DOES THE THAI STOCK MARKET OVERREACT IN RESPONDING INTRA-INDUSTRY INFORMATION TRANSFER?

BY

MR. JEDSADA TANGVATCHARAPRANEE

AN INDEPENDENT STUDY SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF MASTER OF SCIENCE PROGRAM IN FINANCE (INTERNATIONAL PROGRAM)

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ABSTRACT

Intra-industry information transfers are the process that events or announcement of one company lead stock price of other companies in the same industry to respond following although it is not their own information. In the past, many studies found that the reaction of the non-announcing company is inappropriate which can lead to abnormal return. This study examines the existence of overreaction anomaly of stocks listed Thai stock market with earning announcement event from January 2007: I to December 2015: IV.

This study performs panel regression analysis to investigate overreaction (mean reversion) of the non-announcing company between their early announcer’s earning announcement date and its own earning announcement date. The empirical result show strong significant effect of overreaction in Thai Stock market. However, the result only significant for industry with high share turnover. For this result, it can leads to make investment strategy by buying stocks of non-announcing companies which significantly drop around their early announcer’s announcement date on their own announcement date to gain abnormal return.

Keywords: Intra-industry information, Earnings announcement, Overreaction

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Mr. Jedsada Tangvatcharapranee

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CHAPTER 1
INTRODUCTION

Intra-industry information transfers are defined as the transmission of information on one firm to other firms in the same industry. This mechanism could be positive, negative or zero depending on the carrying information. Earnings Announcement is the favor example of intra-industry information transfers as it provides information not only about the earnings information of announcing company but also shows the prospect of economic condition to other firms in the industry (Foster,1981). Although the evidence of intra-industry information transfers has been studied for many decades, there are some issues remain about reaction of other firms in information transmission. Many studies[1] found that reaction of non-announcing firms' price on announcement of early announcing firm is inappropriate which can lead to anomaly return.

Therefore, this paper aims at examining how investors respond appropriately to intra-industry information transfers on earnings announcement of listed firms in Thai stock market. If the information of early announce do not implicate to the late announcers, there should not be predicted the movement of late announcer's movement when the late announcer release their information. So, the relationship of the late announcer's return between early announcer's announcement date and its own announcement date should be zero.

The purpose of this study is to support Thomas and Zhang (2008)'s evidence that there are intra-industry information transfers in the stock exchange market and late-announcing firms overreact to early-announcing firm's news. By studying in Stock Exchange of Thailand (SET) where emerging market is. This can extend the result of previous studies on the different stage and add the research about the emerging market where lack of studies on this field. The scope of this study is the reaction of peer firms

[1] Ramnath (2002) suggest buy and hold strategy by buying non-announcing firm's stock in the same industry within next two day after early announcer showed a positive earnings surprise and hold until after firms that I hold announce their earnings. They got annualized adjusted return around 15%. Thomas and Zhang (2008) found that the stock market overestimates the implication of intra-industry information transfer and this overestimation will correct when late firms announce their own earnings.

on intra-industry information transfers using daily data from January 2007 to January 2016.

The rest of this research paper is organized as follow, chapter 2 explores the literature review about intra-industry information transfers and overreaction. Chapter 3 shows the research methodology. And also explains the data selection and data description. Chapter 4 is the empirical result. And finally, Chapter 5 is the conclusion, recommendations and limitations.

CHAPTER 2
LITERATURE REVIEW AND CONCEPTUAL FRAMWORK

2.1 Literature Review of Overreaction to Intra-Industry transfers

Intra-industry information transfers are described as the process that corporate events or announcements of one firm make stock price of firms in the same industry respond following the firm's events (Laux, 1998). Since firms in the same industry are views as important sources of information for financial analysis (Lees, 1981). Intra-industry information transfers can be occurred in many events such as earnings announcements, dividend announcement, merger and acquisition, government's regulatory action, industrial accidents etc.[2]

Earnings Announcement is the one of attractive events of intra-industry information transfer's studies because the announcement is the source of industry information arriving every business quarter in one year. Moreover, investor can also use the information from the announcing firms to update their expectations for non-announcing firm (Ramnath, 2002).

The effect of an announcement on non-announcing firm can be positive, negative or zero according to the characteristics of information. This can be explained by "Contagion and Competitive Effect" (Asquith et al., 1989). Normally, Industry faces a homogeneous demand curve and companies set their output according to their relative cost. If an announcement contains information that affects all firms in the industry such as change in input price and output prices, change in demand patterns, change in regulatory, the non-announcing firms 'reaction will move in the same direction or positive correlation. This is called "Contagion Effect[3]" or "Commonality Effect". On the other hand, if an announcement contains a shift in market power (revealing competitive shifts within the industry), the non-announcing firms 'reaction will move in the opposite direction or negative correlation. This is called "Competitive Effect".

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[2] For the studies about earning announcement (Foster,1981; Han & Wild, 1993); dividend announcement (Caton et al,2003); merger and acquisition (Eckbo,1983); regulatory actions (Swary,1986); industrial accidents (Bowen et al., 1985).

[3] Contagion effect in this definition means that effect from new information contain the information that effect on structure of industry such as change in demand pattern, change in regulatory which different from definition in international economics theory.

To identify which direction of intra-industry information transfers, Lang and Stulz (1992) suggested that almost the industry where is highly concentrated industry is dominated by competitive effect. In contrast, the industry where is low concentrated industry is dominated by contagion effect.[4] By using the standard tool for measuring market concentration are the Herfindahl index (HHI) and the Concentration Ratio (Horizontal Merger Guideline, 2010). The higher HHI is, the higher concentrate is.[5] While the higher concentration ratio is, the higher concentrate is.

The study of intra-industry information transfer on stock price was began by Foster (1981). He found positive correlation on abnormal return of early announcing firm and non-announcing firm during early earning announcement period. Clinch and Sinclair (1987) also found the positive correlation as well and in addition, they also found the smaller reaction of non-announcing firm than early announcing firm. Around in 1990, Han and Wild used "*Unexpected earnings*[6]" instance of abnormal returns because it can eliminate the over-rejection of the null due to positive cross-sectional covariation in stock returns after that it become to *standard practice* as new information measurement. The "unexpected earnings" or "earnings surprise" is the difference between the reported earnings and the expected earnings of an entity (Pinto et al., 2010).

Joh and Lee (1992) studied in Oligopoly market to extend their explanation that news with revenue information always be positive correlation while news with cost information also be negative. But they did not found the evidence to support their argument. Kim et al. (2008) divide firms into rival and non-rival in the same industry and found that if firms are non-rival from each other, intra-industry information transfer will be positive. In the contrast, if firms are rival to non-announcement firms, intra-industry will be negative.

To study whether investor respond appropriately with intra-industry information transfer, I focus more on investor behavior to new information which can support the additional perspective on intra-industry information transfers. Therefore, in

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[4] Intra-industry information transfers in highly concentration industry (imperfect competition market e.g. oligopoly market) is almost dominated by competitive effect (good announcement is more likely to reveal unfavorable information about its peers.) (Lang and Stulz, 1992)

[5] To calculate HHI and Concentrate Ratio, look Horizontal Merger Guideline (2010).

[6] Unexpected earning is calculated by the different between actual earning over analysts' forecast earning (see Han and Wild, 1990)

this part in related to *Behavior finance* which claims that investors are not fully rational although with public information.

Beginning from DeBondt and Thaler (1985), they investigated the psychological impact on stock prices when investors receive new information and found that most investor overreact to unexpected news and dramatic events. Brown and Harlon (1988) supported prior study by found the overreaction especially to bad news but they suggested that this overreaction is a short phenomenon.

Thomas and Zhang (2008) is the first research to study the overreaction to intra-industry transfers. They investigated whether stock prices of non-announcing firm respond appropriately to earnings reports of early-announcing firms. And they found negative correlation between non-announcing firms' stock price and early announcing firm's stock price around the late earning announcement date. So, it can interpret that the stock market overestimates the implication of intra-industry information transfer and this overestimation will correct when late firms announce their own earnings. Their explanation mention "*the representative heuristic bias*" (Kahneman & Tversky, 1996). The late-announcing firm's price adjusts their price movements following their early announcing peer in the same industry which make their price overshoot although they do not release their earnings yet. And overreaction is corrected when they report their own earning.

Chung et al. (2015) extended Thomas and Zhang's study by focus more on short period of time. They found that the overreaction has decayed over time as increasing in markedly higher trading activity.

Nevertheless, there are some different evidences. For example, Bernard and Thomas (1989) found the different result that investors are inefficient in evaluating current earning and underreact to recently earning news. Ramnath (2002) suggest buy and hold strategy by buying non-announcing firm's stock in the same industry within next two days after early announcer showed a positive earnings surprise and hold until after firms that I hold announce their earnings. They got annualized adjusted return around 15%. This is evidence which show the investor's underreaction to the intra-industry information in the first earning announcement lead to predictable returns to late announcers[7].

For this paper, I focus on overreaction to intra-industry information transfers in Stock Exchange of Thailand. By following Thomas and Zhang's methodology to study whether Thai Stock Market is rational in responding intra-industry transfers by using panel regression analysis. Although many studies have investigated intra-industry information transfers for many decades, researches on this field in emerging market still has few.

2.2 Representativeness Heuristic Bias and Overreaction

The representative heuristic is one of the famous heuristics proposed by Kahneman and Tversky (1972). In uncertainty situation, representative heuristic is used in making decision. Heuristic is defined as "simple rules governing judgment or decision". Kahneman and Tversky explained that people always make "judgment shortcut" in their mind by avoiding complexness and neglect the relevant base. Heuristic are advantageous because investor use effort reduction and simplification in decision making (Shah et al., 2008). And Representativeness is described as "the degree to which (an event) (i) is similar in essential characteristics to its parent population, and (ii) reflects the salient features of the process by which it is generated. (Kahneman & Tversky, 1972).

So, the "representativeness heuristic" is concluded as the reflexive tendency to assess the similarity of outcomes, instances, and categories on relatively salient and even superficial features, and then to use these assessments of similarity as a basis of judgment (Gilovich, 1991). This bias can lead to "neglect of relevant base rate" and other cognitive bias.

Neglect of relevant base rate, is also called base rate fallacy, is the problem when I use the representativeness heuristic which violate *Bayes' Theorem.*

$$P(H|D) = \frac{P(D|H)P(H)}{P(D)}$$

[7] Ramnath (2002) used the analyst forecast's error of the first announcer to adjust their non-announcing firm's expectation earnings. So, if the market overreacts, they cannot gain from this way.

Nevertheless, judgement by representative heuristic only focus at the similarity between the hypothesis and the data so inverse probabilities are associated:

$$P(H|D) = P(D|H)$$

The "base rate" P (H) is missing in this equation, leading to the neglect of relevant base rate (Axelsson and Stefan, 2000).

Fortune et al. (2012) pointed that the representativeness heuristic make people overestimate its ability to correctly predict the possibility of an event. Same as Kahneman (1972) supposed "individual tent to *overweight recent available information* and *underweight base data".*

Brooks and Buskmaster (1976) add the characteristic of investor as "myopic" which mean that investor focus in the recent past too much and too little on long-term.

From many evidences support that representative heuristic bias make non-announcing firm' price overshoot when their peer's earning announcement date as prospect of similarity although they have not release their earning yet. And overreaction is corrected when they report their own earning because investor underweight their base data.

For mean reversion, Poterba and Summer (1988) support that mean reversion may be caused by the irrational behavior of noise traders, resulting in stock prices that take wide swings away from their fundamental value. DeBondt and Thaler (1985) pointed that mean reversion in stock price is evidence of overreaction.

Hypothesis I: There are negative correlation between reaction of non-announcing firm on their early peers earning announcement date and reaction of non-announcing firm on their own announcement date. (Found mean-reversion between two events).

2.3 Intra-Industry information transfers to overreaction

According to Laux (1998), Intra-industry information transfers are described as the process that corporate events or announcements of one firm make stock price of firms in the same industry respond following the firm's events

The effect of an announcement on non-announcing firm can be positive, negative or zero according to the characteristics of information. This can be explained by "Contagion and Competitive Effect" (Asquith et al., 1989). Contagion Effect is the effect that make non-announcing firms' reaction in the same direction or positive correlation which can be explained by information that containing the information that affects all firms in the industry such as change in input price and output prices, change in demand patterns, change in regulatory. And Competitive Effect is the effect that make non-announcing firms react in the opposite direction (negative correlation) which can be explain by information that contain a shift in market power (revealing competitive shifts within the industry).

Lang and Stulz (1992) use the standard tool for measuring market concentration are the Herfindahl index (HHI) and Concentration ratio (Horizontal Merger Guideline, 2010). They suggested that almost the industry where is highly concentrated industry is dominated by competitive effect. In contrast, the industry where is low concentrated industry is dominated by contagion effect. By using

Herfindahl index (HHI) is the measurement of size of companies in relation to the industry. It is definite as the sum of the squares of the market shares of the companies within the industry. If HHI is higher, the concentrate level of industry in higher. Industry which have high concentrate level mean that the industry has high competitive level which have range from 0 to 1.

$$H = \sum_{i}^{N} s_i^2$$

where s_i is the market share of firm i in the market, and N is the number of firms. Therefore, in a market with two firms that each have 50 percent market share, the Herfindahl index equal to $0.50^2+0.50^2 = 0.5$.

An HHI is below 0.01 indicates a highly competitive industry (no dominant players).

An HHI is below 0.15 indicates low concentration.

An HHI is between 0.15 to 0.25 indicates moderate concentration.

An HHI is above 0.25 indicates high concentration.

Another tool is Concentration Ratio[8] calculated by the total market share of the four largest firms in an industry (4-firms' concentration ratio). Concentration ratios range from 0 to 100 percent. 0% means perfect competition. 100% means an extremely concentrated oligopoly.

CR_4=0% indicates that the four largest firms in the industry have no significant market share (Perfect competition.)

CR_4=0%-50% indicates low concentration (Perfect competition to an Oligopoly)

CR_4=50%-80% indicates medium concentration (Oligopoly)

CR_4=80%-100% indicates high concentration (Oligopoly to Monopoly)

CR_4=100% indicates total concentration (Extremely concentrated oligopoly)

Hypothesis II: High concentrated Industry with the opposite direction between early announcers' return and late announcer's return on early announcement date (Competitive Effect) explain overreaction. low concentrated Industry with the same direction between early announcers' return and late announcer's return on early announcement date (Commonality Effect) also explain overreaction.

[8] Concentration ratio and Herfindahl Index have some limitations. For example, these measurements often fail to fully incorporate the revenue from foreign companies so overestimating the concentration of a domestic industry. In addition, limitation is imprecise definitions such as "shoes industry". In the real world, shoes can be classified in many markets such as "athletic shoes", "women's shoes" or "children's shoes".

CHAPTER 3
RESEARCH METHODOLOGY

In this research methodology section, there are three main part which the first part shows how is data collected in this study. The second part describes key variables and descriptive data. And the final part is regression analysis. Panel regression will be performed whether there is significant effect of overreaction and intra-industry information transfer or not.

3.1 Data Selection

Variable data are obtained by two sources. Firstly, Firms' quarterly earnings, earnings forecast, GICS code of each company, announcement dates and financial variable such as book to market ratio, market capitalization and others are collected from Thompson Reuter DataStream. Second, stock returns data from SETSMART.

As following Thomas and Zhang's methodology, I choose firms with December fiscal year-ends for the same fiscal quarter between firms and their peers[9]. Then I use the sample variables has 36 quarter-periods from 2007: I to 2015: IV.

I separate sample following six-digit GICS (The Global Industry Classification Standard) to each industry. In each industry and each quarter, I have late-announcing firm (called firm i) and early announcing firms. Then I measure four sets of excess returns, two for firm i and two for its peers. Each set contains three-days returns which cover [-1, 1] periods[10] where day 0 is the earnings announcement date. All cumulative excess returns are calculated by raw returns minus valued weighted market returns.

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[9] Firms with December fiscal year-end are around 94% of companies (671 of 713) in Stock Exchange of Thailand (SETSMART,2016)
[10] The expected returns are close to zero for short windows (Thomas and Zhang, 2008).

Table 3.1 Number of firms in each industry according to GICs (Eikon, 2016)

Industry	GICs Code (6-digits)	Number of firms
Oil, Gas & Consumable Fuels	101020	15
Chemicals	151010	15
Construction Materials	151020	5
Building Products	201020	8
Construction & Engineering	201030	17
Electrical Equipment	201040	5
Industrial Conglomerates	201050	1
Machinery	201060	6
Trading Companies & Distributors	201070	9
Commercial Services & Supplies	202010	10
Professional Services	202020	1
Airlines	203020	3
Marine	203030	3
Road & Rail	203040	1
Transportation Infrastructure	203050	3
Auto Components	251010	10
Household Durables	252010	5
Textiles, Apparel & Luxury Goods	252030	16
Hotels, Restaurants & Leisure	253010	15
Media	254010	23
Distributors	255010	5
Internet & Direct Marketing Retail	255020	1
Multiline Retail	255030	1
Specialty Retail	255040	7
Food & Staples Retailing	301010	5
Beverages	302010	3
Food Products	302030	34
Household products	303010	2
Personal Products	303020	2
Health Care Providers & Services	351020	15
Health Care Technology	351030	1
Banks	401010	11
Diversified Financial Services	402010	1
Consumer Finance	402020	11
Capital Markets	402030	13
Insurance	403010	15
Internet Software & Services	451010	2
IT services	451020	5
Software	451030	2
Diversified Telecommunication Services	501010	5
Wireless Telecommunication Services	501020	3
Gas Utilities	551020	1

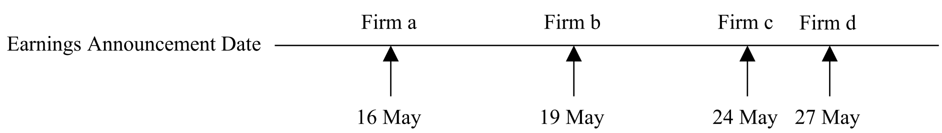
Industry	GICs Code (6-digits)	Number of firms
Water Utilities	551040	1
Independent Power and Renewable Electricity Producers	551050	9
Equity Real Estate Investment Trusts (REITs)	601010	19
Real Estate Management & Development	601020	48

3.2 Key variables and Descriptive Statistics

The first key variable is *OWN* which is the excess return of firm i around its own earnings announcement date. The second key variable is *RES* which is the average excess returns of firm i over three-day window [-1, 1] in response to the earnings announcement of other peer firms which already announced. Because there are more than one firms which announce before firm i so I use the average value of *RES*. However, *OWN* and *RES* should not overlap for each other because of potential problems with bid-ask bounce so I require that the announcement dates between firm i's announcement date and their peer's announcement should be separated from each other by at least five calendar days. The third key variable is *ELOWN* which is the average excess return of peer firms around its own earning announcement.

To show how methodology measures *OWN, RES and ELOWN,* examine following the example (figure below). For example, there are four companies (a, b, c, and d) which announce their first quarter earnings on May 16, 19, 24 and 27 respectively. For company d, I consider early announcement companies only company a and company b because company c's earning announcement date is far from company d's earnings announcement date less than five days. And for *RES* of firm d is the average excess returns of company d around 16 May [15-17 May] and 19 May [18-20 May]. For *ELOWN* is calculated by the average excess returns of company a and company b. Finally, *OWN* is measured by the excess return of company d around 27 May which is the firm d's announcement date.

Figure 3.1 Event window set following Thomas and Zhang's methodology



And other variables are *ACC* (accruals which measured by the change in noncash working capital – depreciation expense scaled by total asset, where the change in noncash working capital is equal to the change in noncash current assets minus the change in current liabilities less short term debt), *SIZE* (the logarithm of market value at the end of the prior quarter), *BM* (the logarithm of the book-to-market ratio), $OWNRESP_{t-4}$ (the excess returns of firm i in the same fiscal year). The variables (*ACC* and $OWNRESP_{t-4}$) are control variable for price momentum according to momentum literature which confirm the underreaction continues past the earnings announcement. (Thomas and Zhang, 2008).

For dummy variables, I have three important variables. Firstly, *HC* is dummy variable set equal to 1 if concentration ratio of industry is more than 50%, and 0 otherwise. This dummy is set to one to identify which industry has high concentration ratio. On the other hand, *LC* is another dummy variable set equal to 1 if concentration ratio of industry is less than 50%, and 0 otherwise. So, this dummy is also set to one to identify which industry has low concentration ratio.

The other two dummy variables are *COMP* which is set equal to 1 if $RES \times ELOWN < 0$ and 0, otherwise. *COMP* is equal to 1 when *RES* and ELOWN are of the opposite sign. It can be indicated as "Competitive Effect" that the good(bad) news from the early announcer implies bad(good) news for the late announcer. While *COMM* is equal to 1 when *RES* and *ELOWN* are of the same sign. It also can be indicated as "Commonality Effect" that the good(bad) news from the early announcer implies good(bad) news for the late announcer.

To investigate whether the intra-industry information transfer explain overreaction, I set $HC \times M \times RES$ and $LC \times P \times RES$. I expect that $HC \times M \times RES$ should be significant and negative and $LC \times P \times RES$ should be significant and negative which can support that both kind of intra-industry transfers can explain overreaction.

For $HC \times M \times RES$ variable, shown as the industry with high concentration ratio is dominated by the competitive effect. By *HC* is set to be 1 if industry has concentration ratio more than 50% and 0 otherwise. *M* should be 1 as following "Competitive effect" (an announcement contains a shift in market power). The return of early announcer should be opposite with the return of late announcer in the same industry on early announcement date. And *RES is* expected to be negative according to the overreaction to information transfers is greater when there is more information transfer. Therefore, I expect that *HC*×*M*×*RES* should be negative and significant.

For *LC*×*P*×*RES* variable, shown as the industry with high concentration ratio is dominated by the competitive effect. By *LC* is set to be 1 if industry has concentration ratio less than 50% and 0 otherwise. *P* should be 1 as following "Commonality effect" (an announcement contains the effect to all firm in the same industry). The return of early announcer should be same with the return of late announcer in the same industry on early announcement date. And *RES is* expected to be negative according to the overreaction to information transfers is greater when there is more information transfer. Therefore, I expect that *LC*×*P*×*RES* should be negative and significant.

As shown in table 3.2 and 3.3 that provides descriptive statistics, the mean earnings announcement return or OWN is close to zero as I also exclude the first announcers in each industry since they do not have early announcing firms. The average ELOWN of 0.05% reported in table 3.3 shows that early announcers tend to have higher announcement returns than late announcer. It consistent with Givoly and Palmon (1982) who found that late announcers react with smaller excess return than early announcer since more of the information become publicly available through other channels by the time it is announced.

Table 3.2 Panel A: Descriptive Statistic of full sample

Variable	N[b]	Mean	St. Dev.	Min.	Max.
OWN	10,420	-0.0002	0.0565	-0.4455	0.9913
RES	8,504	0.0006	0.0335	-0.2719	0.9767
ELOWN	8,531	0.0038	0.0398	-0.1269	0.6294
OWN_{t-4}	9,445	-0.0003	0.0575	-0.4455	0.9913
BM	10,151	-0.2505	0.8122	-4.3761	2.9957
ACC	9,433	-9637.9	20,985	-1,568,398	95,762.5
Size	8,972	7.7340	1.8111	0	13.873

Table 3.3 Panel B: Descriptive Statistic of subsamples

	High Share Turnover ratio subsamples			Low Share Turnover ratio subsamples		
Variable	N[b]	Mean	St. Dev.	N[b]	Mean	St. Dev.
OWN	5,765	-0.0008	0.0571	4,655	0.0006	0.0557
RES	4,715	-0.0003	0.0352	3,789	0.0005	0.0312
ELOWN	4,735	0.0050	0.0440	3,796	0.0024	0.0338
OWN_{t-4}	5,218	-0.0008	0.0582	4,227	0.0003	0.0567
BM	5,638	-0.3060	0.8121	4,513	0.8070	0.8070
ACC	5,214	-9670.9	25,440	4,219	-9597.1	13,598
Size	5,091	7.5987	1.7769	3,881	7.9118	1.8401

Variable Definitions

OWN	late firm's three-days earnings announcement cumulative excess returns (raw returns-value-weight market returns) over the three-days window [-1,1], where day 0 is the earning announcement date.
RES	the average of late firms' three days' excess return around its peers 'earnings announcement, where the earnings announcement dates are at least five day prior to the late firms' earning announcement date.
ELOWN	the average of early peers' three-day earnings announcement excess returns in the same quarter, where the peers 'earnings announcement date are at least five days prior to late firm's earning announcement date.
OWN_{t-4}	the excess return of late firm in its prior year.
BM	book to market ratio measured as the book value of equity divided by its market value at the end of prior quarter
ACC	accruals measured as the change in non-cash working capital minus depreciation expense scaled by average total assets, where the change in noncash working capital is equal to the change in noncash current assets minus the change in current liabilities less short term debts.
SIZE	market value at the end of the prior fiscal quarter.

The sample includes all December fiscal year end firms with earning announcement returns from firm I and its peers. There are 10,420 firm-quarter observations with available data from 2007: I to 2015: IV.

Table 3.4 Panel A: Pearson correlation matrix

	OWN	RES	RES_HC	ELOWN	OWN_{t-4}	BM	ACC	Size	HC M RES	LC P RES
OWN	1.000									
RES	-0.020	1.000								
RES_HC	-0.026	0.672	1.000							
ELOWN	-0.011	0.121	0.087	1.000						
OWN_{t-4}	0.034	-0.023	-0.033	-0.021	1.000					
BM	-0.009	-0.003	-0.019	-0.037	-0.052	1.000				
ACC	-0.058	-0.017	-0.011	-0.027	-0.006	0.117	1.000			
Size	-0.001	-0.005	-0.001	-0.0004	0.030	-0.546	-0.138	1.000		
HC_M_RES	-0.036	0.471	0.752	-0.103	-0.048	-0.004	-0.009	0.002	1.000	
LC_P_RES	-0.002	0.607	-0.0001	0.252	-0.006	-0.001	-0.013	0.002	0.0001	1.000

The sample includes all December fiscal year end firms with earning announcement returns from firm I and its peers. There are 4,655 firm-quarter observations with available data from 2007: I to 2015: IV.

For Table 3.4, panel A provides Pearson correlations between the interest variables. The correlations between OWN and RES is negative following overreaction's literature. I found the evidence of the presence of momentum is provided by the positive correlation between OWN and OWN_{t-4}.

3.3 Panel regression analysis

In order to answer research questions, this paper conducts hypothesis testing based on steps. Firstly, examining the evidence of overreaction for Stock market Exchange of Thailand. Second, examining the overreaction to intra-industry information transfers.

Step I: Examining the evidence of overreaction.

The first hypothesis is set as:

Hypothesis I: There are negative correlation between reaction of non-announcing firm on their early peers earning announcement date and reaction of non-announcing firm on their own announcement date. (Found mean-reversion between two events).

To find the intra-industry information transfers, I apply the same panel regression equation used by Thomas & Zhang (2008):

$$\mathrm{OWN}_{i.j.t} = \alpha_0 + \beta_1 \mathrm{RES}_{i,j,t} + \beta_2 \mathrm{RES}_{i,j,t} \times HC + \beta_3 \mathrm{ELOWN}_{i,j,t} + \beta_4 \mathrm{OWN}_{i,j,t-4} + \beta_5 \mathrm{BM}_{i,j,t} + \beta_6 ACC + \beta_7 \mathrm{SIZE}_{i,j,t} + \beta_8 HC \times M \times \mathrm{RES}_{i,j,t} + \beta_8 LC \times P \times \mathrm{RES}_{i,j,t} + \varepsilon_{i,j,t}$$

Table 3.5: Variables Definition

Variable	Expected Sign	Meaning
OWN		The excess return of late announcer around its own earnings announcement date
RES	-	The average excess returns of late announcer in response to the earnings announcement date of other early announcers (Overreaction Test)
ELOWN	+	The average excess return of early firms around their own earning announcement dates (Lead-Lag Effect; positive if early announcer is larger than late announcer)
OWN_{t-4}	+	The excess return of late announcer i in its same fiscal quarter in the prior year. (Momentum Effect in each period of time)
SIZE	-	The logarithm of market value at the end of the prior quarter. (Size effect; small firms tend to gain return higher than large firms (FF,1965))
ACC	-	Accruals which measured by the change in noncash working capital – depreciation expense scaled by total asset. (Accruals anomaly; High accruals firms tend to gain lower return than low accruals firms (Sloan,1996))
BM	+	The logarithm of the book-to-market ratio at the end of the prior quarter. (Book-to-Market effect; high BTM tend to gain return higher than low BTM (FF, 1965))
M		Minus Dummy variable (equal to 1 if RES×ELOWN<0 and 0, otherwise). Reflect intra-industry information transfers. M is positive if transferring in the opposite direction.
P		Plus Dummy variable (equal to 1 if RES×ELOWN>0 and 0, otherwise). Reflect intra-industry information transfers. P is positive if transferring in the same direction.
HC		High Concentration Industry Dummy variable (equal to 1 if *Concentration ratio>50%,* and 0 otherwise.)
LC		Low Concentration Industry Dummy variable (equal to 1 if *Concentration ratio<50%* and 0 otherwise.)

Where i, j, t is the i^{th} firm in j industry on the t quarter.

According to DeBondt and Thaler (1985), they mentioned that mean reversion in stock price is evidence of overreaction. In addition to Thomas and Zhang's methodology, they tried to find the overreaction of firm i between early announcement date and its own announcement date. So, I used the same equation as hypothesis I. The RESP variable should be negative and significant.

STEP II: Examining the overreaction to intra-industry information transfers.
I set our second hypothesis as:

Hypothesis II: High concentrated Industry with the opposite direction between early announcers' return and late announcer's return on early announcement date (Competitive Effect) explain overreaction. low concentrated Industry with the same direction between early announcers' return and late announcer's return on early announcement date (Commonality Effect) also explain overreaction.

According to Thomas and Zhang (2008) mentioned that overreaction to information transfers is greater when there is more information transfer. So, the variable *HC_M_RES and LC_P_RES* should be negative significant. On the other hand, the variable

CHAPTER 4
EMPIRICAL RESULTS

In this section, the first part is shown as evidence of overreaction which can lead to create strategy to gain profit. The second part is to answer the empirical result whether Thai stock market has overreaction in responding intra-industry information transfers or not.

4.1 Evidence of Overreaction

Table 4.1: Deciles Based on late firm's Reaction to early peers' earnings Announcements (RES)

	Full sample			High share turnover subsample			Low share turnover subsample		
	RES	OWN	ELOWN	RES	OWN	ELOWN	RES	OWN	ELOWN
D1	-4.97%	0.06%	-0.44%	-5.22%	0.29%	-0.33%	-4.61%	-0.29%	-0.69%
D2	-2.08%	-0.14%	-0.11%	-2.23%	-0.21%	-0.21%	-1.88%	0.24%	0.06%
D3	-1.26%	-0.05%	-0.11%	-1.38%	-0.39%	-0.03%	-1.12%	-0.06%	-0.10%
D4	-0.74%	-0.08%	0.18%	-0.83%	0.04%	0.18%	-0.64%	-0.05%	0.14%
D5	-0.32%	-0.28%	0.35%	-0.36%	-0.51%	0.65%	-0.27%	-0.01%	-0.06%
D6	0.10%	-0.04%	0.30%	0.07%	-0.23%	0.55%	0.12%	0.26%	0.02%
D7	0.53%	-0.03%	0.45%	0.55%	-0.23%	0.80%	0.52%	0.26%	0.01%
D8	1.08%	0.16%	0.81%	1.13%	0.15%	0.99%	1.04%	0.14%	0.50%
D9	1.90%	-0.19%	1.06%	1.99%	-0.53%	0.81%	1.80%	0.26%	1.50%
D10	5.81%	-0.06%%	1.34%	5.99%	-0.07%	1.58%	5.57%	0.00%	1.04%
D1-D10	-10.78%	0.12%	-1.79%	-11.22%	0.36%	-1.91%	-10.18%	-0.29%	-1.73%

Note: We sort firms into 10 deciles based on RESP, and calculate the mean values for firms in each decile, and then report in each cell above the time series mean across 37 quarters from 2007: I to 2015 IV.

From Table 4.1, I provide more details on the overreaction of each sample and subsample which described earlier (negative correlation between OWN and RES) by sorting each sample into ten deciles based on RES. You can see that the result also show evidence of price reversal on each sample. RES increase from D1 to D10 while OWN decrease from D1 to D10. Therefore, I can create abnormal strategy by long position in D1 stock and short position in D2. Three-day market excess return is around 0.36%. However, this strategy doesn't work for full sample and low share turnover sample.

4.2 Testing Overreaction and Intra-Industry information transfer by using Panel regression analysis

In this section, I regress OWN on RES in the presence of control variables. These control variables include early peers' announcement returns (ELOWN), the announcement returns for late announcer in the prior year (OWN_{t-4}) is control variable for the price momentum, log of market capitalization (SIZE), log of book to market ratio (BM), and the level of accruals (ACC). ACC is control variable for accrual anomalies.

Table 4.2 present the panel regression results of the model to test significant effect of overreaction and intra-industry transfer of listed companied in the Stock Exchange of Thailand during 2007: I to 2015: IV. Based on panel regression analysis, the result of Hausman test reveals that fixed effect regression model is more appropriate at 99% confidence level. I set the model to 3 model. First, I run the model with full sample. And separate the sample to two subsample following share turnover; high share turnover ratio and low share turnover ratio.

I start from regression with full sample observations (Model 1). Overall variables both interest variables and control variables is almost significant. Especially, RES which is our key variable is consistent with the prior study and our hypothesis in negative significant at 90% confident level. And also, HC_M_RES which is also significant at 99% confident level in expected sign. However, there are some control variable is different sign from our expectation. Book to market ratio show a negative correlation with excess return which conflict with book to market effect (high value stock lead high return) (FF,1965).

Table 4.2: Regression of OWN, RES and control variables.

Variable	Model 1 Full sample	Model 2 High Liquidity	Model 3 Low Liquidity
RES	-0.090** (0.042)	-0.123* (0.064)	0.054 (0.056)
RES_HC	0.103 (0.067)	0.141* (0.083)	0.720 (1.209)
ELOWN	-0.025 (0.018)	-0.035 (0.021)	-0.002 (0.032)
OWN_{t-4}	0.004 (0.012)	0.010 (0.016)	-0.037 (0.017)
BM	-0.004* (0.002)	-0.008*** (0.002)	0.004 (0.003)
ACC	-2.17e-08 (9.60e-08)	-3.56e-08 (1.12e-07)	-1.20e-08 (1.85e-07)
SIZE	-0.007*** (0.002)	-0.007*** (0.002)	-0.008*** (0.003)
HC_M_RES	-0.210*** (0.066)	-0.212*** (0.067)	-1.762 (13.52)
LC_P_RES	-0.071 (0.027)	0.031 (0.089)	0.068 (0.073)
Constant	0.055*** (0.012)	0.046*** (0.015)	0.063*** (0.021)
No. of observations	7,100	3,891	3,209
No. of firms	242	136	106
Overall test	5.96***	4.82***	4.66***
R2	0.0003	0.002	0.001
Fixed effect test	5.96**	1.18	4.66***

Note: This table show the panel regression of OWN and RES and other variables estimated in each of 37 quarters from 2007: I to 2015: I. The sample includes all December fiscal year end firms with earning announcement returns from firm I and its peers. *, **, *** show significant at 10%, 5%, and 1% level where standard errors are reported in brackets.

For Model 1, overall test or F-test is very strong significant at 99% confident level. Nevertheless, R-square of the model 1 is very close to zero. To make it more understandable for very short window, I separate subsample into two subsample; industries with high stock liquidity and industries with low stock liquidity. By using share turnover ratio (trading volume per day divided by share outstanding) separate following available number of firm in the market. And set that Model 2 is using subsample with high stock liquidity or high share turnover. And Model 3 is using subsample with low stock liquidity or low share turnover.

After I regress both Model 2 and Model 3, I find that Model 2 has result nearly with Model 1 but R-square is higher. Both RES and HC_M_RES are negative significant. Moreover, RES_HC is significant in positive sign. While Model 3, almost variable is not significant including RES and HC_M_RES. This support that industries with low liquidity is not appropriate with this model and very short window.

Although overall test of three model is very strong significant at 99% confident level, R-square of three model is still low around 0.1%. I expect that there must also be unobservable variables that explain the excess return. On the other hand, our low R-square is similar with many prior studies as Pavel & Mungo (2015), Thomas & Zhang (2008), Dennis & Karel (2015).

CHAPTER 5
CONCLUSIONS, DISCUSSIONS, AND RECOMMENDATIONS

5.1 Conclusions

The main aim of this study is to support overreaction in responding intra-industry information transfer following Thomas and Zhang's study in Thai Stock market where is emerging market. This paper study in Stock Exchange of Thailand during period 2007 I: 2015 IV (36 quarters observations). I use GIC6 (Global Industry Classification Standard) code in separating industry which categorized listed company data according to the definition of its principal business activity. GIC6 categorized deeper than SET industry categorized. In addition, I use earning announcement event in studying information transfer since this event is often release and measurable. Time event window is set to three-days-window [-1,0,1].

The first research question is whether Thai Stock Market has overreaction between earning announcement date. The empirical result found the negative significant between two events (the excess return of late announcer on its peer's announcement date and the excess return of late announcer on its own announcement date). So, this is the evidence of mean reversion between two days which consistent which Thomas and Zhang's study. However, this effect is significant only industry with high share turnover. There is no significant correlation in the industry with low share turnover.

The second research question is whether information transfer significantly explain overreaction in Thai Stock market. The empirical result found the strong negative significant from "Competitive effect" (the more opposite transfer in high concentrated industry, higher overreaction). While there is no significant correlation in "Commonality effect" (the information transfer in low concentrated industry cannot help to explain the overreaction).

5.2 Discussions

The result of this study is consistent with Thomas and Zhang (2008) that found overreaction in stock market of late announcers between two events (early announcers' earning announcement date and its own earning announcement date). By finding the mean revision between two events. This evidence support that investors overweight to recently news and underweight to actual news so it makes price overshoot although the company has not announced their information yet (DeBondt et al.,1985). So, it makes the respond of the late announcer on its own announcement date move to the opposite way.

However, this overreaction is not found in the industry with low liquidity. This result is consistent with the Turan et al. (2014)'s study. They argue that the low liquidity stocks tend to underreact in responding information because of market friction and lack of investor attention. So, there is limits to arbitrage and few market participation make price adjust slowly (Hishleifer et al., 2003).

Moreover, in this study contribute the effect of high concentration ratio. We found that high concentrated industry tends to have less overreaction than low concentrated industry. The price adjustment of low concentrated industry (nearly perfect market competition) is quicker than high concentrated industry due to the same business structure, price and demand of perfect market competition.

Nevertheless, the competitive effect (high concentrated industry with the negative direction between early announcing firm and non-announcing firm on early announcer's announcement date.) can explain the overreaction better. This evidence is consistent with Brown and Harlon (1988) that finding the overreaction especially to bad news. And also, consistent with Thomas and Zhang (2008) who mention that the more intra-industry information transfer, the more overreaction.

Furthermore, in control variable, we found size effect is consistent with Fama and French's study. The small firms tend to gain return higher than the big firms. But we found the opposite result in book to market value as negative correlation. This evidence is same as Griffin and Lemmon (2002). They support that investor also overreact to the information about the future growth potential of firms with low book to market value.

5.3 Recommendations and Limitations

The study objective is making valuable contributions to readers and market participants. First, to regular investors and fund manager, the investment in overreaction anomaly can be alternative investment strategy to gain abnormal return.

When company announce its own announcement, investors find a stock of some companies in the same industry which significantly drop or increase (especially, high liquidity stock in high concentrated industry). And buy around their own announcement to gain abnormal return in 3 days.

Secondly, to regulators, the evidence of overreaction anomaly prove that the efficient market of Thai stock market fail because some people can gain abnormal return from public information. So, there should be development in regulatory. For example, decreasing an announcement date distance between companies in the same quarter. It might reduce the overlapping of information transfers.

Thirdly, to the managers of the late announcing firm, there is some information transfers between firms in the same industry. The manage should find some ways of reduce the information transfer to decrease the effect of overreaction same as regulatory. Managers could adjust their own announcement date to near with other companies in the same industry.

Finally, to researchers, the study of overreaction in Thai Stock market can add the literature about overreaction anomaly in emerging market and can improve with other models or other approach to determine the behavior finance field.

Limitation of this study is the classification of industry. Although GICs or RIC is standardization, it is hard to clearly point that firms really do its business. Some companies have large product line. So, the problem is the type of business of company cannot be classify clearly.

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APPENDIX

APPENDIX A
REGRESSION RESULTS FROM STATA

All of the regression results in this study are performed in STATA, a data analysis and statistical software, where all commands and displayed results are shown below:

Table A.1: The model with full sample variable

```
xtreg OWN RES RES_COM ELOWN OWN4 BM ACC size HC_M_RES LC_P_RES, fe

Fixed-effects (within) regression               Number of obs      =      7100
Group variable: Ticker                          Number of groups   =       242

R-sq:  within  = 0.0078                         Obs per group: min =         7
       between = 0.0129                                        avg =      29.3
       overall = 0.0003                                        max =        38

                                                F(9,6849)          =      5.96
corr(u_i, Xb)  = -0.6620                        Prob > F           =    0.0000

------------------------------------------------------------------------------
         OWN |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
         RES |  -.0896623   .0419727    -2.14   0.033    -.1719419   -.0073827
     RES_COM |   .1034989   .0671961     1.54   0.124    -.0282264    .2352241
       ELOWN |  -.0250314   .0176249    -1.42   0.156    -.0595817    .0095188
        OWN4 |   .0044414   .0117947     0.38   0.707    -.0186799    .0275626
          BM |  -.0036332   .0019504    -1.86   0.063    -.0074566    .0001902
         ACC |  -2.17e-08   9.61e-08    -0.23   0.821    -2.10e-07    1.67e-07
        size |   -.007271   .0015687    -4.63   0.000    -.0103462   -.0041958
    HC_M_RES |  -.2104672   .0663414    -3.17   0.002    -.3405169   -.0804175
    LC_P_RES |   .0708268   .0551713     1.28   0.199     -.037326    .1789797
       _cons |   .0552535   .0120572     4.58   0.000     .0316176    .0788893
-------------+----------------------------------------------------------------
     sigma_u |  .01617058
     sigma_e |  .05580295
         rho |  .07746733   (fraction of variance due to u_i)
------------------------------------------------------------------------------
F test that all u_i=0:     F(241, 6849) =     1.19           Prob > F = 0.0231

.
. estimates store fixed

.
. xtreg OWN RES RES_COM ELOWN OWN4 BM ACC size HC_M_RES LC_P_RES, re

Random-effects GLS regression                   Number of obs      =      7100
Group variable: Ticker                          Number of groups   =       242

R-sq:  within  = 0.0030                         Obs per group: min =         7
       between = 0.1489                                        avg =      29.3
       overall = 0.0045                                        max =        38

                                                Wald chi2(9)       =     32.09
```

```
corr(u_i, X)   = 0 (assumed)                    Prob > chi2       =    0.0002

------------------------------------------------------------------------------
         OWN |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
         RES |   -.080898    .041292    -1.96   0.050    -.1618287    .0000328
     RES_COM |   .1089856    .066243     1.65   0.100    -.0208484    .2388196
       ELOWN |   -.026719   .0173063    -1.54   0.123    -.0606387    .0072006
        OWN4 |   .0339044   .0115781     2.93   0.003     .0112118     .056597
          BM |   .0002111   .0010084     0.21   0.834    -.0017653    .0021875
         ACC |  -4.25e-08   6.59e-08    -0.64   0.519    -1.72e-07    8.67e-08
        size |  -3.50e-06   .0004718    -0.01   0.994    -.0009282    .0009212
    HC_M_RES |  -.1894885   .0653548    -2.90   0.004    -.3175816   -.0613955
    LC_P_RES |   .0493321   .0542546     0.91   0.363    -.0570049    .1556691
       _cons |  -.0013417   .0037008    -0.36   0.717    -.0085951    .0059116
-------------+----------------------------------------------------------------
     sigma_u |          0
     sigma_e |  .05580295
         rho |          0   (fraction of variance due to u_i)
------------------------------------------------------------------------------

.
. estimates store random

.
. hausman fixed random

Note: the rank of the differenced variance matrix (8) does not equal the number of
coefficients being tested (9); be sure this is what
        you expect, or there may be problems computing the test.  Examine the output
of your estimators for anything unexpected and
        possibly consider scaling your variables so that the coefficients are on a
similar scale.

                 ---- Coefficients ----
             |      (b)          (B)            (b-B)     sqrt(diag(V_b-V_B))
             |     fixed        random       Difference          S.E.
-------------+----------------------------------------------------------------
         RES |   -.0896623     -.080898       -.0087643        .0075289
     RES_COM |    .1034989     .1089856       -.0054868        .0112772
       ELOWN |   -.0250314     -.026719        .0016876        .0033361
        OWN4 |    .0044414     .0339044        -.029463        .0022501
          BM |   -.0036332     .0002111       -.0038443        .0016695
         ACC |   -2.17e-08    -4.25e-08        2.07e-08        6.99e-08
        size |    -.007271    -3.50e-06       -.0072675        .0014961
    HC_M_RES |   -.2104672    -.1894885       -.0209787        .0113987
    LC_P_RES |    .0708268     .0493321        .0214947        .0100156
------------------------------------------------------------------------------
                           b = consistent under Ho and Ha; obtained from xtreg
            B = inconsistent under Ha, efficient under Ho; obtained from xtreg

    Test:  Ho:  difference in coefficients not systematic

                  chi2(8) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                          =      199.19
                Prob>chi2 =      0.0000
```

Table A.2: The model with subsample variable, (high share turnover subsample)

```
.
 xtreg OWN RES RES_COM ELOWN OWN4 BM ACC size HC_M_RES LC_P_RES, fe

Fixed-effects (within) regression               Number of obs      =      3891
Group variable: Ticker                          Number of groups   =       136

R-sq:  within  = 0.0115                         Obs per group: min =         7
       between = 0.0047                                        avg =      28.6
       overall = 0.0023                                        max =        38

                                                F(9,3746)          =      4.82
corr(u_i, Xb)  = -0.5110                        Prob > F           =    0.0000

------------------------------------------------------------------------------
         OWN |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
         RES |  -.1229529   .0638297    -1.93   0.054    -.2480973    .0021915
     RES_COM |   .1408864   .0833697     1.69   0.091     -.022568    .3043408
       ELOWN |   -.034672   .0211924    -1.64   0.102    -.0762217    .0068778
        OWN4 |    .009849   .0158342     0.62   0.534    -.0211956    .0408936
          BM |  -.0082326   .0024125    -3.41   0.001    -.0129625   -.0035027
         ACC |  -3.55e-08   1.12e-07    -0.32   0.751    -2.55e-07    1.84e-07
        size |  -.0065592   .0019373    -3.39   0.001    -.0103575   -.0027609
    HC_M_RES |  -.2116432    .067004    -3.16   0.002    -.3430112   -.0802753
    LC_P_RES |   .0306006   .0887634     0.34   0.730    -.1434287      .20463
       _cons |   .0456426   .0145494     3.14   0.002     .0171171    .0741681
-------------+----------------------------------------------------------------
     sigma_u |  .01446879
     sigma_e |  .05539423
         rho |  .06386651   (fraction of variance due to u_i)
------------------------------------------------------------------------------
F test that all u_i=0:     F(135, 3746) =     1.18           Prob > F = 0.0798

. estimates store fixed

. xtreg OWN RES RES_COM ELOWN OWN4 BM ACC size HC_M_RES LC_P_RES, re

Random-effects GLS regression                   Number of obs      =      3891
Group variable: Ticker                          Number of groups   =       136

R-sq:  within  = 0.0075                         Obs per group: min =         7
       between = 0.1341                                        avg =      28.6
       overall = 0.0106                                        max =        38

                                                Wald chi2(9)       =     41.47
corr(u_i, X)   = 0 (assumed)                    Prob > chi2        =    0.0000

------------------------------------------------------------------------------
         OWN |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
         RES |  -.1260227   .0626575    -2.01   0.044    -.2488291   -.0032162
     RES_COM |   .1597969   .0821444     1.95   0.052    -.0012032     .320797
       ELOWN |  -.0375405   .0208167    -1.80   0.071    -.0783405    .0032594
        OWN4 |   .0407964   .0154779     2.64   0.008     .0104604    .0711325
          BM |  -.0025618   .0013547    -1.89   0.059     -.005217    .0000934
         ACC |   4.01e-08   8.29e-08     0.48   0.628    -1.22e-07    2.03e-07
        size |  -.0000129   .0006801    -0.02   0.985    -.0013459    .0013201
    HC_M_RES |  -.1969241   .0660271    -2.98   0.003    -.3263348   -.0675134
    LC_P_RES |   .0139888     .08672     0.16   0.872    -.1559794    .1839569
       _cons |  -.0027982   .0052179    -0.54   0.592     -.013025    .0074287
```

```
-------------+----------------------------------------------------------------
     sigma_u |          0
     sigma_e |  .05539423
         rho |          0   (fraction of variance due to u_i)
------------------------------------------------------------------------------

. estimates store random

. hausman fixed random

Note: the rank of the differenced variance matrix (8) does not equal the number of
coefficients being tested (9); be sure this is
        what you expect, or there may be problems computing the test.  Examine the
output of your estimators for anything
        unexpected and possibly consider scaling your variables so that the
coefficients are on a similar scale.

                 ---- Coefficients ----
             |      (b)          (B)            (b-B)     sqrt(diag(V_b-V_B))
             |     fixed        random       Difference          S.E.
-------------+----------------------------------------------------------------
         RES |   -.1229529    -.1260227        .0030697        .0121765
     RES_COM |    .1408864     .1597969       -.0189105        .0142407
       ELOWN |    -.034672    -.0375405        .0028686        .0039728
        OWN4 |     .009849     .0407964       -.0309474        .0033405
          BM |   -.0082326    -.0025618       -.0056708        .0019962
         ACC |   -3.55e-08     4.01e-08       -7.56e-08        7.53e-08
        size |   -.0065592    -.0000129       -.0065463         .001814
    HC_M_RES |   -.2116432    -.1969241       -.0147191        .0114002
    LC_P_RES |    .0306006     .0139888        .0166118        .0189363
------------------------------------------------------------------------------
                           b = consistent under Ho and Ha; obtained from xtreg
            B = inconsistent under Ha, efficient under Ho; obtained from xtreg

    Test:  Ho:  difference in coefficients not systematic

                  chi2(8) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                          =       97.01
                Prob>chi2 =      0.0000
```

Table A.3: The model with subsample variable, (low share turnover subsample)

```
. xtreg OWN RES RES_COM ELOWN OWN4 BM ACC size HC_M_RES LC_P_RES, fe

Fixed-effects (within) regression               Number of obs      =      3209
Group variable: Ticker                          Number of groups   =       106

R-sq:  within  = 0.0134                         Obs per group: min =        14
       between = 0.0122                                        avg =      30.3
       overall = 0.0009                                        max =        38

                                                F(9,3094)          =      4.66
corr(u_i, Xb)  = -0.7685                        Prob > F           =    0.0000

------------------------------------------------------------------------------
         OWN |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
         RES |  -.0536459     .05637    -0.95   0.341    -.1641723    .0568804
     RES_COM |   .7207685   1.208811     0.60   0.551    -1.649385    3.090922
       ELOWN |   -.002204   .0315654    -0.07   0.944    -.0640952    .0596872
        OWN4 |  -.0037219    .017631    -0.21   0.833    -.0382914    .0308477
          BM |   .0040215    .003304     1.22   0.224    -.0024568    .0104999
         ACC |  -1.20e-08   1.85e-07    -0.07   0.948    -3.74e-07    3.50e-07
        size |  -.0076571   .0026604    -2.88   0.004    -.0128735   -.0024407
    HC_M_RES |  -1.762208   13.51805    -0.13   0.896    -28.26747    24.74305
    LC_P_RES |   .0675428   .0730538     0.92   0.355     -.075696    .2107816
       _cons |   .0628889   .0210686     2.98   0.003      .021579    .1041989
-------------+----------------------------------------------------------------
     sigma_u |  .01934414
     sigma_e |  .05609265
         rho |  .10628807   (fraction of variance due to u_i)
------------------------------------------------------------------------------
F test that all u_i=0:     F(105, 3094) =     1.28         Prob > F = 0.0295

. estimates store fixed

. . xtreg OWN RES RES_COM ELOWN OWN4 BM ACC size HC_M_RES LC_P_RES, re

Random-effects GLS regression                   Number of obs      =      3209
Group variable: Ticker                          Number of groups   =       106

R-sq:  within  = 0.0053                         Obs per group: min =        14
       between = 0.0002                                        avg =      30.3
       overall = 0.0032                                        max =        38

                                                Wald chi2(9)       =     10.39
corr(u_i, X)   = 0 (assumed)                    Prob > chi2        =    0.3195

------------------------------------------------------------------------------
         OWN |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
         RES |  -.0344926   .0555689    -0.62   0.535    -.1434056    .0744203
     RES_COM |   .5342362   1.101119     0.49   0.628    -1.623917    2.692389
       ELOWN |   .0080802   .0310697     0.26   0.795    -.0528153    .0689756
        OWN4 |     .02354   .0174217     1.35   0.177    -.0106058    .0576859
          BM |   .0032552   .0015483     2.10   0.036     .0002206    .0062898
         ACC |  -1.90e-07   1.08e-07    -1.76   0.079    -4.02e-07    2.21e-08
        size |  -.0001757   .0006717    -0.26   0.794    -.0014921    .0011407
    HC_M_RES |  -.5567589   12.84213    -0.04   0.965    -25.72686    24.61335
    LC_P_RES |   .0266699   .0720559     0.37   0.711     -.114557    .1678968
       _cons |   .0009353   .0054147     0.17   0.863    -.0096774     .011548
```

```
-------------+----------------------------------------------------------------
     sigma_u |          0
     sigma_e |  .05609265
         rho |          0   (fraction of variance due to u_i)
------------------------------------------------------------------------------

. estimates store random

. hausman fixed random

Note: the rank of the differenced variance matrix (8) does not equal the number of
coefficients being tested (9); be sure this is
        what you expect, or there may be problems computing the test.  Examine the
output of your estimators for anything
        unexpected and possibly consider scaling your variables so that the
coefficients are on a similar scale.

                 ---- Coefficients ----
             |      (b)          (B)            (b-B)     sqrt(diag(V_b-V_B))
             |     fixed        random       Difference          S.E.
-------------+----------------------------------------------------------------
         RES |   -.0536459    -.0344926       -.0191533        .0094697
     RES_COM |    .7207685     .5342362        .1865323        .4987609
       ELOWN |    -.002204     .0080802       -.0102842         .005572
        OWN4 |   -.0037219       .02354       -.0272619        .0027086
          BM |    .0040215     .0032552        .0007663        .0029188
         ACC |   -1.20e-08    -1.90e-07        1.78e-07        1.50e-07
        size |   -.0076571    -.0001757       -.0074814        .0025743
    HC_M_RES |   -1.762208    -.5567589       -1.205449        4.221077
    LC_P_RES |    .0675428     .0266699        .0408729        .0120335
------------------------------------------------------------------------------
                           b = consistent under Ho and Ha; obtained from xtreg
            B = inconsistent under Ha, efficient under Ho; obtained from xtreg

    Test:  Ho:  difference in coefficients not systematic

                  chi2(8) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                          =      125.02
                Prob>chi2 =      0.0000
                (V_b-V_B is not positive definite)
```

BIOGRAPHY

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