primary insiders is statistically indistinguishable from zero and with wide confidence intervals (see Fig. 2). Two implications follow. On the one hand, mechanically, so few primary-insider trades cannot explain the economically large average effects in the full sample. On the other hand, a "following" interpretation – lower-ranked employees chasing primary-insider trades – is inconsistent with the timing and counts around earnings news, where the signal is strongest but most purchases are predominantly by lower-ranked employees.

Third, I focus on weekly horizons because option activity forecasts short-term returns particularly well (e.g., Pan and Poteshman, 2006). At longer horizons, the aggregate signal remains positive but differences across the corporate hierarchy are still measured imprecisely (see Section 7). In addition, closing horizons differ systematically by rank. Following open-market purchases of own-company call options, higher-ranked employees close positions more slowly than lower-ranked employees. The median holding period exceeds 80 days for primary insiders versus roughly 35 days for rank-and-file employees (Fig. 3). Longer trading horizons are likely to dilute measured one-week alpha even if some trades by primary insiders are informed.

Fourth, a complementary and important margin is *where* information is deployed. When own-company trading is constrained by closed periods or internal policies, insiders can trade options of economically-linked firms to exploit price-relevant information (e.g., Mehta et al., 2021; Deuskar et al., 2025). Relative to rank-and-file employees, primary insiders in my data are more likely to trade in economically-linked firms than in their own-company's options (representing approximately 30% and 10% of observations, respectively), and their option purchases in supplier or customer firms are nearly as informative as those of rank-and-file employees. This pattern is consistent with information being routed toward venues with lower detection risk and looser formal constraints, helping reconcile the lack of own-company profits for primary insiders with the broader idea that this group possesses valuable information.

### 5.2. Economic significance

An important contribution of this paper is to show that employee trading of their own-company options contains valuable information. This informativeness is primarily measured by the relationship between such trading and subsequent stock returns. I now provide more color on the economic significance of my results.

Prior work highlights that although insider trading can be costly for markets (e.g., Jeng et al., 2003), the financial gains for insiders are typically modest. Cziraki and Gider (2021) report that the median primary insider in the US earns only $464 per year from insider trades. The euro values of option trades in my sample and of the potential gains associated with these trades are also relatively small, although options tend to contain large amounts of embedded leverage.

A simple back-of-the-envelope calculation helps to evaluate the dollar profits from this informed trading. My sample covers approximately 15,000 informed option purchases by employees and tippees. Table 1 indicates that the total trading volume is approximately 50 million euros. On average, these purchases generate an abnormal stock return exceeding 50 basis points over five days, corresponding to gains of 1%–4% depending on option characteristics and translating into weekly abnormal profits of 0.5–2 million euros. As approximately 1000 employees in my sample purchase own-company options, this translates to an average profitability per employee ranging between €500 and €2000. Moreover, this profitability is disproportionately stemming from trades around earnings news (i.e., trades in the [−5,5] window). These trades account for approximately 13% of the euro volume and 37% of the euro profits. It is also important to note that the estimates presented above are likely to be very conservative, as they exclude profits tied to employment relationships that are not covered in my sample and to tipping that is not detected via repeated correlated trading.

I further address the question of economic significance by showing that employees' own-company call option purchases are associated with call option buying by other investors. This analysis is motivated by the intuition that, if employees are spreading purchases across trading accounts or engage in tipping, these actions are likely to coincide in time.

I use the following specification:

$$Y_{o,t} = \alpha + \beta X_{o,t} + \gamma_s + \delta_t + \epsilon_{o,t}, \tag{1}$$

for option $o$ written on stock $s$ in day $t$. $Y_{o,t}$ is a measure of retail buying activity excluding own-company trades, namely either *Retail buy count* or the natural logarithm of one plus the retail buy volume. $X_{o,t}$ is a measure of own-company option buying, and the fixed effects account for constant characteristics at the stock (or option) and day level.

**Table 6**
Option purchases by employees and other retail investors.

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| | Retail buy count | | Ln (1 + retail buy volume) | |
| Employee activity indicator | 10.88** | 10.01** | 4.036*** | 2.000*** |
| | (2.26) | (2.16) | (5.25) | (8.05) |
| Underlying stock FE | Yes | No | Yes | No |
| Option FE | No | Yes | No | Yes |
| Day FE | Yes | Yes | Yes | Yes |
| Observations | 106,519 | 106,519 | 106,457 | 106,457 |

This table examines the contemporaneous trading activity of employees and other retail investors. The dependent variables are a measure of retail buying activity excluding own-company trades, namely either *Retail buy count* (in the first two columns) or the natural logarithm of one plus the retail buy option volume (in the last two columns). The main regressor is *Employee activity indicator*, a variable which equals one if at least one own-company option purchase occurs on that day, and zero otherwise. The unit of analysis is option-day observations. *t*-statistics are based on standard errors that are two-way clustered at the underlying stock and month level. ***, **, and * denote significance at the 1%, 5%, and 10% level, respectively.

Table 6 presents the regression results. The unit of observation is an option-day. The key independent variable is *Employee activity indicator*, which equals one if at least one own-company option purchase occurs on that day, and zero otherwise. The results show that own-company option buying is associated with a significant response from other retail investors, who place more than ten additional buy orders and increase their purchase volume relative to periods without employee activity.

The results are robust across various model specifications. Table F8 yields similar outcomes using a continuous measure of own-company option buying, calculated as the natural logarithm of one plus the volume of own-company purchases. Table F9 further supports these results by showing that they hold when option data are aggregated at the level of the underlying stock.

## 6. What drives the decision to buy own-company options?

The results discussed so far provide strong evidence of informed trading in the option markets. However, a largely unsolved question in the insider trading literature is why some insiders decide to engage in informed trading (Kallunki et al., 2018). In this section, I explore correlates of employees' decisions to purchase own-company call options. Specifically, in Table 7, I employ a logit model to examine the factors influencing an individual's decision to buy own-company call options.[22,23]

### 6.1. Risk preferences

General economic intuition suggests that risk-averse individuals tend to shy away from informed trading because they want to avoid the monetary, reputational, and judicial costs associated with scrutiny. For example, women – who are typically more risk-averse than men (e.g., Borghans et al., 2009) – are less likely to buy own-company options.[24] Table 7 also indicates that recent large portfolio losses are associated with a higher propensity to buy own-company call options. This reduced-form association is consistent with time-varying incentives to take risk.

### 6.2. Probability of detection

Next, I examine the deterrent role of regulatory supervision. Bondarenko and Muravyev (2023) suggest that a higher probability of detection is associated with a lower propensity to engage in informed option trading. To examine whether stronger surveillance is associated with less informed trading, I take advantage of the fact that primary insiders have to publicly disclose all their own-company trades and therefore face a higher probability of detection. Accordingly, the vast majority of the academic literature on insider trading examines trades by primary insiders (see, e.g., Bhattacharya, 2014). Table 7 shows that primary insiders subject to mandatory disclosure requirements are less likely to purchase own-company call options (the corresponding *p*-values range between 0.07 and 0.11).

[22] Data on the underlying asset is missing for several warrants, especially in the early sample period. To avoid selection bias, trades of listed warrants are excluded from the analyses reported in this section.

[23] In line with results from the insider trading literature (e.g., Elliott et al., 1984; Cziraki and Gider, 2021), purchases of own-company shares and options on the open market are infrequent. Specifically, own-company stock (option) buys occur in approximately 1% (0.1%) of employee-month observations. Thus, one may be worried that own-company call option buys are too infrequent to use a logit model. However, it is important to underline that most of the issues described by King and Zeng (2001) arise from having a very small number of rare outcomes, rather than from the rarity of the events (see, e.g., Allison, 2012; Van Smeden et al., 2016). Moreover, Table F10 shows that my findings are robust to the use of rare events logit (Tomz et al., 2003).

[24] This gender gap is in line with survey evidence from Betz et al. (1989) who find that the willingness to engage in insider trading is nearly twice as high among males. Similar gender differences have also been observed among primary insiders (Inci et al., 2017).

**Table 7**
What explains the decision to buy own-company call options?

| Dependent variable: Buys option | | |
|---|---|---|
| | (1) | (2) |
| *Risk preferences* | | |
| Female | −1.559*** | −1.538*** |
| | (−5.84) | (−4.77) |
| Large losses | 0.375*** | 0.321*** |
| | (3.41) | (2.93) |
| Large gains | 0.083 | 0.024 |
| | (0.67) | (0.21) |
| *Probability of detection* | | |
| Primary insider | −0.242 | −0.282* |
| | (−1.56) | (−1.74) |
| *Habit* | | |
| No. of own-company option buys in the previous year | 0.422*** | 0.448*** |
| | (6.57) | (7.42) |
| *Familiarity with financial markets* | | |
| No. of other option buys in the previous year | 0.020 | 0.031* |
| | (0.84) | (1.70) |
| No. of own-company stock buys in the previous year | 0.020 | 0.017 |
| | (1.25) | (1.04) |
| No. of other stock buys in the previous year | 0.018*** | 0.018*** |
| | (3.59) | (3.27) |
| Ln(1 + own-company stock portfolio value) | 0.035*** | 0.031*** |
| | (2.95) | (2.63) |
| Ln(1 + other stock portfolio value) | 0.126*** | 0.104*** |
| | (8.54) | (5.56) |
| *Other employee characteristics* | | |
| Age | 0.206*** | 0.185*** |
| | (3.54) | (2.94) |
| Age squared | −0.003*** | −0.002*** |
| | (−3.93) | (−3.30) |
| Number of observations | 1,211,725 | 639,301 |
| Pseudo R-squared | 0.171 | 0.150 |

This table reports the results from two logit regressions investigating the determinants of the decision to purchase own-company call options from the open market. The unit of analysis is employee-firm-month observations. Trades of listed warrants are not included. I exclude observations in which own-company options are not listed on the exchange. Column (2) only includes observations in which the employee held stocks one month before the observation date. *t*-statistics are based on standard errors that are two-way clustered at the employee and at the firm-month level. ***, **, and * denote significance at the 1%, 5%, and 10% level, respectively. All variables are defined in Table F2.

### 6.3. Habit

Akbas et al. (2020) find that the investment horizon of insiders can serve as a benchmark for anticipated patterns of continued trading activity. This notion aligns with my observation that purchasing own-company options is a recurring behavior: four in five employees who purchase own-company options never buy call options written on other stocks, and Table 7 shows that individuals who have recently engaged in such trades are likely to do it again in the future. To the extent that this trading is informed, the habit of own-company option buying is consistent with a large body of evidence showing that immoral actions become progressively easier after having taken the first step toward unethical behavior (e.g., Milgram, 1963; Lifton, 1986).

### 6.4. Familiarity with financial markets

Finally, I examine the role of familiarity with the financial markets. This dimension is particularly interesting because stock market participation is positively correlated with financial literacy (Van Rooij et al., 2011). Accordingly, more sophisticated employees may be better equipped to identify and exploit price-relevant information, especially using derivatives.

The results in Table 7 show that familiarity with the financial markets is positively correlated with purchasing own-company call options from the open market. Specifically, both stock and option trading (in non-employer instruments) are associated with an increase in the propensity to buy own-company options. Moreover, the size of the individual stock portfolio also displays a positive association with the dependent variable. Nevertheless, the importance of this familiarity is relatively small compared to risk preferences, probability of detection, and habit.

### 6.5. Employee characteristics and informativeness

Overall, the results presented in Table 7 suggest that the propensity to exploit price-relevant information is not uniform within an organization, but is driven by certain subgroups of employees. However, it is natural to question whether these factors also

affect the informativeness of own-company trades. Table F11 examines whether the employee characteristics described above also shape the informativeness of the purchases. I find that employee characteristics have limited ability to explain the informativeness of individual trades in my sample. However, the test has limited power due to the small sample size.

## 7. Additional results

This paper primarily focuses on weekly stock returns because previous research shows option markets mainly contain information about short-term stock returns (e.g., Pan and Poteshman, 2006; Johnson and So, 2012). Nevertheless, I also examine what happens over a longer horizon. Table F12 shows that purchases of own-company call options continue to be generally informative also at monthly horizons. However, the degree of informativeness appears to somewhat decrease over time. The average market-adjusted one-month stock return after own-company buys is approximately 80 basis points, just marginally higher than the average stock return in the first week after the purchase.

Moreover, in Table F13, I verify my results using a three-factor model (Fama and French, 1992). Reassuringly, the informativeness of own-company option trades persists also using risk-adjusted returns. Excess stock returns remain positive and statistically significant at conventional levels.

I perform various additional robustness tests to show that the informativeness of own-company option buys is not driven by certain types of trades that frequently occur within my sample. These are described and included in Section F of the Appendix.

## 8. Conclusion

As suggested by the normative theory of DeMarzo et al. (1998), financial regulators generally tend to focus on large trades (Augustin and Subrahmanyam, 2020). The role of small trades, typical of retail investors, is often overlooked. In this paper, however, I show that between 3% and 9% of all retail demand in the market for single-name equity derivatives in Finland can be attributed to employees who are likely to have an information advantage. Using a conservative approach to account for tipping raises this estimate up to 15%.

Rank-and-file employees' purchases of own-company options contain price-relevant information. They are associated with stock returns of over 60 basis points (corresponding to an annualized return of approximately 40%). Furthermore, consistent with an information advantage story, the informativeness of employees' option trades peaks prior to information events and persists along the firm's supply chain. A number of additional results and extensive robustness tests also support an information advantage story.

More generally, this paper contributes to the debate on the disclosure of informed trades.[25] Strikingly, the vast majority of the information comes from rank-and file employees, rather than from primary insiders or other high-ranking managers. My results have potential implications for regulators. For example, in light of the positive correlation between informed and uninformed volumes (Collin-Dufresne and Fos, 2015; Kacperczyk and Pagnotta, 2019) and the recent explosion in retail option trading (Bryzgalova et al., 2023), there may be a need for enhanced oversight of employee activity in the option market. Additionally, closer monitoring of small option trades in general could ensure greater efficiency and fairness in financial markets.

## Declaration of Generative AI and AI-assisted technologies in the writing process

During the preparation of this work the author used generative AI in order to improve the readability of the manuscript. After using this tool/service, the author reviewed and edited the content as needed and takes full responsibility for the content of the publication.

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[25] Several previous studies examine informed trading in stocks – rather than in options – using data from Nordic countries (e.g., Kallunki et al., 2009, 2016; Berkman et al., 2014, 2020).

## Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

## Appendix A. Supplementary data

Supplementary material related to this article can be found online at https://doi.org/10.1016/j.jcorpfin.2026.102963.

## Data availability

The authors do not have permission to share data.

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