CHAPTER 4

RETURN AND ANALYST FOLLOWING

Jensen and Meckling (1976) introduce the agency cost resulting from the problem of separation of ownership and control. To reduce those agency costs, monitoring activity is required, and one of the parties who can perform this activity at least indirectly is brokers/analysts who gather the data about the firm, analyze and distribute information to their customers who are either the current or prospective investors. Once the agency cost is reduced, so the expected return from the investor required to compensate for those costs should be reduced. Therefore, it exists the relationship between the return and analyst following the firm. This is also supported by Merton (1987) that there is incomplete information where investors who trade are the one who know the security only. With higher number of investors trading in the market, the more information should be exposed to the public, the lower the abnormal return should retain. One way the investors can learn the information is from their brokers/analysts. Therefore, number of analysts following the firm is used as the proxy for the investor base. Many studies also employ the number of analyst as the proxy for the information (Arbel and Strebel (1982, 1983), Arbel (1985), among others.) This implies that number of analysts following the firms has the effect on the expected returns. At the same time, previous studies also show that return also has the effect on the demand and supply of number of analysts following the firm (Bhushan (1989), O'Brien and Bhushan (1991), and others). Analyst tends to follow the firm that has good performance, and good performance can reflect in the share price and return. Therefore, the returns also affect the number of analyst following the firm.

As a result, the simultaneous relationship between number of analyst following the firm and return will be explored.

I. DATA AND METHODOLOGY

From the above-mentioned literature, it can then be obtained that return is the function of analysts following and analyst following is also the function of return. According to Merton (1987), the higher number of analysts is, the lower the return should be, or there is a negative relationship between return and number of analyst following the firm. O'Brien and Bhushan (1991) state that analysts may prefer the good performance stock; therefore, with the higher return, the higher number of analyst should be following, or there is a positive relationship between the number of analyst following the firm and the return.

Applying the Merton (1987)'s model,

Return = f (analysts following , systematic risk, firm-specific risk, firm size)

To fit the applicability in Thai market, the determinants of number of analysts following the firms are :-

Analysts Following = f (return, number of institutional holdings, percentage of shares held by institution, size, volatility, analyst competition, bid-ask spread, trading volume, Growth, Debt ratio, number of shareholders)

By assuming linear relationship, and if return and number of analyst are independent of each other, the Ordinary Least Square (OLS) should be applied to the following structural equations:-

$$\text{Return} = \varphi_0 + \varphi_1 \cdot \text{number of analysts} + \varphi_2 * \text{beta} + \varphi_3 * \text{firm-specific risk} + \varphi_4 * \text{size} + \varepsilon_1$$

$$\text{Number of analysts} = \gamma_0 + \gamma_1 * \text{return} + \gamma_2 * \text{percentage of number of institutional holdings} + \gamma_3 * \text{percentage of shares held by institution} + \gamma_4 * \text{size} + \gamma_5 * \text{volatility} + \gamma_6 * \text{analyst competition} + \gamma_7 * \text{bid-ask spread} + \gamma_8 * \text{trading volume} + \gamma_9 * \text{growth} + \gamma_{10} * \text{debt ratio} + \gamma_{11} * \text{number of shareholders} + \varepsilon_2$$

However, if return and analysts following are jointly determined, the error terms of both equations are not independent of each other and of each explanatory variable. If there is such a correlation, then the OLS regression estimation program is likely to attribute to the particular explanatory variable any variations in the dependent variable that are actually being caused by variations in the error term. The result will be biased estimates (simultaneity bias) and one of the classical assumptions of OLS will be violated. Therefore, two-stage least squares will be employed to help mitigate the bias and avoid the inconsistency inherent in the application of OLS to these simultaneous equations systems (Studenmund (1970:542-546). The null hypothesis is that all parameters are equal to zero.

Annual return will be used from 1995 to 1996. Size is measured by the natural log of market value of the firms. Proxy for volatility will be the variance of residual error from the market model, analyst competition is proxied by the one-period lagged number of analysts following the firm. Annual bid-ask spread comes from the natural log of average of monthly spread in each year (Bid-Ask)/[(Ask+Bid)/2]. Trading volume is measured by the natural log of the average number of monthly transactions traded. Growth is the compound annual growth rate of the firm's total assets. Debt ratio is the long-term debt over total assets.

Two-stage least square will be applied by having return and number of analysts as the endogenous variables and the predetermined variables are systematic risk, firm-specific risk or volatility, size, number of institutional holdings, percentage of shares held by institutions, analysts competition, bid-ask spread, trading volume, growth, debt ratio and total number of shareholders.

Table 23 reports the descriptive statistics for variables not used in the previous section. The period covered is from 1995 to 1996 due to the limitation of the data on bid-ask spread. The median bid-ask spread is at 2.3 percent. The average compound growth of total assets is at 47.25 percent where the negative growth is upto the fifth percentile. Number of shareholders is ranged from 300 shareholders in the fifth percentile to 11,348 in the 95th percentile. Trading volume or the number of transactions traded is averaged at 19,649. Table 24 reports the Pearson correlation between the variables used in this section from 1995 to 1996 based on the Main Board. Number of analyst is very high correlated with the size at 80.7% significantly.

Table 23

Descriptive Statistics for Simultaneous Equations

Bid-ask spread is the difference between bid and ask price over the average of bid and ask price. Growth is the compound growth rate of total asset. And shareholders are the total number of shareholders each year. Trading vol. is the number of transactions traded for each security in the market.

					Percentile		
Variable	Period	Mean	S.D.	Median	5	25	75	95
Bid-ask spread	95-96	0.0341	0.0341	0.02381	0.0079	0.01202	0.04565	0.0884
Growth	92-96	0.47245	9.008	0.1208	-0.2338	0.0009	0.2874	0.7731
Shareholders	95-96	3275.68	8236.9	1133	300	641	2753	11348
Trading Vol.	95-96	19649	35675	5077	227	1202	21609	88447

Table 24

Correlation Analysis on all the variables affecting returns and number of analysts following the firms

Variables affecting returns and number of analysts following are as follow: Beta is the systematic risk, Sigma is the firm-specific risk. Both are taken from the Market model. Size is the market value of the firm. PANA stands for number of analysts following the firm from I/B/E/S Database. Mana is the number of analysts from MIS Database. Count is the number of institutions holding the firm. PCT is the percentage of shares held by institutions. LPANA is the analysts competition which is the one-year lagged number of analysts. Debt is the long-term debt over total assets. Trade is the natural log of average number of trading. Growth is the compound annual growth rate of the firm's total assets. Spread is the natural log of the difference between bid and ask price over the average bid and ask price. Total holders are the natural log of total number of shareholders in the firm. In the parentheses, p-value under the null hypothesis that correlation coefficient equals zero. Data are from 1995 to 1996. In parentheses, p-value under the null hypothesis that correlation coefficients equal zero are shown.

	Return	Beta	Sigma	Size	PANA	COUNT	PCT	LPANA	Debt	Trade	Growth	Spread
Beta	0.05169 (0.2411)											
Sigma	-0.05119 (0.2457)	-0.02328 (0.5978)										
Size	0.06010 (0.1724)	0.321*** (0.0001)	-0.269*** (0.0001)									
PANA	0.06753 (0.1251)	0.300*** (0.0001)	-0.197*** (0.0001)	0.807*** (0.0001)								
COUNT	0.06209 (0.1636)	-0.01859 (0.6771)	-0.04095 (0.3589)	0.03642 (0.4141)	0.01629 (0.7150)							
PCT	0.01950 (0.6619)	-0.00223 (0.9601)	-0.076* (0.0890)	0.167*** (0.0002)	0.130*** (0.0035)	0.342*** (0.0001)						

Table 24 - *continued*

	Return	Beta	Sigma	Size	PANA	COUNT	PCT	LPANA	Debt	Trade	Growth	Spread
LPANA	0.07989**	0.265***	-0.188***	0.747***	0.931***	0.06275	0.03517					
	(0.0891)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.1879)	(0.4608)					
Debt	0.01254	0.169***	-0.101**	0.409***	0.406***	0.04272	0.132***	0.422***				
	(0.7761)	(0.0001)	(0.0222)	(0.0001)	(0.0001)	(0.3380)	(0.0029)	(0.0001)				
Trade	0.16323	0.566***	-0.197***	0.602***	0.546***	0.06525	0.05394	0.463***	0.325***			
	(0.0002)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.1431)	(0.2263)	(0.0001)	(0.0001)			
Growth	0.1954***	-0.00263	-0.155***	0.190***	0.186***	0.01193	-0.01673	0.127***	0.03103	0.141***		
	(0.0001)	(0.9525)	(0.0004)	(0.0001)	(0.0001)	(0.7891)	(0.7077)	(0.0067)	(0.4819)	(0.0014)		
Spread	-0.224***	-0.456***	0.349***	-0.685***	-0.595***	-0.06973	-0.05603	-0.534***	-0.321***	-0.868***	-0.239***	
	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.1198)	(0.2115)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	
Total Holder	-0.02894	0.421***	-0.090**	0.532***	0.425***	0.0142	0.119***	0.360***	0.269***	0.675***	-0.04360	-0.565***
	(0.5139)	(0.0001)	(0.0417)	(0.0001)	(0.0001)	(0.7502)	(0.0074)	(0.0001)	(0.0001)	(0.0001)	(0.3253)	(0.0001)
Mana	0.06815	0.455***	-0.143***	0.543***	0.565***	0.285***	0.565***	0.285***	0.69***	0.128***	-0.617***	0.483***
	(0.1217)	(0.0001)	(0.0011)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0037)	(0.0001)	(0.0001)

* Significant at 10 percent level
** Significant at 5 percent level
*** Significant at 1 percent level

also 93% with one-year lagged number of analysts. Trading volume shows high negatively correlated (-86.8%) with bid-ask spread. Debt ratio is also highly correlated with number of analyst (MIS database) at 69%.

II. EMPIRICAL EVIDENCES ON THE SIMULTANEOUS RELATIONSHIP BETWEEN RETURNAND NUMBER OF ANALYSTS FOLLOWING THE FIRM

Because the two-stage least square regression results presumably provide more accurate estimates than does the OLS, the results based on the two-stage least square regression will be discussed. The result from OLS is also shown. The I/B/E/S database will be used as a proxy for the investor base. Panel A (not adjusted) in Table 25 reports all the variables under the study, while Panel B (adjusted) drops the competition variable proxied by lagged number of analysts because of very high correlation with number of analysts and also the bid-ask spread is dropped because of very high correlation with transaction. The results on both non-adjusted and adjusted bases show the positive relation between the return and the investor base at 1 % significance level. That is the higher the number of analysts following the firm, the higher the return is expected. The direction is opposite to the previous studies. In return model in panel A, size is negatively related to the excess return at 1 percent significance level. For the number of analyst model, I/B/E/S database shows the positive relationship between the size and number of analyst. This is consistent with the previous studies (Bhushan (1989a,b), Moyer et al. (1989), and others) which explain that an investor is likely to find the private information more valuable in the

larger firms than the smaller one The profits are then likely to be higher. Number of analyst is also positively correlated with competition proxied by lagged number of analyst. This is contrary to study done by O'Brien and Bhushan (1991) which state that benefit of analyst will be greatest with the little competition so there should be positive relationship between them. For Merton Model in Panel B, only one variable shows the significant effect on the return that is the investor base. Again this is contradict to the expected result. In Analyst Model after dropping lagged analysts and bid-ask spread, debt ratio and transaction are positively related to the number of analysts at 1 percent significance level. The higher the debt ratio, the more covenants should be placed already, the lower the analysts may be required (Moyer et al (1989)). However, with higher debt, it implies higher risk, analysts may prefer the high-risk firms so they have higher chance to make profit on the transaction. Chung et al. (1995), and Chung and Joe (1996) mention that high volume typically reflects a lack of consensus, demand for informedness should be increased. Our result is consistent with their study. Growth rate is also found positively related to the number of analysts which is consistent with the study done by Moyer et al. (1989) that with higher growth rate, the asset base of the firm may change quickly, managers may shift the risk to other groups, demand for analysts should, therefore, be higher. Table 26 reports the result on the Foreign Board. It shows no relationship between the two endogenous variables which are return and number of analyst following the firms. The predetermined variables tend to fit the model better. In the return model, the systematic risk turns to be negatively related to the excess return at 5 percent significant level. This is contradict to the previous studies and intuitive explanations where higher risk should be compensated with higher return. Size is negatively

related with the excess return at 5 percent significant level. The result is supported by the previous studies where the small-firm size effect is detected (Banz(1981), Reinganum (1981), and others.) In the number of analyst equation, size and competition are positively related to the number of analysts at 1 percent significant level. The results are the same as data on the Main Board which are contradict to the previous studies. This may be explained by the illiquidity of the market. After dropping the lagged analysts and bid-ask spread, the investor base in Return equation turns to be positively related to the return at 10 percent significance level. Beta and size are still negatively related to the return. The number of analysts equation shows that the relationship between number of analysts and size and transaction is significantly positive which is consistent with what is shown on the Main Board. Percentage of shares held by institutions and number of shareholders are negatively related to the number of analyst. This may imply that the investors prefer the in-house analysis on the firms.

In conclusion, for the Thai market, the higher the number of analysts is , the higher the number of return will be. However, no significant relationship between number of analyst and return is shown in the number of analyst equation. The small-firm effect is also detected where the small firm gives higher return than the large one. Most of the determinants of analyst following are not significant. This again may be due to the very small sample size which covers only 2 years of 1995 and 1996, and these two years are during the downtrend period.

Table 25

Two-Stage Least Square Regressions of Return and Analyst Following on the Main Board

Two-Stage Least Square Regressions of Return and Analysts Following are run annually for the year 1995 and 1996. No. of Analysts (Anal) is the No. of Analysts Following each firm. Systematic risk (Beta) and Firm-Specific Risk or Volatility (Sigma) are from the Market Model. Sz is the natural log of the Market Value of the Firm. Nins are the number of institutional investors. Pins are the percentage of institution holding the firms' share. Lana is the analysts competition which is the one-year lag of number of analysts following the firm. Ln (spread) is the natural log of the difference between bid and ask price over the average of bid and ask price. Ln(Trans) is the natural log of number of transaction traded on the Main Board. Growth is the compound annual growth rate of the firm's total assets. Debt ratio is the long-term liability over the total asset. Ln(Totshr) stands for the natural log of total number of shareholders. Samples are from 1995 to 1996. Number of analysts following the firm are from I/B/E/S Database. Panel A reports all the variables under study, while in Panel B, lag of number of analysts and spread are dropped out of the equation. P-value under the null hypothesis that the coefficient equals zero are shown in parentheses.

$$\text{Return} = \varphi_0 + \varphi_1 \cdot \text{No. of Analysts} + \varphi_2 * \text{Beta} + \varphi_3 * \text{Sigma} + \varphi_4 * \text{Ln(SZ)} + \varepsilon_1$$

$$\text{No. of analysts} = \gamma_0 + \gamma_1 * \text{Return} + \gamma_2 * \text{Nins} + \gamma_3 * \text{Pins} + \gamma_4 * \text{Ln(Sz)} + \gamma_5 * \text{Sigma} + \gamma_6 * \text{Lana} + \gamma_7 * \text{Ln(Spread)} + \gamma_8 * \text{Ln(Trans)} + \gamma_9 * \text{Growth} + \gamma_{10} * \text{Debt} + \gamma_{11} * \text{Ln(Totshr)} + \varepsilon_2$$

Table 25 - *Continued*

	Not Adjusted		Adjusted	
	Return	No. of Analysts	Return	No. of Analysts
Beta	-0.002294		-0.01175	
	(0.7801)		(0.1143)	
Sigma	-0.260047	-0.032815	0.023243	-0.43846
	(0.3654)	(0.9793)	(0.9189)	(0.5905)
Ln(Sz)	-0.052838***	0.044165**	-0.0051	0.027185
	(0.0026)	(0.02384)	(0.6968)	(0.5608)
Analysts	0.407328***		0.07274***	
	(0.0020)		(0.0095)	
Return		1.018521		-2.48005
		(0.8155)		(0.2917)
No. of institutional		-0.152345		0.01468
Holdings		(0.2162)		(0.9319)
Percentage of Shares		0.029064		0.09322
held by Institutions		(0.7140)		(0.1018)
Competition		0.704197***		
		(0.0001)		
Debt Ratio		0.024640		0.30851***
		(0.6689)		(0.0023)
Transaction		0.014982		0.07982***
		(0.2157)		(0.0012)
Growth Rate		-0.028085		0.18117*
		(0.8956)		(0.0631)
Bid-Ask Spread		0.042993		
		(0.8222)		
No. of Shareholders		0.000653		-0.00523
		(0.9888)		(0.8631)
Mean Square Error	0.00773	0.01033	0.00475	0.05882

* Significant at 10 percent level
** Significant at 5 percent level
*** Significant at 1 percent level

Table 26

Two-Stage Least Square Regressions of Return and Analyst Following on the Foreign Board

Two-Stage Least Square Regressions of Return and Analysts Following are run annually for the year 1995 and 1996. No. of Analysts (Anal) is the No. of Analysts Following each firm. Systematic risk (Beta) and Firm-Specific Risk or Volatility (Sigma) are from the Market Model. Sz is the natural log of the Market Value of the Firm. Nins are the number of institutional investors. Pins are the percentage of institution holding the firms' share. Lana is the analysts competition which is the one-year lag of number of analysts following the firm. Ln (spread) is the natural log of the difference between bid and ask price over the average of bid and ask price. Ln(Trans) is the natural log of number of transaction traded on the Main Board. Growth is the compound annual growth rate of the firm's total assets. Debt ratio is the long-term liability over the total asset. Ln(Totshr) stands for the natural log of total number of shareholders. Samples are from 1995 to 1996. Number of analysts following the firm are from MIS Database. Panel A reports all the variables under study, while in Panel B, lag of number of analysts and spread are dropped out of the equation. P-value under the null hypothesis that the coefficient equals zero are shown in parentheses.

$$\text{Return} = \varphi_0 + \varphi_1 \cdot \text{No. of Analysts} + \varphi_2 * \text{Beta} + \varphi_3 * \text{Sigma} + \varphi_4 * \text{Ln(SZ)} + \varepsilon_1$$

$$\text{No. of analysts} = \gamma_0 + \gamma_1 * \text{Return} + \gamma_2 * \text{Nins} + \gamma_3 * \text{Pins} + \gamma_4 * \text{Ln(Sz)} + \gamma_5 * \text{Sigma} + \gamma_6 * \text{Lana} + \gamma_7 * \text{Ln(Spread)} + \gamma_8 * \text{Ln(Trans)} + \gamma_9 * \text{Growth} + \gamma_{10} * \text{Debt} + \gamma_{11} * \text{Ln(Totshr)} + \varepsilon_2$$

Table 26 - *Continued*

	Not Adjusted		Adjusted	
	Return	No. of Analysts	Return	No. of Analysts
Beta	-0.021670**		-0.020609*	
	(0.0458)		(0.0583)	
Sigma	-0.08838	0.112326	-0.094132	0.034118
	(0.2705)	(0.2445)	(0.2496)	(0.8038)
Ln(Sz)	-0.04661**	0.07226***	-0.04956**	0.13582***
	(0.0476)	(0.0001)	(0.0439)	(0.0001)
Analysts	0.23540		0.265722*	
	(0.1133)		(0.0909)	
Return		0.440543		-0.420672
		(0.3741)		(0.5616)
No. of institutional		0.079415		0.31616
Holdings		(0.5865)		(0.1067)
Percentage of Shares		-0.029834		-0.23460**
held by Institutions		(0.6808)		(0.0139)
Competition		0.617748***		
		(0.0001)		
Debt Ratio		-0.091329		-0.02173
		(0.2791)		(0.8388)
Transaction		0.012028		0.05206**
		(0.54444)		(0.0185)
Growth Rate		0.022885		-0.07670
		(0.7552)		(0.4378)
Bid-Ask Spread		-0.025404		
		(0.5256)		
No. of Shareholders		-0.016340		-0.080379*
		(0.5866)		(0.0732)
Mean Square Error	0.00894	0.00756	0.0645	0.01457

* Significant at 10 percent level
** Significant at 5 percent level
*** Significant at 1 percent level

III. ROBUSTNESS CHECK

Data from MIS database are used to check for the robustness of the result. The results are shown in Table 27. Number of analysts are significantly positive for both adjusted and non-adjusted bases in the Return equation. However, in the Analyst equation, the return does not show any significant effect on the number of analysts. The small-firm effect is also detected from both bases. For the adjusted model, the analysts equation shows the similar result as I/B/E/S that factors affect positively on number of analysts are size and transaction, where number of institutions holding is negatively related.

Table 27

Two-Stage Least Square Regressions of Return and Analyst Following on the Main Board

Two-Stage Least Square Regressions of Return and Analysts Following are run annually for the year 1995 and 1996. No. of Analysts (Anal) is the No. of Analysts Following each firm. Systematic risk (Beta) and Firm-Specific Risk or Volatility (Sigma) are from the Market Model. Sz is the natural log of the Market Value of the Firm. Nins are the number of institutional investors. Pins are the percentage of institution holding the firms' share. Lana is the analysts competition which is the one-year lag of number of analysts following the firm. Ln (spread) is the natural log of the difference between bid and ask price over the average of bid and ask price. Ln(Trans) is the natural log of number of transaction traded on the Main Board. Growth is the compound annual growth rate of the firm's total assets. Debt ratio is the long-term liability over the total asset. Ln(Totshr) stands for the natural log of total number of shareholders. Samples are from 1995 to 1996. Number of analysts following the firm are from MIS Database. Panel A reports all the variables under study, while in Panel B, lag of number of analysts and spread are dropped out of the equation. P-value under the null hypothesis that the coefficient equals zero are shown in parentheses.

$$\text{Return} = \varphi_0 + \varphi_1 \cdot \text{No. of Analysts} + \varphi_2 * \text{Beta} + \varphi_3 * \text{Sigma} + \varphi_4 * \text{Ln(SZ)} + \varepsilon_1$$

$$\text{No. of analysts} = \gamma_0 + \gamma_1 * \text{Return} + \gamma_2 * \text{Nins} + \gamma_3 * \text{Pins} + \gamma_4 * \text{Ln(Sz)} + \gamma_5 * \text{Sigma} + \gamma_6 * \text{Lana} + \gamma_7 * \text{Ln(Spread)} + \gamma_8 * \text{Ln(Trans)} + \gamma_9 * \text{Growth} + \gamma_{10} * \text{Debt} + \gamma_{11} * \text{Ln(Totshr)} + \varepsilon_2$$

Table 27 *-Continued*

	Not Adjusted		Adjusted	
	Return	No. of Analysts	Return	No. of Analysts
Beta	-0.001116		-0.01083	
	(0.2070)		(0.1681)	
Sigma	-0.182657	2.6479	-0.2156	0.206862
	(0.4538)	(0.7362)	(0.3465)	(0.4973)
Ln(Sz)	-0.00715*	-0.06045	-0.00730**	0.015663***
	(0.0722)	(0.7940)	(0.0417)	(0.0003)
Analysts	0.20484***		0.19335***	
	(0.0075)		(0.0036)	
Return		-9.04092		-0.40431
		(0.7396)		(0.2079)
No. of institutional		0.09880		-0.12236**
Holdings		(0.8971)		(0.0210)
Percentage of Shares		0.17228		0.02804
held by Institutions		(0.7277)		(0.1639)
Competition		0.18147		
		(0.5361)		
Debt Ratio		-0.08877		0.015074
		(0.8031)		(0.6376)
Transaction		0.02280		0.05043***
		(0.7614)		(0.0001)
Growth Rate		0.46064		0.028294
		(0.7296)		(0.2512)
Bid-Ask Spread		-0.37850		
		(0.7508)		
No. of Shareholders		-0.103032		-0.009428
		(0.7220)		(0.1898)
Mean Square Error	0.00559	0.3980	0.00505	0.00878

* Significant at 10 percent level
** Significant at 5 percent level
*** Significant at 1 percent level