FINANCIAL RATIOS AFFECTING SYSTEMATIC RISK IN JOINT-STOCK COMPANIES: BIST TECHNOLOGY (XUTEK) INDUSTRY COMPANIES CASE IN TURKEY

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Abstract

Systematic risk cannot be controlled by business managers and cannot be eliminated by portfolio diversification. Factors related to the systematic risk may be interest rate, inflation, exchange rate, market risk, and politics. Systematic risk may also mean the magnitude of the correlation between stock price and market return. The measure of this risk is the beta coefficient. This study aimed to help the company managers, investors, and technology sector researchers to understand better systematic risk based on the technology companies operating in Borsa Istanbul. Understanding the risk structure of the technology industry is essential for the effective management of business activities. This study aims to examine firm-specific variables that are thought to be directly related to Beta. Findings obtained by panel data analysis from 14 technology companies traded in the BIST Technology (XUTEK) index for 2011: 1Q-2019: 4Q show that liquidity, debt leverage and current ratio are positively associated with risk. No effect of total assets, return on assets, asset turnover, and return on equity have been determined on systematic risk.

Keywords: Systematic Risk, Panel Data Analysis, Financial Ratio

JEL Classification: C12, D53, E44, L25

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1. Introduction

The term risk generally refers to the variability in the price of a particular security. Investments typically have an associated risk based on their exposure to the markets and internal volatility. The risk of an investment is the probability that the actual return will differ from what was expected. The risk includes the possibility of a lower income from the initial investment. The more the actual return deviates from the expected return, the greater the risk and potential reward. Risk is one of the fundamental elements of investing. Risk and return are the two most important criteria for creating appropriate investment strategies. The risk factor arises when future events are not entirely predictable, and some options should be preferred over others. When firms' risk and return factors are well known or predicted, it is easier to make appropriate investment strategies. In the finance literature, the risk is considered in two contexts: an actual return and an expected return. The first includes some risks associated with the company's internal factors, such as risk management. Non-payment risk and liquidity risk can be given as examples of these types of risks, which express non-systematic risk (controllable risk) elements. The second category is related to general market conditions such as economic, political, and social conditions, mostly known as systematic risk (β), including risks that are not related to the company (Faez & Eslam, 2013). Sharp (1964) defines systematic risk as the risk responding to the investment combination's real risk.

The Capital Asset Pricing Model (CAPM), the pioneer of the asset pricing theory, contributes to the valuation method of risky assets and measures the asset's systematic risk. In CAPM, the systematic risk of risky assets measured by Beta is the covariance of market return and market return divided by the variance of market return (Ross et al., 2009). However, Markowitz first developed the risk scale for a particular portfolio of assets in 1952 and 1959. The portfolio model shows that the portfolio's return rate variance is an essential determinant of portfolio risk under a set of logical assumptions. The Beta of a company stock, which reflects the systematic risk of a stock, can also represent its systematic risk. Logue and Merville (1972) consider that the extent to which a company is affected by macroeconomic conditions can be measured from its stocks' Beta. Its stock returns indicate a company's current and potential earnings power against general economic situations (Jiayi, 2016).

The technology sector is a field related to electronic accounts and information processes and intertwined with information technologies. The technology sector has many different fields such as computer software, hardware, networks, communication technologies, well-equipped workforce, internet, intranet, and communication options (Dumanoğlu & Ergül, 2010). Compared to other sectors, faster changes and transformations in the technology sector have caused it to be among the strategically important sectors in all countries in the world. In today's globalizing and boundaries, people's habits have begun to resemble each other more than ever. This situation has also led to a faster transfer of information and technology than ever before between countries in very different geographies. With the rapid innovations and developments in the technological field, people and companies' routines and forms are rapidly changing. This process also contributes significantly to the reduction of costs and the faster, more effective, and efficient execution of activities (Toker & Çınar, 2018; Cited by Gülençer & Hazar, 2020).

Today, technological developments that change all life and working ways and habits of people play an essential role in developing and institutionalizing societies and companies. Rapid developments in technology worldwide and technological investments in Turkey will be a positive impact leads to a further increase with each passing day (Dumanoglu & Ergül, 2010). As a reflection of these developments in the IT sector and other sectors, foreign direct investors are increasing their Turkey investments.

TUBISAD Informatics Industry Association of information and communication technologies in Turkey in 2019 market data report. Referring to Turkey IT market grew by 14% in TRY terms in 2019 to 152.7 billion TRY while accessing; it decreased by 3% in dollar terms and decreased to 26.8 billion dollars. The sector has been growing at an average of 17% annually since 2015. The exports of the sector have grown since 2015 and reached a level of 1.1 billion USD (TUBISAD, 2019).

On the other hand, an important fact that applies to companies operating in all sectors and technology companies is determining the risk element and its factors. Today, companies faced with more diverse and different risk factors compared to the past. These risks include technology, cyber-attacks, regulation, investment risk, and climate changes. Investors, managers, and researchers need to focus on this phenomenon to understand and manage the risk factor effectively.

Managers need to develop strategies to deal with primary systematic risk rather than unsystematic risk.

This study examines the internal factors affecting systematic risks in technology companies, which were not mentioned in previous studies. For this purpose, 14 of the 19 companies whose data can access completely, according to the Borsa Istanbul technology index transactions, were included in the analysis. Panel regression analysis method was used in the study. The study covers quarterly data between 2011 and 2019.

2. Literature Review

The systematic risk criterion beta coefficient shows the relationship between stock returns changes depending on the market portfolio return rates (Ceylan & Korkmaz, 2000). Portfolio and capital market theories have led to developing this basic concept of systematic risk, also known as Beta, non-diversifiable risk or market risk. This risk factor measures a firm's common stocks' sensitivity or volatility relative to the general market. Many researchers have focused on empirical links between systematic risk and various financial and accounting variables. In some studies, liquidity, leverage, operating efficiency, profitability, dividend payment, firm size, growth, tax rate, the market value of equity, and financial risk were used to determine systematic risk (Dedunu, 2017).

Considering the studies that take the systematic risk and financial ratios into account, it is noteworthy that observations from different sectors were made. Besides, studies have focused on measuring or estimating systematic risk and its relationship with firm financial ratio and firm value. As shown in the literature, the beta coefficient-financial ratios relationship can emerge in quite different sectors, periods, and the country of origin. These differences are observed both in the statistically significant rates and in the rates' coefficients and signs (Uyar & Çağlak, 2019). The differences mentioned above arise from the emergence of indicators affecting firm risk in different ways depending on the sector—some of the studies mentioned above in the literature given below.

Ball and Brown (1969) partially explained the beta coefficient based on the accounting variables of 262 businesses. Beaver et al. (1970) conducted a study to determine which variables related to accounting data affect systematic risk and found that some ratios obtained from accounting data explained the change in beta coefficient at the level of 44 percent. Mandelker and Rhee (1984) found that activity and financial leverage explained a significant part of the change in companies' systematic risks in the USA. Huffman (1989) repeated the study by Mandelker & Rhee (1984) on the effect of activity and financial leverage on the systematic risk of common stocks and found a positive relationship between systematic risk and financial leverage. Mensah (1992), in his study on the periods 1966-1977 and 1967-1986 and conducted regression analysis, determined the significant effects of the variables of net income, fund inflows and outflows from activities, working capital, cash flows from operations on Beta. He also stated in his study that three accounting flow measures show that the best model in defining market risk is Mandelker and Rhee models.

In a critical study conducted by Ercan et al. (2006), using the data of 169 businesses, a regression analysis applied between beta coefficient and financial ratios, and some statistically significant relationships were determined between financial ratios 5-6 and beta coefficient.

Kim, Ryan, & Ceschini (2007) examined financial rates in 58 fast-food and other restaurant establishments for 1999-2003. In their studies, they detected a negative correlation between return on investment and Beta. While the debt/equity ratio has a significantly positive relationship with Beta in fast-food restaurants, there is no relationship in other restaurants. Also, considering the studies' results, when the restaurant sector, in general, is considered, a positive relationship is detected between the acid-test ratio (as a liquidity indicator) and risk (Beta). The general restaurant industry found that investments negatively correlated with Beta and equity debt positively associated with Beta.

In another study, Lee and Jang (2007) examined airline companies for 1997-2002. They found that debt leverage (to total debt / total assets), profitability (return on assets), firm size (total assets), and EBIT growth were essential determinants of Beta. It turns out that debt leverage and firm size are positively associated with systematic risk (Beta). The study results also showed that profitability and growth negatively correlated with Beta. This situation shows that the profitability rate is effective in reducing the firm risk. On the other hand, in the study, liquidity (acid-test ratio) and activity (asset turnover) ratios do not have a significant effect on systematic risk (Beta).

Akça (2008) was carried out correlation and regression analyses in his study on 2005-2007. Akça found that current and cash ratio, acid test, total debt/assets, total debt/equity, short-term debt / total debt, interest coverage, financial debts / total debt, financial debts/equity, and return on assets have significant effects on the beta values of firms.

Eryiğit and Eryiğit (2009) analyzed the stocks traded on the Istanbul Stock Exchange between 1995-2005, taking into account the financial ratios that affect systematic risk. Five fundamental financial ratios (acid test ratio, debt/equity ratio, return on equity, asset turnover, defense range measurement) are used in the analysis. The panel regression analysis applied by autocorrelation correction, asset turnover, defense range measurement, and acid test ratio were determined as variables affecting systematic risk. The effect of all three variables on systematic risk was determined to be positive.

Considering the study conducted by Usta & Demireli (2010), a hypothetical portfolio consisting of stocks with equal weights created, and the closing prices of three companies operating in the food sector in 12.04.2007–01.12.2008 analyzed. The risk of the mentioned portfolio is measured based on the closing prices. Later, the risk level was calculated by considering the portfolio effect separated into systematic and unsystematic risk. The results show that systematic risk levels on stocks belonging to companies are almost at the same level, while non-systematic risks are calculated at different levels in both companies. Furthermore, whatever the systematic risks are belonging to companies operating in the same sector, the unsystematic risks of the companies may differ because of the decisions arising from their specific activities. Although the systematic risks are the same, the investors' returns increase directly due to the unsystematic risk level.

Repetti and Kim (2010) analysed financial ratios, which are the most critical determinants of Beta, in their study on gaming industry companies. Their studies are based on return on assets, liabilities as a percentage of assets, asset turnover rate, fast rate, EBITDA growth rate, market capitalization rates, and variables. According to their conclusions, it is the only variable that market capitalization has a significant positive impact on Beta both before and during the financial recession after 2007. While asset turnover is a crucial determinant only before a recession, liabilities as a percentage of assets are only an important factor during a recession.

Tanrıöven & Aksoy (2011) analysed the companies traded on the BIST by using annual data for the period 1997-2008, using accounting variables to determine the determinants of systematic risk on a sectoral basis. According to the results, a positive relationship was found between debt ratios and Beta. Also, it was observed that the growth in sales affected the Beta in all sectors except the food and technology sector, the price/earnings ratio was effective only in the stone-soil sectors, and the leverage ratio was only useful in the metal sector.

Alaghi (2011) investigated the effect of financial leverage on companies' systematic risk traded on the Tehran Stock Exchange. Financial leverage as independent variables and systematic risk as the dependent variable are considered in the study. The results revealed that financial leverage impacts the systematic risks of companies traded on the Tehran Stock Exchange.

Karadeniz et al. (2015) tried to find out the factors affecting systematic risk in tourism companies. The authors analysed using the GMM method using the financial variables of eight companies listed on the stock exchange for the period 2003-2012. According to the findings they obtained, systematic risk and assets' size positively correlated in the tourism sector, while systematic risk and assets turnover were negatively correlated. On the other hand, it is observed that acid test, leverage, and profitability ratios of assets do not have a significant relationship with systematic risk.

Hosseinpour & Saeidi (2016) analysed the relationship between financial ratio and systematic risk based on 25 companies operating in the cement industry listed on the Tehran Stock Exchange. According to the studies' results, covering the period 2007-2013, the cement sector's systematic risk and liquidity ratio is not in a meaningful relationship. There is no significant correlation between shareholders' salary income and systematic risk. A relationship has been identified between the return on assets in the cement industry and systematic risk. Systematic risk and stock turnover variables are not in a meaningful relationship in the cement sector. There is a systematic risk between the increase in profit before interest and tax in the cement sector and systematic risks.

Dedunu (2017) tested the relationship between the financial ratios of 50 companies in the manufacturing sector between 2009 and 2016 and systematic risk using correlation analysis and regression analysis. As a result of the analysis, it has been determined that some ratios show a similar relationship between the systematic risk and financial ratios of companies. In contrast, some ratios show the opposite relationship.

Tepeli (2017) examined the relationship between financial ratios and beta coefficients with panel data analysis in his study on BIST tourism and non-public companies. Also, the model created in the first stage in the study was re-estimated based on non-public companies' data. As a result, non-public company betas were found to be 0.676.

Uyar and Çağlak (2019) investigated the relationship between financial statement data and financial beta values of companies operating in the cement industry in different countries. To this end, Turkey and some other countries with financial ratios of companies operating in the financial year 2007-2017 beta coefficient between the panels subjected to data analysis. According to the results, the beta coefficients of cement companies in Turkey return on equity, current ratio, asset turnover, the operating profit margin, and logarithmic assets are associated in a meaningful way.

Kaygın & Güngör (2019) analysed the relationship between financial ratios and systematic risk, correlation, simple linear regression, and multiple linear regression analysis, based on annual data of 109 companies whose shares traded on BIST and operating in the manufacturing industry between 2010-2018. As a result of the study, they found a significant or opposite relationship between financial ratios and systematic risk. As a result of the analysis, it is determined that the existence, direction, and degree of the relationship between financial ratios and systematic risk varies by year.

Generally, the performance measures are discussed in the studies on technology companies (Dumanoğlu & Ergül, 2010; Tektüfekçi, 2010; Türkmen & Çağıl, 2012; Orçun & Eren, 2017). It is noteworthy that companies operating in the technology sector are generally neglected in the literature on the systematic risk and financial ratios relationship and the measurement of systematic risk. This study aimed to contribute to the completion of this deficiency.

3. Methodology and findings

Borsa Istanbul Technology Index and Public Disclosure Platform (KAP) has been analysed and has determined that 19 companies traded in Borsa Istanbul Technology Index in the analysis period. These companies are ALCATEL Lucent Teletaş, ARD Information Technologies, ARENA Computer, ARMADA Computer, ASELSAN, DESPEC Computer, DATAGATE Computer, ESCORT Technology, FONET Information Technologies, INDEX Computer, KAREL Electronics, KAFEIN Software, KRON Telecommunication, LINK Computer, LOGO Software, NETAŞ Telecom, PAPILON Defence, PLASTIKKART, SMARTIKS Software. However, since this study covers the period between 2011: 1Q-2019: 4Q and in order to avoid possible lost data problems, the analyzes were carried out with a total of 504 observations using 40 observations of 14 technology companies (ALCATEL, ARENA Computer, ARMADA Computer, ASELSAN, DESPEC Computer, DATAGATE Computer, ESCORT Technology, INDEX Computer, KAREL Electronics, KRON Telecommunication, LINK Computer, LOGO Software, NETAŞ Telecom, PLASTICCARD), whose data were fully accessible during the analysis period.

3.1. Panel data analysis

Econometric studies usually use cross-section or time-series data. The time dimension is emphasized in time-series studies, while the cross-sectional size is taken into consideration in cross-section studies. However, the popularity of studies using panel data has increased more in the 2000s. Panel data studies considered both the time dimension and the cross-sectional dimension (Çetin & Ecevit, 2010). In this study, panel data analysis was preferred because panel data models present time series and cross-section data together. Using panel data models, researchers can increase the number of observations and degrees of freedom and reduce the connection problem between observations and explanatory variables (Baltagi, 2005). Estimates can be made using three main models in panel data analysis. These are the pooled model, fixed-effects, and random-effects models. Generally, in panel data analysis, it is observed that the number of cross-section units (N) is more $(N > T)$ than the number of periods (T). This study essentially intended to estimate with the "Generalized Method of Moments-GMM," but this was not possible because the number of periods was higher than the number of horizontal sections in the data set.

The panel data set contains equal length time series for each horizontal section, balanced panel; change of time series lengths from horizontal section to horizontal section is called unbalanced panel

(Wooldridge, 2003; as cited in Çetin & Ecevit, 2010). In this study, there is a balanced panel situation. It is seen that panel data regression is estimated in different ways depending on the assumptions made about the constant, slope coefficient, and the error term. It can be assumed that the constant and the slope coefficient are constant between time and horizontal cross-sections and that the error term can capture differences across time and horizontal cross-sections. This model, in which the data of all units collected in a pool and the effects of independent variables on the dependent variable are analyzed, defined as a pooled regression model or a constant coefficient model (Çetin & Ecevit, 2010). In this study, two different pooled regression models were estimated because only one of the variables with high correlation relations was included in the model. The models in question are as follows:

Model 1:

$$Beta_{it} = \alpha_{it} + \beta_1 SIZ_{it} + ROA_{it} + TUR_{it} + CUR_{it} + LEV_{it} + ROE_{it} + AR(1) + u_{it} \quad (1)$$

Model 2:

$$Beta_{it} = \alpha_{it} + \beta_1 SIZ_{it} + ROA_{it} + TUR_{it} + LIQ_{it} + LEV_{it} + ROE_{it} + AR(1) + u_{it} \quad (2)$$

In the above equation:
$Beta_{it}$ - Beta Coefficient (Systematic Risk)
α_{it} - Constant Term
CUR_{it} - Current Ratio ($Liquidity_2$)
ROA_{it} - Return on Assets (Profitability)
ROE_{it} - Return on Equity ($Profitability_2$)
LIQ_{it} - Acid-Test Ratio (Liquidity)
LEV_{it} - Leverage Ratio
TUR_{it} - The Asset Turnover (Operating Efficiency)
SIZ_{it} - Total Assets (The size of company)
u_{it} - Error Term

3.2. Dependent variable (systematic risk-Beta)

The relationship between the return of a financial instrument or security and the return of the market portfolio is shown with the Beta coefficient *(β)* and is a measure of systematic risk (Sharpe, 1963; as cited in Karadeniz et al. 2015). Beta coefficient is statistically the ratio of the covariance between the return *(r_i)* provided by security and the market portfolio return *(r_m)* to the variance of the market return (Cuthbertson, 1996):

$$\beta_i = \frac{Cov(r_i, r_m)}{Var(r_m)}$$

3.3. Detecting multicollinearity problem

Correlation analysis is used to determine whether there are multiple relationships between variables. According to the analysis results in Table 1, a high rate of correlation was found between *LIQ* and *CUR* variables. At the point of which variable to exclude from the analysis, the probability values of the variables included in the estimated regression model output were examined. As a result, the *LIQ* variable with the highest *p*-value was removed from the analysis.

Table 1

Correlation relations

	BETA	***SIZ***	***ROA***	***TUR***	***CUR***	***LEV***	***LIQ***	***ROE***
BETA	1,0000	-0,1642	-0,0385	-0,0534	0,1459	-0,0618	0,1510	-0,0356
SIZ	-0,1642	1,0000	-0,1717	0,1063	-0,5357	0,6642	-0,5355	0,0775
ROA	-0,0385	-0,1717	1,0000	-0,1072	0,2471	-0,2007	0,2555	0,8288
TUR	-0,0534	0,1063	-0,1072	1,0000	-0,3055	0,5018	-0,3267	0,1248
CUR	0,1459	-0,5357	0,2471	-0,3055	1,0000	-0,7189	0,9893	0,0223
LEV	-0,0618	0,6642	-0,2007	0,5018	-0,7189	1,0000	-0,7096	0,0619
LIQ	0,1510	-0,5355	0,2555	-0,3267	0,9893	-0,7096	1,0000	0,0375
ROE	-0,0356	0,0775	0,8288	0,1248	0,0223	0,0619	0,0375	1,0000

Source: Analysis output. Created by the author.

3.4. Cross section dependence

As a result of the test carried out to determine the cross-section dependency, the H_0 (Null Hypothesis) hypothesis was rejected. It was concluded that there was a cross-section dependence between the error terms. Table 2 shows the cross-section dependency test results.

Table 2

Cross section dependency results

Test	**Statistic**	**d.f.**	**Prob.**
Breusch-Pagan LM	593.7243	91	0.0000
Pesaran scaled LM	37.26440		0.0000
Pesaran CD	6.688590		0.0000
H_0: There is no cross-sectional dependency between error terms. REJECTED.			

Source: Analysis output. Created by the author.

3.5. Second generation Unit Root Tests

The second-generation unit root test was carried out since the cross-sectional dependency determined between the series. Series considered stationary when the *CIPS (t-bar)* statistic is greater than the critical values. According to Table 3, there is a unit root problem at the level in all series. It has been observed that the series whose first differences taken have become stationary.

Table 3

Second generation Unit Root Test results

	BETA	*SIZ*	*ROA*	*TUR*	*CUR*	*LEV*	*ROE*	*LIQ*
Level-CIPS (t-bar)	-1.06312	-1.98023	-1.66515	-1.38935	-1.78961	-1.37844	-1.99233	-1,95031
First Differences-CIPS (t-bar)	-4.01558	-4.41250	-2.45412	-3.21112	-4.55240	-3.50786	-3.36475	-3.86279
Level (Critical Values)	1% (-2.47); 5% (-2.27); 10% (-2.15)							

Source: Analysis output. Created by the author.

3.6. Autocorrelation problem analysis

In the continuation of the study, it is examined whether there was an autocorrelation problem between the series. The probability value is less than *0.05* in the *Breusch-Pagan LM test* results *(Table 2)* performed in order to determine the cross-section dependency. This result is an indication that there is an autocorrelation problem. *Durbin Watson's value*, one of the estimated regression model outputs, was below two and concluded a positive correlation.

3.7. Heteroscedasticity problem

Another pre-test performed in the study is the heteroscedastic test. For this purpose, the Panel Cross-section Heteroskedasticity LR Test was performed. According to the results below, H0 was rejected. Accordingly, there is a problem of variance in the model.

Table 4

Variable variance test

H_0: *Residuals are homoskedastic*	**Value**	**df**	**Prob.**
Likelihood ratio	150.1423	14	0.0000

Source: Analysis output. Created by the author.

3.8. Model selection

In the next stage of the study, analyses were conducted to decide on the panel regression model. For this purpose, the F test was performed first. Pooled Model - Fixed Effects Model tested with the test whose results are given in Table 5. According to the results given in Table 5, H_0 could not be rejected because the probability was more significant than *0.05*. H_0 hypothesis states that the pooled model is the most suitable. According to the test results in Table 5, the hypothesis does not reject since this model's probability values are higher than the margin of error *(0.05)* determined in the study. This result shows that no unit or time effects in the model and the *Pooled OLS* model are suitable.

In the second stage of the model selection, Pooled-Random Effects Models were compared using the *LM test,* and the most suitable model was tried to be determined. In Table 5, the probability value is more significant than *0.05*. Therefore, the H_0 hypothesis, which states that the model is suitable for the pooled model, cannot reject. As a result, it was decided that the pooled model is more suitable. According to these results, there is no need to perform the Hausman test.

Table 5

F Test and Breusch-Pagan LM Test results

Test Model	Test Method	Statistics	Possibility
Pooled-Fixed Effects	F Test	1.729065	0.0522
Pooled-Random Effects	LM Test (Breusch-Pagan)	2.521094	0.1123

Source: Analysis output. Created by the author.

3.9. The results of the analysis

Finally, the equation modelled in the study was estimated. The White period test, which enables the use of a resistant estimator that corrects standard errors, is used to overcome the autocorrelation and variance problem. Also, the *AR process* was applied to the model to eliminate the autocorrelation problem detected in the model.

Table 6 contains the estimation results for Model 1. According to Table 6, the analysis result was found to be meaningful. The R^2 value is *0.034223*. In other words, the financial ratios in the model can explain about *3.4%* of the changes in *Beta (systematic risk)*. It has been determined that the current ratio (this ratio has a high level of positive correlation with the acid test ratio, which is considered as the liquidity ratio) and leverage ratios positively affect the beta coefficient at the 5% significance level. However, the analysis results show that the effect of factors other than financial ratios included in this study is more critical on companies' systematic risks.

Table 6

Panel Regression results for Model 1

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.022739	0.009882	2.301084	0.0386
SIZ	-0.132823	0.108988	-1.218695	0.2446
ROA	-0.000889	0.002023	-0.439405	0.6676
TUR	-0.012099	0.028254	-0.428234	0.6755
CUR	0.004406	0.001713	2.572297	0.0232
LEV	0.159674	0.066378	2.405518	0.0318
ROE	0.000563	0.001009	0.557961	0.5864
AR(1)	0.171130	0.076731	2.230273	0.0440
Root MSE	0.144342	R-squared		0.034223
Mean dependent var	0.019884	Adjusted R-squared		0.019778
SD dependent var	0.147031	SE of regression		0.145570
Akaike info criterion	-0.999655	Sum squared resid		9.917222
Schwarz criterion	-0.929647	Log likelihood		245.9178
Hannan-Quinn criter.	-0.972127	F-statistic		2.369142
Durbin-Watson stat	2.040740	Prob(F-statistic)		0.021834
Inverted AR Roots	.17			

Source: Analysis output

In *Model 2*, the acid-test ratio is used instead of the current ratio. The results obtained are as shown in Table 7. Accordingly, the results are similar to *Model 1*. Liquidity and leverage ratios at the *5%* significance level have a positive effect on systematic risk.

Table 7

Panel Regression results for Model 2

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LIQ	0.004894	0.001956	2.502030	0.0265
LEV	0.161191	0.066339	2.429794	0.0303
ROE	0.000566	0.001006	0.562608	0.5833
SIZ	-0.136071	0.108759	-1.251123	0.2329
ROA	-0.000884	0.002021	-0.437400	0.6690
TUR	-0.011969	0.028179	-0.424734	0.6780
C	0.022748	0.009833	2.313322	0.0377
AR(1)	0.171382	0.076260	2.247327	0.0426
Root MSE	0.144306	R-squared		0.034698
Mean dependent var	0.019884	Adjusted R-squared		0.020260
SD dependent var	0.147031	SE of regression		0.145534
Akaike info criterion	-1.000147	Sum squared resid		9.912344
Schwarz criterion	-0.930139	Log likelihood		246.0349
Hannan-Quinn criter.	-0.972619	F-statistic		2.403209
Durbin-Watson stat	2.040914	Prob(F-statistic)		0.020054
Inverted AR Roots	.17			

Source: Analysis output

4. Conclusion and discussion

There are two essential factors to consider in financial transactions. These are return and risk. In financial literature, two types of risks are generally mentioned. The first is the systematic risk that all companies face, a market risk that cannot avoid or control; the second is the unsystematic risk faced by some companies, which is a preventable or minimized risk.

One of the most important factors to consider in financial decisions is systematic risk. The systematic risk is measured by the beta coefficient *(β)* in this study. This coefficient is also a measure of the closeness of the return rate or profit of stock to the change in the rate of return or profit of the market index. The beta factor has a vital role to play because it enables the relationship between company decisions and the stock market. Incorrect decisions and choices of managers responsible for companies' financial decisions can adversely affect the expectations of all stakeholders of the business, especially investors, regarding the valuation of stocks. Since the systematic risk *(β)* cannot be controlled and reduced, it plays a vital role in company executives' and investors' decisions.

In studies conducted in finance, the relationships between financial ratios such as liquidity ratio, current ratio, leverage, return on assets, asset turnover, firm size, and the Beta coefficient were examined frequently. Generally, significant relationships had been determined in these studies. Findings obtained from this study are in general agreement with the literature mentioned above. Although it has not been addressed in the technology sector, studies on other sectors have intensely examined the relationship between leverage ratio and systematic risk. In these studies, in general, significant relationships between these two financial phenomena have been identified. When all other factors affecting a firm's risk are considered constant, high financial leverage increases its risk level. Hence, higher financial leverage increases the Beta of the firm's equity. Because other factors are equivalent, and a high leverage ratio increases the variability of firms' income. In this study, the findings obtained in the context of leverage ratio are similar to the findings of previous studies by Huffman (1989), Mandelker and Rhee (1984), Tanrıöven and Aksoy (2011), and Alaghi (2011), while Karadeniz et al. (2015), different from the results of the study.

Another finding is the positive relationship between the current and acid-test ratios and the beta coefficient. It is determined, in the correlation analysis section of the study that was performed for multicollinearity research, the acid test and current ratios were highly positively correlated. Therefore, the current ratio and liquidity ratio are included in the analysis separately. As stated in the study by Borde (1998), high liquidity is perceived as an indicator that the available resources are not used wisely; it is a factor that can increase the risk perception of the investors. Therefore, it is significant that the relationship between beta coefficient and liquidity ratios is positive. While the findings obtained in the context of liquidity ratio had similar results to the previous study by Kim et al. (2007) and Uyar and Çağlak (2019), it is different from the results of the study conducted by Lee and Jang (2007), Karadeniz et al. (2015) and Hosseinpour and Saeidi (2016).

References

1. Akça, S. (2008). Beta katsayısı ile finansal oranlar arasındaki ilişkilerin ölçülmesi: İstanbul Menkul Kıymetler Borsası'nda bir uygulama (Master's thesis, Adnan Menderes Üniversitesi, Sosyal Bilimler Enstitüsü).
2. Alaghi, K. (2011). Financial leverage and systematic risk. African Journal of Business Management, 5(15), 6648-6650.
3. Ball, R. & P. Brown, (1969) "Portfolio Theory and Accounting Theory", Journal of Accounting Research, 7.
4. Baltagi, B. H. (2005). Econometric analysis of panel data, 3rd ed., John Wiley and Sons Ltd.
5. Beaver, W., P. Kettler & M. Scholes, (1970) "The Association between Market Determined and Accounting Determined Risk Measures", The Accounting Review, October.
6. Borde, S. (1998). Risk diversity across restaurants. Cornell Hotel & Restaurant Quarterly, 4, 64-69.
7. Ceylan, A. & Korkmaz, T. (2000), Sermaye Piyasası ve Menkul Değer Analizi, Ekin Kitabevi, Bursa.
8. Cuthbertson, K. (1996), Quantitative Financial Economics : Stocks, Bonds and Foreign Exchange, John Wiley & Sons, West Sussex, England.

9. Çetin, M., & Ecevit, E. (2010). Sağlık harcamalarının ekonomik büyüme üzerindeki etkisi: OECD Ülkeleri Üzerine Bir Panel Regresyon Analizi.
10. Dedunu, H. H. (2017). Financial Variables Impact on Common Stock Systematic Risk, International Journal of Scientific Research and Innovative Technology, 4(10), 2313-3759
11. Dumanoğlu, S., & Ergül, N. (2010). İMKB'de işlem gören teknoloji şirketlerinin mali performans ölçümü. Muhasebe ve Finansman Dergisi, (48), 101-111.
12. Ercan, M.K., Öztürk, M.B. Basaran, Küçükkaplan, ve dig. (2006), Halka Açık Firmaların Beta Katsayılarının Regresyon Modeli ile Tespiti ve Halka Açık Olmayan Firmalara Yönelik Uygulama, 10. Ulusal Finans Sempozyumu.
13. Eryiğit, C., & Eryiğit, M. (2009). Temel finansal oranların sistematik riske etkisi. Iktisat Isletme ve Finans, 24(281), 60-76.
14. Faez, A., & Eslam, B. (2013). The effect of financial ratios on systematic risk index. Management Science Letters, 3(11), 2775-2780.
15. Gülençer, S., & Hazar, A. (2020). Borsa İstanbul Teknoloji Endeksi (XUTEK) Şirketlerinin Altman Z-Skor Analizi İle Değerlendirilmesi. ISPEC International Journal of Social Sciences & Humanities, 4(2), 59-76.
16. Hosseinpour, A., & Saeidi, P. (2016). The Relationship between Financial Ratios and Systematic Risk in Cement Industry in Tehran Stock Exchange. Research Journal of Management Reviews, 2(2), 80-84.
17. Huffman, S. P. (1989). The impact of the degrees of operating and financial leverage on the systematic risk of common stocks: another look. Quarterly journal of business and economics, 83-100.
18. Jiayi, L. (2016). Systematic Risk, Financial Indicators and the Financial Crisis: A Risk Study on International Airlines. Master Thesis, Faculty of Business and Economics, University of Groningen Department of Business Studies, Uppsala University.
19. Karadeniz, E., Kandır, S. Y., & İskenderoğlu, Ö. (2015). Sistematik Riskin Belirleyicileri: Borsa Istanbul Turizm Şirketleri Üzerinde Bir Araştırma. Çukurova Üniversitesi Sosyal Bilimler Enstitüsü Dergisi, 24(1), 189-202.
20. Kim, W. G., Ryan, B., & Ceschini, S. (2007). Factors affecting systematic risk in the US restaurant industry. Tourism Economics, 13(2), 197-208.

21. Lee, J., & Jang, S. (2007). The systematic-risk determinants of the US airline industry. Tourism Management, 28,434-442.
22. Logue, D. E., & Merville, L. J. (1972). Financial policy and market expectations. Financial Management, 37-44.
23. Mandelker, G. N. ve Rhee S. G. (1984), "The Impact of the Degrees of Operating and Financial Leverage on Systematic Risk of Common Stock", Journal of Financial and Quantitative Analysis, 19(1): 45-57.
24. Mensah, Y. M. (1992) "Adjusted Accounting Beta, Operating Leverage and Financial Leverage as Determinants of Market Beta: A Synthesis and Empirical Evaluation" Review of Quantitative Finance and Accounting, 2(2), pp.187-203.
25. Orçun, Ç., & Eren, B. S. (2017). TOPSIS Yöntemi ile Finansal Performans Değerlendirmesi: XUTEK Üzerinde Bir Uygulama. Journal of Accounting & Finance, (75).
26. Repetti, T., & Kim, J. (2010). Analyzing the Relationship Between Systematic Risk and Financial Variables in the Casino Industry. UNLV Gaming Research & Review Journal, 14(2), 4.
27. Ross, S. A., Westerfield, R., Jaffe, J. F., & Jordan, B. D. (2009). Corporate finance: Core principles & applications. McGraw-Hill Irwin.
28. Sharpe, W. F. (1963). A simplified model for portfolio analysis. Management science, 9(2), 277-293.
29. Sharpe, W. F. (1964), "Capital Asset Prices: A Theory of Market Equilibrium under Conditions of Risk," Journal of Finance, pp. 425-442
30. Tanrıöven, C., & Aksoy, E. E. (2011). Sistematik riskin belirleyicileri: İMKB'de sektörel karşılaştırma. Muhasebe ve Finansman Dergisi, (51), 119-138.
31. Tektüfekçi, F. (2010). İMKB'ye Kayıtlı Halka Açık Teknoloji Şirketlerinde Finansal Etkinliğin Veri Zarflama Analizi (Vza) İle Değerlendirilmesi. Organizasyon ve Yönetim Bilimleri Dergisi, 2(2), 69-77.
32. Tepeli, Y. (2017). Halka açık olmayan anonim şirketlerde sistematik risk ölçütü beta katsayısının tahmin edilmesi: Turizm sektörü uygulaması. Muhasebe ve Finansman Dergisi, (75).
33. Toker, K. Çınar, F. (2018). Türkiye'de Borsa İstanbul Teknoloji Endeksi (Xutek) ile ihracatın ithalatı karşılama oranı arasındaki ilişkinin incelenmesi,Beyder, 13(2), 139-150

34. Türkmen, S. Y., & Çağıl, G. (2012). İMKB'ye Kote Bilişim Sektörü Şirketlerinin Finansal Performanslarının Topsıs Yöntemi İle Değerlendirilmesi. Maliye ve Finans Yazıları, 1(95), 59-78.

35. Usta, Ö., & Demireli, E. (2010). Risk Bileşenleri Analizi: İmkb'de Bir Uygulama. Zonguldak Karaelmas University Journal of Social Sciences, 6(12).

36. Uyar, U. & Çağlak, E. Çimento Sektörü Açısından Sistematik Risk–Finansal Oran İlişkisi: Ana Çimento Üreticisi Ülkeler Karşılaştırması. Muhasebe ve Finansman Dergisi, (81), 231-248.

37. Wooldridge, J.M. (2003). Econometric analysis of cross section and panel data, The MIT Press., Cambridge.