

The Hot Stock Tip from Debbie: Implications for Market Efficiency

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In July and August 2004 thousands of messages were left on answering machines across the United States touting Maui General Stores (MAUG). Interestingly, these messages contained no material information, but the price of MAUG experienced a significant increase in value. According to the Securities and Exchange Commission (SEC), MAUG's market capitalization increased by more than \$100 million. However, the price of MAUG returned to its "pre-message" level after the firm's CEO enters the market on the sell side, well before the SEC announced the messages as a scam. We discuss how this event expands our understanding of market efficiency.

keywords: Market efficiency, Information cascades, Scams

This following message was left on thousands of answering machines in late July 2004:

"Hey Tracy, it's Debbie! I couldn't find your old number, and Tammy said this was your new one. I hope it's the right one. Anyway, remember Evan, that hot stock exchange guy I'm dating? He gave my dad that stock tip on WLSF and it went from under a buck to like three bucks in two weeks, and you were mad I didn't call you? Well I'm calling you now.

"This new company is supposed to be like the next Tommy Bahama, and they're making some big news announcement this week. The stock symbol is MAUG. He said it's cheap now, like 50 cents. Sorry I'm eating but I'm starving.

"It's 50 cents now, and it's going up to, like, 5 or 6 bucks this week, so get as much as you can. Call me on my cell. I'm still in Orlando. It's xxx.xxx.xxxx. Dad and I are buying a bunch tomorrow, and I already called Kelly and Ron, too. Anyway, I miss you. Give me a call. Bye."

Over the course of ten days in late July and early August 2004, the market price and volume of MAUG skyrocketed. Average daily volume in July increased almost 28 times its level in June, and the average daily price jumped fivefold. The highest daily price reached more than ten times MAUG's average daily price in June. Clearly the call had its intended effect. The question is, why? Other than the supposed tip from Debbie, no substantive information was left on the caller's an-

swering machine. The caller never alludes to any material firm information; she simply states that the recipient should buy the stock tomorrow and that the price will go up next week. Market efficiency would argue that the absence of new stock information would preclude a reaction to such an ambiguous message. How can we explain their reaction? We argue that the perpetrators took advantage of herding behavior. In this case, uninformed agents discounted their personal beliefs regarding the valuation of this security and based their buy decisions on those of previous buyers when weighing the information contained in the "Debbie Call." However, we show that the information cascade (bubble) ended when an informed agent, the firm's CEO, entered the market on the sell side. Interestingly, the run-up in the securities price ended well before the Securities and Exchange Commission (SEC) announced that the calls were a pump-and-dump scam. In the next section we discuss information cascades and how information cascade theory can explain the reaction of MAUG's stock price.

Information Cascades and Herding

Anyone who has used a friend's opinion to purchase a CD, pick a movie, make a menu choice in a restaurant, or even decide where to live has been either a willing or unwitting participant in an information cascade. In some cases, information cascades can act as a search cost reduction tool. However, what happens when a cascade forms based on incorrect beliefs? For example, in 1995 Micheal Treacy and Fred Wiersema purchased 50,000 copies of their own book from stores that were being sampled to obtain the *New York Times* best sellers list ("Did Dirty Tricks Create a Bestseller" [1995]). In spite of average reviews, the book made it

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on the *New York Times* best sellers list and continued to sell enough copies to stay on the list. According to Bikhchandani et al. [1998], informational cascades occur when agents make decisions based on the observation of other agent's decisions (e.g., I may choose to buy a book because I see other people buying the same book, or as in this case, I may choose to believe a message I receive on my answering machine because I see other people buying the stock). Cascades can even arise if the later decision maker has private signals that indicate an alternative choice is optimal. Welch [1992] uses the cascade argument to explain why the success of initial public offerings (IPOs) may hinge upon the investors who are approached earliest. This is because an early investor, who declines the chance to invest in an IPO, indicates his or her belief that the IPO is overpriced, suggesting a low probability of profiting in the after market. While the observer does not know what actual information (if any) that original investor acted upon, he or she deduces from observing the original investor's inaction that the original investor must have assigned a low value to the company.

Bikhchandani et al. [1998] show that cascades not only propagate quickly but are also quite fragile. The authors identify several shocks that may "prick the bubble," such as the arrival of new public information or even an individual's cognitive awareness that he or she is caught in an information cascade. Once someone determines that he or she is caught in a cascade, the individual often realizes that the cascade is based on very little information. Thus, this individual is less inclined to accept the actions of previous trades as a valid informational source and is more inclined to listen to his or her own internally generated signal or those of an informed agent. The similarities between the traditional information cascade and the Debbie Calls are both striking and obvious. Here, individuals were, despite repeated cautionary tales regarding the perils of "hot tip" investing, anxious for the next opportunity to make a quick profit. In this case, investors mistook the signals from the previous buyers as an indication that the market was better informed. The cascade would finally "burst" after an informed agent, the CEO, started to rapidly reduce his ownership in the firm. In the next section we discuss the implications this event has for our understanding of market efficiency and how this event expands our knowledge about information cascades.

Market Efficiency

Traditional market efficiency theory suggests that stock prices reflect all available information; In fact, the literature typically discusses three different levels of market efficiency: strong, semi-strong, and weak. The distinguishing characteristic between the three lev-

els of efficiency is the extent to which information impacts the price of a given security. Weak form efficiency (Fama [1970]) argues that all past information is reflected in the current price of the equity, while semi-strong form efficiency contends that current stock prices instantaneously discount new release of public information. Finally, strong form efficiency assumes that all publicly available information, with few exceptions such as private information, is reflected in the current share price.

Germane to the Debbie Call case is how to reconcile the activity generated from this seemingly innocuous call with the idea that markets fully reflect all information available. We classify the Debbie Call as uninformative; the messages certainly did not introduce any information that would traditionally be considered actionable, such as an impending announcement of increased earnings, increased sales, a change to positive free cash flow, or an announcement of a Food and Drug Administration (FDA) approval letter. Furthermore, even a cursory review of MAUG's fundamentals should have raised several red flags for rational prospective investors. Strikingly, as of the May 2004 10Q-SB, net revenues from inception (January 1995) to the quarter ended March 31, 2004, totaled \$84,811. In the quarter ended March 31, 2004, MAUG reported unaudited net revenues of \$10,220, with cost of goods sold of \$6,255 and total operating expenses of \$3,554, for an income before other income equal to \$411. From inception to the first quarter ending March 2004, MAUG had accumulated gross profit of \$38,696 versus total operating expenses of \$318,849, for a net loss of -\$280,153. Clearly MAUG's financial future was in doubt. In fact, an 8-K filed in November 2004 indicates that MAUG's auditors resigned, expressing serious doubts about MAUG's longevity. In actuality, MAUG needed a significant infusion of capital. However, through our ex-post analysis we find no evidence, through SEC filings or other public records, that a cash infusion was imminent. With MAUG, investors discounted their personal beliefs regarding the valuation of this security and based their buy decisions on those of previous buyers when faced with deciding the validity of the Debbie Call. If markets are fully efficient, how can equity prices temporarily deviate from their intrinsic values? In the next sections we discuss past evidence on short-term price deviations under regimes of investor confusion.

Investor Confusion

Is it possible for investors to become confused or trade on news that is not informative? One famous instance of investor confusion surrounds the firm MCI. MCI the firm traded under the ticker MCIC, while Massmutual Corporate Investors traded under

the ticker MCI (Rashes 2001). Rashes documents unusually high levels of co-movement between the two securities on days when material news was released about MCI the firm. In addition, Rashes documents several other instances where misinformed trader actions temporarily cause security prices to deviate from their intrinsic values. Take, for example, the Castle Convertible Fund, a closed-end mutual fund that trades on the AMEX under the ticker CVF. On April 15, 1997, this security traded at a daily high price of 24-5/8, and 22 minutes later the security was trading at 16-3/4. This event prompted management to issue a press release that suggested there was no economic rationale behind the drop in the securities price. In actuality, the security devaluation was due to an article in the *Financial Times* about a management shakeup at the Czech Value Fund. Incidentally the abbreviation for the Czech Value Fund used in the story was CVF.

Another example is that of the Morgan Stanley Asia Pacific Fund. On February 2, 1998, an issue of *Barron's* incorrectly listed the ticker symbol as APB. The associated fund for the APB ticker is the Barings Asia Pacific Fund. When the market opened on Monday morning, trading was temporarily halted in the Barings Asia Pacific Fund because of massive volume. When the security finally started trading later in the day, it was up 30% from its close on the previous Friday. By the end of the day, more than 1.3 million shares, 15% of the outstanding volume, had traded hands.

On a smaller scale, when AT&T announced that it was purchasing Tele-Communications (ticker: TCOMA), the firm Transcontinental Realty Investors Inc. (ticker: TCI) ended the day up 4.3%. Another example was that of the firm AppNet, whose IPO was slated to open under the ticker AAPN. However, the ticker AAPN had previously been assigned to the firm Appian Technology. Prior to the IPO, confused investors drove price of Appian up 657% in only one day (Trading Places: Mistaken I.D. lifts tiny stock [1999]).

The cases discussed above were related to short-term investor confusion over actual news events. But what happens when investors are given false information and choose to act on it? For example, Larry Harris in his book *Trading and Exchanges*, points to the case of PairGain technologies. On April 7, 1999, a message appeared on a Yahoo! message board prompting people to visit a purported Bloomberg news page that discussed an acquisition agreement. However, this page was a fabrication created by an employee of PairGain who hoped to make a quick profit from the run-up in price of the security. Following the posting, the price of the security rose to 11-1/8 from the previous day's close of 8-1/2 on average volume that was 10 times higher than normal. However, the fraud was detected early and the security closed at 9-3/8, primarily because the firm issued a statement denying an acquisition agreement.

Table 1. *Descriptive Statistics*

Month	Average Daily Volume	Average Price	High Price	Low Price
June	4,221	.097	.20	.05
July	116,138	.46	.99	.14
August	353,354	.615	1.15	.21
September	81,265	.11	.122	.101
October	21,552	.093	.096	.092

Table 1 includes average daily volume, average price, and highest and lowest closing price during the listed months of June, July, August, September, and October.

In the PairGain case, and in many cases involving fraud, investors are misled by false new stories that purport to contain material information. However, in the case of the Debbie Calls, no new credible material information was revealed. It is interesting that investors would react to these messages and their actions would continue for a full two weeks. In the next section we analyze investor reactions to the receipt of the Debbie Calls and discuss what implications these reactions have on our current understanding of market efficiency.

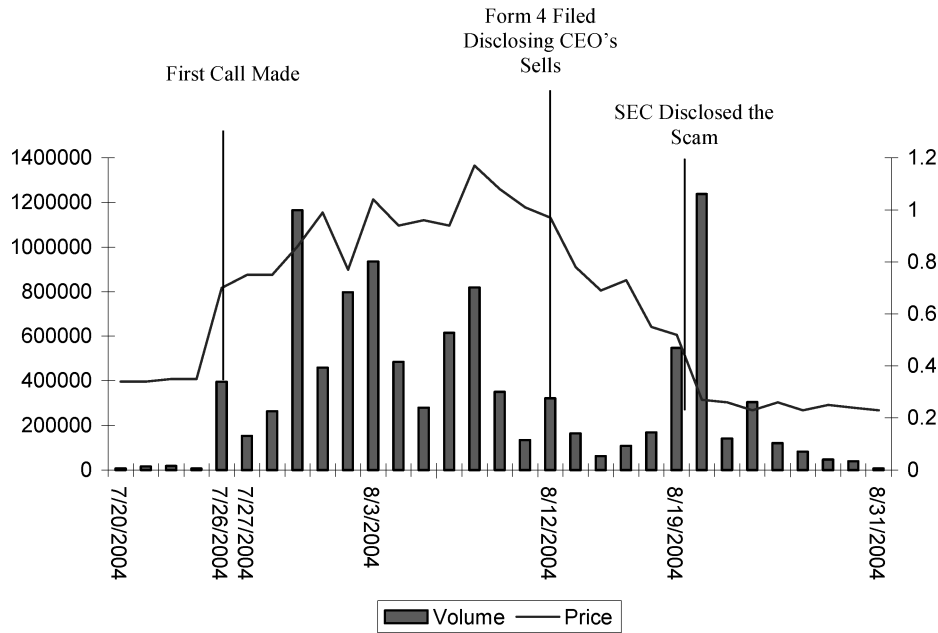
Analysis

Any analysis of potential inefficiencies associated with trading in MAUG should begin with a comparison of trading volumes and prices before, during, and after the messages were planted. Table 1 contains MAUG's average trading volume and price data around the dates of the scam. MAUG's average daily trading volume during June 2004 was 4,221 shares. In one month, the average daily volume increased 2,700%, to 116,138 shares in July 2004, and reached a peak increase of 8,300% (353,354 shares) in August 2004. However, by October 2004 the trading volume had fallen to 21,552 shares, which was still 5 times its average trading volume in June 2004. Interestingly, the average price of a single MAUG share in June 2004 was 9.7 cents a share, and by October 2004 the average price of a share of MAUG was 9.3 cents. However, during the month of August, at the height of the scam, the price reached \$1.15, a twelve-fold increase, and the price averaged 61.5 cents a share during that month.

While the story told by the descriptive statistics alone is compelling, we also use the standard event study methodology to examine the market reaction to the Debbie Calls and the SEC's announcement that the calls were indeed a pump-and-dump scam. Using the market-adjusted approach (Brown and Warner [1980]), the standard market model is used to derive one-day (0) abnormal returns. Abnormal returns are calculated as: $AR_{it} = R_{it} - \hat{\alpha}_i - \hat{\beta}_i R_{mt}$, where R_{it} is the return to firm i on day t , $\hat{\alpha}_i$ is an intercept term estimated using the 110 trading days returns prior to July 1, 2004,

FIGURE 1
MAUG's Price and Volume

Figure 1 includes price and volume of MAUG around the date used in the event study analysis.



$\hat{\beta}_i$ is the market beta for the i th firm estimated using the 110 trading days returns prior to July 1, 2004, and R_{mt} is the market return on day t . Cumulative abnormal returns are the sum of the one-day abnormal return estimates. We obtain stock price and volume data from Commodity Systems Incorporated. We use the Russell 3000 as the market benchmark for this event study analysis.

The dates used in the event study analysis come from several public sources. According to litigation documents filed by the SEC¹ several individuals started making the Debbie Calls on or around July 26, 2004, and stopped making the calls on or around August 6, 2004. We obtain the insider trading data from the SEC's EDGAR database of firm filings. According to a Form 4 filed on August 12, 2004, Richard Miller, MAUG's CEO, made the following sales: 10,000 shares at \$0.53 on July 27, 2004; 10,000 shares at \$0.61 on July 28, 2004; 30,000 shares at \$0.93 on July 29, 2004; 20,000 shares at \$0.92 on August 2, 2004; and 20,000 shares at \$0.99 on August 3, 2004. In addition, the SEC posted an announcement on its Web site on August 19, 2004, that the messages were part of a pump-and-dump scam.

Looking at Figure 1, we see a spike in price that corresponds to the first calls. Specifically, over a period of five days beginning July 23, 2004, the day before the calls took place, the stock more than doubled in price, increasing from \$0.40 to \$0.99. The abnormal return for July 26, 2004, alone was 37.6%. Additionally, the cumulative abnormal returns for the four days starting July 26, 2004, are 108.37%. As previously mentioned,

we see almost identical abnormal negative returns after the SEC announces the scam. The abnormal returns for MAUG are -36.18% on the day the SEC announces the scam to the public. Furthermore, the cumulative abnormal returns for the three days after the announcement are -61.07%. The SEC estimates that MAUG market capitalization increased by more than \$100 million in value at the height of the scam.

Table 2 contains the average daily and monthly returns for MAUG during July and August, although the timeframe includes the two months over which the scam took place. In the month of July, MAUG's daily average returns were 11.8%. The cumulative returns in July equal 249%; ostensibly, MAUG more than doubled as a result of a misdialled number. In August, we see the average return for MAUG turn from positive to negative, with MAUG losing -4.6% each day, on average, and -101% for the entire month.

Table 3 further illustrates the unusual trading activity around the dates used in the event study analysis.

Table 2. *Cumulative Abnormal Returns*

Month	Average Daily Return	Cumulative Returns
July	11.8%	249%
August	-4.6%	-101%

Table 2 includes a returns analysis for the months of July and August. Average daily returns are calculated using closing prices.

Table 3. *Event Study*

Date	Event Description	Return	Day (0) AR	Day (0, 1, 2, 3) CAR
July 26, 2004	First Calls are Made	37.5%	37.6%	108.37%
August 9, 2004	Day After Last Call is Made	-6.08%	-6.01%	-39.42%
August 12, 2004	CEO Files with SEC (Form 4)	-21.05%	-20.59%	-31.19%
August 19, 2004	Scam Posted on SEC Web-Site	-36.36%	-36.18%	-61.07%

Table 3 includes dates and events that are used in the event study analysis. The standard market model is used to construct the abnormal returns. Abnormal returns are calculated as: $AR_{it} = R_{it} - \alpha_i - \beta(R_{mt})$. Where R_{it} is the return to firm i on day t , α_i is an intercept term, β is the market beta for the i th firm estimated using the 110 trading days returns prior to July 1, 2004, and R_m is the market return on day t . Cumulative abnormal returns are the sum of the one-day abnormal return estimates.

Table 3 contains the results of an event study analysis of the abnormal returns around the SEC's announcement regarding the scam. The SEC announced on August 19, 2004, that the missed calls were part of a pump-and-dump scam and that the messages were part of a larger effort to inflate the stock price. The abnormal return for MAUG on the day of the announcement is -36.18%, and the cumulative abnormal returns for the four-day period after the announcement were -61.07%.

Figure 2 is a plot of the cumulative abnormal returns for MAUG starting five days before the announcement until five days after the announcement. Note that the price of MAUG was already decreasing well before the SEC announcement that the Debbie Calls were a pump-and-dump scam. The SEC's announcement helped accelerate the price correction in MAUG but came well after the first information event that aided uninformed agents in their recognition of the information cascade. In the next section we discuss what the real informa-

tion event was and how it led to the price reversal in MAUG.

When in Doubt, Do What the Insiders Do

When information cascades (bubbles) form and uninformed agents (noise traders) begin to take action based on the actions of other uninformed agents, serious repercussions can occur as security prices deviate from their intrinsic values. Corrections in these deviations can come from an information event or the arrival of credible news. If informed agents are perceived to possess material information, and their actions are observable by uninformed traders, their trades can act as signals.

For example, in this case MAUG CEO Richard Miller filed a statement of changes in beneficial ownership (Form 4) on August 12, 2004. This filing indicated

FIGURE 2

Cumulative Abnormal Returns around the Announcement of the Scam

Figure 2 includes an event study analysis around the date when the SEC announces the scam to the public (August 19, 2004). The standard market model is used to construct the abnormal returns. Abnormal returns are calculated as: $AR_{it} = R_{it} - \alpha_i - \beta(R_{mt})$. Where R_{it} is the return to firm i on day t , α_i is an intercept term, β is the market beta for the i th firm estimated using the 110 trading days returns prior to July 1, 2004, and R_m is the market return on day t . Cumulative abnormal returns are the sum of the one-day abnormal return estimates.

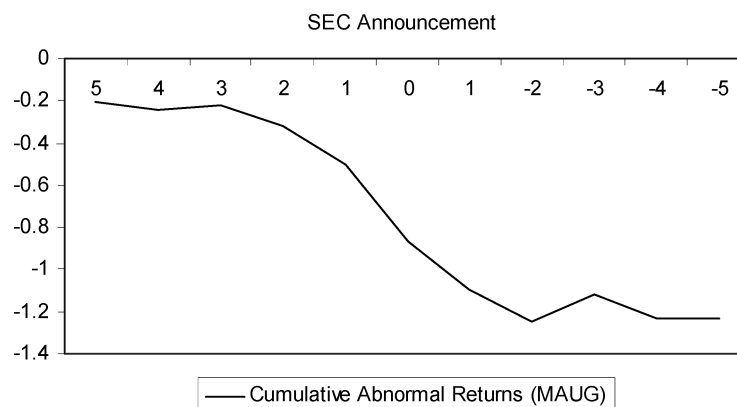
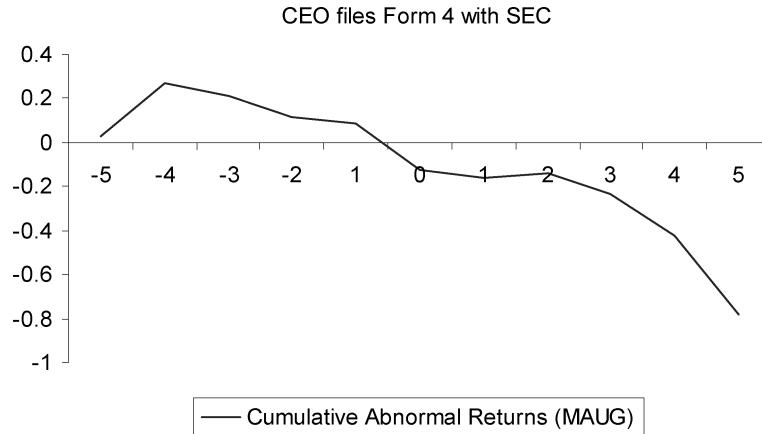


FIGURE 3

Cumulative Abnormal Returns around the CEO's Filing

Figure 3 includes the event study analysis around the date when MAUG's CEO files the form 4, revealing his trading in the firm's equity (August 12, 2004). The standard market model is used to construct the abnormal returns. Abnormal returns are calculated as: $AR_{it} = R_{it} - \alpha_i - \beta(R_{mt})$. Where R_{it} is the return to firm i on day t , α_i is an intercept term estimated using the 110 trading days returns prior to July 1, 2004, β is the market beta for the i th firm estimated using the 110 trading days returns prior to July 1, 2004, and R_m is the market return on day t . Cumulative abnormal returns are the sum of the one-day abnormal return estimates.



that he had sold 100,000 shares at prices ranging from \$0.53 to \$0.99, netting approximately \$85,000 before commissions. The form, cataloguing the CEO's sells, was filed with the SEC seven calendar days before the SEC announcement that the Debbie Calls were part of a pump-and-dump scam. While it would be easy to suspect the CEO of contributing to the Debbie Calls, we note that the SEC is not investigating the CEO and the SEC is not currently considering action against management in this case. However, we note the drop in the securities price after the CEO sells. We hypothesize that investors used this event as a signal that the firm was overvalued

The actions of insiders are often used as an indicator of the future direction of share prices, because insiders possess material non-public information (Lorie and Niederhoffer [1968], Jaffe [1974], Seyhun [1986], Rozeff and Zaman [1988], Lin and Howe [1990]). While insiders may trade for liquidity or diversification purposes, in this case the CEO made five consecutive sales during a period when the stock price was increasing rapidly. This action aided investors in recognizing the information cascade, as the CEO was rapidly selling into an accelerating market. In fact, the declines in the Cumulative Abnormal Return (CAR) noted in Table 3 were most likely precipitated by the Form 4 filing. Figure 3 contains the cumulative abnormal returns for MAUG for five days before and five days after the CEO filed the Form 4 recognizing his sells. Most pronounced is the decrease in abnormal returns on the day of this filing. By the time the SEC announces the

scam, MAUG had given back 86% of its cumulative abnormal returns, returning an additional 36% on the day or the SEC announcement. Taken together, we view results included in Figure 1 and Table 3 as evidence of the informational cascade effect. Clearly, the cascade formed with limited to no new information and continued until new, relevant information was introduced (i.e., the CEO selling and the SEC announcement), after which the fragility of the cascade was illustrated by the quick collapse in price of MAUG's shares.

Conclusion

In this work we document the formation of an information cascade based on a series of messages left on thousands of answering machines during July 2004. We show that these messages contained no relevant or material actionable financial information, but they resulted in the creation of more than \$100 million in market capitalization value for the firm mentioned in the message.

This anecdote illustrates that investors are willing to trade outside the bounds of intrinsic value in the short run, but once given creditable signals regarding a security's value they quickly adjust their beliefs and corrections occurs. Investors, in this context, abandoned their own private signals for those of the market and drove the price of the security up ten times its pre-message level.

Consequently, two months after the scam was revealed, the price of the security was almost exactly what it was the month before the scam began, 9.3 cents in October versus 9.7 cents in June. The impetus for the price decrease was not an announcement by the SEC that the messages were part of a pump-and-dump scam, but rather was related to the actions of the firm's CEO. However, once investors received a credible signal (i.e., the CEO entering the market as a seller), the price of the equity began its decent. Once this signal was received, the market moved rapidly from a state of irrationality to a state of rationality.

Notes

1. <http://www.sec.gov/litigation/complaints/comp19213a.pdf>

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