

# 非預期淨利對股價之影響—— 對在美國上市之加拿大 及亞洲公司之測試

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**中文摘要** 在會計上已有許多學者研究過股票價格對非預期淨利之反應，但過去這些研究主要集中於來自同一資訊系統（指相同之一般公認會計原則）之各公司。由於不同國家的一般公認會計原則不一樣，因而對於證券上市公司有不同的要求。本篇研究即在探討對這些來自不同會計資訊系統的公司所發佈之會計資訊，股票價格是否會有不同的反應。美國證券管理委員會允許符合一定條件之外國公司在美國發行股票，這些外國公司可以依美國之一般公認會計原則重新編製其財務報表，也可以仍舊採用其本國之會計原則，而僅將與美國會計原則間差異之影響數以附註補充說明。因此，本研究即選用在美國證券市場公開上市但採用不同一般公認會計原則（即不同會計資訊系統）的兩組樣本，一為與美國會計原則極為接近之加拿大註冊公司，一為在亞洲註冊之公司，加以測試美國市場對此二組公司之會計資訊是否有不同反應。本研究發現股價對這兩組公司之非預期盈餘有不同之反應，但其原因除可能來自不同會計資訊系統外，亦可能係規模大小，風險、國籍之不同，這些原因與股價之關係則留待未來再進一步加以探討。

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# MARKET RESPONSES TO UNEXPECTED EARNINGS - CANADIAN AND ASIAN COMPANIES LISTED IN U.S. STOCK MARKETS

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## Abstract

The purpose of this paper is to examine stock market responses to accounting earnings information for Canadian and Asian companies traded in the U.S. stock markets. Inherent differences between Canadian and Asian companies include differences related to operational complexity and accounting information systems. The SEC's requirement of size for international companies other than the Canadian companies is much larger than that for the domestic companies. The GAAP under the Canadian accounting system is considered similar to the U.S. GAAP. The difference of earnings

responses between the Canadian and Asian companies can only be attributed to the difference in the accounting systems indirectly. The conclusion only applies to firms that have similar attributes and can not be extended, in general, to all of the Asian and Canadian firms. I found that market responses are different for the Asian and Canadian firms in my sample. The difference may be due to many factors, such

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\* Acknowledgement: I want to thank Lynch, Jones & Ryan for providing the IBES tape which contains the analyst forecasts data.

as size, risk, nationality, and accounting system. This paper does not try to evaluate the causes of differential market responses but the differences between the two types of companies with respect to some firm specific characteristics will be reported.

## 1. Introduction

The purpose of this paper is to examine stock market responses to unexpected earnings for companies that are incorporated in Canada and Asian countries and have stocks traded in the U.S. stock markets. The data are extracted from Compustat, CRSP and IBES data bank. The study is empirical in nature and provides an initial step to evaluate the differential market responses with respect to international firms.

Companies incorporated in foreign countries and trade their stocks in the U.S. stock markets usually prepare their financial statements using their own countries' currencies based on their own GAAP. Annual reports to stockholders may either include the formal statements that are converted according to the U.S. GAAP or only provide supplementary notes for the effects of such conversion. Market may treat differently the adjusted/translated earnings numbers reported from different foreign accounting systems.

Meek [1983] has investigated market responses to earnings announcements with respect to U.S. and non-U.S. firms traded in the U.S. stock market. He concludes that the markets' reaction to earnings announcements are not significantly different between the U.S. and non-U.S. companies and suggests that international harmonization may not be necessary for this type non-U.S. firms [p 401]. Meek only focuses on the variance of abnormal returns around the earnings announcement dates. His results do not necessarily show if the market treats differently the earnings numbers from different accounting systems. This paper is one of the first attempts to report the association between the market abnormal returns and unexpected earnings changes for companies that follow different accounting principles.

I focus on Canadian and Asian international firms. Canadian firms are selected because their GAAP are considered similar to U.S. GAAP and their size requirements are the same as those for U.S. firms. It is reasonable to assume that U.S. stockholders should have no problem in understanding

the accounting information reported by the Canadian firms. Asian firms are selected as the contrast group. A contrast of Canadian and Asian firms may provide some insights for market responses with respect to differences in accounting systems and other international perspectives.

I will proceed by first describe the method employed in this study, the empirical results will be provided followed by conclusions.

## 2. Method

Since Ball and Brown [1968], capital market research has been a popular area in the domain of accounting research. Among numerous issues investigated, market responses to unexpected earnings has been a major focus. Beaver, Clarke and Wright [1979] is one of the first studies that investigates market responses to the magnitude of earnings changes. More recently, the coefficient (namely Earnings Response Coefficient, ERC) that relates market responses and magnitude of earnings changes has been investigated in detail (e.g. Kormendi and Lipe [1987], Collins and Kothari [1989], Easton and Zmijewski [1989]). To investigate market responses to accounting information, I will adopt the return approach as described in Christie [1987].

Basically, the return approach analyzes the relationship of unexpected market returns and unexpected earnings for a certain period of time (the event window). Expectation models for both the market returns and the accounting earnings should be developed before the unexpected market returns and unexpected earnings can be generated. Different expectation models have been employed by past studies. For this paper, I will employ the market model (similar to the one used in Beaver, Clarke and Wright [1979]) as the expectation model for market returns, and random walk and analysts forecasts as the surrogates for market expectation of accounting earnings. The random walk model generate earnings forecasts based on past year's earnings and the unexpected earnings represents the actual earnings changes. Analyst forecasts can be found from different sources, such as publication from Value Line, Standard and Poor, and Lynch, Jones & Ryan. In this paper, I will use the IBES tape provided by Lynch, Jones & Ryan, which contains analyst forecasts on a monthly basis.

Once the expectation models are identified, we can then generate unexpected returns and unexpected earnings for the specific event window studied. Beaver, Lambert and Ryan is one of the first who develop the functional relationship between unexpected returns and unexpected earnings. Likewise, I will employ a simple cross-sectional earnings association/response regression model to investigate the relationship between unexpected returns and unexpected earnings. In the remaining of this section, I will describe my sample, the event windows, unexpected market returns (cumulative abnormal returns), unexpected earnings, and earning response model.

### **2.1 Sample Construction**

The sample was first generated from the Compustat data base and companies that are incorporated in Canada and Asian countries are retained (59 Canadian firms and 18 Asian firms). For the firms remained in the sample, we keep the observations generated from Quarterly Compustat Tape that have earnings announcement dates (The version I used has 11 annual announcement dates available). Then IBES and CRSP daily and monthly return tapes are scanned for relevant data, and the final sample consists only 9 Asian firms with 47 observations and 30 Canadian firms with 192 observations over years 1978 to 1988.

### **2.2 Event Windows**

Previous studies have investigated the association between unexpected returns and unexpected earnings for both long and short event windows. For this paper, two event windows are identified: annual and three-day event windows. The annual event window for a specific year is identified from the thirteen months before the earnings announcement of the current year's earnings to the announcement month of current year's earnings. The three-day event window starts from the day before the earnings announcement for current year's earnings to the day after the announcement. The annual event window generally tests the association between market movements and unexpected earnings, and the three-day event window tests market responses to the earnings announcements.

### **2.3 Cumulative Abnormal Returns**

For each firm and each event window, we need to generate the unexpected returns, namely, the Cumulative Abnormal Returns (CAR). First, market model (described below) regressions based on past returns will be run to derive expectation models for market returns. Abnormal returns will then be generated and summarized for each event window to derive cumulative abnormal returns. Assuming that  $W$  represents the time span (months or days) for an event window and  $M$  represents the time span included in the market model regressions for the event window, calculation of cumulative abnormal returns can be described below formally.

The log form of market model regressions will be run for each firm ( $i$ ) and each event ( $y$ ), where  $y$  represents years 1978 to 1988:

$$\ln(1 + R_{it}) = \hat{\alpha} + \hat{\beta}(1 + R_{mt}) + e_{it}, \quad t \text{ in } M_{iy}. \quad (1)$$

Where  $R_{it}$  represents stock returns of firm  $i$  at time  $t$ , and  $R_{mt}$  represents value-weighted market returns at time  $t$ .

Based on market model parameters generated in (1), the unexpected (abnormal) return for each month or day in the event window ( $W_{iy}$ 's) can be generated:

$$AR_{it} = \ln(1 + R_{it}) - (\hat{\alpha} + \hat{\beta} \ln(1 + R_{mt})), \quad t \text{ in } W_{iy}. \quad (2)$$

Cumulative abnormal returns (CAR) are a simple sum of the abnormal returns:

$$CAR_{iy} = \sum_t AR_{it}, \quad t \text{ in } W_{iy}. \quad (3)$$

Let 0 represents either the month or the day of announcement for current year's earnings. For annual event windows, market model regressions were based on 60 monthly returns prior to the beginning of the event window (i.e. -72 to -13), and the abnormal returns are accumulated over a thirteen month period from month -12 to month 0. For daily event windows, market model regressions were based on 260 days observations from -320 to -61, and the abnormal returns are accumulated over three days (-1 to 1).

## 2.4 Unexpected Earnings

Market expectation of unexpected earnings is not observable; as a result, past researchers have employed different earnings expectation models.

In this paper, I will use the random walk model (RW) and analyst forecasts (AF) as surrogates for measuring market's expectation of earnings. For the annual event window, the AF measure is based on the first analyst forecasts after the earnings announcements. For the three-day event window around the earnings announcements, the AF measure is based on the last earnings forecasts before the earnings announcements. The RW measure of earnings expectation is the same for both the annual and three-day windows. The quality of measurement of earnings expectation for a specific event window partly depends on the matching of the date of the measurement and the beginning date of the event window. For the annual event window, RW model and first analyst forecast may not deviate much; but when time progress that analysts have more information about companies' performance, the AF measure should represents market expectation better than the random walk model.

It has been shown that analyst forecasts are more accurate than the random walk model, especially when the forecasts are provided at a time closer to the actual earnings announcements dates because analysts may have modified their forecasts based on increased information sources (e.g. Brown and Rozeff [1978], and Brown, Hagerman, Griffin and Zmijewski [1987]). We will provide empirical evidence to verify the accuracy of the analysts forecasts relative to that of the random walk forecasts for both of the earliest and latest forecasts.

## 2.5 Earnings Response Model (ERM)

To investigate market responses to accounting information, we employ the following earnings response coefficient model for Canadian and Asian firms separately with respect to different event windows and measurements:

$$CAR_{it} = a_s + b_s UE_{it}, \quad \text{for } i \text{ using system } s. \quad (4)$$

Where  $UE_{it}$  represents the unexpected earnings scaled by market price at the time when the earnings forecasts are provided,<sup>1</sup> and  $a_s$  and  $b_s$  represent

<sup>1</sup>IBES tape has price information which has been adjusted for stock dividends and stock splits. The reason for using prices provided by IBES is because its measure is consistent with the earnings measure reported in IBES and used in this study. Theoretically, the price used to scale the earnings variable should be the price at the beginning of the event window. I am sacrificing the precision of using the proper scale to achieve consistency of measures.

the intercept and earnings response coefficient (ERC) in the earnings response model for different accounting systems (Canadian and Asian firms). Empirical results of the ERM model for different accounting system will be reported and tests of equality of the earnings response/association coefficients (ERC) will be provided. According to previous research, ERC varies with respect to size, beta and earnings persistence. We will also report differences of some of these aspects between the two samples, but a formal analysis of causal relationship will not be provided. I leave it to future research.

### 3. Result

Table 1 provides a list of sample firms. Industry names, SIC code, and number of observations (i.e. number of years) as well as company names are provided for each firm. For Asian firms, the country that each firm belongs to is provided in parenthesis in the column of company name. There are a total of 30 Canadian firms (192 observations) and 9 Asian firms (47 observations).

Because the SEC treats Canadian firms similar to U.S. firms in terms of size requirements while imposing a much larger size requirement on international firms, it is expected that the average size of Canadian firms will be smaller than that of Non-U.S. firms. In Table 2, we can see that Asian firms are much larger in terms of both total assets and sales. Previous studies have shown that risk measured by market model beta (e.g. Easton and Zmijewski) may affect the earnings response coefficient, so market beta is also reported. One-tailed t tests on difference of means between Canadian and Asian firms are conducted for total assets and sales while two-tailed t test for beta, the differences are all significant at the 0.01 significance level.

Table 3 analyzes forecast accuracy for the random walk model (RW) and analysts forecasts (AF). The forecast accuracy is based on the absolute value of forecast errors scaled by price, which is the measurement used in the earnings response model. Also, comparison of RW and AF is based on the difference of the absolute value of forecast errors scaled by price. In Table 3, we can see that Asian firms have smaller average forecasting errors with respect to both the RW and AF measures. For example, RW reports an average of 10.92% of absolute forecast errors to price for Canadian firms



**TABLE 1**  
List of Sample Firms

| <u>Canadian Firms</u> |                              |                                |    |
|-----------------------|------------------------------|--------------------------------|----|
| SIC                   | Industry Name                | Company Name                   | #  |
| 1000                  | Metal Mining                 | Brascan Ltd - Cl A             | 9  |
| 1040                  | Gold and Silver Ores         | Campbell Resources Inc New     | 5  |
|                       |                              | Giant Yellowknife Mines Ltd    | 4  |
|                       |                              | Northgate Exploration Ltd      | 10 |
| 1311                  | Crude Petroleum & Natural Gs | Bow Valley Industries Ltd      | 9  |
|                       |                              | Canadian Occidental Petro      | 4  |
|                       |                              | North Canadian Oils Ltd        | 6  |
|                       |                              | Numac Oil & Gas Ltd            | 8  |
|                       |                              | Ranger Oil Ltd                 | 10 |
|                       |                              | Scurry-Rainbow Oil Ltd         | 2  |
| 1600                  | Heavy Constr-not Bldg Constr | Banister Cont Ltd              | 2  |
| 2080                  | Beverages                    | Seagram Co Ltd                 | 10 |
| 2621                  | Paper Mills                  | Domtar Inc                     | 10 |
| 2750                  | Commercial Printing          | Quebecor Inc                   | 4  |
| 2761                  | Manifold Business Forms      | Moore Corp Ltd                 | 2  |
| 2911                  | Petroleum Refining           | Imperial Oil Ltd - Cl A        | 8  |
|                       |                              | Texaco Canada Inc              | 2  |
| 3330                  | Prim Smelt,Refin Nonfer Metl | Cominco Ltd                    | 9  |
|                       |                              | Inco Ltd                       | 9  |
| 3334                  | Prim Production of Aluminum  | Alcan Aluminum Ltd             | 10 |
| 3523                  | Farm Machinery and Equipment | Varity Corp                    | 10 |
| 3661                  | Tele & Telegraph Apparatus   | Mitel Corp                     | 2  |
|                       |                              | Northern Telecom Ltd           | 7  |
| 3663                  | Radio,TV Broadcast, Comm Eq  | Canadian Marconi Co            | 7  |
| 3711                  | Motor Vehicles & Car Bodies  | Ford Motor Co of Canada Ltd    | 4  |
| 4011                  | Railroads,Line-Haul Operatng | Canadian Pacific Ltd - Ord     | 8  |
| 4813                  | Phone Comm ex Radiotelephone | Bce Inc                        | 5  |
| 4924                  | Natural Gas Distribution     | Inter-City Gas Corp            | 2  |
| 5051                  | Metals Service Centers-Whsl  | Rio Algom Ltd                  | 6  |
| 6795                  | Mineral Royalty Traders      | Mcintyre Mines Ltd             | 8  |
|                       | No of Firms: 30              | No of Observations: 192        |    |
| <u>Asian Firms</u>    |                              |                                |    |
| 1000                  | Metal Mining                 | Atlas Cons Ming & Dev (Phil.)  | 8  |
|                       |                              | Benguet Corp (Phil.)           | 8  |
| 2621                  | Paper Mills                  | Amer Israeli Paper Mls(Israel) | 1  |
| 3320                  | Iron and Steel Foundries     | Kubota Ltd -adr (Japan)        | 3  |
| 3570                  | Computer & Office Equipment  | Hitachi Ltd -adr (Japan)       | 1  |
| 3600                  | Electr, Oth Elec Eq, ex Cmp  | Matsushita Electric (Japan)    | 10 |
| 3651                  | Household Audio & Video Eq   | Pioneer Electronic (Japan)     | 2  |
|                       |                              | Sony Corp (Japan)              | 10 |
| 3711                  | Motor Vehicles & Car Bodies  | Honda Motor Ltd (Japan)        | 4  |
|                       | No of Firms: 9               | No of Observations: 47         |    |

**TABLE 2**  
Firm Characteristics

|                | Total Assets       | Sales              | Beta            |
|----------------|--------------------|--------------------|-----------------|
|                | Mean/(MSE)         | Mean/(MSE)         | Mean/(MSE)      |
| Canadian Firms | \$2,647<br>( 259)  | \$2,041<br>( 206)  | 1.24<br>(0.032) |
| Asian Firms    | \$7,070<br>(1,422) | \$7,746<br>(1,482) | 0.95<br>(0.071) |
| <i>t</i> tests | $p < 0.01$         | $p < 0.01$         | $p < 0.01$      |

Notes:

( ): numbers in parenthesis are mean square errors.

and only an average of 5.30% for Asian firms. First analyst forecasts (1st AF) generate an average of 12.16% and 6.00% forecasting error and last analyst forecasts (2nd AF) an average of 6.80% and 1.83% for Canadian and Asian firms respectively. The difference of forecast accuracy between Canadian firms and Asian firms are significant at either 0.05 or 0.01 level. In comparing the RW and AF measures, we see that the first analyst forecasts are less accurate than the random walk forecasts (though not significant), and the last analyst forecasts are more accurate (the differences are statistically different at 0.01 level) than the RW forecasts.

Table 4 reports the tests of differences in cumulative abnormal returns for both the annual and three-day event windows. They are not significantly different between Canadian and Asian firms.

Table 5 reports regression results of the earnings association/response model for both the Canadian and Asian firms. For annual event window, the ERC is significantly different from zero for the Canadian firms only under the RW measure, while the ERC is significantly different from zero for the Asian firms under both the RW and AF measures. Based on *t* tests of difference of means, the ERC's for Canadian and Asian firms are significantly different with Asian firms reporting larger ERC's. While for

**TABLE 3**  
Forecasting Errors  
(Random Walk Model vs. Analyst Forecasts)

|                | RW Error            | AF Error            |                     | RW vs. AF           |                    |
|----------------|---------------------|---------------------|---------------------|---------------------|--------------------|
|                | Mean/(MSE)          | Mean/(MSE)          |                     | Mean/(MSE)          |                    |
|                |                     | 1st AF              | 2nd AF              | 1st AF              | 2nd AF             |
| Canadian Firms | 0.1092<br>(0.0182)* | 0.1216<br>(0.0258)* | 0.0680<br>(0.0160)* | -0.0123<br>(0.0250) | 0.0552<br>(0.0171) |
| Asian Firms    | 0.0530<br>(0.0124)* | 0.0600<br>(0.0129)* | 0.0183<br>(0.0048)* | -0.0070<br>(0.0064) | 0.0422<br>(0.0137) |
| <i>t</i> test† | $p < 0.05$          | $p < 0.05$          | $p < 0.01$          | NS                  | NS                 |

Notes:

\* indicates that the means of forecasting errors are significantly different from zero.

† *t* test is to compare if the RW forecast error, the AF error, and the (RW vs. AF) are different between Canadian and Asian firms.

( ): numbers in parenthesis are mean square errors.

**TABLE 4**  
Comparisons of Cumulative Abnormal Returns

|                | Annual Window   | Three-Day Window |
|----------------|-----------------|------------------|
|                | Mean/(MSE)      | Mean/(MSE)       |
| Canadian Firms | -0.0137(0.0306) | -0.0019(0.0032)  |
| Asian Firms    | -0.0185(0.0616) | -0.0015(0.0056)  |
| <i>t</i> tests | NS              | NS               |

Notes:

**MSE:** Mean Square Error

**NS:** Not significant at either 0.05 or 0.01 significance level.

( ): numbers in parenthesis are mean square errors.

**TABLE 5**  
**Earnings Response Model**

|                | Annual Event Window           |                               |                      |                                   |
|----------------|-------------------------------|-------------------------------|----------------------|-----------------------------------|
|                | RW                            |                               | AF                   |                                   |
|                | <u>Canadian</u>               | <u>Asian</u>                  | <u>Canadian</u>      | <u>Asian</u>                      |
| Adjusted $R^2$ | 0.043                         | 0.050                         | 0.001                | 0.118                             |
| Intercept      | -0.020<br>(0.030)             | -0.005<br>(0.061)             | -0.005<br>(0.032)    | 0.055<br>(0.064)                  |
| ERC            | 0.339<br>(0.109) <sup>a</sup> | 1.125<br>(0.608) <sup>b</sup> | (d) 0.093<br>(0.084) | 1.614<br>(0.602) <sup>a</sup> (c) |
|                | Three-Day Event Window        |                               |                      |                                   |
|                | RW                            |                               | AF                   |                                   |
|                | <u>Canadian</u>               | <u>Asian</u>                  | <u>Canadian</u>      | <u>Asian</u>                      |
| Adjusted $R^2$ | -0.005                        | -0.005                        | -0.000               | 0.006                             |
| Intercept      | -0.002<br>(0.003)             | -0.002<br>(0.006)             | -0.003<br>(0.003)    | -0.004<br>(0.006)                 |
| ERC            | 0.001<br>(0.012)              | -0.050<br>(0.057)             | -0.009<br>(0.009)    | -0.066<br>(0.058)                 |

Note: Data in parentheses represent coefficient standard error

a: ERC is significantly different from zero at the 0.01 level

b: ERC is significantly different from zero at the 0.05 level

(c): ERC's are significantly different between Canadian and Asian firms at the 0.01 level

(d): ERC's are significantly different between Canadian and Asian firms at the 0.05 level

three-day event window, the ERC's are not statistically different from zero for every measure and every sample.

#### 4. Conclusions

This paper tends to provide some empirical results of market responses for Canadian and Asian firms traded in United States security markets. Differences between these two samples are found with respect to size (measured by total assets and sales), risk (measured by market model beta based on 60 monthly returns), forecasting accuracy (measured by absolute value of forecast errors from either random walk model or first/last analyst forecasts and scaled by price) and earnings association/response coefficient (based on a simple cross-sectional regression model). The difference between the ERC's reported in this paper may be caused by many firm specific factors in addition to different accounting systems between countries. The extent in the differences of the ERC's that may be due to the differences of the accounting systems needs further research. This paper may provide an initial step for this research direction.

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