SINGAPORE MANAGEMENT UNIVERSITY

QF604 Econometrics of Financial Markets

Group Assignment 2

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DECLARATION

Completion of this assignment is a result of group collaboration. About completion of the assignment, we:

1.   have clear and fair division of work;

2.   have no complaint on other group members.

I have read through and give personal consent to statements above.

SIGNATURE:

1 INTRODUCTION

Suggested course reading, *FIANCIAL VALUATION AND ECONOMETRICS*, introduces a methodology on how to conduct an event study which tests whether systematic corporate financial events affect the market price of corresponding stocks, and then draw additional conclusions, such as market efficiency, price pressure effect, substitution effect, and so on, based on statistics and test results.

This assignment will follow the methodology to study the Dividend Increase and Buyback Transaction Announcements of Microsoft Corp.

2 EVENT

Dividend Increase, Buyback Transaction Announcements

Situation: Microsoft Corp. announced that its board of directors approved an 0.08 per share quarterly dividend. Under the plan approved by the Microsoft board, the company will move from its current annual dividend of $0.16 per share to a quarterly dividend of 0.08 per share, which would essentially double the annual dividend to approximately 3.5 billion, if continued at that level. The company will also pay a one-time special dividend of 3 per share, or 32 billion, subject to shareholder approval of stock plan amendments that will allow certain adjustments to employee equity compensation awards to offset the impact of this large one-time payout.

3 TESTING FRAMEWORK

3.1 Event Window:

The announcement day is July 20,2004, we choose 10 trading days before and after the announcement day as observation window, that is, 21 days in total as event window, from July 6,2004 to August 3,2004. No other significant information occurred in this period.

3.2 Estimation Period:

To guarantee the relatively large sample size, we choose 240 trading days before event window, from July 21,2003 to January July 2,2004

3.3 Benchmark

We define mean return rates as the normal return rate and assume Market Model where stock i return at time t r_{it} and market return r_{mt} follow:

$$r_{it} = \alpha_i + \beta_i r_{mt} + e_{it}$$

where following conditions are assumed:

a) $cov(r_{mt}, e_{it}) = 0$

b) $var(e_{it}) = \sigma_i^2, a\ constant$

c) $cov(e_{it}, e_{i(t-k)}) = 0\ for\ k \neq 0$

The OLS regression of data set in Estimation Window will yield BLUE $\hat{a}_i$ and $\hat{\beta}_i$, hence the benchmark during the Event Window is defined as

$$\hat{r}_{i\tau} = \hat{a}_i + \hat{\beta}_i r_{m\tau}. \quad \tau \in [-10,10]$$

and the announcement day is $\tau = 0$.

The normal return on day τ is an expected return conditional on information available up to and including day τ. In the case of market model, this relevant information is just $r_{m\tau}$.

3.4 Test Statistics

The abnormal return to stock i at time τ is

$$AR_{i\tau} = r_{i\tau} - \hat{r}_{i\tau} = r_{i\tau} - \hat{a}_i - \hat{\beta}_i r_{m\tau}$$

Then, the $AR_{i\tau}$'s computed during the Event Window would be randomly varying about zero provided the market is efficient (quick to process information and update price) and rational (will process relevant information correctly given the information) which are basically an assumption about market efficiency.

Define the null hypothesis

$$H_0: event\ has\ no\ impact\ on\ the\ stock's\ abnormal\ returns$$

we have

$$E(AR_{i\tau} \mid r_{m\tau}) = E(r_{i\tau} \mid r_{m\tau}) - E(\hat{\alpha}_i \mid r_{m\tau}) - r_{m\tau}E(\hat{\beta}_i \mid r_{m\tau})$$
$$= E(r_{i\tau} \mid r_{m\tau}) - \alpha - \beta r_{m\tau}$$
$$= 0$$

$$var\,(AR_{i\tau} \mid r_{m\tau}) = var\,(r_{i\tau} \mid r_{m\tau}) + var\,(\hat{\alpha}_i \mid r_{m\tau}) + r_{m\tau}^2 var\,(\hat{\beta}_i \mid r_{m\tau})$$
$$+ 2r_{m\tau}cov\,(\hat{\alpha}_i, \hat{\beta}_i \mid r_{m\tau}) - 2cov\,(r_{i\tau}, \hat{\alpha}_i \mid r_{m\tau})$$
$$- 2r_{m\tau}cov\,(r_{i\tau}, \hat{\beta}_i \mid r_{m\tau})$$

$$var\,(AR_{i\tau} \mid r_{m\tau}) = \sigma_i^2 + \sigma_i^2 \left(\frac{1}{L} + \frac{\bar{r}_m^2}{\sum_{t=-L-10}^{-11} (r_{mt} - \bar{r}_m)^2} \right)$$
$$+ r_{m\tau}^2 \sigma_i^2 \frac{1}{\sum_{t=-L-10}^{-11} (r_{mt} - \bar{r}_m)^2}$$
$$- 2r_{m\tau}\sigma_i^2 \frac{\bar{r}_m}{\sum_{t=-L-10}^{-11} (r_{mt} - \bar{r}_m)^2}$$
$$= \sigma_i^2 \left(1 + \frac{1}{L} + \frac{(r_{m\tau} - \bar{r}_m)^2}{\sum_{t=-L-10}^{-11} (r_{mt} - \bar{r}_m)^2} \right)$$

$$where \ \bar{r}_m = \frac{1}{L} \sum_{t=-L-10}^{-11} r_{mt}$$

The sample size here is $L = 240$, large enough to use σ_i^2 as an approximation of $var(\mathrm{AR}_{i\tau} \mid r_{m\tau})$. Hence

$$AR_{i\tau} \mid r_{m\tau} \overset{\tilde{d}}{} N(0, \sigma_i^2)$$

Test for stock i using

$$t_{AR} = \frac{AR_{i\tau}}{\hat{\sigma}_i} \overset{\tilde{d}}{} N(0,1)$$

In order to test the persistence of the impact of the event during period $\tau_k - \tau_1$ ($where\ \tau_1\ is\ the\ start\ of\ Event\ Window, 1 \leq k \leq 21$) , the cumulative abnormal return are introduced by adding up abnormal return

$$CAR(\tau_1, \tau_k) = \sum_{\tau=\tau_1}^{\tau_k} AR_{i\tau}$$

Assumption c). reveals that

$$var\big(CAR(\tau_1, \tau_k) \mid r_{m\tau_k}, \dots\big) = \sum_{\tau=\tau_1}^{\tau_k} var(AR_{i\tau} \mid r_{m\tau}) \approx (\tau_k - \tau_1 + 1)\sigma_i^2$$

$$CAR(\tau_1, \tau_k) \mid r_{m\tau_k, \dots} \approx N\big(0, (\tau_k - \tau_1 + 1)\sigma_i^2\big)$$

Test for each event window period (τ_1, τ_k) using

$$t_{CAR} = \frac{CAR(\tau_1, \tau_k)}{\sqrt{(\tau_k - \tau_1 + 1)\hat{\sigma}_i^2}} \approx N(0,1)$$

4　TEST REPORT AND CONCLUSIONS

TABLE 1　t-statistics of AR and CAR during the Event Window

Eventtime	date	MFST	MKT	Alpha	Beta	AR	CAR	AR Std.Deviation	CAR Std.Deviation	TStat_AR	TStat_CAR	Signifiance_AR TStat	Signifiance _CAR TStat
-10	6/7/04	-0.0192509	-0.00935	0.0001489	0.88282	-0.0111455	-0.0111455	0.01437849	0.01437849	-0.7751494	-0.7751494	No	No
-9	7/7/04	0.0028551	0.00155	0.0001489	0.88282	0.0013378	-0.0098077	0.01437849	0.02875698	0.0930433	-0.341053	No	No
-8	8/7/04	-0.0163701	-0.00955	0.0001489	0.88282	-0.0080881	-0.0178958	0.01437849	0.043135469	-0.5625152	-0.4148737	No	No
-7	9/7/04	0.0079595	0.00315	0.0001489	0.88282	0.0050297	-0.012866	0.01437849	0.057513959	0.3498095	-0.2237029	No	No
-6	12/7/04	0.0010768	0.00045	0.0001489	0.88282	0.0005306	-0.0123354	0.01437849	0.071892449	0.0369018	-0.171582	No	No
-5	13/7/04	-0.010398	0.00095	0.0001489	0.88282	-0.0113855	-0.023721	0.01437849	0.086270939	-0.7918456	-0.2749592	No	No
-4	14/7/04	0.0192029	-0.00325	0.0001489	0.88282	0.0219231	-0.0017979	0.01437849	0.100649429	1.5247159	-0.0178628	No	No
-3	15/7/04	-0.0092427	-0.00315	0.0001489	0.88282	-0.0066108	-0.0084086	0.01437849	0.115027918	-0.4597678	-0.0731009	No	No
-2	16/7/04	-0.0139936	-0.00555	0.0001489	0.88282	-0.0092428	-0.0176515	0.01437849	0.129406408	-0.6428244	-0.1364035	No	No
-1	19/7/04	0.0171034	-0.00115	0.0001489	0.88282	0.0179697	0.0003182	0.01437849	0.143784898	1.2497647	0.0022133	No	No
0	20/7/04	0.0132379	0.00835	0.0001489	0.88282	0.0057174	0.0060357	0.01437849	0.158163388	0.3976378	0.038161	No	No
1	21/7/04	0.0190678	-0.01485	0.0001489	0.88282	0.0320288	0.0380645	0.01437849	0.172541877	2.2275495	0.22061	Yes	No
2	22/7/04	0.004851	0.00145	0.0001489	0.88282	0.003422	0.0414865	0.01437849	0.186920367	0.2379935	0.2219472	No	No
3	23/7/04	-0.0334483	-0.01025	0.0001489	0.88282	-0.0245483	0.0169382	0.01437849	0.201298857	-1.7072903	0.0841445	No	No
4	26/7/04	0.0224759	-0.00385	0.0001489	0.88282	0.0257258	0.042664	0.01437849	0.215677347	1.7891892	0.1978142	No	No
5	27/7/04	-0.0076762	0.01105	0.0001489	0.88282	-0.0175802	0.0250838	0.01437849	0.230055837	-1.222677	0.1090335	No	No
6	28/7/04	0.0049226	-0.00085	0.0001489	0.88282	0.0055241	0.0306079	0.01437849	0.244434326	0.3841928	0.1252193	No	No
7	29/7/04	-0.003499	0.00665	0.0001489	0.88282	-0.0095186	0.0210893	0.01437849	0.258812816	-0.6620045	0.0814847	No	No
8	30/7/04	0.0003511	0.00145	0.0001489	0.88282	-0.0010779	0.0200114	0.01437849	0.273191306	-0.0749637	0.0732505	No	No
9	2/8/04	0.001053	0.00365	0.0001489	0.88282	-0.0023182	0.0176932	0.01437849	0.287569796	-0.1612252	0.0615268	No	No
10	3/8/04	-0.0157784	-0.00745	0.0001489	0.88282	-0.0093503	0.0083429	0.01437849	0.301948286	-0.6502996	0.0276303	No	No

Our task in this single-event single-firm study is to test (a) if the dividend increase and buyback transaction announcement on July 20,2004 (event day 0) contained significant information that influenced Microsoft share price and (b) if there was a leakage of information during the 2 calendar weeks (10 trading days) before the announcement.

Data were collected from Yahoo Finance. The Market Model is used as the benchmark model. The abnormal returns and the cumulative abnormal returns 10 trading days before announcement date and up to ten trading days post event [-10,10] are shown in *GRAPH 1*. *TABLE 1* shows the t-test results of both abnormal returns and cumulative abnormal returns.
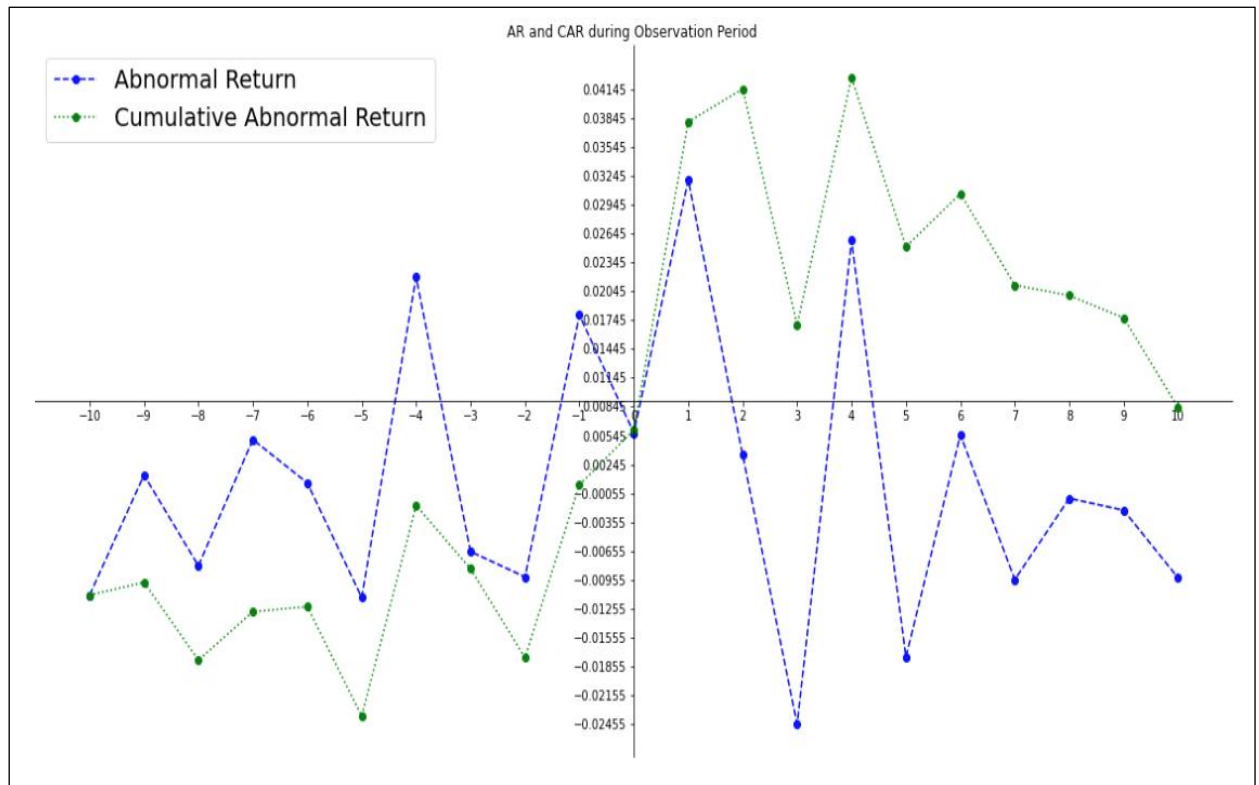
GRAPH 1 Abnormal Returns (AR) and Cumulative Abnormal Returns (CAR) of Microsoft during Event Window

We reject H_0 on the given case as dividend activity has positive impact on stock price which is supported by abnormal returns spiked during the period. Abnormal high AR on July 21, 2004 (event day 1) and its t-statistics reveals that the event has significant impact on stock return at 5% significant level, which also helps to point out that market is not efficient.

Though insignificant on t-statistics, the unusual increase trend of CAR form $t = -2$ to $t = 2$ seems to prove information leakage. CAR dropped to 0 at the end of post-event window could due to excessive trading or price pressure.