Homework 3

Market Model, Abnormal Return, and Event Study

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第一題

* 使用2017/10/25到2018/03/28的每日報酬率資料，分別進行T-Mobile、Sprint、Verizon、AT&T與S&P500的迴歸分析，詳細結果請見表格一、表格二、表格三和表格四。

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Regression Function: | | | | | | | | | | | |
|  | Coefficients | | | | Std Error | | | | P-values | | |
|  | -0.00022078 | | | | 0.001433847 | | | | 0.87792618 | | |
|  | 0.80289802 | | | | 0.148426264 | | | | 0.00000041 | | |
| ANOVA | | | | | | | | | | | |
|  | df | | SS | | | MS | | F | | | Significance F |
| Regression | 1 | | 0.00637475 | | | 0.00637475 | | 29.26167991 | | | 0.00000041 |
| Residual | 104 | | 0.02265674 | | | 0.00021785 | | - | | | - |
| Total | 105 | | 0.02903149 | | | - | | - | | | - |
| Regression Statistics | | | | | | | | | | | |
| Multiple R | | R Square | | Adj. R Square | | | Standard Error | | | Observations | |
| 0.46859428 | | 0.21958060 | | 0.21207657 | | | 0.01475985 | | | 106 | |

Table 1 Regression Results between Daily Returns of T-Mobile and S&P500

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Regression Function: | | | | | | | | | | | |
|  | Coefficients | | | | Std Error | | | | P-values | | |
|  | -0.00319983 | | | | 0.00240494 | | | | 0.18625549 | | |
|  | 0.44387202 | | | | 0.24895023 | | | | 0.07750783 | | |
| ANOVA | | | | | | | | | | | |
|  | df | | SS | | | MS | | F | | | Significance F |
| Regression | 1 | | 0.00194831 | | | 0.00194831 | | 3.17899975 | | | 0.07750783 |
| Residual | 104 | | 0.06373837 | | | 0.00061287 | | - | | | - |
| Total | 105 | | 0.06568668 | | | - | | - | | | - |
| Regression Statistics | | | | | | | | | | | |
| Multiple R | | R Square | | Adj. R Square | | | Standard Error | | | Observations | |
| 0.17222270 | | 0.02966066 | | 0.02033047 | | | 0.02475619 | | | 106 | |

Table 2 Regression Results between Daily Returns of Sprint and S&P500

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Regression Function: | | | | | | | | | | | |
|  | Coefficients | | | | Std Error | | | | P-values | | |
|  | -0.00013098 | | | | 0.00102146 | | | | 0.89821849 | | |
|  | 0.77355789 | | | | 0.10573810 | | | | ≈0 | | |
| ANOVA | | | | | | | | | | | |
|  | df | | SS | | | MS | | F | | | Significance F |
| Regression | 1 | | 0.00591736 | | | 0.00591736 | | 53.52080175 | | | ≈0 |
| Residual | 104 | | 0.01149844 | | | 0.00011056 | | - | | | - |
| Total | 105 | | 0.01741580 | | | - | | - | | | - |
| Regression Statistics | | | | | | | | | | | |
| Multiple R | | R Square | | Adj. R Square | | | Standard Error | | | Observations | |
| 0.58289771 | | 0.33976974 | | 0.33342137 | | | 0.01051484 | | | 106 | |

Table 3 Regression Results between Daily Returns of Verizon and S&P500

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Regression Function: | | | | | | | | | | | |
|  | Coefficients | | | | Std Error | | | | P-values | | |
|  | 0.00027547 | | | | 0.00115365 | | | | 0.81174701 | | |
|  | 0.73580947 | | | | 0.11942155 | | | | 0.00000001 | | |
| ANOVA | | | | | | | | | | | |
|  | df | | SS | | | MS | | F | | | Significance F |
| Regression | 1 | | 0.00535394 | | | 0.00535394 | | 37.96342217 | | | 0.00000001 |
| Residual | 104 | | 0.01466700 | | | 0.00014103 | | - | | | - |
| Total | 105 | | 0.02002094 | | | - | | - | | | - |
| Regression Statistics | | | | | | | | | | | |
| Multiple R | | R Square | | Adj. R Square | | | Standard Error | | | Observations | |
| 0.51712371 | | 0.26741693 | | 0.26037286 | | | 0.01187556 | | | 106 | |

Table 4 Regression Results between Daily Returns of AT&T and S&P500

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* 利用上面每一檔股票的α和β、S&P500每日報酬率資料，以及market model公式：，我們可以得到每一檔股票基於market model的每日應有報酬率。將股票的實際每日報酬率扣掉每日應有報酬率之後，就能獲得每日異常報酬率，詳細結果請見表格五。

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Days Relative to Announcement | T-Mobile | Sprint | Verizon | AT&T |
| -20 | -0.80% | 0.12% | -1.43% | -0.79% |
| -19 | -0.51% | 0.70% | 0.36% | 0.07% |
| -18 | -1.04% | 2.03% | -0.24% | -0.19% |
| -17 | -0.64% | 1.82% | 0.02% | 0.56% |
| -16 | -0.43% | 2.19% | 0.13% | 0.19% |
| -15 | 1.51% | 0.91% | 0.13% | 0.17% |
| -14 | -0.09% | -0.02% | -0.18% | -0.16% |
| -13 | 4.35% | 16.70% | 1.60% | 0.56% |
| -12 | 0.13% | 0.23% | -0.99% | -1.18% |
| -11 | -0.48% | -2.05% | -0.29% | -0.89% |
| -10 | -1.44% | -1.25% | 0.07% | 0.13% |
| -9 | 0.66% | 1.17% | 0.92% | 0.80% |
| -8 | -0.40% | 1.56% | 0.14% | -1.60% |
| -7 | -0.24% | 1.12% | -0.52% | -0.51% |
| -6 | 1.04% | -0.09% | 0.07% | -0.71% |
| -5 | 0.45% | 1.37% | -0.42% | 0.17% |
| -4 | -1.25% | -1.68% | 1.60% | 0.60% |
| -3 | 1.56% | 1.42% | 3.12% | 1.27% |
| -2 | 2.03% | 2.10% | 0.74% | 0.41% |
| -1 | -0.55% | -0.48% | -1.47% | -6.76% |
| 0 (2018/04/27) | 0.59% | 8.60% | 3.56% | -0.29% |
| +1 | -5.54% | -13.01% | -3.66% | -0.45% |
| +2 | -1.97% | -3.18% | -1.26% | -0.70% |
| +3 | -3.54% | -3.97% | -1.62% | -0.97% |
| +4 | -1.64% | 1.19% | 0.38% | -0.24% |
| +5 | 1.39% | 1.09% | -0.25% | -0.34% |
| +6 | -1.51% | -0.59% | -1.21% | -0.59% |
| +7 | -1.65% | -1.39% | -1.45% | -1.07% |
| +8 | 0.58% | 0.47% | -2.10% | -1.69% |
| +9 | 0.21% | -0.10% | 1.06% | 0.81% |
| +10 | -0.92% | -0.14% | 2.89% | 1.13% |
| +11 | 0.08% | -0.11% | -0.32% | -0.40% |
| +12 | 0.41% | 0.43% | -0.90% | 0.17% |
| +13 | -0.02% | -1.03% | -0.15% | 0.33% |
| +14 | 0.36% | 0.75% | 0.06% | -1.11% |
| +15 | 0.67% | 0.83% | -0.01% | 0.54% |
| +16 | -0.11% | 0.97% | 0.89% | 1.11% |
| +17 | 0.26% | 0.85% | 1.04% | -0.29% |
| +18 | -0.52% | -0.60% | -0.69% | -0.57% |
| +19 | 0.11% | 0.80% | 0.27% | 1.51% |
| +20 | -0.47% | 0.23% | -0.05% | -0.68% |

Table 5 Abnormal Daily Returns within ±20 Days Relative to Announcement

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* 從發布日前20天開始計算累積異常報酬率的詳細結果請見表格六和圖一。

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Days Relative to Announcement | T-Mobile | Sprint | Verizon | AT&T |
| -20 | -0.80% | 0.12% | -1.43% | -0.79% |
| -19 | -1.32% | 0.82% | -1.07% | -0.71% |
| -18 | -2.36% | 2.85% | -1.31% | -0.90% |
| -17 | -2.99% | 4.67% | -1.28% | -0.34% |
| -16 | -3.42% | 6.86% | -1.16% | -0.15% |
| -15 | -1.91% | 7.76% | -1.02% | 0.03% |
| -14 | -2.00% | 7.74% | -1.20% | -0.13% |
| -13 | 2.35% | 24.44% | 0.39% | 0.43% |
| -12 | 2.48% | 24.67% | -0.60% | -0.75% |
| -11 | 2.00% | 22.63% | -0.88% | -1.64% |
| -10 | 0.56% | 21.37% | -0.82% | -1.52% |
| -9 | 1.22% | 22.54% | 0.10% | -0.72% |
| -8 | 0.82% | 24.10% | 0.24% | -2.31% |
| -7 | 0.58% | 25.22% | -0.28% | -2.83% |
| -6 | 1.62% | 25.13% | -0.22% | -3.54% |
| -5 | 2.07% | 26.50% | -0.64% | -3.37% |
| -4 | 0.82% | 24.82% | 0.96% | -2.77% |
| -3 | 2.39% | 26.24% | 4.08% | -1.50% |
| -2 | 4.42% | 28.34% | 4.82% | -1.09% |
| -1 | 3.87% | 27.87% | 3.35% | -7.85% |
| 0 (2018/04/27) | 4.46% | 36.47% | 6.91% | -8.14% |
| +1 | -1.08% | 23.46% | 3.25% | -8.59% |
| +2 | -3.05% | 20.28% | 1.99% | -9.30% |
| +3 | -6.59% | 16.31% | 0.37% | -10.27% |
| +4 | -8.23% | 17.50% | 0.75% | -10.51% |
| +5 | -6.84% | 18.60% | 0.50% | -10.85% |
| +6 | -8.35% | 18.01% | -0.71% | -11.44% |
| +7 | -10.00% | 16.62% | -2.16% | -12.51% |
| +8 | -9.43% | 17.09% | -4.26% | -14.20% |
| +9 | -9.22% | 17.00% | -3.20% | -13.39% |
| +10 | -10.14% | 16.86% | -0.31% | -12.26% |
| +11 | -10.07% | 16.75% | -0.63% | -12.66% |
| +12 | -9.65% | 17.18% | -1.54% | -12.49% |
| +13 | -9.67% | 16.15% | -1.69% | -12.16% |
| +14 | -9.32% | 16.90% | -1.63% | -13.27% |
| +15 | -8.64% | 17.73% | -1.64% | -12.73% |
| +16 | -8.76% | 18.70% | -0.76% | -11.62% |
| +17 | -8.50% | 19.55% | 0.28% | -11.91% |
| +18 | -9.02% | 18.95% | -0.41% | -12.48% |
| +19 | -8.91% | 19.75% | -0.13% | -10.97% |
| +20 | -9.38% | 19.98% | -0.18% | -11.65% |

Table 6 Cumulative Abnormal Returns within ±20 Days Relative to Announcement

Figure 1 Plot to Cumulative Abnormal Returns of Table 6

第四題

1. 對於Sprint：首先，這個併購案顯然對於被併購公司的股價有顯著的正面影響，在消息公布日帶來+8.6%的漲幅；另外，也可以發現早在消息公布的前20日開始，被併購公司的股價就有相當可觀的累積異常報酬率，尤其是消息公布的前13日的+16.7%漲幅，我們可以合理懷疑這樣子的現象可能來自於這項併購案有消息洩漏的可能，可能發生了內線交易。
2. 對於T-Mobile：首先，這個併購案顯然被市場投資者認為是太貴的交易，可能減損併購方公司未來的預期獲利，因此相較於消息宣布日前累積異常報酬率只在零軸附近移動，在消息宣布日之後的持續減少，甚至少於-10%。
3. 對於AT&T和Verizon：雖然這項併購案的交易雙方都不是AT&T，但是市場投資者顯然認為這個消息仍對AT&T帶來負面的影響，相較於Verizon的累積異常報酬率並沒有因這個消息有太大的波動，AT&T的累積異常報酬率顯然在消息公布之後顯著的下降，甚至超越的T-Mobile來到-11%。