

Information Leakage on Analyst Recommendations: Does it Exist?

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Working Paper¹

Abstract

Using a proprietary data set containing brokers ID, this study investigates the trading activities of recommending brokers before and after the release of their analyst reports to analyze where information leakage (i.e., ‘tipping’) is most prevalent. Results show that tipping occurs predominantly in mid and smaller capitalization stocks. Evidence suggests that analyst reports provide new content/disseminate valuable information to market participants in these stocks. Recommending institutions experience similar market impact costs to their peers, and anonymity in broker IDs reduce implicit costs for all brokers.

¹ Version 1 July, 2013.

1. Introduction

Financial institutions spend significant amounts of resources collecting and analyzing information to produce analyst research and recommendations. Reliant upon clients' trading volumes, brokerages produce these reports as a basis to persuade clients to trade. Studies examining the impact of analyst recommendations on prices suggest that they have at least short-term investment value (see Stickel (1995), Womack (1996), Barber, Lehavy, McNichols, and Trueman (2001), Jegadeesh, Kim, Krische, and Lee (2004), and Green (2006)). To ensure long-run viability, the costly activity of producing analyst research must be recovered by profitable operations, which includes trading profits and commissions from clients' trading volumes.

The cost-benefit logic applies to investors; to continue paying a premium for brokerage services, the value of the bundled services must be greater than the costs. The most direct method to recoup these costs is to profit from the information content of the analyst reports. Dimson and Marsh (1984) finds that profitability occurs only in the period prior to public release, while buys made a day or a week after upgrade recommendations yields no significant profit. This provides brokers with an incentive to "leak" upcoming equity research to small groups of privileged clients who in turn "reward" them with trading volume. Commonly known as the "tipping" phenomenon, Irvine et al. (2007) demonstrates that this behaviour exists in initial analyst buy recommendations using a sample of institutional trades from Plexus Group. Craig and Corkery (2009) show that tipping is deemed an essential practice to reward clients based on evidence from practitioners. Using a proprietary dataset, Lepone, Leung and Lee (2012) quantify the abnormal profit that can be captured through tipping and show that it amounts to approximately 0.5% for upgrades and 1% for downgrade recommendations.

While prior literature documents the existence of tipping and provides estimates of the potential profits, no study investigates how factors like firm size, analyst coverage and existing information disclosure affects the extent of information leakage. Lang and Lundholm (1993) and Healy and Wahlen (1999) provides evidence that a bilateral positive relationship exists between a company's information environment and analyst coverage; better disclosure by firms leads to more analyst coverage and increased analyst coverage improves the information environment of companies. Bhushan (1989) notes that larger companies generally have better information disclosure and are well-covered by analysts. This suggests that information asymmetry is likely to be most acute for mid- and small-sized companies where there is less disclosure and analyst coverage. Analyst reports in these firms are hence more likely to influence price as they reduce information asymmetry² and "tipping" in these companies is potentially more profitable.

The first part of this study seeks to extend the literature by analyzing the extent of tipping based on company size and further investigates if additional abnormal profits are captured in smaller sized companies through the exploitation of the chronic information asymmetry that exists. This issue is of potential interest to regulators as (to the best of the authors' knowledge) there appears to be a lack of explicit prohibitions on tipping in the current regulatory environment. Given the dearth of regulatory presence in this "grey" area and the need to maintain fair and efficient markets, regulators may wish to re-examine the adequacy of their disclosure requirements to promote confidence among investors. It is also noteworthy that as part of prudent self-regulation, some investment banks have acted to

² While it is debatable if analysts uncover new information or simply disseminate content that some market participants already know, there is evidence that analyst reports reduce information asymmetry (see Easley and O'Hara (2004)).

dismiss analysts for inappropriate dissemination of research opinion as a standard of good practice.³

This study also investigates is the price impact asymmetry of buy and sell trades in the Australian equities market, specifically after announcements of stock recommendation upgrades and downgrades. The significance of transaction costs in assessing trading profitability is well-documented, particularly in evaluating fund performance (see for example, Keim, 1999 and Chiyachantana, Jain, Jiang and Wood, 2004). Empirical research finds both implicit and explicit transaction costs to be a substantial portion of trading costs (Keim and Madhavan, 1998). Chiyachantana, Jain, Jiang and Wood (2004) report higher implicit trading costs of 0.36% relative to explicit trading costs of 0.10% for US stocks in 2001. Chan and Lakonishok (1995) documents that factors influencing implicit trading costs include trade size, firm capitalization and investment style. Price impact asymmetry has been previously documented to be stronger for block buys than block sells (see Kraus and Stoll (1972), Chan and Lakonishok (1993) and Keim and Madhavan (1996)), however, Chiyachantana, Jain, Jiang and Wood (2004) finds contingency of this asymmetry on bull and bear market conditions. Examining international stocks in 37 countries, they find that trading with the market denotes consumption of liquidity, incurring larger price impact, while trading against the market denotes provision of liquidity, causing a lower price impact. These findings are supported by studies on individual markets including the Australian Stock Exchange (ASX) (Aitken and Frino, 1996), Jakarta Stock Exchange (Bonser-Neal, Linnan and Neal, 1999) and Stock Exchange of Thailand (Charoenwong, Ding and Jenwittayaroje, 2007). The second part of this research seeks to extend the literature by examining whether buy/sell orders executed after an upgrade/downgrade recommendation is deemed more informative, hence confirming the contingency of price impact asymmetry to market

³ Smith (2003) documents the dismissal of a Morgan Stanley analyst and Smith and Grocer (2012) on a more recent case in regards to recommendation leakage by an analyst at Citigroup on the bank's views on the Facebook IPO.

conditions at the individual equity-level. Given that the majority of stocks have positive betas, the empirical findings on price impact asymmetry should contain no surprise and result in price movements, on average, that correspond with movements in market indices. When the effect of stock averaging across the entire market is eliminated, it allows for a more robust analysis of the documented price impact asymmetry.

Finally, with a unique and proprietary data set from the ASX, this study also obtains the identities of buying and selling brokers of every trade, enabling a comparison of the market impact costs incurred by clients of recommending institutions before and after the public release of the analyst reports and against competing brokers. This provides insight into the execution efficiency of the recommending brokers and examines if trade competency is an alternative reason for clients' volume. Empirical studies by Womack (1996), Barber, Lehavy, McNichols and Trueman (2001), Green (2006) and Juergens and Lindsey (2009) on analyst recommendations document evidence on information asymmetry between participants with access to this information and those without. Further, Goldstein, Irvine, Kendal and Wiener (2009) also document stronger price effects by recommending brokers on the day of recommendation release relative to trades by non-recommending brokers. Subsequently, with the ASX's adoption of broker anonymity starting 28 November, 2005, this study also examines the effect of anonymity on price impact experienced by recommending brokers.

Results in this study show that broker-analysts execute abnormal trading volumes in the direction of the recommendation prior to its announcement date for downgrades (i.e., increase in sell orders). No statistically significant changes in buy orders were observed for upgrade recommendations. The magnitude of this abnormality is reliant upon the size of the stock in consideration. Small and mid-capitalization firms exhibit stronger abnormal volumes prior to recommendation release. Evidence confirms price impact asymmetry after analyst recommendation upgrades and downgrades, where price impact for buyer-initiated trades is

larger after upgrade revisions, and price impact for seller-initiated trades is larger after downgrade revisions. The magnitude of this asymmetry is dependent upon the level of recommendation change issued. This is also consistent for permanent price impact suggesting stronger presence of information for trades under these circumstances. Further analyses provide that price impact pre- and post-release of first-level recommendations show no significant difference.

From a trade execution perspective, early access to this information does not appear to benefit investors in terms of costs efficiency. Sells executed after release of second-level downgrades experience higher price impact, while buys executed before release of second-level upgrades experience higher price impact. This suggests that the market anticipates positive information surrounding second-level upgrades causing increase in buying pressure and execution costs for buys, but lagged response to negative information with an increase in selling pressure a few days after a second-level downgrade becomes public. In both pre-anonymous and anonymous markets, trades by recommending brokers incur similar market impact costs as their peers, suggesting that they do not provide costs savings in terms of execution efficiency. This supports the hypothesis that clients provide trading volume to broker-analysts as compensation for their research activities (Goldstein, Irvine, Kendal and Wiener, 2009). Market impact costs for all brokers are observed to be generally lower post-broker anonymity.

The remainder of this paper is structured as follows: Section 2 introduces the data and method used in this study; Section 3 presents the results; Section 4 presents several additional test results; and Section 5 concludes.

2. Data and Method

2.1 Data

The data include analyst recommendations for stocks, and stock price information, for the period 29 November, 2004 to 29 November, 2006. Data for all trades are obtained from the Australian Securities Exchange (ASX), while order book data, with information on quotes, is sourced from SIRCA⁴. Each trade record contains fields for security name, stock code, date, time, volume, traded price, the buying and selling broker IDs; quote records contain prevailing best bid and ask prices. With information from the order book, trade direction is inferred from the matching of trade prices with prevailing quotes. Trade prices matched with the best prevailing bid prices are classified as seller-initiated, and trade prices matched with the best prevailing ask prices are classified as buyer-initiated.

Analyst recommendations are obtained from I/B/E/S through the Wharton Research Data Services (WDRS), and include fields for stock code, analyst firm, recommendation date, recommendation release time and the stock recommendation issued. These data have recommendations standardized to five levels of strong buy, buy, hold, sell and strong sell. Upgrades that proxy for bull market conditions, are classified as first time buy and strong buy recommendations. Positive revisions of recommendations – strong sell to sell, sell to hold, hold to buy and buy to strong buy – are also included in this classification. Similarly, downgrades that proxy for bear market conditions are classified as first time sell and strong sell recommendations. Negative revisions of recommendations – strong buy to buy, buy to hold, hold to sell and sell to strong sell – are also included in this classification. While the majority of recommendation revisions are one-step recommendations; that is, upgrade or downgrade to the immediate next recommendation level, on occasions, a previous ‘strong sell’ recommendation may be revised to a ‘buy’ recommendation, bypassing ‘sell’ and ‘hold’

⁴ Securities Industry Research Centre of Asia-Pacific.

recommendations. Therefore, recommendation revisions take two different levels; one-step (to the immediate next recommendation) and two-step recommendations (bypassing one step of recommendation) are classified as the first-level upgrade/downgrade. Three-step and four-step recommendation changes are classified as second-level upgrade/downgrade. First time hold recommendations and recommendations with no change relative to prior release are excluded from the analysis.

The bias in analyst recommendations documented in empirical literature is observed in the sample; there are significantly more issues of buy and strong buy researches relative to sell and strong sells⁵. The sample data contains 794 buy and 542 strong buy recommendations, but only 481 sell and 226 strong sell recommendations. Using the approach by Jegadeesh, Kim, Krusche and Lee (2004), changes in recommendations are used to proxy for the equity market conditions with a total number of 3,842 recommendations issued for the 338 stocks over the sample period. Of the 1,845 upgrades, 1,198 are one-step upgrade, 627 two-step upgrades, 7 three-step upgrades and 13 four-step upgrades. Downgrades consist of a total of 1,934, with 1,225 one-step downgrades, 684 two-step downgrades, 10 three-step downgrades and 15 four-step downgrades.

2.2 Abnormal Trade Volume Imbalance

To analyze the extent of information leakage around the public release of analyst reports, this study examines the trading volumes of recommending brokers over a 21 day event period (10 days pre-release and 10 days post-release). Similar to the methodology used in Lepone, Leung and Lee (2012), this study utilizes the trade volume imbalance in

⁵ See Jegadeesh, Kim, Krusche and Lee (2004) and Womack (1996). A study in the US market by Jegadeesh, Kim, Krusche and Lee (2004) over the 1985 to 1999 period, found that sell or strong sell recommendations made up less than 5% of all recommendations. Womack (1996), in the period 1989 to 1991, find that new buy recommendations occur seven times more often than sell recommendations. The argument for this phenomenon is in relation to costs of disseminating such information, and relationships with banking institutions. The consequence of making incorrect judgments with respect to sell recommendations may be more severe for an analyst's reputation.

percentage (TVI) generated by the recommending broker to examine unusual trading volumes. TVI for recommendation *upgrades* in stock *i*, for broker *j*, on trading day *t*, and can be defined as,

$$UTVI_{(i,j,t)} = \frac{\text{Buy Volume Traded}_{(i,j,t)}}{\text{Total Volume Traded}_{(i,j,t)}} * 100 \quad (1)$$

TVI in percentage for recommendation *downgrades* in stock *i*, for broker *j*, on trading day *t*, and can be defined as,

$$DTVI_{(i,j,t)} = \frac{\text{Sell Volume Traded}_{(i,j,t)}}{\text{Total Volume Traded}_{(i,j,t)}} * 100 \quad (2)$$

To control for market expectations, the abnormal trade volume imbalance is used to measure trading volume that deviate from normal trading days. It can be defined as the difference between actual and benchmark traded volume for the 21 event period. Benchmark traded volume is calculated as the broker's average daily TVI for 20 and 50 trading days *before* the 21 day event period. The abnormal trade volume imbalance in percentage (ATVI) for recommendation *upgrades* can be represented as,

$$UATVI_{(i,j,t)} = UTVI_{(i,j,t)} - \text{Benchmark } UTVI_{(i,j,t)} \quad (3)$$

The abnormal trade volume imbalance (ATVI) for recommendation *downgrades* can be represented as,

$$DATVI_{(i,j,t)} = DTVI_{(i,j,t)} - \text{Benchmark } DTVI_{(i,j,t)} \quad (4)$$

2.3 Price Impact

Studies on the price impact of institutional trades consistently document significantly stronger permanent effects for block buys. The asymmetry found by Kraus and Stoll (1972); Holthausen, Leftwich and Mayers (1987); Holthausen, Leftwich and Mayers (1990); and Keim and Madhavan (1996) is primarily (approximately 50%) temporary for block sell, and permanent for block buys. Kraus and Stoll (1972) examined this asymmetry in the NYSE⁶ with an intraday analysis, using closing prices of day prior to trade and on the day of trade. They find that block sell experience price reversals post-execution and that block buy exhibit price continuations post-execution, suggesting the existence of informational effects in buy, relative to sell.

Using the similar pre- and post-execution price benchmarks, Chan and Lakonishok (1993) provide a similar argument, with evidence of buy-sell asymmetry for U.S. institutional equity trades. The decision to sell a particular stock may not necessarily convey negative information as sells can only be executed among stocks within the current portfolio, limiting the alternatives available. Buys, on the other hand, are made, specifically, selected from virtually all stocks on the market, and are more likely to convey (or perceived to convey) positive firm-specific news.

This study adopts three empirical measures of price impact as discussed above: total temporary and permanent (see Holthausen, Leftwich and Mayers (1990)). While the temporary price impact reflects liquidity cost, and permanent price impact reflects informational effects of the trade, the total price impact measures the total price change caused by the trade, and is essentially the sum of temporary and permanent price impact.

As in Holthausen, Leftwich and Mayers (1990) and Gemmill (1996), in calculating these price effects, we use the price of security 10 trades preceding the measured trades as the

⁶ New York Stock Exchange

pre-execution benchmark, $Price_{-10}$ and the post-execution benchmark, $Price_{+10}$, is the price of the security 10 trades after the measured trade. The three measures of price impact used are mathematically defined as follows:

$$Total\ Price\ Impact = \frac{Trade\ Price - Price_{-10}}{Price_{-10}} \quad (5)$$

$$Permanent\ Price\ Impact = \frac{Price_{+10} - Price_{-10}}{Price_{-10}} \quad (6)$$

$$Temporary\ Price\ Impact = \frac{Price_{+10} - Trade\ Price}{Trade\ Price} \quad (7)$$

The above analysis ignores the various factors that possibly contribute to variations in price impact. To account for the other determinants of price impact, regressions with permanent and total price impact as the dependent variable, consistent with Chiyachantana, Jain, Jiang and Wood (2004) are estimated. The explanatory variables include both order-specific and stock-specific factors, including direction of trade, order complexity, stock market capitalization, stock volatility and industry of the firm. Additionally, variables that capture that variation in analyst coverage that proxies for equity condition, including the number of analysts providing recommendations and the collective reputation of these analysts, are included.

The regression equation for price impact is estimated as follows:

$$PI = \alpha + \beta_1 Buy + \beta_2 Complexity + \beta_3 Cap + \beta_4 Volatility + \beta_5 Mkt\ Return \\ + \beta_{6-10} Industry + \beta_{11} Analysts + \beta_{12} Reputation + \varepsilon, \quad (8)$$

where PI is the permanent/total price impact as defined above; Buy takes the value of 1 for buy orders and 0 for sell orders; Cap refers to the natural logarithm of market

capitalization of the firm, taken from the last trade in the sample period; *Complexity* is the natural logarithm of trade volume relative to the median trading volume, either in the pre-anonymity period or post-anonymity period; *Volatility* is the natural logarithm of difference between the daily high and low price of the stock; *Mkt Return* is the market return measured by the difference between the All Ords Index 10 trades after and the All Ords Index 10 trades prior, less 1; five *Industry* dummy variables take the value of 1 if the stocks traded are respectively from Consumer, Financial, Healthcare, Industrials & Materials and Information Technology & Telecommunications. As there is an intercept term in the model, no dummy variable is assigned to the Resources industry. *Analysts* is the number of analysts that issued the recommendation/revision that proxy the underlying market condition within 3 days of the prior recommendation and *Reputation* takes the value of 1 for reputable analysts and 0 for less reputable analysts according to the East Coles Survey. If a brokerage house is ranked top 10 in the East Coles Survey Research Broker List, the brokerage house is taken as a reputable analyst, if not, the brokerage house is considered otherwise.

3. Results

Table 1 and Figure 1 report the mean percentage of buy traded volume imbalance over a 21 days event period (10 days pre-release and 10 days post-release) of the broker-analyst issuing an upgrade recommendation and mean percentage of sell trade volume imbalance over the same period if the broker-analyst released a downgrade recommendation. Results show that there are no statistically significant abnormal buy volumes prior to the public release of upgrade recommendations. Buy volume only begin to increase on event day (Day 0) and continue in Day 1 and 2. Interestingly, abnormal volume is observed in Day 4 but not Day 3. Results for downgrade recommendation demonstrate that abnormal sell volume starts 3 periods (Day -3) before the public release of downgrade recommendations.

This persists until 4 days after the event day (i.e. abnormal volume is observed from Day -3 to Day 4). These results are consistent across both benchmarks using 20 and 50 trading days.

<Insert Table 1>

<Insert Figure 1>

<Insert Table 2>

The sample data is subsequently divided into four quartiles (largest in first quartile and smallest in fourth quartile) based on the stocks' average market capitalization over the sample period⁷. Table 2 reports the results of average percentage of buy (sell) trading volume imbalance of broker-analysts over the 21 days event period when broker-analysts issue upgrade (downgrade) recommendations. Results show that for upgrade recommendations, there are no statistically significant abnormal buy volumes prior to the public release of analyst recommendations across all four quartiles. This suggests that either tipping did not occur on upgrades or that clients may not be convinced enough to act on the information⁸. For stocks in Quartile 1, abnormal buy volume is observed on the public release date (Day 0) and persists for 2 periods (Day 1 and 2). Interestingly, for Quartile 2 and 3, abnormal buy activities only occur one day after event (Day 1) and continue for another day (Day 2) in Quartile 2. No significant abnormal trading is documented for Quartile 4.

For downgrade recommendations, it is observed that significant abnormal sell volumes consistently occur one day *prior* (Day -1) to the public release of analyst recommendations in Quartile 1, 2 and 3. However, for large stocks (Quartile 1), the results are not statistically significant when the 50 trading days benchmark is used. The magnitude of the abnormal sell activities is also greater in Quartile 2 and 3 (largest), which suggest tipping is more prevalent in small and mid-size companies. Quartile 4 which consists of the

⁷ The average market capitalization for Quartile 1 is approximately \$9.047 billion, Quartile 2 is \$1.306 billion, Quartile 3 is \$0.435 billion and Quartile 4 is \$0.129 billion.

⁸ Clients may be reluctant to act on upgrades due to analyst preference for buy recommendations. Further, Lepone, Leung and Lee (2012) demonstrate that the abnormal profits that can be obtained from acting on downgrades compared to upgrades are approximately double.

smallest firms did not appear to experience abnormal trading activities before event date. Similar to upgrade recommendations, stocks in Quartile 1 and 2 exhibits abnormal sell volume on Day 0, 1 and 2. Quartile 3 experience abnormal sell activities on Day 0 and 1 and Quartile 4 show abnormal sell volumes only on Day 1. Results for both upgrade and downgrade recommendations are generally consistent for both benchmarks order flow using 20 and 50 trading days.

3.1 Price Impact Asymmetry

Table 3 illustrates the characteristics of all trades for the 338 stocks around the public release of analyst recommendation, with a breakdown of these characteristics into upgrades, downgrades, buyer-initiated and seller-initiated trades. It is observed that there are significantly more trades during downgrade recommendations compared to upgrades. Individual trade characteristics show minimal differences between the two types of announcements. Consistent with empirical literature, the percentage of buy (sell) trades in the upgrade (downgrade) period is marginally higher than the percentage of sell (buy) trades in the same period.

<Insert Table 3>

Table 4 presents the total, temporary and permanent price impact for all trades. The total and permanent price impact of buys and sells are consistent with the expectations of the asymmetry, posed by the different analyst recommendations. Both measures of price impact are stronger for buys in upgrade periods, and stronger for sells in downgrade periods, with second-level upgrades experiencing higher asymmetry for buys and second-level downgrades experience higher asymmetry for sells. Partial price reversals are observed for all of the above, with sells experiencing positive temporary effects and buys experiencing negative temporary effects, with the exception of sells after a second-level downgrade where price

continuation was observed. Price reversals observed are stronger for sells in the upgrade periods and stronger for buys in the downgrade periods, particularly with second-level downgrades. The results from permanent price impact reported in Table 4 also exhibits similar trends to results from the total price impact, providing evidence of a price impact asymmetry that relates to the direction of the recommendation change issued by the analyst.

<Insert Table 4>

After controlling for variation in analyst coverage, stock and order-specific characteristics, the regression results in Table 5 and Table 6 provide evidence of price impact asymmetry in the two separate recommendation revision periods. Buy trades executed after upgrade recommendation revisions have a larger price impact, and sell trades executed have a larger price impact after downgrade recommendation revisions. As the upgrade and downgrade recommendation revisions proxy for market conditions at individual equity levels, this finding is consistent with Chiyachantana, Jain, Jiang and Wood (2004). This provides further evidence for underlying market condition to affect the asymmetry in price impact; particularly the results confirm that the condition holds at the equity-level.

<Insert Table 5>

<Insert Table 6>

Table 7 documents total and permanent price impact of buy (sell) 10 days pre- and post-release of upgrade (downgrade) recommendations. Over the 20-day period around release of a recommendation, buy or sell around first-level upgrade or downgrade is relatively flat. Executing trades before or after a recommendation is released provides no savings in terms of implicit trading costs. Price impact of sell over second-level downgrades, however, show higher execution costs post-release of recommendation while price impact of buy over second-level upgrades, show higher execution costs pre-release of recommendation. Sell orders executed one day before a second-level downgrade is approximately 0.036 per cent

lower than those completed one day after a second-level downgrade. Buy orders executed one day before a second-level upgrade is approximately 0.080 per cent higher than those completed one day after a second-level upgrade. This suggests that there may be information asymmetry around this period, causing higher execution costs even prior to release of recommendation.

<Insert Table 7>

3.1 Broker Matched Trades

With the proprietary dataset obtained from the ASX, identity of the buying and selling brokers of trades are matched to the identity of brokers who released the corresponding recommendation change. Table 8 provides the summary statistics of number of trades matched to the corresponding recommendation release broker in the pre-anonymity and post-anonymity periods. It is noteworthy that the number of trades during the post-anonymity period is higher for all levels of recommendation revisions, except for the second-level downgrade.

<Insert Table 8>

Table 9 reports total and permanent price impact of trades of announcement day and 1 day after, which were initiated by brokers who provided the underlying recommendations, and trades initiated by all other brokers in the pre-anonymous period. Table 10 reports this figures in the anonymous period. Results shows that seller-initiated trades executed by recommending brokers after the public release of a downgrade recommendation generally do not incur additional price impact cost when compared to their peers. This is consistent for both pre-and-post anonymous periods. For buyer-initiated trades, broker-analysts experience the same price impact costs as other brokers pre-anonymity. In the post-period, recommending brokers generally incur similar market impact costs as others except for first-

level upgrades where they experience higher total price impact costs⁹. This evidence suggests that recommending brokers do not have a competitive advantage in execution efficiency over other brokers.

<Insert Table 9>

<Insert Table 10>

3.3 Pre- and Post-Anonymity Comparison

Table 11 presents a comparison of total and permanent price impact for trades by recommending brokers in the pre-anonymous and anonymous periods. Due to the market participants' ability to observe the broker on the opposite side of the order book, trades executed by recommending brokers in the pre-anonymous market experience larger magnitudes of price impact for seller-initiated trades after downgrade revisions, and buyer-initiated trades after upgrade revisions. Removal of broker identifiers, thus, leads to lower trading costs for brokers executing trades in accordance to their research. However, apart from sell after first-level downgrades, differences are not statistically significant. This could be due to lack of observations particularly for second-level recommendations.

<Insert Table 11>

4. Additional Tests

For robustness, we also examine the price impact of all trades, measured using a pre-execution benchmark of the security price five trades preceding the measured trade, and a post-execution benchmark of the security price five trades after the measured trade. Table 12 reports the results using these alternative benchmarks and is in support of the above findings.

⁹ Interestingly, when brokers executed orders against the flow of the recommendation (i.e. buy orders on sell recommendation), they incur higher total price impact for first and second level downgrades and higher permanent market impact costs for second-level upgrades pre-anonymity. During post-anonymity, they experience higher total price impact in first-level downgrades, first and second level upgrades, and higher permanent market impact costs for second-level upgrades.

Buyer-initiated trades in second-level upgrade periods experience stronger total and permanent price impact. This asymmetry is reversed for downgrade periods, with price impact magnitudes larger in the second-level downgrade periods. This measure also provides a similar trend for temporary price impact. Both sells and buys experience partial price reversals. Similar to results in the previous section, price reversals are stronger for sells in the upgrade periods, particularly the second-level upgrade, and stronger for buys in the downgrade periods, particularly with second-level downgrades.

<Insert Table 12>

5. Conclusion

This study examines the abnormal trading volume imbalance in the 21 days period around the public release of analyst recommendation for signs of analyst “tipping” to privileged clients in exchange for trading volume. Results suggest that information leakage occurs one day prior to the official release and predominately in downgrade recommendations. Evidence demonstrates that these activities are most prevalent in mid and smaller capitalization stocks.

The execution efficiency of the recommending brokers is also analyzed. Generally, results from this research show that the market impact costs experience by broker-analyst is similar to their peers before and after the public release of analyst reports. Post-anonymity of markets demonstrates that price impact across all brokers was reduced. This suggest that trade competency is unlikely to be a reason for client to award volume, providing an incentive to tip and leverage on the resources already invested on analyst research.

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Table 1**Buy and Sell Trading Volume Imbalance of Recommending Brokers around Upgrades and Downgrades**

Table 1 presents the percentages of trading volume imbalance as per section 2.2. The table reports mean percentage of buy volume imbalance for upgrades and sell volume imbalance for downgrades respectively.

Upgrades			Downgrades		
Buy Volume Imbalance			Sell Volume Imbalance		
Days	Benchmark 20 Days	Benchmark 50 Days	Benchmark 20 Days	Benchmark 50 Days	
-10	1.2322	0.5915	3.4817 **	2.8121 **	
-9	2.5953 *	2.2701	2.2566	2.3920	
-8	-0.2913	-0.3416	0.4438	-0.3514	
-7	0.8220	0.2576	2.0060	2.0552	
-6	-1.2252	-1.7275	-0.4995	-0.2686	
-5	-0.5926	-0.8465	-1.1651	-1.6020	
-4	-1.6340	-2.6135	1.5607	1.8563	
-3	-1.9871	-2.7954 *	3.1436 **	3.1591 **	
-2	0.0567	-0.0992	3.7466 **	3.7994 **	
-1	2.4884	2.8027 *	5.2506 **	4.7660 **	
0	3.5147 **	3.7173 **	5.9907 **	5.9151 **	
1	8.0460 **	7.3736 **	9.1068 **	8.8405 **	
2	4.9350 **	4.5237 **	6.5845 **	6.5252 **	
3	1.7186	1.0395	3.9436 **	3.2302 **	
4	4.4392 **	4.2345 **	3.5384 **	3.7553 **	
5	0.4419	1.1292	2.5341	2.4538	
6	2.2314	1.6277	2.3935	2.8698 *	
7	1.4961	1.2974	3.1254 **	2.6704 *	
8	2.4964	1.9227	4.7054 **	4.6261 **	
9	2.5586	2.9475 **	0.1697	0.6722	
10	1.9356	1.2855	2.8151 **	2.4254	

** indicates statistical significance at the 0.01 level

* indicates statistical significance at the 0.05 level

Figure 1

Buy and Sell Trading Volume Imbalance of Recommending Brokers around Upgrades and Downgrades

Figure 1 illustrates the trading volume imbalance of broker analysts around a recommendation release. This figure displays the variation in average buy volume imbalance of broker analysts around an upgrade recommendation and the variation in average sell volume imbalance of broker analysts around a downgrade recommendation.

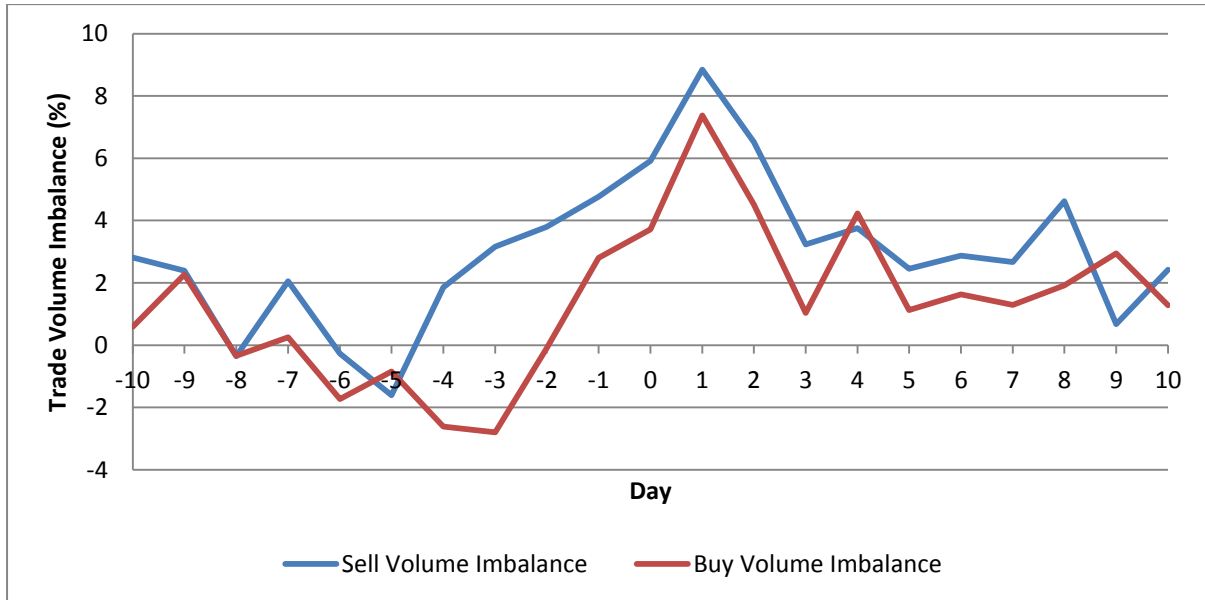


Table 2
Buy and Sell Trading Volume Imbalance of Recommending Brokers around Upgrades and Downgrades

This table is similar to table 1 but all the trading volume imbalances are segregated by the stock's market capitalization. The sample stocks are divided into four different groups according to the market capitalization of each stock, with the largest firms in "MC Quartile 1" and smallest firms in "MC Quartile 4". This table reports mean percentage of buy volume imbalance for upgrades and sell volume imbalance for downgrades respectively.

MC Quartile 1					MC Quartile 2				
Day	Buy Volume Imbalance		Sell Volume Imbalance		Day	Buy Volume Imbalance		Sell Volume Imbalance	
	Benchmark 20 Days	Benchmark 50 Days	Benchmark 20 Days	Benchmark 50 Days		Benchmark 20 Days	Benchmark 50 Days	Benchmark 20 Days	Benchmark 50 Days
-10	1.6814	1.0219	3.7731 **	2.5639	-10	2.8899	2.2682	2.6958	1.7609
-9	3.2620 *	3.2190 *	2.6864	2.3236	-9	1.2085	-0.3206	1.1692	2.2102
-8	-0.2181	-0.1586	-1.4702	-1.9375	-8	-3.5435	-4.2116	3.6312	1.7914
-7	1.6808	1.9678	1.4395	2.4050	-7	-3.2552	-4.1760	3.0564	3.0946
-6	0.6358	0.4076	-0.2256	0.9278	-6	-4.5028	-4.3871	-0.6331	-1.2867
-5	1.3991	1.8696	-0.3690	-0.7347	-5	-3.5759	-4.3229	-1.1229	-1.8145
-4	-1.0783	-2.0844	3.2359 *	3.1904	-4	-2.6510	-3.9056	-1.3150	-1.1983
-3	-1.0151	-1.2646	4.9765 **	5.0369 **	-3	-1.9468	-2.8672	3.0963	2.8794
-2	0.5656	0.2667	2.0840	1.9121	-2	-3.5213	-3.6539	3.3249	4.1341
-1	2.6587	2.9135	3.6295 **	2.9239	-1	4.2550	4.6010	6.5831 **	6.7138 **
0	4.0701 **	4.4010 **	4.3814 **	3.8839 **	0	2.1612	2.7344	6.9360 **	7.0386 **
1	8.8553 **	8.2774 **	9.1761 **	8.7137 **	1	5.7419 **	3.8504	6.8839 **	6.7809 **
2	4.4893 **	4.5861 **	3.7116 **	4.0921 **	2	6.2657 **	6.1746 **	10.7318 **	10.7273 **
3	1.1912	0.8762	3.4168 *	2.9543	3	1.9921	2.0945	3.8511	1.9715
4	2.3387	2.7267	4.3546 **	4.3926 **	4	5.2208	4.9413	3.3006	3.4457
5	0.7882	1.7040	1.4220	0.9093	5	-1.7428	-1.0286	1.7752	2.4138
6	3.2340 *	3.3993 **	0.1558	-0.2199	6	1.4222	0.6587	5.3368 **	6.3949 **
7	2.7785	2.7367	2.9882	2.3362	7	-1.1835	-0.6178	3.5320	3.1720
8	3.8889 **	3.9822 **	2.9712	3.1145	8	3.0250	1.8293	6.0709 **	5.4206 *
9	2.1881	2.9582	-1.9031	-1.9341	9	4.7336	4.6828	0.7885	1.8644
10	3.2165 *	2.4409	1.9146	1.3618	10	1.4094	1.2994	2.1619	1.6649
MC Quartile 3					MC Quartile 4				
-10	-5.1730	-5.6521	2.8457	3.5486	-10	-0.6327	-3.6359	10.8554	19.5014 **
-9	3.5923	5.1943	3.2321	3.3296	-9	-9.0293	-7.3668	0.9189	1.2277
-8	6.3662	8.1713	2.4975	1.0039	-8	14.3371	8.0797	-9.4712	4.6580
-7	8.2618	5.1727	1.7990	-1.4893	-7	2.7179	-2.2911	2.4228	-4.3213
-6	-2.5017	-4.8590	-2.6828	-4.1225	-6	4.4885	-3.0760	9.9171	12.1696
-5	1.3411	-1.7400	-6.8844	-8.5984 *	-5	-36.5081 **	-27.2184	7.5059	16.9533
-4	-1.6961	-2.1740	1.0306	0.6271	-4	-2.5810	0.6777	0.5751	14.2678
-3	-4.8794	-8.1763	-6.3554	-7.3424	-3	-12.1244	-11.6120	6.7637	13.9684
-2	6.7537	7.7775	10.5551 **	8.4681	-2	-4.0597	-9.8256	15.9835	20.9621 **
-1	-1.6633	-2.3669	13.7371 **	11.6676 **	-1	-7.3965	4.2078	-9.4277	-8.2146
0	4.3767	4.1557	10.8228 **	10.0065 **	0	3.4811	-2.7239	5.6835	13.5266
1	11.9136 **	12.9279 **	12.5870 **	11.0064 **	1	-5.5452	-0.2715	19.1976	27.1487 **
2	3.2581	0.9117	4.5176	2.1587	2	8.8582	1.4272	22.7927 **	21.5464 **
3	2.9873	-1.3286	6.0009	7.2832	3	5.3474	5.3507	7.3647	5.5293
4	11.1111 **	8.4381	2.5240	3.8266	4	11.1726	9.3258	-6.7176	-7.1116
5	2.7494	1.7074	3.2421	5.0449	5	11.9106	19.1110	31.0257 **	20.8936 **
6	0.2997	-1.5018	3.8240	5.5039	6	-2.4224	-15.7739	9.8322	15.6416
7	2.4892	0.0774	2.8799	2.2796	7	-0.0479	-2.9301	2.2393	5.8939
8	-4.8257	-6.7211	7.6787	8.6264	8	1.6051	1.5659	18.1738	13.7567
9	-1.1641	1.3929	10.2307 *	10.7147 **	9	5.7030	-18.6392	-3.6054	-2.5424
10	-1.7632	-1.7427	10.9162 **	10.4071 **	10	-3.2060	-14.7551	-3.6958	1.0911

** indicates statistical significance at the 0.01 level

* indicates statistical significance at the 0.05 level

Table 3
Trade Descriptive Statistics

This table presents the characteristics of the 338 stocks listed on the Australian Securities Exchange included in the sample data from 29 November, 2004 to 29 November, 2006. This table is divided into trades in the periods of upgrades and trades in the periods of downgrades. Further, the table also reports trade characteristics of buy and sell trades separately, in addition to the combined statistics of all trades.

	Upgrades			Downgrades		
	All	Buy	Sell	All	Buy	Sell
Number of Trades	748,040	381,493	366,547	1,193,418	593,380	600,038
Dollar Volume (\$ Million)	26,443.9	13,688.9	12,755.0	42,186.3	20,776.8	21,409.5
Percentage of Volume (%)	100.00	51.77	48.25	100.00	49.25	50.75
Average Number of shares per trade	4,793	5,041	4,902	5,149	5,009	5,288
Median Number of shares per trade	1,281	1,300	1,250	1,422	1,410	1,430
Dollar volume per trade (\$)	35,351	35,882	34,798	35,349	35,014	35,680

Table 4
Aggregated Price Impact of Trades

This table presents the arithmetic average values (in per cent) of the three measures of price impacts (total, temporary and permanent price impact), classified by trades occurring after upgrade and downgrade recommendation changes. Additionally, these upgrade and downgrade periods are separated into first-level (one-step and two-steps) or second-level (three-steps or four-steps) change. The sample comprises all trades in 338 stocks listed on the Australian Securities Exchange from 29 November, 2004 to 29 November, 2006. The differences for upgrade periods for total and permanent price impact are calculated by subtracting the magnitude of sells from buys, and the difference for downgrade periods, calculated by subtracting buys from the magnitude of sells. The difference for upgrade periods for temporary price impact is calculated by subtracting the magnitude of buys from sells, and the difference for downgrade periods, calculated by subtracting sells from the magnitude of buys.

	<u>Total Price Impact (%)</u>			<u>Temporary Price Impact (%)</u>			<u>Permanent Price Impact (%)</u>		
	<u>Sell</u>	<u>Buy</u>	<u>Difference (%)</u>	<u>Sell</u>	<u>Buy</u>	<u>Difference (%)</u>	<u>Sell</u>	<u>Buy</u>	<u>Difference (%)</u>
First-Level Upgrade	-0.07118	0.07964	0.00846***	0.02956	-0.01914	0.01042***	-0.04172	0.06043	0.01871***
Second-Level Upgrade	-0.08185	0.14166	0.05981***	0.03332	-0.02502	0.00830***	-0.04867	0.11571	0.06704***
First-Level Downgrade	-0.08964	0.07145	0.01819***	0.01933	-0.03402	0.01469***	-0.07036	0.03741	0.03295***
Second-Level Downgrade	-0.18930	0.10088	0.08842***	-0.00288	-0.08617	0.08905***	-0.19245	0.01467	0.17778***

*** indicates statistical significance at the 0.01 level

** indicates statistical significance at the 0.05 level

* indicates statistical significance at the 0.1 level

Table 5
Regression Analysis of Permanent Price Impact

This table presents the regression analysis of permanent price impact of trades (measured in per cent) for all 748,040 trades executed after an upgrade recommendation release and 1,193,418 trades executed after a downgrade recommendation release using the following equation:

$$PPI = \alpha + \beta_1 Buy + \beta_2 Complexity + \beta_3 Cap + \beta_4 Volatility + \beta_5 Mkt Return + \beta_{6-10} Industry + \beta_{11} Analysts + \beta_{12} Reputation + \varepsilon,$$

where *PPI* is the permanent price impact as defined in Section 5.2.2; *Buy* takes the value of 1 for buy orders and 0 for sell orders; *Cap* refers to the natural logarithm of market capitalisation of the firm; *Complexity* is the natural logarithm of trade volume relative to the median trading volume; *Volatility* is the natural logarithm of difference for high and low daily price; *Mkt Return* is the market return measured by the All Ords Index; five *Industry* dummy variables take the value of 1 if the trades are respectively from Consumer, Financial, Healthcare, Industrials & Materials and Information Technology & Telecommunications. *Analysts* is the number of analysts that issued the revision and *Reputation* takes the value of 1 for reputable analysts and 0 for less reputable analysts (according to the East Coles Survey).

Regression Variables	Upgrade			Downgrade		
	All Orders	Buy	Sell	All Orders	Buy	Sell
Intercept	0.27800% ***	1.19800% ***	-0.56200% ***	-0.37400% ***	0.49700% ***	-1.35800% ***
Indicator for Buy/Sell Order	0.09415% ***			-0.10400% ***		
Complexity	0.00030% ***	0.00175% ***	-0.00119% ***	0.00012% **	0.00269% ***	-0.00037% ***
Market Capitalisation	-0.01417% ***	-0.04957% ***	0.02191% ***	0.01741% ***	-0.02083% ***	0.05550% ***
Volatility	0.00668% ***	0.02887% ***	-0.01489% ***	-0.01267% ***	0.01215% ***	-0.03630% ***
Market Return	66.524% ***	64.92% ***	66.727% ***	67.96% ***	71.26% ***	64.667% ***
Analysts	-0.00733% ***	-0.00764% ***	-0.00471% *	-0.00128%	0.00470% *	-0.00352%
Reputation	-0.00480% ***	-0.01639% ***	0.00446% **	0.00395% **	-0.00792% ***	0.01793% ***
Consumer	0.01532% ***	0.01147% ***	0.02060% ***	0.01023% ***	0.01405% ***	0.00878% **
Financials	0.03220% ***	0.04592% ***	0.02119% ***	-0.00961% ***	0.01930% ***	-0.03539% ***
Healthcare	0.03298% ***	0.02251% ***	0.04504% ***	0.02412% ***	0.01530% ***	0.02699% ***
Industrials & materials	0.02172% ***	0.02779% ***	0.01545% ***	0.00380% *	0.01512% ***	-0.00582% *
IT & Telecommunications	0.02712% ***	0.04417% ***	0.00834% ***	-0.03098% ***	0.01843% ***	-0.07087% ***
Adjusted R Squared	0.0376	0.0354	0.0283	0.0283	0.0195	0.0297

*** indicates statistical significance at the 0.01 level

** indicates statistical significance at the 0.05 level

* indicates statistical significance at the 0.1 level

Table 6
Regression Analysis of Total Price Impact

This table presents the regression analysis of total price impact of trades (measured in per cent) for all 748,040 trades executed after an upgrade recommendation release and 1,193,418 trades executed after a downgrade recommendation release using the following equation:

$$TPI = \alpha + \beta_1 Buy + \beta_2 Complexity + \beta_3 Cap + \beta_4 Volatility + \beta_5 Mkt Return + \beta_{6-10} Industry + \beta_{11} Analysts + \beta_{12} Reputation + \varepsilon,$$

where *TPI* is the total price impact as defined in Section 5.2.2; *Buy* takes the value of 1 for buy orders and 0 for sell orders; *Cap* refers to the natural logarithm of market capitalisation of the firm; *Complexity* is the natural logarithm of trade volume relative to the median trading volume; *Volatility* is the natural logarithm of difference for high and low daily price; *Mkt Return* is the market return measured by the All Ords Index; five *Industry* dummy variables take the value of 1 if the trades are respectively from Consumer, Financial, Healthcare, Industrials & Materials and Information Technology & Telecommunications. *Analysts* is the number of analysts that issued the revision and *Reputation* takes the value of 1 for reputable analysts and 0 for less reputable analysts (according to the East Coles Survey).

Regression Variables	Upgrade			Downgrade		
	All Orders	Buy	Sell	All Orders	Buy	Sell
Intercept	0.09556% ***	0.98800% ***	-0.68600% ***	-0.14700% ***	0.78600% ***	-1.24900% ***
Indicator for Buy/Sell Order	0.15300% ***			-0.17000% ***		
Complexity	0.00015% ***	0.00021% ***	0.00007%	0.00010% ***	0.00052% ***	0.00002%
Market Capitalisation	-0.00773% ***	-0.04136% ***	0.02801% ***	0.00967% ***	-0.03348% ***	0.05246% ***
Volatility	0.00355% ***	-0.00507% ***	0.01374% ***	-0.00904% ***	-0.01515% ***	-0.00514% ***
Market Return	31.950% ***	29.94% ***	30.570% ***	30.71% ***	30.74% ***	28.892% ***
Analysts	-0.00202%	-0.00424% **	0.00181%	-0.00363% **	0.00192%	-0.00592%
Reputation	-0.00079%	-0.01065% ***	0.00519% **	0.00285% **	-0.00696% ***	0.01582% ***
Consumer	0.00782% ***	0.00235%	0.01782% ***	0.00076%	0.00234%	0.00167%
Financials	0.01692% ***	0.00218% ***	0.00656% ***	-0.01115% ***	0.01716% ***	-0.03860% ***
Healthcare	0.02100% ***	0.00752% **	0.03633% ***	0.00888% ***	-0.00311%	0.01683% ***
Industrials & materials	0.01174% ***	0.01787% ***	0.00577% ***	-0.00314% *	0.53950% **	-0.01297% *
IT & Telecommunications	0.01535% ***	0.04637% ***	-0.01337% ***	-0.02649% ***	0.01278% ***	-0.06619% ***
Adjusted R Squared	0.0620	0.0335	0.0274	0.0557	0.0232	0.0326

*** indicates statistical significance at the 0.01 level

** indicates statistical significance at the 0.05 level

* indicates statistical significance at the 0.1 level

Table 7
Price Impact of Trades Pre- and Post- Analyst Recommendations

This table presents the total and permanent price impact of trades 10 days pre- and post-release of the 3842 recommendations. The table reports price impacts for sell over the 20-days in downgrade periods and buy over the 20-days in upgrade periods.

First-Level Downgrade			First-Level Upgrade		
Day	Total Price Impact	Permanent Price Impact	Day	Total Price Impact	Permanent Price Impact
-10	-0.07073	-0.03818	-10	0.07773	0.05075
-9	-0.07322	-0.05004	-9	0.07224	0.04782
-8	-0.06771	-0.03823	-8	0.06659	0.03854
-7	-0.06803	-0.04095	-7	0.07421	0.04461
-6	-0.07055	-0.04135	-6	0.07168	0.04508
-5	-0.07423	-0.04963	-5	0.07220	0.04906
-4	-0.07334	-0.04201	-4	0.07753	0.05472
-3	-0.08483	-0.05566	-3	0.08006	0.05508
-2	-0.09102	-0.07231	-2	0.07421	0.04892
-1	-0.08363	-0.06503	-1	0.07847	0.05895
1	-0.08710	-0.06508	1	0.07726	0.05783
2	-0.07402	-0.05069	2	0.07198	0.04904
3	-0.08080	-0.05367	3	0.07286	0.04921
4	-0.08138	-0.05072	4	0.08026	0.05935
5	-0.08171	-0.05634	5	0.07331	0.05301
6	-0.07228	-0.04695	6	0.07252	0.05159
7	-0.07664	-0.05557	7	0.07407	0.05103
8	-0.07234	-0.04838	8	0.07053	0.04828
9	-0.07432	-0.04588	9	0.07290	0.04704
10	-0.07262	-0.04249	10	0.07549	0.05414
Second-Level Downgrade			Second-Level Upgrade		
-10	-0.05243	0.04983	-10	0.14955	0.04755
-9	-0.12721	-0.09899	-9	0.16374	0.17662
-8	-0.07940	-0.00133	-8	0.15553	0.16164
-7	-0.13579	-0.15745	-7	0.17312	0.23942
-6	-0.07600	-0.05130	-6	0.13415	0.08349
-5	-0.11028	-0.09213	-5	0.14981	0.11426
-4	-0.13749	-0.13727	-4	0.09688	0.04884
-3	-0.11846	-0.06313	-3	0.13761	0.15185
-2	-0.14772	-0.16298	-2	0.15487	0.09681
-1	-0.15086	-0.14502	-1	0.20937	0.21501
1	-0.18613	-0.19450	1	0.12919	0.08269
2	-0.23359	-0.18738	2	0.04815	0.04652
3	-0.22979	-0.18802	3	0.06479	0.01943
4	-0.12201	-0.02757	4	0.13170	0.11577
5	-0.16295	-0.17687	5	0.03680	-0.14527
6	-0.27779	-0.37361	6	0.16527	0.16769
7	-0.17129	-0.17127	7	0.12765	0.11747
8	-0.10621	-0.10813	8	0.10842	0.09517
9	-0.17138	-0.19477	9	0.03634	0.02078
10	-0.05876	0.04654	10	0.12668	0.12764

Table 8
Number of Trades Broker-Matched to Recommendations

The following table presents the number of trades where broker identities for the trades are matched to brokers issuing the corresponding recommendation/revision. Panel A depicts the statistics for the pre-anonymity period [29 November, 2004 to 27 November, 2005] and panel B depicts the statistics for the post-anonymity period [28 November, 2005 to 29 November, 2006].

Panel A: Pre-Anonymity Broker-Matched Trades

	Sell	Buy
First-Level Upgrade	6,746	8,528
Second-Level Upgrade	51	7
First-Level Downgrade	9,508	7,976
Second-Level Downgrade	501	96

Panel B: Post-Anonymity Broker-Matched Trades

	Sell	Buy
First-Level Upgrade	11,172	12,184
Second-Level Upgrade	53	80
First-Level Downgrade	14,123	10,896
Second-Level Downgrade	97	30

Table 9**Total and Permanent Price Impact of Trades by Recommending Brokers and Other Brokers prior to Anonymous Markets**

This table presents the total and permanent price impact, calculated as per the equations stipulated in Section 2.2. Broker Matched reports price impact where broker IDs obtained from ASX trade data are matched to Broker Codes from I/B/E/S Recommendation data. Essentially, Broker Matched displays trades initiated by brokers who released the corresponding recommendation. Other Brokers are all other trades that are submitted not by the recommending brokers. Difference reports the difference in magnitude of price impact between broker matched and other brokers.

Total Price Impact

	Sell (%)			Buy (%)		
	Broker Matched	Other Brokers	Difference (%)	Broker Matched	Other Brokers	Difference (%)
First-Level Upgrade	-0.06883	-0.07706	-0.00823	0.08203	0.08284	-0.00081
Second-Level Upgrade	-0.01322	-0.04236	-0.02914	0.21630	0.10984	0.10646
First-Level Downgrade	-0.09880	-0.10271	-0.00391	0.05989	0.07433	-0.01445 ***
Second-Level Downgrade	-0.20583	-0.21467	-0.00884	0.02711	0.10436	-0.07724 *

Permanent Price Impact

	Sell (%)			Buy (%)		
	Broker Matched	Other Brokers	Difference (%)	Broker Matched	Other Brokers	Difference (%)
First-Level Upgrade	-0.04645	-0.04076	0.00569	0.08099	0.05935	0.02164
Second-Level Upgrade	-0.03409	0.00910	0.02499 *	-0.00295	0.09420	-0.09125
First-Level Downgrade	-0.06985	-0.07935	-0.00950	0.04259	0.03644	0.00615
Second-Level Downgrade	-0.21141	-0.120656	0.00485	-0.03797	0.00728	0.03069

*** indicates statistical significance at the 0.01 level

** indicates statistical significance at the 0.05 level

* indicates statistical significance at the 0.1 level

Table 10
Total and Permanent Price Impact of Trades by Recommending Brokers and Other Brokers in the Post-Anonymity Market

This table presents the total and permanent price impact, calculated as per the equations stipulated in Section 2.2. Broker Matched reports price impact where broker IDs obtained from ASX trade data are matched to Broker Codes from I/B/E/S Recommendation data. Essentially, Broker Matched displays trades initiated by brokers who released the corresponding recommendation. Other Brokers are all other trades that are submitted not by the recommending brokers. Difference reports the difference in magnitude of price impact between broker matched and other brokers.

Total Price Impact

	Sell (%)			Buy (%)		
	Broker Matched	Other Brokers	Difference (%)	Broker Matched	Other Brokers	Difference (%)
First-Level Upgrade	-0.06407	-0.07133	-0.00726**	0.07262	0.05909	-0.00348 *
Second-Level Upgrade	-0.01750	-0.13925	-0.12174**	0.07687	0.09915	0.01303
First-Level Downgrade	-0.07835	-0.08166	-0.00332	0.06990	0.04430	-0.00670 **
Second-Level Downgrade	-0.14695	-0.12016	0.02679	0.02855	-0.04175	0.00873

Permanent Price Impact

	Sell (%)			Buy (%)		
	Broker Matched	Other Brokers	Difference (%)	Broker Matched	Other Brokers	Difference (%)
First-Level Upgrade	-0.04671	-0.04199	0.00471	0.08100	0.06047	0.00526
Second-Level Upgrade	0.12964	-0.12912	0.00053*	0.10213	0.10384	-0.00877
First-Level Downgrade	-0.06366	-0.06342	0.00024	0.07903	0.04187	0.00548
Second-Level Downgrade	-0.29401	-0.13869	0.15532	0.05009	0.00833	0.07901

*** indicates statistical significance at the 0.01 level

** indicates statistical significance at the 0.05 level

* indicates statistical significance at the 0.1 level

Table 11
Total and Permanent Price Impact of Recommending Brokers in Pre-Anonymous and Post-Anonymous Markets

This table presents the total and permanent price impact calculated as per the equations stipulated in Section 2.2. Anonymous reports price impact for broker-matched trades in the pre-anonymous period of 29 November, 2004 to 27 November, 2005 and Post-Anonymous reports price impact for broker-matched trades in the post-anonymous period of 28 November, 2005 to 29 November, 2006. Difference reports the difference in magnitude between price impact in the pre-anonymous and post-anonymous periods.

Total Price Impact

	Sell (%)			Buy (%)		
	Pre-Anonymous	Post-Anonymous	Difference (%)	Pre-Anonymous	Post-Anonymous	Difference (%)
First-Level Upgrade	-0.06883	-0.06407	0.00476	0.08203	0.07707	0.00496
Second-Level Upgrade	-0.01322	-0.01750	-0.00428	0.21630	0.18471	0.03159
First-Level Downgrade	-0.09880	-0.07835	0.02045***	0.05989	0.06531	-0.00542
Second-Level Downgrade	-0.20583	-0.14695	0.05888	0.02711	0.13141	-0.10430*

Permanent Price Impact

	Sell (%)			Buy (%)		
	Pre-Anonymous	Post-Anonymous	Difference (%)	Pre-Anonymous	Post-Anonymous	Difference (%)
First-Level Upgrade	-0.04645	-0.04671	-0.00026	0.08099	0.06545	0.01554***
Second-Level Upgrade	0.03409	0.12964	-0.09555	-0.00295	0.12652	-0.12357
First-Level Downgrade	-0.06985	-0.06366	0.00619	0.04259	0.04362	-0.00103
Second-Level Downgrade	-0.21141	-0.29401	-0.08260	-0.03797	0.13098	-0.09301

*** indicates statistical significance at the 0.01 level

** indicates statistical significance at the 0.05 level

* indicates statistical significance at the 0.1 level

Table 12
Aggregated Price Impact of Trades [Pre- & Post-Benchmark Trades of 5 prior and 5 after]

This table presents the arithmetic average values (in per cent) of the three measures of price impacts (total, temporary and permanent price impact), classified by trades occurring after upgrade and downgrade recommendation changes. Additionally, these upgrade and downgrade periods are separated into first-level (one-step and two-steps) or second-level (three-steps or four-steps) changes. The sample comprises all trades in 338 stocks listed on the Australian Securities Exchange from 29 November, 2004 to 29 November, 2006. The differences for upgrade periods for total and permanent price impact are calculated by subtracting the magnitude of sells from buys, and the difference for downgrade periods, calculated by subtracting buys from the magnitude of sells. The difference for upgrade periods for temporary price impact is calculated by subtracting the magnitude of buys from sells, and the difference for downgrade periods, calculated by subtracting sells from the magnitude of buys.

	<u>Total Price Impact (%)</u>			<u>Temporary Price Impact (%)</u>			<u>Permanent Price Impact (%)</u>		
	Sell	Buy	Difference (%)	Sell	Buy	Difference (%)	Sell	Buy	Difference (%)
First-Level Upgrade	-0.06622	0.06875	0.00253 ***	0.02967	-0.02368	0.00599 ***	-0.03663	0.04501	0.00838 ***
Second-Level Upgrade	-0.07647	0.11626	0.03979 ***	0.02711	-0.02588	0.00124 ***	-0.04951	0.09017	0.04066 ***
First-Level Downgrade	-0.07577	0.06811	0.00766 ***	0.02498	-0.03278	0.00780 ***	-0.05086	0.03526	0.01560 ***
Second-Level Downgrade	-0.14065	0.11966	0.02099 ***	0.02171	-0.06711	0.04540 ***	-0.11916	0.05270	0.06646 ***

*** indicates statistical significance at the 0.01 level

** indicates statistical significance at the 0.05 level

* indicates statistical significance at the 0.1 level