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MEASUREMENT OF MARKET RISK PREMIUMS: A SECTORAL ANALYSIS ON BORSA ISTANBUL

Suat Teker[1], Dilek Teker[2], Esin Demirel Gumustepe[3]

[1 2 3] Isik University, Department of Business, Istanbul, Turkiye

Abstract

The determination of market risk premium is often a problem for academics and practioners when applying Capital Asset Pricing Model (CAPM). This study intends to measure the market risk premiums (MRP) in the sectors of Borsa Istanbul. The monthly data are extracted from Reuters Database for the period of 2016-2021 for the seventeen sectors of Borsa Istanbul. The whole sampling period is devided into two sub-periods based upon the results of Cusum-Squared test statistics showing a structural break with the Covid-19. The emprical results reveal that the market risk premium on BIST100 is -0.7% with a volatility of 0.3% in the pre-Covid-19 period while the market risk premium on BIST100 is -0.21% with a volatlity of 0.23% post-Covid-19 period. The findings show that a significant increase in market risk premiums and volatilies post-Covid-19 era compared to the pre-Covid era. More, the market risk premiums and their volatilies are estimated by utilizing ARIMA model for the 2022-2024 period. The estimates point even higher market risk premiums and volatilies in the near future.

Keywords

Market Risk Premium, Market Risk, Borsa Istanbul, Valatility, CAPM

1. Introduction

The Modern Portfolio Theory (APT) became widely accepted in the 1960s and 1970s, and as a result, diverse factors influencing stock price fluctuations became one of the major research topics in the finance literature. The Capital Asset Pricing Model (CAPM), propesed by Sharpe, Lintner, and Black in 1964 and 1965 and published in 1972, is the most widely used model by academics, researchers, and practitioners. The expected return of a security and the systematic risk of that security are positively correlated, according to CAPM. Additionally, each security's predicted return should be equal to the market's anticipated risk premium.

The most common model for analyzing investment projects, stock valuation, company valuation, mergers and acquisitions, initial public offerings and secondary public offerings may be assumed the Capital Asset Pricing Model (CAPM). One of the most essential inputs in the model's application is the assessment of the market risk premium. The market risk premium is generally defined by the difference in between expected market return and risk-free rate of interest. The market risk premiums for the Turkish markets have not yet well studied by the existing finance literature. With a focus on the Covid-19 era, this study seeks to determine the market risk premiums for the seventeen sub-sectors of Borsa Istanbul. The findings of this study are intended to serve as a reference for regional, national, and international financial institutions, brokerage houses, and scholarly investigations for the applications of CAPM on the Turkish markets..

The following part review the previous literature about the measurement of markets risk premiums in different countries with time periods using different methodologies. The following section covers the data employed and the methodology utilized in the study. The next section presents the empirical findings on the measurement of market risk premiums and volatilities for the seb-sectors of Borsa Istanbul. The last part summarizes the study and focuses on the findings.

2. Literature

Lally and Marsden (2004) examines historical equities returns, long-term government bond returns, bond yields, and New Zealand inflation rates from 1931 to 2002. Estimated personal tax rates on several investment income streams are also provided. In two versions of the capital asset pricing model (CAPM), the market risk premiums are estimated using this data. The Ibbotson methodology is used to estimate the market risk premium in the typical CAPM resulting an estimate of 0.058 compared to long-term government bond returns and 0.055 relative to bond rates. Additionally, the market risk premium is assessed using a parallel technique for the tax-adjusted version of the CAPM, which is now extensively utilized in New Zealand, and produces values of 0.074 relative to bond returns and 0.072 relative to bond yields.

Using weekly return data spanning a period from 2/7/1973 to 12/27/2000, the time series of the risk aversion parameter for the Japanese stock market is computed in Ahn and Shrestha (2009) study. The Chou, Engle, and Kane (1992) Time Varying Parameter (EVP) GARCH-M model is used to estimate the time series of the risk aversion parameter. This model simulates the risk aversion parameter as following a random walk process allowing to alter over time. It is discovered that the risk aversion parameter lies between 3.5 and 2.2. Additionally, it is discovered that the risk aversion parameter has not changed considerably over time. This suggests that variations in market risk can account for the majority of variations in excess return.

The financial turmoil's impact on the Swedish money market risk premium is examined in Soultanaeva and Strömqvist (2009) study. It is also looked more closely at the effects of shocks that are communicated from the US and European markets. Its findings suggest that, unlike the European market, the US market had a substantial impact on the Swedish market. The results also show that liquidity risk was the primary factor driving the money market risk premium during the early stages of the crisis. As the crisis has progressed, the focus shifted from liquidity risk to credit risk. This could be unique policy implications for central banks.

Bhar and Chiarella (2007) study suggests a model for the total stock market including its dividend yield and earnings yield in order to extract the ex-ante risk premium in a framework for unobserved component modeling. The ex-ante risk premium serves as the linking variable in our proposed model, which is a system of linked stochastic differential equations. It shows how such a system could be evaluated as a filtering problem by assuming a realistic dynamic structure for the ex-ante risk premium. It uses the data from the U.K. stock market to apply the model as a practical example of the process.

The risk aversion parameter for the South African stock market is estimated in Bonga and Bonga (2010) study using the time-varying parameter GARCH-M model. The performance of a time-varying risk premium model and a constant risk premium model in forecasting stock market returns on the South African Stock Exchange is compared in this research. The findings demonstrate that risk premiums vary over time and suggest that the South African Stock Market is susceptible to outside shocks. Furthermore, the study discovers that the time-varying GARCH-M model beats the fixed parameter GARCH-M model in predicting stock returns when using short-term prediction horizons,.

Graham and Harvey (2015) study examines the development of the equity risk premium using data from U.S. Chief Financial Officers (CFOs) questionnaires that were conducted every three months between June 2000 and March 2015. The predicted 10-year S&P500 return in comparison to the yield on a 10-year US Treasury bond is the risk premium. It demonstrates a more than 50 basis point increase in the stock risk premium from levels seen in 2014. The 10-year risk premium is currently 4.51%. Similar trends have been observed in risk indicators like investor dissatisfaction and volatility assessments.

Salvi et al. (2019) study examines how the market risk premium in the European market relates to leveraged buyouts (LBOs) and initial public offerings (IPOs). They extend the scope of the research to the years starting in the first quarter of 1999 and ending in the fourth quarter of 2016. According to the longitudinal analysis, there is a clear correlation between LBO volume and the STOXX Europe600 stock index as well as an inverse association between market risk premium and LBO volume. Additionally, the analysis of IPO operations demonstrates the importance of all variables taken into account when forecasting IPO trends in Europe with the market risk premium and the STOXX Europe600 stock index having a particularly pronounced impact in this instance.

During the COVID-19 epidemic, Lubis (2021) study examines the effects of return distribution characteristics such as skewness and kurtosis on lagged market risk premium and risk premium in the Indonesian capital market. The weekly date are used covering 674 firms from January to December 2020. Predictive regression using panel data is employed. The study initialy approached the market risk premiums and the risk premium derivatives. Secondly, the study employed lagged market risk premium and risk premium in 2020. Third, it simultaneously included skewness and kurtosis. The market risk premium and risk premium with a negative return are the outcomes. Risk premium is significantly influenced by the beta-lagged market risk premium. The market risk premiums of skewness and kurtosis are substantial independently rather than jointly. The findings refer that the risk premia and movement market premia during the COVID-19 epidemic are often negative. Future monthly risk premium can be explained by beta lagged market risk premium. Kurtosis and skewness, on the other hand, cannot run together in the long term. When the market risk premium and skewness are beta-lagged, the skewness is somewhat significant and has a positive direction. Only the kurtosis and beta lagged market risk premium, however, continues to be negative compared to the prior model. Only the risk premium under 1%, or around 0.24%, can be explained by including lagged assumptive distribution.

Fernandez et al. conducted surveys on market risk premium in various years. The market risk premiums for 2011 for 56 countries are presented in Fernandez et al. (2011) study. For 56 nations with more than six responses, they present the results. In this survey, the required market risk premiums are questioned. The report includes comments from those who do and do not utilize MRP, as well as the references that support the MRP. The market risk premium statistics for 71 countries in 2016 are presented in Fernandez et al. (2016) study. This survey inquires about the required MRP whereas the majority of earlier studies focused on the expected MRP. The statistics from a survey on the market risk premium and the risk-free rate for 59 countries in 2018 are presented in Fernandez et. al. (2018) study. For 22 nations, the average market risk premium changes by more than 1% between 2015 and 2018. The statistics from a survey on the market risk premium and the risk-free rate for 81 countries in 2020 are presented in Fernandez et al. (2020) study. The majority of the respondents pointed a 2% increase in MRP. The statistics from a survey on the market risk premium and the risk-free rate for 88 countries in 2021 are presented in Fernandez et al. (2021). For the Euro countries, the coefficient of variation of risk-free rate is greater than the coefficient of variation of market risk premium. Table 1 below presents the literature survey by comparing msapling period, countries, number of observations, metholdology and proposed market risk premiums.

Authors	Title of the Article	Period of study	Sampling countries	N. of observa tions	Method.	Market risk primium
Lally & Marsden (2004)	Estimating the Market Risk Premium in New Zealand through the Siegel Methodology	1931-2002	New Zealand	72	Siegel (1992)	3-4%
Ahn & Shrestha (2009)	Estimation of Market Risk Premium for Japan	1973-2000	Japan	1456	GARCH-M	2.2-3.5%
Soultanaeva & Strömqvist (2009)	The Swedish Money Market Risk Premium – Experiences from the Crisis	2006-2009	Swedish, US and Euro area markets	912	Decompo sition	-0.6 to 1.00%
Bhar & chiarella (2010)	A Model for the Ex-Ante U.K. Stock Market Risk Premium	1973-2003	U.K.	361	Kalman Filtering	6%
Bonga & Bonga (2010)	The Assessment of Market Risk Premium In South Africa	1996 - 2010	South Africa	783	GARCH-M	0.7-4.7%
Fernandez et al. (2011)	Market Risk Premium used in 56 countries in 2011: a survey with 6,014 answers	2011	56 countries (United States, Spain, Turkey, Taiwan, etc.)	6014	Survey	5.5-22.9%
Graham & Harvey (2015)	The Equity Risk Premium in 2015	2000-2015	U.K.	21016	Survey	4.51%
Fernandez et al. (2016)	Market Risk Premium used in 71 countries in 2016: a survey with 6,932 answers	2017	71 countries (USA, Spain, Germany, UK, etc.)	6932	Survey	5.1-13.8%
Fernandez et al. (2018)	Market Risk Premium and Risk-Free Rate used for 59 Countries in 2018: A Survey	2018	59 countries (USA, Spain, Germany, Argentina, etc.)	2238	Survey	5.4-22.1%
Fernandez et al. (2020)	Survey: Market Risk Premium and Risk-Free Rate used for 81 countries in 2020	2020	81 countries (USA, Spain, Argentina, Australia, etc.)	1946	Survey	5.6-23.1%
Salvi et al. (2021)	The Relationship between LBOs, IPOs and Market Risk Premium: An Empirical Analysis of the European Market	1999-2016	European Market	72	Log-Linear Regressio n	4.4%
Fernandez et al. (2021)	Market Risk Premium and Risk-Free Rate. Survey 2021	2021	88 countries (USA, Spain, Angola, Argentina, etc.)	1624	Survey	5.5-17.4%
Lubis (2021)	Kurtosis and Skewness on Lagged Market Risk Premium during Covid-19 Pandemic	2020	Indonesia	8088	Panel Data	0.24%
Fernandez et al. (2022)	Survey: Market Risk Premium and Risk-Free Rate Used for 95 Countries in 2022	2022	95 countries (USA, Spain, Andorra, Belgium, etc.)	1624	Survey	5.3-29.9%

Table 1. Summary of Literature Survey

3. Data and Methodology

The Borsa Istanbul 100 (BIST100) Index and 17 other sectoral indices are examined between the years 2016 and 2021 using the monthly data extracted from the Reuters Database. In total, 1296 observations are noted. Table 2 presents the sectors examined in Borsa Istanbul, number of firms in each sector and the market value in USD as of 2023.

No	Sector	Index Code	Number of Firms	Total Market Value (billion USD)
1	BIST100	XU100	100	253,4
2	Banks	XBANK	12	40,1
3	Information Tech	XBLSM	31	5,4
4	Metalware	XMANA	24	18,9
5	Insurance	XSGRT	6	4,7
6	Trade	XTCRT	23	17,7
7	Real Estate	XGMYO	43	12,7
8	Holding	XHOLD	50	45,1
9	Communication	XILTM	2	7,2
10	Leasing	XFINK	7	0,9
11	Electricity	XELKT	29	21,5
12	Food	XGIDA	36	10,4
13	Textile	XTEKS	21	3,1
14	Transportation	XULAS	10	17,1
15	Tourism	XTRZM	12	2,4
16	Paper	XKAGT	16	2,5
17	Chemistry	XKMYA	42	39,9
18	Metal	XMESY	38	40,4
	Total		502	543,4

Table 2. Sectors used in the study

The CAPM equation can be stated as follows;

$$\mathbf{R_{i,t} = R_{f,t} + \left(E[R_M]_t - R_{f,t}\right)(Beta_i)} \quad \textbf{(1)}$$

where, $\mathrm{R_{i,t}}$ is return of firm i at time t, $\mathrm{R_{f,t}}$ is the risk-free rate at time t, $\mathrm{E[R_M]_t}$ is expected market return at time t and $\mathrm{Beta_i}$ is market risk of firm i.

$$\textbf{Market Risk Premium (MRP)} = \mathbf{E[R_M]_t - R_{f,t}} \quad \textbf{(2)}$$

The market risk premium $\left(\mathrm{E[R_M]_t - R_{f,t}}\right)$ is defined as the difference in between expected market returns and risk-free rate. The expected market returns are approximated by the changes in BIST100 index and the risk-free interest rates are approximated by the ineterest rates on 5 year government bonds. Then, the whole sampling period is divided as the 2016-2017-2018 period (before Covid-19) and the 2019-2020-2021 period (after Covid-19). Table 3 and 4 show the desciptive statistics of the date for the periods before Covid-19 and after Covid-19

Sectors	2016-2017-2018					
	Mean	**Max.**	**Min.**	**Std. Dev.**	**Skewness**	**Kurtosis**
BIST100	0,0082	0,1091	-0,0976	0,0557	-0,1128	2,2491
Banks	0,0031	0,1924	-0,1798	0,0862	0,0185	2,4179
Information Tech	-0,0041	0,1203	-0,1281	0,0709	0,0357	2,0864
Leasing	0,0080	0,2629	-0,1232	0,0832	0,8324	4,2171
Electricity	0,0006	0,2038	-0,1336	0,0721	0,9154	3,9487
Food	0,0006	0,2038	-0,1336	0,0721	0,9154	3,9487
Real Estate	-0,0035	0,1098	-0,0920	0,0478	0,1260	2,5118
Holding	0,0091	0,1229	-0,1219	0,0542	-0,5047	3,1815
Communication	0,0097	0,1396	-0,1885	0,0699	-0,5077	3,6539
Paper	0,0151	0,1350	-0,0879	0,0560	0,0512	2,2423
Chemistry	0,0051	0,1115	-0,1505	0,0665	-0,5676	2,8841
Metal	0,0258	0,2135	-0,1813	0,0900	-0,1708	2,6959

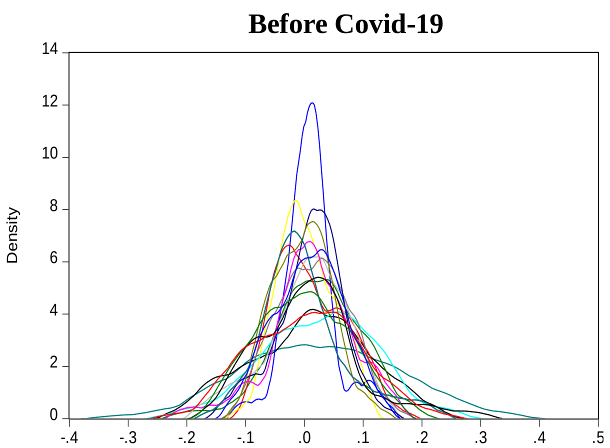
Metalware	0,0036	0,0896	-0,0901	0,0456	0,2036	2,2471
Insurance	0,0107	0,1302	-0,0992	0,0431	0,4792	4,5217
Trade	0,0114	0,1419	-0,0720	0,0573	0,4500	2,1429
Textile	0,0220	0,1600	-0,1752	0,0703	-0,3544	3,3278
Transportation	0,0274	0,2863	-0,2524	0,1245	0,0391	2,5385
Tourism	0,0097	0,1879	-0,1721	0,0952	-0,1539	2,3424

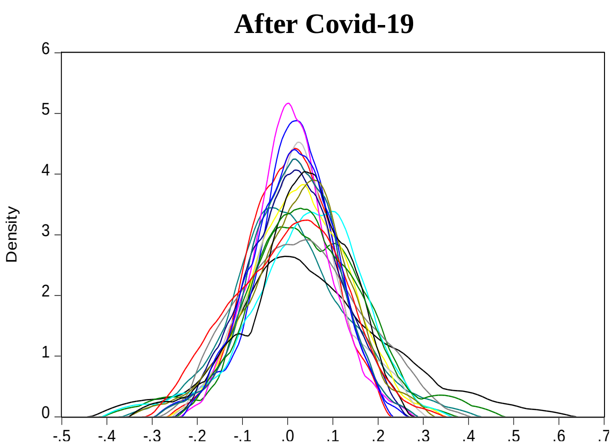
Table 3. Descriptive statistics for the pre-Covid-19 period

Sector	2019-2020-2021					
	Mean	Max.	Min.	Std. Dev.	Skewness	Kurtosis
BIST100	0,0112	0,1539	-0,1543	0,0817	-0,1870	2,3745
Banks	0,0028	0,2399	-0,2066	0,1116	-0,1300	2,3087
Information Tech	0,0515	0,3738	-0,1421	0,1153	0,6354	3,4321
Leasing	0,0257	0,1928	-0,2674	0,1045	-0,6710	3,3078
Electricity	0,0130	0,2068	-0,2127	0,0888	-0,2165	2,9893
Food	0,0130	0,2068	-0,2127	0,0888	-0,2165	2,9893
Real Estate	0,0217	0,2296	-0,2556	0,1052	-0,4145	3,1470
Holding	0,0122	0,1876	-0,1705	0,0916	-0,0273	2,3842
Communication	0,0078	0,2042	-0,1607	0,0785	0,1688	3,0390
Paper	0,0319	0,2876	-0,1692	0,1201	0,2288	2,2286
Chemistry	0,0209	0,2311	-0,1799	0,0959	0,1384	2,8363
Metal	0,0375	0,2617	-0,3096	0,1185	-0,7181	3,6925
Metalware	0,0311	0,2586	-0,1748	0,0977	0,0816	2,6218
Insurance	0,0147	0,1877	-0,2170	0,0848	-0,4559	3,4255
Trade	0,0047	0,1498	-0,1873	0,0809	-0,1554	2,5801
Textile	0,0316	0,2608	-0,2974	0,1174	-0,5041	3,3931
Transportation	0,0070	0,3104	-0,2524	0,1183	0,3310	3,1908
Tourism	0,0549	0,4885	-0,2905	0,1665	0,3806	3,3667

Table 4. Descriptive statistics for the post-Covid-19 period

The mean return on BIST100 index is only 0.82% with a volatility of 5.57% in the pre-Covid-19 period while it is 1.1% with a volatility of 8.15% post-Covid-19 period. According to Figure 1, the distributions of returns for the sectors in the pre-Covid era are normally distributed except transportation (flatter) and insurance sector (sharper). After the Covid-10 period the distribution of returns of all sectors overlap. On the other hand, the volatilities of sectoral returns increase after the Covid-19. The sectoral values of skewness and kurtosis support the normal distribution of returns.





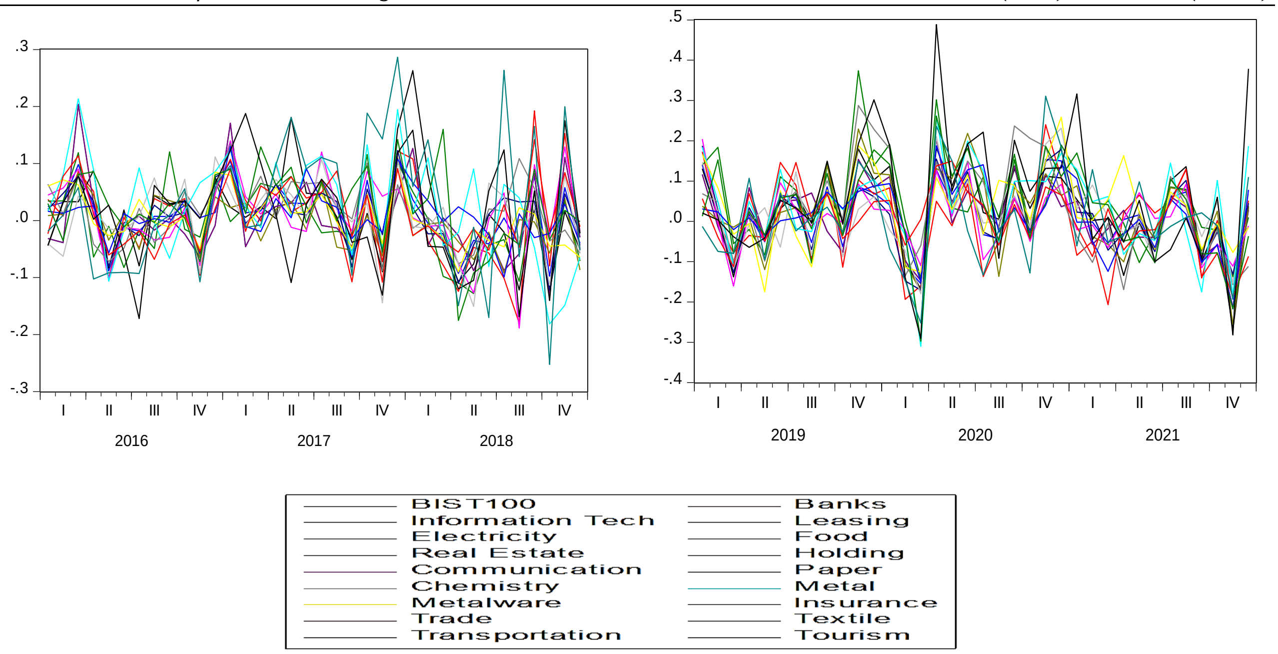


Figure 1. Distributions of returns and volatilities for sector indexes

Cusum-Squared is the test used to determine whether there is a structural change computed by the squares of sequential residuals. Therefore, the Cusum-Squared test is applied whether there is a structural break in the whole sampling period.

The OLS-based CUSUM test statistics (Page, 1954):

$$S_c(t) = \frac{1}{\hat{\sigma}\sqrt{T}} \sum_{i=1}^{[Tt]} \hat{u}_{i;}\ 0 \leq t \leq 1 \qquad (3)$$

where, $\hat{u}$ is OLS residuals from the model under the null, $\hat{\sigma}$ is the standard deviation of the estimated residuals. In both graphs,. Therefore, there has been a break in the risk premium and volatilities in the Covid-19 era. The Figure 2 below shows that the Cusum-Squares bands are outside the bandwidth, indicating the 5% significance level. Hence, there is a structural break at the beginning of the Covid-19 period for market risk premiums and a structural break after the Covid-19 period for volatility.

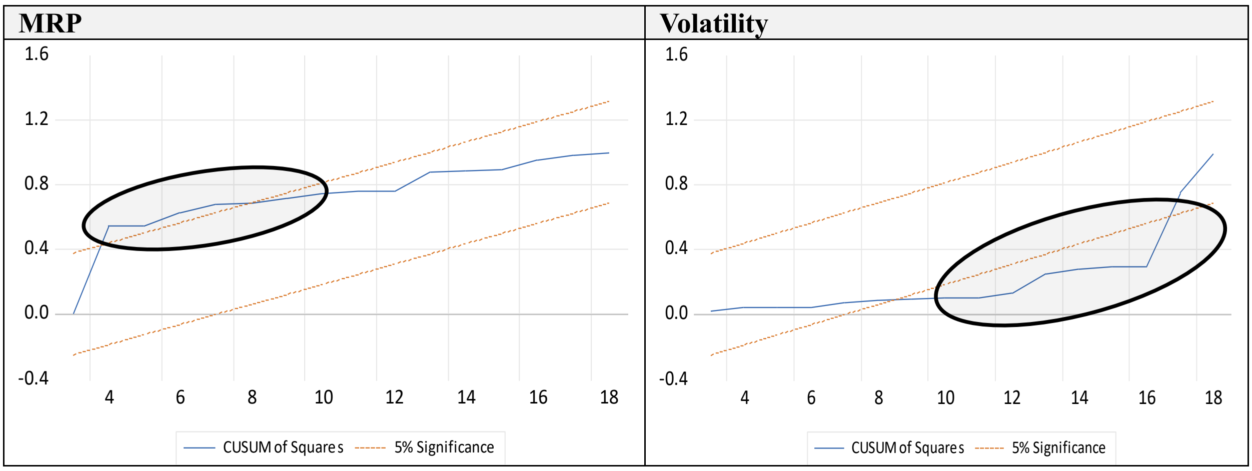


Figure 2. Structural Break - Cusum Squared Test

A class of models known as ARIMA models may accurately anticipate the future based on historical data for a single variable and can represent stationary and non-stationary time series. Therefore, one of the most well-known techniques for financial forecasting may refer the ARIMA model.

The future value of a variable in the ARIMA model is a linear combination of previous values and past errors stated as follows (Box & Jenkins, 1968):

$$Y_t = \varphi_0 + \varphi_1 Y_{t-1} + \varphi_2 Y_{t-2} + \cdots + \varphi_p Y_{t-p} + \varepsilon_t - \theta_1 \varepsilon_{t-1} - \theta_2 \varepsilon_{t-2} - \cdots - \theta_q \varepsilon_{t-q} \qquad (4)$$

where, Y_t is the actual value at t, ε_t is the random error at t, φ_i and θ_j are the coefficients p and q is integers that are often referred to as autoregressive and moving average, respectively.

Volatility formula used in this study may be stated as below (Walters, 2007)

$$\boldsymbol{Volatility} = \sqrt{\frac{\boldsymbol{\alpha_0}}{\boldsymbol{1-\alpha_1-\cdots-\alpha_p-\beta_1-\cdots-\beta_q}}} \qquad \textbf{(5)}$$

where, α_0 is the coefficient of the constant variable in the ARIMA model, α_p the coefficient of AR(p) and β_q the coefficient of MA(q).

Afterwords, ARIMA forecasting method is used to estimate the market risk premiums for all sectors for the years 2022, 2023, and 2024. There are a total of 576 projected data points.

4. Findings

The results of calculations of market risk premiums and volatilities of sectors for the periods of pre-Covid-19 (2016-2017-2018) and the post-Covid-19 (2019-202-2021) are presented in this part of the study. Then, the market risk premiums and volatilities for each sub-period are averaged. According to Table 5, the market risk premiums for sectors in the pre-Covid-19 period are generally negative. In other words, the returns of the sectors are lower than the return of the risk-free assets. During the pos-Covid-19 period (see Table 6), the market risk premiums of the sectors are generally positive. In other words, the returns of the sectors during the post-Covid-19 period are higher than the returns of a risk-free assets. The investors demand higher returns to compansate the extra risk they face during the Covid era.

Sectors	**2016**		**2017**		**2018**		**Average**	
	MRP	**Vol.**	**MRP**	**Vol.**	**MRP**	**Vol.**	**MRP**	**Vol.**
BIST100	0,0006	0,0017	0,0252	0,0027	-0,032	0,0024	-0,0021	0,0023
Banks	0,0005	0,0017	0,0171	0,0009	-0,039	0,0116	-0,0071	0,0047
Information Tech	0,0017	0,0027	0,0168	0,0022	-0,0616	0,0035	-0,0144	0,0028
Leasing	0,0268	0,0013	0,0224	0,0056	0,1155	0,0012	0,0549	0,0027
Electricity	-0,0009	0,0017	0,0203	0,0034	-0,0263	0,0037	-0,0023	0,0029
Food	-0,0115	0,0017	0,0105	0,001	-0,0281	0,0047	-0,0097	0,0025
Real Estate	0,0055	0,0007	-0,0026	0,0022	-0,0441	0,0014	-0,0137	0,0014
Holding	0,0034	0,0014	0,0201	0,0014	-0,0271	0,0013	-0,0012	0,0014
Communication	-0,0071	0,0003	0,0338	0,002	-0,0285	0,0076	-0,0006	0,0033
Paper	-0,0004	0,0026	0,0174	0,004	-0,0324	0,0038	-0,0051	0,0035
Chemistry	-0,0016	0,0024	0,0361	0,0024	-0,02	0,0023	0,0048	0,0024
Metal	0,0096	0,0011	0,0131	0,0016	-0,0426	0,0008	-0,0066	0,0012
Metalware	0,0312	0,0063	0,052	0,0052	-0,0367	0,0059	0,0155	0,0058
Insurance	-0,0008	0,0003	0,0201	0,0024	-0,018	0,001	0,0004	0,0012
Trade	-0,0109	0,0024	0,0296	0,0012	-0,0154	0,0007	0,0011	0,0014
Textile	0,0111	0,0019	0,0483	0,003	-0,0242	0,0051	0,0117	0,0033
Transportation	-0,0343	0,0033	0,0891	0,0018	-0,0033	0,0231	0,0172	0,0094
Tourism	-0,0027	0,0115	0,0222	0,0039	-0,0212	0,0097	-0,0006	0,0084

Table 5. Monthly market risk premiums and volatilities in the pre- Covid-19 period

Sectors	**2019**		**2020**		**2021**		**Average**	
	MRP	**Vol.**	**MRP**	**Vol.**	**MRP**	**Vol.**	**MRP**	**Vol.**
BIST100	0,0083	0,0017	0,0169	0,0082	-0,0273	0,0003	-0,0007	0,0034
Banks	0,0175	0,0067	-0,0042	0,0072	-0,0406	0,0049	-0,0091	0,0063
Information Tech	0,0617	0,0049	0,0665	0,0106	-0,0093	0,0037	0,0396	0,0064
Leasing	0,0034	0,0306	0,0135	0,0095	-0,0413	0,0196	-0,0081	0,0199
Electricity	0,0229	0,0025	0,0527	0,0079	-0,0342	0,0025	0,0138	0,0043
Food	0,0158	0,0033	0,0267	0,0045	-0,0391	0,0013	0,0011	0,0030
Real Estate	0,0234	0,0045	0,0393	0,006	-0,0335	0,0013	0,0097	0,0039
Holding	0,0117	0,0005	0,0185	0,0031	-0,0293	0,0011	0,0003	0,0016
Communication	0,0094	0,0006	0,0083	0,0063	-0,0301	0,0014	-0,0041	0,0028

Paper	0,044	0,0117	0,0825	0,0098	-0,0666	0,0031	0,0200	0,0082
Chemistry	0,0015	0,0044	0,0348	0,0049	-0,0092	0,0025	0,0090	0,0039
Metal	0,0289	0,0043	0,0505	0,0192	-0,0025	0,0028	0,0256	0,0088
Metalware	0,0159	0,0087	0,0438	0,0101	-0,0022	0,0025	0,0192	0,0071
Insurance	0,0123	0,001	0,0412	0,0078	-0,0452	0,0008	0,0028	0,0032
Trade	0,0017	0,0029	0,0316	0,0036	-0,055	0,0011	-0,0072	0,0025
Textile	0,0322	0,0052	0,0555	0,0201	-0,0287	0,0027	0,0197	0,0093
Transportation	0,0001	0,004	0,002	0,0229	-0,0167	0,0054	-0,0049	0,0108
Tourism	0,037	0,0033	0,0895	0,0257	0,0023	0,0023	0,0429	0,0104

Table 6. Monthly market risk premiums and volatilities in the post- Covid-19 period

Table 7 shows the predicted market risk premiums and volatility predictions fort he years of 2022-2023-2024. The average monthly markets risk premium for BIST100 is 0.91% with a volatility of 0.71%.

Sector	2022		2023		2024		Average	
	MRP	Vol.	MRP	Vol.	MRP	Vol.	MRP	Vol.
BIST100	0,0187	0,007	0,0043	0,0072	0,0042	0,0071	0,0091	0,0071
Banks	-0,0001	0,0052	-0,0067	0,0052	-0,0084	0,0046	-0,0051	0,0050
Information Tech	0,0396	0,011	0,0396	0,0035	0,0396	0,0035	0,0396	0,0060
Leasing	0,0396	0,0072	0,0049	0,0062	0,0051	0,0027	0,0165	0,0054
Electricity	0,0261	0,0052	0,0179	0,0026	0,0179	0,0025	0,0206	0,0034
Food	0,0011	0,0121	0,0011	0,0099	0,0011	0,0099	0,0011	0,0106
Real Estate	0,0255	0,0078	0,0143	0,0033	0,0143	0,0041	0,0180	0,0051
Holding	0,0195	0,0062	0,0046	0,0049	0,0046	0,0019	0,0096	0,0043
Communication	0,0057	0,0052	0,0014	0,0041	-0,0009	0,0032	0,0021	0,0042
Paper	0,0062	0,0052	0,0179	0,0097	0,0179	0,0028	0,0140	0,0059
Chemistry	0,009	0,0035	0,009	0,0035	0,009	0,0035	0,0090	0,0035
Metal	0,0256	0,0043	0,0256	0,0043	0,0256	0,0046	0,0256	0,0044
Metalware	0,0192	0,0045	0,0192	0,0046	0,0192	0,0036	0,0192	0,0042
Insurance	0,0028	0,0035	0,0028	0,0035	0,0028	0,0035	0,0028	0,0035
Trade	-0,0072	0,0064	-0,0072	0,004	-0,0072	0,0037	-0,0072	0,0047
Textile	0,0062	0,0059	0,0001	0,0072	0,0001	0,0035	0,0021	0,0055
Transportation	0,0429	0,0035	0,0429	0,0035	0,0429	0,0035	0,0429	0,0035
Tourism	0,0187	0,0029	0,0043	0,0057	0,0042	0,0058	0,0091	0,0048

Table 7. Predicted market risk premiums and volatilities for 2022-2023-2024

5. Conclusion

The capital asset pricing model is the most popular and widely used technique for analyzing investment projects, stock valuation, company valuation, mergers and acquisitions, initial and secondary public offerings. This study tends to measure the sectoral market risk premiums in the Turkish market in the period of pre- and post Covid-10 period by applying the market risk premium definition of CAPM. Monthly sectoral stock returns on Borsa Istanbul are extracted form the Reuters database for the period of 2016 and 2021. Then, the sectoral market risk premiumsa are estimated fort he years of 2022-2023-2024 by utilizing ARIMA model.

Based upon the results of Cusum-Squared test, there is a clear structural change during the Covid-19 year. Therefore, the whole sampling period is divided as pre and post-Covid-19 period to observe the effect of Covid-19 on the market risk premiums of the sectors. According to the results, sectoral market risk premiums are often negative for the pre-Covid-19 period. The market risk premium on BIST100 is -0.21% and its volatility is 0.23%. The market risk premiums of the sectors are generally positive after the Covid-19 period. However, the market risk premium of BIST100 is -0.7% and its volatility is 0.03%. Hence, a significant increase in market risk premiums and its volatility are depicted on the post-Covid-19 period compared to pre-Covid-19 period. The estimated average markets risk premium on BIST100 and its volatility for 2022-2024 period are 0.9% and 0.71%, respectively. The predictions point that the risk premiums and volatilities could be even higher in the near future for the Turkish market.

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