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Testing for Seasonality in Option and Calendar Month: An Empirical Investigation on the US Major Index Components

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Abstract

Using all securities from Dow 30, S&P 100 and S&P 500 indices respectively we show that Option month based monthly returns and volatilities are different from those of calendar month. These differences may explain the worthiness of options contracts on call and put options when they expire. We conclude the option expiration effect may explain the differences in return in option month compared to the calendar month. Our result contributes to the existing literature by offering evidence of return differences in option month what support the option expiration effect. When security returns are analyzed based on calendar month and option month to test for seasonality, our results support the findings of the existing literature in terms of the calendar month. Our findings contribute to the literature by adding the result that when security returns are analyzed based on the option month; it also shows the seasonal pattern. Our both results could be the added evidence against the weak-form market efficiency.

I. Introduction

Seasonality in financial market is widely investigated in finance literature. It is addressed by investigating the abnormal returns in the month of January, day of the week, tax loss selling effect, among other effects. When analyzing the January effect, it is the calendar month January effect addressed in the literature. However, there remains to be seen the effect of option month in return pattern. Option month's beginning and ending dates are from two calendar months. The third Friday of a month marks the ending day of the option month and the Monday after the third Friday marks the First day of the option month. Trillions of dollar transaction takes place in option markets to profit from the movement of the underlying assets. That makes the option month a special case and event for stock market. The intent of this current research is to analyze the option month effect whether it adds as an additional anomaly in financial market.

II. Literature Review

The January effect has been widely studied to see if a profitable investment strategy exists. The key explanations for the January effect are: the year-end tax-loss-selling hypothesis (e.g., Branch (1977), Dyl (1977), and Schultz (1985)); the window-dressing hypothesis (e.g., Haugen and Lakonishok (1988), and Ritter and Chopra (1989)); turn-of- the-year 'liquidity' hypothesis (e.g., Ogden (1990)); accounting information hypothesis (e.g., Rozeff and Kinney (1976)), and bid-ask spread (e.g., Keim (1989)). However, Bhardwaj and Brooks (1992) conclude that for typical investors, the January anomaly of low-price stocks outperforming high-price stocks cannot be used to earn abnormal returns. Mills and Coutts (1995) report that even if calendar effects are persistent in their occurrence and magnitude, the costs of implementing trading rules is prohibitive. Draper and Paudyal (1997) find that although it appears to be feasible to earn a high nominal return by trading on seasonality, it does not appear to be feasible to earn excess returns after allowance for transaction costs. Booth and Keim (2000) also conclude that the January effect is 'alive' but difficult to capture.

On the other hand, Ko (1998) gives some favorable evidence on the economic exploitation of seasonalities. Specifically, he investigates the effects of international diversification on the stock market monthly seasonality from an economic point of view. He finds that the strategy using monthly seasonality outperforms a buy-and-hold strategy. De Bondt, Thaler and Bernstein (1985), found that investors over-reacted to unexpected news. Stocks that performed well in the previous periods (winners), and stocks that performed poorly in the

previous periods (losers), both tended to revert back to their mean value in the subsequent periods. In a psychological study, Kahneman and Tversky (1982) document individuals over-reacting to new information, whether good or bad. If over-reaction behavior occurs, profitable contrarian trading strategies, buying past losers and selling past winners can be formed. Smirlock and Starks (1986) report the negative Monday effect in stock returns has been "moving up" in time. Johnston, Kracaw, and McConnell find similar results (for GNMAs, this effect occurs after December 1984. For T-bonds, the negative Wednesday occurs before January 1981) of Gay and Kim (1987) and Chang and Kim (1988), who document the disappearance of Monday effects in the commodities futures index.

III. Data and Methodology

The data in this research is taken from PC QUOTES for stocks of three US indices: Dow Jones Industrial Average, S&P 100, and S&P 500 respectively. Stocks of each of these indices are analyzed from the period beginning 1970 to the end of 2001. We sort the stock price data for each stock based on calendar month and option months and estimate two different monthly returns and standard deviations respectively. We then organize times series of monthly returns and standard deviation of each stock according to month. For example, we pool all monthly returns of January (only) from 1970 to 2001 and averaged over this period to estimate mean January return for a stock. Similarly mean monthly return for all other months are estimated. This process is followed to estimate mean monthly return for both calendar month and option month. Then a cross section of all stocks' monthly returns are pooled together to conduct different econometric analysis.

Once the data are processed and pooled, we first test for the equality of mean return and volatility for calendar month and option month, i.e., for return, if the mean calendar month January returns is equal to mean option month January return and so on. Our hypothesis is that there is no difference between the return and volatilities of these two types of months. Second, we also test if there is any seasonality in monthly return. We conduct the seasonality test on both calendar month and option month returns. Our test hypothesis would be that there is no difference between returns in different option months. Using the F test we investigate if the seasonality persists in return pattern of the option months. If the calendar month and option month returns are not the same then the second issue is of our importance. Third, if seasonality exists in options month then we investigate if one can capture abnormal returns from the seasonality in options month by applying some trading rules.

IV. Econometric Analysis:

We propose that the mean return of the calendar month return and option month return are equal. So our formal hypothesis is:

$$H_0 : \mu_{OM} = \mu_{CM}$$
$$H_a : \mu_{OM} \neq \mu_{CM} \qquad (1)$$

Here, μ_{OM} indicates the mean option month return, and μ_{CM} indicates the calendar month mean return. This hypothesis is tested under two different circumstances: when the variance of calendar month and option month are same and when they are different. Similarly, the equality

of monthly variance is tested to see if the variance based on option month is equal to that of calendar month. So, our test hypothesis is of the following form:

$$H_0 : \sigma^2_{OM} = \sigma^2_{CM}$$
$$H_a : \sigma^2_{OM} \neq \sigma^2_{CM} \qquad (2)$$

Next we investigate the seasonality in monthly returns on both calendar month return and on option month return. The regression equation that addresses this issue is as follows:

$$R_t = \alpha + \beta_1 D_{1t} + \beta_2 D_{2t} + \beta_3 D_{3t} + \beta_4 D_{4t} + \text{--------} + \beta_{11} D_{11t} + \varepsilon_t \qquad (3)$$

The dependent variable, R_t is the stock's monthly return at time t, ε_t is the white noise error term. α, the constant, in the right hand side of the equation identifies the monthly return for the month of January. The seasonal dummy variables are defined by the $D_{1t}, \ldots\ldots\ldots, D_{12,t}$ where $D_{it} = \begin{bmatrix} 1, & for \quad the \quad ith \quad month \\ 0, & otherwise \end{bmatrix}$ and month begins from the second month (February) of the year and hence i = 2, ------,12, indicates the difference in return between January and the ith month of the year.

V. Results:

V.1 Summary Statistics:

We calculate returns on calendar month and option month and is presented in Table 1. Table 1A shows the calendar month based monthly returns for the 30 DOW components from period 1970-2001. Results are pooled by the month. It is shown in the table that on an average the DOW components offer the lowest return of -0.686% in the month of September and highest return of 2.89% in the month of January.

Please insert Table 1A and 1B about here

Looking at the results one would presume that historically, September and August are the two worst months for DOW components and January, December, and November are the best months. In Table 1B it is observed that option period average monthly returns offer different returns. The worst average return for the DOW components comes in October option month with -0.118% and the highest average return comes in January option month with 2.602%. Historically, October and September offer the worst returns and January, November, December, and February offer the best returns.

Table 2A offers the summary statistics of historical returns for S&P 100 components based on the calendar month. Results show that S&P 100 components offer worst return in the month of April with average return of -3.747% and best return in the month of January with average return of 3.268%.

Please insert Table 2A and 2B about here

Table 2B shows the summary statistics of historical returns for S&P 100 components based on the option month. On average, S&P 100 components offer worst return in the option month of October with average return of -0.051% and best return in the option month of January with average return of 2.823%.

Table 3A presents the summary results of historical average returns for S&P 500 components based on calendar month. It shows that April calendar month offers the worst average ret urn of -6.937% and January calendar month offers the highest average return of 3.449%.

Please Insert Table 3A and 3B about here

When data are arranged based on option months, the summary results are shown in Table 3B. It shows that the lowest return comes in the October option month with average return of 0.102% and the highest return comes in the option month of January with average return of 4.078%.

V.2 Results for Mean-Variance Equality Test

Table 4-6 shows the test results on S&P 100 components. When the mean returns, based on calendar month and option months, are tested they are done under two different assumptions: once it is tested assuming the variances (based on calendar month and option month respectively) are equal and next when assumed that variances are not equal.

Please Insert Table 4, 5, and 6 about here

In both cases our test results show that the null hypothesis is rejected implying that the mean return based on calendar month and that of option month are different. Next we conduct a variance equality test and result indicates that even variance calculated based on calendar month and on option month is different.

We conduct the similar tests on the DOW 30 components. Table 7, 8, and 9 show the test results. When assumed that the variance calculated based on calendar month and option month are equal, our mean equality test indicate the similar result that we find in S&P 100 components: the means are not equal.

Please Insert Table 7, 8, and 9 About Here

Also, when assumed the variances are not equal, the mean returns turn out to be different. The tests for variance equality also show that the variances are not equal either.

Please Insert Table 10, 11, and 12 About Here

Finally, we conduct the similar tests on S&P 500 components. The test results are identical to those of S&P 100 and DOW 30 Components.

The main conclusion we can draw from our findings is that monthly returns show a pattern when they are estimated based on the option period. Outstanding options contracts, whose value depend on the third Friday's closing price, whether they are worthless or not and hence exercised or not may have some impact on the closing price of the Third Friday and that may make the monthly return and variances to be different from calendar month.

V. 3 Results for Seasonality Test

Seasonality tests are done both on calendar month return and on option month returns. Table 13 shows the seasonality test results conducted on S&P 500 components.

Please Insert Table 13 and 14 About Here

Results indicate that there is a seasonal pattern exists in the calendar month returns. Table 14 shows the seasonality test results of option month returns. It is quite clear that there is a seasonal pattern in return structure of the option month as well. One difference we like to include is the T statistics for the month of December. Calendar month show that it is insignificant where as the Option month based T statistics shows that it is significant.

Table 15 and 16 show the seasonality test results for Calendar month and option month respectively on S&P 100 components. Both calendar month and option month based tests show that there is a seasonal pattern in return structure.

Please Insert Table 15 and 16 About Here

One interesting observation is that in calendar month analysis, December month return turns out to be insignificant. However, in the option month based analysis it is observed that February, May, June and October turn insignificant.

Table 17 and 18 show the seasonality test results of calendar month and option month based returns on DOW 30 components. Results and conclusions are very similar to the ones we observe in S&P 500 and S&P 100 components.

Please Insert Table 17 and 18 About Here

Just like S&P 500 and S&P 100, the December calendar month return comes insignificant in DOW 30 Securities as well. When option month based test is conducted, February, October, and November month returns turn insignificant.

VI. Concluding Remarks

We investigate whether option month based monthly returns and volatilities are different from those of calendar month. Our test results support the differences. These differences may explain the worthiness of options contracts on call and put options when they expire. As a result, we conclude the option expiration effect may explain the differences in return in option month compared to the calendar month. Our result contributes to the existing literature by offering evidence of return differences in option month what support the option expiration effect. When security returns are analyzed based on calendar month and option month to test for seasonality, our results support the findings of the existing literature in terms of the calendar month. Our findings contribute to the literature by adding the result that when security returns are analyzed based on the option month; it also shows the seasonal pattern. Our both results could be the added evidence against the weak-form market efficiency.

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Summary Table 1: Calendar month Vs. Option Month Returns (Descriptive Statistics) for DJIA Components.

Calendar Month:	1A											
	Jan	**Feb**	**March**	**April**	**May**	**June**	**July**	**August**	**Sept**	**Oct**	**Nov**	**Dec**
Average	2.890%	0.721%	1.080%	1.171%	1.298%	0.736%	0.728%	-0.067%	-0.686%	0.576%	1.543%	2.258%
Max	11.225%	3.687%	4.756%	5.300%	5.701%	5.068%	3.019%	2.854%	4.688%	5.404%	5.426%	6.807%
Min	-0.549%	-1.883%	-1.130%	-3.920%	-1.592%	-1.845%	-3.459%	-2.180%	-3.170%	-4.073%	-1.730%	-0.135%
Median	0.086%	0.014%	0.022%	0.074%	0.032%	0.025%	0.020%	0.016%	0.030%	0.038%	0.025%	0.029%
Variance	0.086%	0.014%	0.022%	0.074%	0.032%	0.025%	0.020%	0.016%	0.030%	0.038%	0.025%	0.029%
STDEV	2.939%	1.201%	1.471%	2.729%	1.776%	1.591%	1.405%	1.274%	1.732%	1.949%	1.582%	1.710%
Option Month:	1B											
	Jan	**Feb**	**March**	**April**	**May**	**June**	**July**	**August**	**Sep**	**Oct**	**Nov**	**Dec**
Average	2.602%	2.123%	1.361%	1.096%	1.251%	1.419%	0.930%	0.904%	-0.012%	-0.118%	2.217%	2.178%
Max	10.383%	5.423%	5.977%	6.330%	4.462%	5.134%	5.821%	4.746%	5.099%	4.515%	6.101%	5.640%
Min	-1.006%	-1.445%	-1.725%	-2.646%	-0.620%	-2.415%	-3.093%	-4.770%	-4.186%	-3.497%	-0.440%	-1.602%
Median	0.070%	0.025%	0.027%	0.032%	0.018%	0.027%	0.037%	0.036%	0.035%	0.057%	0.021%	0.028%
Variance	0.070%	0.025%	0.027%	0.032%	0.018%	0.027%	0.037%	0.036%	0.035%	0.057%	0.021%	0.028%
STDEV	2.643%	1.566%	1.633%	1.778%	1.338%	1.645%	1.926%	1.886%	1.866%	2.393%	1.461%	1.673%

Summary Table 2: Calendar month Vs. Option Month Returns (Descriptive Statistics) for S&P 100 Components.

											S&P 100
Calendar	2A										
	Jan	**Feb**	**Mar**	**April**	**May**	**June**	**July**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Avg	3.268%	0.629%	1.409%	-3.747%	1.391%	1.028%	0.609%	0.233%	-0.142%	1.232%	1.339%	2.478%
Max	11.894%	6.842%	11.625%	5.300%	12.798%	22.480%	6.713%	11.960%	8.798%	12.232%	10.345%	27.019%
Min	-2.925%	-10.500%	-9.042%	-55.806%	-24.162%	-20.222%	-7.087%	-7.813%	-16.427%	-11.067%	-7.942%	-12.697%
Med	2.698%	0.753%	1.113%	-1.942%	1.327%	0.639%	0.826%	0.009%	-0.337%	1.043%	1.313%	2.075%
Var	0.101%	0.065%	0.065%	0.844%	0.145%	0.184%	0.049%	0.070%	0.096%	0.109%	0.065%	0.193%
STDEV	3.171%	2.549%	2.545%	9.186%	3.804%	4.295%	2.217%	2.642%	3.093%	3.294%	2.547%	4.397%
Option:	2B											
	Jan	**Feb**	**Mar**	**April**	**May**	**June**	**July**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Avg	2.823%	2.359%	1.937%	0.499%	2.031%	2.058%	1.261%	0.973%	0.782%	-0.051%	2.767%	1.685%
Max	16.874%	11.038%	17.023%	6.330%	31.250%	22.070%	12.954%	6.748%	6.967%	6.543%	16.025%	24.713%
Min	-5.283%	-5.712%	-7.887%	-10.623%	-3.781%	-23.223%	-8.158%	-7.878%	-8.934%	-13.032%	-4.133%	-14.426%
Med	2.115%	2.283%	1.726%	0.599%	1.361%	1.595%	0.865%	0.965%	0.580%	-0.008%	2.278%	1.607%
Var	0.151%	0.060%	0.078%	0.069%	0.143%	0.183%	0.091%	0.049%	0.060%	0.095%	0.101%	0.128%
STDEV	3.880%	2.444%	2.793%	2.621%	3.784%	4.276%	3.013%	2.206%	2.443%	3.079%	3.185%	3.583%

Summary Table 3: Calendar month Vs. Option Month Returns (Descriptive Statistics) for S&P 500 Components.

												S&P 500
Calendar	3A											
	Jan	**Feb**	**Mar**	**April**	**May**	**June**	**July**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Avg	3.449%	0.933%	1.444%	-6.937%	1.907%	1.371%	0.449%	1.040%	0.330%	1.672%	1.314%	3.434%
Max	51.825%	32.608%	22.117%	5.300%	24.390%	48.326%	18.342%	38.133%	22.939%	27.535%	39.740%	41.680%
Min	-9.148%	-22.402%	-39.993%	-10.000%	-33.424%	-22.287%	-27.485%	-15.169%	-21.596%	-11.067%	-24.011%	-12.697%
Median	2.335%	0.730%	1.301%	-3.887%	1.719%	0.591%	0.555%	0.306%	0.090%	0.989%	1.312%	2.618%
Variance	0.312%	0.146%	0.216%	1.530%	0.199%	0.343%	0.147%	0.231%	0.182%	0.207%	0.152%	0.237%
Option:	3B											
	Jan	**Feb**	**Mar**	**April**	**May**	**June**	**July**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Avg	4.078%	2.604%	1.741%	1.143%	2.787%	2.305%	2.330%	1.103%	1.223%	0.102%	3.435%	1.579%
Max	35.310%	38.301%	35.876%	20.866%	55.573%	60.900%	84.666%	23.258%	18.630%	41.102%	52.421%	33.209%
Min	-13.349%	-26.859%	-17.373%	-29.641%	-27.673%	-37.671%	-15.127%	-21.465%	-14.435%	-16.733%	-11.738%	-24.061%
Median	2.812%	2.354%	1.445%	1.113%	1.769%	1.773%	1.308%	0.937%	0.724%	0.041%	2.487%	1.472%
Variance	0.319%	0.189%	0.185%	0.168%	0.300%	0.303%	0.414%	0.141%	0.142%	0.163%	0.294%	0.192%
			4.304%	4.104%	5.473%	5.507%	6.437%	3.756%	3.763%	4.037%	5.423%	4.379%

Table 4

T-Test: Two-Sample Assuming Equal Variances	S&P 100	
	Variable 1	Variable 2
Mean	0.007975726	0.015796377
Variance	0.001893774	0.001068701
Observations	1224	1224
Pooled Variance	0.001481237	
Hypothesized Mean Difference	0	
Df	2446	
t Stat	-5.02696988	
P(T<=t) one-tail	2.6718E-07	
t Critical one-tail	1.645476829	
P(T<=t) two-tail	5.34359E-07	
t Critical two-tail	1.960934263	

Table 5

T-Test: Two-Sample Assuming Unequal Variances	S&P 100	
	Variable 1	Variable 2
Mean	0.007975726	0.015796377
Variance	0.001893774	0.001068701
Observations	1224	1224
Hypothesized Mean Difference	0	
Df	2270	
t Stat	-5.02696988	
P(T<=t) one-tail	2.68621E-07	
t Critical one-tail	1.645525167	
P(T<=t) two-tail	5.37241E-07	
t Critical two-tail	1.961009535	

Table 6

T-Test: Two-Sample Assuming Equal Variances	Dow 30		
	Variable 1	Variable 2	
Mean	0.009950414	0.013292335	
Variance	0.00040674	0.000390124	
Observations	360	360	
Pooled Variance	0.000398432		
Hypothesized Mean Difference	0		
Df	718		
t Stat	-2.246235835		
P(T<=t) one-tail	0.012496062		
t Critical one-tail	1.646978626		
P(T<=t) two-tail	0.024992124		
t Critical two-tail	1.963273425		

Table 7

F-Test Two-Sample for Variances	S&P 100		
	Variable 1	Variable 2	
Mean	0.007975726	0.015796377	
Variance	0.001893774	0.001068701	
Observations	1224	1224	
Df	1223	1223	
F	1.772033996		
P(F<=f) one-tail	1.46509E-23		
F Critical one-tail	1.098675144		

Table 8

T-Test: Two-Sample Assuming Unequal Variances	Dow 30		
	Variable 1	Variable 2	
Mean	0.009950414	0.013292335	
Variance	0.00040674	0.000390124	
Observations	360	360	
Hypothesized Mean Difference	0		
df	718		
t Stat	-2.246235835		
P(T<=t) one-tail	0.012496062		
t Critical one-tail	1.646978626		
P(T<=t) two-tail	0.024992124		
t Critical two-tail	1.963273425		

Table 9

F-Test Two-Sample for Variances	Dow 30	
	Variable 1	Variable 2
Mean	0.009950414	0.013292335
Variance	0.00040674	0.000390124
Observations	360	360
Df	359	359
F	1.042592014	
P(F<=f) one-tail	0.346474651	
F Critical one-tail	1.189882153	

Table 10

T-Test: Two-Sample Assuming Equal Variances	S&P 500	
	Variable 1	Variable 2
Mean	0.008750693	0.020359568
Variance	0.004248011	0.002667552
Observations	6000	6000
Pooled Variance	0.003457782	
Hypothesized Mean Difference	0	
Df	11998	
t Stat	-10.81314392	
P(T<=t) one-tail	1.98881E-27	
t Critical one-tail	1.644980639	
P(T<=t) two-tail	3.97762E-27	
t Critical two-tail	1.960161671	
T-Test: Two-Sample Assuming Equal Variances	S&P 500	

Table 11

T-Test: Two-Sample Assuming Unequal Variances	S&P 500	
	Variable 1	Variable 2
Mean	0.008750693	0.020359568
Variance	0.004248011	0.002667552
Observations	6000	6000
Hypothesized Mean Difference	0	
Df	11402	
t Stat	-10.81314392	
P(T<=t) one-tail	2.01876E-27	
t Critical one-tail	1.644987279	
P(T<=t) two-tail	4.03751E-27	
t Critical two-tail	1.960172008	
T-Test: Two-Sample Assuming Unequal Variances		

Table 12

F-Test Two-Sample for Variances	S&P 500	
	Variable 1	Variable 2
Mean	0.008750693	0.020359568
Variance	0.004248011	0.002667552
Observations	6000	6000
df	5999	5999
F	**1.592475574**	
P(F<=f) one-tail	2.97519E-72	
F Critical one-tail	1.043391895	

Table 13: Calendar Month Seasonality Test on S&P 500 Components (1970-2001)

Regression Statistics								
Multiple R	0.399606							
R Square	0.159685							
Adjusted R Square	0.158056							
Standard Error	0.058236							
Observations	5688							
ANOVA								
	df	SS	MS	F	Significance F			
Regression	11	3.657979	0.332544	98.0553	6.4E-205			
Residual	5676	19.24952	0.003391					
Total	5687	22.9075						
	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept	0.034489	0.002675	12.89373	1.63E-37	0.029245	0.039733	0.029245	0.039733
February	-0.02516	0.003783	-6.65084	3.19E-11	-0.03257	-0.01774	-0.03257	-0.01774
March	-0.02005	0.003783	-5.29967	1.2E-07	-0.02746	-0.01263	-0.02746	-0.01263
April	-0.10386	0.003783	-27.455	6.3E-156	-0.11127	-0.09644	-0.11127	-0.09644
May	-0.01542	0.003783	-4.07577	4.65E-05	-0.02283	-0.008	-0.02283	-0.008
June	-0.02077	0.003783	-5.49171	4.15E-08	-0.02819	-0.01336	-0.02819	-0.01336
July	-0.02999	0.003783	-7.92924	2.64E-15	-0.03741	-0.02258	-0.03741	-0.02258
August	-0.02409	0.003783	-6.36758	2.07E-10	-0.0315	-0.01667	-0.0315	-0.01667
September	-0.03119	0.003783	-8.24583	2.02E-16	-0.03861	-0.02378	-0.03861	-0.02378
October	-0.01777	0.003783	-4.69778	2.69E-06	-0.02519	-0.01036	-0.02519	-0.01036
November	-0.02134	0.003783	-5.64248	1.76E-08	-0.02876	-0.01393	-0.02876	-0.01393
December	-0.00014	0.003783	-0.03803	0.969664	-0.00756	0.007272	-0.00756	0.007272

Table 14: Option Month Seasonality Test on S&P 500 Components (1970-2001)

Regression Statistics								
Multiple R	0.212326							
R Square	0.045082							
Adjusted R Square	0.043232							
Standard Error	0.048935							
Observations	5688							
ANOVA								
	df	SS	MS	F	Significance F			
Regression	11	0.64169	0.058335	24.36078	8.37E-50			
Residual	5676	13.59201	0.002395					
Total	5687	14.2337						
	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept	0.040777	0.002248	18.14184	1.52E-71	0.03637	0.045183	0.03637	0.045183
February	-0.01474	0.003179	-4.63689	3.62E-06	-0.02097	-0.00851	-0.02097	-0.00851
March	-0.02337	0.003179	-7.35074	2.25E-13	-0.0296	-0.01713	-0.0296	-0.01713
April	-0.02935	0.003179	-9.23296	3.64E-20	-0.03558	-0.02312	-0.03558	-0.02312
May	-0.0129	0.003179	-4.05982	4.98E-05	-0.01914	-0.00667	-0.01914	-0.00667
June	-0.01773	0.003179	-5.57692	2.56E-08	-0.02396	-0.0115	-0.02396	-0.0115
July	-0.01748	0.003179	-5.49921	3.98E-08	-0.02371	-0.01125	-0.02371	-0.01125
August	-0.02975	0.003179	-9.35851	1.14E-20	-0.03598	-0.02352	-0.03598	-0.02352
September	-0.02855	0.003179	-8.98065	3.6E-19	-0.03478	-0.02232	-0.03478	-0.02232
October	-0.03976	0.003179	-12.5076	1.98E-35	-0.04599	-0.03353	-0.04599	-0.03353
November	-0.00642	0.003179	-2.02076	0.043352	-0.01265	-0.00019	-0.01265	-0.00019
December	-0.02499	0.003179	-7.86114	4.52E-15	-0.03122	-0.01876	-0.03122	-0.01876

Table 15: Calendar Month Seasonality Test on S&P 100 Components (1970-2001)

Regression Statistics								
Multiple R	0.373864							
R Square	0.139774							
Adjusted R Square	0.131967							
Standard Error	0.040545							
Observations	1224							
ANOVA								
	Df	SS	MS	F	Significance F			
Regression	11	0.323729	0.02943	17.90293	2.29E-33			
Residual	1212	1.992357	0.001644					
Total	1223	2.316085						
	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept	0.032678	0.004015	8.139874	9.73E-16	0.024801	0.040554	0.024801	0.040554
February	-0.02643	0.005677	-4.65586	3.58E-06	-0.03757	-0.01529	-0.03757	-0.01529
March	-0.01872	0.005677	-3.29796	0.001002	-0.02986	-0.00759	-0.02986	-0.00759
April	-0.06988	0.005677	-12.308	6.89E-33	-0.08102	-0.05874	-0.08102	-0.05874
May	-0.01886	0.005677	-3.32226	0.00092	-0.03	-0.00772	-0.03	-0.00772
June	-0.02247	0.005677	-3.95758	8.01E-05	-0.03361	-0.01133	-0.03361	-0.01133
July	-0.02687	0.005677	-4.73295	2.47E-06	-0.03801	-0.01573	-0.03801	-0.01573
August	-0.03034	0.005677	-5.3443	1.08E-07	-0.04148	-0.0192	-0.04148	-0.0192
September	-0.03433	0.005677	-6.04619	1.97E-09	-0.04547	-0.02319	-0.04547	-0.02319
October	-0.02091	0.005677	-3.68301	0.000241	-0.03205	-0.00977	-0.03205	-0.00977
November	-0.01946	0.005677	-3.42755	0.000629	-0.0306	-0.00832	-0.0306	-0.00832
December	-0.00815	0.005677	-1.43548	0.151409	-0.01929	0.002989	-0.01929	0.002989

Table 16: Option Month Seasonality Test on S&P 100 Components (1970-2001)

Regression Statistics								
Multiple R	0.266395							
R Square	0.070966							
Adjusted R Square	0.062535							
Standard Error	0.031652							
Observations	1224							
ANOVA								
	df	SS	MS	F	Significance F			
Regression	11	0.092755	0.008432	8.416493	2.05E-14			
Residual	1212	1.214266	0.001002					
Total	1223	1.307021						
	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept	0.02823	0.003134	9.007508	7.99E-19	0.022081	0.034379	0.022081	0.034379
Intercept	-0.00467	0.004432	-1.0546	0.29182	-0.01337	0.004021	-0.01337	0.004021
February	-0.00913	0.004432	-2.06043	0.039571	-0.01783	-0.00044	-0.01783	-0.00044
March	-0.02303	0.004432	-5.1969	2.38E-07	-0.03173	-0.01434	-0.03173	-0.01434
April	-0.008	0.004432	-1.80533	0.07127	-0.0167	0.000694	-0.0167	0.000694

May	-0.00789	0.004432	-1.78018	0.075297	-0.01659	0.000806	-0.01659	0.000806
June	-0.01582	0.004432	-3.56977	0.000371	-0.02452	-0.00713	-0.02452	-0.00713
July	-0.01845	0.004432	-4.16317	3.36E-05	-0.02715	-0.00976	-0.02715	-0.00976
August	-0.02063	0.004432	-4.65563	3.59E-06	-0.02933	-0.01194	-0.02933	-0.01194
September	-0.02919	0.004432	-6.58529	6.75E-11	-0.03788	-0.02049	-0.03788	-0.02049
October	-0.00083	0.004432	-0.18808	0.850844	-0.00953	0.007862	-0.00953	0.007862
November	-0.01154	0.004432	-2.60393	0.009329	-0.02024	-0.00285	-0.02024	-0.00285

Table 17: Calendar Month Seasonality Test on DJIA Components (1970-2001)

Regression Statistics								
Multiple R	0.445377							
R Square		0.198361						
Adjusted R Square	0.173021							
Standard Error	0.01834							
Observations	360							
ANOVA								
	df	SS	MS	F	Significance F			
Regression	11	0.028965	0.002633	7.828214	3.73E-12			
Residual	348	0.117055	0.000336					
Total	359	0.14602						
	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	
Intercept	**0.028899**	**0.003348**	**8.630455**	**2.22E-16**	**0.022313**	**0.035484**	**0.022313**	
February	-0.02248	0.004735	-4.74801	3.01E-06	-0.0318	-0.01317	-0.0318	Upper 95.0%
March	-0.0181	0.004735	-3.8214	0.000157	-0.02741	-0.00878	-0.02741	**0.035484**
April	-0.01878	0.004735	-3.96553	8.89E-05	-0.02809	-0.00946	-0.02809	-0.01317
May	-0.01634	0.004735	-3.45092	0.000627	-0.02566	-0.00703	-0.02566	-0.00878
June	-0.0214	0.004735	-4.51823	8.55E-06	-0.03071	-0.01208	-0.03071	-0.00946
July	-0.02147	0.004735	-4.53375	7.98E-06	-0.03078	-0.01216	-0.03078	-0.00703
August	-0.02957	0.004735	-6.24521	1.23E-09	-0.03889	-0.02026	-0.03889	-0.01208
September	-0.03532	0.004735	-7.45842	7.04E-13	-0.04463	-0.02601	-0.04463	-0.01216
October	-0.02312	0.004735	-4.88261	1.6E-06	-0.03243	-0.01381	-0.03243	-0.02026
November	-0.01425	0.004735	-3.00873	0.002815	-0.02356	-0.00493	-0.02356	-0.02601
December	-0.00655	0.004735	-1.38382	0.1673	-0.01587	0.002761	-0.01587	-0.01381

Table 18: Option Month Seasonality Test on DJIA Components (1970-2001)

Regression Statistics								
Multiple R	0.40731							
R Square	0.165901							
Adjusted R Square	0.139536							
Standard Error	0.018322							
Observations	360							
ANOVA								
	df	SS	MS	F	Significance F			
Regression	11	0.023235	0.002112	6.292434	1.71E-09			
Residual	348	0.116819	0.000336					
Total	359	0.140054						
	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept	**0.026024**	**0.003345**	**7.779672**	**8.35E-14**	**0.019445**	**0.032603**	**0.019445**	**0.032603**
February	-0.00538	0.004731	-1.13676	0.256423	-0.01468	0.003927	-0.01468	0.003927
March	-0.01225	0.004731	-2.58968	0.01001	-0.02156	-0.00295	-0.02156	-0.00295
April	-0.01459	0.004731	-3.08408	0.002205	-0.02389	-0.00529	-0.02389	-0.00529
May	-0.01352	0.004731	-2.85787	0.004522	-0.02282	-0.00422	-0.02282	-0.00422
June	-0.01206	0.004731	-2.54976	0.011208	-0.02137	-0.00276	-0.02137	-0.00276
July	-0.01698	0.004731	-3.58983	0.000378	-0.02629	-0.00768	-0.02629	-0.00768
August	-0.01685	0.004731	-3.56278	0.000418	-0.02616	-0.00755	-0.02616	-0.00755
September	-0.02577	0.004731	-5.44808	9.65E-08	-0.03508	-0.01647	-0.03508	-0.01647
October	-0.02697	0.004731	-5.70123	2.54E-08	-0.03627	-0.01767	-0.03627	-0.01767
November	-0.00406	0.004731	-0.85853	0.391189	-0.01337	0.005243	-0.01337	0.005243
December	-0.00433	0.004731	-0.91622	0.360188	-0.01364	0.00497	-0.01364	0.00497

Determinants Influencing the Seasoned Equity Offerings: Private Placements vs Rights Issue

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Abstract

The number of private placements proposals demonstrates an interesting change and it is steadily being made use of as one of the equity financing method for the last 15 years in Malaysia. The volume of private placements in these years significantly rises as well comparatively to the same range of period. However the number of rights issue proposals demonstrates the opposite pattern of private placements similarly to the volume. The increase of private placements combine with the decrease of rights issue within the same period initiate the need to identify the existence of either differences or similarities in the determinants of firms that chose these financing methods. It is found that there are differences in the determinants of firms that chose private placement with firms that chose rights issue. The findings report that the determinants of firms that chose private placements are with high degree of asymmetric information, limited financial slack undervalued as well as large. And the determinants of firms that chose rights issue shares are high degree of asymmetric information, limited financial slack and large. The diversity of findings confirms that the determinants might be caused by the characteristics in emerging markets compared to established environments.

Keywords: private placement, rights issue, determinants, seasoned equity offerings, Malaysia
JEL: G30, G32

I. Introduction

The pecking order theory states that firm chooses to issue equity as the last resort to raise funds may perhaps be explained by the finding of these fellow researchers. It is suggested that the public perceived the issuance of seasoned equity offering as due to limited capability of firms in raising either internal funds or failure to raise funds via lending. Nonetheless firms discover that it is not easy to avoid equity issuance particularly when the financing is required for either investment or growth opportunities. Hence fundamentally firms have two options to raise fund via equity which is via the open market viz. bonus issue, stock split, rights issue and seasoned offerings or via the private market viz. private placement.

Past studies of equity issuance corroborate that firms which opt for public offerings encounter negative results and confirm the least preference of financing in pecking order theory. Studies performed by Mikkelson and Ruback (1985), Schleifer and Vishny (1986), Agrawal and Mandelker (1990) and Brous and Kini (1994) show that public offerings are seen to have a negative association with shareholders wealth. Furthermore studies performed by Healy and Palepu (1990) and Jain (1992) illustrate that market will construe public offerings as an indication that the firm is in need of cash or dealing with financial problems which causes the negative return upon the announcement of public offerings.

In contrast to the issuance of public offerings as discussed above funds that are raised via private market is dependent on merely the scrutiny of the intended parties that has direct contact with the managers as well as shareholders of the firms. The divergence in the process of public issuance and private issuance may lead to the variation of motivations to choose either method.

The circumstances are substantiated with the outcome of the research performed by Wruck (1989). The research claims that there is positive relationship between issuance of private equity and shareholder's wealth due to ownership concentration level. Afterward Goh, Gombola, Lee, & Liu (1999) prove that private placements have the capability to convey special information to the market that lead to positive wealth impact. This is again being supported by the research of Lee and Kocher (2001) and Brooks and Graham (2005) that

stated firm size and ownership structure are the important determinants which release the positive information that explains the market reaction for private placement.
Nevertheless Prowse (1998) reported that the private equity market in United States has been the fastest growing market for corporate finance in the past 15 years. Moreover Carey, Prowse, Rea, & Udell (1993) stated that the US market of private equity issuance started to grow in the late 1980s from a mere USD6 billion to more than USD150 billion in 1996 (Prowse, 1998). There are many published articles that discussed the private equity trends in other countries that start as early as in 1989.
As such the list of researches in the US market continues until now and it is extended to the Japan market by Kato and Schallheim (1993), Singapore market by Tan, Chng, & Tong, (2002) and New Zealand market by Anderson, Rose & Cahan (2006). The pronouncement of these studies revealed that a private placement is capable to reverse the impact of public offerings for most of the market except for Singapore market. Though the reverse in wealth impact may possibly explain the reasons for change in the number of proposals and volume in Malaysia, the researchers in Singapore market has concluded that the variations may exist due to differences of regulation in some of the markets.
Private placements in Malaysia are perceived as a second class option of equity financing method. This is elucidated by the volume of private placement over the period of fifteen years from the year 1975 to 1990 is recorded at a mere RM97.8 million and occurs in three occasions of 1976, 1978 and 1987 respectively. Subsequently private placement was steadily being made use of from the year 1992 to 2004 with an upward trend for four consecutive years starting in 1992 and another five consecutive years starting in 1998 with a total volume over the same period of fifteen years recorded at RM17.8 billion.
On the other hand rights issue is a more common method of financing among Malaysian company as the use and the volume of proceeds can be traced back to the year 1976 reported at RM9.5 million and jumped to RM4.419 billion in 1990 for the same periods mentioned in private placements. Nonetheless from the year 1990 to year 2009 the overall volume of rights issues are sensitive towards economic changes as the Asian Financial Crisis caused a drop from RM8.525 billion to RM722 million. Yet again rights issue is consistently being employed for all the years though the volume rises up in 1999 followed by seven consecutive years of plunging down ended in 2006. Indisputably it is a more popular method of financing tools in Malaysia comparatively to private placements.
Owing to this a look into the information provided by SC on the number of accepted private placement proposals as well as the number of rights issue proposals may perhaps indicate the current trend of corporate raising exercises as well as the recent change of pattern over the issuance of private placement proposals in Malaysia.

[Insert Table 1 here]

II. Literature Review

Free Cash Flow Hypothesis

Jensen (1986) defines free cash flow as the excess cash flow required to fund projects with positive net present value that improve the future expected return of firms. Copeland and Weston (1988) state that the distributions of excess cash flow to existing shareholders reduce the amount of funds under managers' control. Lesser management control reduces their power on future growth opportunities that once again under the scrutiny of the market when firms decide to seek for additional funds particularly in raising new capital. Hertzel and Smith (1993) in an extension of Myers and Majluf (1984) argue that private placement is used by firms with limited financial slack or free cash flow in order to take advantage of profitable investment opportunities. Brooks and Graham (2005) corroborate the outcome of others that firms with low excess cash flow may be inclined to issue equity through the private transaction rather than the public transaction. Despite this Brooks and Graham (2005)

as well state that established firms with excess cash flow problem are associated with public offerings. Hence it is propose that free cash flow and private placements are inversely related while free cash flow and rights issues are positively related.

Asymmetric Information Hypothesis

The finding of Akerlof (1970) led to the work of Leland and Pyle (1977) that linked the role of information with the financial structure of a firm. The link is being established through the action of entrepreneurs as one of the indicators for the type of information being dispersed in the market. Their argument on choosing the action of entrepreneur as an indicator is based on the belief that as a shareholder entrepreneur act to protect his interest upon the release of any information to the market. The research of Myers and Majluf (1984) reveal that the level of information possessed by managers' is superior to the level of information possessed by investors. The work discussed the impact on level of information towards the investment and financing decisions of managers. Hertzel and Smith (1993) initiate that the private sales of equity carry important information effect while Anderson (2006) suggests that the informational effect of private placement in a lesser regulated market documented that private placement is a tool used by firms to exploit the market. In contrast to this Lee and Kocher (2001) illustrate that public common stock is not chosen if firms suffers greater degree of asymmetric information since the issuance diffuse negative information to the market. It is propose that asymmetric information and private placements are positively related while asymmetric information and rights issues are inversely related.

Stock Price Run-up Hypothesis

Charles Dow, the founder of Dow Jones as cited by Hamilton (1922) defines the up-trends as a time when there is successive rallies price that close at a level higher than those achieved in the previous rallies and when lows occur at a level higher than the previous lows. Nonetheless the links between stock price run-up theories with the issuance of equity is ascertained through the overvaluation theory that suggested firms sell their shares when the market price is superior to the book price in order to avoid extensive pull down of prices. Thus Hertzel and Smith (1993) suggest that as long as the NPV of investment is higher than the cost of transferring information, managers of undervalued firm chose private placement as their financing method in order to mitigate under-investment problem that is supported by Lee and Kocher (2001). Meanwhile Hertzel, Lemmon, Linck & Rees (2002) confirm the evidence of investor optimism surrounding the announcement of private placement is attributable to the significant price run-up. On the contrary Lee and Wu (2009) state that the implication of asymmetric information causes firms to issue public offerings when the shares are overvalued which affirmed to the finding of Myers and Majluf (1984). Hence stock price run-up and private placements are inversely related while stock price run-up and rights issues are positively related**.**

Agency Cost Hypothesis

Jensen and Meckling (1976) has develop a theory of ownership structure with relevant to the theory of agency, property rights and finance. Agency theory as explained by Jensen and Meckling (1976) affirm that the costs of the relationship between agent and principal arise due to the contract drawn to ensure the action of agent is consistent with the interest of principal. Hence Lehn and Poulsen (1989) suggest that the monitoring effect as well as the alignment of managers and shareholders interest reduce the severity of agency costs in a firm. Wruck (1989) establish that private placement instituted the change on the level of ownership concentration which creates a new block-holder of share that enable the alignment of managers and shareholders interest through supervision and monitoring. Cronqvist and

Nilsson (2005) institute that in addition to monitoring effect, private placement is useful to reduce moral hazard particularly to align interest between firms and business partners as well as when the potential of value-reducing managerial discretion is high. Despite this Wu, Wang & Yao (2005) ascertain that public offerings do not lead to monitoring effect due to the involvement of passive investors and smaller shareholding. Based on this agency cost and private placements are positively related while agency cost and rights issues are inversely related.

Firm Size Hypothesis

Likewise Freeman (1987) asserts that small firms tend to experience a greater degree of asymmetric information than large firms prior to announcement of any corporate events. Hertzel and Smith (1993) postulates that small firm with substantial growth opportunities tend to choose private placement in order to raise fund externally. As for Lee and Kocher (2001) firm size is an indicator to support asymmetric information following Freeman (1987) that suggests the asymmetric information problem is borne by small firms with investment opportunities. Wu et. al (2005) corroborated that private equity issuers are usually small and suffers asymmetric information. Nonetheless Lee and Kocher (2001) also conclude that public issuance is selected by larger firms as an indicator of positive past and current performance. Thus the proposition is firm size and private placements are inversely related while firm size and rights issues are positively related.

III. Methodology

The sample collections focus on identifying firms that announced private placement and rights issue. Both of these samples are collected either through Investor's Digest or directly from Bursa Malaysia website. The website search is classify under company announcement and by keying in keywords such as "private placement", "equity private placement", "equity right issues", "rights issue" as well as "renounceable rights issue". The search on the announcements is extending to Investor's Digest for the announcements prior to 2004. The initial sample is match with the characteristics that only one issuance of secondary equity offerings is announced by companies currently listed in Bursa Malaysia from the period of January 2002 to December 2007 and the announcements are not from the same companies. The final number of sample that is pursued for collection of data is 118 companies for private placements issuers and 114 companies for rights issue issuers.

The extraction of measurable data is performed in Data stream and Perfect Analysis though it is expanded to Bursa Malaysia website for downloading of firms' annual report. The dependent variable selected to reflect the choice of methods is the natural log of gross proceeds for each issuance. The gross proceeds are measured by multiplying the number of issued shares with the issue price on the day of announcement that is used by Wu (2001) and Tan et al. (2002). The measurement of free cash flow by Copeland and Weston (1988) includes the earnings before interest and tax, depreciation, change in working capital as well as the tax impact on depreciation and interest is selected as the first independent variable and the proxy for free cash flow hypothesis.

The second independent variable and proxy of asymmetric information theory is the comparison between book value of equity to the market value of equity in the preceding year of announcement referred in Chen et al. (2002), Tan et al. (2002) and Anderson et al. (2006). The third independent variable as a proxy to stock price run-up theory is cumulative abnormal return using market model of Scholes and William (1977) for beta estimation as in Wruck (1989), Anderson et al. (2006) and Barclay et al. (2007). The fourth independent variable and the proxy of agency costs theory is measured as the change in the ownership fraction of managers including directors to the shareholders similarly to Hertzel and Smith

(1993), Lee and Kocher (2001). The final independent variable selected as the proxy of firm size hypothesis is the logarithm of market value of equity.

The statistical testing are White Heteroscedasticity test of homoscedasticity on the variance of residuals and the Variance Inflation Factor (VIF) test of multicollinearity for the independent variables. The RAMSEY Reset test of stability testing for justification of misspecification is performed. The bi-variate correlation among independent variables as well as between dependent and independent variable is reflected by the Pearson correlation test. Eventually the developed model undertakes the cross section pool data regression analysis subjected to the fitness of model testing that is reflected in F-test, t-test and adjusted R^2 result. The developed model is written as below:

$$LOGGP_{ppe/ri} = \beta_0 + \beta_1 FCF_{ppe/ri} + \beta_2 AI_{ppe/ri} + \beta_3 RP_{ppe/ri} + \beta_4 AC_{ppe/ri} + \beta_5 FS_{ppe/ri} + \varepsilon$$

where,

LOGGP = log of gross private placement or rights issue proceeds
FCF = free cash flow of private placement or rights issue issuer
AI = BVMV = asymmetric information of private placement or rights issue issuer
RP = CAR = stock price run-up indicator of private placement or rights issue issuer
AC = OWNFRAC = agency cost of private placement or rights issue issuer
FS = firm size of private placement or rights issue issuer
β_0 = constant
$\beta_{1,2,\ldots 5}$ = regression coefficients of predictor
ε = error term

IV. Results

The heteroscedasticity testing of White reported in Table 2 below shows a p-value of lesser than 0.05 for both private placements and rights issue. The results suggest the existence of heteroscedasticity in both developed models.

[Insert Table 2 here]

The outcome of multicollinearity test of Variance Inflation Factor (VIF) is reported to fall in the range 1.035 to 1.287. Based on the report of results in Table 3 it is concluded that there is no serious multicollinearity in the developed models of private placement.

[Insert Table 3 here]

Table 4 reports the outcome of stability testing for the developed model of private placement with p-value of more than 0.05. The documented p-value suggests that there is no misspecification in the model. The outcome of RAMSEY Reset test of stability testing for the developed model of rights issue reported in Table 4 also suggest the absence of misspecification in the model.

[Insert Table 4 here]

Table 5 documents that there is significant positive relationship between firm size hypothesis and log of gross proceeds for private placements issuers as well as firm size hypothesis and free cash hypothesis. Nonetheless there is significant negative relationship between firm size hypothesis and asymmetric information theory. Hence the outcomes suggest that firm size hypothesis is the characteristic of private placements issuers along with the relationship of asymmetric information theory and free cash flow hypothesis.

Table 5 reports significant relationship firm size theory and log of gross proceeds of rights issue as positive and on top of that firm size hypothesis has significant negative relationship with the asymmetric information theory. Additionally the asymmetric information theory has significant positive relationship with the price run-up theory. Thus the outcome suggests that the firm size hypothesis and asymmetric information theory is the determinants of rights issue issuers while the asymmetric information theory is as well related to the price run-up theory.

[Insert Table 5 here]

The outcome of pool data regression analysis with corrected heteroscedasticity for the developed model is reported in Table 6. The analysis reports the result of R^2 and adjusted R^2 at 0.622 and 0.599 supported by the outcome of F-statistics with p-value of less than 0.05 that suggest the independent variables can jointly influence the dependent variable.

The t-statistic testing in Table 6 documents significant negative relationship between free cash flow hypothesis and the log of gross proceeds of private placement that leads to the conclusion that limited financial slack is the determinants of private placements issuers. The finding supports the proposed relationship of private placement but the relationship of free cash flow with the log of gross proceeds of rights issue is reported to be similar to private placement instead of the opposite direction as being proposed. Owing to this it is instituted that limited financial slack is as well the determinants of rights issue issuers.

The p-value of t-statistics reports significant positive relationship between the ratios of book to market value of equity with the log of gross proceeds of private placement support the proposed relationship. It is suggested that high level of asymmetric information is the determinants of private placements issuers. On top of that the relationship between the ratios of book to market value of equity with log of gross proceeds of rights issue is found to be positive rather than negative as stated in the proposition. Thus it is concluded that high level of asymmetric information is as well the determinants of rights issue issuers.

The outcome of the t-statistic reports significant negative relationship between cumulative abnormal return and the log of gross proceeds of private placements. This is interpreted as undervaluation of share price is the determinants of private placements issuers consistent with the proposed relationship. Nevertheless the positive relationship between cumulative abnormal return stated in the proposed relationship of rights issue is found to be not significant. Due to this the proposition that overvaluation of share price is the determinants of rights issue issuers are not conclusive.

The relationship between ownership fraction and log of gross proceeds of private placement is found to be negative as opposed to the proposition though it is not significant. The result suggests that high agency costs as the determinants of private placements issuers are not supported. Moreover the low agency cost as the determinants of private placements issuers is not conclusive as well. Similarly the relationship between ownership fraction and log of gross proceeds of rights issue is negative as proposed but statistically insignificant. Owing to this it is concluded that high agency cost is the determinants of rights issue issuers are not conclusive.

Finally the relationship between firm size and the log of gross proceeds of private placement is found to be positive instead of negative as stated in the proposition. The positive relationship is statistically significant that suggest large firms are inclined to issue private placements. Additionally the positive relationship between firm size and log of gross proceeds of rights issue is also statistically significant and consistent with the proposed relationship. In lieu of this it is concluded that large firms do issue rights issuance as their financing method.

Eventually the outcome reveals the support for the propositions as well as the contrast of the propositions. The differences and similarities in the characteristic of firm that choose private placements and rights issue is determine though the finding may not be as stipulated in the propositions. But without doubt the result fulfilled the objective of this study which is to differentiate the determinants of both issuing firms. The developed model of private placement is written as below:

$LOGGP_{PPE} = \beta_0 + \beta_1 FCF_{PPE} + \beta_2 AI_{PPE} + \beta_3 RP_{PPE} + \beta_4 AC_{PPE} + \beta_5 FS_{PPE} + \varepsilon = 6.4621 - 8.667e\text{-}007FCF + 5.201e\text{-}008AI - 0.0199RP + 0.0742FS + \varepsilon$

And the developed model of rights issue is written as below:

$LOGGP_{RI} = \beta_0 + \beta_1 FCF_{PPE} + \beta_2 AI_{PPE} + \beta_3 RP_{PPE} + \beta_4 AC_{PPE} + \beta_5 FS_{PPE} + \varepsilon = 5.929 - 6.019e\text{-}008 FCF_{ri} + 1.304e\text{-}007 AI_{ri} + 0.3049 FS_{ri} + \varepsilon$

[Insert Table 6 here]

V. Discussion

The finding that firms with limited free cash flow is the determinants for private placements issuers is consistent with the finding of Hertzel and Smith (1993), Hertzel and Rees (1998), Goh et. al (1999), Lee and Kocher (2001) as well as Brooks and Graham (2005). The conclusions that higher degree of asymmetric information as the determinants for private placements issuers is consistent with the finding of Hertzel and Smith (1993), Lee and Kocher (2001), Wu (2003) and Anderson (2006) but not by Chen et. al (2002). Subsequently it is concluded that undervalued as the determinants for private placements issuers is similarly reported in Hertzel and Smith (1993) and Lee and Kocher (2001) that is further supported by Hertzel et.al (2002) as well as Marciukaityte et. al (2005) with investors' optimism as the underlying explanations. The negative relationship between agency cost theory and private placement issuers that is found to be not conclusive is in contrast to other researchers such as Wruck (1989), Chen et.al (2002), Cronqvist and Nilsson (2005) and Barclay et.al (2007). However the research of Hertzel and Smith (1993) as well as Lee and Kocher (2001) report that the evidence of agency cost is not as significant as asymmetric information. Likewise the conclusion that large firms is the determinants for private placements issuers is in contrast to the finding of Freeman (1987), Hertzel and Smith (1993), Lee and Kocher (2001), Wu et. al (2005) and Ferreira and Brooks (2007). Marciukaityte and Varma (2007) show that most institutional buyers remain passive investors after convertible debt placements to equity linked securities confirms the monitoring and realignment of interest by Jensen and Meckling (1976) to reduce the agency cost effect and benefits the exercises of private placements. Thus the finding of the research does deviate from others particularly on the influence of agency cost theory and firm size. Nonetheless it is suggested by the Pearson correlations test that the determinants for private placements issuers are small, high asymmetric information and limited financial slack that is consistent with the same researchers' effect.

Consequently the finding that limited financial slack as the determinants of rights issue issuers is not supporting the finding of Pilotte (1992), Lee and Kocher (2001) and Brooks and Graham (2005). The conclusion that higher degree of asymmetric information the determinants of rights issue issuers is diverging from researchers such as Chemmanur and Fuighieri (1999) and Lee and Kocher (2001) though supported by Wu et.al (2005). The finding that suggests the inconclusive result of overvaluation in share price as the determinants of rights issue issuers is not consistent with Myers and Majluf (1984), Lucas and McDonald (1990), Lee and Kocher (2001) as well as Lee and Wu (2009). The proposition that lower agency cost as the determinants of rights issue issuers is not concluded as such not consistent with researches by Schleifer and Vishny (1986), Hertzel and Smith (1993), Lee and Kocher (2001) and Wu et al. (2005). The positive relationship between firm size and rights issue issuers is consistent with the proposition as well as Miller and Rock (1985) and Lee and Kocher (2001). With exception of firm size effect, the influence of other factors as the determinants of rights issue issuers in Malaysian market is diverging from others.

VI. Concluding Remarks

Eventually it is concluded that the determinants for private placements issuers are limited financial slack, high asymmetric information, undervalued and large. And it is concluded that the determinants of rights issue issuers are limited financial slack, high asymmetric information and large. Ultimately the similar characteristic of firms that choose private

placement with firms that choose rights issue is free cash flow, asymmetric information and firm size while the differentiating characteristic is stock price run-up theory.
The finding that limited financial slack as the determinants of rights issue issuers is contradict to the past researches though the conclusion of rights issue has reconfirmed the existence of asymmetric information theory in Malaysia as well as its role in motivating firms to choose rights issue in the same way to the finding of private placements. Similarly to the previous finding it is inconclusive that free cash flow effect is related to asymmetric information theory due to limited empirical evidence. But the conclusion emphasized the domination of free cash flow effect in the issue of choosing a suitable equity financing methods that is claimed to be linked with the informational effect. Nonetheless since the influence of free cash flow to the choice of rights issue is not as proposed it is worth to note that in addition to informational effect, investment opportunities might be the another initiator.
The finding concludes high asymmetric information as the determinants of rights issue issuers found in this research is consistent with others even in Singapore. Despite this it is concluded that both free cash flow effect and asymmetric information theory is crucial in choosing equity financing method. The conclusion may possibly suggest that the need to undertake investment opportunities might be the reasons for these firms to ignore specific preference of equity financing method. Again the similarities of rules and regulation in Malaysian market and Singapore market in term of no restriction to resell do not lead to the same finding of asymmetric information theory.
The finding of overvaluation theory is supporting the suggestion that the theory has no influence over the rights issue issuer that lead to the conclusion that the impact of price run-up theory is not being fully supported in the issue of choosing equity financing method as the influence is only significant in private placement exercises. Subsequently the finding of agency cost theory suggested that the theory is not applicable in Malaysian market which reemphasized the differentiation of finding in Singapore market despite the similar rules and regulation. The finding is consistent with the suggestion that agency cost theory is not visible in a market with high ownership concentration level.
Eventually the finding indicates the influence of firm size effect towards the choice of private placement is not consistent with others inclusive the US market. Nonetheless the partial relationship of Pearson test between firm size and free cash flow effect as well as firm size and asymmetric information theory for private placements suggests domination of firm size effect to explain the determinants of private placements issuers. The partial relationship suggests that smaller firm does suffer limited financial slack and higher degree of asymmetric information though further investigation is suggested to confirm the continuation of effect to the private placement issuers as independent relationship suggested other wise. The partial relationship between asymmetric information and firm size effect as well as asymmetric information and price run-up theory for rights issue issuers suggested domination of asymmetric information theory to explain the determinants of rights issue issuers though further probing is required as the independent relationship of run-up theory is not documented.

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Table 1: Number of Corporate Proposals Received by Securities Commission of Malaysia
Source: Bank Negara Malaysia, Monthly Statistical Bulletin, 2009.

Year	Private Placement Proposals	Rights Issue Proposals
2000	29	45
2001	16	17
2002	38	24
2003	30	44
2004	56	79
2005	38	50
2006	58	21
2007	76	47

Table 2: White Heteroskedasticity Testing

	F-Statistics	Probability
Private Placements	2.458812	0.002713
Rights Issue	2.652745	0.001107

Table 3: Multicollinearity Testing

	Private Placements		Rights Issue	
	Tolerance	**VIF**	**Tolerance**	**VIF**
FCF	.906	1.103	.966	1.035
BVMV	.821	1.218	.858	1.166
CAR	.989	1.011	.895	1.117
OWNFRAC	.965	1.036	.988	1.012
FS	.777	1.287	.906	1.104

Table 4: Ramsey RESET Testing

	F-Statistics	Probability
Private Placements	2.673964	0.074582
Rights Issue	1.564560	0.214635

Table 5: Pearson Correlations

	LOGGP	FCF	BVMV	CAR	OWNFRAC	FS
LOGGP	1 {1}					
FCF	.002 {.038}	1 {1}				
BVMV	-.082 {.007}	.044 {.020}	1 {1}			
CAR	-.019 {.047}	-.031 {.010}	-.037 {.314**}	1 {1}		
OWNFRAC	.021 {-.090}	.165 {.008}	.063 {-.011}	-.045 {-.071}	1 {1}	
FS	.548** {.603**}	.228* {.171}	-.395** {-.235*}	.080 {-.108}	.052 {-.073}	1 {1}

- The figure in bracket {} is for rights issue.
- ** Correlation is significant at the 0.01 level (2-tailed).
- * Correlation is significant at the 0.05 level (2-tailed).

Table 6: Regression Analysis

Variable	Predicted Sign	Coefficient		
FCF - PPE	-	-8.67E-07	[4.04E-07]	{-2.143287}*
FCF - RI	+	-6.02E-08	[2.43E-08]	{-2.472516}*
BVMV - PPE	+	5.20E-08	[1.17E-08]	{4.433152}*
BVMV - RI	-	1.30E-07	[6.63E-08]	{1.966602}**
CAR - PPE	-	-0.019871	[0.005485]	{-3.622509}*
CAR - RI	+	1.024836	[0.682643]	{1.501277}
OWNFRAC - PPE	+	-0.003394	[0.165188]	{-0.020546}
OWNFRAC - RI	-	-0.085881	[0.191914]	{-0.447495}
FS - PPE	-	0.074229	[0.013650]	{5.437855}*
FS - RI	+	0.304948	[0.045346]	{6.724905}*
Weighted Statistics: Cross-section fixed (dummy variables)				
Constant	**6.188800**	F-statistic		14.09445
Adjusted R-squared	**0.423595**	Prob(F-statistic)		0.000000

- * Significant at 5%
- ** Significant at 10%
- Pooled EGLS method with LOGGP as the dependent variable and cross section weight
- Estimation of CAR is based on Scholes & William's market model
- The outcome of standard error is stated in []
- The outcome of t-statistic is stated in {}
- The model is corrected with White Heteroskedasticity-Consistent Standard Errors and Covariance
- The difference in constant value of equation for private placements is 0.273294 and -0.25977 for rights issue

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Effect on Security Prices and Volatility from Cross Listing within the GCC Markets

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Abstract

The literature on foreign firms listing their equity in the US is extensive. This paper extends research in this area by looking at the experience of firms engaging in cross listing across the regional GCC equity markets. Parametric tests show that on average there is a run up in prices leading up to the listing date, this however is reversed quickly in the days following the cross listing. Non parametric results generally support this conclusion. There is also weak evidence that the variability in returns experience a decline across the event period.

Key Words: Cross-Listing; GCC Markets; Event Study

I. Introduction

Effect on Security Prices and Volatility from Cross Listing within the GCC markets.

The GCC[1] (Gulf Cooperation Council States) equity markets have become an important destination for international portfolio investments by managers seeking opportunities for diversification. While still lagging behind the developed markets of the US, Europe and Japan, the local security markets within the GCC have taken important strides in improving transparency, trading practices and promoting good corporate governance of their listed companies. Economic integration has arguably been one of the most frequently stated long term objectives of the GCC states, structured along the lines of the European union and perhaps one day culminating in a common currency. This paper investigates one dimension of this integration by looking at the effects of cross listing of stocks within the Council states. Since the objective of the paper is confined to cross listing within the GCC the analysis does not consider instances where firms have chosen to issue ADRs (American Depositary Receipts) in the US or GDRs (Global Depositary Receipts) in London or other international markets.

Cross listing a stock is not an inexpensive exercise for the firm, there are considerable costs involved, which include conforming to (in most cases) more stringent disclosure requirements, the need for greater transparency, being subjected to greater scrutiny by a larger body of well informed analysts, and the direct administrative, legal and investment banker costs. What are the counterbalancing benefits that offset these costs? Many sources of value are identified in the literature, all of these however collapse into one measureable benefit – the potential to lower the cost of capital for the firm and hence enhance firm value. Amongst other factors, a lower cost of capital stems from one or more of the following : International listing may serve to overcome the limitations of segmented national markets (Doukas and Switzer [2000]), equalizing rates of return for similar risk securities (Errunza and Miller [2003]), cross listing may be expected to increase liquidity resulting from a larger base of potential investors, and greater analyst coverage could lead to raised visibility both in the domestic and international markets, (Baker and Weaver [2002]). Stultz [1999] has also argued that cross listing could lead to improved corporate governance systems and enhanced protection for minority holders by managers "bonding" themselves to an extended legal and regulatory framework. There is a large body of literature on international cross listing, particularly focused on non US firms choosing to list in the US. The higher degree of disclosure requirements in the US provides firms the ability to signal their quality to investors by voluntarily choosing to adhere to the stringent US standards, (Bailey et al [2006]). Karolyi [1998 & 2006], provides a comprehensive coverage of these and other issues related to cross listing.

Much less attention has been directed at cross listing within regional markets. This study specifically looks at the experience of companies within the Gulf that have chosen to cross

[1] The Gulf Cooperation Council states consist of Saudi Arabia, Kuwait, UAE, Bahrain, Qatar, and Oman.

list within the GCC region. This regional market with a combined market capitalization of $680 billion as on December 2009, boasts eight stock exchanges which include Bahrain, Saudi Arabia, Kuwait, Abu Dhabi, Dubai, Doha and Muscat. As far as we know there have been no studies that have looked at the experience of cross listing in this important regional market. Academic literature on the Middle Eastern markets mostly has focused on efficiency of prices (Abraham et al [2002]), (Omran & Gunduz [2001]). Issues relating to market integration and dynamic relationship between the GCC stock markets are explored in Darrat et al [2000] and Hammoudeh & Aleisa [2004]. Bley and Chen [2006] provide a good overview of the GCC stock markets with historical details of the evolution of these markets.

The decision by a firm to cross list within the GCC markets may seem surprising, given that a GCC resident in one state is permitted to freely invest in any of the securities listed on the other exchanges. However there are subtle differences between the different markets when it comes to international recognition. Dubai and Abu Dhabi are by far the more popular destinations for international investors by virtue of the concerted efforts made to simplify, streamline and encourage international participation. Although a smaller market, Bahrain has stepped up its effort to be an international financial center in the Middle East. Saudi Arabia on the other hand until recently prohibited any international participation. (Since 2009, international investors may purchase Saudi stocks through a local custodial arrangement). All the cross listing that have occurred in the region are therefore either in Dubai, Abu Dhabi, or Bahrain. For instance the Qatari firm, Qatar Telecom, chose Abu Dhabi to enhance its international investor base.

The predominant share of cross listing studies address the effect on share prices around the listing date using a standard event study methodology and have been directed at international firms listing in the US and vice versa. Two studies deserve special mention in their comprehensive coverage: Miller [1999] and Foerster & Karolyi [1999]. Both find that there is a positive abnormal return around the event day, particularly so for firms from the emerging markets listing in the US. Interestingly enough, the Foerster & Karolyi [1999] found that the run up of prices up to the event date is followed by average declines during the post event period.

In this paper we extend these studies by applying the event study methodology to cross listing of firms within the GCC markets, providing an important empirical contribution to the international cross listing literature. A number of papers have looked at changes in post cross listing risk. The evidence seems to suggest that US firms listing abroad generally experience little or no change in volatility, if anything their beta's tend to marginally increase. For foreign firms listing in the US, research shows a significant decrease in local market betas with little or no change in US market betas, Foerster & Karolyi [1993] and Jayaraman et al [1993]. In the current study we examine the relative change in local market volatility for different reference windows using an univariate GARCH representation. This approach is more likely to capture the time varying nature of volatility resulting from the cross listing exercise. The paper is organized as follows: Section I describes the data and methodology used, section II discusses the results, and section III concludes.

II. **Data and Methodological Issues**.

The sample consisted of 31 companies that cross listed within the GCC states for the period May 2002 to Jan 2010. Of these, two firms had to be discarded because of insufficient or inaccurate data on prices that spanned the event window, this left a final sample of 29 firms. Table I below summarizes the primary listing market and the cross listed destination market.

Table I. Distribution of Firms by Primary and Cross listed Markets.

No. of Firms	Primary Market	Destination Market
6	Kuwait	Dubai
14	Kuwait	Abu Dhabi
1	Kuwait	Bahrain
1	Qatar	Abu Dhabi
1	Oman	Abu Dhabi
1	Oman	Bahrain
3	Bahrain	Kuwait
1	Bahrain	Dubai
1	Bahrain	Abu Dhabi

As can be seen, the majority of firms are from Kuwait wishing to list on the more high profile Abu Dhabi and Dubai markets. Saudi Arabia is conspicuously missing, as a result of its domestic policy that prohibits local firms from listing abroad.

There are no reliable data sources to accurately determine the exact date when the cross listing decision is first mooted and disseminated to the market. We therefore chose to err on the side of the more reliable date by using the listing date as the event day. The event window was defined as ±20 days of the event date. Closing prices were collected from -240 days to +120 days of the listing date. The estimation period for the event study is therefore -240 days to -21 days relative to the event date.

The methodology used in the study follows the standard event study used in the literature. Abnormal returns are computed for the event window based on parameters estimated for the market model from the estimation period. Parametric tests in the literature have followed the developments that have taken place from the seminal works of Ball & Brown [1968], Patell [1976], and Ball & Brown[1980]. The methodology used in this paper closely mirrors the Ball & Brown [1980] approach but is modified to account for event induced variance as in Boehmer, Musumeci, and Poulsen [1991] (BMP). Brief details are provided below for reference. The notation follows BMP.

Security abnormal returns are defined as: $A_{i,t} = R_{i,t} - (\alpha_i + \beta_i R_{m,t})$ with the notations referring to the standard market index model.

Cumulative average abnormal returns (CAR) are computed by aggregating the abnormal returns over the relevant time horizon and then averaging over the security sample..

To compute the test statistic, we first compute each securities' standardized residual (SR), where $\hat{s}$ is the standard deviation of abnormal returns during the estimation period.

$$SR_{i,t} = A_{i,t} \Big/ \hat{s}_i \sqrt{1 + \frac{1}{T} + \frac{(R_{m,t} - \bar{R}_m)^2}{\sum_{j=1}^{T}(R_{m,j} - \bar{R}_m)^2}}$$

The standardized residuals are then averaged over the security sample and corrected for event induced variance.

$$SAR_t = \frac{1}{N}\sum_{i=1}^{N} SR_{i,t} \Big/ \sqrt{\frac{1}{N(N-1)}\sum_{i=1}^{N}\left(SR_{i,t} - \sum_{i=1}^{N}\frac{SR_{i,t}}{N}\right)^2}$$

Finally the test statistic for the CAR is computed as

$$\frac{1}{\sqrt{\tau}}\sum_{t=1}^{\tau} SAR_t$$

Where τ is the period over which the CAR is computed

The parametric tests described above are clearly dependent on the assumed normality of returns. Corrado [1989] propose an alternate non parametric rank test to examine abnormal event returns when departures from normality are of concern. The test begins by ranking abnormal returns over the estimation and event period and then uses the following test statistic for a given event date t. The expected rank for firm "i" is given by $\bar{R}_i = (T/2 + 0.5)$, T being the total number of days including the estimation period.

$$RStat_t = \frac{\frac{1}{N}\sum_{i=1}^{N}(R_{it} - \bar{R}_i)}{\hat{s}_R}$$

Where, $\hat{s}_R = \sqrt{\frac{1}{T}\sum_{t=1}^{T}\frac{1}{N^2}\sum_{j=1}^{N}\left(R_{jt} - \bar{R}_j\right)^2}$

For τ day multi periods, the rank statistic computed below is unit normal.

$$RStat_\tau = \frac{\sum_{t=1}^{\tau}\frac{1}{N}\sum_{i=1}^{N}(R_{it} - \bar{R}_i)}{\hat{s}_R\sqrt{\tau}}$$

III. Results and Discussion.

Table II provides some summary measures on the average returns and average abnormal returns for the 29 firms computed over the estimation period. As can be seen, the abnormal return series departs significantly from normality as measured by the Jarque Bera statistic.

Table II. Summary Measures – Daily returns and Abnormal returns.

	Return %	Abnormal Return %
Mean	0.052	-0.034
Median	0.048	-0.067
Maximum	1.729	4.495
Minimum	-1.278	-4.271
Std. Dev.	0.495	0.953
Skewness	0.081	0.200
Kurtosis	3.049	6.928
Jarque-Bera	0.433	233.862
Probability	0.805	0.000

Cumulative abnormal returns shown in table III, computed for various length windows that span the event date show no significant differences from zero, although in terms of signs the longer windows show negative abnormal returns while the shorter windows show positive abnormal returns. One therefore concludes that the cross listing has no effect on returns or that there may perhaps be non symmetric effects before and after the listing dates that tend to cancel out.

Table III. Cumulative abnormal returns around listing date

	CAR	Test Stat
Window		
-20 to +20	-2.5373	-1.0139
-10 to +10	-0.2964	-0.3841
-5 to +5	1.3627	1.0838
-2 to +2	0.5603	0.7425

To test for this, the cumulative abnormal returns were disaggregated for pre event vs. post event windows and are shown in table IV below.

Table IV. Pre event vs. Post event abnormal returns

Pre event	CAR	Test Stat
-20 to -1	1.4383	0.7843
-10 to -1	1.3696	0.7066
-5 to -1	2.0572	2.0249*
-2 to -1	0.9411	1.3831
Post event		
0 to +20	-3.9756	-2.1821*
0 to +10	-1.6660	-1.2044
0 to +5	-0.6944	-0.3810
0 to +2	-0.3808	-0.1708
*Significant at the 5% level		

Interestingly, there is a positive run up in values prior to the cross listing date – all the pre event windows show positive abnormal returns – however a significant positive effect is seen only within a five day period prior to the event. Much of this run up in prices are however eroded post event, with all abnormal returns showing negative values after the listing date. By about 20 days after the cross listing, one sees a significant negative cumulative abnormal return, negating any gains that accrued prior to the cross listing event.

It is evident from table 1 that the abnormal returns exhibit significant departures from normality, diluting the results from the parametric tests above. To examine the effects of the cross listing, we also conduct non parametric rank tests as shown in section 2. Table V shows the average deviation in ranks (ADR) of abnormal returns and the associated rank test statistic.

Table V. Abnormal return rank test around the listing date

	ADR	Test Stat
Window		
-20 to +20	-29.9310	-0.3382
-10 to +10	7.0345	0.1111
-5 to +5	59.4828	1.2977
-2 to +2	19.3793	0.6271

The deviation in ranks from the expected rank under the null of no effect cannot be rejected for any of the intervals, implying that when the pre event and the post event is considered together, cross listing does not lead to any material effect on security prices. To see whether

the pre event period experience differs from the post event period the test was repeated for the different sub periods, and is shown in table VI.

Table VI. Pre event vs. Post event abnormal return rank test.

Pre event	ADR	Test Stat
-20 to -1	51.3793	0.2597
-10 to -1	29.8621	0.6833
-5 to -1	59.2069	1.9159*
-2 to -1	26.2414	0.8492
Post event		
0 to +20	-81.3103	-1.2839
0 to +10	-22.8276	-0.4980
0 to +5	0.2759	0.0081
0 to +2	-6.8621	-0.2867
*Significant at the 10% level		

Again, none of the intervals show a significant listing effect, except for the immediate 5 day interval prior to the event date. However the results here are broadly consistent with the parametric results from table IV, where the abnormal returns are generally positive before the listing date, with these gains then being dissipated during the post listing period. The evidence presented here are also in line with those reported in Foerster and Karolyi [1999], with a 10% pre listing run up of abnormal returns for ADRs in the US, followed by an average 9% post listing decline.

Finally we also look at changes in volatility with respect to post listing. We have chosen to use a GARCH representation[2] to pick up possible time varying volatility that may be present due to the cross listing. From table VII it can be seen that although not statistically significant, volatility generally tends to decline over the event period in magnitude terms.

Table VII. Cross listing induced changes in volatility

	Average Variance*	Variance Ratio**	5% Critical	10% Critical
Preevent < -20	0.243			
Event -20 to +20	0.231	1.049	1.539	1.398
Event -10 to +10	0.228	1.065	1.842	1.607
Event -5 to +5	0.232	1.044	2.429	1.987
Post event >+20	0.225	1.079	1.337	1.254
*Average one period ahead forecast variance				
**Ratio relative to the pre event average variance				

IV. **Conclusion**.

In this paper we have examined the effect of regional GCC cross listing on equity prices. Much of the earlier research in this area has focused on foreign firms listing in the US or US firms listing in overseas markets. The results from this paper therefore extends the cross listing literature for small emerging regional markets. As argued by Stultz [1999], the objective to cross list is driven by the desire to lower the cost of capital, which results not only from the earlier belief of reducing segmented market barriers but also from a variety of

[2] We use a low order GARCH(1,1) model: $\sigma_t^2 = \alpha + \beta\epsilon_{t-1}^2 + \gamma\sigma_{t-1}^2$

other related corporate governance issues. These include improvements in its corporate governance system, better and more effective protection of minority shareholders stemming from the required adherence to an extended legal framework, and greater transparency which lowers monitoring costs.

The event study methodology employed in this paper shows that there is a positive run up in prices just prior to the cross listing date. However these gains are quickly eroded in the days following the cross listing. This pattern is consistent with the results reported in the literature of foreign firms listing in the US. Results are based on both parametric and non parametric test statistics. The non parametric results, although not statistically significant, is weakly consistent with the conclusion of the parametric tests. Finally, there is weak evidence that the variability of returns decreases, going from the pre event period to the post event period.

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Cash Flow-Investment Sensitivity for Manufacturing Firms in America, Japan and Taiwan

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Abstract

This essay is to research internal and external cash flow - investment sensitivity for manufacturing industry in America, Japan and Taiwan in 1997 to 2007. Result of the research demonstrates that, among the three countries, the manufacturing industry in America has the highest cash flow-investment sensitivity, and is the only one which invests debt and stocks as sources of finance into R&D; manufacturing industry in Taiwan has the highest cash flow-physical investment sensitivity, all of the three countries except America invest cash from new debts and stocks into physical investment. Only being under the condition of positive cash flow, will manufacturing firms in Japan invest in R&D and physical asset. Obviously, among the three countries, America has the largest scale of manufacturing industry and their only way to keep the leading role is to keep investing in R&D. While most manufacturing firms in Taiwan are from electronics and heavy industry and they have to focus on physical investment to enlarge their enterprise scale and develop international market.

Keywords: Cash flow, R&D, Physical investment, Debt issues, Stocks issues
JEL classification: G31, G32

I. Introduction

In history, Fazzari, Hubbard and Peterson (1988) claimed the earliest research about investment-cash flow sensitivity and found firms with higher financial restraint have relatively higher cash flow-investment sensitivity. However, Kaplan and Zingales (1997) put forward different opinions. Their research adopted the Fazzari et al.(1988) sample, but found firms with lower financial restraint have relativily higher investment-cash flow sensitivity (Alti,2003 ; Cleary, 2006 ; Agca and Mozumdar, 2008). The follow-up researches on investment-cash flow sensitivity employ various methods to replace financial restraint, in order to investigate cash flow-investment sensitivity. The latest research was made by Brown and Petersen (2009), investigating manufacturing firm in America in the period from 1970 to 2006, and found that cash flow-R&D sensitivity was the highest in 1970 to 2006; cash flow-gross investment sensitivity was relatively low but still existed and cash flow-capital spending sensitivity did not exist.

The fact is, the previous researches merely focused on English-speaking countries, but seldom on Asian countries. Organization for Economic Cooperation and Development (OECD) pointed out that, calculated in international exchange rate, GDP of Japan was ranked only second to America. Moreover, Japan is an insularity, which occupies scarce natural resources and abundant timber resources, so Japan is not a suitable land for farming and industrialized at an early age. Taiwan is the fifteenth major economy across the country, with its GDP ranked the nineteenth all over the world in 2008 and over half of its industries as service industry and high-tech industry, as well as its international powerful electronic industry, therefore, this research will discuss the differences among America, Japan and Taiwan, concerning internal and external (including new debt issues and stocks issues) cash flow-investment sensitivity, in order to be helpful to investors.

The result of this research reveals that, among the three countries, America has the biggest scale of manufacturing industry, and the highest cash flow-R&D sensitivity. Manufacturing firms in Japan will invest in R&D and physical asset only under positive cash flow. Manufacturing firms in Taiwan has the highest cash flow-physical investment sensitivity. Obviously, manufacturing firms in America incline to invest internal and external funds into R&D, while their counterparts in Taiwan incline to invest into physical asset. Thus it can be seen that, among the three countries, America has the largest scale of manufacturing industry. The only way to keep the leading role is to keep investing in R&D. While most manufacturing firms in Taiwan are from electronics and heavy industry, and they have to focus on physical investment to enlarge their firm scale and develop international market.

II. Literature Review

II.1 Cash Flow and Physical Investment

The first research about cash flow-investment sensitivity in record was made by Fazzari et al.(1988), targeting on manufacturing firms in America during the period from 1970 to 1984, and revealed that the stronger financial restraint was, the higher cash flow-investment sensitivity was. However, Kaplan and Zingales (1997) claimed different opinions. Their research adopted the Fazzari et al.(1988) sample, but found firms with lower financial restraint have relativily higher investment-cash flow sensitivity. Moyen (2004) established two models to investigate the reason of conflict between Fazzari et al. (1988) and Kaplan and Zingales (1997). Moyen (2004) found that the research result was in conformity with that of Fazzari et al. (1988) when judging whether financial restraint existed by the level of payout ratio, but met the conclusion of Kaplan and¬¬¬¬¬ Zingales (1997) when investigating respectively by financial restraint models.

Using samples resembling Fazzari et al. (1988), which being adopted data of manufacturing firms in America from 1969 to 1984, Alti (2003) found that young companies with no financial restraint and companies with lower payout ratio have higher cash flow-investment sensitivity. Cleary (2006) targeted on the world's biggest economies: Australia, Canada, France, Germany, Japan, the UK and the US, and found companies in larger scale and higher allomen t of shares have relatively higher cash flow-investment sensitivity. Ascioglu, Hegde and McDermott (2008) studied 1224 firms with over 10 billion capital amount in the year 2000 from S&P 1500 Index, and revealed information asymmetry would cause higher cash flow-investment sensitivity. Agca and Mozumdar (2008) made a research on manufacturing firms in America from 1970 to 2001, and got the result that decreasing the imperfection of capital market could lower the investment-cash flow sensitivity.

While the 7, 176 American companies in the period from 1985 to 2003 studied by Hovakimian and Hovakimian(2009) showed a lower sensitivity of low cash flow-investment, and higher sensitivity of high cash flow-investment. Therefore, financial restraint will influence the investment strategy of a company and its cash flow-investment sensitivity, but in order to enlarge firm scale and enforce competitive power, a company has to increase physical investment when capital is affluent. On the contrary, when running short of cash, investment will tend to be conservative and physical investment will be reduced.

II.2 Cash Flow and R&D

In the past, many scholars took the opinion that R&D could upgrade firm value. Szewczyk, Tsetsekos and Zantout (1996) researched the American listed companies from 1979 to 1992, and found a positive correlation between R&D and abnormal returns. Tubbs (2007) limited the research in the period from 1974 to 2001 and demonstrated that increasing R&D would lead to the improvement of production capability and service, and therefore inrease sales. Furthermore, significant abnormal returns will pay to companies that keep adding R&D for continuous five years. A study by Pyykkö (2009) showed that, in Europe, the acquired companies will increase their stock values via R&D.

Accordingly, this study takes the view that investment in R&D can not only increase company value, but also strengthen competitive advantages. Companies will actively invest in R&D when having relatively affluent funds; in contrast, companies will reduce expenditure on R&D when finance is tight. Nonetheless, Brown and Petersen (2009) claimed, total investment consists of R&D and physical investment is the best combination for investment. Consequently, this research divides cash flow into positive cash flow and negative cash flow, while the former represents conditions with affluent cash, and the latter represents conditions with tight finance. And this research analyses sensitivity of cash flow-R&D, and sensitivity of cash flow- physical investment respectively.

II. 3 **External Fund and Investment**

Lyandres (2007) investigated American Companies in the period of 1951 to 2005, and got a conclusion that cost of external funds influenced investment-cash flow sensitivity. Ogawa (2007) studied the influence of new debt issues on R&D among Japanese manufacturing firms in the 1990's, and found a negative correlation between new debt issues and R&D. Ovtchinnikov and McConnell (2009) claimed that sensitivity of stock value and investment will be influenced by debt and tight finance. In addition, a healthy capital market can improve capital and help companies to gather funds of positive net present value. Baum, Caglayan and Talavera (2010) researched on American manufacturing companies in the period of 1988 to 2005 and found that debt would be produced because of the uncertain change in market, and therefore influence capital spending. All of the above researchers found that new debt issues and stock issues have influences on investment. Taking American manufacturing companies during the period of 1979 to 1996 as samples, Bhagat, Moyen and Inchul (2005) investigated their financial conditions under financial difficulties, and found poor managed companies would try to survive by external funds gathered through speculation on stocks. Whereas, this research deems that companies will probably use external funds to fill up financing gap under negative cash flow, and thus leads to relatively lower sensitivity; while companies will probably use external funds for investment under positive cash flow, and therefore leads to a relatively higher sensitivity.

III. Methodology

III.1. **Sample Selection**

This research takes manufacturing firms in America, Japan and Taiwan (SIC codes 2000-3999) as samples, and the sample period lasts from 1997 to 2007. The material resources are Compustat and Compustat_Global. The following materials are deleted from this research: manufacturing firms not listed; manufacturing firms miss materials about R&D and capital spending for over three years; abnormal values when R&D and capital spending are negative; and outliers as 1% of regression value.

As a result, this research employs 3196 American manufacturing firms in total, deletes 1530 firms with missing materials for over three years, 8 firms with abnormal values and 32 firms with outliers, finally adopts 1626 firms as samples. And 1687 Japanese manufacturing firms in total are gathered, among which 458 firms with missing materials for over three years, 4 firms with abnormal values and 17 firms with outliers are deleted, and therefore 1216 firms are taken as samples. Moreover, 929 Taiwanese manufacturing firms are collected, among which 832 firms with missing materials for over three years and 9 firms with outliers are deleted, and consequently adopted 88 firms as samples. The sample forms are in time series, and the sample selection process is demonstrated in Table 1.

III.2 **Model Design and Variable Measurement**

Adopting ordinary least square method (OLS), this research firstly detects cash flow-physical investment sensitivity, cash flow- R&D sensitivity for manufacturing firms in America, Japan and Taiwan. Then, this essay analyses, external funds (debts and stocks)- physical investment sensitivity and external funds-R&D sensitivity. To control differences of firm sizes, all variables are scaled by beginning of-period total assets (TA). This essay employs the method of La Porta, Lopez-de-Silanes and Vishny (2002) to calculate Tobin's Q. The higher the Q value is, the greater chance for further development, the higher firm value is. Table 2 is the definition and scale for model variable. All materials adopt time series and build up the following models:

$$(CAP/TA)it=\beta1(CAP/TA)it\text{-}1 + \beta2(NCF/TA)\, i,t +\beta3(Q)it\text{-}1 +\beta4(DBT/TA)it +\beta5(STK/TA)it+dt+\alpha i+vi,t \quad (1)$$

$$(CAP/TA)it=\beta1(CAP/TA)it\text{-}1 + \beta2(PCF/TA)\, i,t +\beta3(Q)it\text{-}1 +\beta4(DBT/TA)it +\beta5(STK/TA)it+dt+\alpha i+vi,t \quad (2)$$

$$(R\&D/TA)it=\beta1(R\&D/TA)it\text{-}1 + \beta2(PCF/TA)\, i,t + \beta3(Q)it\text{-}1 + \beta4(DBT/TA)it + \beta5(STK/TA)it + dt + \alpha i + vi,t \quad (3)$$

$$(R\&D/TA)it=\beta1(R\&D/TA)it\text{-}1 + \beta2(PCF/TA)\, i,t + \beta3(Q)it\text{-}1 + \beta4(DBT/TA)it + \beta5(STK/TA)it + dt + \alpha i + vi,t \quad (4)$$

IV. Results

Table 3 demonstrates 17,886 narrative statistics of variables concerning the American manufacturing firms, 13,376 concerning the Japanese manufacturing firms, and 968 concerning the Taiwanese manufacturing firms during the period from 1997 to 2007. The mean value of total assets (Assets) of manufacturing firms in America, Japan and Taiwan are 4091.108 billion, 1627.957 billion and 1.4907 billion respectively. It shows that the American manufacturing industry is of the largest scale, and Japanese is the second. The mean value of R&D to total assets in American, Japanese and Taiwanese manufacturing firms are 0.178197, 0.022881 and 0.019671 respectively, which shows that the American manufacturing industry invests the most in R&D, while the Japanese is the second, and Taiwanese is the least. The mean value of physical investment (CAP) to total assets in American, Japanese and Taiwanese manufacturing firms respectively are 0.044733, 0.037873 and 0.061066. We can see that the Taiwanese manufacturing industry has the highest physical investment, being followed by the American, while the Japanese has the lowest.

The mean value of the ratio of gross cash flow (GCF) to total assets in American Japanese and Taiwanese manufacturing firms respectively are -0.13301, 0.074018 and 0.053874. It shows that the American manufacturing industry is under negative cash flow, while the Japanese and Taiwanese are under positive cash flow. The mean value of ratio of DBT to total assets in American, Japanese and Taiwanese manufacturing firms respectively are 0.03088, -0.00395 and 0.11195, which means that the debenture issued by the American manufacturing firms are higher than that by the Taiwanese, while the Japanese are recorded with a higher number of indebtedness. The mean value of ratio of STK to total assets in American, Japanese and Taiwanese manufacturing firms respectively are 0.116957, 0.001501 and 0.014062. It demonstrates the STK of the American manufacturing industry is higher than that of Taiwanese and Japanese.

After dividing cash flow further into negative cash flow (NCF) and positive cash flow (PCF), the mean value of negative cash flow in American, Japanese and Taiwanese manufacturing firms respectively are -0.91513, -0.06015 and -0.43613, which shows that the American manufacturing industry is under the highest negative cash flow, while the Taiwanese is the second. The mean value of positive cash flow (PCF) in American, Japanese and Taiwanese manufacturing firms respectively are 0.16261, 0.082001 and 0.10488, which shows that the American manufacturing industry has the highest positive cash flow, being followed by the Taiwanese.

Panel A in Table 4 shows that, under gross cash flow, a negative correlation (t value for -8.366733) exists between gross cash flow and physical investment in American manufacturing firms, with coefficient for -0.001858, while a positive correlation (t value for 7.757040) exists in Japanese manufacturing firms, with coefficient for 0.043785, and the factors in Taiwanese manufacturing firms are insignificant. Concerning the controlled variable, only Q value for Taiwanese manufacturing firms is in negative correlation (t value for -4.914265); all three countries display significant positive correlation in DBT and STK, which represents that under gross cash flow, all the countries will invest external funds combined of debts and newly issued stocks into physical investment. Panel B of Table 4 shows that, negative correlation （t values respectively are -5.235001 and -1.73752) exists between negative cash flow and physical investment in both America and Taiwan, with coefficients is -0.001577 and -0.002427 respectively, while the data in Japan are

insignificant. When displaying negative cash flow, Taiwanese manufacturing firms will deduct physical investment more than American, and positive correlation exists between debts and newly issued stocks, and physical investment. Under negative cash flow, external funds combined of debts and newly issued stocks will be invested into physical investment. Panel C in Table 4 shows that, with coefficients respectively are 0.126623 and 0.166171, positive correlation (t values respectively are 20.06789 and 5.931173) exists between positive cash flow and physical investment in Japanese and Taiwanese manufacturing firms, in which Japanese demonstrates a higher sensitivity than American, while the factors for American are insignificant. When displaying positive cash flow, except for newly issued stocks and physical investment in American manufacturing firms, the rest display positive correlation, which mean, under positive cash flow, except that America will not invest cash from new stocks into physical investment, all of the three countries will invest external funds combined of debts and new stocks into physical investment. This result conforms to opinions claimed by Brown and Petersen (2009).

Panel A in Table 5 shows that, positive correlation (t value for 5.964748) exists between gross cash flow and R&D in Japanese manufacturing firms, while negative correlation (t value for -2.209228) exists in Taiwanese manufacturing firms, and the factors in American manufacturing firms are insignificant. It means that Japanese manufacturing firms will invest the most gross cash flow into R&D, while Taiwanese manufacturing firms will reduce R&D. Panel B in Table 5 shows that, negative correlation (t value for -5.035535) exists between negative cash flow and R&D in Japanese manufacturing firms, with coefficient of -0.017184, while that factor in American and Taiwanese manufacturing firms is insignificant. It means that when displaying negative cash flow, Japanese manufacturing firms will tighten R&D. Panel C in Table 5 shows that, positive correlation (t values respectively are 15.94211, 14.79481 and 3.979810) exists between positive cash flow and R&D in manufacturing firms from America, Japan and Taiwan, with coefficients respectively are 0.155853, 0.027863 and 0.035304. It reveals that the investment of positive cash flow into R&D by American manufacturing firms is the highest among the three countries. Regarding the controlled variables in Panel A, B and C, Q is in significant positive correlation (t value for 2.006135) only in Taiwanese manufacturing firms, while Q is insignificant in America and Japan. Considering controlled variables of external debts and newly issued stocks, positive correlation exists between debts and R&D, as well as newly issued stocks and R&D in American manufacturing firms. The phenomenon shows that the American manufacturing firms will invest funds gathered from both debts and newly issued stocks into R&D, under conditions of gross, positive or negative cash flow. Except for insignificant negative cash flow, Japanese manufacturing firms display a negative correlation exists between debts and R&D, as well as newly issued stocks and R&D, which reveals that Japanese manufacturing firms will not invest funds, gathered from debts and newly issued stocks into R&D. Only under gross cash flow and positive cash flow, will Taiwanese manufacturing firms display a negative correlation between newly issued stocks and R&D. It means that Taiwanese manufacturing firms will not invest funds gathered from newly issued stocks into R&D. Therefore, among the three countries, America is the only country which invests funds from debts and newly issued stocks into R&D.

The adjusted R2 in Table 4 and 5 fluctuates between 38%~92%, which displays the excellent interpretability of this study model. Through Table 4 and 5, it shows that under positive cash flow, investment into R&D from the American manufacturing firms is the highest among the three countries. However, America is also the country which makes the highest deduction in R&D when under negative cash flow. Manufacturing firms in Japan will invest in R&D, as well as physical investment, only under the condition of positive cash flow. While manufacturing firms from Taiwan invest the most into physical investment when having

positive cash flow, and execute the highest deduction in this part when having negative cash flow. Considering external funds, except that America will not invest cash from new stocks into physical investment, all of the three countries will invest cash from debts and new stocks into physical investment. While among the three countries, America is the only country which invest funds gathered from debts and new stocks into R&D.

Conclusion

This research investigates internal and external cash flow-investment sensitivity for manufacturing firms in America, Japan and Taiwan, focusing on the period from 1997 to 2007, and analyses differences in three countries. The results demonstrate that, under positive cash flow, investment into R&D from the American manufacturing firms is the highest among the three countries. However, America is also the country makes the highest deduction in R&D when under negative cash flow. Manufacturing firms in Japan will invest in R&D, as well as physical investment, only under the condition of positive cash flow. While manufacturing firms from Taiwan invest the most into physical investment when having positive cash flow, and execute the highest deduction in this part when having negative cash flow. Considering external funds, except that America will not invest cash from new stocks into physical investment, all of the three countries will invest cash from debts and new stocks into physical investment. Among the three countries, America is the only country will invest funds gathered from debts and new stocks into R&D.

Obviously, manufacturing firms in America value R&D, while manufacturing firms in Taiwan treasure physical investment. The reason for American manufacturing firms value R&D lies on the ground that creativity produced by R&D can not only strengthen production capability, improve product quality and lower cost, but the intellectual property produced can also harvest option premium. Furthermore, it is common to apply for loans in America, where R&D fund for investment loans established by the state are available in lower-than-market interest for qualified companies. Manufacturing firms in Taiwan value physical investment for the reason that physical investment can obtain lower loan interest, while investing into R&D, firms have to get guarantee fund before applying for credit guarantee fund, whose interest is appreciably higher than physical investment. Therefore, manufacturing firms in Taiwan incline to invest cash flow into physical investment. Obviously, among the three countries, America has the largest scale of manufacturing industry. The only way to keep the leading role is to keep investing in R&D. While most manufacturing firms in Taiwan are from electronics and heavy industry, and they have to focus on physical investment to enlarge their firm scale and develop international market.

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Table 1 Sample Selection Process

American manufacturing firms	observations
manufacturing firms in America over 1997-2007 (SIC codes 2000-3999)	3196
missing R&D, capital spending and total assets for over three years	(1530)
abnormal values (R&D and capital spending observations are negative)	(8)
outliers	(32)
total	1626
Japanese manufacturing firms	
manufacturing firms in Japan over 1997-2007 (SIC codes 2000-3999)	1687
missing R&D, capital spending and total assets for over three years	(458)
abnormal values (R&D and capital spending observations are negative)	(4)
outliers	(17)
Total	1216
Taiwanese manufacturing firms	
manufacturing firms in Taiwan over 1997-2007 (SIC codes 2000-3999)	929
missing R&D, capital spending and total assets for over three years	(832)
outliers	(9)
total	88

Table 2 Variable Measurement

Code	Name	Measurement
CAP/TA	Capital spending	Compustat data 46
R&D	Research & development	Compustat data 128
PCF/TA	Positive cash flow	after-tax income before extraordinary items plus R&D and depreciation
NCF/TA	Negative cash flow	after-tax income before extraordinary items plus R&D and depreciation
Q	Tobin's Q	(book value of total assets - book value of equity - deferred inc tax + market value of common stock) / book value of total assets
DBT/TA	Net new long-term debt	Issuance of long-term debt – buyback of treasury stocks
STK/TA	Net new stock issues	Issuance of preferred stocks and common stocks – Treasury stocks
d_t	year fixed effects	Control for year fixed effects
α_i	Specific effect	a firm specific effect thatcontrol for all time-invariant determinates of R&I the firm level
$\nu_{i,t}$	Error term	a random error term
TA	Total assets	Compustat data 6

Table 3 Summary descriptive for manufacturing firms in America, Japan, and Taiwan

Variable		America	Japan	Taiwan
$Assets_t$	Mean	4091.108	1627.957	1.490777
	Median	129.31	444.25	0.592697
$(R\&D/TA)_{,t}$	Mean	0.178197	0.022881	0.019671
	Median	0.066176	0.016328	0.013139
$(CAP/TA)_t$	Mean	0.044733	0.037873	0.061066
	Median	0.031103	0.03041	0.041903
$(GCF/TA)_t$	Mean	-0.13301	0.074018	0.053874
	Median	0.101495	0.072622	0.085858
Q_{t-1}	Mean	4.395917	6.299945	0.436231
	Median	1.909248	4.428669	0.470992
$(DBT/TA)_t$	Mean	0.03088	-0.00395	0.11195
	Median	0	-0.00077	0.087271

$(STK/TA)_t$	Mean	0.116957	0.001501	0.014062
	Median	0.002214	0	0
NCF	Mean	-0.91513	-0.06015	-0.43613
	Median	-0.20422	-0.03096	-0.03189
PCF	Mean	0.16261	0.082001	0.10488
	Median	0.13812	0.075857	0.094176
Observations		17886	13376	968

Table 4 OLS estimates of the cash flow - physical investment Sensitivity

	America	t-value	Japan	t-value	Taiwan	t-value
Panel A : all firms						
Q_{t-1}	2.44E-06	0.125191	6.63E-06	1.368257	0.078748	-4.914265***
$(GCF/TA)_t$	-0.001858	-8.366733***	0.043785	7.757040***	-0.001711	-1.227828
$(DBT/TA)_t$	0.007567	7.010897***	0.061069	11.52882***	0.078748	4.615799***
$(STK/TA)_t$	0.002916	2.859127***	0.045414	4.784612***	0.168871	4.975452***
Observations	11811		8484		874	
Adj.R^2	0.362289		0.567094		0.354161	
Panel B : NCF firms						
Q_{t-1}	-6.93E-05	-2.692639***	0.000721	4.428360***	-0.056615	-1.643280
(NCF/TA)t	-0.001577	-5.235001***	0.004260	0.483280	-0.002427	-1.737528*
DBT/TA	0.006193	4.024205**	-0.014135	-1.097268	0.107894	1.782857*
$(STK/TA)_t$	0.002508	1.863616*	-0.007403	-0.655533	0.159538	1.861050*
Observations	3099		478		84	
Adj.R^2	0.148439		0.304921		0.307371	
Panel C : PCF firms						
Q_{t-1}	0.000457	4.283602***	1.92E-06	0.370554	-0.029688	-3.121541***
$(PCF/TA)_t$	0.003177	1.597061	0.126623	20.06789***	0.166171	5.931173***
DBT/TA	0.008118	2.997290***	0.073092	11.99804***	0.103226	5.737900***
$(STK/TA)_t$	-0.012606	-4.566889***	0.067879	5.768129***	0.178232	4.919816***
Observations	8712		7851		790	
Adj.R^2	0.396024		0.459454		0.375828	

*, **, ***Significant at the 10%, 5%, and 1% levels, respectively.

Table 5 OLS estimates of the cash flow - R&D sensitivity

	America	t-value	Japan	t-value	Taiwan	t-value
Panel A : all firms						
Q_{t-1}	0.000176	0.914191	1.21E-06	0.857779	0.007664	2.006135***
$(GCF/TA)_t$	0.002214	1.027818	0.007651	5.964748***	-0.018869	-2.209228***
$(DBT/TA)_t$	0.277085	26.17764***	-0.006428	-4.300176***	-0.020483	-2.705033***
$(STK/TA)_t$	0.207560	20.65692***	-0.015202	-6.683147***	-0.019786	-2.020476***
Observations	11873		8979		569	
Adj.R^2	0.437092		0.912005		0.751916	

Panel B : NCF firms						
Q_{t-1}	0.000368	1.144061	3.57E-05	0.558234	0.007652	0.241240
(NCF/TA)t	0.004701	1.288119	-0.017184	-5.035535***	-0.036052	-0.643627
$(DBT/TA)_t$	0.299610	15.52137***	0.004485	0.905057	0.026273	0.653669
$(STK/TA)_t$	0.255435	15.20639***	-0.023033	-5.184902***	-0.034173	-0.665737
Observations	3106		508		32	
Adj.R^2	0.329422		0.837368		0.565456	
Panel C : PCF firms						
Q_{t-1}	-0.000329	-0.716966	2.49E-07	0.179876	0.005079	1.589690
$(PCF/TA)_t$	0.155853	15.94211***	0.027863	14.79481***	0.035304	3.979810***
$(DBT/TA)_t$	0.414456	35.50291***	-0.007177	-4.530682***	-0.006321	-1.140086
$(STK/TA)_t$	0.244284	19.39484***	-0.022661	-7.637182***	-0.050489	-4.474260***
Observations	8767		8310		537	
Adj.R^2	0.379344		0.916072		0.644028	

*, **, ***Significant at the 10%, 5%, and 1% levels, respectively

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Determinants of the 'Decision to Finance' in Micro Finance Institutions

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Abstract

The objective of this paper is to identify the factors that explain credit rationing by micro-finance institutions. The results of a Logit model test on our emerging market Tunisian data indicate that the absence of a "Guarantor" constitutes the main obstacle to access to credit. In rebuilding the economy of Tunisia it is clear that long-term relationships will increase applicant chances of access, while the 'sector of activity' hasn't (historically) had any impact on the micro finance decision. Finally, we find no evidence of discrimination against the poor - while women benefit from positive discrimination.

KEY-WORDS: micro-finance, credit rationing, micro-finance long-term relationship.

I. Introduction

Micro-finance is lauded as a new instrument to reach and facilitate micro-entrepreneurs who do not have access to traditional financial products, given the hype it is remarkable that the volume of financial intermediation has not met expectations [Claessens: 2006; Christen et al. 2004; Honohan: 2004]. The exclusion of the majority of micro-entrepreneurs from the services of Micro-Finance Institutions (MFI) is due, not only to self-exclusion, but also to problems of credit's rationing by the MFI [Claessens: 2006; Honohan: 2005; Kempson et al. : 2000; Morduch: 1999a; and Baydas et al. : 1994]. This rationing stems in part from the unbalance between the offer and the demand of credit and in part from the inability of the mechanism of price to balance the market of credit [Stiglitz and Weiss: 1981].

In Tunisia, Mejdoub and Mamoghli (2009) estimated that the rate of penetration of the MFI, that have the status of "local development associations"[3], would not exceed 25% of eligible micro-entrepreneurs. This rate is very worrying considering the effort conducted by the new government to reach the maximum population in the remote areas. This historically low rate could be explained by the rationing of credit. In fact, Coleman (2006), Honohan (2005), Morduch (2000), Mosley (2001), Amin et al. (1999), Evans et al. (1999) and Buvinic et Berger (1990) all show that eligible micro-entrepreneurs are suffering from loan rationing by MFIs. Therefore, the objective of this research is to investigate the factors underpinning the rationing of credit pursued by the MFIs – and where possible contextualize this in the Tunisian emerging market. Basically this research will seek to identify the specific factors that are used to justify rationing of credit to the micro entrepreneur.

The sample on which this work is carried out is composed of 146 micro-entrepreneurs. Data are collected by questionnaire during the months of June and July 2007. A Logit model is specified in order to explain the reasons of rationing of the credit by local development associations. Results show that: first, the absence of guarantor constitutes the main obstacle to the access to financing. Second, the duration of the customer relationship with the FMI decreases the likelihood of credit rationing. Third, the micro-entrepreneur's reputation in his/her community is a criterion of selection; however when he/she cannot be guaranteed by a guarantor, such reputation does not have any effect on the financing decision. Fourth, females have a higher likelihood of obtaining financing from the MFI than men. Fifth, agriculture activity, as privileged by the associations, doesn't improve the likelihood to access to credit granted by the MFI. Finally, entrepreneurship profile does not improve the likelihood to obtain MFI financing, however when such criteria is supplemented by providing a guarantor, the likelihood of rationing micro-credit, will be decreased.

Our findings suggest that the guarantor constitutes the major criteria that explain credit rationing. Such findings, makes our research relevant – particularly compared to others which

[3] In Tunisia, the MFI are called "local development associations" having the non-profit association status, and operating in all delegations, to serve micro-entrepreneurs in financial services. They are exclusively financed by a state bank, the Tunisian Bank of Solidarity (BTS).

do not consider such determinants in explaining the likelihood of rationing credit. In fact this finding is of direct relevance to Tunisian reconstruction policymakers seeking to broaden the support for MFI reach and implementation. The rest of this paper is organized as follows. First, the literature review is discussed and hypotheses are developed (along with robustness tests); second, the research methods are explained; then empirical results are reported and discussed; finally this paper ends with a summary and conclusions.

II. Literature Review and Hypotheses Development

Some previous works identify certain number of factors that explain financial exclusion, and particularly the rationing of the credit as made by the MFI. These factors are: (1) reputation, (2) entrepreneurial profile, (3) poverty, (4) customer relationship with the IMF, (5) sector of activity (6) guarantee and collateral, (7) gender. Next we will review the major researches that explained how these factors affected the rationing policy of the FMI and subsequently, we will state our hypothesis.

According to Diamond (1989), the reputation of the borrower has an impact on his/her access to financing. Berger et al. (2001) explain that the reputation allows the bank to collect private information about the entrepreneur, which will be used at the time of the loan screening. In addition, Howorth and Moro (2006) report that in small cities, banks do not finance the entrepreneur who has a bad reputation in his/her community. Therefore, reputation is considered as a major factor in loan decision making. In the area of micro-finance, Wenner (1995), Aghion and Morduch (2000), Casson and Giusta (2004) and Coleman (2006) showed that the better reputation a micro-entrepreneur benefits in his/her community, the luckier he/she is to get the financing from the MFI. Thus we predict that:

Hypothesis 1: The reputation of the micro-entrepreneur has a negative effect on the likelihood of loan rationing.

Since Schumpeter (1934), it seems that the entrepreneurial profile has an effect on the financing decision of the bank. Some more present studies confirm these first intuitions in the field of the micro-finance. Morduch and Haley (2002) explain that services of the MFI should be destined only to people having an entrepreneurial profile, and, therefore, able to insure the success of a micro-enterprise. Khandker (1998) demonstrates that the distribution of financial services to people who do not have entrepreneurial skills increases the risk of defaulting. These findings suggest the following hypothesis:

Hypothesis 2: The entrepreneurial profile has a negative effect on the likelihood of loan rationing.

The effect of the poverty on the financing decision of the MFI nourishes a lot of debates in the literature on micro-finance. In fact, it is through its ability to touch the poor that the micro-finance emerged, developed and is revealed as a new financial intermediation [Barr, 2005,; Seck, 2007,; Morduch, 1999b,; Moll, 2005,; Morning et al., 2002]. However, most researches showed that loans granted to poor entrepreneur represent low percentage in MFI loan portfolio. [Najavas et al. 2000; Morduch: 1998; Evans et al. 1999; Datta, 2004]. Such inadequacy suggests the following hypothesis:

Hypothesis 3: Poverty has a positive effect on the likelihood of loan rationing.

Such relation could be moderated by the following two factors: (1) Size of the MFI, (2) entrepreneur age and education level. Cull et al. (2007) and Hartarska (2005) conclude that the size of the institution has an effect on the relation between poverty and credit rationing. On the other hand, Datta (2004) and Cleassens (2006) respectively explain that entrepreneur age and education level can moderate the relation between poverty and credit rationing. This research will consider these two factors as moderate variables.

Sustainable relation with the financial institution is considered to be a positive factor in the process of screening and granting financial facilities. Such relation has been validated by Petersan and Rajan, (1994), Angelini, Salvo and Ferri (1998), Elsas and Krahnen (1998),

Lehmann and Neuberger (2001), Bodt, Lobez and Statnik (2005). In micro-finance, several researches demonstrate the importance of such sustainable relationship on the credit decision made by the MFI. . Pollinger et al. (2007) suggest that the duration of customer relationship contributes to reduce the cost of credit monitoring, which is high in micro-finance, by attenuating the information asymmetry cost. According to Honlonkou et al. (2006) and Lanha (2002), MFI becomes less demanding in terms of guarantees and of follow-up with micro-entrepreneurs who build up a sustainable relationship and demonstrate success in their previous endeavors. These contentions are captured in the following hypothesis:

Hypothesis 4: customer relationship with the MFI has a negative effect on the likelihood of loan rationing.

The business activity is a major component in assessing credit risk. The agricultural enterprises are those that suffer most from credit rationing [Beck et al.: 2004; Beck and De La Torre.: 2006]. They are considered to be very risky due to the following phenomena: (1) climatic conditions [Zeller and Sharma: 2000], and market volatility [Beck and De La Torre.: 2006]. Hence, such risk is idiosyncratic and precludes financial institutions from financing such activities [Beck and De La Torre: 2006]. Schreiner: 2003 demonstrates that micro-agriculture businesses are much more risky than other type of activities such as confection or service industries. Honlonkou et al. 2006 finds that the risk of non-repayment is higher for micro-entrepreneurs running agricultural activities. This inherent risk could increase the likelihood of excluding micro-agriculture from accessing MFI financing [Baydas et al.:1994]. Accordingly, we propose that:

Hypothesis5: The agricultural activity, that the micro-entrepreneur tries to finance, has a positive effect on the likelihood of loan rationing.

In banking intermediation collaterals and corporal guaranties are considered to be one of the major components of any credit decision. Without such support, the banks are reluctant to provide any financing facilities. This condition explains largely the exclusion of micro-entrepreneurs from getting any financial supports from traditional commercial banks [Pretes: 2002; Snow & Buss: 2001, Morduch: 1999a].

In an effort to grant credit facilities to micro-entrepreneurs who are powerless to offer any corporal guaranties, a new financial intermediation emerged with the essence to offering financing without requiring corporal guarantees. The first MFIs substitute corporal guarantees by the system of joint responsibility, on which the technique of group credit[4] is based. [Ghatak: 1999; Ghatak and Guinane: 1999; Morduch: 1999a; Ghatek: 2000]. However, such system was not sufficient in remote area where people do not trust each other. Although these MFIs are emerged to help micro-entrepreneur in the process of financing their small projects, Honlonkou et al. (2006) indicated that in Benin, some MFIs still require corporal guaranties such us land or agricultural material, in counter part of access to credit. Aghion and Morduch (2005) identified the same credit conditions required by IMFs in Albania. Although there are few researches works on the effect of guarantees on the rationing of the credit, it would be advisable to anticipate a negative relationship between the two variables. Hence, we hypothesize that:

Hypothesis 6: guarantors and collaterals have a negative effect on the likelihood of loan rationing.

The micro-entrepreneur's gender can have an impact on the financing decision made by the MFIs. Morduch (1999a) and Mosley (2001) showed that women constitute a favored clientele

[4] The technique of group credits foresees that the bank first starts with constituting groups of micro-entrepreneurs (3 to 7 members) within the community that is in its field of activity. It proceeds thereafter to the financial services distribution to some of these micro-entrepreneurs. If these refund, then it continues to finance the rest of the group. If not, the other members are obliged to refund in their favor to the risk to be excluded of financing [Aghion and Morduch: 2000].

of the MFI and represent respectively 94% and 60% of customers' portfolio of the Gramenn Bank and the Banco-Sol, which are considered to be the biggest MFI in the world. Women are considered by the MFIs as more serious, honest and creditworthy than men (Brau and Woller, 2004; Pitt and Khandker, 1998; Morduch, 1999a; Schreiner, 2003). However, Buvinic and Berger (1990) and Evans et al. (1999) respectively showed that in Peru and Bangladesh, micro-entrepreneur women are more rationed by the MFIs than their counterparts, men. Considering these inconsistencies, it is appropriate to formulate the following hypothesis:

Hypothesis 7: The gender has an effect on the likelihood of loan rationing.

According to Buvinic and Berger (1990) and Berger (1989), levels of training and education of women can influence their access to financing. Therefore, these factors will be retained as moderate variables of the relationship between gender and loan rationing.

III. Method

This section presents the methodology carried out by the researchers. First we will present the sample selection method. Second we will justify our variables' measurement instrument. Third, the data collection method is specified and finally we will specify the likelihood model.

Sample Selection

The sample is composed of 146 micro-entrepreneurs being in the area of Siliana (located in the north-west of Tunisia). This location is selected by the researchers for two reasons: first, the area is considered by the Tunisian government to be remote and requires full support to develop small projects carried on by local entrepreneurs. Second, we were able to identify four MFIs operating in the area for the last four years. This timeframe is considered by the researchers to be sufficient enough to build up a data basis for analysis. Among the four associations, only three accepted to participate in this project; the other one declined by showing no interest in the project. To build up the sample, researchers accessed to the micro-credit applications register of each of the three associations. They classified the loan requests, as recorded in the application registers, between accepted for financing and rationing. Our sample was selected randomly from each group from each association. The financed people and those rationed by the credit represent respectively 71% and 29% of the sample. The middle age of micro-entrepreneurs is 41 years and women represent more than 37% of the sample. Nearly half of micro-entrepreneurs do not have a level of education and the majority has not attended a technical training in advance. People who want to finance some agricultural activities constitute nearly 44% of the sample. Table 1 describes the composition of the retained sample.

Table 1 : Description of the sample

	FREQUENCY	PERCENTAGE
EXCLUSION		
Refused	42	28.8
Financed	104	71.2
GENDER		
Male	92	63.0
Female	54	37.0
LEVEL OF EDUCATION		
Educated	78	53.4
Non educated	68	46.6
LEVEL OF TRAINING		
Trained	39	73.3
Non trained	107	26.7
.SECTOR OF ACTIVITY		
Agricultural	64	43.8

Non agricultural	82	56.2
DÉLÉGATIONS		
Bergou	51	34.9
Rouhia	44	30.2
Southern Siliana	51	34.9

Size of the sample = 146 people

Measurement of Variables

Credit rationing

Stiglitz and Weiss (1981) define the rationing of the credit as of situations where: "(a) among applicants for credits who seem to be similar, some receive a credit whereas others not, and applicants who are rejected will not receive a credit even though they are ready to pay for a high interest rate; or (b) there are groups of individuals among the population who, for a given offer of credit, are enable to get a credit, whatever the interest rate is, and who will be able to get it for a larger offer of credit". Therefore, this variable will be binary: zero value if the loan request is financed and the value 1 if it is rejected.

Poverty

Reference to Evans et al. (1999) and Datta (2004) methodology, this research used annual expenses by unit of consumption to measure this concept. The expenses quartiles are used as criteria for scattering the sample into different socio-economic groups. Considering this instrument, our sample is classified into four groups: (1) rich (annual expenses superior to the 75th percentile), (2) comfortable (annual expense between 50th and 75th percentile), (3) poor (annual expenses between 25th and 50th percentile) and (4) very poor (annual expenses less than the 25th percentile). We assign the following scores for each group: rich = 1, comfortable = 2, poor = 3 and very poor = 4.

Reputation

The micro-entrepreneur's reliability is used as a proxy to measure this construct (Howorth and Moro, 2006). The perception of the village chief toward every micro-entrepreneur is used by Coleman (2006) to gauge reliability. Mayer et al. (1995) and Davies and Prince (2005) employed three dimensions to measure this construct: (1) competency, (2) integrity and (3) benevolence. Each dimension has been measured on a scale of 3 points that takes values 1 for bad, 2 for average and 3 for good. The scale has been purified by the ACP method (KMO = 0.67 and alpha of Cronbach = 0.87) and a factor called " reputation for reliability » which explains 80% of the variance, has been identified. The factorial score is introduced in the econometric model.

Entrepreneurial profile

The entrepreneurial profile is measured by the "internal locus of control"[5]. According to Rotter (1966), Pandey and Tewary (1979), Cromie and Jhons (1983) and Cromie (1987), entrepreneurship requires an internal locus control attitude. Levenson (1974) identifies 21 items[6], to measure this concept. Each item is quantified on a likert scale basis of five points going from "completely agree" to "completely disagree". The scale has been purified by the

[5] The locus of control emerged with Rotter (1966) and reflects the perception that individuals of the control of events have in their life. Those who associate the control of events to themselves are said to have an internal " locus of control ". Those who assign the control to outside powers are said to have an external " locus of control ".

[6] At the beginning, the scale comprises 24 items. Three items have been eliminated (at the rate of an item by dimension). It is the item that measures the perception of the guarantors' control within an organization. These items cannot be used in our work because guarantors are micro-entrepreneurs and not employees in an organization

method of ACP (KMO = 0.85 and alpha of Cronbach = 0.91) and a factor called "internal" has been identified which explains 79.5% of the variance. The factorial score is introduced in the econometric model.

Customer relationship duration

Customer relationship duration is generally measured by the number of years during which the client maintains a sustainable relationship with the financial institution [Angelini et al., 1998; Berger and Udell, 1995 and Peterson and Rajan, 1994]. However, In micro-finance, considering the nature of the micro-credit that is generally distributed on the short term basis, most researchers employed the number of credits incurred by the micro-entrepreneur within the MFI [Honlonkou et al. 2006 and Lanhas, 2002]. In this research, we will proceed in the same way and the customer relation will take the value 0 if the micro-entrepreneur did not run up a credit at the institution, the value 1 if he ran up credit, the value 2 if he ran up 2 credits and the value 3 if he run up 3 credits or more.

Guarantee

Honlonkou et al. (2006) have measured this variable in the area of micro-finance. They used the percentage of material collateral values over the loan amount as a measurement of this variable. In Tunisia, the legal framework[7] stipulates that the micro-credit should be granted to micro-entrepreneur who could not provide any corporal collateral. To get around this rule, the MFI requested a "guarantor" as a substitute of corporal collateral. Such third party will guarantee by bills the pay back of the loan. Thus, this variable will take the zero value if the applicant could not provide a guarantor and the value of 1 value otherwise.

Finally, the age of the micro-entrepreneur and the size of the association are respectively measured by the number of years and the log of the credit portfolio, whereas the remaining variables are introduced as binary variables as follows: Gender = 1 for female and zero for male; Sector of activity = 1 for agriculture and zero for the remaining sectors; level of education = 0 if the micro-entrepreneur is analphabet and 1 otherwise; and training = 1 if the person has already attended a technical training and zero otherwise.

Data collection

In this research, the questionnaire has been used as an instrument of data collection. This questionnaire has been managed to the sample of the survey, during the months of June and July 2007. The field work mobilized 8 investigators. The relative questions to the variable poverty have been developed together with the experts of the National Institute of Statistics, which proceeds every five years to the assessment of the standard of living of Tunisians and to measuring poverty. The questionnaire has been tested during two days with a group of micro-entrepreneurs and adjustments have been carried at the level of questions relative to the variable locus of control, to take into consideration the cultural sensitivities.

Specification of the econometric model

In this work, the variable to explain is the financial exclusion that can take two modes:

$$y_i\,(\text{Exclusion}) = \begin{cases} 0 \text{ if the person is financed} \\ 1 \text{ if the person is rationed by the credit} \end{cases}$$

[7] Laws 99-67 and 99-70

The phenomenon to study is therefore discreet and the variable that describes it is dichotomic. The specification of a traditional regression model is therefore misfit. The resort to a binary Logit model proves to be adapted to our econometric analysis.

IV. RESULTS

Tests of correlations and associations have been conducted before the specification of the model to check if there is no problem of multi co-linearity between the explanatory variables. Results of these tests indicate that values of coefficients are low and still lower to 0.5. Therefore, there is no problem of multi co-linearity between the retained explanatory variables in this research.

The process of modeling has been achieved in several stages. We opted for a method of an ascending step-by-step regression. The explanatory variables and those of control have been introduced progressively in the model. Ten equations have thus been specified in order to study the effect of different explanatory variable combinations on the probability of the exclusion. The retained model is judged as having a good quality of adjustment (Pseudo R^2 of 0.68). The remaining part of this section will be dedicated to the interpretation of the sign and the point of coefficient significance obtained and presented in Table 3.

Results reveal the existence of a negative and significant relation to the point of 5% between the variables "gender" and "rationing". It implies that women have less risk to be excluded that men. This result confirms contributions of Schreiner (2000), Morduch (1999a) and Khandar (1998) that explain that the MFI prefer to grant micro-credits to women rather than to men. It also confirms hypothesis 7 according to which the gender has an effect on the rationing. The introduction of the control variables "training * gender" and "level of education * gender" (equation 2) shows that the level of education does not have any effect on the exclusion of women but that the training increases their risk to be rationed. This result is explained by the fact that the trained women want to get involved in activities that are not priority to associations. In fact, 43% of trained women want to invest in non-agricultural activities that are not priority to the association. Indeed, more than 62% of refused credit requests concern non-agricultural projects.

Poverty proves to be without an explanatory power on the probability of credit rationing. It shows that, on one hand, the poor do not endure a discriminatory behavior on the part of associations, but that on the other hand, they do not constitute a privileged clientele to these associations. The introduction of control variables in the relation (" age * poverty ", " level of education * poverty " and " size of the institution * poverty ") (equation 3) does not change anything of the results. This report reveals that poverty does not constitute a criterion of selection for associations of development and leads to reject the third hypothesis of research. Nevertheless, it is convenient to push the analysis further to know if the behavior of associations is the same towards the different socio-economic categories. To do that, we proceed to the crossed-sorting between the variables poverty and rationing.

Results of Table 2 show that the poor recorded the highest rate of financed people, which is 78.4%. They are directly followed by the comfortable (75.7%). The very poor, with a financing rate of 66.7%, are more confronted to the problem of rationing than these first two groups. However, they are more disposed to be financed than the rich that record a rate of financing of 63.9%. So, these results show that the poor and the very poor are not confronted to a problem of rationing from associations.

Table 2 : Crossed sorting between « poverty » and « rationing »

	FINANCE	RATION	TOTAL
Rich	63.9%	36.1%	100%
Comfortable	75.7%	24.3%	100%
Poor	78.4%	21.6%	100%
Very poor	66.7%	28.8%	100%

The results of equation 4 show that the sector of activity does not have an impact on the financing decision of the association and then invalidate the fifth hypothesis of research. This result is contradictory with contributions of Beck and De La Torre (2006), Beck et al. (2006) and Baydas (1994) who explain that agriculture is a risky activity and that banks and the MFI avoid financing. By introducing the variable "guarantor" (equation 7), the relation between "agriculture" and "exclusion" becomes significant and negative. This indicates that agriculture has the same negative effect on the rationing but that this effect is not robust. On the economic side, the interpretation of this result proves to be difficult, so much that there is no association between the variables "agriculture" and "guarantor". However, it is to remind that associations of local development constitute one of the privileged mechanisms of the state to finance the small agriculture. In the annual financing contract that links the association to the BTS, the latter requires that a great part of credits be granted to the agricultural activity.

The first and the second hypotheses of research are respectively confirmed and rejected. In fact, the "reputation for reliability" has a negative impact on the rationing of the credit whereas the "locus of internal control" has a positive impact (equations 7 and 9). These explain that, on the one hand, associations of development rely on the local information to attenuate problems linked to the asymmetry of information, and on the other hand, the local socio-cultural environment does not encourage a good perception of people having some entrepreneurial characteristics. However, with the introduction of the variable "guarantor", the effects of the "reputation for reliability" and of "locus of internal control" are not more significant (equation 10). This gives rise to two interpretations. The first is that the "reputation for reliability" of a micro-entrepreneur does not have an effect on his/her access to financing if this one does not find a guarantor. The second is that the risk linked to the entrepreneurial profile is attenuated when the micro-entrepreneur is guaranteed by a guarantor.

The estimation of the coefficient of the variable "duration of the customer relationship" shows that the longer the relationship, the less the micro-entrepreneur risks to be rationed by the credit (equations 8, 9 and 10). This result confirms the contributions of Honlonkou (2006) who explains that for a micro-entrepreneur, an evolved relation with the institution of micro-finance is synonymous of a more lasting access to the credit. He joins as well the results of Petersan and Rajan (1994), Angelini, Salvo and Ferri (1998), Lehmann and Neuberger (2001) and Bodt, Lobez and Statnik (2005) who showed that the duration of the customer relationship has a positive effect on the access to financing.

However, the resort to the crossed sorting between the two variables (Table 4) shows that nearly 90% of micro-entrepreneurs having an experience, or more, with the association are guaranteed by guarantors. This percentage decreases to 32% for those who do not have any experience. The re-introduction of the variable "guarantor" at the same time as the variable "duration of the customer relationship", shows that the "guarantor" always has a negative and significant effect. Besides, this re-introduction permitted to improve the explanatory power of the model considerably.

Thus, the found results permit to conclude that the effect of the "duration of the customer relationship" on the exclusion is extensively influenced by the effect "guarantor". To study the direct impact of the variable "duration of the customer relationship" on the probability of the exclusion, it is convenient to eliminate the effect "guarantor". For that, we started with decreasing the variable "duration of the customer relationship" in relation to the variable "guarantor". The results show that the "guarantor" has a significant effect (at 1%) and strong (? = 0.77) on the duration of the customer relationship. The residue (the mistake which is not explained) of the decline has thereafter been kept as a new variable called "excessrc". This

one corresponds to the variance of duration of the customer relationship not explained by the variable "guarantor".

To determine if the duration of the customer relationship has an effect on the probability of the exclusion even in the absence of the effect "guarantor", there is possibility to estimate the coefficient of the Logit model for the variable "excessrc". The result (Table 5) reveals the existence of a negative and significant relation at 1%. The elimination of the effect "guarantor" has not therefore changed anything to the relation between the variable "duration of the customer relationship" and the variable "exclusion". This result implies that the "guarantor" is not the only explanatory variable of the probability of the exclusion. The duration of the customer relationship has a negative effect on the exclusion, and this independently on the effect "guarantor". Therefore, hypothesis 4 is confirmed.

To be sure of the quality of adjustment of the last specified model (equation 10), we consider, in addition to the R^2 of McFadden (which is equal to 0.68)[8], another indicator which is the quality of prediction[9]. The table of prediction, presented in Appendix, reveals a prediction rate of 95.21%.

This indicates that in 95% of cases, values 0 and 1 of the dependent variable have been predicted well. A more thorough analysis of the table of prediction shows that for the excluded, 36 cases out of 42 have been predicted well whereas for the financed, 103 cases out of 104 have been predicted well.

Finally, it proves to be interesting to measure the degree of impact of each of the explanatory variables on the exclusion. Results of the marginal impact calculations (table 6) show that women have nearly 30% of risk less than men to be rationed by the quantity of the credit. The trained women have, as for them, 60% of risk in addition to be excluded than non-trained women. The increase of the duration of the customer relationship by experience decreases by 25% the risk of the exclusion. An improvement of 10% of the "reputation for reliability" in the community decreases the risk of the exclusion by 3.5%. An increase of 10% of entrepreneurial skills results in an increase of 5.4% in the risk of exclusion. In short, micro-entrepreneurs who are guaranteed by a guarantor have 83% less risk to be excluded.

Conclusion

Results of this work bring us to make five main conclusions. The first is that guarantor's absence constitutes the main barrier to the access to the micro-credit. The second is that the "duration of the customer relationship" has a negative effect on the exclusion but does not result in an improvement of conditions of financing, notably in term of guarantor. The third is that, contrary to what has been anticipated, the agricultural sector does not have a positive impact on the decision of rationing of the credit. Finally, the last two conclusions permit to position some results of Mejdoub and Mamoghli (2009) in a better way. On the one hand, the "reputation for reliability", even though taken into consideration in the decision of financing, loses all its significance in guarantor's absence. On the other hand, the risk that represents, paradoxically, the entrepreneurial profile for associations, is attenuated when the borrower is guaranteed by a guarantor.

[8] The R^2 of McFadden remains a statistic that is not very useful for the interpretation of results. In fact, in logistical decline, it is not possible to calculate the variance in the dependent variable that is explained by the independent variables.

[9] The explanation of the prediction quality is the following. If event yi = 1 occurs when the latent variable takes a value higher than the C point (fixed at 0.5 by default in the Logit model) and if event yi = 0 occurs when the latent variable either takes a value equal or lower than the C point, then it is convenient to compare these predictions to the true values held by yi.

Table 3 : Estimation of coefficients of the model

	Equation 1	Equation 2	Equation 3	Equation 4	Equation 5	Equation 6	Equation 7	Equation 8	Equation 9	Equation 10
Gender	-.86** (-2.11)	-1.70** (-2.12)	-1.80** (-2.31)	-1.89** (-2.36)	-1.56* (-1.92)	-1.38* (-1.67)	-1.59* (-1.79)	-2.23*** (-3.10)	-1.88*** (-3.74)	-3.35*** (-3.34)
Level of education	-	.63 (1.37)	.60 (1.30)	.57 (1.25)	.68 (1.37)	.75 (1.47)	.99 (1.48)	.56 (0.89)	-	-
Level of education*gender	-	-.06 (-0.07)	.06 (0.07)	.00 (0.01)	.03 (0.04)	-.06 (-0.07)	-.56 (-0.57)	.35 (0.38)	-	-
Training	-	-.06 (-0.13)	-.00 (-0.01)	-.06 (-0.12)	-.01 (-0.02)	.12 (0.20)	.41 (0.62)	-.44 (-0.72)	-	-
training*gender	-	1.84* (1.91)	1.88* (1.91)	1.94** (1.98)	1.78* (1.81)	1.40 (1.45)	.99 (0.83)	1.93** (1.96)	1.35* (1.68)	3.26*** (3.10)
Poverty	-.084 (-0.48)	.07 (0.38)	-.84 (-0.44)	-.92 (-0.49)	.16 (0.08)	.50 (0.24)	1.98 (0.79)	-.24 (-0.96)	-	-
Age	-	-	.02 (0.62)	.03 (0.75)	.043 (0.92)	.05 (0.94)	.035 (0.66)	-	-	-
Age*poverty	-	-	-.00 (-0.50)	-.01 (-0.56)	-.012 (-0.67)	-.01 (-0.60)	-.015 (-0.78)	-	-	-
Association size*poverty	-	-	.37 (0.64)	.42 (0.72)	.16 (0.29)	.10 (0.17)	-.34 (-0.46)	-	-	-
Agriculture	-	-	-	-.46 (-1.14)	-.45 (-1.04)	-.60 (-1.29)	-1.54** (-2.20)	.57 (0.94)	-	-
Duration of customer relation	-	-	-	-	-	-	-	-2.64*** (-3.35)	-2.43*** (-3.28)	-2.56*** (-3.06)
Guarantor	-	-	-	-	-	-	-4.62*** (-5.28)	-	-	-5.14*** (-3.46)
Reputation for reliability	-	-	-	-	-	-.62*** (-2.72)	-	-	-.45* (-1.67)	-.36 (-1.35)
Locus of internal control	-	-	-	-	.70*** (3.31)	.66*** (2.88)	.38 (1.40)	.58*** (2.79)	.58*** (2.63)	.56 (1.50)
Constant	-.41 (-0.85)	-1.14*** (-1.71)	-2.45 (-1.16)	-2.54 (-1.23)	- 3.353299 (-1.62)	-4.00** (-1.72)	.95 (0.36)	2.29** (2.54)	1.90* (2.83)	6.20* (3.10)
Pseudo R^2	0,03	0,075	0,08	0,09	0,15	0,2	0,48	0,49	0,49	0,68

***Signification at 1% ** Signification at 5% * Signification at 10%

Table 4 : Crossed sorting between « guarantor » and « duration of the customer relationship »

	HAS NO GUARANTOR	HAS A GUARANTOR	TOTAL
No previous credit contracted	67.9%	32.1%	100%
A previous credit contracted	13.0%	87.0%	100%
Two or more credits contracted	9.4%	90.6%	100%

Table 5 : Crossed sorting between « guarantor » and « duration of the customer relationship »

	COEFFICIENT	Z	SIGNIFICATION
Excessrc	-1.451774	-2.82	***
Constant	-1.194612	-4.05	***

***Signification at 1%

Table 6 : Estimation of marginal impacts of explicatory variables

	dy/dx	Z	SIGNIFICATION
Gender	-.283901	-2.53	**
Training * Gender	.6030231	2.91	***
Duration of customer relationship	-.2502157	-4.43	***
Guarantor	-.8340719	-5.94	***
Reputation for reliability	-.03575	-1.17	
Internal	.0548742	1.72	*

***Signification at 1%** Signification at 5%* Signification at 10%

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Appendix: Tableau of prediction for the specified logit model.

Logistic model for excldum

Classified	D (True)	~D (True)	Total
+	36	1	37
-	6	103	109
Total	42	104	146

Classified + if predicted Pr(D) >= .5
True D defined as excldum != 0

Sensitivity	Pr(+| D)	85.71%
Specificity	Pr(-|~D)	99.04%
Positive predictive value	Pr(D| +)	97.30%
Negative predictive value	Pr(~D| -)	94.50%
False + rate for true ~D	Pr(+|~D)	0.96%
False - rate for true D	Pr(-| D)	14.29%
False + rate for classified +	Pr(~D| +)	2.70%
False - rate for classified -	Pr(D| -)	5.50%
Correctly classified		95.21%

Cost of equity in emerging markets. Evidence from Romanian listed companies

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Abstract

The cost of equity has been for decades the purpose of the work of many famous economists that embraced the challenge of finding the appropriate method of calculation. From models and formulas to real application and impact, we built our research on Romanian listed companies, as a quest to both the theory and practice of one of the most controversial indicator in the financial world: the cost of equity. Through this article, our purpose is to provide clear examples for calculating the cost of equity for emerging countries, which could be useful for both academicians and practitioners.

Keywords: cost of equity, cost of capital, asset pricing

I. Introduction

In an unpredictable financial world, the theory could face difficulties of explaining evident differences to practice when it comes to cost of equity. Some models could be seriously affected by the evolution of the global financial crisis started in 2008. For example, the common calculation of the market return, when calculating the market risk premium, could be affected by the negative evolution of the markets. Some authors claimed that the use of arithmetic averages or geometric average can show us the value of the market return. The evolution of the financial markets from 2008 till today can provide us sufficient understanding that this method has important limitation. Another example could be the value of volatility coefficient – beta which can have a negative value due to the opposite evolution of a company compared with the stock index which was taken as a benchmark. The quest for calculating the cost of capital has multiple applications, from the stock market, valuation or performance measurement. Starting from these ideas, we provided relevant information from the Romanian financial market.

The framework for the cost of equity

For the financial point of view, the capital represents the sum of financial resources needed by companies, governmental institutions for current operations or for financing or investments. The cost of capital represents the opportunity cost of financial resources (both equity and debt), and required return for the investors. The cost of capital is the minimum expected return by the investors for the capital provided by them to the company. Another application is using the cost of capital in calculating value creation metrics such as Economic Value Added, one of the most complex indicator of company' performance.

The paper of Franco Modigliani and Merton Miller (1958)," The cost of capital, corporation finance and the theory of investment", presents that the market value of any company is independent from the capital structure, and will be the same for different leverage ratios. Moreover, the same authors consider that the average value of the cost of capital is independent from the capital structure. The authors support this argument, starting from simple hypothesis. Thus, investors must trade shares without restrictions and can borrow money in the same conditions as the company. The financial markets must by efficient, so the shares must have a price proper to the information held by investors. The theory of the two famous economists takes into consideration neither the supplementary cost for supplementary borrowings, nor the distorted taxes, as Brealey, Myers and Marcus stated (2005). In the real activity of a company, the mix of equity and debt for financing can influence the value of the company. Damodaran (1994) tells us that companies take into consideration the decision for capital structure, and potential influences for the value of the company (level of debt, agency cost, borrowings benefits).

Invested capital is the sum of equity and financial debt, as the model:

$$K = E + D \qquad (1)$$

K= Invested capital
E = Equity
D = Financial debt

The value of equity and financial debt can be the book value from the financial statements or the market value calculated through the valuation of the company. Calculating the cost of capital is through the weighted average cost of capital, and it is complex due to the need of calculating the cost of equity and cost of debt.

Thus, the weighted average cost of capital is obtained through the following model presented by Pratt (2002):

$$WACC = \frac{E * \overline{Ke} + D * (1-t) * \overline{Kd}}{E + D} \qquad (2)$$

Ke = cost of equity
Kd = cost of debt
t = income tax

II. Empirical Analysis for calculating the cost of equity: Romanian listed companies

We will focus on calculating the cost of equity on Romanian listed companies, as a way of expressing the methods used in an emerging market such as Romania. Our study was developed taking information from 15 listed companies at the Bucharest Stock Exchange for the period 2005-2009, a period important from the perspective of the global impact of financial crisis on nations' economies.

Companies were chosen from a set of criteria: companies that were listed during 2005-2009; strategic sectors such as energy or chemical industry; high capitalization level

The companies were grouped as follows: Energy including: extractive, transport, storage of oil and natural gas; Pharmaceutical sector; Metallurgical industry; Chemical industry; Aerospace industry. The companies chose represented 23.43% of the total capitalization of the Bucharest Stock Exchange and the end of 2009. In the chosen companies we can find the largest company in Romania, which had 17.61% of the total capitalization of the Bucharest Stock Exchange. For calculating the cost of equity, we used the most used model, mainly CAPM (Capital Asset Pricing Model). This model was proposed independently by J. Treynor (1961, 1962), J.Lintner (1965), J. Mossin(1966), but underpinner by the wpork of William Sharpe (1964) through his article "Capital Asset Prices: a theory of market equilibrium under conditions of risk". The subject was also researched by economists Harry Markowitz (1952). In a research of John Graham and Campbell Harvey (2001) over 392 companies in USA (including companies from Forbes 500) showed that 73.5% from the chief financial officers questioned use CAPM to estimate the cost of equity.

CAPM states that if all investors follow the market portfolio, the risk premium required by them will be proportional with beta volatility coefficient, and adding the risk-free rate.

$$\overline{Ke} = R_f + \beta * (R_m - R_f) \qquad (3)$$

R_f = risk-free rate

β = beta volatility coefficient

R_m = market return

$R_m - R_f$ = market risk premium

CAPM starts from the following assumption as Pratt(2002) presents: investors are risk averse; rational investors intend to own diversified portfolio of shares; all investors have identical time

horizons (period of owning the shares); all investors have identical expectation for returns and the way capitalization rates are generated; there aren't any transaction cost; there aren't taxes for investments;

A. Determining the risk-free rate

The risk-free rate must not reflect specific risk, thus it is found in the yield of governmental bonds. Companies have different ratings, because they have different levels of risk. The countries that must be taken into consideration are countries with AAA rating (the highest rank from international rating organizations). Using a long-term maturity (more than 10 years) offer a real value of this rate. Authors Anghel, Oancea Negescu, Anica-Popa and Popescu (2010)consider that this period is recommended because it is similar with the period of free cash-flow prevision of a company. Moreover, the currency used to calculate this rate must be the same with the currency in which the cash-flows are calculated and the financial statements are presented. For Romania different authors consider the risk-free rate as the Romanian governmental bonds yield to maturity. We consider that this approach do not reflect the relation between risk and risk-free rate.

To estimate this rate we used the following method as Ciobanu (2010) presents: taking as a benchmark the risk-free rate expressed in euro (German governmental bonds with a maturity of 10 years) and adding the difference between the inflation rate expressed for lei (Romania's currency) and inflation rate for euro, stated by Damodaran (2010):

$$Rf_{lei} = Rf_{euro} + (Ri_{lei} - Ri_{euro}) \quad (4)$$

For the risk-free rate of euro we took into consideration the yield to maturity of bonds issued by Germany 10 years maturity, because the country rating for Germany is AAA (Moody's). As we see in Table I, the risk-free rate evolved from 36.90% in 2001 (high value because of inflation) to 8.61% in 2009.

The applicability of this calculation is very high for emerging markets that have lower country ratings.

B. Determining Beta volatility coefficient

Beta volatility coefficient (β) is one of the most used instruments to measure company risk related to the investment in shares. Beta multiplies the risk premium for measuring the investment in the company's shares. Thus, companies with a beta higher than 1 present a supplementary risk than the market portfolio (represented by the benchmark index), companies with beta equal to 1 present a similar risk with the market, and companies with beta less than 1 are less riskier than the market portfolio.

Beta volatility coefficient is calculated as follows:

$$\beta = \frac{Cov\,(R_i,R_m)}{\sigma^2(R_m)} \quad (5)$$

$Cov\,(R_i,R_m)$= covariance of "i" share return and index return of the stock market"m"

$\sigma^2(R_m)$ = variance of the index return from stock market "m"

For different levels of financial debt, the level of beta is different, because of extra risk. Thus, beta volatility coefficient must be adjusted as follows, as presented by Pratt (2002):

$$\beta_L = \beta_u\,(1+(1-\tau)(D/E)) \quad (6)$$

Unde:

β_L= leveraged beta

β_u=unleveraged beta

τ = income tax rate

As the weight of financial debt in invested capital is higher, we will have a higher risk reflected through a higher level of the beta volatility coefficient, and through a higher level of the cost of

equity. A higher level of debt in the capital structure represents a supplementary risk for investors, and therefore higher expectations related to the required return, as it is shown in table II. At the sector level, through the beta coefficient we can compare different sectors to obtain important evidence of the risk category for the companies. In table III we can see the level of the unleveraged beta for the sectors in which we can find the selected companies.
Companies from the energy sector have a beta volatility coefficient higher than 1, expressing the supplementary risk for these companies, in a period of uncertainty and fluctuation in the oil and natural gas market. A similar situation can be seen in the chemical industry (with an exception in 2005), and in companies from the pharmaceutical industry. Companies from the metallurgical industry and aerospace industry have less volatility than the market, thus a variation in the market will lead to a slower modification of the prices of the companies in these sectors. This is shown in figure 1.

C. Determining the market risk premium

For calculating the market risk premium for 2005-2009, we used the BET-C index from the Bucharest Stock Exchange as a benchmark for comparison.
The market risk premium is calculated as follows:

$$\text{Market risk premium} = Rm - Rf \qquad (7)$$

Rm = return of stock market "m"
Rf = risk-free rate
There are several ways of calculating the market risk-premium: using results from questionnaires from the stock market in which investors claim the required return; using the historical date from the stock market and through average or geometrical calculation establishing the return of the market, and thus the market risk premium; using a market risk premium from a developed market by referring to the benchmark index or governmental bonds from that country; using the benchmark index from the emerging country and benchmark index from the developed market
We used the last method as it is one of the best ways of calculating the risk premium for Romania's case. The use of average or geometrical mean could have provided us negative returns for 2008-2009 and thus an great negative influence on the cost of equity.
Damodaran (2010) considers that in this case the model becomes:

$$\text{Emerging MRP} = \text{Developed MRP} \times \frac{\sigma_{emerging\ country\ benchmark\ index}}{\sigma_{developed\ country\ benchmark\ index}} \qquad (8)$$

MRP= market risk premium
σ = standard deviation
By using the example of USA as developed market, for Romanian stock market, the model becomes:

$$(Rm - Rf)_{RO} = (Rm - Rf)_{US} \times \frac{\sigma_{BETC}}{\sigma_{S\&P500}} \qquad (9)$$

$(Rm - Rf)_{RO}$ = market risk premium for Romanian stock market
$(Rm - Rf)_{US}$ = market risk premium for USA stock market
σ_{BETC} = standard deviation of BET-C return
$\sigma_{S\&P500}$ = standard deviation of S&P 500 return
Table IV provides a closer look on the calculations for the period 2005-2009.
From the above calculations, we can observe an average of 2 for the ratio between the standard deviation of BET-C return and standard deviation of S&P 500 return, expressing the supplementary risk from the Romanian capital market compared with the more developed

American market. The market risk premium for Romania's stock market will be calculated as a product between market risk premium from the developed country (USA) and the ratio of their benchmark index's standard deviation (previously calculated). The results are presented in Table V, and so is the value for the market risk premiums for Romania between 2005 and 2009.

D. Calculating the cost of equity

Based on the information provided for the risk-free rate, beta volatility coefficient and market risk premium, we calculated the value for the cost of equity which can be seen in table 6.

From the date calculated in table VI we can see some important opinions.

The average value of the cost of equity increased from 19.33% in 2005 to 19.65% in 2006, based on the increase of uncertainty for investors. The year 2007, which was known as a economy boom year, lead to a decrease of the average cost of equity for the selected companies to 18.42% (which is also the minimum of the 5 year period). The effects of the financial crisis soon were represented in the financial indicators, leading to an increase to 21.75% of the average cost of equity in 2008. In this year, investors felt the extra risk, and thus, increase the required return. In 2009, the average cost of equity decrease to a value of 19.66%.

The level of the cost of equity is useful for representing the SML's (Security Market Line) for 2005-2009. The oX line represents the beta volatility coefficient, while oY line is the expected return or the cost of equity, calculated through CAPM. In figure 3 we represented the SML for the largest company in Romania – OMV Petrom (energy sector).

III. Conclusions

The article examines the methods used for calculating the cost of equity for companies from emerging countries. Emerging markets have the disadvantage of having more risk that developed countries presented by the country ratings. Thus the risk-free rate must be calculated in a customized method, as well as the market risk premium. This articles offer eloquent opinions and facts for academicians and practitioners. Underpinning, as our quest provided deeper understanding for the cost of capital, the result offers us a practical image of how the cost of capital should be calculated. The cost of equity represents a challenging topic that will continue to bring ideas.

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Table I - Calculating the risk-free rate for Romania for 2001-2009

	2001	2002	2003	2004	2005	2006	2007	2008	2009
Yield to maturity of bonds issued by Germany with 10 years maturity	4,80%	4,78%	4,07%	4,04%	3,35%	3,76%	4,02%	3,20%	3,32%
Inflation rate - LEI	34,50%	22,50%	15,30%	11,90%	9,00%	6,56%	4,84%	7,85%	5,59%
Inflation rate EURO	2,40%	2,30%	2,10%	2,10%	2,20%	2,20%	2,10%	3,30%	0,30%
Risk-free rate - Romania	36,90%	24,98%	17,27%	13,84%	10,15%	8,12%	6,76%	7,75%	8,61%

(Sources: Eurostat, INSSE, National Bank of Romania, own calculation)

Table II - Unleveraged and leveraged beta as averages for the selected companies

Type	Unleveraged beta					Leveraged beta				
	2005	2006	2007	2008	2009	2005	2006	2007	2008	2009
Minimum	0.24	0.12	0.1	0.4	0.53	0.24	0.16	0.11	0.42	0.56
Average	0.867	0.978	1.025	1.066	0.987	0.966	1.119	1.165	1.288	1.202
Median	0.97	1.03	1.08	1.06	0.97	1.04	1.1	1.13	1.4	1.2
Maximum	1.69	1.64	1.41	1.44	1.62	1.75	1.9	2.32	2.2	1.91

*the symbols for the companies are symbols used for the Bucharest Stock Exchange

Table III - Unleveraged Beta volatility coefficient grouped by sector

Sector:	2005	2006	2007	2008	2009
Energy	1.30	1.26	1.11	1.14	1.24
Metallurgical industry	0.52	0.70	0.81	0.86	0.87
Chemical industry	0.80	1.07	1.23	1.24	1.14
Pharmaceutical industry	1.01	1.16	1.14	1.18	1.11
Aerospace industry	0.30	0.60	0.76	0.95	0.92

Table IV - Standard deviation ratio for BET-C and S&P 500 'returns

	σ_{BET-C}	$\sigma_{S\&P500}$	$\sigma_{BET-C} / \sigma_{S\&P500}$
2009	10.05%	4.65%	2.163
2008	9.47%	4.35%	2.178
2007	8.03%	3.84%	2.092
2006	8.35%	4.00%	2.085
2005	8.53%	4.31%	1.977

Table V - Market risk premium

	MRP USA	$\sigma_{BET-C} / \sigma_{S\&P500}$	MRP Romania
2009	4.50%	2.163	9.73%
2008	5%	2.178	10.89%
2007	4.79%	2.092	10.02%
2006	4.91%	2.085	10.24%
2005	4.80%	1.977	9.49%

Table VI - Cost of equity for selected companies between 2005 - 2009

Cost of equity	2005	2006	2007	2008	2009
Minimum	12.46%	9.76%	7.88%	12.31%	14.01%
Average	19.33%	19.65%	18.42%	21.75%	19.66%
Median	20.05%	20.30%	18.09%	23.03%	19.33%
Maximum	26.78%	27.56%	29.97%	31.72%	24.84%

Figure 1 Unleveraged beta by sector

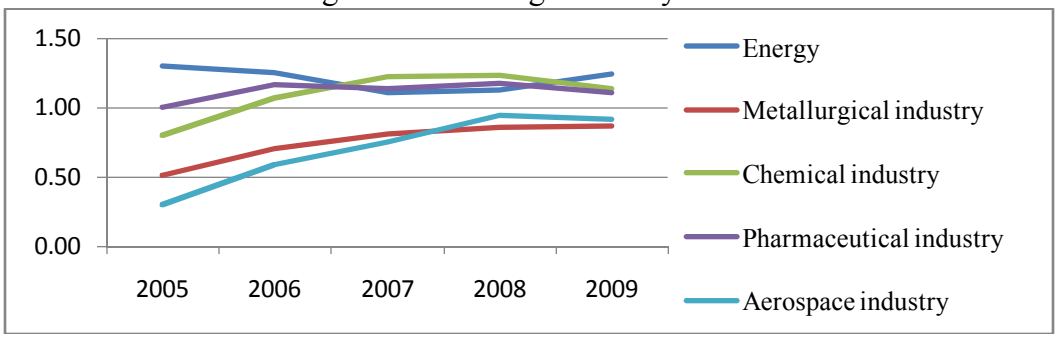


Figure 2 Comparison between USA market risk premium and Romanian market risk premium

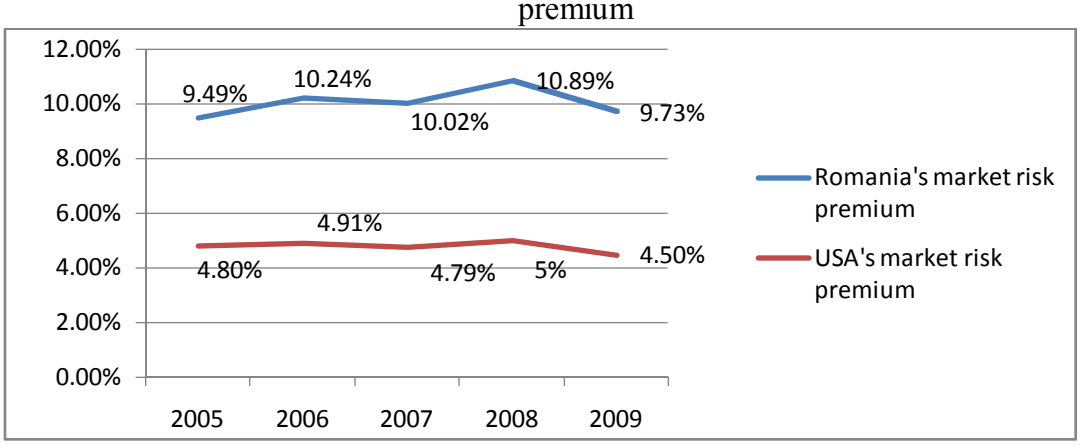
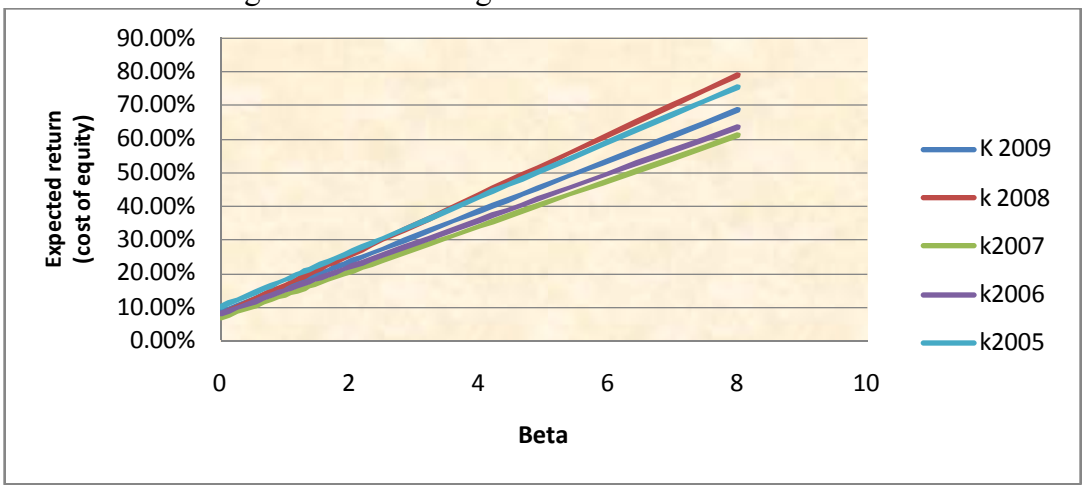


Figure 3 SML during 2005-2009 for OMV Petrom



Corporate Events' Effect on Stock Returns: Evidence from Athens Stock Exchange

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Abstract

This study examines firm's stock returns' behaviour, when they announce corporate events like management change, collaborations and stock repurchase. It examines how this change is portrayed in firms' stock prices returns. The methodologies used are the methodology of event study analysis and bootstrap methodology. Companies selected belong to eight different sectors of Athens Stock Exchange with different Stock Exchange value in order to get a more general picture that does not only represent one sector which can be influenced individually from accidental factors. The sample constitutes forty firms listed in Athens Stock Exchange. Results indicate that corporate events' impact is important and a key for enterprises to follow new challenges and create financial value. This paper provides evidence on the impact of corporate governance on stock returns in Greece. The implication is that corporate events create financial value.

Keywords: Corporate governance; Cumulative abnormal returns; Athens stock exchange, Event study analysis, Bootstrap methodology

Jel: G14, G15

I. Introduction

In the beginning of the new century, Athens Stock Exchange's (ASE) returns led to euphoria after the abrupt rise in 1999 when unjustifiable stock prices reactions were observed. Stock prices' increase led the sector indices and Athens Stock Exchange general index to a frantic ascendant course till September 1999. Then, a sudden change in the investment climate influenced negatively on stock prices returns and the aforementioned increase finally stopped.

In this study, the examined period concerns the period 2000-2006 when ASE had a smoother fluctuations than the last years when we observe an extremely volatile market. During that period, ASE was characterized mature, stock prices' reactions in various events were more equitable and represent a physiologic development of enterprising incidents. On the other hand, the last few years, all markets face huge problems and high volatility follow previous years' stability. The need to understand corporate events impact on stock returns is the reason why this research exempts the volatile period.

The purpose of this paper is to examine the relationship between corporate events and eight sectors share prices' returns in Athens Stock Exchange. There are 97 events that took place in the examination period (Table I). Moreover, this study proves that these issues are very important, especially in this new economic environment for enterprises.

Please Insert Table I about here

The rest of the paper is structured as below. The next section refers to the literature review in order to contribute our study with the relevant literature and section 3 describes the methodology used. Moreover, section 4 outlines the data used to this study and section 5 provides the empirical results and the evidence of their robustness. Finally, paper is concluded by section 6 which outlines the conclusions of this research.

II. Literature Review

Three centuries ago, Adam Smith made the question of companies' property segregation and management. However, shareholders and managers have often refuted opinions and interests. Managers follow their own policy which naturally influences also the shareholders. Allen and Gale (2001) support that managers' interests keep pace with those of shareholders, while ''big''

shareholders try to develop their earnings without taking care the ‘’small’’ shareholders’ profit. This is also a huge problem for big companies according to La Porta et al. (1998).

Moreover, Ascioglu et al. (2005) consider that the fluidity is bigger when feeble corporate governance prevails. This opinion has also been supported by Becht et al. (1998), while Scholtens and De Wit (2004) support that the statements on fusions influence positively the returns, as the corresponding statements on repurchases.

Coopera et al. (2005) support that the changes, even in companies’ name, show that these companies follow the new challenges and attribute positively in their participial value, without proceeding in big investments. This opinion comes to support also, that companies by entering new markets, as it is the electronic market, may influence positively their stock prices.

Regarding Greek literature review, studies are very interesting. Athanassoglou et al. (2005), stated that mergers and acquisitions’ announcement effects on Greek bank stock returns lead to positive stock returns. One year before, Athanassoglou and Brissimis (2004) made another study and found similar results.
Moreover, Mylonidis and Kelnikola (2005) note that announcements for mergers and acquisitions create value on a net basis at the banking sector. Manasakis (2005) approved that after a merger or an acquisition announcement, we take statistically significant CAR’s. Alexakis et al. (2006) found that corporate governance reduces the enterprises financial value’s volatility. Finally, Tsipouri and Xanthakis (2004) approved that Greek companies demonstrate a fairly satisfactory degree of compliance with corporate governance principles. Moreover this result became after Hellenic Capital Market Commission’s rules and regulations, so as to enhance investor protection, Capital Market’s liquidity, trading efficiency, market making and short selling.
Therefore, corporate governance inside companies’ operation gives them the opportunity to grow up their financial value and draw capital from the Stock Exchange markets. Lasfer et al. (2003), report that positive news leads to positive CAR’s and opposite.

III. Methodology

III.1 Event Study Analysis

The events tested for possible abnormal returns are announcements based on management change, the collaborations with other companies and stock repurchase. According to the particular methodology, the expected normal stock returns during a period of $[t_0 \pm t_i]$ days are examined in combination with the announcement date(t_0). The difference between the real and forecasted returns represents the abnormal stock returns.
The abnormal returns are calculated as the difference between the real and the expected returns at the duration of $[t_1, t_2]$ days before and after the event’s announcement date (t_0) that we examine, according to equation (1):

$$AR_{it} = R_{it} - RF_{it} \quad (1)$$

where: AR_{it} = the abnormal attribution of stock i the day t

R_{it} = the real attribution of stock i.

RF_{it} = the expected attribution of stock i.

We suppose that $AR_{it} \sim [0, VAR(AR_{it})]$ with $VAR(AR_{it}) \approx \sigma_{si}^2$ in case the estimation period is big. Thus, the statistical importance of abnormal returns can be checked via an estimation of standardised abnormal return SAR_{it} that is determined by equation (2):

$$SAR_{it} = \frac{AR_{it}}{S(AR_{it})} \quad (2)$$

Similarly, we can check the cumulative abnormal returns' AAR_t statistical importance via equation (3):

$$SAAR_{it} = \frac{AAR_t}{S(AAR_{it})} \quad (3)$$

where: $AAR_t = \frac{1}{N}\sum_{i=1}^{N} AR_{it}$ and $S(AAR_t) =$ standard deviation of AAR_t.

It is realised that, the abnormal returns should be calculated accumulatively for a period $[t_1, t_2]$ of days for each event, according to equation (4):

$$CAR_{i,[t_1,t_2]} = \sum_{t=t_1}^{t_2} AR_{it} \quad (4)$$

In order to check the cumulative abnormal returns' statistical importance, we use the following equation (5):

$$SCAR_{[t_1,t_2]} = \frac{CAR_{[t_1,t_2]}}{S(CAR_{[t_1,t_2]})} \quad (5)$$

As in the case of $AAR's$, we can check the $CAAR's$ statistical importance by using equation (6):

$$SCAAR_{[t_1,t_2]} = \frac{CAAR_{[t_1,t_2]}}{S(CAAR_{[t_1,t_2]})} \quad (6)$$

where: $CAAR_{[t_1,t_2]} = \frac{1}{N}\sum_{i=1}^{N} CAR_{i[t_1,t_2]}$ and $S(CAAR_{[t_1,t_2]}) =$ Standard deviation of $CAAR_{[t_1,t_2]}$

In any case we used the t-student distribution (significance level: 5% and 10%). Usually, the $CAR's$ calculation's period is between 10 and 50 days before and after the announcement date. In this study, we used a period of [- 20, +20], that is to say 20 days before and 20 days after the announcement date (t_0), while the intermediary time periods are used in order to ratify the results.

III.2. **Bootstrap Methodology**

The bootstrap method is a computer-based resampling procedure introduced by Efron (1979) which has been discussed in the statistics and econometrics literature over the past 20 years (e.g., Efron, 1987; Freedman & Peters, 1984a; Freedman & Peters, 1984b and Veall, 1992). When we are not able to obtain sampling results, we use bootstrap method. This method requires no analytical calculations. The procedure uses only the original data for resampling to access the unobservable sampling distribution and to provide a measure of sampling variability, bias, and confidence intervals. Efron and Tibshirani (1986) propose that the use of the bootstrap:

1. enlarges the type of statistical problem that can be analysed,
2. reduces the assumptions required to validate the analyses, and

3. Eliminates the tedious theoretical calculations associated with the assessment of accuracy.

In our study, we use bootstrap methodology in order to provide more accurate results. Bootstrap methodology takes into account arbitrary trend and volatility functions which are useful exploratory analytical tools. Hence, using this methodology, we are able to provide some insight into the structure of these functions independent of specific model assumptions.

Our first step is to derive the confidence intervals that will help us to determine the bootstrap standard error. Then, the original data set $\overline{X_t}$ is bootstrapped to produce a new data set $\overline{X_t^*}$ having identical or similar time series properties and the original specification is then re-estimated using the new data. This can be repeated N times. A similar procedure has been discussed from Breiman, 1996, 1999 among others.

A priori, it is not clear if bootstrap methods will work, as we know that standard bootstrap techniques fail in the context of non-stationary autoregressions, see Basawa et al. (1991). In our study, we estimate the model with OLS obtaining the residuals. Then, we run the bootstrap sample 1,000 times and calculate the OLS estimates for model parameters.

To calculate the t-test we follow Krammer (2001):

$$Z^k = \sum_{i=1}^{T} \frac{t_i}{\sqrt{T}} \quad (7)$$

where t_i is the t-statistic of the γ_i parameter of the following univariate model:

$$R_{i,t} = \alpha_i + \beta_i R_{m,t} + \gamma_i D_i + e_{i,t} \quad (8)$$

where D_t is a dummy variable that takes the value of 1 in the event day and 0 otherwise.

The standard deviation of t is:

$$\hat{\sigma}_T = \frac{\sqrt{\sum_{i=1}^{T} (ti - \bar{t})^2}}{\sqrt{T-1}} \quad (9)$$

Hence we obtain asymptotic normality and following equation (7) we can measure accurately the effect of the corporate event on the stock price movement.

When the percentage of t*'s are greater than the corresponding statistic calculated based on the sample which give us the bootstrap, we reach the significance level with a strong p – value and we accept the null hypothesis that $\bar{t} = \sum ti / T$.

The b draws of t*'s constitute a sample from the sampling distribution of the test statistic under the null. As b approaches infinity, the empirical distribution constructed based on t*'s will converge to the true sampling distribution of the statistic under consideration. Hence, the p-value can be approximated by the percentage of t*'s that are greater than the corresponding statistic calculated that is based on the sample.

IV. Data

This paper begins with suitable criteria's selection that is immediately connected with the objective of our research. In this case the criteria that we used, so as to check if corporate events influence stock returns, are the following: management change, stock repurchase and collaborations with other companies. The announcement date is considered to be the official publication of the above news to all the market and the investors. Data's sources are the financial press, as well as firms' web pages and finally the Athens Stock Exchange.

Firms selected belong to eight different sectors with different capitalization. Succinctly, the examined sectors are the following: Banks, Information technology, Wholesale Trade, Insurances, Investment Companies, Non Metal Mining, Constructors and Adviser Companies. The companies that selected per sector are five so that they constitute, as long as this is possible, a representative sample of their sector.

Firms' selection became taking into consideration their sectoral differentiation, so as to get a better view for the market that does not only represent a sector, which can be influenced individually from accidental factors. Our sample is constituted by forty enterprises that are ASE's members. Finally, present study's data start from 01st January 2000 and reach up to 31st December 2006. The examined period includes 150 daily observations (close prices per day), while event windows include 40 observations, 20 before the company event and 20 after. In addition, the company events are 97 and conclusions expected to be useful.

V. Empirical results

There are three models to calculate the companies' abnormal returns: a. Market model, b. Mean adjusted return model and c. Market adjusted return model. The abnormal returns are the difference between the real returns and the forecasted returns. The cumulative abnormal returns concern a better observation of repercussions at the stock prices returns.

Table II presents the cumulative abnormal returns after collaborations' announcement and the significant results outline that this kind of announcements affects positively enterprises' stock returns. This is clearly observed in the sectors like banking, information technology, insurance, wholesale trade, non mining and advising sectors, which perform positive event windows after the announcement. Even though there are many negative CAR's before the announcement, the climate is getting positive after the news and results are significant.

Please Insert Table II about here

First of all, banks have positive CAR's at the event window [- 2, 2], while the event windows [-5, -1] and [0, 4] are negative, respectively. This means that the announcements for collaborations in the banking sector are known before they are officially announced but they also do not have important influence in the CAR's. Information technology and investment companies have similar results. Wholesale Trade and Insurance sector seem to be influenced positively by these announcements. As we can see from Table II, event windows [0, 4], [5, 9] are positive and statistically significant, when event window [0, 2] is negative. This is a conclusion that refers to the average CAR's, too.

Furthermore, the announcements related to collaborations give negative ACAR's, even if previous event windows are positive. Sectors like constructors and investment companies seem to be negatively influenced by collaborations. Negative CAR's indicate this attitude, but in general the results outline a different side of this opinion. Most of the investigated sectors have positive CAR's after the announcement date, which means that collaboration's effect is positive in enterprises' financial value and positive abnormal returns should follow the collaborations' announcements.

Table III refers to the management change. Management change is a tool that helps companies to increase their financial value. This is clearly seen at the average CAR's column, where event windows [0, 4] and [5, 9] have bigger positive CAR's than previous event windows. Management change creates financial value and helps firms to avoid crises mainly to the following sectors: information technology, constructors, insurance, non mining & cements.

Please Insert Table III about here

Most of the results with positive CAR's are significant at a level of 5% or 10%. On the other hand, the negative event windows like the one in wholesale trade sector, the investment companies and the banking sector are not significant. The strength of the banking sector is the main reason that we do not have a great impact after a change in management.

Table IV contains the event windows before and after a stock repurchase's announcement. In this case, firms' financial value is expected to increase and the high number of the positive CAR's after the announcement date confirms this expectation. Also, before the announcement, there are more negative observations. Even though there are three negative CAR's at the event window [-2, 2], the climate to the next event window is getting better and there is only one negative CAR. The following windows [5, 9], [10, 14] and [15, 19] have only eight negative CAR's in total.

Please Insert Table IV about here

The average CAR's give a clear view of the results. In the event windows before the announcement – [-20, -16], [-10, -6] and [-5, -1] – the negative CAR's are significant at the level of 5%. Following event windows have positive CAR's which are significant at the level of 10%. Stock repurchases change the climate and give enterprises the chance to increase their financial value. Finally, stock repurchases' impact is statistically important.

Moreover, in order to draw more safe results, study retested the results with bootstrap methodology.

Please Insert TABLE V, VI, VII, VIII, IX, X, XI about here

The Bootstrap methodology results supports the above findings in short differences and gives a clear view of the announcements' impacts.

VI. Conclusions

This study uses the event study analysis methodology and the bootstrap methodology in order to examine the corporate events announcements' impacts on stock returns. Despite that fact that all the aforementioned events should influence the stock returns positively, sometimes – e.g. after a management change – the impact on stock returns is negative. The results indicate that collaborations between companies give a negative impact (-0,000839) around the event announcement [- 2, 2], which is followed by positive observations at the next two event windows ([0,4] and [5,9]). These changes effect, also, the stability on stock's variability. On the other hand, examining the behaviour of stock returns after management change, the results outline a high degree for the event window [0,4]. Generally, there are positive CAR's in event windows before and after the announcement. Finally, in the stock repurchase case, the negative and low degree CAR's before the announcement are followed by positive and high degree CAR's.

In conclusion, findings constitute a useful tool for the rational investor, who tries to avoid the market danger. Even though results are important, corporate governance constitutes a developing aspect for firms, while management change and collaborations help them to survive during crucial economic periods. Corporate governance is the new way for companies to follow new challenges and survive in volatile markets like the turbulent period after the year 2007.

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Appendix

	Company	Corporate Event		
		Collaboration	Management Change	Stock Repurchase
	EFG Eurobank	19/4/2005	31/1/2005	23/9/2005
	Geniki Bank	17/1/2002	16/5/2003	12/6/2003
	Piraeus Bank	19/5/2003	9/8/2001	15/4/2005
	Emporiki Bank	15/12/2004	3/12/2004	4/6/2003
	Alpha Bank	3/2/2005	22/12/2004	5/8/2004
	Pouliadis	1/7/2005	1/7/2004	28/6/2002
	Info-Quest	29/9/2005	28/6/2001	-
	Informatics	26/10/2004	30/6/2004	26/7/2004
	PC Systems	13/6/2005	10/8/2005	13/7/2004
	CPI	19/7/2004	25/9/2001	14/2/2003
	Themeliodomi	1/8/2003	4/7/2003	28/11/2003
	Aktor	2/5/2001	26/9/2005	-
	Aegek	-	2/7/2003	29/6/2004
	Diekat	-	7/7/2004	29/6/2004
	Proodeftiki	21/9/2004	12/5/2003	-
	Dionic	15/6/2005	1/7/2005	24/4/2003
	Druckfarben	28/11/2002	2/7/2004	7/7/2003
	Benroubi	27/7/2005	29/7/2005	1/6/2005
	Mytilineos	11/5/2004	25/6/2003	-
	Keranis	7/5/2001	-	14/7/2004
	Lamda Development	9/1/2003	2/6/2005	20/3/2003
	Notos	8/7/2003	26/5/2004	11/6/2004
	Boutaris	7/3/2002	7/7/2003	28/12/2004
	Fourlis	4/12/2001	9/3/2005	-
	Delta Holdings	23/11/2001	-	3/4/2001
	Aspis Pronoia	10/2/2004	29/1/2004	-
	Evropaiki Pisti	12/3/2003	4/1/2005	24/5/2005
	Phoenix	8/4/2003	30/6/2005	-
	Ethniki Asfalistiki	-	5/8/2004	-
	Agrotiki Asfalistiki	-	20/10/2003	29/9/2003
	Optima	8/10/2004	-	29/6/2004
	Eoliki	-	8/2/2005	26/7/2005
	Active	-	11/7/2002	-
	Ellinikes Ependiseis	-	24/3/2005	-
	Proodos	18/4/2001	14/4/2005	2/6/2005
	Titan	26/6/2001	24/5/2004	24/1/2005
	Betanet	27/9/2004	-	2/9/2004
	Mathios Pyrimaha	-	28/7/2005	28/7/2005
Table I	Iktinos	25/5/2005	3/6/2003	29/12/2003
Sample	Kyriakidis Marbles	-	14/3/2003	8/3/2004

	Event Windows	Banks	Information Technology	Constructors	Wholesale Trade	Advising Companies	Insurance	Investment	Non Mining & Cements	Average
	[-20,-16]	-0,000732	0,036317	0,009368	0,041619	0,008285	-0,00729	-0,01043**	-0,01354**	0,008031975
	[-15,-11]	0,028952	-0,12185*	-0,01255	0,021039	0,039276	0,008759	0,01418	-0,02896*	-0,00639425**
	[-10,-6]	0,0046114*	0,081025	0,010874	0,018249	0,0169**	-0,01322**	0,015891	0,008116	0,0178058
	[-5,-1]	-0,019084**	0,059568	-0,01413*	-0,00676*	0,029503	0,023994	-0,00604*	-0,01144**	0,006951375*
	[-2,2]	0,003794*	0,027144**	-0,00652	-0,00211**	-0,0133	-0,02262	0,006692	0,000203*	-0,000839625
	[0,4]	-0,016823	-0,02003	-0,01671	0,045698**	-0,01574	0,039586*	-0,00476	0,02646**	0,004710125**
	[5,9]	0,0053814	0,016592*	-0,01981	0,019843*	0,004797*	0,060851**	0,012549*	-0,01275	0,010931675*
	[10,14]	-0,005595	0,094617**	0,009035**	-0,03282	-0,0517	0,017475**	-0,03547	-0,01633	-0,0025985
	[15,19]	0,026908**	-0,03714	0,016809	0,004337	0,017611	0,00148	-0,00109**	0,043194	0,009013625**
Table II Collaborations – CAR's	* 5% Significance Level, ** 10% Significance Level.									

	Event Windows	Banks	Information Technology	Constructors	Wholesale Trade	Advising Companies	Insurance	Investment	Non Mining & Cements	Average
	[-20,-16]	0,002412	-0,02162	0,029398	-0,02635**	-0,00511**	0,008843	-0,0297**	-0,02565*	-0,00847**
	[-15,-	0,03645	0,017623	-	-0,00339*	0,007338	-	0,007078	0,032261	0,008185

	11]			0,00074**			0,03114			
	[-10,-6]	-0,04593*	-0,05862*	0,038213	0,045803	0,009793	0,023871	0,008061	0,004688	0,003235
	[-5,-1]	0,003238	-0,07382**	0,006805	0,081066	0,032163	-0,03696	-0,00989*	0,002878	0,000685
	[-2,2]	-0,00234**	0,001142**	0,000289*	-0,01942	0,018505**	0,022443	0,006193*	-0,00314**	0,002959*
	[0,4]	0,004833*	0,045001*	0,04771*	-0,00502	0,019825**	0,038028	-0,00363	0,022778*	0,021191**
	[5,9]	-0,00247	0,03407**	-0,01743	-0,0035	0,002223*	0,082937	0,023663**	0,044472*	0,020496**
	[10,14]	0,005282	-0,05009	0,002886**	0,031124	-0,00581	-0,03648	-0,00478	0,009304	-0,00607
	[15,19]	0,030645	0,14398*	0,056436**	0,041202**	0,007353*	0,01925	-0,00338	-0,03557	0,03249**
Table III Management Change– CAR's	* 5% Significance Level, ** 10% Significance Level.									

	Event Windows	Banks	Information Technology	Constructors	Wholesale Trade	Advising Companies	Insurance	Investment	Non Mining & Cements	Average
	[-20,-16]	-0,02566	-0,02277*	0,012898	0,004588	0,00101	-0,01285	0,01284	0,007648	-0,00279
	[-15,-11]	0,003571*	0,008491	-0,03103**	0,026748**	0,016028	-0,00378	0,008024	0,02234	0,006299
	[-10,-6]	0,007655	-0,04648**	-0,01547*	0,003216	-0,02121	-0,00449**	-0,01287**	0,000899	-0,01109*
	[-5,-1]	0,006566	-0,00632**	-0,02616**	0,002259**	-0,00504*	-0,00731**	-0,01601**	0,013791	-0,00478**
	[-2,2]	0,002838**	0,017549*	-0,0017	0,002312*	-0,00945	0,005769*	0,002868	-0,00621	0,001747**
	[0,4]	0,004327*	0,053423**	0,011674**	0,044571*	0,016735*	-0,01122	0,033478*	0,009539*	0,020316*
	[5,9]	0,023472**	-0,0273	0,001213*	0,028168**	0,006033**	0,000509**	0,004294**	-0,02729	0,001137*
	[10,14]	0,003487*	-0,01086	-0,03623	0,025582	0,014356*	0,009413	0,019554*	0,006642**	0,003993**
	[15,19]	-0,00915	0,050176	0,026841**	-0,00712	-0,00671	0,050653*	0,004581	-0,00913	0,012518
Table	* 5% Significance Level, ** 10% Significance Level.									

	Day	Collaborations		Management Change		Stock Repurchase	
		Abnormal Returns	Bootstrap	Abnormal	Bootstrap	Abnormal	Bootstrap

IV Stock repurchase – CAR's	

		(ARs)	Results (ARs)	Returns (ARs)	Results (ARs)	Returns (ARs)	Results (ARs)
	-20	0,014715	0,015415	0,011221	0,011921	-0,00241	-0,00171
	-19	0,00129	0,00177	0,004196	0,004676	-0,01132	-0,01084
	-18	-0,01138	-0,005045	-0,01346	-0,004632	0,000624	-0,005348
	-17	-0,0071	-0,0053603	-0,00234	-0,004333	-0,01336	-0,003977
	-16	0,002399	0,003099	0,002801	0,003501	0,000805	0,001505
	-15	0,007143	0,007623	0,009079	0,009559	-0,00064	-0,00016
	-14	0,007755	0,007449	0,003763	0,006421	0,001032	0,000196
	-13	-0,00635	0,0036383	0,001844	0,007404	0,008674	-0,0008747
	-12	0,00951	0,01021	0,016605	0,017305	-0,01233	-0,01163
	-11	0,010895	0,011375	0,005158	0,005638	0,006833	0,007313
	-10	0,007575	0,009235	-0,00984	-0,002341	-0,00233	0,0022515
	-9	0,001764	0,0046263	-0,03429	-0,0168167	-0,01064	-0,002832
	-8	0,00454	0,00524	-0,00632	-0,00562	0,004474	0,005174
	-7	-0,00577	-0,00529	0,006725	0,007205	0,014836	0,015316
	-6	-0,00349	-0,00463	-0,00221	0,0022575	0,001315	0,0080755
	-5	-0,00368	-0,001349	-0,00485	0,0025137	-0,00239	-0,0032283
	-4	0,003123	0,003823	0,014601	0,015301	-0,00861	-0,00791
	-3	-0,00191	-0,00143	0,000008	0,000488	-0,02044	-0,01996
	-2	-0,00976	-0,005835	-0,00472	-0,002356	0,029837	0,0046985
	-1	-0,00685	-0,004272	-0,0018	-0,0029533	0,008166	0,0136137
	0	0,003794	0,004494	-0,00234	-0,00164	0,002838	0,003538
	1	-0,00166	-0,00118	0,000919	0,001399	-0,01153	-0,01105
	2	-0,00738	-0,00452	-0,00726	-0,0031705	0,013822	0,001146
	3	0,000317	-0,0063177	0,006928	0,0020873	0,000822	0,004338
	4	-0,01189	-0,01119	0,006594	0,007294	-0,00163	-0,00093
	5	-0,00618	-0,0057	-0,0068	-0,00632	0,003904	0,004384
	6	-0,0026	-0,00439	0,003357	-0,0017215	0,020725	0,0123145
	7	0,006704	0,003867	-0,00808	-0,0009277	-0,01126	0,00647
	8	0,007497	0,008197	0,00194	0,00264	0,009945	0,010645
	9	-0,00004	0,00044	0,007119	0,007599	0,000152	0,000632
	10	0,013024	0,006492	-0,00631	0,0004045	-0,02209	-0,010969
	11	-0,00162	0,0051683	0,008683	0,0041073	-0,0074	-0,0019163
	12	0,004101	0,004801	0,009949	0,010649	0,023741	0,024441
	13	-0,03497	-0,03449	-0,000016	0,000464	0,007055	0,007535
	14	0,013871	-0,0105495	-0,00703	-0,003523	0,002183	0,004619
	15	0,007519	0,010336	0,003114	-0,002132	-0,00187	-0,002619
	16	0,009618	0,010318	-0,00248	-0,00178	-0,00817	-0,00747
	17	0,013388	0,013868	0,007887	0,008367	0,000153	0,000633
Table V	18	0,005851	0,0096195	0,019487	0,013687	-0,00428	-0,0020635

Banks	19	-0,00947	-0,0018095	0,002641	0,011064	0,005017	0,0003685

	Day	Collaborations		Management Change		Stock Repurchase	
		Abnormal Returns (ARs)	Bootstrap Results (ARs)	Abnormal Returns (ARs)	Bootstrap Results (ARs)	Abnormal Returns (ARs)	Bootstrap Results (ARs)
	-20	0,023001	0,023701	-0,00363	-0,00293	-0,02769	-0,02699
	-19	-0,00099	-0,00051	-0,00188	-0,0014	-0,05852	-0,05804
	-18	0,005141	0,0020755	-0,01332	-0,0076	-0,00819	-0,033355
	-17	0,006555	0,00477	0,002898	-0,005364	0,036246	0,0211453
	-16	0,002614	0,003314	-0,00567	-0,00497	0,03538	0,03608
	-15	0,007545	0,008025	0,049916	0,050396	0,016743	0,017223
	-14	-0,00893	-0,000692	0,024705	0,0373105	-0,01638	0,0001815
	-13	-0,03186	-0,03046	-0,01858	0,002943	0,001884	-0,004343
	-12	-0,05059	-0,04989	0,002704	0,003404	0,001465	0,002165
	-11	-0,03802	-0,03754	-0,04112	-0,04064	0,004783	0,005263
	-10	0,080299	0,0211395	-0,00092	-0,02102	-0,00568	-0,000448
	-9	-0,00732	0,016743	-0,02614	-0,002605	-0,01244	-0,00891
	-8	-0,02275	-0,02205	0,019245	0,019945	-0,00861	-0,00791
	-7	0,002354	0,002834	-0,02257	-0,02209	-0,01394	-0,01346
	-6	0,028441	0,0153975	-0,02823	-0,0254	-0,00581	-0,009875
	-5	0,017764	0,0238043	0,029018	-0,00528	-0,00446	-0,011543
	-4	0,025208	0,025908	-0,01663	-0,01593	-0,02436	-0,02366
	-3	0,002592	0,003072	-0,03104	-0,03056	0,023397	0,023877
	-2	-0,00095	0,000821	-0,01713	-0,024085	-0,01076	0,0063185
	-1	0,014952	0,0137153	-0,03803	-0,018006	0,009854	0,0055477
	0	0,027144	0,027844	0,001142	0,001842	0,017549	0,018249
	1	-0,03564	-0,03516	0,029435	0,029915	0,020789	0,021269
	2	-0,03658	-0,03611	0,032512	0,0309735	0,008436	0,0146125
	3	0,03925	-0,003843	-0,00083	0,0048073	-0,00606	0,0050283
	4	-0,0142	-0,0135	-0,01726	-0,01656	0,012709	0,013409
	5	-0,00064	-0,00016	0,006534	0,007014	-0,01779	-0,01731
	6	0,01299	0,006175	0,006106	0,00632	0,002356	-0,007717
	7	-0,00973	0,0064537	0,012944	0,007838	-0,03216	-0,008259
	8	0,016101	0,016801	0,004464	0,005164	0,005027	0,005727
	9	-0,00213	-0,00165	0,004022	0,004502	0,015265	0,015745
	10	-0,01598	-0,009055	0,006422	0,005222	0,01137	0,0133175
	11	0,033652	0,0156977	0,001414	-0,002144	-0,00248	-0,00244
	12	0,029421	0,030121	-0,01427	-0,01357	-0,01621	-0,01551
	13	0,014149	0,014629	-0,02959	-0,02911	0,004015	0,004495
	14	0,033371	0,02376	-0,01407	-0,02183	-0,00756	-0,001772
	15	-0,02779	0,0076483	0,01988	0,0054887	0,005635	0,001793
	16	0,017364	0,018064	0,010656	0,011356	0,007304	0,008004
Table VI	17	-0,00577	-0,00529	0,015356	0,015836	0,004841	0,005321
Information	18	-0,00715	-0,00646	0,056235	0,0357955	0,018165	0,011503
Technology	19	-0,01379	-0,01047	0,041852	0,0490435	0,014231	0,016198

	Day	Collaborations		Management Change		Stock Repurchase	
		Abnormal Returns (ARs)	Bootstrap Results (ARs)	Abnormal Returns (ARs)	Bootstrap Results (ARs)	Abnormal Returns (ARs)	Bootstrap Results (ARs)
	-20	-0,01106	-0,01036	-0,00328	-0,00258	0,02526	0,02596
	-19	0,010192	0,010672	0,01637	0,01685	0,006635	0,007115
	-18	-0,00528	0,002456	-0,00316	0,006605	0,00399	0,0053125
	-17	0,007539	0,003412	0,00517	0,0054353	-0,00999	-0,00633
	-16	0,007977	0,008677	0,014296	0,014996	-0,01299	-0,01229
	-15	-0,01154	-0,01106	0,005246	0,005726	0,004784	0,005264
	-14	0,004582	-0,003479	-0,00423	0,000508	-0,0081	-0,001658
	-13	0,00301	0,0015307	0,002552	-0,003486	-0,00425	-0,00795
	-12	-0,003	-0,0023	-0,00878	-0,00808	-0,0115	-0,0108
	-11	-0,0056	-0,00512	0,004474	0,004954	-0,01197	-0,01149
	-10	-0,00089	-0,003245	0,02685	0,015662	0,005362	-0,003304
	-9	0,010119	0,0003097	-0,02412	-0,0016033	-0,00812	-0,0043693
	-8	-0,0083	-0,0076	-0,00754	-0,00684	-0,01035	-0,00965
	-7	0,009894	0,010374	0,040565	0,041045	0,009114	0,009594
	-6	0,000048	0,004971	0,002455	0,02151	-0,01147	-0,001178
	-5	-0,00955	-0,00211	0,022908	0,0039977	-0,00258	-0,0056067
	-4	0,003172	0,003872	-0,01337	-0,01267	-0,00277	-0,00207
	-3	-0,00547	-0,00499	-0,00995	-0,00947	-0,01498	-0,0145
	-2	0,000978	-0,002246	0,00059	-0,00468	-0,02544	-0,02021
	-1	-0,00326	-0,002934	0,006631	0,0025033	0,019611	-0,0025097
	0	-0,00652	-0,00582	0,000289	0,000989	-0,0017	-0,001
	1	-0,00701	-0,00653	0,010643	0,011123	0,008932	0,009412
	2	-0,000009	-0,0035095	0,004826	0,0077345	-0,00459	0,002171
	3	-0,01018	-0,0010627	0,023541	0,0122593	0,009333	0,001481
	4	0,007001	0,007701	0,008411	0,009111	-0,0003	0,0004
	5	0,001028	0,001508	-0,0177	-0,01722	-0,00478	-0,0043
	6	-0,00195	-0,000461	0,013729	-0,0019855	-0,000073	-0,0024265
	7	-0,01366	-0,00679	-0,02424	0,0024723	0,000004	0,0022213
	8	-0,00476	-0,00406	0,017928	0,018628	0,006733	0,007433
	9	-0,00047	0,00001	-0,00716	-0,00668	-0,00067	-0,00019
	10	0,011849	0,0056895	-0,0082	-0,00768	0,004501	0,0019155
	11	-0,00165	0,0031663	-0,01408	-0,0006167	-0,01455	-0,0077597
	12	-0,0007	0	0,02043	0,02113	-0,01323	-0,01253
	13	0,003552	0,004032	0,00242	0,0029	-0,00974	-0,00926
	14	-0,00402	-0,000234	0,002316	0,002368	-0,00322	-0,00648
	15	-0,00681	0,0080717	0,009635	0,0059273	0,006899	0,0026037
	16	0,035045	0,035745	0,005831	0,006531	0,004132	0,004832
	17	0,004613	0,005093	-0,00082	-0,00034	-0,01766	-0,01718
Table VII	18	-0,00592	-0,0006535	0,007591	0,0033855	0,016111	-0,0007745
Constructors	19	-0,01012	-0,00802	0,034196	0,0208935	0,017363	0,016737

	Day	Collaborations		Management Change		Stock Repurchase	
		Abnormal Returns (ARs)	Bootstrap Results (ARs)	Abnormal Returns (ARs)	Bootstrap Results (ARs)	Abnormal Returns (ARs)	Bootstrap Results (ARs)
	-20	0,01134	0,01204	-0,00423	-0,00353	0,002418	0,003118
	-19	0,008246	0,008726	-0,00449	-0,00401	-0,00113	-0,00065
	-18	0,023519	0,0158825	-0,01852	-0,011505	0,004399	0,0016345
	-17	-0,00101	0,0073463	0,010759	-0,005877	0,026848	0,0011023
	-16	-0,00047	0,00023	-0,00987	-0,00917	-0,02794	-0,02724
	-15	0,000016	0,000496	-0,00074	-0,00026	-0,01868	-0,0182
	-14	0,014457	0,0072365	0,010083	0,0046715	0,025278	0,003299
	-13	0,002135	0,008643	-0,00881	0,001411	0,005257	0,008255
	-12	0,009337	0,010037	0,00296	0,00366	-0,00577	-0,00507
	-11	-0,00491	-0,00443	-0,00688	-0,0064	0,020668	0,021148
	-10	0,008232	0,001661	0,030986	0,012053	-0,01913	0,000769
	-9	0,001662	0,003701	-0,0014	0,0071987	0,008095	-0,0019073
	-8	0,001209	0,001909	-0,00799	-0,00729	0,005313	0,006013
	-7	0,004455	0,004935	0,011244	0,011724	0,008436	0,008916
	-6	0,002691	0,003573	0,012964	0,012104	0,000504	0,00447
	-5	-0,00735	-0,006133	-0,0068	0,019762	-0,00738	-0,0074287
	-4	-0,01374	-0,01304	0,053122	0,053822	-0,01541	-0,01471
	-3	0,014787	0,015267	0,020698	0,021178	-0,00063	-0,00015
	-2	0,020077	0,017432	-0,00317	0,008764	0,012954	0,006162
	-1	-0,02053	-0,0008543	0,017218	-0,0017907	0,012719	0,0093283
	0	-0,00211	-0,00141	-0,01942	-0,01872	0,002312	0,003012
	1	0,02763	0,02811	-0,00451	-0,00403	0,012193	0,012673
	2	0,028105	0,0278675	0,00205	-0,00123	0,013396	0,0127945
	3	-0,01618	0,006727	0,004193	0,006304	0,022835	0,0100237
	4	0,008256	0,008956	0,012669	0,013369	-0,00616	-0,00546
	5	0,002708	0,003188	-0,02375	-0,02327	0,008483	0,008963
	6	-0,00707	-0,002181	0,00857	-0,00759	-0,0009	0,0037915
	7	-0,01012	-0,0045033	0,015607	0,012603	0,007243	0,0028033
	8	0,00368	0,00438	0,013632	0,014332	0,002067	0,002767
	9	0,030645	0,031125	-0,01757	-0,01709	0,011278	0,011758
	10	0,004517	0,017581	0,020437	0,0014335	0,009871	0,0105745
	11	-0,02477	-0,0076177	0,000629	0,0125107	0,00567	0,0066833
	12	-0,0026	-0,0019	0,016466	0,017166	0,004509	0,005209
	13	-0,00028	0,0002	-0,00051	-0,00003	0,002693	0,003173
	14	-0,00969	-0,004985	-0,0059	-0,003205	0,00284	0,0027665
	15	0,006875	-0,004695	0,030104	0,0186227	0,00679	0,008838
	16	-0,01127	-0,01057	0,031664	0,032364	0,016884	0,017584

Table VIII	17	-0,01083	-0,01035	-0,01371	-0,01323	-0,00109	-0,00061
Wholesale	18	0,018501	0,0038355	-0,01125	-0,01248	-0,03143	-0,01626
Trade	19	0,001055	0,009778	0,004396	-0,003427	0,001723	0,012387

	Day	Collaborations		Management Change		Stock Repurchase	
		Abnormal Returns (ARs)	Bootstrap Results (ARs)	Abnormal Returns (ARs)	Bootstrap Results (ARs)	Abnormal Returns (ARs)	Bootstrap Results (ARs)
	-20	-0,01226	-0,01156	0,009451	0,010151	-0,00543	-0,00473
	-19	0,003425	0,003905	-0,01848	-0,018	0,004083	0,004563
	-18	0,009443	0,006434	0,00418	-0,00715	0,012402	0,0082425
	-17	0,007932	0,0057083	-0,0007	0,0013083	-0,00449	0,0007873
	-16	-0,00025	0,00045	0,000445	0,001145	-0,00555	-0,00485
	-15	0,012517	0,012997	-0,00508	-0,0046	-0,00752	-0,00704
	-14	0,025972	0,0192445	0,009659	0,0022895	-0,00599	-0,006755
	-13	0,000663	0,0074917	0,020365	0,002838	0,024507	0,0097067
	-12	-0,00416	-0,00346	-0,02151	-0,02081	0,010603	0,011303
	-11	0,004282	0,004762	0,003904	0,004384	-0,00557	-0,00509
	-10	0,004164	0,004223	-0,00887	-0,002483	-0,01427	-0,00992
	-9	-0,00485	0,0101113	0,003718	-0,0012357	-0,00712	-0,0058633
	-8	0,03102	0,03172	0,001445	0,002145	0,0038	0,0045
	-7	-0,006	-0,00552	0,007214	0,007694	0,001945	0,002425
	-6	-0,00743	-0,006715	0,006282	0,006748	-0,00556	-0,0018075
	-5	0,01219	0,008558	-0,00421	-0,002686	-0,00296	-0,0038367
	-4	0,020914	0,021614	-0,01013	-0,00943	-0,00299	-0,00229
	-3	0,006562	0,007042	0,030261	0,030741	-0,01522	-0,01474
	-2	0,003192	0,004877	-0,00105	0,0146055	0,014071	-0,0005745
	-1	-0,01335	-0,0078193	0,017302	0,0115857	0,002051	0,002224
	0	-0,0133	-0,0126	0,018505	0,019205	-0,00945	-0,00875
	1	0,012179	0,012659	0,002783	0,003263	0,01191	0,01239
	2	0,003422	0,0078005	0,020079	0,011431	0,017259	0,0145845
	3	-0,01929	-0,0048737	-0,00668	-0,0004903	0,001281	0,0047567
	4	0,001247	0,001947	-0,01487	-0,01417	-0,00427	-0,00357
	5	0,020017	0,020497	0,004589	0,005069	-0,00014	0,00034
	6	0,008372	0,0141945	-0,0124	-0,0039055	-0,00091	-0,000525
	7	-0,01728	-0,0059327	-0,00082	-0,000544	-0,0114	-0,0020237
	8	-0,00889	-0,00819	0,011588	0,012288	0,006239	0,006939
	9	0,002577	0,003057	-0,00074	-0,00026	0,012248	0,012728
	10	-0,00014	0,0012185	0,010368	0,004814	-0,00394	0,004154
	11	-0,00734	-0,0038667	0,000975	0,0001343	-0,00145	0,00222
	12	-0,00412	-0,00342	-0,01094	-0,01024	0,01205	0,01275

	13	-0,01862	-0,01814	0,000415	0,000895	0,009217	0,009697
	14	-0,02149	-0,020055	-0,00663	-0,0031075	-0,00152	0,0038485
	15	-0,00425	-0,0097733	-0,01114	-0,003889	-0,00613	-0,0029867
	16	-0,00358	-0,00288	0,006103	0,006803	-0,00131	-0,00061
Table IX	17	0,02766	0,02814	0,004514	0,004994	0,002164	0,002644
Advising	18	-0,0041	0,01178	-0,00597	-0,000728	-0,01142	-0,004628
Firms	19	0,001885	-0,0011075	0,013845	0,0039375	0,009981	-0,0007195

	Day	Collaborations		Management Change		Stock Repurchase	
		Abnormal Returns (ARs)	Bootstrap Results (ARs)	Abnormal Returns (ARs)	Bootstrap Results (ARs)	Abnormal Returns (ARs)	Bootstrap Results (ARs)
	-20	0,012311	0,013011	-0,00539	-0,00469	-0,000093	0,000607
	-19	0,012439	0,012919	0,007892	0,008372	-0,01812	-0,01764
	-18	-0,02437	-0,0059655	0,005645	0,0067685	-0,00618	-0,01215
	-17	-0,01202	-0,010682	0,003739	0,0021147	0,010201	0,0017877
	-16	0,004344	0,005044	-0,00304	-0,00234	0,001342	0,002042
	-15	-0,02291	-0,02243	0,006438	0,006918	-0,00769	-0,00721
	-14	0,041469	0,0092795	-0,02918	-0,011371	-0,00947	-0,00858
	-13	-0,00713	0,005483	-0,01056	-0,0137833	0,01305	0,0025177
	-12	-0,01789	-0,01719	-0,00161	-0,00091	0,003973	0,004673
	-11	0,01522	0,0157	0,003775	0,004255	-0,00364	-0,00316
	-10	-0,03903	-0,011905	-0,00027	0,0017525	0,004136	0,000248
	-9	0,007995	-0,005076	-0,00339	0,0025593	-0,00069	0,0013363
	-8	0,015807	0,016507	0,011338	0,012038	0,000563	0,001263
	-7	0,006473	0,006953	0,007928	0,008408	-0,00208	-0,0016
	-6	-0,00447	0,0010015	0,00826	0,008094	-0,00641	-0,004245
	-5	-0,0231	-0,0062723	-0,01811	-0,0012677	0,001316	-0,002348
	-4	0,008753	0,009453	0,006047	0,006747	-0,00195	-0,00125
	-3	0,022499	0,022979	-0,00469	-0,00421	0,002588	0,003068
	-2	0,011674	0,0170865	-0,00919	-0,00694	-0,01379	-0,005601
	-1	0,004167	-0,0022597	-0,01102	0,0007443	0,004525	-0,0011653
	0	-0,02262	-0,02192	0,022443	0,023143	0,005769	0,006469
	1	0,013613	0,014093	0,010152	0,010632	-0,01421	-0,01373
	2	0,00944	0,0115265	0,018181	0,0141665	0,004991	-0,0046095
	3	0,006291	0,0161977	-0,01123	0,0018137	-0,00314	-0,0009263
	4	0,032862	0,033562	-0,00151	-0,00081	-0,00463	-0,00393
	5	0,01408	0,01456	0,012419	0,012899	0,009128	0,009608
	6	-0,01871	-0,002315	0,022619	0,017519	-0,00663	0,001249
	7	0,016901	-0,0040363	0,023262	0,026563	0,004173	0,0005537
	8	-0,0103	-0,0096	0,033808	0,034508	0,004118	0,004818

	9	0,058878	0,059358	-0,00917	-0,00869	-0,01028	-0,0098
	10	0,01397	0,036424	-0,00604	-0,007605	0,005486	-0,002397
	11	-0,01256	7,333E-05	-0,00127	-0,00331	-0,00299	0,004221
	12	-0,00119	-0,00049	-0,00262	-0,00192	0,010167	0,010867
	13	0,001628	0,002108	-0,0107	-0,01022	-0,00671	-0,00623
	14	0,015623	0,0086255	-0,01585	-0,013275	0,003464	-0,001623
	15	-0,0115	0,012403	0,016197	0,001148	-0,00607	0,0014663
	16	0,033086	0,033786	0,003097	0,003797	0,007005	0,007705
	17	-0,01171	-0,01123	-0,01663	-0,01615	0,011358	0,011838
Table X	18	-0,01146	-0,011585	0,016519	-0,0000555	0,027669	0,0195135
Insurance	19	0,003061	-0,0041995	0,000069	0,008294	0,010686	0,0191775

	Day	Collaborations		Management Change		Stock Repurchase	
		Abnormal Returns (ARs)	Bootstrap Results (ARs)	Abnormal Returns (ARs)	Bootstrap Results (ARs)	Abnormal Returns (ARs)	Bootstrap Results (ARs)
	-20	-0,00488	-0,00418	-0,0066	-0,0059	0,021881	0,022581
	-19	-0,0032	-0,00272	-0,000015	0,000465	0,001262	0,001742
	-18	-0,00189	-0,002545	-0,01316	-0,0065875	-0,01302	-0,005879
	-17	-0,00071	-0,0007817	0,001204	-0,0076953	0,000234	-0,003436
	-16	0,000255	0,000955	-0,01113	-0,01043	0,002478	0,003178
	-15	-0,00222	-0,00174	-0,00181	-0,00133	0,00923	0,00971
	-14	-0,014	-0,00811	0,000947	-0,0004315	-0,00051	0,00436
	-13	0,001513	-0,0035507	0,006676	0,0037597	-0,00408	0,0013743
	-12	0,001835	0,002535	0,003656	0,004356	0,008713	0,009413
	-11	0,027054	0,027534	-0,00239	-0,00191	-0,00534	-0,00486
	-10	-0,01614	0,005457	0,004425	0,0010175	-0,01162	-0,00848
	-9	0,021159	0,0006663	-0,00175	-0,000505	-0,00005	-0,003749
	-8	-0,00302	-0,00232	-0,00419	-0,00349	0,000423	0,001123
	-7	-0,00348	-0,003	-0,00039	0,00009	-0,00496	-0,00448
	-6	0,017362	0,006941	0,009966	0,004788	0,003345	-0,0008075
	-5	0,00389	0,0005307	-0,00111	0,0047773	0,00969	0,0023217
	-4	-0,01966	-0,01896	0,005476	0,006176	-0,00607	-0,00537
	-3	-0,00464	-0,00416	-0,00185	-0,00137	-0,01937	-0,01889
	-2	0,004971	0,0001655	-0,0183	-0,010075	-0,00126	-0,010315
	-1	0,009399	0,0070207	0,005898	-0,0020697	0,001003	0,0008703
	0	0,006692	0,007392	0,006193	0,006893	0,002868	0,003568
	1	0,00043	0,00091	-0,00598	-0,0055	0,015733	0,016213
	2	-0,00054	-0,000055	-0,00274	-0,00436	0,007826	0,0117795
	3	-0,01264	-0,0039617	-0,00267	-0,0012813	0,006884	0,004959
	4	0,001295	0,001995	0,001566	0,002266	0,000167	0,000867
	5	0,004738	0,005218	0,00293	0,00341	0,00163	0,00211
	6	-0,00186	0,001439	0,005022	0,003976	0,020534	0,011082
	7	-0,00502	0,0029783	-0,01308	-0,0013257	-0,00554	0,0008347
	8	0,015815	0,016515	0,004081	0,004781	-0,01249	-0,01179
	9	-0,00113	-0,00065	0,024709	0,025189	0,000163	0,000643
	10	-0,00807	-0,0046	-0,00422	0,0102445	0,010711	0,005437
	11	0,001724	-0,0045353	-0,00651	-0,0007323	0,008345	0,0056853
	12	-0,00726	-0,00656	0,008533	0,009233	-0,002	-0,0013
	13	-0,00296	-0,00248	-0,00181	-0,00133	-0,00764	-0,00716
	14	-0,01891	-0,010935	-0,00078	-0,001295	0,010141	0,0012505
	15	-0,01399	-0,0081437	-0,02205	-0,00688	0,007357	0,0049727
	16	0,008469	0,009169	0,00219	0,00289	-0,00258	-0,00188
	17	-0,00311	-0,00263	0,008753	0,009233	0,008873	0,009353
Table XI	18	0,009183	0,0030365	0,004914	0,0068335	-0,00296	0,0029565
Investment	19	-0,00165	0,0037665	0,002817	0,0038655	-0,00611	-0,004535

	Day	Collaborations		Management Change		Stock Repurchase	
		Abnormal Returns (ARs)	Bootstrap Results (ARs)	Abnormal Returns (ARs)	Bootstrap Results (ARs)	Abnormal Returns (ARs)	Bootstrap Results (ARs)
	-20	-0,000002	0,000698	-0,00513	-0,00443	-0,0051	-0,0044
	-19	-0,00743	-0,00695	-0,00178	-0,0013	-0,00044	0,00004
	-18	0,003959	-0,0017355	-0,00886	-0,00532	-0,00412	-0,00228
	-17	-0,00551	-0,002037	-0,01373	-0,006246	-0,00303	0,004396
	-16	-0,00456	-0,00386	0,003852	0,004552	0,020338	0,021038
	-15	-0,01808	-0,0176	0,015882	0,016362	0,004263	0,004743
	-14	-0,00103	-0,009555	0,004176	0,010029	-0,00018	0,0020415
	-13	-0,00869	-0,0027987	0,008381	0,0069467	0,02484	0,011718
	-12	0,001324	0,002024	0,008283	0,008983	0,010494	0,011194
	-11	-0,00249	-0,00201	-0,00446	-0,00398	-0,01708	-0,0166
	-10	0,004905	0,0012075	0,006581	0,0010605	0,007489	-0,0047955
	-9	-0,00202	-0,0011717	0,000949	0,0060983	-0,00559	0,004616
	-8	-0,0064	-0,0057	0,010765	0,011465	0,011949	0,012649
	-7	0,003076	0,003556	-0,00634	-0,00586	-0,01167	-0,01119
	-6	0,008556	0,005816	-0,00727	-0,006805	-0,00127	-0,00647
	-5	-0,00798	0,0071603	-0,00789	-0,0005627	-0,00213	0,0065383
	-4	0,020905	0,021605	0,013472	0,014172	0,023015	0,023715
	-3	-0,0048	-0,00432	0,000864	0,001344	-0,00368	-0,0032
	-2	-0,00203	-0,003415	-0,02743	-0,013283	0,000327	-0,0016765
	-1	-0,01752	-0,006449	0,023859	-0,002237	-0,00374	-0,0032077
	0	0,000203	0,000903	-0,00314	-0,00244	-0,00621	-0,00551
	1	0,006667	0,007147	0,002018	0,002498	0,017977	0,018457
	2	0,009283	0,007975	0,004294	0,003156	-0,0013	0,0083385
	3	0,015742	0,0065283	0,023115	0,0079663	-0,00422	-0,0007447
	4	-0,00544	-0,00474	-0,00351	-0,00281	0,003286	0,003986
	5	0,007442	0,007922	0,004255	0,004735	-0,01339	-0,01291
	6	-0,00049	0,003476	-0,00666	-0,0012025	-0,00462	-0,009005
	7	0,00233	-0,0007233	0,012374	0,0114323	-0,00891	-0,0068133
	8	-0,00401	-0,00331	0,028583	0,029283	-0,00691	-0,00621
	9	-0,01803	-0,01755	0,005915	0,006395	0,006537	0,007017
	10	0,003846	-0,007092	-0,01398	-0,0040325	-0,00394	0,0012985
	11	-0,00748	0,002511	-0,01294	-0,00959	0,009819	-0,000467
	12	0,011167	0,011867	-0,00185	-0,00115	-0,00728	-0,00658
	13	-0,01321	-0,01273	0,020822	0,021302	-0,01704	-0,01656
	14	-0,01065	-0,01193	0,017259	0,0190405	0,025094	0,004027
	15	0,004473	-0,00091	-0,00028	0,0032097	0,021395	0,015687
	16	0,003447	0,004147	-0,00735	-0,00665	0,000572	0,001272

Table XII	17	0,019755	0,020235	-0,02139	-0,02091	-0,02324	-0,02276
Non Mining	18	-0,01108	0,0043375	-0,00545	-0,01342	-0,01151	-0,017375
& Cements	19	0,026596	0,007758	-0,00111	-0,00328	0,003648	-0,003931

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