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Insider Sales vs. Short Sellers: Negative Information Trading in Australia

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Abstract

In contrast to U.S. studies, we show that Australian short sellers do not front-run and profit after insider sales. Results are robust to conditional trading classified by book-to-market, intangible ratios, industry and multiple factor analysis. A combination of insider sales and short selling provides a contrarian signal that dampens prior overpricing, but is not associated with subsequent abnormal returns. We contend that the commercial and legal environment in Australia, together with the daily reporting of short sales, plays a significant role in restraining short selling profitability. Our results contradict front-running by short sellers in the U.S., that is explained by a business environment that induces the leakage of pre-traded negative information by corporate insiders. Overall, we highlight how information flow direction and profitability can be affected by different country legal and business cultures.

Key words: Short selling around insider sales, Front-run/mimic trading by short sellers, Contrarian trading returns, Short sale reporting

JEL Classification: G14, G18, M41

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Abstract

In contrast to U.S. studies, we show that Australian short sellers do not front-run and profit after insider sales. Results are robust to conditional trading classified by book-to-market, intangible ratios, industry and multiple factor analysis. A combination of insider sales and short selling provides a contrarian signal that dampens prior overpricing, but is not associated with subsequent abnormal returns. We contend that the commercial and legal environment in Australia, together with the daily reporting of short sales, plays a significant role in restraining short selling profitability. Our results contradict front-running by short sellers in the U.S., that is explained by a business environment that induces the leakage of pre-traded negative information by corporate insiders. Overall, we highlight how information flow direction and profitability can be affected by different country legal and business cultures.

1. Introduction

Prior studies examine the selling by well-informed market actors such as corporate insiders (Beneish and Vargus, 2002; Ali et al., 2011) and short sellers (Desai et al., 2006). Short sellers and corporate insiders (directors, senior management) derive their trading advantage from access to information not generally available to the investing public. Hence, their individual trading represents a potential leading signal for negative information cues.

In this paper, we study the combined and conditional trading behaviour of short sellers around corporate insider sales in Australia. Specifically, we examine whether short sellers trade ahead, or follow, corporate insider sales. We find that Australian corporate insiders significantly provide the trading lead with short sellers, in the main, undertaking mimic trades. Short sellers focus on large insider sales and results are robust to conditional trading classified by market-to-book, intangible ratios, and industry. The only exception is front-running by short sellers in firms with a large positive accrual component in earnings. Our final analyses show that sell trading by insiders and short traders does not result in abnormal profits, but provides a contrarian signal that stabilises prior strong price increases.

These results contrast with a recent U.S. study by Khan and Lu (2013) who report that short sellers provide the major price information lead by front-running the trading of corporate insiders. There are several reasons to explain this directional trading reversal that include disparities in business culture, litigation risk and reporting requirements. First, short selling and information content in Australia is not as intensive. The proportion of short volume is 24% and 31% of the trading volume for NYSE and NASDAQ stocks (Diether et al., 2009), compared to a short ratio of 13.29% in Australia (Do and Gray, 2011). Second, under Australian Regulatory Guide 196 (hereafter, RG196), short selling is highly visible with the

requirement to report on a daily basis.[1] This compares with insider trades that have up to one week to report. Consequently, this weakens the incentive for short sellers to undertake costly information search and provides a constraint on their trading advantage (per Kyle, 1995).

The reporting requirements and litigation environment in the U.S. reverse the trading incentives of insiders. Short sales to the SEC can be reported on a delayed one month basis, but insider' sales must be reported within two business days. Moreover, in the U.S. corporate insiders face higher litigation risk which increases reluctance to profit and risk public exposure through the lodgement of a Form 4 on EDGAR (Huddart et al., 2007). Consequently, this provides U.S. insiders with a greater incentive to leak or tip negative information to short sellers before they trade (Campbell et al., 1993; Christophe et al., 2010; Khan and Lu, 2013). Finally, price related information contained in insider sales in the U.S. is difficult to decode (Cohen et al. 2012), consistent with a high concentration of liquidity and/or rebalancing trades from executive salary perquisites (Lakonishok and Lee, 2001).

We follow Khan and Lu (2013) by dissecting our sample into large, medium and small insider trades and analyse accounting ratios as indicators of possible trading asymmetry. We add a methodological improvement by using RG196 to track actual daily short sales rather than using short selling potential (i.e. lendable shares) or monthly measures to estimate the competition from short sellers (per Khan and Lu, 2013; Massa et al., 2015).[2] Real time short sales data is hand collected and this allows us to more efficiently trace, on a micro basis, the inter-temporal daily transfer of information.

Our paper contributes in several ways. This is the first Australian study to contemporaneously extract negative price discovery from two trading sources and to show

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[1] Appendix 1 summarises recent legislation and operational changes made by RG196.
[2] RG196 provides a rich data base that is not available in other countries. Do and Gray (2011) document the data reporting and research advantages of Australian short selling compared to the U.S., U.K., Hong Kong, Canada and Japan.

how business environment can affect information flow direction. We show that abnormal short sales peak on the day, and day after, large insider sales and in combination provide a halt to prior price run-ups. Our study also affirms the importance of conditioning informed selling and in anchoring on accounting numbers. Results are informative to investors in revealing that short selling accelerates price discovery by aiding in the reduction of overpricing, consistent with Diamond and Verrechia (1987); Chen and Rhee (2010); and Beber and Pagano (2013). Improved investor equity is also evidenced by increased competition from short sellers that restricts the ability of insiders to rent extract through stealth trading. In this regard, RG196 likely plays a significant role through rapid one day reporting.

The remainder of the paper is organized as follows. Section 2 develops hypotheses, Section 3 describes the data sources and research methodology, and Section 4 reports the results. Section 5 undertakes further analyses and reports multiple factor and trading profitability results and Section 6 concludes the paper.

2. Background Motivation and Hypotheses Development

2.1 Do short sellers front-run insider sales?

Our first research question focusses on which informed trader provides the superior negative information lead to the market. It is well documented that corporate insider purchases in the U.S. contain superior information about a firm's future prospects (Seyhun, 1992; Lustgarten and Mande, 1999; Aboody and Lev, 2000; Ke et al., 2003; Ali et al., 2011; Badertscher et al., 2011; Hillier et al., 2015; Gider and Westheide, 2016). This is not so much the case for insider selling which tends to consist of non-information based liquidity and rebalancing trades from executive salary perquisites (Lakonishok and Lee, 2001). However, Cohen et al.

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(2012), show that non-routine inside sales contain price sensitive information, but they are more likely to attract the ire of stockholders and the adverse attention of litigators.

Short sellers are also considered particularly well informed (Drake et al., 2011). They are consistently profitable in identifying overvalued stocks (Diamond and Verrechia, 1987; Chen and Rhee, 2010; Karpoff and Lou, 2010; Beber and Pagano, 2013), and they front-run price sensitive announcements (Berkman and McKenzie, 2012; Engel et al., 2012), earnings announcements (Christophe et al., 2004; Feng and Chan, 2016), analyst downgrades (Christophe et al., 2010), and negative earnings restatements and financial misconduct (Desai et al., 2006; Karpoff and Lou, 2010). Importantly, they do not have the same internal firm and regulatory constraints that are imposed on corporate insiders.

We develop hypotheses that examine the trading interaction between these two informed competitors. In doing so we build on Khan and Lu (2013), who argue that short sellers in the U.S. front-run because: (i) they have a dominant information set, or (ii) insider sellers strategically delay trading in order to mitigate legal jeopardy from regulatory attention (see also Huddart et al., 2007).

We note that (ii) does not preclude corporate insiders from possessing a superior volume of asymmetric negative information. Christophe et al. (2010) say they do, arguing that front-running by short sellers arises, not from information search, but from direct tipping by corporate insiders (Khan and Lu, 2013). Campbell et al. (1993) contend that the primary reason for insider tipping is to mitigate problems induced by a litigious U.S. corporate environment. From an insider's perspective the tipping to short sellers increases trading liquidity, raising the possibility of stealth trading (Kyle, 1985), and supports the argument that insiders are trading on publicly known information—reducing the possibility of attracting regulatory, shareholder, and unwanted media attention.

Khan and Lu (2013) add a trading volume caveat and document that short sellers trade strategically by only front-running the information content of large insider sales. According to Hillier and Marshall (2002) and Fidrmuc et al. (2006) higher insider trading volume reflects a stronger belief about future direction, and Seyhun (1986) and Scott and Xu (2004) report that large insider sales are associated with negative abnormal returns. Hence, if an insider is more likely to reveal his/her asymmetric negative information through a large trade, there is a greater tendency to pre-leak information to a limited clientele and then trade on the increased liquidity. To observe a more clear interaction between insiders and short sellers, we focus on large insider sales.[3]

The above highlights several factors that might determine the direction of the information lead channel: (i) the extent of informed short selling, (ii) the degree of legal jeopardy from inside selling, and (iii) the information content contained in insider selling. In the U.S. legal jeopardy concerns dominate and, if this is the case in Australia, then:

Hypothesis 1 (Front-running Hypothesis): *Short selling front-runs large insider sales.*

In framing directional front-running hypotheses there is competing tension in expectations of the comparative timing and trading ability of insiders and short sellers. The short selling front-running hypothesis may only reflect a U.S. commercial scenario. Other countries are less litigious and they report a greater price reaction content from insider selling. For example, in Spain (Brio et al., 2002), in Germany (Betzer and Theissen, 2009), in Australia (Brown et al. (2003); Hodgson and van Praag, 2006), and in the Hong Kong stock market (Firth et al., 2011). Moreover, in Australia, the requirement to report short sales

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[3] Defined as the top 30 percent of insider sales as a percent of firm market value in the full sample. We find that short sellers concentrate on trading around large insider sales but virtually ignore other trades. We also repeat analyses for medium and small insider sales, defined as middle 40 percent and bottom 30 percent, with insignificant results.

within one day (RG196), as we predict would rapidly reduce comparative incentives for private information search by short sellers.

Hence, if corporate insiders are directly more informed, the less litigious Australian environment does not induce insiders to leak information before trading, and the short seller's information advantage is rapidly diffused, then corporate insiders in Australia would provide the dominant information lead. This leads to our second hypothesis that short sellers wait on information cues and mimic corporate insider sales in Australia:

Hypothesis 2 (Mimicking Hypothesis): Short selling mimics large insider sales.

2.2 Do short sellers front-run on public accounting information?

Our second research question seeks to answer whether there are specific publicly available circumstances when short sellers front-run and when they mimic? Khan and Lu (2013) focus on accounting variables as important inputs into pricing. They hypothesise and report that high R&D, poor earnings announcements and loss frequency attract a heightened degree of front-running. However, this is somewhat counter intuitive at first glance. Corporate insiders have direct access to accounting ratios, audit reports and accounting quality. Moreover, in situations where opaque financial information is in the public domain (and yet fully priced), we conjecture that insiders retain a comparative private advantage that is less likely to attract undue media and regulatory attention. In these circumstances short sellers, given lower comparative advantage, would then mimic. However, in a competitive information environment, if a short seller's trading advantage derives from a macro based ability to trade on a broader based (comparative) industry information set, then they would provide the lead (Khan and Lu, 2013).

Taking into consideration the Australian commercial environment that tends to allow corporate insiders to retain their asymmetric information advantage, our expectation is that

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short sellers will mimic, rather than front-run, large accounting based trades. We focus on accounts that tend to be opaque to outside investors by examining the high/low extremities of book-to-market, intangible and accrual ratios.

Accounting opaqueness

There is ample empirical evidence that corporate insiders conditionally trade on accounting subjectivity (Beneish and Vargus, 2002; Ke et al., 2003; Hodgson and van Praag, 2006), and a growing literature that short sellers trade on accounting reports. For example, short selling activity increases prior to periods of disappointing earnings (Christophe et al., 2004), short sellers target firms with earnings restatements (Efendi at al., 2005), and high short trading predicts negative abnormal returns (Asquith and Meulbroek, 1995; Desai at al., 2002).

Book-to-market ratios are a combination of observed market price and the aggregate components of book values that comprise disparate valuation methods generally obscure to outsiders. Whilst, market prices are readily observable, net book values are not, and may consist of overvalued assets or undervalued liabilities. The opacity of value stocks, (high book-to-market ratios), tends to be confined to asset value estimation. On the other hand, growth firms (low book-to-market ratios) with accelerated sales and rapid expansion, attract a higher degree of investor attention. This in turn increases the potential for uninformed trading with the market more generally overvaluing growth firms (see De Bondt and Thaler, 1985; Rozeff and Zaman, 1998; Dechow et al., 2001).

Our expectations are that, because of the mixture of untimely book values and the possibility of market overreaction, then low book-to-market ratios would attract the greater pricing errors. Hence, due to greater private knowledge of real asset values and related market pricing, we hypothesise that corporate insiders have a greater fundamental understanding of valuation impacts, and short sellers will time their trades relative to insiders.

However, there is also the possibility that high book values constitute over-valuation. Accordingly, we examine both possibilities:

Hypothesis 3 (Value/Growth Hypothesis): *Short selling mimics large insider sales in extreme high and extreme low book-to-market firms.[4]*

The next two hypotheses specifically concentrate on the conditional trading associated with two accounting ratios that are well known to contain elements of internal management subjectivity.

We first target the reporting of intangibles. Intangible valuation is highly subjective, the financial impact is heterogeneous across industry and firms, and they suffer from considerable endogeneity problems that make it difficult for any outsider to disentangle direct and indirect value effects (Hodgson et al., 2017). In this regard, the level of reported intangibles within firms contributes to considerable information asymmetry and a private trading advantage to insiders (Aboody and Lev, 2000). Whilst, Khan and Lu (2013) report that short sellers both front-run and mimic insiders who trade on R&D expenses in the U.S., due to the commercial conditions that do not provide insiders incentives for information tipping in Australia, we do not conjecture short sellers' front-run.

Consequently, with a greater difficulty involved in deciphering information from intangibles, there is greater incentive for short sellers to track insider trades in firms with high levels of intangibles. We therefore hypothesise:

Hypothesis 4 (Intangible Hypothesis): *Short selling mimics large insider sales in extreme intangible rich firms.*

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[4] Defined as the top (bottom) 30 percent, respectively, based on the firm's relevant ratio in the sample of large insider sales.

Finally, it is also well known that high levels of accruals are associated with valuation mispricing with the general market unable to distinguish between the lower persistence of accruals compared to higher persistence of cash flows embedded in earnings (Sloan, 1996). Beneish and Vargus (2002) further show that the persistence of income increasing accruals is lower when accompanied by insider sales. Desai et al. (2006) and Khan and Lu (2013) examine the effects of accruals on short selling behaviour and similarly find higher abnormal short selling in firms with high accruals. But not all high accrual levels are bad news. Accruals are potential future cash flows and high levels may signal increased economic well-being that is accompanied by insider buying (Hodgson and van Praag, 2006).

Therefore, similar to intangibles, our accrual hypothesis follows the logic that deciphering information from internally generated accruals provides insiders with a comparative advantage in Australia. Therefore, the greater incentive for short sellers is to track insider selling in firms with high levels of accruals. We therefore hypothesise:

Hypothesis 5 (Accrual Hypothesis): Short selling mimics large insider sales in high accrual firms.

3. Data and Method

3.1 Data

After the global financial crisis (GFC), the Australian Securities and Investments Commission (ASIC) implement a temporary short selling ban on all stocks in the Australian market. The ban on covered short selling was lifted on non-financial stocks in November 2008 and on financial stocks in May 2009. To date, the ban on naked short selling is still in place.[5] The new regulatory guide on short selling RG196 requires short transactions and

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[5] Covered short selling refers to the case where the stock must be borrowed first before a short sale can proceed. Naked short selling denotes the case of selling a stock without the need to borrow it first. However, the stock has to be delivered on the settlement date. Failure to do so results in a 'failure-to-deliver'.

short positions to be reported on a daily basis. Facilitated by the increased reporting frequency, we hand collected short selling data for the period January 2010 to March 2013 from the daily gross short sales reports released by the Australian Stock Exchange (ASX). Average short sales on the day of insider trading was 0.03% of shares outstanding (Table 2) with average abnormal short sales volume 0.0095% (Figure 1).

The insiders considered in this study are corporate directors. The data on directors' transactions on Australian stocks is sourced from Directors Deals over the same period. The data includes the transaction date, announcement date, type of financial instrument traded, identity of the director, nature of ownership, transaction type, and share price and volume for each transaction. To identify the position held by the insiders, we match the identity of the insiders against the corporate governance data obtained from the Securities Industry Research Centre of Asia-Pacific (SIRCA). Where the position held by the insiders is ambiguous or not included in the corporate governance data, we hand collected the insider's position from the company's annual financial reports or the company's website as per the year of the transaction.

We apply the following filtering criteria. First, insider purchase only days are excluded and sales only days retained. Any sales that are accompanied with purchases on the same day are netted off. Second, we restrict the trading window period to twenty one days where the insider sale was accompanied by short selling—ten days before any insider sale and ten days afterwards. Third, incomplete, missing or obviously erroneous trades are removed. Next, we truncate the trades that are not in the open market and exclude the trades that are associated with the exercising of options, security lending and takeover agreements. Finally, we eliminate insiders that are not directors after matching against corporate governance data. In the case that multiple trades are conducted by directors in the same firm and on the same day, the number of shares sold are aggregated and counted as a single

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observation. We extract a final sample of 1,039 insider sale events. Table 1 documents the sample filtering process.

[Insert Table 1 About Here]

3.2 Method

To test our trading based hypotheses we follow Khan and Lu (2013) by employing an event based study method, and defining the event day [0] as the day of an insider sale transaction.[6] The test window is set at [-10, +10] trading days around the event day and the estimation window used for calculating the expected level of short sales is [-60, -11] trading days (Christophe et al., 2004).

The expected level of short sales during the estimation window is computed as:

$$E(Sh_n) = \frac{1}{J} \sum_{j=-60}^{j=-11} Sh_{j,n}, \tag{1}$$

where $E(Sh_n)$ is the expected level of daily short sales for insider sale n; $Sh_{j,n}$ is the gross short sales (expressed as a percentage of shares outstanding) for insider sale n on day j; and J is the number of days in the estimation window. The abnormal short sales for a given insider sale n in the test window is then calculated as:

$$e_{i,n} = Sh_{i,n} - E(Sh_n), \tag{2}$$

where $e_{i,n}$ is the abnormal short sales for insider sale n on day i and $Sh_{i,n}$ is the gross short sales for insider sale n on day i. To observe the short selling pattern around insider sales, we proceed to aggregate all the abnormal short sales across all firm-events for each day in the test window:

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[6] We also considered the date of insider sales disclosure as a primary event. However, the date of insider sales is considered to be the more important foci given information flow is based on transactions and the possibility of broker information leakage.

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$$E_N(e_i) = \frac{1}{N} \sum_{N=1}^{N} e_{i,n,} \tag{3}$$

where $E_N(e_i)$ is the average abnormal short sales on event day i and N is the number of firm events (i.e. 1,039 insider sale events in our full sample). Statistical significance is inferred using a standard t-test, calculated as:

$$t_{E_N(e_i)} = \frac{E_N(e_i)}{\frac{\sigma(E_N(e_i))}{\sqrt{N}}}, \tag{4}$$

where $t_{E_N(e_i)}$ is the t-statistic for the average abnormal short sales on event day i and $\sigma(E_N(e_i))$ is the standard deviation of the average abnormal short sales on event day i.

4. Descriptive Statistics and Results

4.1 Descriptive Statistics

Table 2 Panel A presents the summary statistics for the full sample of 1,039 firm-events. The mean market value of firm is $1.9 billion with the median only $152 million, indicating that most of the firms in the sample are relatively small. On average, the shares sold by directors and short sellers represent respectively 0.97% and 0.03% of firms' shares outstanding. Firms are likely to be growth firms according to the median of market-to-book ratio of 1.94. The mean (median) lag from an insider sale and its public disclosure is 2.64 (2) trading days. Although timely within the required ASX five business days, it also reveals a further trading window to extract information from information search or tipping.

[Insert Table 2 About Here]

Panels B-D provide a breakdown based on the size of insider sales, expressed as a percentage of shares outstanding. The top 30 percent is classified as large insider sales, with the medium 40 percent, and the bottom 30 percent respectively defined as medium and small

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insider sales. These subsample descriptive statistics reveal that large insider sales tend to be conducted in small firms (average firm size $199 million). The size of insider sales does not appear to be conditioned on the growth prospects of firms, since the mean market-to-book ratios of the three groups is close (3.24 vs 3.22 vs 3.33). The disclosure lag reporting of insider sales is similar across the three subsamples, ranging from 2.31 to 3.41 trading days. Finally, the number of shares outstanding coincides with average firm size, with large insider sales clustering in small firms that have the least number of shares on issue.

4.2 Results

Abnormal short sales around insider selling

The short selling pattern for the aggregate sample around all insider sales with a [-10, +10] trading day event window is shown in Figure 1. Daily abnormal short sales, as the ratio of shares outstanding reach its peak at 0.0095 (significant at 5%) on the day an insider sells and decreases to 0.0057 (significant at 10%) one day after the insider sale. The short selling activity then drops monotonically in the subsequent 5 days. These preliminary aggregate results indicate that in Australia short sellers may only mimic inside sales, in contrast to the results of both front-running and mimicking found in the U.S. However, as we argue in the introduction, this aggregated result may not hold for all insider trading and we now turn to short selling around large insider sales as events that hold significantly greater information content.

[Insert Figure 1 About Here]

The daily abnormal short sales clustered around insider sales of different sizes are reported in Table 3.[7] Our expectation is that large insider selling contains significantly

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[7] To conserve space, from Table 3 afterwards, we only show the [-5, +5] results as the other days in the [-10, +10] window exhibit insignificant results.

greater information content and this will pre-focus greater short selling research and attention to insider trading. This is the case with abnormal front-running occurs at days -3 and -2 and also significant mimic short selling on days 0, 1, 2, and 3. These results supports the argument that large insider sales encompass larger information content (Seyhun, 1986; Scott and Xu, 2004), of higher quality (McNally et al., 2015), and short sellers both anticipate and closely follow large insider transactions (Khan and Lu, 2013).

For medium insider sale volumes, there is no significant pattern of increased short selling. For small insider sales, the evidence is confined to abnormal short selling on the day of insider trades. In short, small and medium insider sales provide little trading interest from short sellers. In consequence, we now have a situation where short sellers both front-run and mimic insider selling and this provides limited attainment for our research objectives. Given one objective is to inform investors of specific negative information channels, we now turn to the analysis of opaque accounting variables.

[Insert Table 3 About Here]

Abnormal short sales around accounting variables

Table 4 tabulates these results. With respect to the market-to-book ratio (M/B), there is no evidence that abnormal short sales front-run insider sales. They occur contemporaneously on the day of the insider sale in low M/B value firms (0.0089, t=2.17), with lagged one day trading (0.0057, t=1.88), and contemporaneously for growth stocks (0.0342, t=1.74). This result is consistent with a mimic hypothesis and affirm that value and growth stocks are generally not easy to value by outsiders compared to the information advantages endowed on corporate insiders.

[Insert Table 4 About Here]

We next comment on results from conditional short selling based on the level of intangibles and accruals. In terms of intangibles, significant abnormal short sales are observed on the day of and one day after the insider sales for high intangibles firms. These findings are consistent with prior evidence that shows a positive correlation between intangibles and an insider's information advantage (Aboody and Lev, 2000), and that short sellers react to this as a primary information event and undertake a mimic strategy. In contrast, there is no evidence of abnormal short selling for firms with low intangibles affirming there is little information interest for short sellers.

Turning to accruals, high accruals that significantly increase income above cash from operations tend not to be persistent and are likely to mean revert to lower levels in subsequent periods. They also tend not to be well understood by the market—treated as income similar to cash income, with corporate insiders expected to have the dominant asymmetric knowledge of quality (Sloan, 1996; Hodgson and van Praag, 2006). However, Table 4 reports that abnormal short sales in high accrual firms significantly front-run insider selling— short sellers front-run insiders in high accruals firms from day [-5] to day [-2]. Given this result contradicts the front-running direction of our accrual hypothesis, in untabulated results we further explore short selling on high accruals by checking abnormal trading around all insider sales. We also find front-running by short sellers up to five days before small insider trades.

We offer two possible explanations. If insiders intend to sell on manipulated accruals that increase earnings then this action, if discovered, would attract unwanted attention. In this case, insidersmight have an incentive to tip short sellers to increase liquidity trading. Second, short sellers may have a perceptive awareness of this accounting attribute with a possible advantage acquired by industry wide comparison, exacerbated by the reticence of insiders to pre-sell on prior manipulated accruals. In contrast, low accrual firms tend to

report income closer to cash flows and contain smaller negative information content. In this case, short sellers mimic insiders (0.0070, t=1.95) on the day of insider sales.

5. Further Analyses

5.1 Economic Impact Analysis

After establishing abnormal trading patterns from short sellers we now determine economic consequences by examining if trading volume transforms into profitability. There is limited research that extends abnormal short selling trading metrics to price impact with results, confined to the U.S. They show both insiders and short sellers extract post trading profits. For example, Massa et al. (2015) report that high levels of potential short selling trading (in terms of lendable shares), enhances the raw return predictability of insider sales over the following month. Khan and Lu (2013) report 20 day negative returns of 3% from insider sales in firms with high accounting information asymmetry.

In analysing price impact we draw on empirical research that establishes insiders as contrarian traders who reverse the trajectory of past returns, sending signals that prices are under or overvalued (Piotroski and Roulstone, 2005). Our prediction is that front-running by short sellers and mimic trading, in combination with the requirement for daily reporting through RG196, will increase competitive pressure and contribute to price efficiency. This could be done in two ways. Front-running would pre-release negative information and dampen subsequent returns from insider selling. If short sellers are mimic traders the immediate reporting requirement in Australia should also limit the ability of inside sellers to subsequently profit.

To examine profitability around insider sales, we calculate cumulative abnormal returns (CARs) we apply the market-adjusted returns model as follows:

$$AR_{i,t} = R_{i,t} - R_{m,t}, \tag{5}$$

where $AR_{i,t}$ is the abnormal return for security i on day t; $R_{i,t}$ is the realised return for security i on day t and $R_{m,t}$ is the realised return for the market on day t. AR's are then cumulated and averaged across stocks:

$$\overline{CAR}_{(t1,t2)} = \frac{1}{N} \sum_{i=1}^{N} CAR_{i\,(t1,t2)}, \qquad (6)$$

where $t1$ is the initial event date in the event window; $t2$ is the final event date in the event window and $\overline{CAR}_{(t1,t2)}$ is the average cumulative abnormal returns from $t1$ to $t2$, with statistical significance tested as follows:

$$t_{CAR_{i\,(t1,t2)}} = \frac{\overline{CAR}_{(t1,t2)}}{\dfrac{\sigma\left(CAR_{i\,(t1,t2)}\right)}{\sqrt{N}}}, \qquad (7)$$

where t_{CAR} is the t-statistic for average cumulative abnormal returns and $\sigma\left(CAR_{i\,(t1,t2)}\right)$ is the standard deviation of the average cumulative abnormal returns over the period $t1$ to $t2$. CARs are reported over three trading periods; [-10, 0], [0, +10] and to [0, +20] to replicate one month post insider large sales.

Results are reported in Table 5. The first result of note is that trading on negative news does not result in significant negative post insider traded returns. That is, the combination of front-running and mimic competition appears to constrain insider rent extraction. The other major result is that in all cases (except intangibles) the combination of short selling and insider sales imparts a significant contrarian trend that abates pre-traded positive returns. The impact can be substantial. For example, low accrual (6.75%), high accrual (6.10%), and low M/B (5.68%) firms.

In summary there are two strong takeaways. First, trading on negative news by short sellers and insiders does not transfer into significant or substantial negative returns post

insider trading. Second, the major price impact is a contrarian termination of prior positive returns which provides a strong signal of prior over-pricing.

5.2 Industry Analysis

Accounting analysis concentrates on trading publicly available information which is less sensitive to regulatory censure. We next examine trading where corporate insiders might have a greater reluctance to trade on firms that have a politically sensitive profile. Underlying this analysis is the observation that, whilst the litigation environment in Australia is not as arduous as the U.S., none-the-less, insider selling still attracts negative media and regulatory attention. If this is the case then corporate insiders have incentives to delay trading and create an increased liquidity environment consistent with tipping and information leakage theories.

We first examine the financial sector. The operations of financial firms are complex, covering such areas as mortgage lending, business lending, foreign exchange operations, hedging with derivative instruments, and trading in collateral debt obligations. On the face of it this complexity provides corporate insiders with a comparative valuation advantage over market investors, especially in the case of assessing the loan book and trading in complex derivative securities (Flannery et al., 2004; Ryan et al. 2016). However, the financial industry is heavily regulated and has a high public and political profile which might mitigate against an insiders proclivity to undertake a trading advantage.

Another industry that is significant to Australia is the mining industry which witnessed a price slump in the ASX 300 Metals and Mining Index of over 69% during our research period[8] with a contagion effect across the whole economy. Mining operations are also complex with most of the asset value underground in estimated reserves with valuation

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[8] The ASX300 Metal and Mining Index fell by 61% from 5130 (March 2011) to 3184 (March 2013).

heavily based on volatile macro factors such as international economic growth. In addition, the mining industry attracts significant media attention in Australia.

We repeat the front-running and return analyses for these two industries and in untabulated results we find no front-running by short sellers. In Financial firms, there is no abnormal short trading before large insider sales nor any evidence of abnormal returns. For mining firms there is mimic trading on the day an insider sells (0.011, t=2.23), and evidence of contrarian trading. In short, there is no strong support for a front-running hypothesis. We can only surmise that operations in these industries are far too complex for short traders to interpret as argued by Cziraki (2017) and Adams et al. (2012), or that political sensitivity and the clear and rapid reporting requirement inhibits negative trading.

5.3 *Multiple Factor Analysis*

It is likely that value/growth, accounting ratios and industry are not independent. In order to analyse the influence of all these variables on short sellers' behaviour around insider sales, we conduct a multiple factor analysis (MFA). With MFA, we simplify the complex and diverse relationship among the variables of interest by uncovering the common dimensions/factors that link them together (Alli et al., 1993). Figure 2 reports the results. We observe that the first two factors explain almost 60% of the variability (41.55% and 16.17% respectively). Day [0] has the highest coordinate on the first factor whereas day [2] is most highly related to the second factor. This confirms that, in the majority of cases, short sellers undertake mimic trading.

6. Conclusion

We examine abnormal short selling around corporate insider sales in the Australian stock market. The purpose is to identify negative information trading channels whereby investors

can identify overpricing or portending price declines. In contrast with the U.S. studies of Khan and Lu (2013) and Massa et al. (2015), we find little substantial evidence that short selling front-runs insider selling in Australia, or that insider selling earns subsequent abnormal returns. The dominant result is that short sellers primarily exhibit mimic behaviour on the day of large insider selling. Results are robust to trading on opaque accounting variables, politically sensitive industries and multiple factor analysis. The one channel that induces significant front-running by short sellers is high accrual firms, explained by a possible reluctance to highlight prior accrual manipulation.

The lack of front-running by short sellers in Australia can be explained by a commercial business environment that more insulates the natural information advantages of corporate insiders. In the U.S., the litigious environment inhibits front-running by insiders and induces an environment that encourages tipping and information transfer to short sellers who have lagged monthly reporting requirements. The intention is to increase trading volumes and deflect attention away from subsequent large insider selling. Compared to the U.S., Australia has a less litigious commercial environment, and lower short selling volumes with daily reporting requirements under RG196.

There are two major price implications. A first order impact is that the combination of abnormal short selling with large insider sales results in insignificant post traded abnormal returns—in other words, corporate insiders are constrained from rent extracting. A secondary impact, is that contemporary abnormal short selling with large insider sales, results in a substantial contrarian price dampening signal to markets. Results also indicate the effectiveness of the daily reporting requirements of RG196 in providing competitive and rapid price signals—effectively reducing insider monopoly power and inducing larger trading blocks (per Kyle, 1985). Finally, we emphasise that results shed light on information

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channels that alert investors to negative information and the role changes in the commercial

and legal business environment play in diverting information cues.

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Appendix 1: Regulatory Regimes on Short Selling in Australia

Category	Before the GFC	After the GFC
Regulation guidance	• s1020B of the Corporations Act 2001	• Regulatory Guide 196: Short Selling
Shortable stocks	• Covered short sales permitted for all stocks. • Naked short sales permitted if they are in the approved short sales list or arrangements have been made to deliver the stocks within 3 days after the short sale.	• Abolishment of approved list of short products. • Any stock can be short sold as long as there is supply. • Only covered short sales permitted.
Reporting frequency	• Daily short position reporting which must be done by the next trading day. • Commencement of the reporting regime on July 2001.	• Daily short transaction reporting which must be done by the next trading day. • Daily short position reporting which must be done within three trading days[9].
Short sales limit	• Outstanding short sales volume to be <10% of total shares volume.	• No limitations on the volume of stocks that can be short sold.

This table presents the comparison of short selling regulations in Australia before and after the Global Financial Crisis (GFC).

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[9] Based on RG 196.127 released by ASIC, relief is granted to sellers from reporting a short position if the short position as at 7 pm on a particular day is <$100,000 and less than 0.01% of total shares issued.

Table 1: Sample Filtering for Insider Sales Associated with Short Selling

Type of transaction	Number of observations
Insider sale transactions	1,958
Sample exclusions	
Not matched with short selling in window	-393
Takeovers	-61
Off-market transactions	-217
Option related	-65
Trades not made by directors	-182
Final matched sample	1,039

This table records the data selection over the period January 2010 to March 2013. The final matched sample is for insider sales with short selling that occurs in a twenty one day window, i.e. ten days before/after the day of the insider sale.

Table 2: Descriptive Statistics

Panel A: Full Insider Sales Sample (Number of Firm-Events: 1,039)

	Mean	Median	Std. Dev.
Firm Size ($'000)	1,923,378	152,075	7,523,716
Size of Insider Sales (%)	0.97	0.11	4.72
Market-to-book ratio	3.24	1.94	5.24
Short Sales on Day of Insider Sales (%)	0.03	0.02	0.14
Lag between Insider Sale and Disclosure (trading days)	2.64	2	7.33
Shares Outstanding ('000)	318,640	156,197	474,420

Panel B: Small Insider Sales Only (Number of Firm-Events: 311)

	Mean	Median	Std. Dev.
Firm Size ($'000)	5,610,100	702,492	12,976,303
Size of Insider Sales (%)	0.20	0.02	2.84
Market-to-book ratio	3.24	1.875	7.21
Short Sales on Day of Insider Sales (%)	0.06	0.02	0.16
Lag between Insider Sale and Disclosure (trading days)	3.41	2	11.30
Shares Outstanding ('000)	514,709	253,123	669,528

Panel C: Medium Insider Sales Only (Number of Firm-Events: 416)

	Mean	Median	Std. Dev.
Firm Size ($'000)	460,661	132,567	1,036,884
Size of Insider Sales (%)	0.28	0.11	1.88
Market-to-book ratio	3.22	2.08	4.53
Short Sales on Day of Insider Sales (%)	0.02	0.02	0.07
Lag between Insider Sale and Disclosure (trading days)	2.31	2	5.45
Shares Outstanding ('000)	245,081	139,625	313,983

Panel D: Large Insider Sales Only (Number of Firm-Events: 312)

	Mean	Median	Std. Dev.
Firm Size ($'000)	198,762	40,461	463,721
Size of Insider Sales (%)	2.65	0.79	7.59
Market-to-book ratio	3.33	2.07	3.63
Short Sales on Day of Insider Sales (%)	0.02	0.016	0.18
Lag between Insider Sale and Disclosure (trading days)	2.38	2	4.39
Shares Outstanding ('000)	221,278	123,591	342,987

Panel A presents the descriptive statistics for all directors' sales from January 2010 - March 2013. Panels B, C and D report the descriptive statistics for small, medium and large insider sales, respectively. Small (large) insider sales are defined as the bottom (top) 30 percent of the insider sales as a percent of shares outstanding with medium insider sales defined as the middle 40 percent. Firm size is market capitalisation of firms at the end of the Australian financial year (30th June). Size of insider sales is shares sold by the director as a percent of shares outstanding. Market-to-book ratio is the ratio of the market value of equity divided by the book value of equity at the end of the financial year. Short Sales on Day of Insider Sales is the number of shares shorted on the day of the insider sale as a percent of shares outstanding. The Lag between Insider Sale and Disclosure is the delay in the disclosure of insider sales and its execution.

Table 3: Daily Abnormal Short Sales Conditioned on Insider Sale Trade Size

Event Day	Large insider sales		Medium insider sales		Small insider sales	
	Abnormal Short Sales	t-stat	Abnormal Short Sales	t-stat	Abnormal Short Sales	t-stat
-5	0.0006	0.70	-0.0067*	-1.75	0.0019	0.51
-4	0.0004	0.36	0.0008	0.18	0.0055	1.17
-3	0.0036*	1.88	-0.0006	-0.14	0.0018	0.61
-2	0.0031*	1.80	-0.0033	-0.84	0.0044	1.31
-1	0.0147	1.32	-0.0002	-0.04	0.0038	1.00
0	0.0173*	1.69	-0.0003	-0.06	0.0148**	2.31
1	0.0061*	1.77	-0.0010	-0.23	0.0143	1.64
2	0.0050**	2.14	0.0009	0.23	0.0090	1.06
3	0.0027*	1.72	0.0037	0.69	0.0078	0.92
4	0.0017	1.19	0.0041	0.83	-0.0020	-0.82
5	0.0011	0.97	-0.0027	-0.68	-0.0011	-0.20
Number of Insider Sale Events	312		416		311	

This table reports the daily abnormal short sales (measured as a ratio of shares outstanding) within [-5, +5] trading days of insider sales of different sizes. Abnormal short sales around an insider sale event is the difference between the daily short sales on a particular day during the [-5, +5] trading day event window and the mean daily short sales estimated from a [-60, -11] trading day estimation window. The average daily abnormal short sales is calculated by averaging all the firms' abnormal short sales. Large, medium and small insider sales are defined as the top 30 percent, middle 40 percent and bottom 30 percent, respectively, of insider sales as a percent of firm market value in the full sample. *, ** and *** denote two-tailed statistical significance at 10%, 5% and 1%, respectively.

Table 4: Daily Abnormal Short Sales Conditioned on Publicly Available Market Information

Event Day	Low M/B Firms		High M/B Firms		High Intangibles		Low Intangibles		High Accruals		Low Accruals	
	Abnormal Short Sales	t-stat	Abnormal Short Sales	t-stat	Abnormal Short Sales	t-stat	Abnormal Short Sales	t-stat	Abnormal Short Sales	t-stat	Abnormal Short Sales	t-stat
-5	0.0016	1.47	0.0058	0.57	0.0037	0.45	0.0043	1.49	0.0158*	1.68	0.0013	0.81
-4	0.0019	0.84	0.0074	0.78	-0.0025	-0.32	-0.0004	-0.17	0.0127*	1.89	-0.0010	-0.50
-3	0.0068	1.57	0.0077	1.03	-0.0042	-0.79	0.0073	0.88	0.0095*	1.91	0.0025	1.13
-2	0.0036	1.56	0.0104	1.34	0.0000	0.00	-0.0004	-0.14	0.0110**	2.45	0.0040	1.10
-1	0.0076	1.64	0.0062	1.06	0.0098	0.60	0.0085	1.02	0.0047	1.53	0.0006	0.41
0	0.0089**	2.17	0.0342*	1.74	0.0192**	2.20	0.0066	1.42	0.0126**	2.27	0.0070*	1.95
1	0.0057*	1.88	0.0351	1.26	0.0172*	1.82	0.0062	1.11	0.0010	0.37	0.0012	0.66
2	0.0091	1.54	0.0310	1.14	-0.0062	-0.83	0.0080	1.28	-0.0003	-0.08	-0.0007	-0.42
3	0.0020	0.92	0.0210	0.79	0.0049	0.44	0.0110	1.34	0.0006	0.19	0.0024	0.95
4	0.0006	0.83	-0.0006	-0.10	0.0081	1.24	0.0004	0.46	0.0005	0.14	0.0010	0.64
5	0.0008	0.56	0.0087	0.53	-0.0044	-0.65	0.0032	1.27	-0.0030	-1.12	0.0000	0.01

This table reports daily abnormal short sales (measured as a ratio of shares outstanding) based on market-to-book ratio, intangibles and accruals within [-5, +5] trading days of insider sales using the sample of large insider sales only. Abnormal short sales around an insider sale event is the difference between the daily short sales on a particular day during the [-5, +5] trading day event window and mean daily short sales estimated from the [-60, -11] trading day estimation window. The average daily abnormal short sales is calculated by averaging all the firms' abnormal short sales. High (Low) M/B, intangible and accrual firms are defined as the top (bottom) 30 percent based on the firm's relevant ratio in the sample of large insider sales only. *, ** and *** denote two-tailed statistical significance at 10%, 5% and 1%, respectively.

Table 5: Profitability of Insider Sales

Panel A: Profitability around Insider Sales based on Trading and Market Characteristics:

Trading period	Full Sample		Large Insider Sales		High M/B ratio		Low M/B Ratio	
	CAR	t-stat	CAR	t-stat	CAR	t-stat	CAR	t-stat
[-10,-1]	2.55***	5.48	4.60***	3.97	2.76**	2.01	6.76**	2.29
[0,+10]	-0.30	-0.76	-0.90	-1.01	0.97	0.74	-0.96	-0.54
[0,+20]	0.00	0.12	0.30	0.46	0.81	0.89	1.08	0.83
Short sellers	*Mimic*		*Mimic and front-run*		*Mimic*		*Mimic*	

Panel B: Profitability around Insider Sales based on Accounting Characteristics: Large Insider Sales

Trading period	High Intangibles		Low Intangibles		High Accruals		Low Accruals	
	CAR	t-stat	CAR	t-stat	CAR	t-stat	CAR	t-stat
[-10,-1]	0.19	0.13	2.22	1.00	6.04***	2.98	7.28**	2.37
[0,+10]	0.29	0.17	-0.91	-0.57	-2.3	-1.02	-1.02	-0.57
[0,+20]	1.13	0.98	0.37	0.30	-0.06	-0.04	0.53	0.40
Short sellers	*Mimic*		*None*		*Front-run*		*Mimic*	

This table reports average cumulative abnormal returns (CARs) around insider sales in the [-10, -1], [0, +10] and [0, +20] trading windows based on market characteristics (Panel A) and accounting characteristics (Panel B). Large insider sales is defined as the top 30 percent of insider sales as a percent of firm market value in the full sample. *, ** and *** denotes two-tailed statistical significance at 10%, 5% and 1%, respectively. The bottom row (short sellers) notes whether short abnormal trading is generally categorised as front-running, mimicking, or no significance.

Figure 1: Daily Abnormal Short Sales around Insider Selling
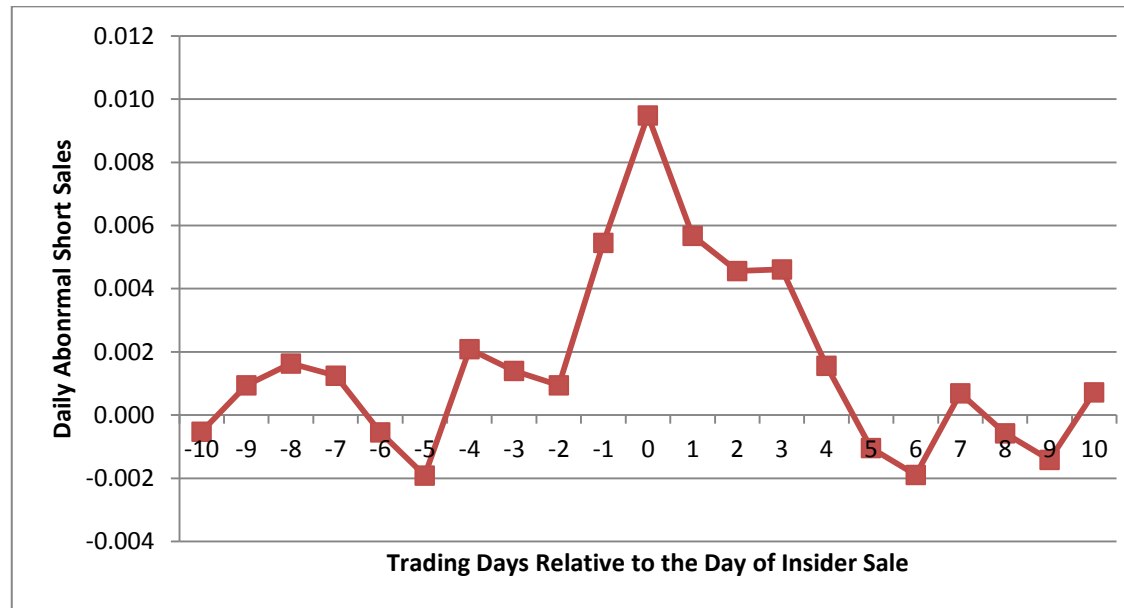
This figure presents the average daily abnormal short sales (expressed as a ratio of shares outstanding) around [-10, +10] trading days when an insider sells. Abnormal short sales are calculated as the difference between daily short sales and the mean daily short sales estimated from the [-60, -11] trading day estimation window. Significance is recorded at time (0) ($\mu= 0.0095$, t=2.36) and time +1 ($\mu= 0.0057$, t=1.74).

Figure 2: Multiple Factor Analysis of Abnormal Short Sales around Insider Sales

Observations (axes F1 and F2: 57.72 %)

40
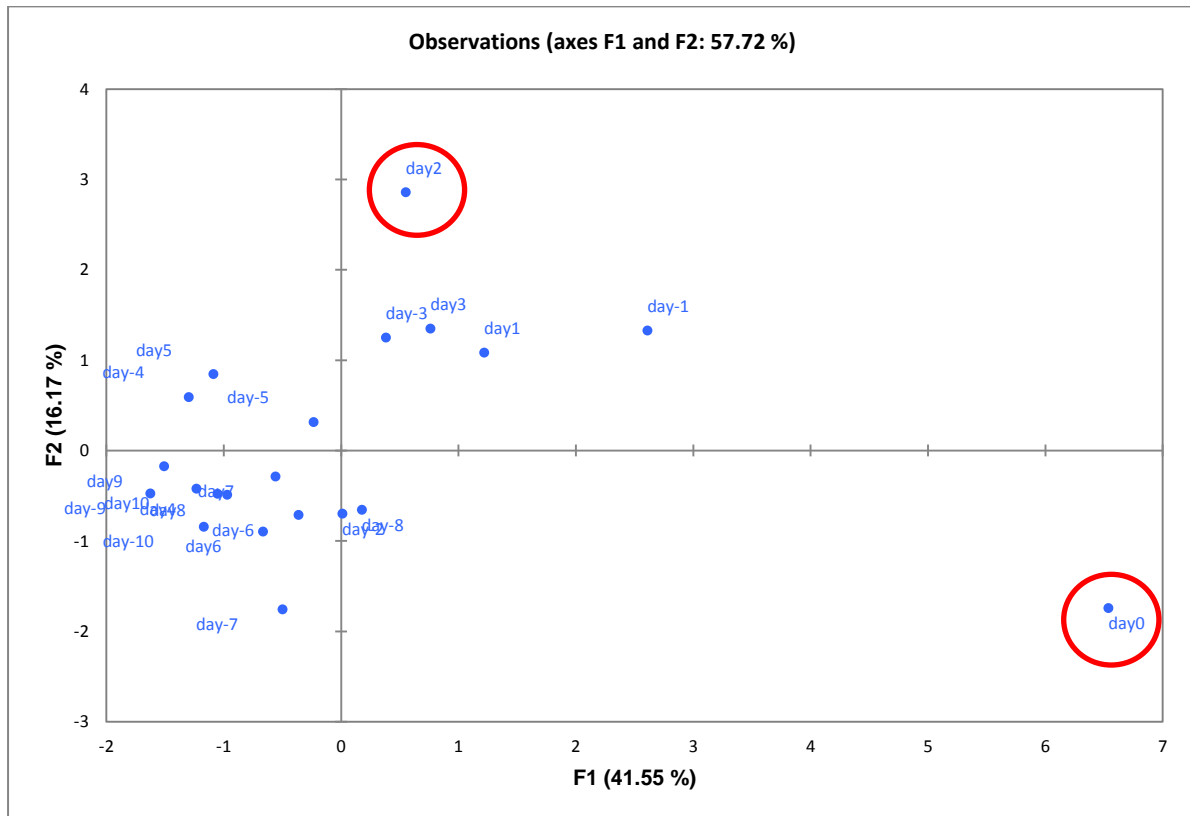
Highlights for "Insider Sales vs. Short Sellers: Negative Information Trading in Australia":

- Short sellers in the main mimic large insider sales.

- Our results contradict front-running by short sellers in the U.S.

- The different commercial and legal environment in Australia explains the results.

- Insider sales and short selling does not result in abnormal returns.