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# **The Nature and Extent of use of *Twitter* for Financial Reporting by ASX Listed Companies: An Exploratory Study**

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## **Abstract**

We investigate the extent and nature of use of use of twitter for financial reporting by ASX listed companies. We consider 199 financial information related tweets from 14 ASX listed companies' Twitter accounts. A thematic analysis of these tweets shows 'Earnings' and 'Operational Performance' are the most discussed financial reporting themes. Further, a comparison across industry sectors reveals that listed companies from varies industries show different usage patterns of financial reporting on Twitter. The examination of tweet sentiments also indicates a reporting bias within these tweets, as listed companies are more willing to disclose positive financial reporting tweets.

## 1. Introduction

Financial reporting is an important aspect of today's business activity, as financial reporting notifies current and potential investors about the companies' financial performance (Healy and Palepu, 2001). Organisations use various corporate disclosure channels to communicate directly and indirectly with investors: financial reports, analyst ratings, online tool, market announcements and financial media. There is no specific requirement on the choice of communication channel in Australia (Australian Securities Exchange, 2013b). Regulators are, however, concerned about the content of financial disclosure, as well as the timeliness of such disclosure (Australian Securities Exchange, 2013a). In Australia, listed companies are required to report to the market operator (the Australian Stock Exchange) material price sensitive information, which is announced to the market prior to individual firm level disclosure (Australian Securities Exchange, 2013b). Material information means any company information that a reasonable person expects that such information will trigger a market reaction. This regulation encourages listed companies to disclose information in a fast, low cost and efficient manner to ensure compliance, and attract shareholders' attention.

Organisations now are leveraging information technology (IT) tools to provide up-to-date information to investors. For example, social media, a platform designed for user interaction, is gaining prominence. *Twitter*, which emphasises fast speed information transmission, is a new form of social media tool used to communicate financial information (Sprenger, Tumasjan, Sandner, and Welpe, 2014b). *Twitter* allows users to post information on their own *Twitter* page, re-post other users' content and even add their own comments when repost. *Twitter* includes "pushing service" feature, which means that if *Twitter* users follow a listed company's *Twitter* page, all the tweets that posted by this company will show up on *Twitter* users' *Twitter* page. These timely and low cost features of social media are very useful for financial reporting to investors. Traditionally, investors wait for the listed companies to upload their financial disclosure information such as annual reporting on their own website, or the ASX central information platform<sup>1</sup>. Nowadays, a shorter version of financial reporting content can be delivered to investors' *Twitter* accounts at nearly zero cost and almost

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<sup>1</sup> <http://www.asx.com.au/asx/statistics/todayAnns.do>

instantly. Such form of reporting is gaining momentum in Australia, as regulators acknowledge the adoption of Twitter in enhancing financial reporting information dissemination (Australian Securities Exchange, 2013a).

There has some research that focus on the content and sentiment of financial information on Twitter (Blankespoor, Miller, and White, 2014; Sprenger, Sandner, Tumasjan, and Welppe, 2014a). Sprenger *et al.* (2014a) examine all the tweets that contain the stock tick symbol. However, they did not discriminate between the tweets that were posted by listed companies and all others tweets. From our observation, listed companies are using Twitter to communicate with stakeholders. On the other side, there is a lack a lack of understanding regarding the exact content of financial reporting information on Twitter. Accordingly, a throughout insight into the practice of financial reporting on Twitter is essential, for maintaining a fair disclosure requirement as proposed by the Australian Securities Exchange (2013b). Therefore, in this paper we explore the characteristics of financial reporting on Twitter by ASX listed companies. Specifically, we address the following question in this research. *What are the nature and extent of financial reporting information on Twitter, which are disclosed by ASX listed companies?*

Using a sample of 24 ASX listed companies' Twitter accounts, we collect more than 4000 tweets, from which 199 financial information related tweets are identified after a thematic analysis process. These 199 tweets are further examined to identify the financial reporting themes. The results show that listed companies are interested in discussing 'Earnings' and 'Operational Performance' financial reporting themes. At the same time, listed companies also prefer to disclose more positive financial reporting tweets.

The rest of the paper progresses as follows. A literature review is presented, focusing on the role of financial reporting, as well as how the adoption of varies IT technologies facilitates communicating financial information. This is followed by a discussion current business uses of Twitter, especially in the field of corporate disclosure. We explain the results of this research and relevant contributions. The limitations of this study are reviewed and future research directions are presented.

## 2. Literature Review

Financial reporting is one of many types of corporate disclosure used to address information asymmetry and reduce agency costs<sup>2</sup> (Healy and Palepu, 2001). The agency relations arise from the principals (shareholders) delegating decision making powers to the agents (managers) (Jensen and Meckling, 1976). Due to this separation of ownership and control, Jensen and Meckling (1976) indicated that agency costs will arise when both the principals and agents pursue maximum benefits for their self-interests. As Healy and Palepu (2001) discussed, corporate disclosure reduces agency conflicts by allowing principals to monitor agents' resource management efforts and also provides more information for potential investors to achieve optimal allocation of savings into adequate investment opportunities. As corporate disclosure is essential in reducing information asymmetry, it is important to identify effective channels through which companies disclose corporate information.

Technological innovations provide opportunities to reduce the cost of disseminating company information and increase the supply and access of such information (Healy and Palepu, 2001). For example, corporate disclosure ranges from traditional annual reports on paper (Botosan, 1997) to business press coverage (Bushee, Core, Guay, and Hamm, 2010; Kothari, Li, and Short, 2009) and conference calls (Tasker, 1998). Information and Communication Technologies (ICT) have assisted in reducing the cost of corporate disclosure. More recently, ICT applications including Internet Financial Reporting (IFR) (Bui and Sankaran, 2009; Poon and Yu, 2012) and XBRL (Hodge, Kennedy, and Maines, 2004), facilitate the wide dissemination of company information. At present, social media is attracting financial traders because the information is transmitted at a fast pace and at a lower cost, and the richness of information is also enhanced (Bollen and Mao, 2011; Rao and Srivastava, 2012; Zhang, Fuehres, and Gloor, 2012).

Today, social media is shaping the corporate disclosure environment (Blankespoor *et al.*, 2014). Social media is considered as a Web 2.0 service tool, as it encourages users to not only obtain information from the Internet, but also produce information at the same time. Users of social media

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<sup>2</sup> As Jensen and Meckling (1976) states, agency costs include (1) the monitoring expenditures by the principal; (2) the bonding expenditures by the agent; (3) the residual loss.

can interact with other users on the Internet through various forms of discussion. As one of today's key communication tools in the social media era (Saeed and Sinnappan, 2011), *Twitter* allows users to produce and consume information through following other users or being followed, i.e. building up their own online community or network (Magro, Ryan, Sharp, and Ryan, 2009). Producing 140 characters each time within a post, *Twitter* has been used for many different purposes, including marketing, customer service, and financial reporting press release (Knights, 2007; Fraser, 2009; Blankespoor *et al.*, 2014). However, there is limited literature that examines the nature and extent of financial reporting information on *Twitter*. Therefore, a broader understanding of what companies are currently disclosing on this social media channel is warranted.

A key study using social media as data is provided by (Sprenger *et al.*, 2014a). During 2010, more than 400,000 S&P 500 stock-related *Twitter* messages were selected based on the stock tick symbol<sup>3</sup> to identify and understand the company-specific news flow. In this study, Sprenger *et al.* (2014a) develop a list of categories about these stock-related tweets. However, the mixture of financial reporting tweets from companies' *Twitter* accounts<sup>4</sup> and general market news from newswire service provider<sup>5</sup> presents a major challenge in this study. General market newswire service providers, such as 'Financial Review' and 'The Australian', are free to disclose corporate information on their newspaper website, as well as through social media channel. However, listed companies' disclosures are more strictly regulated (Australian Securities Exchange, 2013b). To be more specific, when a material information is leaked to the media, the listed company must show cause why such material information is not lodged with ASX as soon as possible (Australian Securities Exchange, 2013a). That is, listed companies essentially have a legal obligation to respond to rumours. In this case, it is important to separate the financial information that is published, written, or retweeted<sup>6</sup> by listed companies managed *Twitter* accounts. This research proposes to investigate the nature and extent of financial information that is disclosed by listed companies *Twitter* accounts.

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<sup>3</sup> "\$AAPL" for Apple Inc.

<sup>4</sup> Tweets that are disclosed by company's *Twitter* account, such as Commonwealth Bank of Australia (@CBA).

<sup>5</sup> Tweets that are disclosed by news agency's *Twitter* account, such as Financial Review (@FinancialReview).

<sup>6</sup> *Twitter* users can re-post other *Twitter* users' content, for example, if there is a *Twitter* post about the earning performance of Commonwealth Bank of Australia (CBA), CBA can retweet this *Twitter* post.

### **3. Research Methodology**

In this section, we describe the sample, final dataset and detail our methodology (see Table 1). This includes a description of the search of *Twitter* accounts and retrieval of tweets. Further, we discuss how we develop our own thematic analysis framework.

#### **3.1 Thematic analysis approach**

The aim of this study is to investigate the nature and extent of financial reporting information disclosed using *Twitter* by Australian listed companies. This exercise requires the researcher to read and analyse all existing financial reporting tweets. This process of tweet examination is described as thematic analysis, which involves pattern recognition and interpretation of financial reporting tweets (Boyatzis, 1998). In this study, we used the thematic analysis approach twice (see Table 1). The first thematic analysis is to reduce the number of final sampling tweets. The second thematic analysis is to examine the nature and extent of financial reporting tweets. For the first thematic analysis, a thematic analysis template (see Table 2) is constructed from a previous study (Case and King, 2011). We further develop a more comprehensive thematic analysis template (see Table 3) to categorise different types of corporate disclosure. A similar procedure is conducted for the second thematic analysis. A more comprehensive thematic analysis framework (see Table 4) is developed from the findings (See Table 5) in a previous study (Sprenger *et al.*, 2014a). These two newly developed frameworks (Table 3 and Table 4) serve as data management tools for identifying and organizing the data themes (Crabtree and Miller, 1999), and support the credibility of a study (Fereday and Muir-Cochrane, 2008).

#### **3.2 Data collection**

The data collection process involves the identification of listed companies *Twitter* accounts and financial information tweets collection.

The first step involves the identification of existing *Twitter* accounts that are promoted or created by Australian listed companies. Figures 1 illustrates the process of *Twitter* account identification. There are two approaches to identify the existing *Twitter* accounts. The first approach is to explore the listed

companies' webpages. These webpages are accessible through the ASX website (www.asx.com.au), as registered webpages under the company profiles of the corresponding listed companies. The company corporate webpages are then searched for the *Twitter* word or symbol, to denote a link to a corporate *Twitter* account. If there is no identifiable link to a corporate *Twitter* account, then a search of the *Twitter* platform itself is conducted for the full ASX listed business name (as above) in order to search for the corporate *Twitter* account.

The second step involves collecting historical tweets from these selected *Twitter* accounts. The most recent tweets (3200 max) from these *Twitter* accounts are generated and saved through a third-party service provider<sup>7</sup>.

### **3.3 Data Analysis**

The data analysis of this study constitutes 3 different steps. In the first step, the collected tweets are filtered to construct a smaller pool of sampling tweets. The focus of this study is to examine the nature and extent of financial reporting information disclosed by the Australian listed companies. Therefore, only financial reporting information is relevant. A data coding framework<sup>8</sup> is established to act as the filter (see Table 6 for detail). The use of this data coding framework acts as the filter, in order to reduce the number of sampling tweets, while retaining as many financial reporting tweets as possible.

The second step of this study is to apply thematic analysis to select the tweets that are communicating financial reporting information, from the smaller pool of sampling tweets developed from step 2. After the filtering process in step one, there remains a sub sample of tweets that are not directly disclosing financial information, even though these tweets contain keywords from the data coding framework. In this case, the thematic analysis assists in selecting the real financial reporting tweets. Based on the findings of Sprenger *et al.* (2014a), there are six major event categories during earning announcement dates, which constitute sixteen earnings events (see Table 5). Nine specific events are

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<sup>7</sup> Twimemachine.com is the third-party service provider that allows users to search the most recent 3200 *Twitter* posts of any *Twitter* accounts.

<sup>8</sup> This data coding framework is developed from a book about investment analysis (Vause, 2005). This book discusses what areas of financial reporting that investors should focus on, as well as further analyse company performance through the comparison of financial ratio. The data coding framework includes the term of financial ratio.



selected from the event categories established by Sprenger *et al.* (2014a), as these specific events could potentially move the market. Through the examination of financial reporting tweets from the ASX20 companies, six additional events are added to the existing event categories (see Table 4).

In the third step, the final sample of financial reporting tweets is examined, based on the thematic analysis framework as illustrated in Table 4. This examination reveals whether Australian listed companies show a preference in posting certain types of financial reporting information disclosed on *Twitter*, across various industry sectors.

#### **4. Results**

Results from data collection (see Table 7) indicate that 15 ASX 20 companies host 24 *Twitter* accounts that are accessible. Through the first and second step of data analysis, it reveals that 10 out of the 15 ASX 20 listed companies use *Twitter* for financial reporting on 14 *Twitter* accounts (some listed companies hold more than one *Twitter* accounts). We collected 4353 tweets from these 24 *Twitter* accounts, prior to November 2013. The use of filter reduces the tweet sample size to 312. Through manually thematic analysis and deleting tweets with repeated contents, the final tweet sample size is 199. These 199 tweets are posted by ASX 20 listed companies on *Twitter*, they contain financial keyword, and they are considered as financial information disclosure.

##### **4.1 The frequency of financial keywords within financial reporting tweets**

Figure 2 shows the frequency of financial keywords appearance in ASX 20 companies' *Twitter* accounts. There is frequent use of some keywords. For example, the most mentioned keyword 'Interest' has appeared for more than 45 times, which nearly double the second most mentioned keyword 'Profit'. This figure shows that 'Interest', 'Profit', 'Earnings', 'Sales' and 'Revenue' are among the frequent discussed category. There are a few potential explanations. First of all, 6 out of the 14 *Twitter* accounts in the sample belong to listed companies in the financial sectors. The thematic analysis reveals that listed companies in the financial sectors, especially banks, intend to disclose the change of the interest rate of their products, including mortgage and saving. In general, the frequently used keywords, including 'Profit', 'Revenue', and 'Earnings' show that listed companies consider

*Twitter* as an excellent channel for ‘Earnings’ related announcement. A further analysis of the financial reporting keywords frequency based on industry sectors will explain diverse disclosure patterns across industries in detail.

#### **4.2 The frequency of financial keywords across industry sectors**

Table 8 & Table 9 indicate that there are different focuses on using financial reporting keywords across industry sectors. For example, more than half of the tweets in Financials industry sectors discuss ‘Interest’. Whereas, listed companies in the Materials industry sectors are more interested in disclosing financial information related to ‘Assets’, ‘Share’ and ‘Stock’. In general, ‘Profit’ and ‘Revenue’ are the most mentioned keywords across different industries.

The use of financial reporting keywords provides early indication regarding the content of these financial reporting related tweets. However, it is difficult to confirm the type of financial reporting information that is disclosed on *Twitter*, merely based on the financial information keywords. Therefore, a thematic analysis is conducted to reveal the themes of financial information tweets.

#### **4.3 The frequency of financial themes within financial reporting tweets**

Figure 3 shows that ‘Earnings’, ‘Operational Performance’, ‘Changes of Interest Rate’, ‘Operational/Capital Income/Expenditure’ and ‘M&A’ are the most mentioned themes among financial reporting tweets. The most mentioned financial theme is ‘Earnings’, this is matching the relative high frequency appearance of the financial keyword ‘Earnings’ (see Figure 2). The financial themes ‘Earnings’ and ‘Operational Performance’ hold similar meanings as they promote listed companies’ financial healthiness. As discussed in previous section, a great number of tweets contain the keyword ‘Interest’. This is related to listed companies in the Financials industry, especially the banks. The results from Table 10 further confirm this argument, which show that 65% of tweets from Financials industry are related to ‘Change of Interest Rate/Bank’. In addition, firms in general are also interested in disclosing their actions in the financial market, such as ‘M&A’, ‘Issue New Capital’ and dividend policy on *Twitter*.

The above sample of banks publishing the news about interest rates indicates listed companies from distinct industry sectors may use *Twitter* for different types of financial reporting. Therefore, a further examination of financial reporting themes, based on industry sectors will expand our understanding on this issue.

#### **4.4 The frequency of financial reporting themes across industry sectors**

According to Table 10 and Table 11, 65% of tweets from Financials industry are related to ‘Change of Interest Rate/Bank’. This explains why more than 50% of financial reporting tweets from the Financials industry sectors include the keyword ‘Interest’. For the industry sectors of ‘Energy’, ‘Telecommunication Services’ and ‘Utilities’, ‘Earnings’ and ‘Operational Performance’ are frequently mentioned financial reporting themes. In contrast, listed companies in Materials industry sector see *Twitter* in a different way. Two listed companies in the Materials industry sector disclose ‘Operational/Capital Income and Expenditure’ and ‘Stock Related’ technical trading information, which constitutes more than 60% of total financial information tweets in their industry sectors. A potential explanation for this use pattern may due to the fact that Materials listed companies prefer to keep investors updated with their operational/capital business transaction and stock movement, rather than current earnings and operational performance.

The above findings further demonstrate the current use of *Twitter* as a corporate financial information reporting channel. However, are all these information unbiased, i.e., is all essential components of the listed companies’ financial situation disclosed? In this case, a review of the sentiments of these tweets is warranted.

#### **4.5 Sentiments of Tweets among themes**

According to Table 12, the numbers of neutral and positive sentiment tweets are similar. It is apparent that listed companies tend to disclose positive financial reporting information, over negative ones.

Table 13, Table 14 and Table 15 indicate the number of financial reporting tweets in different sentiments across five different industry sectors. We observe that ‘Operational Performance’ tweets

are nearly all positive, while the tweets about 'Change of Interest Rate/Bank' are all neutral. A tweet of 'Operational Performance' relates to the discussion about improvement of productivity or delay on projects. The high ratio of positive 'Operational Performance' tweets indicates that disclosing positive financial information on this theme is a widely spread phenomenon across various industry sectors. For tweets related to change of interest rate, it is difficult to define whether the increase or decrease of interest rate is good or bad thing for the banks. Therefore, most of the 'Change of Interest Rate/Bank' should be neutral. 'Earnings', 'Analyst Rating', 'Operation/Capital Income/Expenditure' and 'Give Out Dividend' are among the second highest positive sentiment group, range from 1 to 4, represented as the ratio of positive to neutral tweets. 'Analyst Rating' is the leading theme with the ratio as 4. This means that on average, listed companies disclose 4 positive sentiment 'Analyst Rating' related tweets, for every 1 neutral sentiment tweet related to 'Analyst Rating'. Furthermore, the themes of 'Market/Price settlement', 'Joint Venture', 'M&A' and 'Issue New Capital' are among the less positive sentiment tweets range. Listed companies tend to purely state the fact when they disclose information in these themes.

#### **4.6 Sentiments of Tweets among industry sectors**

According to Table 16, there are distinct ratios of positive financial reporting tweets from listed companies between Financials and Utilities. Even though there is only one *Twitter* account in the Utilities industry sector, the ratio of positive financial reporting is nearly five times more than the one in the Financials industry sector. On the other hand, we see a similar level of presence across Telecommunication Service, Materials and Energy industry sectors

The above 6 findings show different aspects of financial reporting on *Twitter*. It shows that listed companies in the ASX 20 are interested in disclosing earnings related financial reporting information on *Twitter*. Further, it also reveals that the high frequency of keyword does not necessarily mean that companies are disclosing financial reporting information linked to that keyword. For example, the high frequency of the keyword 'Interest' is not related to corporate debt interest; instead, it relates to the banks' announcement of interest rate change. On the other side, the investigation of tweet

sentiment present the fact that listed companies prefer to disclose positive financial reporting information on *Twitter* rather than negative ones, especially in the themes of ‘Earnings’ and ‘Operational Performance’.

## **5. Discussion**

The objective of this research is to explore the nature and extent of financial reporting information disclosed by ASX listed companies on Twitter. The above results indicate that Twitter is a developing financial reporting disclosure channel. During the sampling period, we captured 199 financial reporting related tweets. A detail analysis of these tweets reveals that listed companies from varies industry sectors hold different interests in the financial reporting themes. At the end, the sentiment of these tweets reports that listed companies are more willing to disclose positive information.

The results of this preliminary analysis reveal several discussion points. First, we confirm the current use of Twitter as a developing corporate disclosure channel. It contributes to the current literature of financial reporting on Twitter in Australian context. According to our knowledge, this is the first study to examine the nature and extent of financial reporting tweets distributed by ASX listed companies. This research maps out the current status of financial reporting disclosure on Twitter by ASX.

Second, this research explores the nature and extent of financial reporting tweets. It contributes a new thematic analysis framework, which is developed from a previous study (Sprenger *et al.*, 2014a), to the literature. This thematic analysis framework in basic on Australian data, yet it can be generalised to other developed capital market. In future studies, researchers can use this thematic analysis framework to categorise different types of financial reporting information. For industry professionals, firms that are currently using or planning to use Twitter for financial reporting can see their Twitter adoption status among their peers. More importantly, they can learn how to conduct financial reporting through the understanding of current practice by peer listed companies.

Third, this research presents that listed companies are especially interested in discussing a few specific financial reporting themes, including ‘Earnings’ and ‘Operational Performance’. Further, it

also reveals that listed companies tend to disclose positive financial reporting information instead of negative ones. Such findings add to the literature with further understanding of how listed company conduct financial reporting on Twitter. For regulators, such findings should raise alarm for regulators to investigate whether selective disclosure behaviour is presented in Twitter.

There are a few limitations of this research. First of all, we only examine 199 tweets out of 14 listed companies' Twitter accounts. There are more than 3000 companies listed on ASX, a broader sample with more listed companies' Twitter accounts will enhance the generalizability of our result. Second, the thematic analyses are conducted by us, instead of a machine. Two thematic analysis frameworks are developed as data management tools to ensure the consistency of our analysis procedure. However, it is still possible for us to accidentally miscategorise a few tweets. Third, all the tweets are collected prior to November 2013. The current financial reporting pattern on Twitter may change significantly nowadays.

Future research can focus on a few different aspects. For example, a future research with larger sample size and a more detailed thematic analysis framework will increase the validity and generalizability of results. On the other hand, researchers can look into the information dissemination process of financial reporting tweets and see if any parameters change during the communication process.

## **6. Conclusion**

The objective of this paper is to explore the nature and extent of financial reporting information that is posted by Australian listed companies on *Twitter*. This paper reveals a few financial keywords are especially popular among financial reporting tweets, including 'Earnings', 'Interest', 'Profit' and 'Sales'. This is corresponding to the fact that listed companies pose greater interest in disclosing 'Earnings Announcement', 'Operational/Capital Income/Expenditure' and 'M&A' news. At the end, this paper shows that listed companies are opting to disclose positive financial reporting information, rather than negative financial information. Previous literatures look into the general use of *Twitter* from diversified aspects, especially in the United States context. However, a comprehensive

examination of financial reporting tweets is missing. This research corresponds to such need. We develop an extensive thematic analysis framework of financial reporting information themes in *Twitter*. We examine the financial reporting tweets disclosed by ASX listed companies with this thematic analysis framework and produce the above results. Future study can rely on this thematic analysis framework to further explore the characteristics of financial reporting content on *Twitter*, with great number of sampling tweets and more listed companies from diverse industry sectors.

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## Tables and Figures

Table 1

Full procedure of data collection and data analysis

Stage 1 Data collection	
Step 1 Twitter identification	Identify Twitter account through listed companies web homepage or search www.twitter.com.
Step 2 Tweet collection	Collect the most updated 3200 tweets via www.twimemachine.com.
Stage 2 Data analysis	
Step 1 Tweet filtering	Filter the collected tweets, filter these tweets with established data coding framework.
Step 2 Thematic analysis of corporate disclosure themes of tweets	Analyse the types of corporate disclosure information that tweets are disclosing.
Step 3 Thematic analysis of financial reporting information of tweets	Analyse the types of financial reporting information that tweets are disclosing.

Table 2

Corporate disclosure themes from Case and King (2009)

News; Marketing/Promotions; Customer Service; Human Resources
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Table 3

Corporate Disclosure Themes

Tweet post themes	Definitions
1. Human Resource (Case & King 2011)	Changes in or new appointments of staff, as well as announcements related to companies' staff, such as receiving the award of "best mining team 2012". Also, this category includes the news that any staff give speech in public.
2. Customer Service (Case & King 2011)	@ another user, customer service related, such as answering inquiries or in a set of conversation threads
3. Corporate Promotion (Case & King 2011)	Promotion of products and services of listed companies.
4. Investor Relation (Heaps, 2009)	Company announcement that related to investor relation corporate announcement, such as the update of AGM and dividend policy (with no specific financial content).
5. Corporate Social Responsibility	Corporate social responsibility issues, such as companies donating money to charity, or becoming sponsors of the Olympic or aboriginal events

6. Market News	Announcement about markets, such as the change of central bank interest rate.
7. Event Tweet	Tweets that promote specific events of the companies, such as lucky draw for customers etc.
8. Financial Reporting	Specific Financial Reporting information, such as profit amount, dividend policy etc. This kind of financial reporting information directly shows the financial aspect of listed companies.
9. Potential Financial Reporting	Different from financial reporting information, potential financial reporting information do not directly indicate financial aspects of listed companies.
10. Company News (Case & King, 2010)	Corporate announcements that cannot be categorised in the above themes.
11. Meaningless Tweets and Retweets	Anything else that does not belong to the above seven themes, such as “Merry Christmas” or “Thank God it is Friday”.

Table 4  
Explanation of financial themes

	Themes	Explanation of themes
Financial	Earnings	News about earnings announcement, including profit.
	Analyst Rating	Tweets about the change of analyst rating/comments on firms' performance.
	Change of/Maintain Interest Rate	Banks announce their actions on the interest rates on their product, most likely after the interest rate review by the reserve bank.
	Dividend Distribution	The announcement of dividend or any discussion related to the dividend issue.
	Issue New Capital/Change of Capital	When company issue new shares or employee exercise share options.
	Operational/Capital Income Expenditure	When companies purchase or sell assets.
	Market/Price Settlement	Companies settle price with customers
	Award New Contract	New contract signed between companies and other stakeholders
	Others	Tweets that do not belong to the above themes
Operational	Operational Performance	Companies discuss company performance, such as an increase in productivity.
	Joint Venture	An announcement about the establishment of Joint Venture, or any news that is related to the Joint Venture.
	M&A (Merger & Acquisition)	Tweets discuss the merger and acquisition behaviour of companies.
Technic	Stock Related	Discussion/updates about the performance of companies' share price or share performance.
	Market Related	Discussion/updates about the performance of the stock market in general.

Table 5  
Financial reporting themes from Sprenger et al (2014)

Event Category	Event Detail
Corporate Governance	CEO
	Other Executive
Financial Issues	Earnings
	Analyst Rating
	Financial Other
Operations	Labor Issues
	Product Development
	Operational Performance
	Marketing
	Contract
Restructuring Issues	Joint Venture
	M&A
Legal Issues	Jurisdiction
	Government Authorities
Technical Trading	Stock Related
	Market Related

Table 6  
Data coding framework developed from Vause (2005)

Assets; Accruals; Cash; Cash Flow; Capital; Dividends; Cost; Debt; Equity; Earnings; Employee; Expenditure; (Expense); Interest; Inventory; Liabilities; Margin; Price; Profit; Remuneration; Receivable; Revenue; Return; Salary; Sales; Share; (Stock); Tax; Wage;

Table 7  
Sample Statistics

Firm Level	No. of Firms	No. of Twitter Accounts	No. of Tweets
ASX 20	20	N/A	N/A
Firms with Twitter Accounts	15	24	4353
Firms with Twitter accounts that disclose financial reporting information	10	14	1051
Final sample	8	9	199

Table 8  
Frequency ratios of financial reporting keywords across industry sectors (Part I)

Industry Sectors	No. of Twitter Accounts	Keywords								
		Assets	Cash	Cash Flow	Capital	Dividends	Cost	Debt	Equity	Earnings
Energy	2	3.45%	0.00%	3.45%	5.17%	0.00%	3.45%	0.00%	<b>12.84%</b>	3.45%
Financials	6	0.00%	0.44%	0.00%	0.44%	2.80%	0.00%	<b>16.67%</b>	0.00%	0.88%
Materials	3	<b>10.96%</b>	5.15%	4.97%	4.71%	3.65%	6.54%	5.74%	0.44%	7.27%
Telecommunication Services	2	0.00%	0.00%	0.00%	0.00%	8.82%	0.00%	0.00%	0.00%	2.94%
Utilities	1	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%

Table 9  
Frequency ratios of financial reporting keywords across industry sectors (Part II)

Industry Sectors	No. of Twitter Accounts	Keywords									
		Expenditure	Interest	Price	Profit	Revenue	Return	Sales	Share	Stock	Tax
Energy	2	1.72%	6.90%	3.45%	<b>34.29%</b>	<b>29.31%</b>	0.00%	36.97%	1.72%	1.72%	5.56%
Financials	6	0.00%	<b>56.52%</b>	0.00%	<b>11.13%</b>	0.44%	1.92%	0.44%	0.00%	0.00%	8.33%
Materials	3	2.52%	1.75%	4.53%	2.52%	1.39%	0.88%	6.36%	<b>9.76%</b>	<b>16.67%</b>	4.17%
Telecommunication Services	2	0.00%	0.00%	0.00%	36.76%	30.88%	2.94%	2.94%	<b>8.82%</b>	0.00%	5.88%
Utilities	1	0.00%	0.00%	0.00%	<b>100.00%</b>	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%

Table 10

## Frequency of Financial Reporting Themes in Financial Information Tweet (Part I)

Industry Sectors	No. of Twitter Accounts	Financial Issues					
		Earnings	Analyst Rating	Change of Interest Rate/Bank	Give out Dividend	Issue New Capital	Operation/ Capital Income/Expenditure
Energy	2	32%	0%	1%	0%	6%	6%
Financials	6	6%	10%	65%	3%	12%	0%
Materials	3	8%	0%	4%	6%	3%	27%
Telecommunication Services	2	48%	0%	0%	15%	0%	4%
Utilities	1	50%	0%	0%	0%	0%	0%

Table 11

## Frequency of Financial Reporting Themes in Financial Information Tweet (Part II)

Industry Sectors	No. of Twitter Accounts	Financial Issues		Operations	Restructuring Issues		Technical Trading
		Market/Price Settlement	Others	Operational Performance	Joint Venture	M&A	Stock Related
Energy	2	0%	0%	26%	1%	27%	1%
Financials	6	0%	0%	2%	0%	0%	1%
Materials	3	0%	0%	8%	1%	7%	36%
Telecommunication Services	2	0%	0%	33%	0%	0%	0%
Utilities	1	0%	0%	50%	0%	0%	0%

Table 12

## Sentiment Distribution of Selected Twitter Accounts

Industry Sectors (No. of Twitter accounts)	No. of Tweets in Each Sentiment			Total
	-1 (Negative)	0 (Neutral)	1 (Positive)	
Financials (6)	0	46	12	58
Telecommunication Services (3)	0	4	6	10
Materials (4)	1	40	45	86
Energy (3)	0	14	30	44
Utilities (1)	0	0	1	1
Total (14)	1	104	94	199

Table 13

Tweet sentiment distribution among financial reporting themes by industry sectors (Part I)

Industry Sectors	Financial Issues											
	Earnings			Analyst Rating			Change of Interest Rate/Bank			Give out Dividend		
	-1	0	1	-1	0	1	-1	0	1	-1	0	1
Financials (6)		2	10			1		36			1	3
Telecommunication Services (3)		2	5							3	1	
Materials (4)	1	7	15							1	5	
Energy (3)		1	8		1	3						
Utilities (1)			1									
Total (14)	1	12	39		1	4		36		5	9	
Ratio (Positive/Neutral)			<b>3.25</b>			<b>4</b>			N/A			1.8

Table 14

Tweet sentiment distribution among financial reporting themes by industry sectors (Part II)

Industry Sectors	Financial Issues						Operations		
	Issue New Capital		Operation/Capital Income/Expenditure			Market/Price Settlement		Operational Performance	
	-1	0	1	-1	0	1	-1	0	1
Financials (6)		5	1					1	3
Telecommunication Services (3)					1				2
Materials (4)		4	3		11	20	2	1	16
Energy (3)		1			1	5			22
Utilities (1)									1
Total (14)		10	4		13	25	2	2	44
Ratio (Positive/Neutral)			0.4			1.92		N/A	22

Table 15

Tweet sentiment distribution among financial reporting themes by industry sectors (Part III)

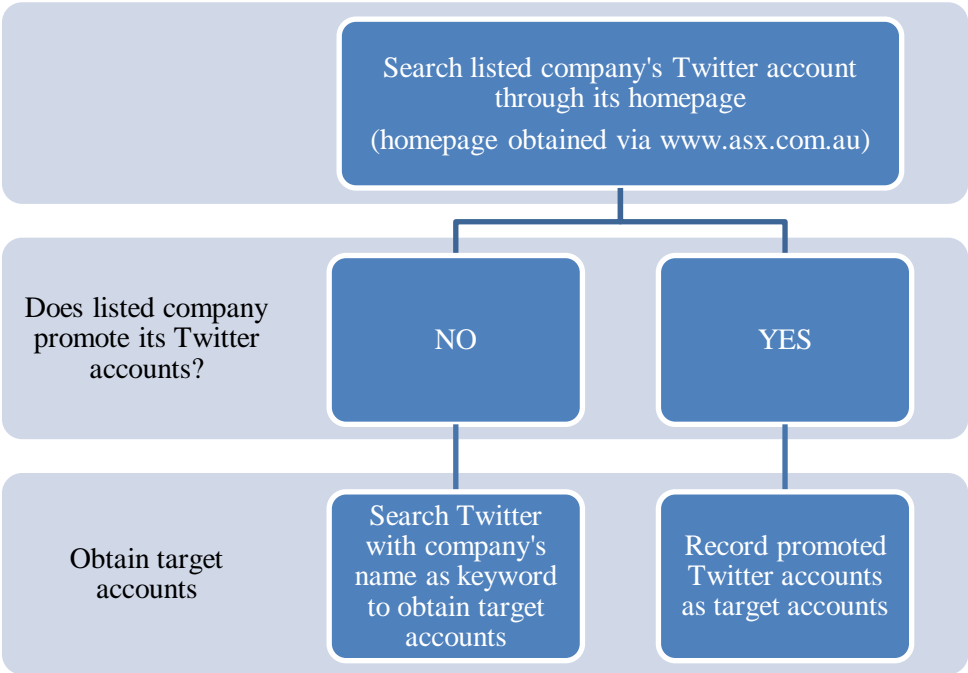
Industry Sectors	Restructuring Issues			Restructuring Issues			Technical Trading		
	Joint Venture			M&A			Stock Related		
	-1	0	1	-1	0	1	-1	0	1
Financials (6)					1			2	
Telecommunication Services (3)									
Materials (4)		1			12	2		4	1
Energy (3)		1			4				5
Utilities (1)									
Total (14)		2			17	2		6	6
Ratio (Positive/Neutral)				N/A			0.12		1



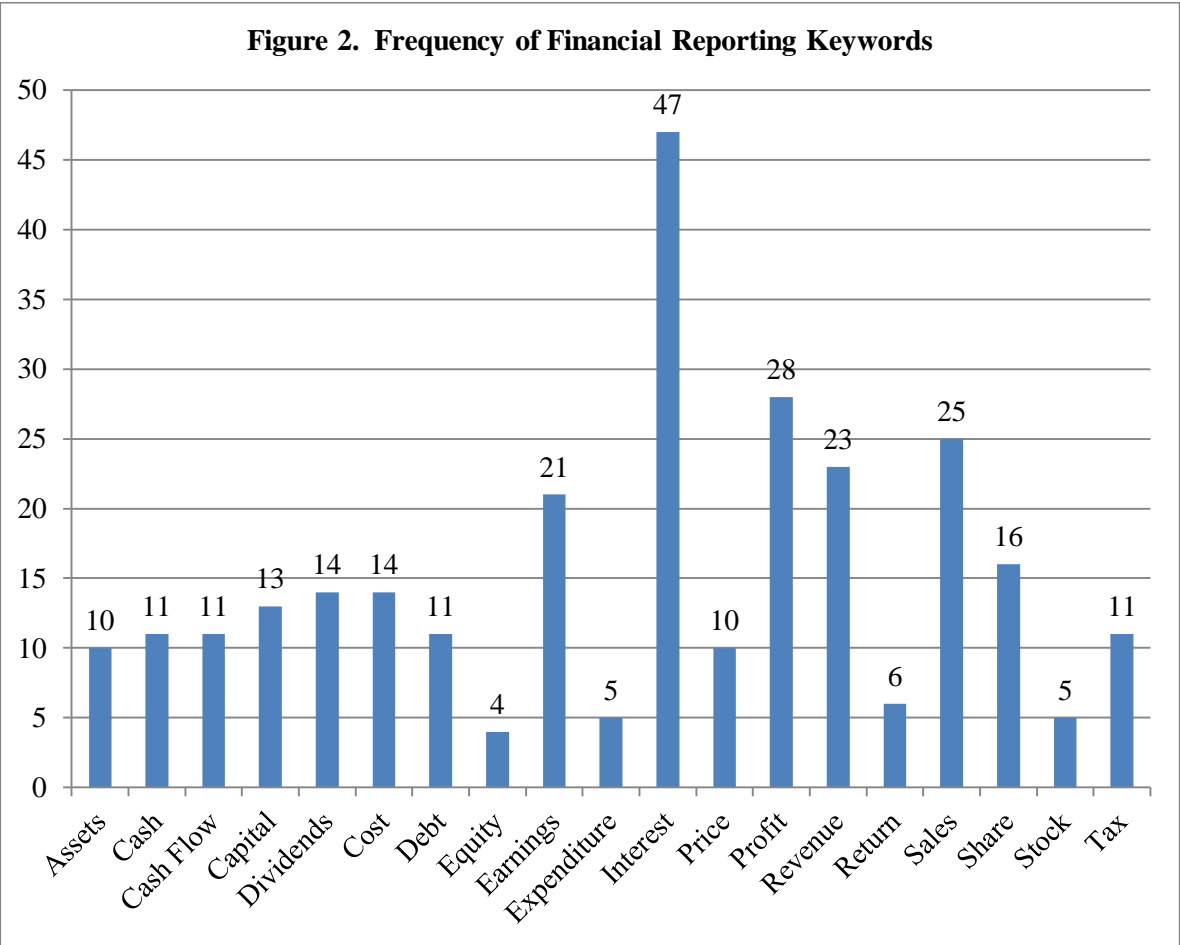
Table 16  
Sentiment ratios comparison across industry sectors

Industry Sectors (No. of Twitter accounts)	Ratios of tweet sentiment over total financial reporting tweets			Total
	-1 (Negative)	0 (Neutral)	1 (Positive)	
Financials (6)	0	79.3%	20.69%	58
Telecommunication Services (3)	0	40%	60%	10
Materials (4)	1	46.5%	52.3%	86
Energy (3)	0	31.8%	68.2%	44
Utilities (1)	0	0	100%	1
Total (14)	1	104	94	199

**Figure 1. Twitter account identification process**



**Figure 2. Frequency of Financial Reporting Keywords**



**Figure 3. Frequency of Financial Reporting Themes**

