Event Studies on Stock Price Manipulation

By

Seong-Rok Park

THESIS

Submitted to
School of Public Policy and Management, KDI
in partial fulfillment of the requirements
for the degree of

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Professor Woochan Kim

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ABSTRACT

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This paper introduces the meaning, trend and methodologies of stock price manipulation and conducts three event studies, using daily transaction data from the Korea Stock Exchange (KSE) and Korea Securities Dealers' Automated Quotation (KOSDAQ). Having introduced the event study method, three companies - Willbes, Dongjak Cable and Communications, and Littauer Technologies - were tested by the method to see any symptom of stock price manipulation. This paper also tries to call people's attention to the distinction of the normal returns of Acquisition and Development stocks from any returns made by manipulative efforts.

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Abstract

This paper introduces the meaning, trend and methodologies of stock price manipulation and conducts three event studies, using daily transaction data from the Korea Stock Exchange (KSE) and Korea Securities Dealers' Automated Quotation (KOSDAQ). Having introduced the event study method, three companies - Willbes, Dongjak Cable and Communications, and Littauer Technologies - were tested by the method to see any symptom of stock price manipulation. This paper also tries to call people's attention to the distinction of the normal returns of Acquisition and Development stocks from any returns made by manipulative efforts.

Market size and size of illegal securities transaction moves together. As the trading volume of the Korea Stock Exchange (KSE) and the Korea Dealers' Automated

Quotation (KOSDAQ) has increased, illegal securities transaction followed suit. As the figures in <table I > shows, there is a positive relationship between trading volume and illegal trading practices. Since 1999, with the overall improvement of market condition and lively investment activities in both the KSE and the KOSDAQ markets, those illegal securities transaction woke up from the hibernation as well.

Here, one can raise a question. Why was there only a relatively small increase in these illegal practices in 1999, compared to the four-fold increase in daily trading volume? Are those practices decreasing? The seemingly decreasing trend in those practices may imply that the market riggers are either too dexterous or too clever to be caught.[1]

Before the prevalence of the Internet, the major way of doing illegal securities transaction was to exploit information asymmetry. The main actors were insiders of listed companies who had inside information, not opened to the public. The other main actors were people who received inside information under a certain obligation. Those people broke the obligation which prohibits misappropriation of the information and exploited illegal profits. Such superior piece of information power enabled these

[1] The major reason of the seemingly decreasing trend is market riggers' cleverness – they reduced the possibility of being detected by moving to the KOSDAQ market where market surveillance is relatively poor. And, there exist barriers to investigation on institutional and foreign investors. With it, financial authorities have difficulty in finding illegal securities transaction of those investors. Moreover, the financial authorities' insufficient capability to eradicate the market disturbing power made conducive environment for manipulators.

insiders to exploit extraordinary benefit over ordinary investors. However, those transactions had a defect, possibility of trace, due to their attribute of requiring physical contacts of seller and buyer, and leaving documented or recorded evidences. However the spread of the Internet has brought a great increase in numbers of investors as traders do not need to appear on the exchange spot and, at the same time, the cost and procedure of buying and selling stocks have become cheaper and faster. At the same time, the Internet provided manipulators enormous chances in on-line spaces in the form of chat room or on-line bulletin boards. Being under vast information on the web enabled manipulators to hide themselves from on-line detectives. Also, internet providers do not store information under their control for a long time because it is costly and inefficient. With the characteristics, on-line manipulation records hardly can be traced. As a result, the Internet has made a friendly environment for the illegal securities transaction.

With the quantitative increase in the trading volume and the qualitative improvement in dexterity of the illegal securities transaction skills, the precensorship of those illegal transactions has become next to impossible. Besides the shortage of human resource to detect on-line manipulations, the major reason enabling those manners is current computer system's poor functioning.[2] Therefore, event study method – as an *ex post* study- is widely adopted in testing the existence of those illegal securities transaction. Even courts use event study in estimation of illegal securities transaction's existence.[3]

Willbes, Dongjak Cable & Communications (DCC), and Littauer Technologies are the three companies I focus in this paper. Those companies had and have been under suspicion of stock price manipulation.[4] These three corporations are listed in different markets – Willbes in the KSE, and the other two in the KOSDAQ - and they were conducted by different groups of investors – insiders and institutional investors. Also, the methods, the manipulators used in those three cases, were diverse – dissemination of false information, immoral behavior and illegal allurement using information asymmetry. I chose the three different stock price manipulation cases to find out whether they show similarity in spite of their different attributes. The three cases are

2 October 1994, the KSE launched "Stock Watch System (SWAS)" which detects unusual stock price movement. In addition, "Computer-assisted Surveillance System (CASS)" is also operating from January 1995. However, the precise operations of the two systems are not disclosed to public, and some researches suggest possible errors of the systems. See Kim & Jang, 2000, "An inquiry into the function and role of stock price surveillance", Symposium in the Korean Securities Association: 243-266.

3 For the first time in Korea, on December 5, 2000 a court ordered a manipulator to indemnify plaintiffs (deceived investors) for the half of losses he inflicted. In the loss-estimation process, the court used a method of subtracting normal price from manipulated price following the American practices. However, the normal price was estimated by selecting the highest price of the securities for the last three years instead of using a market model. Thus, there might be some gap between the normal price obtained by a market model and used in the decision.

4 As of May 2001, the Willbes case is the only one terminated by a court among the three cases. The court wrapped up the case by ordering the company to pay fine and by having manipulator's indictment suspended. The other two cases are still under investigations.

about relatively small and medium size firms in which people are less interested. According to the information asymmetry literature, small and medium firms are susceptible to the illegal transactions such as stock price manipulation since their total amounts of equity are small and, consequently, easy to manipulate the stock prices. Thus riggers choose small and medium size firms so as to stir the market with less effort.

This study tries to find out any distinction or similarity in the degree of manipulation by looking at the price changes of the three companies of interest.

The structure of this paper is as follows. Part I and II explains stock price manipulation and covers event study methodologies. Section III introduces results of the event studies. Section IV concludes.

I. Stock Price Manipulation

Stock price manipulation refers to all sorts of actions, which try to manipulate price through artificial pressures on supply and demand of a specific stock. It is subject to penalty under the criminal and the civil law in Korea due to its negative effect of damaging investors' confidence on the market.

The Securities Exchange Law in Korea specifies insiders' trading and stock price manipulation as the twin axis of illegal transactions.[5] The two kinds of illegal securities transactions are considered to destroy the market's price-setting function and to inflict abnormal losses to investors by hindering investors' reasonable decision making. For the eradication of the two main illegal transactions, the law adopts 'control on public disclosure' and 'control on illegal transactions', respectively. The control on public disclosure is to alleviate information asymmetry problem between insiders and outside investors by obligating companies to disclose their information in the securities market. The control on illegal transactions is to secure the confidence of investors by prohibiting deceptive trades which hamper the price-setting function of the market and which abnormally inflict losses to investors.

Even with those legal preventions, it is not an easy work to regulate the stock price manipulation because discrimination of legal transactions from illegal ones is tricky since every security transaction has an impact on the stock price in the securities market. Also, stock price manipulation temporarily leads to increase in trading volume and, as a result, to increase in stock price when the market is not liquid enough. Thus, punishment of the manipulation is not a clear-cut issue when there exists a need to

[5] Clause 188-2 of Securities Exchange Law (revised in February 1999) specifies the range of insider and inside information & responsibilities of compensation for damage. Clause 188-4 (revised in January 1997) and 188-5 (revised in February 1999) of the same Law specify the penal responsibilities and civil liabilities of market manipulations.

activate the market but the securities market is still sluggish.

The stock price manipulation has another attribute that exploits extraordinary benefits from the nature of securities trading business. Those illegal transactions cannot take place without any approval or cooperation of the employees of a securities company because of the fact that the securities companies are in the best position of detecting the illegal securities transactions since all the stock trading orders are brokeraged though them. Nevertheless, the securities companies might be giving tacit consent to the unfair trade because they are highly dependent upon brokerage commission from customers as their major source of earnings.

Lately, manipulation opportunities expanded with the spread of cyber and day trading that were enabled by the Internet. With the increase in cyber and day trading as shown in the <table Ⅱ> and <table Ⅲ>, attempts to rig the market have increased. The implication of these attempts is that manipulators are now in much easier position to disturb the market while in a much harder position to be detected. The manipulators, using anonyms, can deceive millions of other investors in a day thanks to the net. Relatively light punishment for manipulation is also devoting to the increase of the attempts. As already mentioned, manipulation case hardly detected and penalized. Also, the penalty for manipulations is, at best, paying fine. That is, if a manipulator gets caught out of a couple of manipulations and pays fine, he/she would still have some profits from the undetected manipulations. These manners would leave a room for future manipulative attempts.

Based on their types, market manipulation can be classified into four categories – disguised trade, actual trade, manifestation, fixation and stabilization. The followings are the detailed definitions and their respective methods.

1. Disguised Trade (Painting the Tape)

A disguised trade refers to a transaction that has a purpose of inducing investors to a misconception without any intention for transfer of ownership. Otherwise, people are made to think that the trading volume is increasing or the price is rising by disguised trades.

Under this category there are two sub-categories. First type is an improper matched order. An improper matched order is a securities transaction at the same time with the same price and quality following collusion. All trades with in-advance promise are not necessarily stock price manipulation since it can be used to transfer rights. However, repeated reverse trading orders can reap the effect of inflating the trading volume at a low cost, and once other investors begin to buy the stock and, consequently, the stock price begin to rise, the riggers make profit by later selling the stocks they own.

Second type is a wash sale. One may call it 'a single-handed improper matched order'. This type of transaction is seemingly the same with an ordinary transaction except for the absence of transfer of ownership. It has the same effect with an improper matched order in inflating the trading volume and market price. It is the case at which the person who place a buy-order and the person who place a sell-order of the stocks is the same person. Otherwise, it is the case when a person, after a transaction, eliminates the effect of the transfer of right through a reverse trade.

An investor who asks those trading orders or an employee of a securities firm who accepts those orders can be the target of legal penalty under the Korean Securities Exchange Law.[6] The basis of the punishment is that not only the trade itself but also the orders that are not materialized can affect the reasonable decision making of investors.

2. Actual Trade

An actual transaction having the intention of leading investors to a misconception is

[6] Article 1 of Clause 188-4 Securities Exchange Law

also prohibited by the Korean Securities Exchange Law. The law specifies an actual trade by which traders can mistakenly think trading volume is increasing or market price is rising is another category of stock price manipulation. It is the foundation of the stipulation that a bulk order has a possibility of causing disequilibria of supply and demand in the securities market, as well as having a leverage on the price by hinting people an existence of a good-news or bad-news.

However, an extensive order, of course, affects the price of a stock. Thus, the manipulative intention using an actual trade requires a sophisticated examination to be uncovered. Therefore, in many countries, analogous factors are used in estimation of the intention of misconception. Factor used for the estimation in the United States is pecuniary interest of a manipulator. Japan considers factors such as subsistence of economic rationality, presumable motive, modality, and pre- & post-circumstances of a transaction. Korea estimates the intention of misconception by examining whether an extraordinary turbulence in the price was generated, whether the trade is natural under trading sense, and whether the trade has a chance to blur the reasonable decision making of investors. Once a transaction lacks the economic rationality, it is regarded as an actual trade, and, consequently become an object of punishment.[7]

[7] Item 1 of Article 2 of Clause 188-4 Securities Exchange Law

3. Manifestation

Manifestation is the third category of stock price manipulation using notification. It refers those actions deceiving investors by spreading or displaying fallacy with the intention of misconception. First type of manifestation is dissemination of manipulation. Disseminators circulate rumors that stock price would be changed by a manipulation which is not existing. Other investors who received the rumors obviously sell or buy to avoid future losses. Then, the manipulator would gain profits when other investors are in the chaotic state.

Second type is false disclosure. It is the behavior that an entity deliberately makes up a story, which can critically affect the stock price owned by the entity, about dividend payment and capital increase by public offering. Gaining profits by selling the shares after the false notification with the intention of misconception is what is necessary to penalize the manipulator.[8]

4. Fixations and Stabilization

The Korean Securities Exchange Law also inhibits selling and buying stocks, as well as

[8] Item 2, 3 of Article 2 of Clause 188-4 Securities Exchange Law

asking and accepting orders which are placed for the purpose of fixation or stabilization of stock price. Fixation – effort of maintaining current price – has a difference from general manipulations in its passive nature. However, it is a manipulative act since it hinders the markets' price-setting function.

It has two exceptions. The law tolerates narrowly defined stabilization and market fostering even though they fall apparently within the purview of actual trades. The basis of the permission can be found in the two exceptions' alleviative function on the market percussion raised by share offerings. The narrowly defined stabilization implies that action of an undertaker of new shares intervenes the market and stabilizes the price of already-offered shares to promote the new share offerings. It is market fostering that controlling the demand and supply for the newly offered shares for some time period after the listing. It is to prevent a decline in the price of the offered stock following the increase in the quantity of the stock.[9]

Beside those four types of manipulation, the Securities Exchange Law has a clause prohibits deceptive transactions in general. Even if the clause is abstract, the clause which gives a strong message that it is against any kind of practices which leads

[9] Article 1 of Clause 83-8 Securities Exchange Law

ordinary investors to engage in irrational decision making or which hampers the market from being efficient.[10]

Ⅱ. Event Study Methodologies

Everything in this world has reasons of origination as well as effects on others. In economy, events such as announcement of new information, increase in capital through public offering, merger and acquisition, etc., have effects on other variables in the economy – most importantly on the value of a firm. In a scholastic world, the effect of these economic events can be measured by an event study method: the statistics-based research method using past data on equity price. It is the strong point of an event study that allows researchers to measure the effect of an economic event with ease and objectivity. And also it enables researchers to distinguish whether the impact is reasonable or artificially fabricated. Thus, this merit made people in legal field and economics use event study method to assess and disgorge ill-gotten money, and to measure the impact on the value of a firm caused by an event. When an early detection system does not function well, event study method can be the best *ex post* tool

[10] According to a report "Investigating and Prosecuting the Market Manipulation", Technical Committee of the International Organization of Securities Commissions (ISOCO), 2000, the member countries of Technical Committee Working Group on Enforcement and the Exchange of Information (TCWG-4) regard advancing the bid, pumping and dumping, marking the close, and squeeze as the other manipulative methods.

detecting and gauging effect of stock price manipulation with.

Since the first publication by Dolley (1933), continuing developments by Myers and Bakay (1948), Baker (1956, 1957, 1958), and Ashley (1962) have settled event study methodology as the form of modern research method. Further modifications by scholars such as Ball and Brown (1968), Fama, Fisher, Jensen, and Roll (1969) shaped event study into an ingenious tool of study broadly used now.[11]

Event study is based on the efficient market hypothesis stating that stock price reflects all publicly available information.[12] Since the hypothesis has an assumption of reasonable behavior of investors, event study also assumes that investors would reasonably react to a new arrival of information. Under the assumption, distinguishing normal profit or return from abnormal one is possible through estimation of normal profit assuming absence of the specific event and comparison of it with the actual one.

Among many detailed steps, the major steps include defining event and estimation windows, finding normal and abnormal returns, and testing for the significance of abnormal return.

1. Estimation and Event Windows

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[11] See Campbell, Lo & Mackinlay, 1996, "*The Econometrics of Financial Markets*"

[12] Cone & Laurence, 1994, How Accurate are Estimates of Aggregate Damages in Securities Fraud Cases?, *The Business Lawyer,* Vol. 49

After identifying an event, defining an event window and an estimation window are the first steps in any event study. Event window includes the period during which an event is thought to have affected the value of a firm concerned. The period is a core part in an event study since, without any clear definition of an event window, an event study tends to lose its direction and end up giving wrong implications.

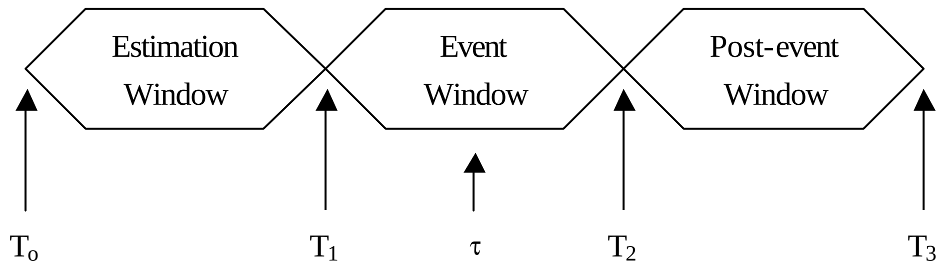
The length of an event window (L_2) depends on the characteristic of the event being studied. Normally a fraud case in a stock market requires a sufficient period to be studied as they leave aftershocks in the market. The longer the event window, however, the more difficult it will be for researchers to discriminate the effect of the targeted event from that of other events.

Estimation window is the period during which a normal relationship is estimated between a specific firm's stock return and the market return. Besides the market return such as KOSPI, in the regression model, one may include other indices' returns as independent variables such as return from an industry index or return from a comparable company. However, the market model is most widely used.

Like the length of an event window, there exists a trade-off in determining the length of an estimation window (L_1). Barriers to the collection of sufficient trading data due to unavailability arising from occasion such as short operating history may hamper representing the normal relationship with accuracy, while too long estimation window may dilute the relationship with the possible inclusion of other events.

Some events may leave negative aftershocks for a long period of time after the outburst of the event. Study on the post-event period would capture the residual.[13] The following figure shows the three windows graphically.

Time Line of Windows



In the figure above, τ denotes the day on which an event took place, and T_n denotes the first day and last day of each window. In this paper, for the simplicity, I treat event and post-event windows together as an event window. Thus, the length of an estimation window (L_1) is the period between T_0 and T_1, and the length of an event

[13] The purpose of a manipulation is to realize an abnormal return. Ordinary procedure of a manipulation begins with an artificial increase of a stock price through inflating trading volume. People with inferior information may think the price hike is reasonable and may want to join the investors group expecting further price increase. At peak, manipulators would sell their own shares. Then, the result of selling is usually nose-diving stock price and huge losses to the people joined the group later. In this frame, an event window covers the period up to the peak in order to measure the abnormal return the manipulators got and a post-event window covers the later period in order to measure the amount of damage the investors received.

window (L_2) is the period between T_1 and T_3.

2. Abnormal returns

Having defined an estimation window and an event window, researchers calculate normal and abnormal returns of a specific stock. Beforehand, researchers opt some indices for the analysis under consideration of barriers arouse in data gathering process. Selection of criteria, although highly subjective, needs some considerations.[14] Through ordinary least square (OLS) analysis using past daily trading data during the estimation window period (L_1), the normal relationship among the stock return and other criteria are obtained and are articulated in regression models:

$$\boldsymbol{R_t} = a + b_{\boldsymbol{n}} \boldsymbol{Rm_{tn}} + e_{\boldsymbol{t}} \qquad \text{------------------} \ \mathbf{(1)}$$

$$\mathbf{E}\ [e_{\mathbf{t}}] = \mathbf{0} \qquad \mathbf{Var}\ [e_{\mathbf{t}}] = s_e^{\mathbf{2}}$$

R_t and Rm_t are the returns on the stock under question and the n indices from the market, respectively, on the trading date t.[15] e_t is the disturbance term which cannot be

[14] Campbell, Lo & Mackinlay, 1996 "*The Econometrics of Financial Markets*"

[15] The returns on a stock are 'adjusted returns'. That is, returns are adjusted for special events such as stock splits, dividends, and issuing of new shares. If R_t denotes nominal return on day t, P_t and P_{t-1} respectively denote prices on day t and $t-1$, their relationship can be shown as following:

$$R_t = \left(\frac{P_t}{P_{t-1}}\right) - 1$$

For adjustment for a stock split, the following equation is used where K_1 is the ratio of number of newly distributed shares to the number of outstanding shares:

explained by the market returns, and a, b_n and e_t are parameters. This model has the name of Multiple Factor Market Model since the parameters are derived from the relations among the return of the stock and the returns of market indices.[16] In this step, researchers create many regression models using combinations of market indices. Among many candidate regression models sought through the regression analysis, the model with the highest adjusted R^2 is chosen because of the fact that the higher R^2, the greater reduction in the variance of the return.[17]

Based on the regression model, researchers estimate normal return, the return that would have taken place in the absence of the event over the event window period (L_2). Inputting returns of market indices into the regression model chosen does this procedure.

As the definition implies, abnormal return is the excess return earned by the impact of the event over the normal return. Thus, next job is to estimate the abnormal return

---

$$R_t = (1 + K_1)\left(\frac{P_t}{P_{t-1}}\right) - 1$$

For a capital increase through issuing new shares where K_2 denotes the ratio of the number of new shares issued to the number of stocks outstanding and A denotes the price of the newly issued share, the following equation is used.

$$R_t = \frac{((1 + K_2)P_t - K_2 * A)}{P_{t-1}} - 1$$

[16] Campbell, Lo & Mackinlay, 1996, "*The Econometrics of Financial Markets*" " ..The Capital Asset Pricing Model was commonly used in event studies during the 1970s. During the last ten years, however, deviations from the CAPM have been discovered, and this casts doubts on the validity of the restrictions imposed by the CAPM on the market model. Since these restrictions can be relaxed at little cost by using the market model, the use of the CAPM in event studies has almost ceased."

[17] Campbell, Lo & Mackinlay, 1996, "*The Econometrics of Financial Markets*"

by subtracting the estimated normal return from actual return of the stock. Equationwise the abnormal return on trading day t is expressed by the following.

$$\hat{e}_t = R_t - \hat{a}_t - \hat{b}_n Rm_{tn} \qquad \text{------------------ (2)}$$

Under the null hypothesis that the event had no effect on the value of the stock of interest, the abnormal return ($\hat{e}_t$) follows a distribution with a mean of zero, thus unbiased.

In order to find out the overall magnitude of the event's impact, researchers aggregate the abnormal returns over the event window. The usual method used in this step is to compute cumulative abnormal returns (CAR). The CAR is a mere geometric summation of the abnormal returns during the period T_1 and T_3 having distributional mean of zero and a variance of $\sigma^2(T_1, T_3)$ under the null hypothesis. The following is the equation for CAR.

$$\boldsymbol{CAR\ (T_1, T_n) =}\ [(1+AR_1)(1+AR_2)\Lambda\ ((1+AR_n)]-1$$

$$= \prod_{i=1}^{n}(1+AR_i)-1 \qquad \textbf{------------------ (3)}$$

3. Test for the Significance of the Abnormal Returns

Whether the event's impact on the value of the firm's stock was significant or not is tested through the significance test (usually the student's t-test) on CAR. As the daily

CAR has statistical significance, researchers are in the position where they can claim the value of the specific stock is certainly affected by the event and different from the normality. The testing requires a process of transforming CAR into standard form (Standardized Cumulative Abnormal Return: SCAR) by dividing CAR with its standard deviation:

$$\boldsymbol{SCAR}\ (\mathbf{T_1, T_n}) = \frac{CAR(T_1, T_n)}{s(T_1, T_n)}$$

With the test statistic of $t^*_{(L1\ -2;\ a/2)}$ where (L_1–2) and a are, respectively, the degree of freedom and the significance level of an event study, every daily SCAR is tested their statistical significance. By doing so, the null hypothesis can be either accepted or rejected. If the null hypothesis is rejected, the CAR during the event window period is said to have been affected by the event of interest.[18]

For further inferences, researchers calculate normal and abnormal prices of the stock during the verified period of impact. Usually it is to disgorge or charge penalty on the abnormal gains of market riggers.

Ⅲ. Actual Cases

Among many stock price manipulation cases in Korea, I choose the three firms –

[18] If the CAR of certain period is significant, researchers consider the stock price is affected by a manipulation even though each AR during the period is insignificant.

Willbes, Littauer Technologies, and Dongjak Cable and Communications (DCC). These cases are chosen to cover different sorts of manipulation types.[19]

The data used here are daily trading data obtained from Korea Securities Research Institute (KSRI). To estimate of the multi-factor model for each case, I utilized Korea Composite Stock Price Index (KOSPI), KOSDAQ index and industrial indices as well as price records of others firms that are comparable to the firms of interest. Since recent manipulation cases are picked, the time period covered in this paper is from year 1997 to 2000. The following three parts are allocated to three cases under question and some general inferences.

1. Willbes

Willbes is a knitwear producing company established in 1973 under the name of Kunja Industrial Co. Ltd. In February 1997, it changed its name to the current one and enlarged the areas of business into venture capital and internet business through a couple of acquisitions of information technology, internet, and venture capital companies such as KTB network, Auction, MiraeNet and promising internet venture

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[19] Willbes is listed in the KSE and the CEO of the company executed the manipulation. DCC is registered at KOSDAQ and was manipulated by employees of a securities company. Littauer Technologies is registered at KOSDAQ and thought to be the co-work of the CEO and institutional investors.

companies.

On February 11th 1998, the company announced an innovative invention of cooling-can (they named it Wonder-can) using an epochal cooling catalyst. According to the announcement, the can does not need any refrigerator or ice in order to be cooled - just by opening the can, the company claimed, people can enjoy cold beverages. With the announcement, investors got excited resulting in skyrocketing stock price from 5000 to 6000 KRW in January to 34500 KRW at the end of February.

The invention was amazing, however the problem was that the catalyst did not have any certification or approval of authority due to its harm to people, and that was the epicenter of manipulative suspicion. Number of people who believed the announcement was cooked up to increase the stock price of Willbes increased. Consequently, Financial Supervisory Service (FSS) began to suspect the announcement to be a stock price manipulation case led by insiders.

Thus, I set the event window for this case the period between February 11, 1998 and March 12 of the same year (L_2 = 26 trading days) considering the possible aftermath of the announcement until the date it turned out to be a gimmick.[20] To estimate the normal relationship, the Willbes' historical rate of return data were

[20] Another event study with longer event window (L_2 = 115) gave a diluted effect of the announcement on the stock price without any improvement in the model.

regressed by returns of KOSPI, mid-sized corporations' index, whole sellers' index and Shinsung Corporation for 126 trading days (L_1=126).[21] I chose Shinsung Corporation since it is a comparable company in size (medium size) and the nature of business (a knit-wear producing company).

Having identified the estimation and event windows, it was found that the best regression model, showing the highest adjusted R^2, was the model with the three variables including KOSPI, mid-sized corporations' index and Shinsung Corporation as independent variables. The regression model is as follows;

$$\boldsymbol{R_{Willbes} = 0.0136 - 1.7495\, R_{KOSPI} + 2.8341\, R_{Mid\text{-}sized} - 0.2771\, R_{Shinsung}} \qquad \text{----- (4)}$$

$$(0.0050) \qquad (0.4441) \qquad\qquad (0.4905) \qquad\qquad (0.1219)$$

Here, ***R*** stands for returns on each variable with its standard error in the parentheses. The results of other models are available in <Table **IV**>.

The next step is to calculate the normal return and the abnormal return of the Willbes using the equation above. This is nothing but inserting the actual movements of the three market indices during the event window into the model above, and subtracting the result from the actual return of Willbes.

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[21] The estimation window for this specific case could vary since Willbes has a rich historical price database coming from its long history, consequently having no limitation on collecting data to compare with. After trying several regressions, I found out the model with shorter estimation window (L_1=126) is better than the one with longer estimation period (L_1=323) in explaining the movements of the Willbes stock return in the market. For example, the best model with the shorter window has an adjusted R^2 of 0.2964 while the best with longer one has that of 0.2290.

For the primary purpose of testing the manipulation, the abnormal returns were aggregated and changed into CARs, and then standardized into SCARs. The test criterion for the Willbes case is $t_{(124;\, 0.05/2)} = 1.96$, and compared with each t-value in <table V>. According to the criterion, 21-day period between February 11 and March 6, 1998 has t-values that are larger than the criterion.[22] This rejected the null hypothesis of 'no manipulative impact on the stock's performance' at the five percent significance level, statistically supporting the assertion on the existence of manipulative actions. Like the result of t-test, <figure I> suggested that the CAR of Willbes were positive during the period between February 11 and March 9, 1998.

With the recognition of manipulation on the Willbes stock during the event window period, I calculated normal stock price movements and the stock's return movements, and compared them with the actual price movements and actual return movements in <figure II>. As the figure suggests, there is acknowledgeable difference between the actual and the normal movements. Since the graphical difference was statistically proven, I was able to conclude this case as following: during the period February 11 to March 6, 1998, stock investors were manipulated by the false information on the unauthorized catalyst so that the existing shareholders including the

[22] Although the company announced the invention on February 11, 1998, its stock price went down on that day. Starting from the following day, however, the stock price launched a fifteen-day increase.

management might have a chance to gain abnormal returns.

2.Dongjak Cable & Communications

The second case is about the manipulation case led by the institutional investors in the KOSDAQ market. DCC was a small cable television company in Seoul that provided local cable television services and cable relaying services. Due to its monopolistic position in the region, DCC grew steadily with the population in the region. In October 1999, a joint cable television company called Daeho Cable Communications and Network that provide nationwide cable services and Internet cable services acquired DCC. Before the transformation, it was a negligible company with a relatively small market capitalization. The manipulation on the company began with the easiness of manipulation arising from the small size and unpopularity of the firm to the public.

Though the name of this case is DCC stock price manipulation, the cable television company, as far as I know, has nothing to do with illegal transactions, and was a scapegoat with the price decrease following the scandal – the riggers of this case were institutional investors, Tong Yang Securities Co. Ltd.

On November 30 1999, Tong Yang Securities sent a positive message to investors and recommended buying DCC stocks. Investors who received the information from investment information facilities such as stock trade magazines, bulletin boards on the Internet, believed it and began to buy the stock since it was an auspicious sign from a reliable securities firm. As a result, the DCC stock price, which was 34,900 KRW on November 30th, rose up to 39,050 KRW on the next trading day. However, on December 2nd, the securities firm began to sell huge amount of stocks it had owned, leading the stock price of DCC to fall. On December 3rd, the stock price closed at 31,400 KRW per share. People filed protests against the immoral conduct. Against these protests, the securities firm made an excuse regarding the extensive selling of the stocks with a comment that the selling was prompted by the sell orders from its clients. Many investors who thought they were cheated by the securities firm requested a scrutiny by the FSS.

For the estimation of regression models, I selected the KOSDAQ index as a comparable index in finding the normal movement of the DCC stock in the market. In addition, I included the Venture industry index and the Futures Cable TV into the estimation. The choice of Venture industry index reflected the belief of ordinary investors that the DCC was a venture business having plans to enlarge its business sector into the Internet service provision. And, the inclusion of the Futures Cable TV, like the Willbes case, came from the consideration of size (small sized local firm) and the nature of business (cable television relaying service).

Characteristically the event window for the DCC consists of two consecutive time periods because two manipulative actions were involved. One was the first two-day period during which the securities firm recommended the investors to buy DCC stocks, and the other was the following nineteen-day period during which the securities firm sold its owned stocks. Since these two actions had offsetting effects to the prices and returns of the stock, I decided to treat them separately. In sum, the length of the event window was twenty-one days (L_2=21).

The possible estimation window for this case was sixty-two days and, some might raise doubt on the significance of the inferences extracted out of it. The estimation from such a short period of time might have led me to a wrongful relationship, however, it was the best choice allowed since the DCC and the Futures Cable TV were registered at KOSDAQ for only a short period of time before the event. Thus, for the purpose of the consistent comparison, I had no choice but to set the estimation window period from September 1 to November 29, 1999 which is a sixty-two-days period (L_1=62).[23]

Through the multi-factor market model, I estimated seven regression models, and

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[23] To be consistent, one has to use the same length of time period for all the comparable sources of comparison. Though the other two comparing indices (KOSDAQ and Venture industry) had long enough trading records to use, the short history of the two companies restricted the use of the rich information about the two indices from the past before their registration.

picked the one with the highest adjusted R_2 from <table Ⅵ>. The model is following.

$$R_{DCC} = -0.0032 - 0.9905\, R_{KOSDAQ} + 1.0313\, R_{Venture} + 0.4637\, R_{FCT} \qquad \text{----- (5)}$$

$$(0.0068) \qquad (0.4803) \qquad (0.3360) \qquad (0.1216)$$

As before, ***R*** represents returns for each index and the companies, and the numbers in the parentheses are their standard errors. One can find that the return of DCC is negatively correlated with the KOSDAQ index while moving together with the Venture industry index and the similar firm during the estimation period.

With the relationship above, I estimated the DCC stock's normal and abnormal returns. As for the effect of recommendation, I accumulated the first two-day's returns. As for the effect of selling, I accumulated the period from day three (December 2, 1999) to the end of the event window.

As shown in <table Ⅶ>, the CARs show different signs. Graphical expression in <figure Ⅲ> also shows the confrontation – positive CARs for the first two days followed by sharp drop to negative CARs. The figure implies that the stock price of the DCC went up sharply as a result of the recommendation for the first two days, and then, nose-dived right after the selling orders of the securities company. One can easily imagine the huge losses of innocent investors who purchased the DCC stock following the recommendation. In the *t*-test result, the five-trading-day period

(December 1^{st} ~ 5^{th}) was found to be significant rejecting the null hypothesis, which says the CAR is different from zero, under five percent significance level. Thus, Tong Yang Securities manipulated the stock price of DCC by making it increase through the recommendation, and by making it decrease through the intensive selling. Though whether the securities firm purchased the DCC stock after the price fall was not confirm, the securities firm might have exploited abnormal gains through the two manipulations.

The graphical result in <figure Ⅳ> shows the normal prices of DCC which had been obtained if manipulation had not taken place. One can find the biggest gap between the normal and actual price on the second day of event window (December 1^{st}), and the gap decreases due to the effects of the intensive selling.

3.Littauer Technologies

Littauer Technologies is an international holding and management company which invests, develops and manages a comprehensive network of business solutions companies in the Asia Pacific region. Before an American corporation called Littauer Strategics acquired it in June 2000, it was a small manufacturing company which produced motors and dischargers for boilers.

The stock price of the manufacturing company on January 26, 2000 was 2,000

KRW per share. However, for the following a few months, its stock price went up beyond ordinary investors' expectation, and reached at the pick of 362,000 KRW on May 18, 2000. The surprised investors and stock market analysts tried to find out the momentum of the price hike. However, those efforts revealed nothing except for a suspicion of manipulation on its notification about inflow of foreign capital. Though Littauer Technologies acquired huge amount of foreign capital on July 21, 2000, people claimed it was to cheat ordinary investors since the money flowed out just in three hours. People also pointed the management as a rigger of the illegal transaction. With the suspicion, the FSS of Korea asked prosecutors for investigation.

To test the Littauer Technologies' case, I set the period from January 27 to the end of year 2000 as the event window (L_2=224). Information about the inflow of foreign capital was released from February but the exact day on which the manipulation began was not clear. So, I selected the day with the lowest stock price before it began to rise as the beginning. Likewise, when the manipulation was finished is also not clear. So, I set the event window long enough to catch all the possible aftermath.

The estimation window for this case starts from August 2, 2000. The historical data of Littauer Technologies prior to this date is useless because Littauer Strategics acquired PowerTech, the Littauer Technologies' former self, and named Littauer

Technologies in June 2000. As already mentioned, after the acquisition the manufacturing company transformed into an investment holding company. Under the name of Acquisition and Development (A&D)[24], it has changed its business sector and outfits, and, at the same time, its stock price began to rise. Consequently, the history of PowerTech was no longer useful in estimating normal movement of Littauer Technologies and the longest estimation window I could get was from August 2, 1999 (L_1=122).

Like the case of DCC, Littauer Technologies is registered at the KOSDAQ market. This fact led me use the KOSDAQ index and Venture industry index in the estimation of the multi-factor market model. The fact that it is an A&D stock also allowed me to use another A&D stock to compare – it was Barunson, a well-known A&D company.[25] After a couple of trials to draw the best regression model, I got the following model and the result is in <table Ⅷ>:

$$R_{Littauer} = 0.0022 - 0.6180\, R_{KOSDAQ} + 0.6276\, R_{Venture} + 0.3459\, R_{Barunson} \quad \text{----- (6)}$$
$$(0.0068) \qquad (0.4837) \qquad (0.3535) \qquad (0.0841)$$

The equation above revealed the similar movement of Littauer Technologies' stock

[24] A&D refers to a managerial technique under which a company with ample fund acquires a firm with high level of technologies, develops and increases the value of the acquired firm. The Cisco Systems' case is a good example of successful A&D.

[25] Barunson was originally school and office supplies manufacturing company. Through an acquisition by an investment company, its business sector has been widened and its stock price began to rise like Littauer Technologies.

price and DCC - it shows positive relationship with the Venture industry index and the Barunson stock while moving opposite direction to the KOSDAQ index. However, as the coefficients suggest, the movement of Littauer Technologies was not dependent on the market or the similar firm as much as the case of DCC. This can also be found in the smaller adjusted R^2 of Littauer Technologies.[26]

In the process of compounding normal and abnormal returns of the company, one thing deserves to be highlighted – the treatment of special events during the event window. Special events including rights offering for stock split or dividend payments could have a greater impact on the stock's return than the effect of a manipulative action. On these days, normal returns of the stock of interest were set to be equal to the actual return.[27] Based on the assumption above, the normal return on September 14, 2000 was set to be equal to the actual return of that day since Littauer Technologies executed a stock split.

Through the accumulation process, I found that CARs were positive throughout the event window period with the exception of the last two days. This implies that the

[26] The R^2 of Littauer Technologies is only 0.1523 while the R^2 of the previous two cases were 0.3~0.45. This implies the movement of the Littauer Technologies stock price is less related to the movement of the market.

[27] In case of rights offering for the third party (new shareholder), the reaction of the existing shareholders was not as significant as that toward other events. Littauer Technologies' case had several offerings during the estimation and event windows period. However, the effect of those special events was too weak to have some meaning. Hence, I decided to ignore the effects and there was no need for the return to be adjusted.

effect of manipulation lasted for almost a year. The student's *t*-test showed that CARs were significantly different from zero during the period between February 2 and September 4, 2000. The <figure **V**> graphically shows the movement of CARs.

<Figure **VI**> shows that the normal price level is always lower than the actual price level implying the existence of manipulation. Based upon the test result in <table **IX**>, I can conclude that Littauer Technologies' stock price was affected by manipulative power during the period between February 1 and September 5, 2000.

However, in case of A&D stocks like Littauer Technologies, people may have difficulty in differentiating stock price hike reflecting the development efforts from the hike influenced by manipulation. In the Littauer Technologies' case, one might not easily distinguish them, either. So, a need for comparison between ordinary movements of A&D stocks with that of Littauer Technologies arose.

Since investors classify Littauer Technologies into Acquisition and Development (A&D) stock group, the large price change of Littauer Technologies might have been inevitable like most of other A&D stocks because A&D companies pour their effort to develop acquired firms. Unfortunately, as of now, hardly anybody can suggest a precise distinction of those two price hikes. So, as the second best policy, I surveyed the stock price movements and cumulative returns of PS Corporation (PS Technologies), Mohenz Ltd, Dongteuk Corporation, IHIC Partners, ENPIA Corporation, Dongmi Industrial (Hostech Global) and Locus Holdings, which are thought to be A&D stocks.[28] The time period surveyed for those A&D stocks is one year or less from the first day of the month on which the firm experienced an acquisition.[29] According to the study, these firms of concern showed stock price increase within four months from the acquisitions. In the Littauer Technologies case, the stock price at the time of acquisition was around 1,000 KRW per share and it went up to 4,350 KRW per share in a two-month period, and one can say it was the result of the development efforts. However, while other stocks began to be stabilized after the hike, the Littauer Technologies stock price, after a while, skyrocketed again. The size of increase is also problematic. The other A&D stocks showed less than 700 percent increase following these acquisitions as <figure Ⅶ> shows. On the other hand, the stock price of Littauer Technologies jumped up around 40,000 percent from the stock price on June 1, 1999. Since, the company did not released an epochal invention but released several unexamined auspicious news that are under investigation, no reasonable person would regard the price hike as a 'normal' one, and this can be an evidence of stock price

[28] Among many classifications of A&D stocks, I chose those companies following the classification of Joongang Ilbo, a daily newspaper company in Korea, since the classification includes most of A&D stocks in securities market.

[29] The one-year period was studied to capture the eccentric price hike of the Littauer Technologies' stock. Some companies' acquisitions, however, were done in the second half of year 2000 except for Dongteuk Corporation and ENPIA Corporation, thus, not have been one year since the acquisitions.

manipulation.

Ⅳ. Conclusion

With so-called ‘venture boom’, the price change of securities in the KOSDAQ market has been more volatile than that of the KSE, since most of the companies registered in the KOSDAQ are venture companies with high level of technologies. However, some portion of the volatility might be explained by active involvement of manipulators. According to the information asymmetry literature, large firms are less subject to the information asymmetry problem since investors heavily study them. The KSE consists of those large firms so that the market's self-surveillance by investors performs well. On the other hand, instability and low level of investors' interest in small firms are giving more room for manipulators to exploit illegal profits. Therefore, there is a need to study more and raise the level of surveillance system to frozen any future manipulation. In addition, a need to shorten the time for investigation and prosecution should be stressed along with the strengthening the penalty. A long investigation period contains the probability to give a distorted result and makes it hard to indemnify victims.[30] Further investor education to prevent from being a victim of manipulation is

[30] Kim & Jang, 2000, An inquiry into the function and the role of stock price surveillance, Symposium in the Korean Securities Association: 243-266

also recommended.

Investors recognize the shortage of surveillance power compare to the increasing number of illegal securities transaction. However, in order to fight against clever manipulators, the supervisory body would have to come up with a smarter tool which can detect the crimes red-handed.[31] Furthermore, device for evaluation of A&D stocks is required. Without it, no one can guarantee there would not be a recurrence of manipulation in those stocks.

This paper has some limitations. Since the nature of event study is quite subjective in selecting the windows and the variable to be included in the model, there would sure be people who would raise doubts on the results. Shortage of enough trading data in some cases also decreases the significance of the findings. And, evaluation of A&D stock is problematic too. People might also raise questions on the mere comparison of stock price movement during the period following acquisitions. Those limitations would be relieved in further studies.

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[31] Researches such as Park & Lee (2000), How to detect dummy orders?, Symposium in the Korean Securities Association:163-190, try to suggest more efficient tools which can detect manipulative attempts in the vast amount of trading orders with relatively few human resources.

Table I

Trends in Daily Trading Volume, Stock Price Manipulation and Insider Trading

	1996	1997	1998	1999	2000. 7
Daily Trading Volume (tril)	487	558 (14.1%)	660 (18.8%)	3482 (427.8%)	3066
Stock Price Manipulation	37	34	21	77	38
Insider Trading	18	35	72	71	33
Total	55	69 (25.4%)	93 (34.8%)	148 (59.1%)	71

* Figures in the parentheses are year-to-year changes

Source: Korea Stock Exchange

Table II

Ratio of Cyber Trade (based on Trade Value)

	1998	1999	2000. 6
Total Trade Value (billion)	43,989	133,969	138,937
Cyber Trade Value (billion)	1,634	53,882	82,015
Ratio	3.7 %	40.2 %	59.0 %

Source: Korea Stock Exchange

Table III

Ratio of Day Trade

	1999. 7	1999. 12	2000. 7
In Trade Volume	20.43%	27.42%	46.25%
In Trade Value	17.89%	23.71%	33.23%

Source: Korea Stock Exchange

Table Ⅳ

Regression models for Willbes

	Model 1	Model 2	Model 3	Model 4
Intercept	0.0084 (0.0055)	0.0105** (0.0052)	0.0088 (0.0055)	0.0087 (0.0055)
KOSPI	0.6652*** (0.1592)			
Mid-size Firms		0.8724*** (0.1497)		
Whole Sellers			0.6252*** (0.1428)	
Shinsung				0.2809*** (0.0987)
Adj. R^2	0.1163	0.2086	0.1269	0.0537
Observations	126	126	126	126

	Model 5	Model 6	Model 7	Model 8
Intercept	0.0133*** (0.0051)	0.0087 (0.0055)	0.0086 (0.0055)	0.0115** (0.0052)
KOSPI	-1.5164*** (0.4394)	0.1730 (0.4129)	0.6013*** (0.2002)	
Mid-size Firms	2.2953*** (0.4366)			1.6220*** (0.3874)
Whole Sellers		0.4811 (0.3725)		-0.7363** (0.3517)
Shinsung			0.0635 (0.1200)	
Adj. R^2	0.2726	0.1211	0.1112	0.2296
Observations	126	126	126	126

Continued:

	Model 9	Model 10	Model 11	**Model 12**
Intercept	0.0104** (0.0052)	0.0088 (0.0055)	0.0135*** (0.0051)	**0.0136*** (0.0050)**
KOSPI			-1.3543*** (0.4797)	**-1.7495*** (0.4441)**
Mid-size Firms	1.0642*** (0.2080)		2.4648*** (0.4808)	**2.8341*** (0.4905)**
Whole Sellers		0.6132*** (0.1908)	-0.3159 (0.3732)	
Shinsung	-0.1661 (0.1254)	0.1730 (0.4129)		**-0.2771** (0.1219)**
Adj. R^2	0.2134	0.1211	0.2709	**0.2964**
Observations	126	126	126	**126**

	Model 13	Model 14
Intercept	0.0114** (0.0052)	0.0137*** (0.0050)
KOSPI		-1.6488*** (0.4922)
Mid-size Firms	1.7708*** (0.4054)	2.2911*** (0.5172)
Whole Sellers	-0.711** (0.3517)	-0.1797 (0.3732)
Shinsung	-0.1513 (0.1241)	-0.2700** (0.1241)
Adj. R^2	0.2327	0.2920
Observations	126	126

Figures in the parentheses are standard errors.

*, **, *** imply the coefficient is significant at 10%, 5%, and 1% level of significance, respectively.

Table Ⅴ

<u>t-value of Willbes</u>

Date	t-value
98/02/11	-5.4498*
98/02/12	12.1720*
98/02/13	16.1241*
98/02/14	22.2564*
98/02/16	28.2879*
98/02/17	23.7995*
98/02/18	22.9102*
98/02/19	20.8478*
98/02/20	22.3630*
98/02/21	23.2628*
98/02/23	19.8248*
98/02/24	19.8504*
98/02/25	21.9668*

Date	t-value
98/02/26	20.1328*
98/02/27	14.9394*
98/02/28	10.6145*
98/03/02	7.0760*
98/03/03	10.0721*
98/03/04	10.7051*
98/03/05	5.7759*
98/03/06	3.4656*
98/03/07	1.9158
98/03/09	0.4230
98/03/10	-1.1208
98/03/11	-0.2192
98/03/12	-0.6103

Test statistics is $t_{(124;\,0.025)}$ = 1.96, and the figures with star-mark (*) are greater than the test statistics implying their significance under five percent significance level. With the implication, I can conclude that the CAR from February 11 to March 6, 1998 is significant and the stock is affected by manipulation.

Table Ⅵ

Regression models for DCC

	Model 1	Model 2	Model 3	Model 4
Intercept	0.0036 (0.0076)	-0.0040 (0.0072)	0.0051 (0.0066)	-0.0063 (0.0075)
KOSDAQ Index	1.0734*** (0.2731)			-0.5378 (0.5160)
Venture Index		0.9676*** (0.1764)		1.2998*** (0.3643)
Futures Cable TV			0.5827*** (0.0941)	
Adj. R^2	0.1915	0.3228	0.3795	0.3238
Observations	62	62	62	62

	Model 5	Model 6	**Model 7**
Intercept	0.0048 (0.0067)	0.0003 (0.0068)	**-0.0032** **(0.0068)**
KOSDAQ Index	0.1553 (0.3230)		**-0.5378**** **(0.5160)**
Venture Index		0.4928** (0.2171)	**1.0313***** **(0.3360)**
Futures Cable TV	0.5420*** (0.1271)	0.4017*** (0.1211)	**0.4637***** **(0.1216)**
Adj. R^2	0.3715	0.4196	**0.4500**
Observations	62	62	**62**

Figures in the parentheses are standard errors.

*, **, *** imply the coefficient is significant at 10%, 5%, and 1% level of significance, respectively.

Table Ⅶ

CAR and t-value of DCC

Date	1999/11/30	1999/12/01	1999/12/02	1999/12/03	1999/12/06
CAR	0.0718	0.1869	-0.0536	-0.1137	-0.1275
t-test	1.4088	2.5677*	-14.4810*	-6.2481*	-4.5522*

Date	1999/12/07	1999/12/08	1999/12/09	1999/12/10	1999/12/13
CAR	-0.1506	-0.0847	-0.1557	-0.1948	-0.1486
t-test	-3.2673*	-1.2412	-1.4839	-1.2852	-0.6644

The CAR of both November 30th and December 1st were showing positive signs suggesting the impact of the recommendation. From December 2nd, it turned into negative as a result of the extensive selling orders of the organizational investor.

Test statistics is $t_{(60;0.025)} = 2.00$, and the t-value figures with star mark (*)are greater than the test statistics implying their significance under five percent significance level. With the implication, I can conclude that the CAR from December 1 to December 7, 1999 the DCC stock price was affected by the two manipulations.

Table Ⅷ

Regression models for Littauer Technologies

	Model 1	Model 2	Model 3	Model 4
Intercept	0.0026 (0.0072)	0.0011 (0.0071)	0.0049 (0.0067)	-0.0005 (0.0072)
KOSDAQ Index	0.3362 (0.2242)			-0.6606 (0.5149)
Venture Index		0.3678** (0.1608)		0.8008** (0.3737)
Barunson			0.3757*** (0.0824)	
Adj. R^2	0.0102	0.0338	0.1404	0.3238
Observations	122	122	122	122

	Model 5	Model 6	**Model 7**
Intercept	0.0048 (0.0067)	0.0038 (0.0067)	**0.0022** **(0.0068)**
KOSDAQ Index	0.1542 (0.2136)		**-0.6180** **(0.4837)**
Venture Index		0.2215 (0.1551)	**0.6276*** **(0.3535)**
Futures Cable TV	0.3637*** (0.0843)	0.3482*** (0.0843)	**0.3459***** **(0.0841)**
Adj. R^2	0.1370	0.1478	**0.1523**
Observations	122	122	**122**

Figures in the parentheses are standard errors.

*, **, *** imply the coefficient is significant at 10%, 5%, and 1% level of significance, respectively.

Table Ⅸ

t-value of Littauer Technologies

Date	t-value	Date	t-value	Date	t-value
00/01/27	1.3298	00/03/08	31.9662*	00/04/18	38.4829*
00/01/28	1.6595	00/03/09	33.8494*	00/04/19	36.1548*
00/01/31	1.8406	00/03/10	36.0944*	00/04/20	30.4435*
00/02/01	1.9953*	00/03/13	38.2744*	00/04/21	31.6736*
00/02/02	2.7158*	00/03/14	43.6599*	00/04/24	36.5247*
00/02/03	2.9627**	00/03/15	49.9312*	00/04/25	41.0700*
00/02/07	3.7450*	00/03/16	57.8355*	00/04/26	43.5686*
00/02/08	4.7377*	00/03/17	66.1496*	00/04/27	42.9819*
00/02/09	5.6752*	00/03/20	55.4520*	00/04/28	41.3531*
00/02/10	6.6135*	00/03/21	44.8064*	00/05/02	45.6902*
00/02/11	7.2988*	00/03/22	49.5678*	00/05/03	49.6480*
00/02/14	8.0351*	00/03/23	52.5944*	00/05/04	55.7022*
00/02/15	9.4699*	00/03/24	43.2827*	00/05/08	48.9028*
00/02/16	10.1341*	00/03/27	43.1966*	00/05/09	52.0497*
00/02/17	10.9420*	00/03/28	45.8009*	00/05/10	56.9046*
00/02/18	11.8449*	00/03/29	49.8707*	00/05/12	63.6982*
00/02/21	12.2660*	00/03/30	52.9167*	00/05/15	71.1417*
00/02/22	13.2784*	00/03/31	57.1204*	00/05/16	80.6683*
00/02/23	14.2258*	00/04/03	61.6581*	00/05/17	90.1157*
00/02/24	14.5999*	00/04/04	71.3159*	00/05/18	78.4590*
00/02/25	15.9841*	00/04/06	68.4796*	00/05/19	68.9891*
00/02/28	17.8628*	00/04/07	69.6745*	00/05/22	60.3597*
00/02/29	18.7275*	00/04/10	68.7176*	00/05/23	62.5692*
00/03/02	20.0661*	00/04/11	56.5956*	00/05/24	56.5150*
00/03/03	22.4062*	00/04/12	60.4605*	00/05/25	60.3786*
00/03/06	25.8864*	00/04/14	56.6998*	00/05/26	54.0334*
00/03/07	28.4267*	00/04/17	46.6562*	00/05/29	47.2493*

Continued:

Date	t-value	Date	t-value	Date	t-value
00/05/30	43.7981*	00/07/07	19.5476*	00/08/17	3.9005*
00/05/31	48.5035*	00/07/10	17.9967*	00/08/18	3.5102*
00/06/01	45.0386*	00/07/11	17.5032*	00/08/21	3.8259*
00/06/02	42.4304*	00/07/12	16.2786*	00/08/22	3.5789*
00/06/05	46.5883*	00/07/13	14.1505*	00/08/23	3.0977*
00/06/07	51.4176*	00/07/14	13.7237*	00/08/24	3.0800*
00/06/08	45.7808*	00/07/18	12.1324*	00/08/25	2.7541*
00/06/09	44.2104*	00/07/19	10.1350*	00/08/28	2.8166*
00/06/12	43.3187*	00/07/20	8.2913*	00/08/29	3.2853*
00/06/13	41.5248*	00/07/21	8.0686*	00/08/30	2.9463*
00/06/14	40.2662*	00/07/24	8.7502*	00/08/31	2.6432*
00/06/15	35.8331*	00/07/25	9.4735*	00/09/01	2.4234*
00/06/16	33.7842*	00/07/26	8.4337*	00/09/04	2.0172*
00/06/19	37.4490*	00/07/27	8.2715*	00/09/05	2.1548*
00/06/20	41.5304*	00/07/28	7.1504*	00/09/06	1.9236
00/06/21	46.6934*	00/07/31	7.3439*	00/09/07	1.6952
00/06/22	38.3657*	00/08/01	8.5097*	00/09/08	1.9218
00/06/23	40.9671*	00/08/02	8.2428*	00/09/14	1.9152
00/06/26	36.9584*	00/08/03	8.7793*	00/09/15	1.7729
00/06/27	34.1010*	00/08/04	8.4957*	00/09/18	1.4756
00/06/28	31.1355*	00/08/07	8.1961*	00/09/19	1.3039
00/06/29	30.2821*	00/08/08	7.4993*	00/09/20	1.3202
00/06/30	26.1484*	00/08/09	7.0684*	00/09/21	1.1414
00/07/03	24.8234*	00/08/10	6.2213*	00/09/22	0.9198
00/07/04	26.6433*	00/08/11	5.3438*	00/09/25	1.0221
00/07/05	23.2786*	00/08/14	4.4571*	00/09/26	0.9289
00/07/06	20.4202*	00/08/16	4.8454*	00/09/27	1.0861

Test statistics is $t_{(120;0.025)} = 1.98$, and the t-value figures with star mark (*)are greater than the test statistics implying their significance under five percent significance level. With the implication, I can conclude that the CAR from February 1 to September 5, 2000, the DCC stock price was affected by manipulation.

Figure Ⅰ

Cumulative Abnormal Return Movements of Willbes

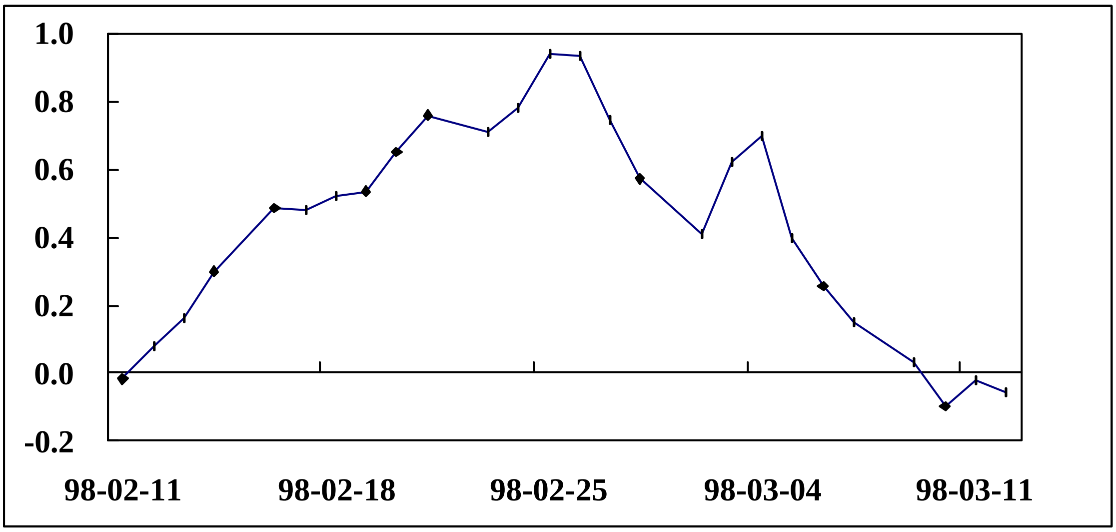


Figure Ⅱ

Movements of Normal and Actual Price of Willbes

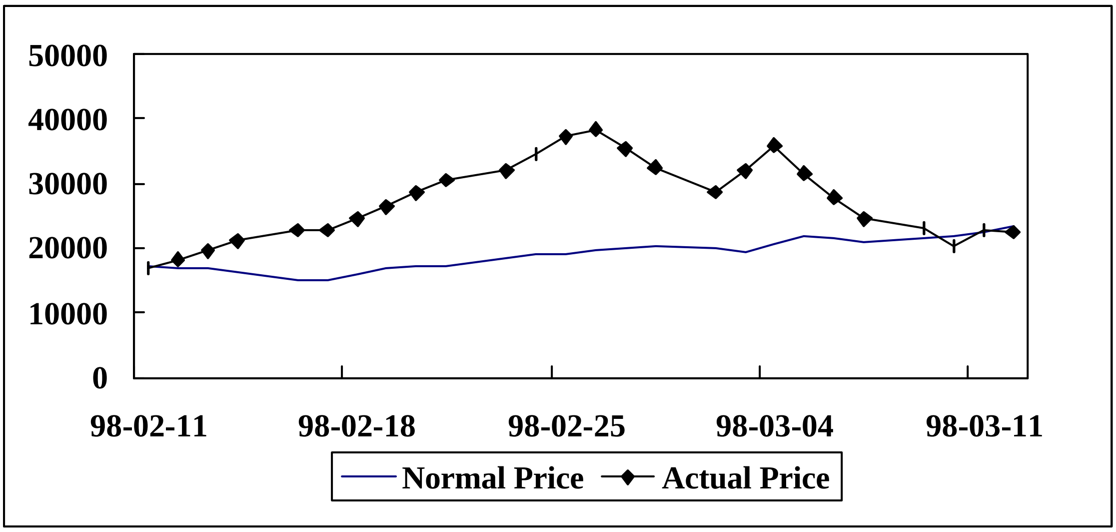


Figure Ⅲ

Cumulative Abnormal Return Movements of DCC

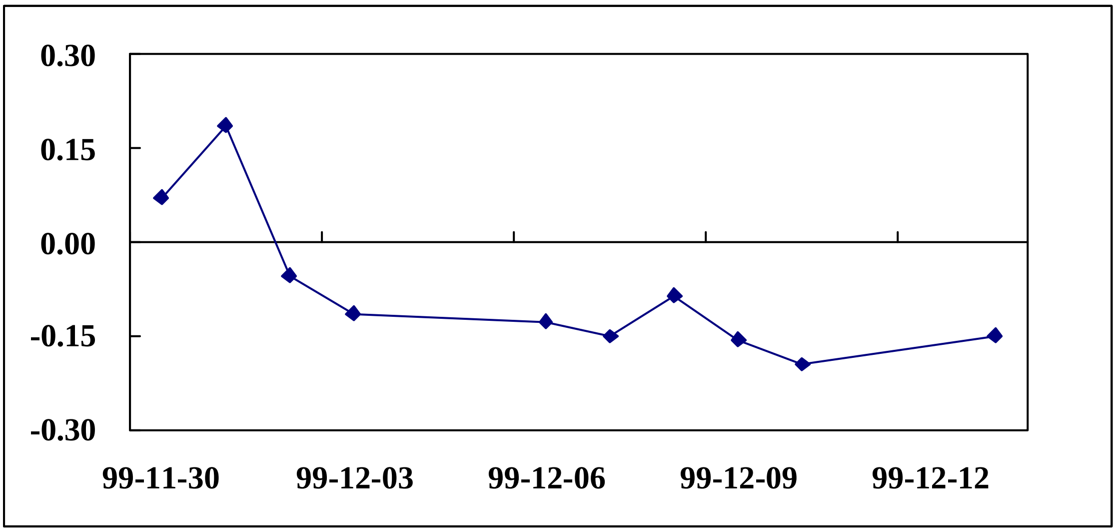


Figure Ⅳ

Movements of Normal and Actual Price of DCC

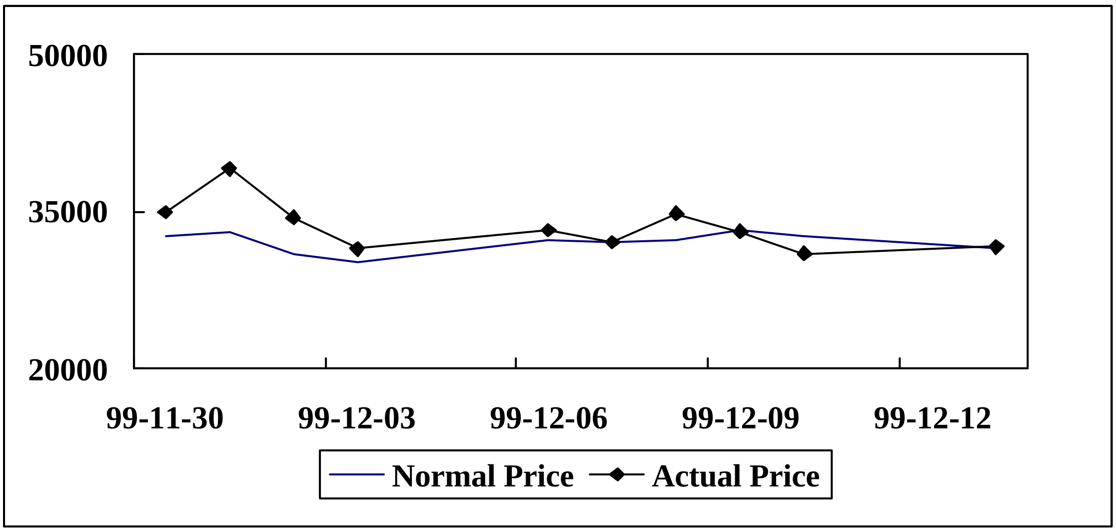


Figure Ⅴ

Cumulative Abnormal Return Movements of Littauer Technologies

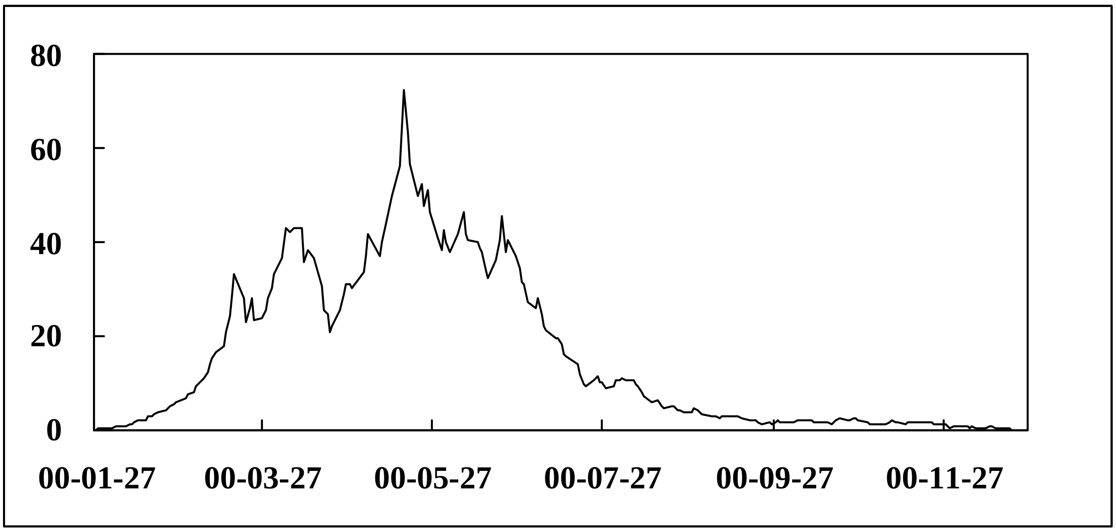


Figure Ⅵ

Movements of Normal and Actual Price of Littauer Technologies

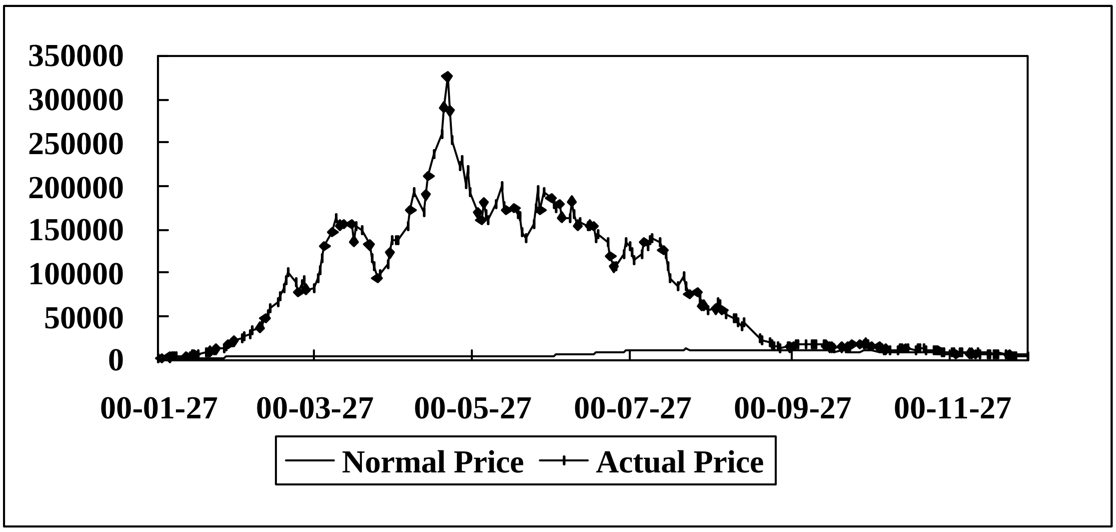
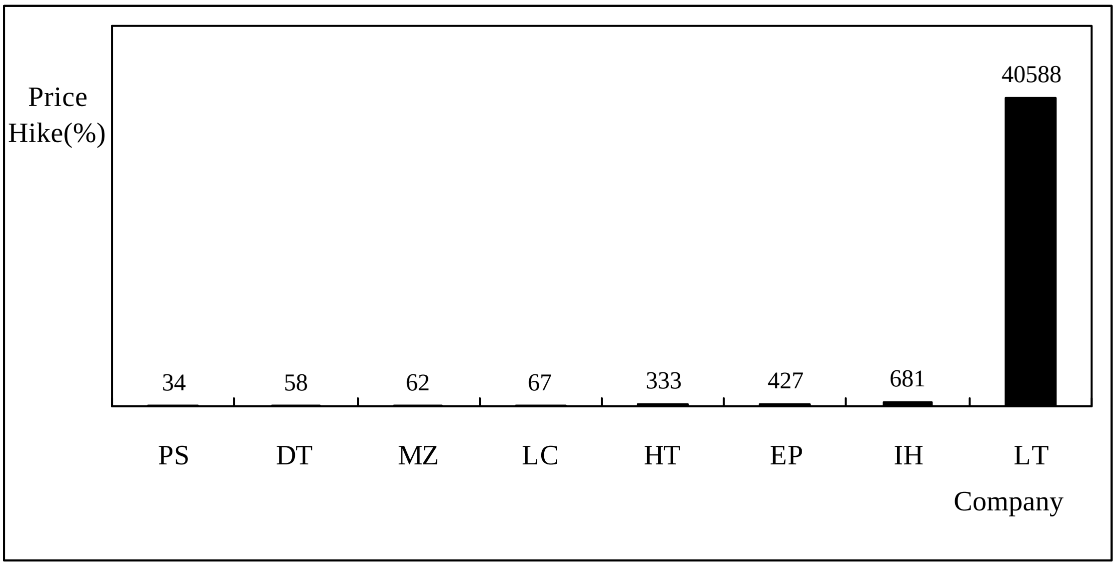


Figure Ⅶ

<u>Price Hikes of A&D Stocks</u>



* The company names are abbreviated as follows: PS(PS Corporation), DT(Dongteuk Corporation), MZ(Mohenz Ltd.), LC(Locus Holdings), HT(Hostech Global), EP(ENPIA Corporation), IH(IHIC Partners), LT(Littauer Technologies).

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