Man 404 Group #5 **Term Project – Part II** **Date: 8.04.2019**

Group members: Ceyda Çelikdoğan, Enes Tayyip Burca, Osman Valimammadli, Shukhrat Khuseynov.

Initial stocks: TAVHL, ARCLK, ALBRK, BJKAS, TRKCM, HURGZ, PETKM, JANTS.

Additional stocks: BIMAS, ENKAI, TTKOM, YATAS.

Report

Q1. Using the data previously obtained in the first part of the project and the newly retrieved monthly returns of BIST-100 index, betas of the individual securities were estimated through the regression analysis:

Jan 2014-Dec 2018	TAVHL	ARCLK	ALBRK	BJKAS	TRKCM	HURGZ	PETKM	JANTS	BIMAS	YATAS	ENKAI	TTKOM
β	0,4864	0,3910	0,8341	0,9021	0,9572	1,2106	0,7790	0,8556	0,7169	1,1679	0,4181	0,9431

The following model was estimated in the regression analysis for each individual stock:

$$Return_i^{Stock} = \alpha^{Stock} + \beta^{Stock} Return_i^{BIST100} + \varepsilon_i^{Stock}$$

As seen in the table above, among the most sensitive stocks to the market are HURGZ and YATAS securities, whereas the least sensitive stock is ARCLK.

Q2. The total sample was divided into two sub-periods covering 2.5 years each. Similar to the first question, the stocks' betas were calculated for each subgroup, employing the similar model in the regression analysis:

Jan 2014-Jun 2016	TAVHL	ARCLK	ALBRK	BJKAS	TRKCM	HURGZ	PETKM	JANTS	BIMAS	YATAS	ENKAI	TTKOM
β1	0,0514	0,6140	0,6035	0,8653	1,0659	1,0670	0,6931	0,5177	0,7886	1,0005	0,2492	0,8556

Jul 2016-Dec 2018	TAVHL	ARCLK	ALBRK	BJKAS	TRKCM	HURGZ	PETKM	JANTS	BIMAS	YATAS	ENKAI	TTKOM
β2	0,9062	0,1773	1,0603	0,9530	0,8461	1,3440	0,8662	1,1845	0,6451	1,3304	0,5821	1,0333

As can be seen in the tables, there is a noticeable difference between the betas calculated for different time periods. The usage of these calculated betas of the subgroups in the analysis might be problematic due to fact that the number of observations is 30 in each, which can be too low to estimate the betas correctly. This also depends on the investment horizon. While the usage of the first sub-period, which is outdated, is not reasonable at all, the second one being more recent might pave the way for more actual and short-term value of beta. In this case, weekly or daily observations can be used to increase the sample size.

Q3. The variances of each security were calculated and decomposed as follows:

Jan 2014-Dec 2018	Total risk	Systematic risk	Systematic risk (%)	Unique risk	Unique risk (%)
TAVHL	0,008111	0,00071456	8,81%	0,007397	91,19%
ARCLK	0,005048	0,00046178	9,15%	0,004586	90,85%
ALBRK	0,006101	0,00210086	34,44%	0,004	65,56%
BJKAS	0,018492	0,0024577	13,29%	0,016034	86,71%
TRKCM	0,008285	0,00276708	33,40%	0,005518	66,60%
HURGZ	0,02001	0,004426	22,12%	0,015584	77,88%
PETKM	0,008297	0,00183259	22,09%	0,006464	77,91%
JANTS	0,013585	0,00221091	16,27%	0,011374	83,73%
BIMAS	0,003605	0,00155204	43,06%	0,002053	56,94%
YATAS	0,022591	0,00411937	18,23%	0,018472	81,77%
ENKAI	0,002809	0,00052788	18,79%	0,002281	81,21%
TTKOM	0,005941	0,00268631	45,22%	0,003255	54,78%

According to the table above, the unique risk of all the stocks comprises the most portion of the total risk to a greater or lesser extent and, therefore, the diversification of these stocks can give very fruitful results. Comparing the percentages, TAVHL and ARCLK express the lowest portion of systematic risk and TTKOM with BIMAS have the highest. If to compare the total risk left alone, the highest variance belongs to YATAS and HURGZ, while ENKAI has the lowest total risk. After a perfect diversification, i. e. eliminating completely the unique risk, ARCLK and ENKAI would have the lowest risk in total, whereas the highest systematic risk belongs to HURGZ and YATAS.

Q4. Since the beginning of holding period, the day of portfolio formation and its purchase, was not specified, it was assumed to be on March 18, 2019, which is the submission date of the first part of the project. The holding period consists of 58 days until May 15, 2019. The stocks' annual expected rates of return being adjusted accordingly were used to calculate the expected prices as follows:

Jan 2014-Dec 2018	Mean returns (annual)	Expected return of holding period (18.03.2019 - 15.05.2019) ~ 58 days	Po (close price on 18.03.2019)	Pnew (exp)
TAVHL	1,134%	0,18020%	23,87	23,913
ARCLK	0,683%	0,10857%	19,12	19,141
ALBRK	-0,107%	-0,01704%	1,6	1,600
BJKAS	0,701%	0,11142%	1,59	1,592
TRKCM	1,664%	0,26448%	3,87	3,880
HURGZ	1,649%	0,26201%	0,95	0,952
PETKM	2,301%	0,36562%	4,95	4,968
JANTS	0,970%	0,15413%	27,68	27,723
BIMAS	1,339%	0,21278%	85,2	85,381
YATAS	6,027%	0,95773%	5,53	5,583
ENKAI	0,425%	0,06757%	4,9	4,903
TTKOM	-0,410%	-0,06509%	5,36	5,357

Among the announced or distributed dividends within the holding period, TAVHL has distributed dividends on March 20 with a yield of 8.20%, TRKCM is planning to distribute on May 31 with a yield of 4.07%, JANTS on May 2 with a yield of 7.61% and ENKAI on April 17 with a yield of 3.93%. Others have not distributed or announced any dividend distribution this year.

Q5. The required rate of return was calculated for each stock, using the CAPM model:

$$E(\ return_{Stock}\ ) = return_{risk\_free} + [\ E(\ return_{BIST100}\ ) - return_{risk\_free}\ ] \times \beta_{Stock}$$

The risk-free rate of return was assumed to be 21.1%, which is the return of short-term Treasury Bills (of 1 year) in Turkey. With such rate, market risk premium seems to be negative only for few stocks. The required rate of return then was compared with the expected rate of return of each security, which was taken as the 5-year average of monthly returns previously calculated:

Jan 2014-Dec 2018	Expected rate of return	Market risk premium	Required rate of return	State
TAVHL	1,1340%	-0,6243%	1,4547%	***overpriced***
ARCLK	0,6833%	0,6833%	0,2672%	***underpriced***
ALBRK	-0,1073%	-0,1073%	-0,0895%	***overpriced***
BJKAS	0,7012%	0,7012%	0,6325%	***underpriced***
TRKCM	1,6644%	1,6644%	1,5932%	***underpriced***
HURGZ	1,6488%	1,6488%	1,9961%	***overpriced***
PETKM	2,3009%	2,3009%	1,7924%	***underpriced***
JANTS	0,9700%	0,9700%	0,8299%	***underpriced***
BIMAS	1,3391%	1,3391%	0,9600%	***underpriced***
YATAS	6,0271%	6,0271%	7,0392%	***overpriced***
ENKAI	0,4252%	0,4252%	0,1778%	***underpriced***
TTKOM	-0,4096%	-0,4096%	-0,3863%	***overpriced***

Apparently, none of the stocks is correctly priced according to the model used. As seen in the table above, largest part of the securities is underpriced, demonstrating good chances in the market even without forming a portfolio.

References

- Bloomberg databases were used to obtain the financial data on the securities.