Econ 301-03 Assignment #3 (Prof. Hakan Berument)

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Brief Report

analyzing the effect of the return of BIST100 on Arçelik A. Ş.'s return.

One of the factors that influences the return of Arçelik A. Ş. firm is the return of BIST100 index that includes many important companies traded in the Borsa Istanbul stock market. In order to check and verify the particular effect that is present in such a relation, the regression analysis has to be done. In such analysis it is essential to test several properties that will describe in what way does the BIST100 return impacts the return of ARCLK equity.

The primary concern is to determine whether there is any relationship at all between the returns of Arçelik A. Ş. and BIST100 index. After performing the proper technique[1], it may be seen that having no relationship gets disproved with 5% acceptable error amount. Thus, in this model BIST100 index return is assumed to have some effects on the return of Arçelik A. Ş.

Furthermore, to understand whether both of the returns have more or less one-to-one relationships, i. e. for ARCLK equity to have the same increase or decrease in return as BIST100 does, several other tests have to be conducted. First test that equally concentrates on all possibilities failed to reject the basic assumption of having one-to-one relationship between two returns. It demonstrates that concentrating on all probabilities was not successful to disprove their one-to-one relationships. When another test based on the idea to prove high increase in ARCLK return as BIST100 return increases, together with the opposite test were performed, the result was the same. There is insufficient evidence to prove that both returns have relationship different than one-to-one. Consequently, these tests draw an assumed conclusion that ARCLK return increases or decreases same as BIST100 return does[2].

Lastly, another important thing to check is the mean of the returns of Arçelik A. Ş. when the return of BIST100 is zero. Basic assumption before the tests for the ARCLK return is taken as zero in order to disprove it. First step of testing considering all possible probabilities failed to reject the basic assumption. It means that the zero return of ARCLK when BIST100 return is zero could not be disproved. While to be more specific and to test either for the positive return or for the negative return of ARCLK equity with the same conditions of BIST100, does not actually help. In fact, these both tests failed to reject the basic idea, and hence, basic assumption stays the same[3].

In a nutshell, according to all hypotheses testing performed, three main assumed conclusions drawn are the model of Arçelik A. Ş and BIST100 returns is significant, both returns might have one-to-one relationships and the return of Arçelik A. Ş. is nearly zero when BIST100 has no return.

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[1] All specified hypotheses testing are reported in the Appendix in the same order.
[2] These are hypotheses testing $\beta 2$ not to be equal to 1.
[3] These are hypotheses testing $\beta 1$ not to be equal to 0.

Appendix

> Eviews output of the estimated equation of firm's return (ARCLK share), which is
ARCLK Return = β_1 + β_2 BIST100 Return + u, is given below[4].

Dependent Variable: RETURN_OF_ARCLK
Method: Least Squares (Gauss-Newton / Marquardt steps)
Date: 10/19/17   Time: 17:58
Sample: 2013M08 2017M09
Included observations: 50
RETURN_OF_ARCLK = C(1) + C(2)*RETURN_OF_BIST_100

	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	1.010542	0.892426	1.132355	0.2631
C(2)	0.787325	0.157161	5.009674	0.0000

R-squared	0.343337	Mean dependent var	1.668680
Adjusted R-squared	0.329656	S.D. dependent var	7.623437
S.E. of regression	6.241652	Akaike info criterion	6.539545
Sum squared resid	1869.995	Schwarz criterion	6.616026
Log likelihood	-161.4886	Hannan-Quinn criter.	6.568669
F-statistic	25.09683	Durbin-Watson stat	2.288603
Prob(F-statistic)	0.000008		

> Various hypotheses testing for the above estimated equation (α=5%).

Degrees of freedom (df) = n - k = n - 2 = 48.

1. H_0: $\beta_2 = 0$.
   H_A: $\beta_2 \neq 0$.

Test statistic = t = (0.787 - 0) / 0.157 = 5.00967.

Critical value = $t_{48, \, 0.0025}$ =~ 2.00.

Since t = 5.00967 > t-critical = 2.00, the null hypothesis is rejected.

2. H_0: $\beta_2 = 1$.
   H_A: $\beta_2 \neq 1$.

Test statistic = t = (0.787 - 1) / 0.157 = -1.353.

Critical value = $t_{48, \, 0.0025}$ =~ 2.00.

Since | t | = 1.353 is not > t-critical = 2.00, fail to reject the null hypothesis.

3. H_0: $\beta_2 = 1$.
   H_A: $\beta_2 > 1$.

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[4] Monthly observations of time period between August 2013 and September 2017 were collected.

Test statistic = t = (0.787 - 1) / 0.157 = -1.353.

Critical value = $t_{48, 0.05}$ =~ 1.67.

Since t = -1.353 is not > t-critical = 1.67, fail to reject the null hypothesis.

4. H_0: $\beta_2 = 1$.
   H_A: $\beta_2 < 1$.

Test statistic = t = (0.787 - 1) / 0.157 = -1.353.

Critical value = $t_{48, 0.05}$ =~ 1.67.

Since t = -1.353 is not < - t-critical = -1.67, fail to reject the null hypothesis.

5. H_0: $\beta_1 = 0$.
   H_A: $\beta_1 \neq 0$.

Test statistic = t = (1.011 - 0) / 0.892 = 1.132.

Critical value = $t_{48, 0.0025}$ =~ 2.00.

Since t = 1.132 is not > t-critical = 2.00, fail to reject the null hypothesis.

6. H_0: $\beta_1 = 0$.
   H_A: $\beta_1 > 0$.

Test statistic = t = (1.011 - 0) / 0.892 = 1.132.

Critical value = $t_{48, 0.05}$ =~ 1.67.

Since t = 1.132 is not > t-critical = 1.67, fail to reject the null hypothesis.

7. H_0: $\beta_1 = 0$.
   H_A: $\beta_1 < 0$.

Test statistic = t = (1.011 - 0) / 0.892 = 1.132.

Critical value = $t_{48, 0.05}$ =~ 1.67.

Since t = 1.132 is not < - t-critical = - 1.67, fail to reject the null hypothesis.

References.

1. www.investing.com was used for data collection of ARCLK and BIST100 monthly prices.
2. The Eviews program was used to reveal the output of regression analysis.