

The News and Stock Market Activity in Canada

Cheng Zhang

A Thesis

In

John Molson School of Business

Presented in Partial Fulfillment of the Requirements
for the Degree of Master of Science in Administration (Finance) at
Concordia University
Montreal, Quebec, Canada

May 2006

© Cheng Zhang, 2006



Library and
Archives Canada

Bibliothèque et
Archives Canada

Published Heritage
Branch

Direction du
Patrimoine de l'édition

395 Wellington Street
Ottawa ON K1A 0N4
Canada

395, rue Wellington
Ottawa ON K1A 0N4
Canada

Your file *Votre référence*
ISBN: 978-0-494-20818-2
Our file *Notre référence*
ISBN: 978-0-494-20818-2

NOTICE:

The author has granted a non-exclusive license allowing Library and Archives Canada to reproduce, publish, archive, preserve, conserve, communicate to the public by telecommunication or on the Internet, loan, distribute and sell theses worldwide, for commercial or non-commercial purposes, in microform, paper, electronic and/or any other formats.

The author retains copyright ownership and moral rights in this thesis. Neither the thesis nor substantial extracts from it may be printed or otherwise reproduced without the author's permission.

AVIS:

L'auteur a accordé une licence non exclusive permettant à la Bibliothèque et Archives Canada de reproduire, publier, archiver, sauvegarder, conserver, transmettre au public par télécommunication ou par l'Internet, prêter, distribuer et vendre des thèses partout dans le monde, à des fins commerciales ou autres, sur support microforme, papier, électronique et/ou autres formats.

L'auteur conserve la propriété du droit d'auteur et des droits moraux qui protègent cette thèse. Ni la thèse ni des extraits substantiels de celle-ci ne doivent être imprimés ou autrement reproduits sans son autorisation.

In compliance with the Canadian Privacy Act some supporting forms may have been removed from this thesis.

Conformément à la loi canadienne sur la protection de la vie privée, quelques formulaires secondaires ont été enlevés de cette thèse.

While these forms may be included in the document page count, their removal does not represent any loss of content from the thesis.

Bien que ces formulaires aient inclus dans la pagination, il n'y aura aucun contenu manquant.


Canada

ABSTRACT

The News and Stock Market Activity in Canada

Cheng Zhang

This study explores the relationship between public information and Canadian stock market activity. Headlines of stories published by Canada NewsWire from 1999 through 2003 were indexed and characterized by content and timing of release and then associated with measures of market activity, such as daily return, the number of transactions, and the volume of trade on the Toronto Stock Exchange, for both a broad index and individual companies. While strong patterns in the way news is released are not evident, there is systematic seasonal and daily variation. About 12% of the variation in the volume of trade and 3% of the variation in average daily return can be attributed to the flow of all news as measured by the number of stories released, but these numbers drop sharply when the flow of news is restricted to the number of headlines mentioning company names. The first finding suggests that news is uncertainty or divergence of opinion which results in more trade but the effect on the market is largely netted out. The second suggests that markets do respond to general news and not just firm-specific news, a vindication of sorts for market efficiency, but that most trade remains unexplained.

ACKNOWLEDGEMENTS

I am very grateful to my thesis supervisor Dr. Gregory Lypny for his continuous encouragement and unconditional support.

I appreciate Dr. Sandra Betton and Dr. Stylianos Perrakis for their insightful comments that improved the content of the thesis.

Wholehearted gratitude to my parents, whose belief in education has been my inspiration for knowledge, and motivated me to pursue advanced academic studies.

TABLE OF CONTENTS

I. INTRODUCTION.....	1
II. BACKGROUND.....	3
III. DATA AND METHODOLOGY.....	6
A. HEADLINES.....	6
B. COMPANY NAMES.....	11
C. STOCK DATA.....	12
D. MERGING HEADLINES AND STOCK DATA.....	12
E. GRANGER CAUSALITY TEST.....	12
F. ORDINARY MULTIPLE REGRESSION ANALYSIS.....	14
G. PANEL DATA REGRESSION.....	15
H. ORDINARY MULTIPLE REGRESSION ON SUBSET DATA.....	16
IV. RESULTS.....	17
A. NEWS ARRIVAL.....	17
B. CORRELATION ANALYSIS AND CAUSALITY TESTS.....	22
C. REGRESSION ANALYSIS — MARKET.....	26
D. REGRESSION ANALYSIS — COMPANIES.....	29
E. REGRESSION ANALYSIS — SELECTED COMPANIES.....	31
V. DISCUSSION.....	33
A. INFORMATION ARRIVAL.....	33
B. INFORMATION AND MARKET ACTIVITIES.....	34
VI. CONCLUSION.....	36
VII. REFERENCES.....	37

I. Introduction

The Efficient Markets Hypothesis poses that security prices continuously reflect all information about the cash flow that may ultimately end up in the hands of investors. This efficiency is achieved by investors reacting promptly to new information, demanding or offering the securities affected, which in turn causes their prices to change too quickly to be exploited. The implication of this is that no one can make themselves wealthier by trading on information, at least not in the long run.

Evidence against the Efficient Market Hypothesis can be found in studies that show that some prices change predictably and that these patterns can be exploited profitably. DeBondt and Thaler (1985, 1987) were among the first to show that investors could profit from momentum by buying stocks whose prices had risen recently because their prices were more likely than not to continue rising, if only for a short time. They were also able to show that profits could be made by investing in a portfolio of loser stocks — those whose average returns were comparatively low — and financing this by selling a portfolio of winner stocks. Repeated application of the strategy takes advantage of the fact that stock returns tend to be negatively serially correlated or mean reverting over longer terms. The momentum anomaly was later shown to be pervasive and global, and both patterns are consistent with investors over-reacting to both good news and bad. Seasonality in security price movements, likewise, suggests that investors can profit by trading at specific times. Haugen and Lakonishok (1987, 1988) demonstrate this for a predictable spike in returns in early January, although the chances of profiting from it have diminished greatly. Other anomalies include the weekend effect, the turn-of-the-month effect and various holiday effects.

What these studies have in common is that they test an implication of the Efficient Markets Hypothesis without directly testing the posited relationship between primary information and security price changes itself. These tests, popular in the 1980s and typically focusing on the properties of return distributions or the profitability of trading strategies, were true to the spirit of positive economics by giving more prominence to the central implications of a model than its underlying assumptions. More recent studies, however, have attempted to connect information arrival with market activity directly in order to find the evidence in support of the assumed relationship, and this, in my opinion, may lead to explanations for the properties of return distributions, including the anomalies. The rationale is that if information does influence the market and information arrival is not random, then the market itself would display patterns. Evidence about the extent to which market activity does or does not depend on information, moreover, can tell us how badly we need to look for alternative explanations, investor irrationality being a top contender.

This study, therefore, explores the extent to which stock market activity in Canada is affected by the flow of general information. It can shed light on a potential source of temporal anomalies, but the broader objective is to get a sense of the strength of the direct relationship between information arrival and market activity, while recognizing that the conclusions that can be drawn from an observed relationship are limited. Ex-ante, we expect that a relationship exists but can say little about its size or strength; and it goes without saying that the absence of an observed relationship or only a weak one doesn't mean it doesn't exist; With that caveat, the headlines of stories published by Canada NewsWire from 1999 to 2003 were examined and related to measures of activity on the

Toronto Stock Exchange (TSX), such as the daily return on an index of all common stocks traded, the volume of trade, the number of transactions, and similarly for individual companies. It is found that news in general explains about 12% of the variation in transactions and volume and about 3% of the variation in returns. The relationships with company-specific news are far weaker. This can be viewed as supporting efficiency in that the market is influenced by diverse, and presumably relevant, information rather than just that which is flagged as such.

The rest of the paper is organized as follows. Section II provides background on news-market studies, focusing on the data selection and methodology. Section II describes the data selection criteria and method of analysis, and discusses the validity of the using Canada NewsWire releases as a proxy for information. Section IV reports the results of the analysis, beginning with a description of the distribution of news, and then regression analyses of measures of market and individual stock activity against news arrival. Section V discusses the results, and VI concludes.

II. Background

The relationship between information and market activity has not been studied intensively because information is all-encompassing. Information is broadly defined in economics and is qualitatively complex by its nature, so it is difficult to proxy and analyze. Comprehensive and reasonably accessible news archives only began to spring up with the widespread use of the Internet and World Wide Web. Rozeff and Kinney's (1976) study of the January effect could only speculate that abnormal returns might stem from an

above-average amount of company news being released in the first month of the year. French and Roll (1986) likewise suggest, without doing actual tests that public and private information might be behind the day-of-the-week and weekend effects.

This changes with Thompson, Olsen, and Dietrich (1987) who use *Wall Street Journal Index* announcements to study firms listed on the New York Stock Exchange and the American Stock Exchange. They find significant day-of-the-week and month-of-the-year patterns in information arrival. Looking at firm-specific stories, such as earnings and dividend reports, they are able to determine that the cross-sectional distribution of average daily returns differs on days with news from those with none. Their study of firm-specific stories are similar to classic event studies in the sense that they both study event and its influence to market, whereas a fundamental difference between two types of study are whether the focus is on the information (i.e. consist all kinds of event) or on a certain type of event.

Berry and Howe (1994) and Mitchell and Mulherin (1994) link the flow of news to overall market activity. Berry and Howe (1994) quantify the arrival of information by the number of daily newspaper headlines and earnings announcements indexed by Reuter's News Service. They document distinct intraday arrival patterns and find a positive but modest relationship between the amount of news and trading volume. They are, however, unable to conclude that the same relationship exists between news and the price volatility of the Standard and Poors 500 index. Mitchell and Mulherin (1994) also count stories, but use Dow Jones and Company as their source, to study news and both the New York Stock Exchange and American Stock Exchange. They too find that while the relationship between information and trading volume is moderate, news accounts for little of the vari-

ability in market return. They also find that proxies for news importance, story prominence in *New York Times* headlines and whether the day's stories contained at least one of 17 major macroeconomic announcements, bear little connection to market activity. More recent studies on the news-market relationship continue to use firm-specific announcements but longer time horizons. Kalev et al. (2003) find a significant positive relationship between the rate of firm-specific news arrival and the variance of return on a selected group of stocks listed on the Australian Stock Exchange.

The connection between news arrival and market activity is therefore fuzzy, being either weak or small; Roll (1988) had in fact reported earlier that stories in the financial press had little effect on the return of 96 large stocks. Damodaran (1989) finds a clear day-of-the-week information arrival pattern yet fails to uncover a link between news and market activity. Haugen, Talmor, and Torous (1991) likewise find only a weak connection between major stories and big movements in stock prices. This has led some researchers to speculate that some forms of market activity, particularly trading volume, may be driven by other factors, like the need for liquidity, rather than information. Kalev et al. (2003) suggest that informed traders may prefer to disguise their informational advantage by making several small-to-medium sized trades, and that this may lessen the strength of any connection between trading volume and information arrival. Anderson (1996) documents that up to 35 percent of daily trading is unrelated to news arrival.

Our study extends the previous literature on information and market relation in several areas. For the first time, we select a Canadian news source as information proxy to explore its relationship with Canadian market activities; furthermore, our news source, unlike many mentioned above, is an exhaustive information source that covers not only

firm-specific news but also macroeconomics, political and social stories relevant to Canada. We improve market activity measures by introducing two more measures in addition to trading volume and return. The daily transaction measure allows us to count for the argument of Kalev et al. (2003) that informed traders tend to break a big volume trade into several small or medium sized trades; the mean absolute return measure improves in the sense that it leaves the magnitude of return unchanged as opposed to a simple market index return whose magnitude is largely netted out by its components.

III. Data and Methodology

A. Headlines

The news data used in this study are 127,375 stories released by Canada NewsWire from 1999 to 2003, and obtained through an academic subscription to Factiva, an online distributor of news.¹ Canada NewsWire (CNW) is a multi-media disseminator of news from source, whose clients, as pointed out on its home page, are “public companies, associations, unions, not-for-profits, municipal, provincial, and federal governments...”. According to the Canadian Public Relations Society (CPRS)², the CNW Group web site is the most frequently used and most widely accessed full-text news release site in Canada. It is therefore reasonable to assume that market participants are aware of this service and that the information obtained from it may feed into investment decisions. It is worth emphasizing that the influence of *general* news and not just business or economic news is of

¹ We are grateful for the research assistance of Steven DiMarco who devised a way to download the raw CNW data and perform a preliminary analysis. CNW website: www.newswire.ca/en/; Factiva website: www.factiva.com/.

² www.cprsottawa.com/english/.

interest here. Unlike other studies in this vein, specific topics were not sought, the stories were not classified by subject, nor were Canada NewsWire's own classifications used³; in this regard, the sample is free of selection bias. The stories cover everything from allergy alerts and murders to earnings announcements and trading halts.

The growth in the number of stories from year to year, as shown in Table I, is consistent with that of other news providers, as is the number of headlines mentioning company names. It is likely that the sample of stories for 2003 is incomplete, although the distribution of stories across time and topics for that year does not suggest systematic omissions. Nonetheless, we dropped 2003 from the regression analyses, although it is included in the profile of news.

³ In fact, the Canada NewsWire and Factiva web sites have subject and keyword search capabilities, but these were unavailable to us because we were retrieving entire years of stories.

Table I
Canada NewsWire Stories, 1999-2003

Year	All News	Company News
1999	17,653	6,645
2000	25,887	6,767
2001	32,764	7,181
2002	37,403	6,848
2003	13,668	2,652
Total	127,375	30,093

All News is the number of Canada NewsWire stories, and Company News is the number of stories whose headlines contain at least one company name.

The number of stories related to public firms will be understated because some headlines do not contain a firm's name; it will be overstated, in a sense, whenever a headline contains a company name but the story itself has little to do with the company. However, since a typical headline format consists a party's name and its action, we do not see either understatement or overstatement pose a serious flaw to our counting accuracy. These sources of error aside, the headlines with company names are representative of that reported in Canada's three biggest newspapers. Table II shows that the rank order of the number of times that the 12 biggest companies, by market capitalization 2005, are mentioned in Canada NewsWire headlines is comparable to that found in the newspapers. The numbers for citations in newspapers is generally higher because those also include names found in the body of stories and, in particular, regular columns such as market commentaries and stock updates. Table III lists other Canadian news providers.

Table II
A Comparison of Canada NewsWire and Three Newspapers
Using Selected Companies Listed on the Toronto Stock Exchange

Company Name	CNW	Globe and Mail	National Post	Toronto Star
Alcan	182	292	648	184
ATI Technologies	164	182	387	136
Barrick Gold	67	190	548	131
Biovail	13	234	319	92
Bombardier Aerospace	64	43	109	62
Canadian National Railway	14	267	388	125
Hudson's Bay Co.	213	184	539	201
Molson Breweries	9	59	72	21
Nortel Network	388	1,074	2,116	1,241
Rogers Communication	446	270	703	167
Royal Bank	542	551	1,997	721
TransCanada Pipeline	53	190	299	40

The number of stories mentioning selected companies listed on the Toronto Stock Exchange and reported by CNW, *The Globe and Mail*, *The National Post*, and *The Toronto Star* in 2003. The numbers for CNW report only instances of company names found in headlines, whereas those for the three newspapers report names found in headlines and the body of stories. The source for citations in the three newspapers is Canadian NewsStandard on Proquest. www.proquest.com/products_pq/descriptions/canadian_newsstand.shtml

Table III
Canadian News Syndicates and Distributors

Provider	Focus	Coverage	Timing
Artistat Canada Limited	General	Regional	Yes
Bowdens Media Monitoring Limited	General	Regional	No
Broadcast News Limited	N/A	N/A	N/A
CKWX News (Ratio)	General	National	Yes
CNW Telbec (Canada NewsWire)	General	National	Yes
Dow Jones & Company (Canada) Incorporated	Business	Continental	Yes
Federation Des Producteurs Aceriocolos Du Que.	General	Regional	No
Habendum Holding Limited	N/A	N/A	N/A
La Federation Da La Metgeneralurgie (CSN)	General	National	Yes
News Canada Incorporated	General	National	Yes
Press News Limited	General	National	Yes
Reuters Information Service (Canada) Limited	Business	Worldwide	Yes
Snell Medical Communication Incorporated	Business	Regional	No
Syndicat Des Ressources Du Lac Meston (CSN)	General	Regional	Yes
The Canadian Press	General	National	Yes
This week Limited	N/A	N/A	N/A

Source: National Service Directory (2005).

We developed software to process and index the raw story data by date and time, and the headlines by company name, and keywords. Only the headlines and not the stories themselves were analyzed for this study. A description of the 18 variables in the resulting headline database is given in Table IV.

Table IV
The Headline Database

Variable	Description
1. Headline No.	Record number in order of release date. It is unique.
2. Old Headline No.	Record number in order of original indexing. It is unique.
3. GMT Time Stamp	Greenwich Mean Time
4. ET Time Stamp	Eastern Time
5. Numeric Date	YYYYMMDD
6. Year	YYYY
7. Month	Abbreviated month name
8. Day	Abbreviated day name
9. Hour	Hour using 24-hour clock
10. Minute	Minutes
11. Time Type	Eastern Standard Time (EST) or Daylight Savings Time (DST)
12. Trading	1 if the story was released during normal trading hours, 9 AM to 4 PM; 0 otherwise.
13. Extended Trading	1 if the story was released during extended trading hours, between 4 PM and 5 PM; 0 otherwise.
14. Non-Trading	1 if the story was released when TSX was closed; 0 otherwise.
15. Headline	The headline
16. Words	Number of words in the story
17. Source	Source of the story
18. CNW Serial No.	CNW's own serial number

B. Company Names

Company names were obtained from The Canadian Financial Markets Research Centre Summary Information Database.⁴ The core list includes all 3,686 common stocks listed on the Toronto Stock Exchange as of the summer 2005. Software was written to index these, separate the suffixes (e.g., Corporation, Limited, Incorporated, etc.) from the primary name, and then rebuild the primary name from the fewest constituent words to arrive at a version of each name that would most likely appear in the press. The names were checked for uniqueness, but some names that are substrings of others were permitted if the companies are connected or could be perceived to be connected (e.g., Canadian Pacific and Canadian Pacific Railways). In a small number of cases suffixes were reattached to one-word names, such as Asbestos [Corporation], to avoid confusion of the name with the noun in searches. The final list consists of 2,922 names, examples of which are shown in Table V. These were used to search the headlines.

Table V
Selected Company Names

Company Name	Suffix	Number	Ticker
Ashton Mining Of Canada	Incorporated	28	ACA
Scott's Restaurants	Incorporated	3057	SRG
Upper Canada Brewing	Company Limited	3398	UCB
Zenith Electric Supply	Limited	3678	ZES

Examples of company names that were searched for in headlines.

⁴ www.lib.uwo.ca/business/CFMRC.html

C. Stock Data

Daily log-differenced total returns for the 1,258 trading days from 1999 through 2003 for the TSX composite index and all common stocks were obtained from The Canadian Financial Markets Research Centre. An equally-weighted daily index of the absolute return of all common stocks was also constructed. This index is essentially an undiversified proxy of the market that allows the relationship between firm-specific news and the market to be better captured. Finally, aggregate daily transactions and volume of trade were computed using the data for all common stocks listed.

D. Merging Headlines and Stock Data

News is released 24 hours a day, seven days a week, but stocks are traded on the TSX Monday through Friday from nine o'clock in the morning until four in the afternoon, with extended trading of about an hour. Each news story therefore had to be assigned to its nearest trading day. For 101,838 of the stories, the publication date and the trading date are the same because the stories were released between the close of trading on the previous day and the close of trading on the release day; the other 25,537 were assigned the next nearest trading date, which was typically one to five days after the publication date.

E. Granger Causality Test

Some news is the result of stock market activity rather than the other way around (*The TSX composite index dropped ten points today*). The Granger Causality Test is used to test whether this sort of endogeneity is a problem.

The test is conducted by assuming an autoregressive lag length, p , and estimating the fol-

lowing unrestricted equation by ordinary least squares: $x_t = c_1 + \sum_{i=1}^p \alpha_i x_{t-i} + \sum_{i=1}^p \beta_i y_{t-i} + u_t$,

where x and y represent a market activity variable and information variable or *vice versa*, depending on the direction of the test.

An F -test of the null hypothesis $H_0: \beta_0 = \beta_1 = \beta_2 \dots \beta_p = 0$ is conducted by estimating the

restricted equation $x_t = c_1 + \sum_{i=1}^p \gamma_i x_{t-i} + e_t$ by ordinary least squares, and comparing their

respective sum of squared residuals,

$$RSS_1 = \sum_{t=1}^t u^2_t, \text{ and } RSS_0 = \sum_{t=1}^t e^2_t$$

using the test statistic

$$S_1 = \frac{(RSS_0 - RSS_1) / p}{RSS_1 / (t - 2p - 1)} \sim F_{p, t-2p-1}.$$

If S_1 is greater than the specified critical value, the null hypothesis that y does not Granger-cause x is rejected.

F. Ordinary Multiple Regression Analysis

The effect of news on the market is explored by estimating eight simple regressions, where market activity (the dependent variable) is represented, in turn, by the number of transactions, trading volume, the mean absolute return on the market, and the total return on the TSX composite index. These are regressed on the total number of news releases (All News) and then on the total number of news releases that mention at least one company name in a headline (Company News). Controls for the day of the week are also included.

$$\text{Market activity measures}_i = \alpha + \beta \text{information proxy}_i + \varepsilon$$

The effect of news on individual companies is analyzed similarly except that four panel regressions are run with common intercepts and coefficients. Daily return and trading volume are each regressed on the total number of news releases and then on the total number of news releases that mention at least one company name in a headline, along with controls for the day of the week. An additional dummy variable is included to flag those days on which a specific company has appeared in the news. Three hundred companies were included in the panel, each satisfying the requirement of having observations for at least 1,132 of the 1,258 trading days (90%) and having appeared in at least one headline. Following Switzer, Roth, and Switzer (1998), the panel is left unbalanced with the dates for missing observations simply omitted, and as discussed previously, observations for 2003 are dropped, so that the maximum number of observations for any one company is 1,005.

$$Return_{i,t} = \alpha + \beta_1 TSXReturn_t + \beta_2 information\ proxy_t + \beta_3 dummy_{i,t} + \varepsilon_i$$

$$Volume_{i,t} = \alpha + \beta_1 TotalVolume_t + \beta_2 information\ proxy_t + \beta_3 dummy_{i,t} + \varepsilon_i$$

G. Panel Data Regression

A panel data regression is used to analyze the impact of information on market activity at the level of the firm. A panel regression has the potential to handle both cross sectional and time series data better than ordinary multiple regression techniques in the sense that the estimates of coefficients derived from regression are not subject to omitted variable bias.

The error specification for the two-way panel regression model is

$$u_{it} = v_i + e_t + \varepsilon_{it}$$

where each is assumed *iid* and normally distributed

Let X^* and y^* be the independent and dependent variables arranged by time and by cross section within each time period. (The data set must be sorted by cross section and then by time within each cross section.) Let M_t be the number of cross sections observed in year t and let $\sum_t M_t = M$. Let D_t be the $M_t \times N$ matrix obtained from the $N \times N$ identity matrix from which rows corresponding to cross sections not observed at time t have been omitted. Consider

$$Z = (Z_1, Z_2),$$

where $Z_1 = (D^1, D^2, \dots, D^T)'$ and $Z_2 = \text{diag}(D_1 j_N, D_2 j_N, \dots, D_T j_N)$. The matrix Z gives the dummy variable structure for the two-way model.

$$\text{Let } \Delta_N = Z_1' Z_1, \quad \Delta_T = Z_2' Z_2, \quad A = Z_2' Z_1$$

$$\bar{Z} = Z_2 - Z_1 \Delta_N^{-1} A'$$

$$Q = \Delta_T - A \Delta_N^{-1} A'$$

$$P = (I_M - Z_1 \Delta_N^{-1} Z_1') - \bar{Z} Q - \bar{Z}'$$

The estimators for the intercept and the fixed effects are given by the usual OLS expressions. The estimate of the regression slope coefficients is given by

$$\tilde{\beta}_s = (X_{*s}' P X_{*s})^{-1} X_{*s}' P y_x$$

where X_{*s} is the X_* matrix without the vector of 1s.

The estimator of the error variance is

$$\hat{\sigma}_\varepsilon^2 = \tilde{u}' P \tilde{u} / (M - T - N + 1 - (K - 1))$$

where the residuals are given by $\tilde{u} = (I_M - j_M j_M')(y_* - X_{*s} \tilde{\beta}_s)$ if there is an intercept in the model and by $\tilde{u} = y_* - X_{*s} \tilde{\beta}_s$ if there is no intercept.

H. Ordinary Multiple Regression Analysis on subset data

The panel regression described above is not an approach without drawbacks. In our case specifically, it has too many cross-sectional observations (307), requiring too many dummy variables for their specification. This situation may sap model efficiency and reduce the power of statistical tests. Furthermore, the distribution of company news is highly skewed with the vast majority of the 307 firms making the news less than five times, whereas some five firms appear in the headlines hundreds of times. We therefore perform individual simple regression analyses on a subset of firms.

The firms in this subset were chosen to meet two criteria. First, valid observations of its market activity had to be available throughout 90% of the sample period, in other words, no more than 10% missing observations. Second, each firm has a relatively high frequency of news appearances in that each must have appeared in a headline at least 100 times during the five years. This screening left 23 major firms for analysis. Three regressions were run for each, the model remaining the same as the panel regression.

$$MarketActivity_t = \alpha + \beta_1 ControlVariable_t + \beta_2 All\ News_t + \beta_3 dummy_t + \varepsilon_t$$

IV. Results

A. News arrival

In seeking to establish whether market activity is affected by the news in general, it is worthwhile to see whether there are patterns in news arrival day to day, month to month, and even during the course of a day. Table VI shows that news traffic is thickest during the middle of the week, Tuesday, Wednesday, and Thursday; it drops off on Friday; there is little on the weekends, and it takes Monday for traffic to pick up again. Most importantly, the distribution of company news, which is usually studied in isolation, tracks general news closely. The null hypothesis that the average number of stories is the same each day of the week is strongly rejected for both general news and company news.

Table VI
Canada NewsWire Stories by Day of the Week, 1999 to 2003

	All News	Company News
Monday	89	22
Tuesday	102	26
Wednesdays	101	26
Thursday	105	25
Friday	82	19
Saturday	6	2
Sundays	6	1
All Days	73	21
F-stat	233.05	97.50
p-value	0.000	0.000

Average number of stories per day. All News refers to all Canada NewsWire stories, and Company News refers to stories whose headlines contain at least one company name. F-test has a null argument of an equal number of news stories per day.

That firm performance is often reported and analyzed quarterly suggests the possibility of a news cycle with a bigger number of financial stories in the first month of second, third, and fourth quarters. This isn't the case, as can be seen in Table VII, although the null hypothesis that the average number of stories is the same each month is rejected for all news and company news. And as with the daily arrival of news, company news closely tracks all news from month to month; the coefficient of correlation is 0.75. Furthermore, the company news also has a fairly high correlation (0.66) with non-company news on monthly basis.

Table VII
Canada NewsWire Stories by Month, 1999 to 2003

	All News	Company News
January	1,568	422
February	1,751	490
March	1,841	484
April	1,921	508
May	2,283	604
June	2,329	495
July	1,872	454
August	1,939	450
September	2,454	489
October	2,778	596
November	2,821	614
December	1,917	413
All Months	2123	502
F-stat	3.19	3.59
p-value	0.003	0.001

Average number of stories per month. All News refers to all Canada NewsWire stories, and Company News refers to stories whose headlines contain at least one company name. F-test has a null argument of an equal number of news stories per month.

From early 1990s, scholars began to discover the imbalance distribution of return variation and trading volume in a trading day. Most studies, including the study of Foster and Viswanathan (1993) on NYSE and Abhyankar et al. (1997) on London Stock Exchange, conclude what they called U-shaped phenomenon that variance of return and trading volume are greater at the beginning and ending trading period. Although there are a few studies have done on intraday trading behaviour on Canadian market, it is interesting to revisit previous discovery to confirm whether in Canada a U-shaped news arrival pattern exists in a trading day. Figure I displays news arrivals pattern by time of day. First, the CNW news stories arrive in an inverted U-shaped, which is similar to Berry and Howe's (1994) finding. Second, the arrival of TSX related new articles exhibit clear U-shaped pattern around the regular trading hour. Close to 50% of TSX related news concentrates in two two-hour intervals: 8:30-10:30 AM and 3:00-5:00 PM. For the same period, the number of CNW news articles only counts for 30% of total intraday volume.

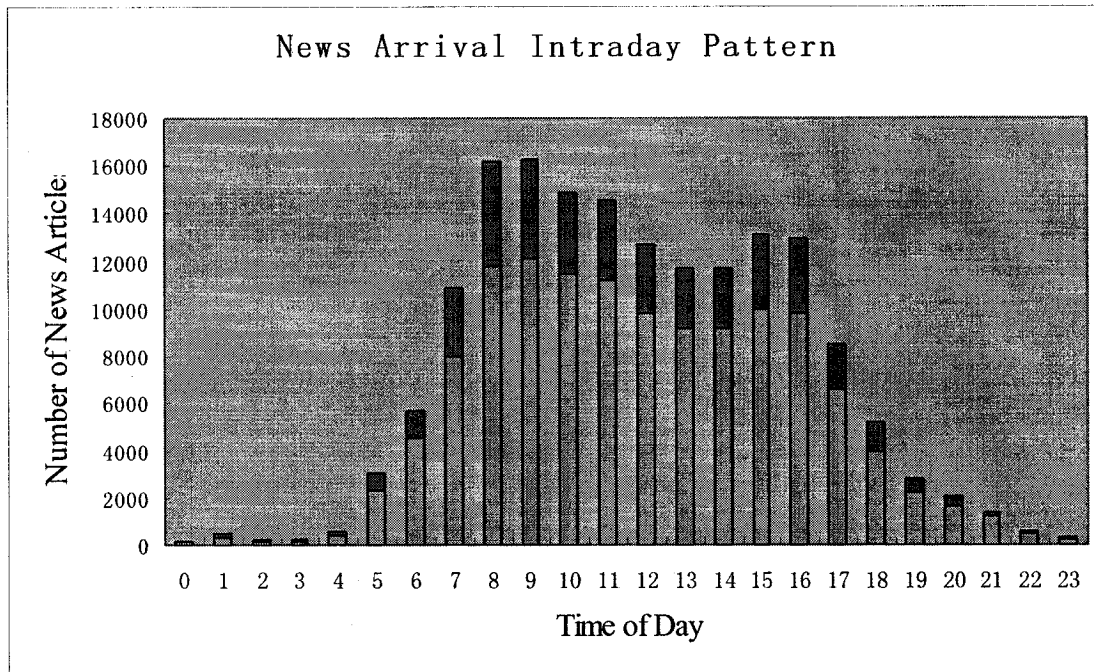


Figure I. Canada NewsWire Stories By Time of Day

The light column represents the average number of stories, and the dark column represents the average number of stories whose headlines mention at least one company name.

We examine the information arrival pattern in three time intervals including hourly, daily and monthly. In general, there is more systematic formation for information arrival in short-term time interval (i.e. hourly, daily) than in longer term time interval. However, whether these detected patterns are powerful enough to influence the market is still unclear. The next section continues to explore the news and market relationship.

B. Correlation analysis and causality tests

As a precursor to regression analysis, Table VIII presents the coefficients of correlation between measures of market activity (Transactions, Volume, MAR, and Index), and measures of information flow (All News, Company News). It can be seen that transactions and volume are more strongly correlated with information flow than are market return (MAR or Index), and that the correlations are stronger for general news than for company-specific news.

Table VIII
Correlation Coefficient of News Article and Market Activities

	Transactions	Volume	MAR	Index	All News	Company News
Transactions	1	.724** (.000)	.334** (.000)	-.018 (.568)	.139** (.000)	.080* (.011)
Volume		1	.196** (.000)	-.009 (.772)	.281** (.000)	.113** (.000)
MAR			1	.110** (.000)	-.147** (.000)	.013 (.673)
Index				1	-.062 (.051)	-.053 (.093)
All News					1	.534** (.000)
Company News						1

This table reports the correlation between four market activity measures and two information flow proxies. Transactions and Volume are the number of daily transactions and volume of trade on all TSX common stock. MAR is the mean absolute daily return on all TSX common stocks, and Index is the daily S&P/TSX composite total return index. All News is the daily number of Canada NewsWire stories; Company News is the number of stories whose headlines contain at least one company name. The sample period is 1999 to 2002 for a total of 1,005 observations. T test of significance is done and the p-values are reported in parentheses. ** Correlation is significant at the 0.01 level (2-tailed test). * Correlation is significant at the 0.05 level (2-tailed).

It is possible that the news reports on market activity, so that there are instances when the direction of causality is reversed. Tables IXa and IXb report the results of Granger causality tests, indicating that the extent of endogeneity is negligible. In Table IXa, we present test results on whether information flow Granger causes market activity. Most F-statistics are significant at 1% level consistent with the hypothesis that information does cause market activity. Neither information proxy is found to Granger cause the number of transactions at 5% level when lag=1 but as we allow the lag value to increase, the F-test suggest that information flow does Granger cause the number of transaction at the 1% significant level. The information proxies Granger cause volume at 1% level at all three lag values. These relationships are stronger for All News than for Company News.

Table IXb reports granger causality test on whether market activity reverse impact information flow. The F-test results reject the hypothesis that market activity affects information flow at all three given lag values at the 5% significant level except for one specific case. Statistically speaking, mean absolute return appears to Granger cause the number of Canada NewsWire article at 1% level when lag value is one.

Table IXa
Pairwise Granger Causality Tests of
Whether Information Flow Causes Market Activity

	Transactions	Volume	Mean Absolute Return	TSX Index Return
Lag = 1				
All News	1.789 (0.181)	24.366 (0.000)	15.377 (0.001)	8.272 (0.004)
Company News	0.109 (0.741)	10.227 (0.0014)	4.379 (0.037)	1.704 (0.192)
Lag = 2				
All News	3.842 (0.022)	15.997 (0.000)	6.32 (0.002)	5.427 (0.005)
Company News	7.189 (0.000)	20.604 (0.000)	2.179 (0.114)	1.089 (0.337)
Lag = 3				
All News	4.284 (0.005)	9.792 (0.000)	3.583 (0.013)	3.579 (0.014)
Company News	6.228 (0.000)	14.582 (0.000)	1.485 (0.217)	0.707 (0.548)

This table reports Granger Causality Test statistics on the null hypothesis that information flow does not drive market activity for assumed lags of 1, 2, and 3 days. Market activity is measured four ways: the number of transactions, the volume of trade, the mean absolute return and the return on the S&P/TSX composite index. Information flow is measured by the number of Canada NewsWire stories published (All News) and the number of stories whose headlines contain at least one company name (Company News). All values are daily and cover 1999 through 2002 for a total of 1,005 observations. Each cell shows an F statistic with its p-value in parenthesis.

Table IXb
 Pairwise Granger Causality Tests of
 Whether Market Activity Causes Information Flow

	Transactions	Volume	Mean Absolute Return	TSX Index Return
Lag = 1				
All News	0.211 (0.646)	2.077 (0.149)	6.754 (0.001)	1.555 (0.213)
Company News	0.011 (0.919)	0.192 (0.001)	0.20644 (0.649)	4.892 (0.027)
Lag = 2				
All News	0.09 (0.914)	0.566 (0.568)	1.194 (0.304)	0.591 (0.554)
Company News	0.914 (0.401)	0.614 (0.541)	0.04 (0.961)	2.371 (0.094)
Lag = 3				
All News	0.242 (0.867)	0.279 (0.841)	0.961 (0.41)	0.853 (0.465)
Company News	1.561 (0.197)	1.298 (0.273)	0.327 (0.806)	1.651 (0.176)

This table reports Granger Causality Test statistics on the null hypothesis that market activity does not drive the flow of information for assumed lags of 1, 2, and 3 days. Market activity is measured four ways: the number of transactions, the volume of trade, the mean absolute return and the return on the S&P/TSX composite index. Information flow is measured by the number of Canada NewsWire stories published (All News) and the number of stories whose headlines contain at least one company name (Company News). All values are daily and cover 1999 through 2002 for a total of 1,005 observations. Each cell shows an F statistic with its p-value in parenthesis.

C. Regression analysis — Market

News can affect stock returns, the number of transactions, and the volume of stocks traded. These, along with one additional variable, were used as aggregate measures of market activity to be regressed on the flow of information, which itself was proxied by the number of Canada NewsWire stories released daily (All News) and the number of stories whose headlines contain at least one company name (Company News). The additional market activity variable is the average absolute daily return on all stocks on the TSX, which is a proxy for an undiversified market portfolio.

Table X shows that, after controlling for the day of the week, the number of stories accounts for, at best, two to three percent of the variation in market returns and transactions, and about 12% of volume. The lower panel of the table shows that explanatory power declines if the flow of information is restricted to company news. Furthermore, the effect of news in the aggregate, however small, is current; the explanatory power of these regressions generally declines across market activity measures the greater they are lagged (Table XI). Unlike Mitchell and Mulherin (1994) who found that counting the day-of-the-week effect contributes significantly to the model's overall fit, we find that in Canada, adding day-of-the-week variables has a marginally influence. Our partial F tests suggest that newly added day-of-the-week variables are not significant at 5% level.

Table X
Regression Analysis of Market Activity on Information Flow

<i>Information flow measured by number of stories</i>				
	(1)	(2)	(3)	(4)
	Transactions	Volume	Mean Absolute Return	TSX Index Return
All News	93.947 (4.385)	290,992 (9.499)	0.000 (-5.006)	0.000 (-1.812)
Monday	-5,032 (-1.636)	-18,569,600 (-4.219)	0.003 (2.765)	0.001 (0.511)
Tuesday	1,648 (0.548)	228,330.4 (0.519)	0.002 (1.601)	-0.003 (-2.477)
Wednesday	4,704 (1.574)	7,338,075 (1.717)	0.001 (1.044)	-0.002 (-1.4160)
Thursday	2,983 (0.994)	2,981,586 (0.695)	0.001 (1.245)	0.000 (0.259)
Adjusted R-squared	0.031	0.116	0.029	0.017
<i>Information flow measured by number of headlines containing company names</i>				
	(5)	(6)	(7)	(8)
	Transactions	Volume	Mean Absolute Return	TSX Index Return
Company News	204 (1.965)	428,372 (2.801)	0.000 (0.267)	0.000 (-0.101)
Monday	-3,985 (-1.28)	-14,311,062 (-3.119)	0.002 (1.914)	0.001 (0.417)
Tuesday	2,076 (0.67)	5,109,419 (1.118)	0.001 (0.736)	-0.003 (2.404)
Wednesday	4,715 (1.52)	8,913,754 (1.953)	0.000 (0.335)	-0.002 (-1.307)
Thursday	3,641 (1.183)	6,463,543 (1.424)	0.000 (0.356)	0.000 (0.2330)
Adjusted R-squared	0.016	0.044	0.005	0.015

This table reports the results of eight regressions of market activity on the flow of information. The four regressions in the upper panel use the number of Canada NewsWire stories published (All News) as the measure of information flow while the four in the lower panel use the number of stories whose headlines contain at least one company name (Company News). Day-of-the-week dummies are included. Intercepts are not reported. Market activity is measured four ways: Transactions is the total number of transactions on the TSX divided by the daily average; Volume is total trading volume divided by the daily average; Mean Absolute Return is the daily average absolute return of all TSX traded stocks; TSX index is the daily total return on the TSX composite index. All data are daily and run from 1999 through 2002 for a total of 1,005 observations ($df = 999$). Student t-statistics appear in parenthesis under each estimated coefficient.

Table XI
Regressions of Market Activity on Lagged Information Flow

All News				
	Transactions	Volume	Mean Absolute Return	TSX Index Return
Lag = 1	0.019	0.091	0.030	0.009
Lag = 2	0.013	0.062	0.025	0.002
Lag = 3	0.009	0.069	0.027	0.002
Company News				
	Transactions	Volume	Mean Absolute Return	TSX Index Return
Lag = 1	0.005	0.022	0.003	0.002
Lag = 2	0.000	0.000	0.003	0.003
Lag = 3	0.000	0.000	0.003	0.000

This table reports coefficients of determination (R-squared) of regressions of market activity on lagged information flow. Information flow is measured by the number of Canada NewsWire stories (All News) in the upper panel and the number of stories whose headlines contain at least one company name (Company News) in the lower panel. Market activity is measured four ways: Transactions is the total number of transactions on the TSX divided by the daily average; Volume is total trading volume divided by the daily average; Mean Absolute Return is the daily average absolute return of all TSX traded stocks; TSX index is the daily total return on the TSX composite index. The data run from 1999 through 2002 for a total of 1,005 observations.

D. Regression analysis — Companies

That company news influences the market less than all news in general may seem counter-intuitive at first. It may be that measures of market activity simply do not capture the influence of firm-specific news. In exploring this possibility, Table XII reports the results of four panel regressions of daily returns and trading volumes of individual TSX-listed companies on information flow. The volume of stock of a company is significantly related to the explicit mention of that company in the headlines (see the coefficient for Company in both panels), but the flow of information has a negligible effect on individual returns or volume. Similar to our discovery of market regression, controlling for the day-of-the-week does not significantly improve the original panel regression model.

Table XII
Panel Regressions of Information Flow and Company Activity

<i>Information flow measured by number of stories</i>				
	(1)		(2)	
	Return		Volume	
Market	0.002564	(1.03)	0.001891	(24.01)
All News	-0.00002	(-1.21)	488.412	(6.13)
Company	0.00015	(1.03)	34,153	(2.76)
Monday	0.004916	(1.9)	-73,664	(-1.01)
Tuesday	0.00384	(0.15)	-67,392	(-0.901)
Wednesday	0.000331	(0.13)	-61,451	(-0.892)
Thursday	0.000583	(0.23)	-74,849	(0.78)
Adjusted R Squared	0.000		0.0026	
<i>Information flow measured by number of headlines containing company names</i>				
	(3)		(4)	
	Return		Volume	
Market	-0.00127	(-0.49)	0.002024	(26.71)
Company News	0.000079	(0.99)	289.257	(0.79)
Company	-0.00031	(-0.7)	35,701	(2.88)
Monday	0.0404	(1.56)	-51,354	(-1.12)
Tuesday	-0.0068	(-0.66)	-50,447	(-0.856)
Wednesday	-0.00063	(-0.25)	-51,710	(-1.32)
Thursday	-0.00046	(-0.25)	-50,071	(-0.654)
Adjusted R Squared	0.000		0.0025	

This table reports the results of four panel regressions of company activity on information flow. The panel consists of the daily return and trading volume for 307 TSX-listed companies, each missing no more than ten percent of the observations for the period 1999 through 2002 (a maximum of 1,005 observations per company) and having been mentioned in at least one Canada NewsWire headline during that time. Information flow is measured by the number of Canada NewsWire stories published (All News) in the upper panel and the number of stories whose headlines contain at least one company name (Company News) in the lower panel. The variable Company is equal to 1 if the specific company in the panel is mentioned in a headline on a given day and 0 otherwise. Market is the total daily return for the TSX composite index in regressions (1) and (3) and total daily volume for the TSX in regressions (2) and (4). Student t-statistics are reported in parenthesis beside each coefficient estimate.

E. Regression Analysis – Selected companies

Using a group of 23 selected firms, we run individual multiple regressions to verify the panel regression results and capture factor effects that the panel regression may have failed to uncover. In Table XIII, the multiple regression analysis supports the panel regression results in that volume and transactions are more strongly affected by information flow than are returns. More importantly, this result is general in that it is true for the vast majority of firms in the sample. And while the panel regression yielded doubtful, tiny R-squares, the regressions on the selected group of firms shows that using information flow to explain firm specific market activity such as return, volume and transaction yield an overall model fit of 7.5%, 10% and 3.3% respectively.

Table XIII

No.	Return			Volume			Transaction		
	R ²	All News	Co.	R ²	All News	Co.	R ²	All News	Co.
1	0.09	0.00	0.00 *	0.10	4909**	809376**	0.04	91**	7067*
26	0.07	0.00	0.00*	0.03	(1653)	295655**	0.04	21**	1923**
106	0.05	0.00	0.00	0.06	146*	2997*	0.04	87*	7
115	0.12	0.00	0.00*	0.07	1247**	254976*	0.03	95*	(181)
268	0.16	0.00	0.00*	0.13	109	149508**	0.04	87*	6613**
374	0.20	0.00	0.00*	0.21	4942**	(223)	0.03	90**	1864
485	0.11	0.00	0.00**	0.10	5580**	214215**	0.04	102**	(95)*
617	0.05	0.00	0.00	0.05	(238)	1418	0.02	58*	13
1071	0.09	0.00	0.00	0.03	488*	77245*	0.03	92**	1868
1289	0.00	0.00	0.00	0.04	(297)*	29244	0.03	90**	585
1324	0.01	0.00	0.00*	0.25	2602**	36173*	0.04	93**	(613)
1521	0.02	0.00*	0.00	0.04	954*	71629	0.03	94**	527
1886	0.09	0.00	0.00*	0.10	89*	476	0.02	69*	475
2242	0.07	0.00	0.00*	0.10	317*	78477**	0.03	23**	715**
2357	0.09	0.00	0.00	0.06	(548)*	98533**	0.03	88**	4972*
2378	0.25	0.00	0.00*	0.35	948**	26034**	0.04	105**	6592*
2507	0.04	0.00*	0.00	0.07	353*	69651	0.04	90**	692
2523	0.05	0.00	0.00	0.08	557**	54101**	0.03	94**	2212
2524	0.00	0.00	0.00	0.18	5016**	381606*	0.04	101**	(121)
2890	0.07	0.00*	0.00	0.07	262	4481*	0.03	97**	372*
2945	0.03	0.00	0.00*	0.03	(30)	1214*	0.03	93**	348
3070	0.02	0.00*	0.00	0.02	(25)	(8484)	0.03	96**	659
3332	0.03	0.00	0.00*	0.15	(5047)**	137656*	0.03	94*	993

This table reports the results of 69 ordinary least squares regressions, three for each of 23 selected TSX-listed companies, of company activity on information flow, including controls for the day of the week (not shown). To be included in the analysis a company had to have at least 90% valid stock observations during 1999 through 2003 (about 1,005 observations) and be mentioned in at least 100 Canada NewsWire headlines during the same period. Information flow is measured by the number of Canada NewsWire stories published (All News). The variable company (Co.) is equal to 1 if the company in question is mentioned in a headline on a given day and 0 otherwise. The three regressions are shown in the three panels: dependent variables Return (daily total return), Volume (volume of shares traded); and Transactions (number of trades). The estimated coefficients of the independent variables appear in the columns titled All News and Co. (for Company) with regression R-squares preceding each. The company's identifying number appears in the leftmost column.

V. Discussion

A. Information Arrival

There are patterns in the arrival of news. Company news tends to track all news. Its correlation, in daily numbers, with all news and non-company news is 0.75 and 0.66. During the day news traffic, particularly company news, is heaviest at the beginning and end of regular business hours. Over the course of a week, there is noticeably less news on Mondays and Fridays and a lull over the weekend. Patterns, if any, are less obvious over longer horizons. From month to month, the average number of stories differs statistically, dipping lowest during peak holiday season (July and August) and the first quarter of the year.

Managers, presumably possessing better information than ordinary investors, may attempt to influence the market by releasing information at specific times. Canada News-Wire is, in fact, a vehicle for doing just that. Positive news released at the beginning of the trading day and in the middle of the week, may be responded to more readily than that released at other times; so may news released just before markets open. Less positive news may be released on Friday after markets close, or at least at the end of trading during other days of the week, perhaps subduing negative reaction with a period of contemplation. Damodaran (1987) finds support for this hypothesis. He concludes that earnings and dividend announcements made on Fridays are more likely to be negative. While we did not analyze our news releases for positive and negative content, we do find that more of the news is company news at the beginning and end of the trading day. It rises from about one-fifth to almost one-third of all news from eight to ten o'clock in the morning, and then again to one-quarter of all news from four to six o'clock in the afternoon. How-

ever, company news remains firmly at about one-quarter of all news from day to day, although both are, as discussed previously, heaviest in the middle of the week.

Mitchell and Mulherin (1994) find what they call a “financial reporting cycle effect”: a greater number of stories appearing in April, July, and October when public companies file their quarterly reports. Although the number of our stories varies month to month, we do not find pronounced cycling. It may be that the number of TSX firms whose fiscal year end is December 31st is not dominant. And, unlike the United States, there is no clearly regulatory requirement by Ontario Securities Commission requiring public firms to file a quarterly report within 30 days of the end of the fiscal quarter.

B. Information and Market activities

The influence of information flow on market activity is significant but small and smaller still when looking only at company news. Table X shows that the strongest relationship is between All News and trading volume, where 12% of the variation in volume is explained by the number of stories released. The All News and Company News coefficients are significant at 1% level for both the transactions and trading volume regressions. To put this in context, the release of one additional story and one additional company-specific story are associated with an increase of 94 and 204 transactions on the TSX; that translates into 290,000 and 428,000 shares changing hands. There is, moreover, little connection between the number of stories released and the return on the market index. While the All News coefficient is significant for mean absolute return (Table X, regression 3), it is zero to three decimal places as is the Company News coefficient.

The results for individual companies (Table XI) are consistent with the market results but

far weaker. It may be that the use of a common intercept and common coefficients in the panel washed away any advantage that the pooling of time series and cross-sectional data had over the use of market indices. The All News and Company News coefficients are significant in the volume regressions, where an analogous interpretation applies: one additional story is associated with an average of 488 additional shares per company being traded and 289 shares if the headline mentions any company name. In either case, the incremental effect of identifying a specific company in the news (the Company variable as opposed to the Company News variable) is about 35,000 more shares traded per company. In this sense, more information in the form of company identity has the expected effect.

Two questions remain. One is why the relationship between news arrival and return is negligible, while that with transactions or volume is not. It may be that much of the influence on returns is washed away because the market index is an average and the panel regressions involve an averaging too; transactions and volume, on the other hand, are aggregates. The second is why the relationships are stronger with a count of all stories than with a count of company stories. This one can be interpreted as supporting market efficiency. To the extent that general news contains information relevant to the market as a whole (e.g., macroeconomic items) or industry or company items without specific companies necessarily being mentioned (e.g., a new technology), investors do respond to it just as economic theory poses. The implication for future research is that it is worthwhile to branch out from specific or narrow stories (e.g., earnings announcements) to more ambiguous ones in the study of the informational efficiency of markets.

VI. Conclusion

This study examined the relationship between the number of news stories reported daily by Canada NewsWire and three measures of Canadian stock market activity. It is found that news arrival displays temporal patterns, and that the number of transactions and volume of trade on the Toronto Stock Exchange bear a moderate association with the number of general stories released and a smaller one with those whose headlines explicitly mention company names. The relationship between story counts and market returns, however, is negligible. That news for which no specific messages have been identified explains more of the variation in market activity than ostensibly company-specific news holds promise for research into the analysis of story content and the way and the way in which the market incorporates it.

VII. References

- Abhyankar, A., D. Ghosh, E. Levin, and R. J. Limmack, 1997, Bid-ask spreads, trading volume and volatility: Intra-day evidence from the London Stock Exchange. *Journal of Business Finance & Accounting*, 24, 321-343.
- Andersen, T.G., 1996, Return volatility and trading volume: An information flow interpretation of stochastic volatility. *Journal of Finance*, 51, 169–204.
- Berry, T. D., and K. M. Howe, 1994, Public information arrival. *The Journal of Finance*, 49, 1331-1346.
- De Bondt, W. F. M., and R.H. Thaler, 1985, Does the market overreact? *The Journal of Finance*, 40, 793-805.
- De Bondt, W. F. M., and R.H. Thaler, 1987, Further evidence on investor overreaction and stock market seasonality. *The Journal of Finance*, 42, 557-581.
- Damodaran, A., 1989, The weekend effect in information releases: A study of earnings and dividend announcements. *The Review of Financial Studies*, 2, 607-624.
- Fama, E.F., 1965, The Behavior of Stock Market Prices, *Journal of Business*, 38, 34-108
- Foster, F. D., and S. Viswanathan, 1993, Variations in trading volume, return volatility and trading costs: Evidence on recent price formation models. *Journal of Finance*, 48, 187-211
- Fred S Switzer III, Philip L Roth, Deborah M Switzer. 1998, Systematic data loss in HRM settings: A Monte Carlo analysis. *Journal of Management*, 24, 736-763
- French, K. R., and R. Roll, 1986, Stock return variances – The arrival of information and the reaction of traders. *Journal of Financial Economics*, 17, 5-26
- Granger, C.W.J. and Newbold, P., *Forecasting Economic Time Series*. New York: Academic Press, Inc (1977).
- HAUGEN, R.A. and J. LAKONISHOK, *The incredible January effect: the stock market's unsolved mystery*, Homewood, Ill.: Dow Jones-Irwin, (1987).
- Haugen, Robert A., Talmor, Eli, Torous, 1991, Walter N., The Effect of Volatility Changes on the Level of Stock Prices and Subsequent Expected Returns. *The Journal of Finance*, 6, 985-1107
- Lakonishok, Josef, and Edwin Maberly, 1990, The weekend effect: Trading patterns of individual and institutional investors. *Journal of Finance*, 45, 231-243
- Mitchell, M.L., and J.H. Mulherin, 1994, The impact of public information on the stock Market. *Journal of Finance*, 49, 923-950

Kalve P. S., Peter Pham K. P., and Elvis J., 2003, Public information arrival and volatility of intraday stock returns. *Journal of Banking and Finance*, 28, 1441-1467

Rozeff, M.S., and W.R. Kinney Jr., 1976, Capital market seasonality: the case of stock returns. *Journal of Financial Economics*, 3, 379-402.

Stoll, H.R., and R.E. Whaley, 1990, Stock market structure and volatility. *The Review of Financial Studies*, 3, 37-75.

Thompson, R.B., C.Olsen, And J.R. Dietrich, 1987, Attributes of news about firms: An analysis of firm-specific news reported in the Wall Street Journal Index. *Journal of Accounting Research*, 25, 245-274.