What Causes the Target Stock Price Run-Up Prior to M&A Announcements?

Zhenyang Tang
Clark University

Xiaowei Xu
University of Rhode Island

We investigate the target stock price run-up prior to M&A announcements between 1981 and 2011. About one third of the total price run-up occurs before announcements, and the pre-announcement run-up does not seem to be caused by market anticipation of M&As, toehold acquisitions or reported insider trading. Instead, the pre-announcement run-up is significantly larger when media attention on insider trading is lower, when institutional ownership is lower, and when probability of informed trading is higher. The findings are consistent with the view that the target stock price run-up prior to M&A announcements is caused by unreported insider trading.

INTRODUCTION

Target firms usually experience dramatic stock price run-up when they are acquired. However, a great portion of the run-up occurs prior to M&A announcements. Keown and Pinkerton (1981) find that stock prices react to future mergers about one month before announcements; Halpern (1973) and Mandelker (1974) find the price run-up may start several months before M&A announcements. The pre-announcement run-up is significant and is often accompanied by abnormal trading volumes; not surprisingly, it draws suspicion towards illegal insider trading. The 2012 Nexen insider trading case is a good example, where several traders from Asia are accused of buying Nexen shares before an acquisition announcement which resulted in a 50% stock price increase.

Some researchers argue that the pre-announcement run-up is a proxy for illegal insider trading (Keown and Pinkerton, 1981; Bris, 2005; Beny and Seyhun, 2012). A study by Bhattacharya et al. (2000) finds that in some developing countries, insider trading makes significant pre-announcement abnormal returns and leaves no significant post-announcement abnormal returns. The argument is consistent with Meulbroek (1992) and Cornell and Sirri (1992) who find that illegal insider trading significantly moves stock prices. On the other hand, some researchers argue the pre-announcement run-up is not necessarily an outcome of illegal insider trading. In an efficient market for corporate control, takeovers can be anticipated by sophisticated investors. Besides, toehold acquisitions before M&A announcements may also be the reason for the pre-announcement run-up (Mikkelson and Ruback, 1985; Choi, 1991). Jarrell and Poulsen (1989) find the pre-announcement run-up is associated with prevailing rumors and toe-hold acquisitions. Sanders and Zdanowicz (1992) argue the run-up may simply be a measurement error; once the announcement dates are corrected, the pre-announcement run-up becomes insignificant. King (2009)

finds that the price-volume dynamics before M&A announcements are more consistent with market anticipation hypothesis rather than insider trading hypothesis.

This paper aims to provide a comprehensive study on what causes the target stock price run-up before M&A announcements. The findings do not support the views that the run-up is caused by market anticipation, toehold acquisition or reported insider trading; instead, the run-up is strongly associated with proxies of unreported insider trading. The pre-announcement price run-up is significantly greater when media attention on insider trading is lower, when institutional ownership is lower, and when probability of informed trading (PIN) is higher. Overall, the findings suggest that pre-announcement run-ups are mainly caused by non-corporate insiders not subject to SEC reporting requirements.

The paper contributes to the literature by documenting associations between the target price run-up before M&A announcements and measures of unreported insider trading. The economic and policy implications are important. Target stock price run-up before M&A announcements makes acquisitions much more expensive and imposes significant transaction costs to the market for corporate control[1]. If the run-up is caused by illegal insider traders, more stringent laws on illegal insider trading may mitigate transaction costs in the market for corporate control and lead to better corporate governance. The magnitude of the pre-announcement run-up may also motivate insiders to enact acquisition barriers to exploit more profits, which may eventually lead to poor corporate governance.

The rest of the paper is organized as follows. Section 2 describes the target stock price run-up prior to M&A announcements and the competing hypotheses explaining the run-up. Section 3 describes the data. Section 4 presents empirical results. Section 5 concludes.

THE PRE-ANNOUNCEMENT PRICE RUN-UP

The target stock price run-up before M&A announcements has been documented in many previous studies[2], along with changes in volume and price volatility[3]. Such price-volume anomaly often results in trading halts and investigations, and sometimes insider trading lawsuits[4]. Though many people suspect unreported illegal insider trading as the reason behind the price run-up, it is extremely difficult to detect unreported trades and confirm the suspicion.

Insider trading nowadays has gone beyond its original concept. Any person trading on material non-public information may be accused of insider trading, even though he or she is not a corporate insider subject to SEC filing requirements. The infamous case of Ivan Boesky is one such example: though Boesky was not a corporate insider of the stocks he traded, he was accused of illegal insider trading for receiving tips and trading on private information. There are many traders like Boesky, from big hedge funds to individuals, who are not subject to SEC filing requirements and may trade on inside information secretly. While corporate insiders are found to abstain from trading before M&A activities[5], unreported insider trading is more likely to come into play and move prices prior to announcements.

On the other hand, a pre-announcement run-up is not necessarily caused by insider trades. In a mature and efficient market for corporate control, sophisticated investors might be able to figure out potential M&A targets. Those potential targets' stock prices may experience pre-announcement run-up due to takeover speculation. For example, fast-growing and cash-rich companies like Apple and Google are often linked to smaller firms in a certain industry with acquisition rumors. Some analysts also predict M&As in their reports based on price levels and strategic considerations. If an acquisition is successfully predicted by the market, a pre-announcement price run-up may be interpreted as a proof of market efficiency rather than an outcome of insider trading.

Investors may also anticipate an acquisition when the potential target is trading at a low price. In an extreme case, a financially distressed firm may actively seek a buyer, which makes the acquisition no secret at all. Many of such firms spend a long time to seal a deal, but some deals are done in less than a month. Therefore, the price run-up before the final announcement may not be a surprise.

Some researchers argue that the pre-announcement run-up is a result of toehold acquisitions (Mikkelson and Ruback, 1985; Choi, 1991). According to SEC Schedule 13D requirements, a bidder may start cumulating stakes long before a takeover is announced. Though Schedule 13D requires that a bidder

must update 13D filings when her ownership passes the 5% threshold, there is still a gap of up to ten days before a filing must be made. The toehold acquisition explanation could overlap with the market anticipation explanation because the market could anticipate a takeover once investors learn that a potential bidder is acquiring a toehold. Therefore, the run-up before M&A announcements may also be driven by toehold acquisitions rather than unreported insider trading.

It is worth noting that we do not consider "rumors" as a separate explanation. Based on the news search on Factiva, rumors usually follow existing abnormal price movements or other signs of insider trading (such as trading halts). This makes sense because insiders have no incentive to spread information to other investors at the risk of being sued, and most of the rumors are probably born after abnormal trading activities are observed. Besides, rumors do not always lead to positive abnormal returns. Pound and Zeckhauser (1990) report trading on takeover rumors in a Wall Street Journal column "Heard on the Street" do not yield positive returns, and rumors often come after price run-ups[6]. As a result, we consider rumors as byproducts of the pre-announcement price run-up, rather than what causes the run-up.

A branch of literature focuses on reported insider trading before M&As, but the findings are in general weak[7] as corporate insiders appear to refrain from trading before takeovers. This is probably because corporate insiders are under strict scrutiny particularly around M&As, and they are unlikely to file abnormal trades just before M&A announcements. However, unreported insider trades elude eyes of the general public as non-corporate insiders are not always subject to insider filings. Unreported insider trading is involved in many of the most infamous insider trading scandals including the Boesky case and the recent Galleon case. Under some circumstances, corporate insiders may intentionally seek to hide their trades and avoid reporting their trades to the SEC (see Berkman et al. 2014).

While it is not possible to directly observe unreported insider trades, we employ an indirect approach. We first hypothesize that unreported insider trading is negatively associated with media attention on insider trading. Barber and Odean (2008) find the buying behavior of individual and institutional investors is affected by news; for illegal insider trading, the story is slightly different. When public attention towards insider trading is high, illegal insider trades are more likely to get caught and thus are more costly. When public attention is low, insiders may become audacious with their illegal trading activities. The second proxy for unreported insider trading is institutional ownership. We hypothesize that unreported insider trading is negative associated with institutional ownership. Fidrmuc et al. (2006) find the monitoring effect of blockholders reduce insider trading informativeness; the monitoring role of institutional owners may help reduce unreported insider trading prior to M&A announcements. The third measure of unreported insider trading is the probability of informed trading (PIN) defined in Easley et al. (2002). Unreported insider trading is a kind of informed trading and should be included in *PIN*; therefore, the intensity of unreported insider trading should be positively associated with *PIN*.

DATA

We obtain a sample of 22,920 M&A events from Thomson SDC Platinum after cleaning out non-M&A corporate deals8. The sample is then merged with CRSP and COMPUSTAT for stock data and accounting data, and the final sample size is 10,202. Most of the M&As are done by US domestic acquirers, though we also have 1,378 foreign acquirers in the sample. Consistent with other studies, only a small percentage of our events are hostile M&As; the majority are friendly or neutral M&As. Sample description is reported in Table 1.

To measure the pre-announcement run-up, we estimate the 30-day cumulated abnormal returns (CAR) before M&A announcements for all events in the sample. Beta is estimated using a market model over a one-year window ending two months before the M&A announcement ([t-295, t-45]). The market return is approximated by S&P 500 index return but the results are robust to other market returns. Consistent with Keown and Pinkerton (1981), positive price reactions are detected up to 30 days before announcements, which gradually increase all the way to the event announcement day. Panel A of Table 2 reports abnormal returns from day t-10 to day t-1, along with cumulated abnormal returns of several representative windows. As can be seen in the table, prices start to react to future M&A events as early as

30 trading days prior to M&A announcements. From ten trading days before announcements, abnormal returns become significantly positive on a daily basis, and the magnitude increases all the way to the announcement day. The pre-announcement run-up is about 5.2% in window [-30, -1], and is as large as 4.8% in a shorter window of [-20, -1]. Compared to the post-announcement of 10.5%, the pre-announcement run-up represents more than one third of the total market reaction to M&A announcements. In this paper, we use CAR[-30, -1] as the main measure of pre-announcement run-up; however, the results are largely the same if other event windows are used.

TABLE 1
SAMPLE DESCRIPTION

			Obs
US M&A activities from 1981 to 2011			22920
with available CRSP data to calculate CAR			11918
with available COMPUSTAT data			10202
Final Sample Size:			10202
Sample by Attitude and Bidder Location			
	Domestic Bidder	Foreign Bidder	Total
Friendly	5,839	1,027	6,866
Hostile	337	36	373
Neutral	2,236	284	2,520
Other	412	31	443
Total	8,824	1,378	10,202

TABLE 2
PRE-ANNOUNCEMENT PRICE RUN-UPS

	Mean	*Std. Dev.*	*Min*	*Max*	*t*
		Panel A. Sample			
CAR[-30, -21]	0.415***	12.466	-99.184	131.298	3.364
CAR[-20, -11]	1.141***	13.296	-110.580	201.334	8.667
AR[-10]	0.096**	4.955	-48.630	89.038	1.962
AR[-9]	0.091*	5.190	-76.100	100.522	1.762
AR[-8]	0.257***	5.083	-59.182	132.438	5.102
AR[-7]	0.299***	4.749	-44.461	99.750	6.358
AR[-6]	0.244***	4.829	-55.787	69.853	5.106
AR[-5]	0.241***	5.087	-60.600	72.247	4.782
AR[-4]	0.345***	5.144	-61.985	89.021	6.765
AR[-3]	0.427***	5.698	-51.648	112.340	7.572
AR[-2]	0.566***	5.594	-38.708	99.970	10.212
AR[-1]	1.105***	6.224	-48.603	107.243	17.938
CAR[-30, -1]	5.226***	23.656	-172.394	256.911	22.315
CAR[0, 5]	10.572***	21.977	-99.459	434.722	48.429

		Panel B. Match Firms			
CAR[-30, -21]	-0.132	9.736	-133.253	113.791	-1.578
CAR[-20, -11]	-0.165*	10.413	-161.672	205.578	-1.840
AR[-10]	-0.020	4.366	-36.742	188.963	-0.527
AR[-9]	-0.060	4.519	-61.477	127.088	-1.546
AR[-8]	0.077*	5.013	-53.443	189.080	1.789
AR[-7]	0.099**	5.009	-38.423	231.981	2.307
AR[-6]	-0.022	4.589	-41.445	189.229	-0.554
AR[-5]	-0.106***	4.188	-62.438	126.785	-2.926
AR[-4]	-0.002	4.469	-56.816	189.304	-0.049
AR[-3]	0.032	4.101	-33.772	126.715	0.908
AR[-2]	0.005	4.269	-47.047	189.586	0.146
AR[-1]	-0.003	4.239	-56.504	126.623	-0.070
CAR[-30, -1]	-0.297**	16.285	-185.785	274.502	-2.116
CAR[0, 5]	-0.179**	8.781	-83.179	275.080	-2.367

Thomson SDC provides details of the deals, including target attitude, acquirer location, percentage of shares owned by acquirers before the deals, and payment form (i.e., how many percentage of the payments are made in cash). We take advantage of the information and include a list of control variables that are likely to affect the pre-announcement run-up. Tobin's Q ratio (*TBQ* hereafter) is defined as total assets minus book value of common equity plus market value of shares outstanding at the end of the fiscal year, and then scaled by total assets. This Q approximation is also used Baker et al. (2003). *SIZE* is defined as the log value of total assets. We define *FRIENDLY* as a dummy variable which equals 1 if target attitude is marked "friendly" and 0 if otherwise. A friendly deal is more likely to be pre-negotiated and is exposed to more insiders, while a neutral or hostile deal may be more sudden to targets. Therefore, *FRIENDLY* is hypothesized to have a positive association with pre-announcement run-up. *FOREIGN* is a dummy variable which equals 1 if the acquirer is a foreign firm. A target in an international deal is less likely to expect the acquisition and may have lower pre-announcement run-up compared to targets in domestic deals. *BEFPCT* is defined as the percentage of shares owned by the acquirer before the announcement. When acquirers own a large percentage of shares before acquisitions, other investors are more likely to anticipate the acquisition; as a result, *BEFPCT* is negatively associated with the pre-announcement run-up. *CASH* is a dummy variable which takes value of 1 if the deal is all paid in cash, and 0 if otherwise. If a deal is paid in 100% cash, the acquirer may cash rich prior to the acquisition and it is more likely for investors to anticipate the acquisition.

As introduced in Section 2, we use three variables as indirect measures of unreported insider trading: news about insider trading (*IT_NEWS*), institutional holdings (*INST*), and probability of informed insider trading (*PIN*). For each month we search news articles with keywords "insider trading" or "insider trade"[9] on Factiva and *IT_NEWS* is defined as the monthly number of news articles we found. Most of those articles are about illegal insider trading scandals and trials, and the number of these articles could be a measure of public attention on illegal insider trading. The more news articles there are, the higher media attention on insider trading is and the more aware insiders may become of the risks in their opportunistic trading. As a result, higher media attention may be associated with a lower pre-announcement run-up, if the run-up is caused by unreported insider trading. Institutional holdings data is obtained from Thomson 13F database, and is defined as the percentage of reported 13F ownership at the end of the year. Firms with high institutional ownership are usually larger and more closely watched by other investors and SEC, and are thus less likely to have illegal pre-announcement trading; besides, firms with higher institutional ownership are usually better monitored and have better governance, which could potentially

limit the profitability and intensity of insider trading (Fidrmuc et al., 2006). Consequently, *INST* should have a negative association with the pre-announcement run-up if unreported insider trading causes the pre-announcement run-up. *PIN* is the probability of informed trading as estimated in Easley et al. (2002). If the pre-announcement run-up is driven by unreported insider trading, the run-up should be greater in firms with higher probability of informed trading. The *PIN* data from 1983 - 2001 is downloaded from Dr. Hvidkjaer's website.

We winsorize all continuous variables by 1% to eliminate outliers. The variables are reported in Table 3. Panel A reports summary statistics of variables, and Panel B reports the correlation matrix. Since *PIN* data is only available from 1983 – 2001, only a small portion of observations have available *PIN*. The pre-announcement run-up measure CAR[-30, -1] is significantly correlated with many of the variables as hypothesized. Other CAR measures are highly correlated with CAR[-30, -1] and using other event windows do not change the results.

TABLE 3
DESCRIPTION STATISTICS AND CORRELATION

Panel A. Variable Descriptive Statistics

	Obs	*Mean*	*Std. Dev.*	*Min*	*Max*
SIZE	10202	5.539	1.960	1.399	10.632
TBQ	10179	1.623	1.373	0.548	9.837
IT_NEWS (in hundreds)	9541	0.449	0.471	0.000	3.850
INST (%)	9367	35.029	28.661	0.117	100.00
PIN	3456	0.218	0.074	0.024	0.761
FRIENDLY	10202	0.673	0.469	0.000	1.000
FOREIGN	10202	0.135	0.342	0.000	1.000
BEFPCT (%)	7398	5.694	14.859	-0.050	99.680
CASH	10202	0.473	0.499	0.000	1.000

Panel B. Correlation

	CAR [-30, -1]	*SIZE*	*TBQ*	*IT_NEWS*	*INST*	*PIN*	*FRIENDLY*	*FOREIGN*	*BEFPCT*
SIZE	-0.053								
TBQ	-0.037	-0.311							
IT_NEWS	-0.037	0.119	0.017						
INST	-0.089	0.430	-0.028	0.150					
PIN	0.022	-0.456	-0.145	-0.176	-0.143				
FRIENDLY	0.072	0.009	0.041	0.270	-0.129	-0.070			
FOREIGN	0.018	-0.022	0.057	0.039	-0.028	-0.035	0.089		
BEFPCT	-0.029	-0.022	-0.036	-0.053	-0.082	0.148	-0.011	0.012	
CASH	-0.043	-0.070	-0.057	-0.123	0.060	0.147	-0.462	-0.003	0.104

MAIN RESULTS

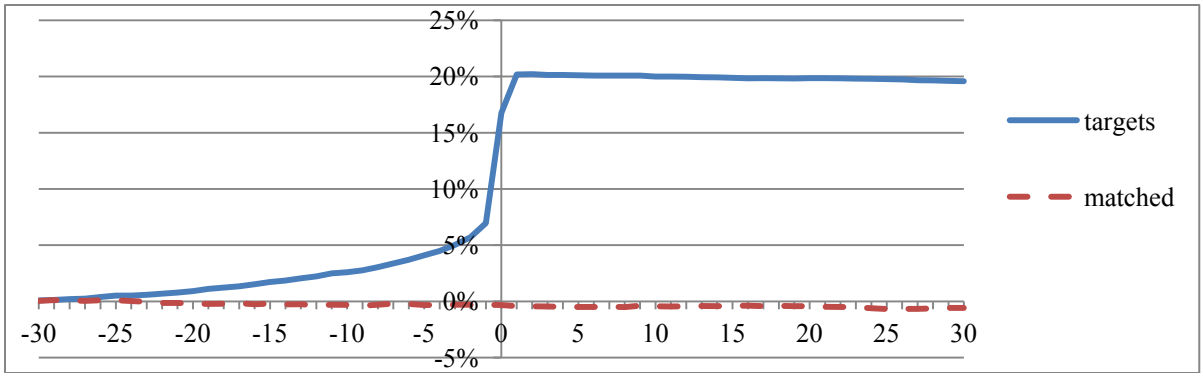
Market Anticipation

We first test whether the pre-announcement run-up is caused by market anticipation of acquisitions. Specifically, we examine price movements of comparable companies (hence speculated target) in the same industry to the final target: if the pre-announcement run-up is caused by market anticipation, other comparable firms should also experience price run-ups before the final announcement is made. On the announcement day, the stock price of the final target will go up even more, while the stock prices of other speculated targets are likely to go back to normal levels.

For every target firm, we select a comparable match firm from the same industry. We delete firms that have M&As from the pool of all companies to avoid contaminated match, and then match the remaining "non-target" companies to our sample based on the following criteria: 1, the match firm and the sample firm are in the same SIC 2-digit industry; 2, the combined percentage difference in log total assets and Tobin's Q is not greater than 5% in the year before the event year, e.g. |% difference in log total assets|+|% difference in Tobin's Q|<0.05. The combined difference of 5% threshold is selected so that the match firm sample size is roughly equal to the original sample size (13,487 compared to 10202). We also tried other thresholds and the results are basically unchanged.

Panel B of Table 2 reports statistics of abnormal returns for match firms. In general, the match firms do not show any price increases before announcements, and their prices do not go down after the M&A announcements. The results are also illustrated in Figure 1: while the sample firms experience price run-up prior to M&A announcements, match firms do not have significant changes in price. We find no evidence supporting the market anticipation hypothesis.

FIGURE 1
PRICE RUN-UPS AROUND M&A ANNOUNCEMENTS



We continue to examine other possible market anticipation explanations. Market anticipation can occur to a particular firm, not other comparable rivals in the same industry, when the target is actively looking for buyers or financially distressed. If the pre-announcement run-up is primarily caused by this kind of targets, market anticipation story could be true even when no run-up is observed in match firms. We test whether this explains the pre-announcement run-up by categorizing our sample into quintiles by Tobin's Q ratio and examine whether the pre-announcement run-up only exists in low-Q quintiles. The idea is that most firms looking for buyers are poorly-run or distressed firms; as a result, if the market anticipation story is true, the pre-announcement run-up should only be observed in low-Q quintiles but not in high-Q quintiles.

TABLE 4
PRE-ANNOUNCEMENT RUN-UP BY SIZE AND TOBIN'S Q

	Quintile	CAR[-30, -1]		CAR[-30, -6]		CAR[-30, -11]	
	Mean	CAR	t	Mean	t	Mean	t
				Panel A: TBQ			
Q1	0.827	7.136***	14.71	4.337***	10.41	3.131***	8.57
Q2	1.012	5.958***	13.55	3.279***	8.51	2.422***	7.35
Q3	1.159	4.432***	9.93	1.786***	4.72	0.950***	2.88
Q4	1.519	4.518***	9.99	2.151***	5.46	1.076***	3.14
Q5	3.597	3.427***	6.36	0.709	1.53	-0.223	-0.54
				Panel B: Size			
Q1	2.921	7.721***	11.44	4.136***	7.33	2.758***	5.48
Q2	4.382	5.987***	10.93	2.719***	5.70	1.475***	3.65
Q3	5.409	4.632***	9.82	2.197***	5.37	1.181***	3.39
Q4	6.514	3.950***	9.06	1.834***	4.59	0.907***	2.51
Q5	8.427	3.876***	8.60	1.849***	4.83	1.474***	4.42

Table 4 Panel A presents pre-announcement run-ups categorized by Q quintiles. There is a monotonic relationship between Q and the run-up, but the run-up does not only exist in low Q quintiles. In an event window of [-30, -1], even the highest Q quintile (with a *TBQ* average of 3.6) has a significant pre-announcement run-up. In other two event windows, [-30, -6] and [-30, -11], the top quintiles do not show significant run-up, but the run-up exists in all other quintiles including the second-to-highest quintile with a Q average of 1.5. It is hard to imagine that firms with a Tobin's Q ratio of 1.5 (which is slightly higher than the average of all listed firms) is anticipated to be acquired while the stock prices of peer firms do not change much. The results do not support the story that the run-up is primarily caused by distressed targets. Panel B of Table 4 reports run-ups categorized by size. The pre-announcement run-up is significant across all size groups, suggesting it is not a manifestation of size effect. We still do not find any support for the anticipation hypothesis. In fact, if the acquisition could be fully anticipated before announcements, no abnormal returns should be observed when the acquisition is announced. We conclude that the pre-announcement target stock price run-up is not likely caused by market anticipation.

Toehold Acquisition

We also consider the effect of toeholds on stock price before the announcement. It is possible that acquirers start buying target shares before official announcements, and the run-up can be a result of the toehold acquisition. To test this possibility, we select a clean sub-sample which is not likely influenced by toehold acquisition. The official M&A announcements usually precede Schedule 13D filings. Schedule 13D requires that acquirers report to SEC within 10 days immediately after they reach an ownership of 5% threshold of the targets' stocks; besides, Schedule 13D also requires that all acquirers who hold more than 5% of targets' shares update their filings "promptly" to reflect any "material change[10]" in the ownership. Hence, acquirers who hold more than 5% target shares are not allowed to buy more shares without making a prompt Schedule 13D update. The term "prompt" is a bit ambiguous in law, but we take a conservative estimation that this should not be longer than the 10-day reporting period when acquirers reach the reporting threshold for the first time. We create a subsample in which all acquirers have more than 5% target ownership before takeovers, and examine target stock abnormal returns in a [t-30, t-10] window. If the pre-announcement run-up is caused by toehold acquisition, it should not be observed in the [t-30, t-11] window when acquirers initially hold more than 5% target shares[11].

We find the average CAR[t-30, t-11] is 1.404% for the sub-sample; this is not significantly different from the total sample mean of 1.556%. Besides, the sub-sample run-up is significant with a t-value of 4.926. This suggests that the run-up is not entirely driven by toehold acquisition.

Reported Insider Trading

We further conjecture that the run-up could be a result of reported insider trading or unreported insider trading. The effect of reported insider trading is easier to test as corporate insiders are subject to SEC filings. We obtain reported insider trading data from Thomson Financial Insider Filing Data Files. Only open market purchases and sales (with transaction code of "P" or "S") are kept as other types of trades are less informative.

We track reported insider trades around M&A announcements; specifically, we calculate the number of total insider trades, the number of insider buys, the number of insider sells, the volume of total insider trades, the volume of insider buys, and the volume of insider sells on both daily and monthly levels, and then normalize the data so that we can directly compare different series. Figure 2 show normalized insider trades over time on a daily basis. Consistent with previous literature, we do not find significant increase in reported insider trading until only a few days before the announcements. Table 5 gives a detailed 30-day daily change of reported insider trading (normalized from day t-30 to day t+30) prior to M&A announcements. Both Figure 2 and Table 5 show that reported insider trades do not significantly increase until only a few days before the announcement, suggesting that the price run-up up to 30 days before the announcement is not likely a result of reported insider trading.

FIGURE 2
DAILY REPORTED INSIDER TRADES BEFORE M&A ANNOUNCEMENTS

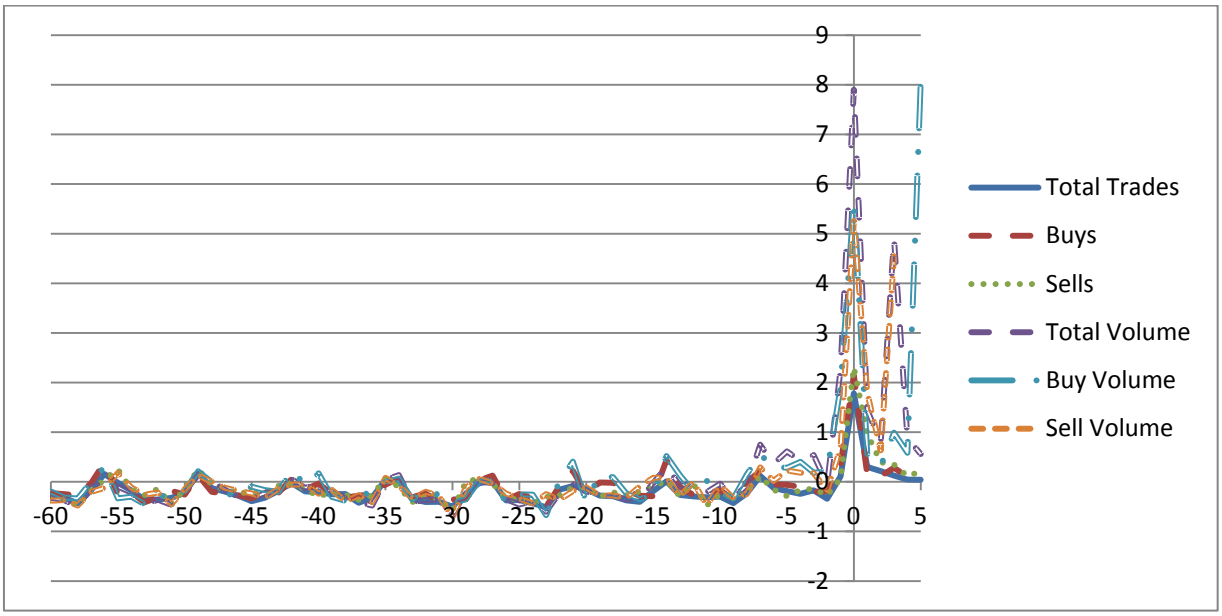


TABLE 5
REPORTED INSIDER TRADES BY DAY

Day	*Total Trades*	*Buys*	*Sells*	*Total Volume*	*Buy Volume*	*Sell Volume*	*AR*
-30	-49.943%	-35.423%	-57.969%	-68.033%	-43.026%	-72.414%	0.077%
-29	-23.707%	-35.072%	-0.812%	-19.547%	-35.048%	-11.814%	0.059%
-28	-2.791%	2.741%	6.925%	1.280%	2.248%	5.922%	0.052%
-27	0.961%	12.447%	-3.760%	-3.054%	2.017%	-3.416%	0.010%
-26	-37.521%	-36.469%	-33.259%	-34.828%	-40.899%	-23.444%	0.109%
-25	-36.820%	-24.651%	-35.305%	-45.752%	-25.104%	-33.907%	0.078%
-24	-43.134%	-32.816%	-43.866%	-38.831%	-25.717%	-43.156%	-0.075%
-23	-51.399%	-49.666%	-29.915%	-60.087%	-66.971%	-24.751%	-0.008%
-22	-15.920%	-9.060%	-27.319%	-22.172%	1.107%	-36.288%	0.027%
-21	-8.537%	22.154%	-10.806%	-4.377%	40.590%	-18.760%	0.087%
-20	-14.223%	-24.139%	-12.680%	-20.075%	-39.239%	-11.322%	0.078%
-19	-27.635%	-1.254%	-29.900%	-22.236%	12.610%	-27.052%	0.091%
-18	-28.931%	-2.020%	-20.961%	-27.231%	9.289%	-27.476%	0.147%
-17	-37.314%	-17.516%	-27.177%	-35.492%	-23.268%	-32.765%	0.103%
-16	-40.429%	-28.235%	-19.520%	-34.733%	-35.266%	-9.206%	0.105%
-15	-18.892%	-29.080%	-10.805%	-2.770%	-25.947%	8.150%	0.108%
-14	0.885%	43.935%	2.543%	30.968%	51.862%	8.556%	0.013%
-13	-26.601%	-9.954%	-28.925%	-8.039%	13.647%	-29.141%	0.193%
-12	-29.341%	-26.392%	-4.162%	-3.755%	-19.476%	-0.372%	0.102%
-11	-31.388%	-23.886%	-47.641%	-21.042%	2.242%	-47.031%	0.202%
-10	-29.851%	-16.858%	-24.439%	-4.025%	-21.955%	-7.460%	0.096%
-9	-42.796%	-35.900%	-28.683%	-32.126%	-33.434%	-32.773%	0.091%
-8	-23.312%	-0.221%	-18.722%	-6.931%	14.706%	-24.494%	0.257%
-7	11.786%	21.444%	11.278%	74.654%	55.142%	29.116%	0.299%
-6	-12.156%	-5.209%	-15.826%	36.227%	30.057%	1.896%	0.244%
-5	-18.719%	-5.807%	-28.688%	61.258%	28.302%	22.703%	0.241%
-4	-24.293%	-10.581%	-16.441%	42.318%	40.338%	18.358%	0.345%
-3	-16.989%	-19.886%	-13.973%	53.770%	18.335%	17.438%	0.427%
-2	-34.251%	-18.677%	-27.463%	-4.794%	21.379%	-18.235%	0.566%
-1	10.951%	33.134%	6.929%	226.618%	191.070%	67.978%	1.105%

Unreported Insider Trading

Finally, we use an indirect way to test whether unreported insider trading leads to pre-announcement run-up, despite the invisibility of unreported insider trades. As mentioned before, there are three key measures of unreported insider trading, along with some other variables that are likely to be associated with the pre-announcement run-up. The first measure is public attention on insider trading, measured by the monthly number of news articles on insider trading in Factiva (*IT_NEWS*). In the text search, we find most of the news articles are associated with insider trading scandals, ongoing trials and court decisions about previous insider trading cases; hence, the number of articles about insider trading to some extent

reflects the degree of insider trading law enforcement and the likelihood that an illegal insider gets caught. If the pre-announcement run-up is caused by unreported insider trading, *IT_NEWS* should be negatively associated with the run-up. The second measure is institutional ownership (*INST*). Firms with higher institutional ownership are more closely monitored, and are thus less likely affected by illegal insider trading. Therefore, *INST* is negatively associated with the pre-announcement run-up if unreported insider trading leads to the run-up. The third measure is the probability of informed trading (*PIN*). If the pre-announcement run-up reflects the degree of unreported insider trading, the run-up should be greater in firms with higher *PIN*.

In a preliminary test, we sort *IT_NEWS*, *INST* and *PIN* into quintiles and report the mean and t-statistic of CAR[-30, -1] in each quintile. Results are reported in Table 6. Consistent with our prior hypotheses, the pre-announcement run-up is significantly lower in the quintile with the highest number of insider trading news articles, the quintile with the highest institutional ownership, and the quintile with the lowest PIN. The results suggest that stock prices are more likely to react to undisclosed future takeovers in firms more likely to have unreported insider trading.

TABLE 6
UNIVARIATE RESULTS

	Low	Q2	Q3	Q4	High	High - Low
IT_NEWS						
Mean	5.395***	4.725***	5.330***	5.028***	3.933***	-1.461*
T	(11.58)	(11.10)	(8.06)	(9.66)	(6.68)	(-1.95)
INST						
Mean	6.450***	5.776***	5.718***	3.181***	2.295***	-4.155***
T	(10.56)	(9.22)	(10.98)	(6.44)	(4.84)	(-5.37)
PIN						
Mean	2.830***	3.463***	3.694***	6.211***	5.819***	2.989**
T	(4.48)	(4.54)	(4.87)	(7.58)	(5.60)	(2.46)

We conduct formal regression analysis. *PIN* is a bounded variable with small standard deviation, so we create a dummy variable *PIN_HIGH* which equals 1 if *PIN* is above its median and 0 if otherwise[12]. *IT_NEWS* and *INST* are the same as defined in Table 6.

There are other variables that are likely to be associated with price run-ups before takeover announcements. If M&As are not easy to predict, fewer insiders have access to the information and thus unreported insider trading is reduced. If unreported insider trades cause pre-announcement run-ups, we should observe a small run-up or even no run-up at all. Variables of this kind include *FRIENDLY* and *FOREIGN*. Friendly deals are more likely to be pre-negotiated before announcements, while foreign deals are likely to be more sudden due to geographical distance. As a result, *FRIENDLY* is likely to be positively associated with the run-up, and *FOREIGN* is likely to be negatively associated with the run-up, if the run-up is caused mainly by unreported insider trading.

SIZE and *TBQ* are included as control variables for obvious reasons. They are shown to be associated with CAR calculated in a market model; besides, they are usually highly correlated with most corporate variables. It is intuitive to think size and Tobin's Q both predict a lower pre-announcement run-up, as small firms and low-Q firms are more likely to be poorly monitored and vulnerable to unreported insider trading. Other control variables include *BEFPCT* and *CASH*. As discussed in Section 3, they are associated with the likelihood that an acquisition is anticipated. Besides, a high percentage of pre-announcement ownership indicates a low percentage of ownership transferred in the M&A, so the total

market reaction is small. M&As paid in cash are very different from those paid in shares (Loughran and Vijh, 1997), and an acquisition paid with equity may signal the equity prices are too high.

Table 7 presents multi-variate regression results using CAR[-30, -1]. as the dependent variable. As M&As come in waves and are often clustered in certain industries (Jarrell and Poulsen, 1989), we include 2-digit target SIC industry dummies and year dummies to adjust for industry and year effects. All regressions are clustered by 2-digit target SIC industry.

TABLE 7
MULTI-VARIATE REGRESSIONS

	(1)	(2)	(3)
IT_NEWS	-0.023*		
	(-1.92)		
INST		-0.052***	
		(-3.88)	
PIN_HIGH			0.031***
			(2.97)
SIZE	-0.006**	-0.002	-0.001
	(-2.60)	(-0.70)	(-0.07)
TBQ	-0.011***	-0.010***	-0.011
	(-3.88)	(-3.09)	(-1.22)
BEFPCT	-0.001***	-0.001***	-0.001**
	(-3.58)	(-4.03)	(-2.51)
FOREIGN	0.013	0.010	0.013
	(1.59)	(1.21)	(1.08)
FRIENDLY	0.033***	0.030***	0.019**
	(4.42)	(3.87)	(2.26)
CASH	-0.005	-0.004	-0.004
	(-0.87)	(-0.58)	(-0.48)
Constant	0.134***	0.124***	-0.014
	(6.08)	(4.64)	(-0.39)
Observations	6,830	6,194	2,205
R-squared	0.041	0.044	0.095

In general, the results are consistent with the results in Table 6 and in favor of the hypothesis that unreported insider trades lead to the pre-announcement run-up. All primary measures of unreported insider trading – *IT_NEWS*, *INST* and *PIN_HIGH* – are significantly associated with the pre-announcement price run-up. With year fixed effects controlled, every additional 100 news articles about insider trading results in a 2.3% decrease in the pre-announcement run-up, and every one percent change of institutional ownership reduces the run-up by 0.05%. Target firms with above-median PIN have 3.1% higher pre-announcement run-up compared to target firms with below-median PIN. The economic significances are also large: a one standard deviation increase in both *IT_NEWS* and *INST* corresponds to about a 1% decrease in pre-announcement run-up. In results not tabulated here, dummy variables constructed based on *IT_NEWS* and *INST* are also significant in regressions, and various transformations of *IT_NEWS* and *INST* lead to similar results.

Other variables are also consistent with the unreported insider trading story. Friendly M&As appear to have about 3% lower run-ups compared to hostile M&As and others, and the difference is very

significant. M&As with high pre-announcement acquirer ownerships exhibit significantly low run-ups. High-Q firms have low run-ups compared to low-Q firms.

Robustness

We use different event windows (CAR[-30, -6] and CAR[-30, -11]) to ensure the results are robust. These two windows are more rigorous than the [-30, -1] window because the majority of the pre-announcement run-up occurs just a few days before day 0. We report multi-variate regressions with the two alternative event windows in Table 8. As shown in the table, the results are virtually unchanged as the coefficients of the three key variables are significant in most regressions, though *IT_NEWS* becomes insignificant in the [-30, -11] window. Dummy variables based on *IT_NEWS* are still significant even in the [-30, -11] window in results not tabulated here.

TABLE 8
MULTI-VARIATE REGRESSIONS: ALTERNATE WINDOWS

	(1)	(2)	(3)	(4)	(5)	(6)
Dep. Var.		CAR[-30, -6]			CAR[-30, -11]	
IT_NEWS	-0.017*			-0.011		
	(-1.73)			(-1.30)		
INST		-0.030***			-0.017**	
		(-3.04)			(-2.17)	
PIN_HIGH			0.031***			0.021***
			(3.71)			(2.75)
SIZE	-0.005**	-0.002	0.002	-0.003	-0.002	0.003
	(-2.28)	(-0.98)	(0.68)	(-1.56)	(-0.78)	(0.87)
TBQ	-0.011***	-0.010***	-0.008	-0.009***	-0.008***	-0.006
	(-4.26)	(-3.61)	(-1.12)	(-3.82)	(-3.04)	(-1.16)
BEFPCT	-0.000**	-0.000***	-0.000***	-0.000	-0.000	-0.000**
	(-2.40)	(-2.66)	(-2.77)	(-0.44)	(-0.76)	(-2.15)
FOREIGN	0.007	0.009	0.013	0.009*	0.009*	0.016
	(1.11)	(1.38)	(1.17)	(1.71)	(1.67)	(1.36)
FRIENDLY	0.016**	0.014**	0.004	0.012***	0.011***	0.002
	(2.60)	(2.32)	(0.44)	(2.85)	(2.83)	(0.32)
CASH	-0.002	-0.000	0.003	-0.005	-0.003	-0.004
	(-0.43)	(-0.04)	(0.33)	(-1.07)	(-0.58)	(-0.71)
Constant	0.086***	0.092***	-0.083**	0.046***	0.051***	-0.105***
	(4.30)	(3.99)	(-2.58)	(3.25)	(3.16)	(-4.16)
Observations	6,830	6,194	2,205	6,830	6,194	2,205
R-squared	0.029	0.032	0.076	0.026	0.028	0.053

CONCLUSION

The big magnitude of target price run-up before M&A announcements makes people wonder what causes the run-up. While some researchers believe the run-up is caused by market anticipation or toehold acquisition, we find neither of the two is able to explain the target stock price run-up prior to M&A announcements. Instead, variables that are associated with unreported insider trading are significantly

associated with the run-up. At the end of the day, we may find that Keown and Pinkerton (1981) are right after all in explaining the pre-announcement run-up as insider trading.

While reported insider trades are mostly legal and believed to increase market efficiency (Leland, 1992; Lakonishok and Lee, 2001), unreported insider trades based on material information are considered illegal in almost every country in the world (Bhattacharya and Daouk, 2002). However, due to the low expected cost (as only a small portion of insider trades are caught each year), non-corporate insiders still have a great incentive to get tips from corporate insiders and make profits. These trades are different from reported insider trades partly because they are not visible to the public; therefore, even though these trades still improve ex-post price accuracy, they may not promote general market efficiency as reported insider trades do.

The finding that the target price run-up before M&A announcements is associated with unreported insider trading measures raises the concern that rampant illegal insider trading may undermine corporate governance. Mergers and acquisitions are important in motivating managers as they work as alternative mechanisms for corporate control (Morck et al., 1988). The pre-announcement run-up could add significant costs to mergers and acquisitions, which may have a negative effect on corporate governance.

How to get rid of unreported insider trades? Our results indicate that high media attention and institutional ownership can reduce unreported insider trades, or at least make them less profitable. However, things do not seem to improve over time. Beny and Seyhun (2012) observe that insider trading is getting even more rampant over time. Unreported insider trading and the price run-up before M&A announcements are not likely to cease soon.

ENDNOTES

1. In the sample, about a third of the total run-up occurs before M&A announcements, and the pre-announcement run-up is negatively associated with the post-announcement run-up.
2. See Keown and Pinkerton (1981), Jabbour, Jalilvand and Switzer (2000) and Beny and Seyhun (2012).
3. See Bris (2005) and King (2009).
4. Meulbroek (1992) finds a direct link between pre-announcement run-up and illegal insider trading cases.
5. See Agrawal and Nasser (2012).
6. Ironically, the column was involved in an insider trading case as the columnist Foster Winans was convicted in 1987.
7. See Seyhun (1990) and Agrawal and Nasser (2012).
8. We only keep deals that are marked “merger” or “acquisitions of partial/major/remaining interest”.
9. We also tried other related keywords but the majority of news articles use the phrase “insider trading”.
10. Any acquisition of more than 1% target shares is considered material, but a material change is not limited to the 1% ownership change.
11. The conservative window actually introduces a bias in favor of the toehold acquisition hypothesis.
12. If we put *PIN* in regressions directly, its coefficient is significantly positive in some windows and only marginally significant in other windows, possibly due to limited observations and its low variance. Log transformation of *PIN* does not change the results much

REFERENCES

Agrawal, A. & Nasser, T. (2012). Insider Trading in Takeover Targets. *Journal of Corporate Finance,* 18, (3), 598-625.

Baker, M., Stein, J.C. & Wurgler, J. (2003). When Does the Market Matter? Stock Prices and the Investment of Equity-Dependent Firms. *The Quarterly Journal of Economics,* 118, (3), 969-1005.

Barber, B.M. & Odean, T. (2008). All That Glitters: The Effect of Attention and News on the Buying Behavior of Individual and Institutional Investors. *Review of Financial Studies*, 21, (2), 785-818.

Beny, L.N. & Seyhun, H.N. (2012). Has Insider Trading Become More Rampant in the United States? Evidence from Takeovers. *U of Michigan Law & Econ Research Paper,* No. 12-012.

Berkman, H., Koch, P.D. & Westerholm, P.J. (2014). Informed Trading through the Accounts of Children. *Journal of Finance,* 69, (1), 363-404.
Bhattacharya, U. & Daouk, H. (2002). The World Price of Insider Trading. *The Journal of Finance,* vol. 57, no. 1, pp. pp. 75-108.
Bhattacharya, U., Daouk, H., Jorgenson, B. & Kehr, C. (2000). When An Event Is Not An Event: The Curious Case Of An Emerging Market. *Journal of Financial Economics,* 55, (1), 69-101.
Bris, A. (2005). Do Insider Trading Laws Work? *European Financial Management,* 11, (3), 267-312.
Choi, D. (1991). Toehold Acquisitions, Shareholder Wealth, and the Market for Corporate Control, *The Journal of Financial and Quantitative Analysis,* 26, (3), 391-407.
Cornell, B. & Sirri, E.R. (1992). The Reaction of Investors and Stock Prices to Insider Trading. *The Journal of Finance,* 47, (3), 1031-1059.
Easley, D., Hvidkjaer, S. & O'Hara, M. (2002). Is information risk a determinant of asset returns? *Journal of Finance,* 57, (5), 2185-2221.
Fama, E.F. & French, K.R. (1993). Common Risk Factors in the Returns on Stocks and Bonds. *Journal of Financial Economics,* 33, (1), 3-56.
Fidrmuc, J.P., Goergen, M. & Renneboog, L. (2006). Insider Trading, News Releases and Ownership Concentration. *Journal of Finance*, 61, (6), 2931-2973.
Halpern, P.J. (1973). Empirical Estimates of the Amount and Distribution of Gains to Companies in Mergers. *The Journal of Business,* 46, (4), 554-575.
Jabbour, A.R., Jalilvand, A. & Switzer, J.A. (2000). Pre-Bid Price Run-Ups and Insider Trading Activity: Evidence from Canadian Acquisitions. *International Review of Financial Analysis,* 9, (1), 21-43.
Jarrell, G.A. & Poulsen, A.B. (1989). Stock Trading before the Announcement of Tender Offers: Insider Trading or Market Anticipation? *Journal of Law, Economics, & Organization,* 5, (2), 225-248.
Jensen, M.C. & Ruback, R.S. (1983). The Market for Corporate Control: The Scientific Evidence. *Journal of Financial Economics,*11, (1–4), 5-50.
Keown, A.J. & Pinkerton, J.M. (1981). Merger Announcements and Insider Trading Activity: An Empirical Investigation. *The Journal of Finance,* 36, (4), 855-869.
King, M.R. (2009). Prebid Run-Ups Ahead of Canadian Takeovers: How Big Is the Problem? *Financial Management,* 38, (4), 699-726.
Lakonishok, J. & Lee, I. (2001). Are Insider Trades Informative? *The Review of Financial Studies,*14, (1). 79-111.
Loughran, T. & Vijh, A. (1997). Do Long-Term Shareholders Benefit from Corporate Acquisitions? *The Journal of Finance,*52, (5), 1765-1790.
Mandelker, G. (1974). Risk and Return: The Case of Merging Firms. *Journal of Financial Economics,* 1, (4), 303-335.
Meulbroek, L.K. (1992). An Empirical Analysis of Illegal Insider Trading. *The Journal of Finance,* 47, (5), 1661-1699.
Mikkelson, W.H. & Ruback, R.S. (1985). An Empirical Analysis of the Interfirm Equity Investment Process. *Journal of Financial Economics,* 14, (4), 523-553.
Morck, R., Shleifer, A. & Vishny, R.W. (1988). Alternative Mechanisms for Corporate Control. *American Economic Review,*79, (4), 842-852.
Pound, J. & Zeckhauser, R. (1990). Clearly Heard on the Street: The Effect of Takeover Rumors on Stock Prices. *The Journal of Business.* 63, (3), 291-308.
Sanders, R.W., Jr. & Zdanowicz, J.S. (1992). Target Firm Abnormal Returns and Trading Volume Around the Initiation of Change in Control Transactions. *The Journal of Financial and Quantitative Analysis,* 27, (1), 109-129.
Schwert, G.W. (1996). Markup Pricing in Mergers and Acquisitions. *Journal of Financial Economics,* 41, (2), 153-192.
Seyhun, H.N. (1990). Do Bidder Managers Knowingly Pay Too Much for Target Firms? *The Journal of Business,* 63, (4), 439-464.