The Effects Of International Integration On Cost Of Equity: Application Of Turkey's Tourism Sector

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ABSTRACT

In this paper, the cost of equities of the companies listed in the BISTTRZM index in BORSAİSTANBUL were computed by using models which are based on the Capital Asset Pricing Model (CAPM). The results of models using local data were compared with the results of models using global data. Thus the effect of Turkey's integration of international capital market on the cost of equity was measured.

Local and Global Capital Asset Pricing Model (CAPM), Multifactor Global CAPM, Bekaert – Harvey Mixture Model, Goldman Model, Harvey – Viskanta Model, Damadoran Model, Ibbotson Model, CSFB Model and Erb – Harvey – Viskanta Model were used to compute the firms' cost of equity. First, the cost of equity of all firms was computed at only one time point and also was computed for time varying cost of equity but only using the Global CAPM and Bekaert – Harvey Mixture Model. All data used includes June 2008 – June 2013.

First, the results that we have reached show that Local Models cannot be used for Turkey. It seems that the models which take into account the market's integration level produce more realistic results than others. Finally, it was found that the Bekaert Harvey Mixture Model which provides the time varying effect on cost of equity is the best model for Turkey.

Keywords: *cost of equity, CAPM, firm value.*
Jel Classification *G12, G31, G32.*

Uluslararası Entegrasyonun Özsermaye Maliyeti Üzerindeki Etkileri: Turizm Sektörü

ÖZET

Bu çalışmada, Borsa İstanbul'da işlem gören ve turizm sektöründe faaliyet gösteren firmaların özsermaye maliyetlerini, Sermaye Varlıklarını Fiyatlama Modelini (SVFM) temel alan yöntemler kullanılarak hesaplanmıştır. Yerel piyasaya ait veriler kullanılarak elde edilen sonuçlar uluslararası veriler kullanılarak elde edilen sonuçlar ile karşılaştırılmıştır. Böylece uluslararası finansal piyasalara entegrasyonun özsermaye maliyeti üzerindeki etkisi ölçülmüştür.

Firmaların özsermaye maliyetlerinin bulunmasında Tek Faktörlü Lokal / Global SVFM, Çok Faktörlü Global SVFM, Bekaert – Harvey Karışım Modeli, Goldman Modeli, Harvey – Viskanta Modeli, Damadoran Modeli, Ibbotsan Modeli, CSFB Modeli ve Erb – Harvey – Viskanta Modeli kullanılmıştır. Tüm modeller için tek bir zaman noktasında özsermaye maliyeti hesaplanmış ve ayrıca Global SVFM ve BekaertHarvey Karışım Modeli için zaman içinde değişen özsermaye maliyeti hesaplanmıştır. Kullanılan tüm veriler Haziran 2008 – Haziran 2013 tarih aralığını kapsamaktadır.

Elde edilen sonuçlar öncelikle Lokal modellerin ülkemiz için geçerli olmadığını göstermektedir. Global modeller arasında uluslar arası entegrasyon derecesini hesaba katan modellerin diğer modellerden daha gerçekçi sonuçlar elde etmeyi sağladığı görülmektedir. Sonuç olarak özermayenin zaman içindeki değişimini bulmayı sağlayan Bekaert – Harvey Karışım Modelinin ülkemiz için en uygun model olduğu bulgusuna ulaşılmıştır.

Anahtar Kelimeler: *Özsermaye Maliyeti, SVFM, Firma Değeri.*
JEL Sınıflandırması:: *G12, G31, G32.*

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1. INTRODUCTION

The methods used to find the cost of equity are based on two main approaches. These are the methods which are based on Cash Flows and the methods which are based on The Capital Asset Pricing Model (CAPM). The methods which are based on Cash Flows started with the Gordon Growth Model (or Dividend Discount Model) and completed their development with the Free Cash Flows Model. On the other hand, the development of the CAPM for finding the cost of equity went in two different ways. While it was studied on multifactor models instead of the single factor model, the international version of CAPM was developed because of the globalization effect. The studies in this field were accelerated by international investors who trade worldwide, and especially at the beginning of the 90s were developed by cost of equity methods based on the international CAPM.

The empirical tests of the models which are based on cash flows for developed countries continued being used until the 2000s. But in developing countries, since there isn't a regular structure for dividend distribution, the firms which distribute cash dividend are very few and the financial data produced isn't robust enough to apply to the cash flows methods. That's why we do not focus on free cash flow models in this paper. At this point, if we take into account the global integration of Turkey's financial market, completed mostly in the last ten years it would seem that the solution for Turkey is to use the international models based on CAPM.

For the above reasons, the models based on CAPM were applied. This study was inspired by Harvey (2005) in which he summarizes all methods of the CAPM and applicable methods for Turkey were chosen for this paper. These methods are the Local CAPM, the International (Global) CAPM, the Multifactor CAPM, the Bekaert – Harvey Mixture Model, the Goldman (Sovereign Spread) Model, the Sovereign Spread Volatility ratio Model, the Ibbotson Bayesian Model and the CSFB (Credit Suisse First Boston) Model.

To evaluate long term investments and to determine the present value of assets a discount rate is required. If the discount rate is determined to be false all financial plans of firms would be false. This situation sufficiently emphasizes the importance of cost of equity and the cost of capital. The accuracy of all calculations which are based on the time value of money depends entirely on the accuracy of the discount rate. At this point, we think that this paper has high importance in terms of planning Turkey's financial sources on the basis of business. The methods applied were carefully considered based on suitability to Turkey's financial markets and on availability and suitability of data.

In the following section, to help understand the emergence and development of the methods, which are based on CAPM,a literature review is provided. Then a method section was composed to help understand the details of the eight applied models. After the application section, which includes data and results, this paper ends with a conclusion section.

2. LITERATURE REVIEW

The two different models based on two different approaches for finding the cost of equity and the cost of capital were collected in two famous papers. The models based on cash flows were examined by Fernandez (2005) and ten methods were evaluated. He reached the conclusion that the models based on the same assumptions but on different cash flow starting points gave the same results. On the other hand, the twelve models which are based on the CAPM were examined by Harvey (2005). Harvey (2005) evaluated these models in terms of applicability in developed and developing countries.

The free cash flow model assumes that the present value of a firm’s future cash flowequals the firm value. The discount rate that is used for this process is the cost of capital. The present value of the future cash flows of equity is the equity value and the discount rate used for this calculation is called the cost of equity. Apart from this process, the equity value can be measured by its market value. In efficient markets, the calculated equity real value is assumed to be equal to the equity market value. The discount rate that ensures this equality is the cost of equity. This approach was first discussed by Lee, Ng and Swaminathan (2005) and it has been called “implied cost of capital (equity)” in literature. Inspired by this study, an application was done on firms which are listed in the BIST 100 index by Dokuzfidan (2013). Since most of the results are unrealistic (negative or abnormally high), to calculate the cost of equity using this method seems impossible. For this reason the literature of the models based on CAPM will be focused on.

CAPM was first put forward by Markowitz (1952) concerning portfolio selection. Then CAPM was developed by Treynor (1961, 1962), Sharpe (1964), Lintner (1965) and Mossin (1966), and began to be used as an Asset Valuation Model. The international version of CAPM was put forward by Solnik (1974) and developed as a model based on consumption by Stulz (1981).

The studies on the use of CAPM to find the cost of equity go back to the beginning of 1980s. This model, which was first used to find risk premium, has gone on to develop into versions such as Local CAPM, International (Global) CAPM and Conditional CAPM, etc.

The one of the main papers on this subject is Brigham and Shome (1980). According to this study finding the cost of equity depends on the estimation of market risk premium. The risk premiums obtained by using free cash flows models which are based on fixed or unfixed growth rate were compared with the results of other models (Ibbotson – Sinquefield Model, Malkiel Model and Benore Model) and all models were analyzed in terms of cost of equity.

Brigham et al (1985) measured the relation between risk premium and interest rate. According to this study, the changing of interest rates creates dramatic effects on risk premium. This situation raises the volatility of risk premium. Finally, they reached the conclusion that the calculation of risk premium based on expectations can give more realistic results.

Mariscal and Lee (1993) developed a new version of CAPM for developing countries. They calculated the cost of equity using the relationship between the bond market and the stock market. This model, which was first applied in Mexico, was changed radically by using Sovereign Spread instead of the risk – free interest rate. Sovereign Spread is the difference between the return of local government bond in dollar and the return of US government bond. It is the country-specific risk.

Ferson and Harvey (1993, 1994, 1995 and 1999) developed the international multifactor CAPM. In this model, global economic risk factors (international market portfolio return, volatility of interest rate, global inflation, international default risk and world industrial production etc.) were used to forecast international stock return. To forecast the return of local markets in the 18 countries, the regression between stock returns and global / local variables was established. The results showed that local variables are more effective in forecasting. For this reason, the relationship between stock returns and country specific betas are more strong and significant.

Ferson and Harvey (1993) used the difference between short term interest rates and the MSCI Global Equity Index, the log of the first difference in the trade – weighted U.S. dollar prices of the currencies, global inflation and so on as factors. They tested empirically the multifactor model using different variables (book to market ratio, dividend ratio, cash flows and so on) in 1994 and after. Ferson and Harvey (1994b) divided the factors into two groups. Then they obtained the meaningful factors to describe risk premium. But the main problem in this study is that the risk premium and the factor correlations are very low.

Bekaert and Harvey (1995) measured the change over time of the integration of countries to the global financial market. They added the integration degree to the CAPM through a lambda coefficient and they assumed that the higher the lambda the more integrated the market. Lambda can be between 0 and 1. They studied 12 developing countries and 21 developed countries. They used the MSCI World index for developed markets and the IFC (International Finance Cooperation) Index for developing countries as the market index. Finally, they found that many developing financial markets have the time - varying integration degree.

Erb, Harvey and Viskanta (1996) presented a model which is based on credit rating in developing countries. They measured systematic risk depending on credit rating. They concluded that to use this model in developing countries, an efficient capital market is required in these countries. Also, they proposed a new model to measure systematic risk when these conditions cannot be provided. In this model, the alternative systematic risk measure is obtained by converting the country credit rating to a number. Finally, this new model provides a calculationof the expected return and the estimated volatility of the equity by limited data the developing countries that do not have an efficient and integrated capital market.

Fama and French (1997) focused on the forecast standard errors of the cost of equity. They argued that an increase in standard errors creates an uncertainty about which factors form the risk premium.

Leuz (2003) examined the international differences between cost of equities. They used the data of 35.122 firms in the years 1992-2001 and obtained cost of equity using the four models include the analyst estimates. They explained the differences between costs of equities by the efficiency of a country's capital market regulations. Finally, they concluded that if the efficiency of the capital market regulations increase the cost of equity will decrease.

Pastor et al (2008) studied whether the implied cost of capital which is calculated using the dividend forecast could be used to catch the change over time of the expected stock return or not. First, they explained theoretically the relationship between the implied cost of capital and the expected stock return. And then they proved that the implied cost of capital is appropriate to determine the relationship between risk and return. The findings of the application for G7 countries showed that there is a positive relationship between the average implied cost of capital and the changing of stock returns.

Dolde et al (2011a) examined whether the difference between the cost of equity in the local CAPM and the cost of equity in the global CAPM reflects firm's exposure to foreign currency risk or not. They also focused on the estimation of the global beta coefficient instead of the local beta coefficient for the firms exposed to foreign currency risk. The results showed that these two models give a very similar cost of capital even if firms are deeply exposed to currency risk. Hence the local CAPM can be use instead of the global CAPM.

Starting with the results of their previous study, Dolde et al (2011b) developed a two factor global CAPM to measure foreign currency risk. They compared this model with the single factor (local and global) CAPM. The results showed that there are a few differences between the costs of capital estimates of these three models for the firms exposed the low-to-moderate foreign currency risk. But there are relatively more differences between the costs of capital estimates for the firms exposed to extreme positive or negative foreign currency risk.

Studies on cost of equity and cost of capital in Turkey are very few. These studies focused on finding the sector – wide cost of capital and the country – wide cost of capital. Gönenç et al (2010) calculated the country risk premium based on the country risk rating and examined the trend of cost of capital over time. According to this study, the integration of international financial markets has a reducing effect on the cost of capital.

Gözen (2012) applied the seven models based on CAPM to the electricity sector in Turkey. He found that the cost of equity in Turkey depends on the volatility of stock returns. He concluded that the cost of equity in Turkey is between 4.86% and 11.34%. Additionally, he found that the methods based on local risk premium instead of USA risk premium produced unrealistic results.

3. METHOD

We used eight models to find the cost of equity of sevens firms listed in the BISTTRZM index. These models are the local CAPM, the international CAPM, the multifactor CAPM, the Bekaert - Harvey mixture model, the Goldman model, the sovereign spread volatility model (SSVR), the Ibbotson Bayesian model, and the Credit Suisse First Boston model (CSFB). The multifactor model was applied in two different ways, the three-factor model and the four - factor model. In the four-factor model, the industrial product index, the interest rate and the inflation rate were used. In the three-factor model, the inflation factor was not used.

The some models based on CAPM could not be applied since there was no available data. For example, the Implied Sovereign Spread Model is a model which is based on the country risk rating. The risk rating data of Turkey is not sufficient for running a regression. In this model recommended by Damodaran (1999), a proportional relationship between a firm's stock issue and its bond issue was established. Since none of the firms which we studied have issueda bond this method could not be applied. Finally, the eight models were applied mathematically. In the following section, the details of these models will be explained.

3.1. The Local CAPM

The Local CAPM was found by Sharpe in 1964.Thismodel estimates the stock return based on the relation between market return and stock return. In the following years, this model was developed by Lintner (1965) and Black (1970), and numerous empirical studies were done in many counties and markets to test the validity of this model. This model measures the relationship between the well - diversified market portfolio and stock return by the beta coefficient. But this model ignores the relation between the local market and the global market. So its portfolio diversification is limited by the local market. This model can give good results for a segmented market, but nowadays this is impossible. This model was applied only to compare the other model's results. The Local CAPM Formula is as follows.

$$\mathbf{k_{iTL}} = \mathbf{r_{Lf}} + \boldsymbol{\beta}_{\mathbf{Li}}(\mathbf{r_{Lm}} - \mathbf{r_{Lf}}) + \mathbf{e_i}$$

where $\mathbf{k_{iTL}}$ is the rate of return on equity in Turkish Liras (also the cost of equity), $\mathbf{r_{Lf}}$ is the local risk – free interest rate, $\mathbf{r_{Lm}}$ is the rate of return on market in Turkish Liras. $\beta_{\mathbf{Li}}$ is the coefficient of regression which measures the sensitivity of return on equity to the return on market. In other words, it is named "beta". $\mathbf{e_i}$ is the regression residual. $(\mathbf{r_{Lm}} - \mathbf{r_{Lf}})$is the market risk premium. If we move the $\mathbf{r_{Lf}}$ to the left side of the equation, this model will become more understandable. In this case, the left side means the equity risk premium and the right side means the market risk prim multiplied by Beta. Hence, this model measures the rate of return on equity (the cost of equity) only by the sensitivity of the local market index.

3.2. The International CAPM

This model is the globally expanded version of the Local CAPM. It was first applied by Solnik (1974). The main difference between this model and the local CAPM is the use of the global market index instead of the local market index. This index should be proper to firms in terms of sector and country. The following formula is used for the Local CAPM.

$$\mathbf{k_{i\$} = r_{Gf} + \beta_{Gi}(r_{Gm} - r_{Gf}) + e_1}$$

Unlike the Local CAPM, the risk – free rate, $\mathbf{r_{Gf}}$, is the applicable interest rate of the global market which includes the country concerned. $\mathbf{k_{i\$}}$ is the cost of equity in dollar. Using the stock return in dollars provides the cost of equity without foreign currency risk. But this result is only true when the assumption of purchase power parity is applicable. $\beta_{\mathbf{Gi}}$ is the beta coefficient of the relation between the rate of return on stocks in dollars and the rate of return on the global market. $\mathbf{(r_{Gm} - r_{Gf})}$ is the market risk premium without the exchange currency risk. Using the global market index to obtain this term means that the global risk premium is calculated regardless of the country risk.

Calculating of cost of equity by using the global CAPM at a time point means that only one beta coefficient is used. Because of the instability of the beta coefficient the cost of equity at a time point may not be applicable for all times. That is why this model must be reformulated as follows to calculate the time varying beta.

$$E[R_{i\$,t}|Z_{t-1} = r_{Gf,t} + \beta_{Gi,t-1}E[R_{GW,t}|Z_{t-1}]]$$

where Z_{t-1} is the equity return relying on current data. $\beta_{Gi,t-1}$ shows that the beta coefficient is calculated for all time points again and again.

3.3. The Multifactor CAPM

The multifactor CAPM was presented by Ross (1976). Ferson and Harvey (1993) improved this model and take into account the effect of the international market too. Fama and French (1998) developed a common model for developed countries and developing countries. This model is formulated as follows.

$$\mathbf{E}[R_{i,t}|Z_{t-1}] = \sum_{j=1}^{k} \boldsymbol{\beta}_{i,j,t-1}\, \mathbf{E}[R_{j,t}|Z_{t-1}]$$

This model assumed the possibility of factors which explain equity return apart from the relation between market return and equity return. The empirical studies on this model make clear which factors are explanatory variables of equity return and how these variables to explain equity return. But the main problem with this model is that the relation between the explanatory variables and the equity return has high volatility over time. For this reason, the significance of this relationship is usually unable to be maintained.

3.4. The Bekaert and Harvey Mixture Model

Applying the Global CAPM to obtain accurate results depends on the degree of integration. When this integration has not been completed a new parameter indicating the degree of integration should be added to the model. The lambda (λ) parameter used in this model represents the degree of integration. This parameter takes values between 0 and 1. When Lambda is 1 (0) market is well - integrated (segmented).

The Bekaert and Harvey mixture model also included a second beta coefficient. The first beta shows the relationship between the equity return and the global market index return. The second beta shows the relationship between the equity return and the local market index return. According to these explanations, the cost of equity is calculated by using the following formula.

$$\mathbf{E}[R_{h,i,t}|Z_{t-1}] = r_{f,t} + \lambda_t \beta_{h,W,t-1} \mathbf{E}[R_{w,t}|Z_{t-1}] + (1-\lambda)\beta_{h,L,t-1} \mathbf{E}[R_{i,t}|Z_{t-1}]$$

where $\beta_{h,W,t-1}$ is the time varying beta of equity h and global market return W. and $\beta_{h,L,t-1}$ is the time varying beta of equity h and local market return L. In this model, the cost of equity was estimated using the time varying beta. The advantage of this model is that it can be used for countries which do not complete the global integration.

3.5. The Goldman Model

This model was developed to eliminate the problem of the beta coefficient being very low or negative in emerging countries. After finding beta in the same way as in the other models, the difference between the risk free interest rate in the global market and the risk free interest rate in the local market (means that Sovereign Spread) is added to the equity risk premium (the market risk premium times beta).

$$\mathbf{E}[R_{i,t}] = SS_i + \beta_{i,w} \mathbf{E}[R_{w,t}]$$

Sovereign Spread (SS) is the difference between the global return on bond and the return on the local government bond. This term is only the measure of the country risk. But the most criticized aspect of this model is that SS is same for all firms. For this reason, it can produce wrong results for firms in different risk groups.

To apply this model the country considered should have issued a bond in the global market. Otherwise it can’t be used. To solve this problem Erb, Harvey and Viskanta (1996) developed a new model in which SS is calculated based on the country risk rating. This model was not used in this study since Turkey has issued Eurobondsin the global market.

3.6. The Sovereign Spread Volatility Ratio Model

This model is a new version of the Goldman Model. The difference between this model and the Goldman Model is the taking into account of the degree of integration in the global market. The degree of integration is included in this model as a modified beta. This beta is obtained by dividing the local market volatility by the global market volatility.

$$\mathbf{E}[R_{i,t}] = SS_i + \frac{\sigma_i}{\sigma_w}\mathbf{E}[R_{w,t}]$$

Erb – Harvey – Viskanta (1996) suggested that SS can also be found using the country risk rating. But using the country risk rating is usually only possible when the appropriate data can be found.

The main criticized point of Sovereign Models is the use of bond interest rates to calculate the cost of equity. In this case, the fact that the equity is riskier than bonds is neglected. Damodaran (1999) suggested a new correction by the following formula.

$$\mathbf{E}[R_{i,t}] = \frac{\sigma_{i,e}}{\sigma_{i,d}}SS_i + \beta_{i,w}\mathbf{E}[R_{w,t}]$$

where $\mathbf{E}[R_{i,t}]$ is the cost of equity, $\sigma_{i,e}$ is the standard deviation of equity, $\sigma_{i,d}$ is the standard deviation of a firm's issued bond, SS_i is the Sovereign Spread of the firm, $\beta_{i,w}$ is the firm's beta and $\mathbf{E}[R_{w,t}]$ is the risk premium of the global market. This model couldn't be applied since the concerned firms in this study have not issueda bond.

3.7. The Ibbotson Bayesian Model

This model calculates the beta coefficient that results from the regression between the equity risk premium and the global market risk premium. The cost of equity is obtained by the expected risk premium multiply by this beta.

Later, this model was developed to include an additional factor. The regression intercept represents most of the risk factors which had been ignored and it is considered that the half of this intercept is the sovereign spread. In this mixture model, after calculating the global market risk premium, the country risk premium is regressed on the global market risk premium.The country beta is multiplied by the global market risk premium. The additional factor (multiplying 0.5 by the regression intercept)is added the former.

3.8. The CSFB Model

Hauptman and Natella (1997) developed a new model using two different relationships unlike the other models. The first is the relationship between the risk – free rate and the equity risk premium. The second is the relationship between the local market return and the global market return.

$$\mathbf{E}[r_{i,t}] = rf_t + \beta_{i,gs}\{\mathbf{E}[r_{gs,t} - rf_{g,t}] \times A_i\}K_i$$

where $\mathbf{E}[r_{i,t}]$ is the cost of equity, rf_t is the risk – free rate, $r_{gs,t}$ is the return of a firm included in the global sector index, $rf_{g,t}$ is the bond interest rate of a firm included in the economical zone, K_i is the adjustment factor (the ratio which measures dependency between risk - free rate and equity risk premium) and A_i is the ratio of the coefficient of variation in the local sector index to the coefficient of variation in the global sector index.

This model uses two additional parameters unlike the standard global CAPM. The first parameter is A_i which measure the relationship between the global market return and the local market return and the second parameter is K_i which measure the relation between the risk – free rate and the equity risk premium. This parameter solves the problem of the use of bond returns to explain equity return in the other models.

4. APPLICATION

In this study, an application on the seven firms listed in the BISTTRZM index was realized. These firms are AVTUR, AYCES, MAALT, MARTI, METUR, NTTUR and TEKTU. There are nine firms listed in the BISTTRZM index. Two firms were excluded in this application since these firms' data are not appropriate for application in the models.

The data required for all models covers June 2008 – June 2013 and all of them are monthly. In the Local CAPM and the Multifactor CAPM, the return on equity in Turkish Liras (TL), the return on the BISTTRZM index as market index and the monthly average interest rate of the government bond as risk – free rate was used. In the Multifactor CAPM, inflation rate, interest rate and industrial production index were used as factors. The equity returns data and the market returns data were obtained from the Borsa Istanbul official website. The interest rate, the inflation rate and the industrial production index were obtained from the Central Bank of the Republic of Turkey database.

In the global CAPM, the return on equity in dollars was used. The MSCI Emerging Markets Consumer Services Index (MSCI EM CSI) produced by the Morgan Stanley Capital International Inc. was used as market index. The yearly interest rate in Euro Zone including Turkey was used as the risk – free interest rate. Unlike the other models, in the Goldman model the interest rate of the Eurobond issued by Turkey was used as the risk – free interest rate. All data used in this study is summarized in the following chart.

Chart 1. The Data Used In The Models

Data	Value	Calculation	Model
Risk – Free Interest rate in TL	8.16%	Monthly average of the observations	Local CAPM, Multifactor CAPM, Bekaert – Harvey Model, Ibbotson Model
Risk – Free Interest rate in $	1.76%	Monthly average of the observations	Global CAPM
Inflation rate	7.14%	Monthly average of the observations	Multifactor CAPM
Industrial Production Index Variation Ratio	2.95%	Monthly average of the observations	Multifactor CAPM
Lambda Coefficient	0.3562	Cor (BISTTRZM,MSCI EM CSI)	Bekaert – Harvey Model
Sovereign Spread	6.64%	$r_{fs} - r_{fw}$	Goldman Model, SSVR Model
The Variance/Covariance	0.8907	Var(MSCI EM	SSVR Model

Ratio		CSI)/Covar(MSCI EM CSI, BISTTRZM)	
Eurobond Interest rate	7.96%	Monthly average of the observations	CSFB Model
Variation Coefficient	1.7907	$\frac{\sigma_{BISTTRZM}}{\sigma_{MSCIEMCDSI}}$	CSFB Model

The values in Chart 1 were calculated at a single point in time using the data between 2008 June and 2013 June. The 24 - month data were used to calculate the time varying beta and the cost of equity in the Bekaert – Harvey Model and in the Global CAPM.

In this study, using the models based on CAPM the main component giving direction to calculate the cost of equity is beta. That is why the calculated beta coefficients were shown in the following chart.

Chart 2. Beta Coefficient

	AVTUR	**AYCES**	**MAALT**	**MARTI**	**METUR**	**NTTUR**	**TEKTU**
Local CAPM	0.2017	0.1716	0.1984	0.3896	-0.056	0.164	0.3299
- Global CAPM - Goldman Model - CSFB Model - SSVR Model	0.4876	0.8953	-0.291	1.3757	0.8953	0.9926	1.1896
Multifactor CAPM							
1. Four factors							
- Market Beta	0.2097	0.1548	0.205	0.3996	-0.0717	0.1551	0.3486
- Inflation Beta	2.7697	-2.9837	-0.8955	-0.6927	-2.7211	1.0719	-1.6517
- Ind. Prod. Index Beta	0.1182	0.4553	-0.3303	-0.4925	0.3767	0.4699	-0.8905
- Interest Rate Beta	10.4945	2.6388	-0.585	-3.1827	-0.2989	2.668	-2.8712
2. Three Model							
- Market Beta	0.2199	0.1574	0.2044	0.3996	-0.0717	0.1551	0.3486
- Inflation Beta	2.6449	-3.0151	-0.8886	-0.6927	-2.7211	1.0719	-1.6517
- Ind. Prod. Index Beta	-0.4812	0.3046	-0.2969	-0.4925	0.3767	0.4699	-0.8905
Ibbotson Model	0.3069	0.506	0.5714	0.9976	0.8953	0.9926	1.1896

In the above chart, the first noticeable point is that negative betas were frequently observed in the multifactor model. The inflation factor’s beta coefficient is negative for almost all firms. The negative relationship between the inflation rate and the cost of equity is a realistic result. Also, the fact that the industrial production index’s beta coefficient becomes almost negative is due to the firms work in the tourism sector.

The standard beta coefficient was used for the Global CAPM, the Goldman model, the CSFB model and the SSVR model. In the Ibbotson model, the beta coefficient was obtained using the risk premiums instead of returns. This dissimilarity caused the beta coefficients to have different values. While the beta coefficient is 0.79 in the other models, it is 0.78 in the Ibbotson model. But the beta of the local CAPM is substantially lower than others.

The instability of the beta coefficient creates doubt regarding the accuracy of the results of obtaining the cost of equity at a point in time. That’s why previously the time varying beta coefficients were calculated for all models. Since the volatility of beta coefficients in the all models, except for the Bekaert – Harvey Model and the Global CAPM, is very low the average of betas was calculated and the cost of equities was obtained at a time point. The effect of the instability of beta coefficients is very high in the Bekaert – Harvey model since two different betas and Lambda coefficient were used. Finally, the time varying cost of equities in the Bekaert – Harvey model were calculated and its results were shown as compared with the results of the Global CAPM.

Chart 3. The Cost Of Equity At A Time Point

	Multifactor CAPM								
	Four Factor	Three Factor	CSFB Model	GOLDMAN Model	Ibbotson Model	Global CAPM	Local CAPM	SSVR	Average
AVTUR	115.87%	27.61%	7.91%	7.72%	10.50%	5.87%	9.70%	8.62%	8.39%
AYCES	10.47%	-11.73%	7.57%	7.96%	12.02%	9.31%	9.47%	9.95%	9.38%
MAALT	-2.66%	2.26%	7.73%	7.31%	12.51%	-0.70%	9.67%	7.31%	7.31%
MARTI	-21.47%	4.51%	7.88%	11.03%	15.76%	13.36%	11.13%	11.03%	11.70%
METUR	-13.53%	-11.09%	7.75%	9.96%	12.02%	9.31%	7.74%	9.96%	9.45%
NTTUR	40.25%	18.48%	8.08%	10.17%	12.94%	10.13%	9.41%	10.17%	10.15%
TEKTU	-27.46%	-4.03%	8.12%	10.61%	17.98%	11.79%	10.67%	10.61%	11.63%
Average	-	-	7.86%	9.25%	13.39%	8.44%	9.68%	9.66%	9.72%

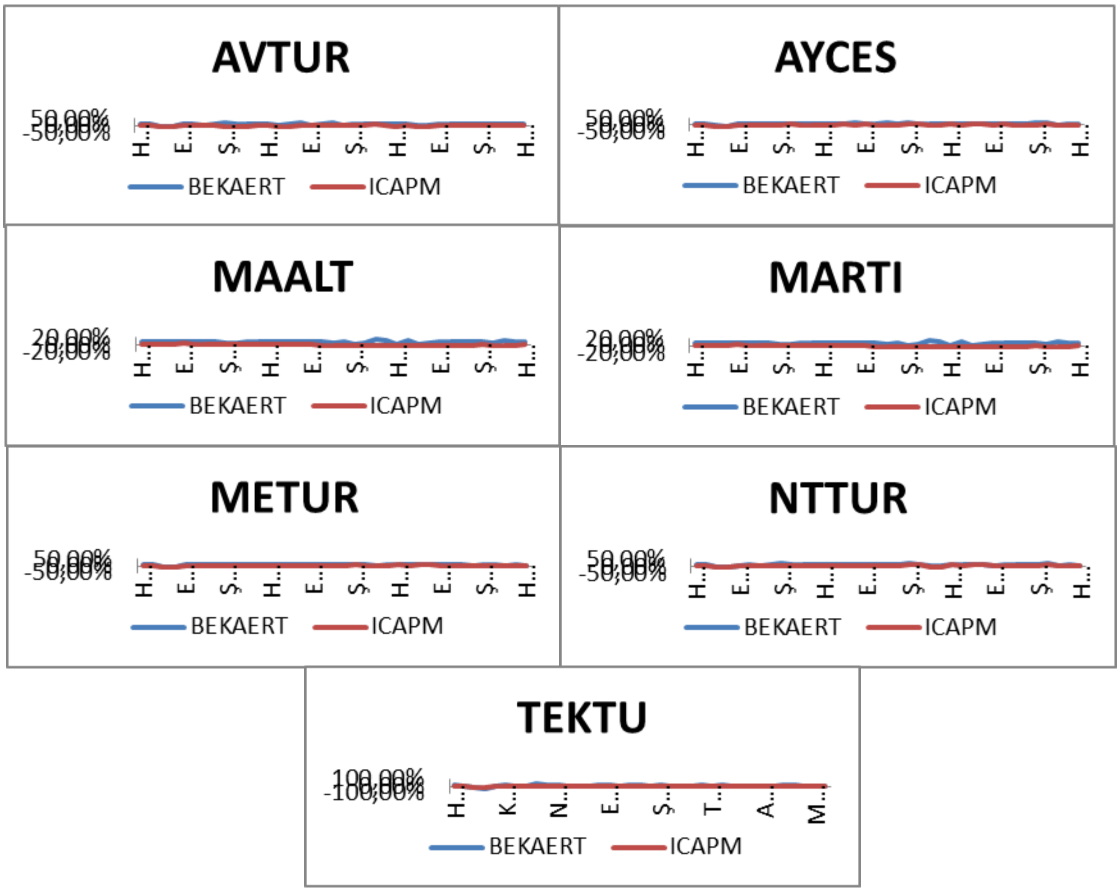
The results of the multifactor CAPM are either negative or high unrealistically. It is not normal for the difference in cost of equity for the firms in the same risk group to be this high (between -0.70% and 13.60%). So the results of the multifactor model were not compared with the results of other models.

The cost of equities of firms included in the same risk group should not be very different from each other. The average column, which was formed by averaging all of the rows, supports this assumption. The average costs of equities for all firms are between 7.37% and 11.70%. This difference can explain the firm specific risk. The averages of columns are the average of each firm's cost of equity related to different methods. Since the results of the multifactor model are unrealistic its average was not calculated. The average for each column is the all methods industrial average of the cost of equity. Finally, the average of the all methods cost of equity averages (the columns averages) and the average of the all firms cost of equity averages (the rows averages) is 9.72%. This value is an indicative for the tourism firms in Turkey.

If we add the country risk and the currency risk to the global risk – free rate we would obtain the approximate cost of equity which is valid for all sectors. Aswath Damodaran1 has done this calculation continuously. Damodaran found that the 2014 country risk in Turkey is 3.60%. If we add this to the risk – free rate in Turkey (average 6.00%) we find a value very close to the methods results. Finally, the results show that a firm should be evaluated in with the global sector.

[1]AswathDamodaran is the finance professor in Stern School of Business, New York University. His website is http://people.stern.nyu.edu/adamodar/.

To see how he time varying beta coefficient which has high volatility effect the cost of equity forecasts the results of two models (Bekaert – Harvey Model and global CAPM) show in the following graph. The costs of equities which found using these models have very high volatility.



Graph 1. The Time Varying Cost Of Capital Which Found Using Bekaert – Harvey Mixture Model And Global CAPM

The time varying beta caused all firms cost of equity to change about equally. The results of the global CAPM are very low since they are adjusted for foreign currency risk. The instability of the beta coefficient caused the costs of equities often to take negative values for all firms in the global CAPM. The difference between the results of the two models is about 6.99% for all firms. We can explain this difference by the foreign currency risk, so the country risk reflects entirely foreign currency risk. At this point, it is quite clear that the Bekaert – Harvey Mixture Model obtains which results include the foreign currency risk.

5. REMARKS

In this study, the costs of equities of the seven firms listed in BISTTRZM are calculated by the models based on CAPM. The calculation of cost of equity using different models was obtained to compare the models with each other.

The models that take into account degree of global integration give more realistic results. The local CAPM ignores global integration completely. The global CAPM accepts that the market is perfectly integrated. In the Bekaert – Harvey mixture model, the degree of integration is added in the model by a coefficient. That is why in cases of low degree of integration, the Bekaert – Harvey mixture model yields more correct results. Finally, in developing countries like Turkey a model that takes into account the degree of integration should be used to find the cost of equity.

The time varying beta coefficients were yielded using the Bekaert – Harvey mixture model and Global CAPM. In the Bekaert – Harvey mixture model the changing of beta coefficients over time caused that the cost of equities to fluctuate significantly. However, the results are not unrealistic. In the global CAPM the cost of equities were negative because of negative betas in almost all firms. This result shows that the applicability of the global CAPM in Turkey should be questioned.

The cost of capital of a firm is the weighted average of the cost of equity and the cost of debt. When the capital structure of a firm is change its weighted cost of capital can change too. Financial managers must continuously monitor and estimate the cost of equity to see the effects of the changes in capital structure on the cost of capital. In this way they can gain knowledge about how they can decrease the cost of capital. The most of time using models provide a way to find the time varying cost of equity. We can reveal the features of the cost of equity process followed and obtain the estimated cost of equity. It is natural that use of the estimated cost of equity will be better than using the cost of equity based on historical data.

The models based on the CAPM use three main variables (the return on equity, the return on market and the risk – free rate). These variables are significantly affected by abnormal market conditions like the crisis. According to the models based on CAPM, the process of the cost of equity depends on these variables. The beta coefficient has high volatility under abnormal market conditions. But the real cost of equity is not as volatile as this. For this reason, the effect of abnormal conditions on all variables, but especially on the beta coefficient, must be removed. At this point, our suggestion is that algorithms appropriate for the process of these variables are created. Thus we can remove the effect of volatility clustering, enabling us to perform more correct estimations.

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