

**STEEPENING VERSUS FLATTENING YIELD CURVES:
IMPLICATIONS FOR WACC CALCULATION AND
COMPANY VALUATION**

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To my beloved family



ABSTRACT

Recent survey conducted by Pinto et al. (2019) shows that Income Approach is one of the most preferred approaches by valuation practitioners. Weighted Average Cost of Capital (WACC) is used as the discount factor of future cash flows of the company in this approach and constant risk-free rate is one of the major assumptions in WACC calculation. However; it is not valid in inverted yield curve conditions. Inverted yield curves can be observed in both developed and emerging economies. This paper compares the valuation results computed with Changing WACC and Stable WACC and the results show that Changing WACC provides estimates closer to market price in inverted yield curve conditions.

ÖZETÇE

Pinto ve diğerleri (2019) tarafından yapılan son araştırma Gelir Yaklaşımı'nın değerleme uzmanları tarafından en çok tercih edilen yaklaşımlardan biri olduğunu göstermektedir. Bu yaklaşımda Ağırlıklı Ortalama Sermaye Maliyeti (AOSM), şirketin gelecekteki nakit akımlarının iskonto faktörü olarak kullanılmaktadır ve sabit risksiz getiri oranı AOSM hesaplamasındaki en önemli varsayımlardan biridir. Buna karşın, bu varsayım ters verim eğrisi koşullarında geçerli olmamaktadır. Ters verim eğrisi, hem gelişmiş hem de gelişmekte olan ülke ekonomilerinde gözlemlenebilmektedir. Bu tez, Değişken AOSM ve Sabit AOSM yaklaşımları ile hesaplanan değerleme sonuçlarını karşılaştırmaktadır; ve sonuçlar, Değişken AOSM yaklaşımının ters verim eğrisi koşullarında piyasa fiyatlamasına daha yakın bir sonuç sunduğunu göstermektedir.

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CHAPTER I

INTRODUCTORY STATEMENT

1.1 – Introduction

This paper examines why Changing WACC Approach should be used in company valuation in inverted yield conditions, especially valuing a company in emerging markets. In order to analyze the effect of Changing WACC and Stable WACC Approaches, the valuation study performed with both approaches and the valuation results based on point and range estimates are analyzed with market pricing. It is found that applying Changing WACC in the valuation study provides closer results to pricing of market players when there is an inverted yield curve condition.

In the second chapter, valuation approaches are introduced, which are Income, Market and Cost Approaches. In the third chapter, yield curve conditions are introduced and slope of yield curves in developed and emerging countries are analyzed. United States is selected as developed country. Brazil, Russia, India and Turkey are selected as emerging countries. It is found that inverted yield curve can be observed regardless of development level; however, it is more likely to be seen in emerging markets by the reason of fragility. In the fourth chapter, Weighted Average Cost of Capital Methodology is introduced.

In the fifth chapter, the yield curve of Turkey Government Bonds and BIST 100 performance based on earnings yield and MSCI Emerging Market Index over the last seven years are analyzed.

After analyzing slope of yield curves of Turkey Government Bonds, the valuation study starts with the sixth chapter. In the sixth chapter, peer selection for the valuation

study and key performance indicators of peers is analyzed in the last three fiscal years according to the valuation date. In the seventh section, weighted average cost of capital for both approaches are calculated and presented, which are used in the valuation study.

In the eighth and ninth sections, financial results of the company in the last three fiscal years is analyzed and valuation assumptions are explained. In the tenth section, the valuation study is performed based on Changing WACC and Stable WACC Approaches and the valuation results are analyzed with market pricing based on point and range estimates.

1.2 – Core Problem

The core problem of using Stable WACC Approach in a valuation study when there is an inverted yield condition and the spread between short and long term rates is greater than 3.0-4.0% leads undervaluing or overvaluing the target company, since the risk-free rate used in WACC calculation is not year-specific rate and does not reflect the market pricing correctly. To avoid this issue and calculate the fair value of the target company more accurate, Changing WACC Approach should be used in the valuation study.

CHAPTER II

VALUATION APPROACHES

In this chapter, valuation approaches and methodologies are presented and described, which are income approach (discounted cash flow), market approach (trading and transaction multiples) and cost approach (adjusted net asset value). Invention of these approaches, academic studies about these methodologies and findings from Turkey are presented respectively in literature review. After that, stated methodologies are explained in detail.

2.1 – Income Approach – Discounted Cash Flow

2.1.1 – Literature Review

In order to understand and apply discounted cash flow methodology, understanding cash inflows/outflows and compounded interest are required. Not surprisingly, early instances of discounted cash flow applications in the history were in credit market. With developments in international trade in the 16th and 17th centuries, it was started to use in actuarial science, which involves projections and possibilities. With economic developments and expansions in the United States in the 19th century, a new issue was born in the cash inflow/outflow analysis. The issue was about utilized capacity of the company. Professionals started to question the adequacy of current capacity and future investments. Parker (1968) mentioned that the first capital expenditure projections were used in railway industry (p. 62).¹

¹ Parker, R. H. (1968). Discounted Cash Flow in Historical Perspective. *Journal of Accounting Research*, 58-71.

Academics started to work on Income Approach in the first half of 20th century. Fisher (1930) developed modern principles of income approach and presented four methodologies.² Two of them were about net present value calculation, and others were about internal and marginal rate of return. Boulding (1935) presented internal rate of return of the investment from the initial investment and the future cash flows (p. 493).³ Samuelson (1937) presented different aspects of these methodologies and explained that net present value methodology should be chosen by the investors (p. 487).⁴

Like developed and developing countries, local risk free rates are used in valuation studies generally. In developed countries, long-term rates have 30-year maturity; however, it decreases to 10-year in developing countries, such as Turkey. In terms of calculating equity risk premium, Borsa Istanbul 100 Index (BIST 100) is generally used in the studies. However, it is seen that MSCI Emerging Markets Index is preferred in some valuation studies. This situation is also seen in valuation studies in developing countries.

2.1.2 – Methodology

In business valuation practice, there are several methodologies to estimate enterprise value (EV) or equity value (EqV) of a company and income approach is one of the most preferred approaches used by practitioners. The purpose of using income approach is to calculate enterprise or equity value as of valuation date by projecting operational cash flows of the company for next 5 to 7 years and also terminal value (TV) of the company.

² Fisher, I. (1930). *Theory of Interest: As Determined by Impatience to Spend Income and Opportunity to Invest It*. Augustusm Kelly Publishers, Clifton.

³ Boulding, K. E. (1935). The Theory of a Single Investment. *The Quarterly Journal of Economics*, 49(3), 475-494.

⁴ Samuelson, P. A. (1937). Some Aspects of the Pure Theory of Capital. *The Quarterly Journal of Economics*, 51(3), 469-496.

The methodology is based on discounting free cash flows to firm (FCFF), which will be generated by the company, and terminal value of the company with a defined discount factor (DF). Gordon Growth Model is considered for terminal value calculation, as it is expected that growth of future operating cash flows (g) of the company will be stable in the long term.

The structure of discounted cash flow, considering 5-year projection period, is shown in equation 1.

Equation 1: Discounted Cash Flow Structure

$$EV = FCFF_1*DF_1+FCFF_2*DF_2+FCFF_3*DF_3+FCFF_4*DF_4+FCFF_5*DF_5+TV*DF_5$$

$$TV = \frac{FCFF_6}{r - g}$$

$$DF_n = \frac{1}{(1 + r)^n}$$

Free cash flow to firm is generated cash flow by firm after adding depreciation expenses and reducing taxes paid, capital expenditures and net operating working capital investments.

- i. Depreciation Expenses: Depreciation is allocated useful life cost of a tangible or an intangible asset in line with accounting principles. As it is non-cash item, it is added in free cash flow to firm calculation.
- ii. Taxes Paid: Effective tax rate of the company is considered in free cash flow to firm calculation. It includes not only announced corporate tax rate by authorities in the related fiscal year, but also agreed tax incentives with the authority and carried tax loss from prior fiscal years.
- iii. Capital Expenditures: Capital expenditures are classified in two types. Maintenance capital expenditures are required for owned fixed assets, as they are depreciating or used during the year. If maintenance capital expenditures are not

made by the company, existing assets will not be useful or scrapped in the long term. It is an essential expenditure for sustainable business operations. The second is expansion capital expenditures. If the company plans to expand its operations or production lines in future, it is required to acquire new equipment which will be used in production or new facilities for operations.

- iv. **Net Operating Working Capital Investments:** Difference in operating current assets and operating current liabilities is accepted as net operating working capital. Change in net operating working capital investments between actual and prior period reflects required investment to net operating working capital. Operating current assets include accounts receivables, inventories and other operating current assets, such as prepaid expenses. Operating current liabilities include accounts payables and other operating current liabilities, such as deferred income.

Considering items that explained above, the structure of free cash flow to firm calculation is shown in Equation 2.

Equation 2: Free Cash Flow to Firm Formula

Earnings before Interest and Taxes (EBIT)

- Taxes Paid on EBIT

+ Depreciation

Operational Cash Flow

- Capital Expenditures

- Change in Net Operating Working Capital

Free Cash Flow to Firm (FCFF)

Equation 2 displays the calculation of free cash flow to firm. Discounted cash flow methodology is a custom-made approach to find enterprise value of a company in several ways. Practitioner must understand business environment and dynamics of the operating sector, select peer companies which are comparable to the company, revenue and cost

structure of the company, funding strategy for operational sustainability and growth opportunities of the business. However, it may not reflect the financial market perspective completely.

Despite of analyzing and forecasting future operational cash flows of a firm, the result of discounted cash flow analysis can vary from expectations of equity traders and portfolio managers. If financial market consensus is more optimistic than expectations of the practitioner, calculated enterprise value by using discounted cash flow methodology will be undervalued in comparison to market capitalization. On the contrary, if financial market players are more pessimist than the practitioner, discounted cash flow result will be overvalued in comparison to market price.

Another aspect in discounted cash flow methodology is deciding which currency will be used in the valuation study. Operating currency of the company should be considered as the origin of revenue and cost stream rather than the geographical location of the company. If headquarter of the company is in Turkey and the company collects its revenue and pays its expenses in U.S. Dollar, the sensible approach to choosing valuation currency will be U.S. Dollar for several reasons. The most significant reason is that operating currency will provide more reliable results for the company. Secondly, it will include its own currency dynamics and fundamentals, such as currency risk and inflation. If the company has more than one operating currency, the most proper approach to choose valuation currency will be considering the currency that the company generates the revenue due to applying income approach in the valuation study. In addition to this circumstance, there will be more than one operating currency in revenue stream. If one currency does not overweight the other one, the practitioner should consider the location of the company. To covert a currency to the local currency of valuation study, the

practitioner can use own currency forecast or collect forecasts from independent resources, which provides up to 10 or 15 years.

Even though discounted cash flow approach is based on future expectations of the company management, they are based on significant number of projections. They include volume, prices, cost, capital expenditures and financing projections. As a result of heavy number of projections, a deviation in these assumptions can lead to different fair value in comparison to valuation study.

2.2 Market Approach – Trading and Transactions Multiples Methodologies

2.2.1 – Literature Review

To apply market approach in the valuation study, comparative firms or transactions should be found. With the absence of comparatives, market approach cannot be applied. In historical context, market approach was not firstly used in company valuation, but in real estate valuation. Pollock (1930) stated that all valuation studies are relative and setting systemic and standardized methods are crucial (p. 103).⁵ Practitioners started to use certain multiples in order to calculate the fair value of companies. Fernandez (2001) found that earnings multiples and enterprise value multiples are preferred by practitioners (p. 3).⁶ As opposed to defining single approach to calculate the fair value of any company, Yee (2004) argued that single approach cannot provide accurate results and be precise in a valuation study (p. 23).⁷ Damodaran (2002) provided supportive findings

⁵ Pollock, W. W. (1930). A Scientific Approach to Real Estate Valuation. *The Annals of the American Academy of Political and Social Science*, 148(1), 97-105.

⁶ Fernandez, P. (2001). Valuation Using Multiples. How Do Analysts Reach Their Conclusions? *IESE Business School*, 1, 1-13.

⁷ Yee, K. K. (2004). Combining Value Estimates to Increase Accuracy. *Financial Analysts Journal*, 60(4), 23-28.

to this argument and stated that about 90% of equity analysts use market approach in their reports and market approach is used nearly half of announced transactions.⁸

Market approach is more preferred approach compared to income approach by equity analysts and money managers, due to less complexity. Asquith et al. (2005) conducted a research about valuation approaches used in equity research reports by analyzing 1,126 reports and found that market approach was used in 99.1% of the reports and income approach was used in just 12.8% of them (p. 252).⁹ Pinto et al. (2019) conducted a survey among nearly 2,000 equity analysts who are part of Chartered Financial Analyst Institute and presented that 92.8% of analysts uses market approach and 78.8% of them uses income approach in their valuation studies (p. 227).¹⁰

2.2.2 – Methodology

In contradistinction to income approach, the practitioner takes into account historical market prices in the market approach. There are two methodologies in the market approach, which are trading multiples and transaction multiples. Placing similarities and differences on one side, the most significant step is to choose comparable companies for valuation study. Pratt (2006) mentions that selecting right time period and comparable companies is critical to apply market approach (p. 77).¹¹ In order to apply market approach, the practitioner must find comparable companies; otherwise, choosing incomparable companies will mislead the practitioner and the valuation result will not reflect fair value of the company. Hanlin Jr. and Claywell (2010) mentioned that a single

⁸ Damodaran, A., 2002, *Investment Valuation (Second Edition)*, John Wiley and Sons, New York.

⁹ Asquith, P., Mikhail, M. B., & Au, A. S. (2005). Information Content of Equity Analyst Reports. *Journal of Financial Economics*, 75(2), 245-282.

¹⁰ Pinto, J. E., Robinson, T. R., & Stowe, J. D. (2019). Equity Valuation: A Survey of Professional Practice. *Review of Financial Economics*, 37(2), 219-233.

¹¹ Pratt, S. P. (2006). *The Market Approach to Valuing Businesses*. John Wiley & Sons.

approach should not be considered as correct or incorrect approach, it should be supported by other approaches (p. 37).¹²

2.2.2.1 – Trading Multiples Methodology

In trading multiples methodology, the practitioner targets to find enterprise value with historical financials of the company, such as EBIT and EBITDA. As mentioned above, first step is to select proper comparable companies to the target company. The practitioner should consider industry, revenue and cost stream, revenue size, cash flow generation, funding strategies, EBIT and EBITDA margins, asset size and location of the company. The most common approach to select comparable companies is to select from same geographical location, as they will operate in same business dynamics and environment. If there are not adequate comparable companies in the location, the practitioner can search comparable companies from countries that have similar macroeconomic dynamics. If the target company is a Turkish company and there are not adequate comparable companies in Turkey, the practitioner can extend peer analysis to emerging markets like Poland or Russia.

Another critical principle in trading multiples methodology is looking at same time frame for historical values. If the practitioner decides to use trading multiples in the valuation study, both the numerator and denominator should have same time period range. For instance, the practitioner decides to study EV/EBITDA multiple with comparable companies and the valuation date is 31.12.2018, enterprise value should be an average of FY2018 values and EBITDA should be FY2018 EBITDA values.

As today's business world is evolving and new industries are arising; valuation practitioners do not consider only financial metrics in their studies. There are several non-

¹² Hanlin Jr, W. A., & Claywell, R. (2010). *The Market Approach. Guide to Fair Value under IFRS*. Hoboken, 37-55.

financial metrics which are used by the practitioners. They are key metrics that businesses are measuring their performances, such as subscriber or store traffic. The most common trading multiples are explained below.

- i. EV/Revenue: It is a general application of enterprise value of the company to revenue of the company. It is a common approach to reach enterprise value of the target and applicable to any industry. This multiple analysis is used mainly to companies that are in early stages.
- ii. EV/EBITDA: The aim is to find enterprise value of the company by considering its EBITDA. It is applicable to several sectors and it is one of the most used multiples in market approach.
- iii. EV/EBIT: In contradistinction to EV/EBITDA multiple, depreciation and amortization expenses of the company are excluded. Like EV/EBITDA multiple, it is used frequently by practitioners.
- iv. EV/EBITDAR: In addition to considering depreciation and amortization expenses, renting and leasing expenses are also included in this multiple. It is applicable to airline and retail industries, as renting and leasing expenses have significant proportion in their cost structure.
- v. EV/Production: In this multiple, the practitioner considers production of the company in order to calculate enterprise value of the company. It is used in production companies, such as oil companies.
- vi. EV/Reserves: Reserves of the company is taken into account in this multiple analysis. It is mainly considered for the company that have exploration operations and hold reserves in their inventories, such as mining firms.

- vii. Price/Book Value: Book value of equity and market capitalization of the company are considered in this multiple. It is commonly used in valuation studies of financial institutions, such as banks.
- viii. Price/Earnings per Share: In addition to market capitalization of the company, net income of the company is used in the analysis. This multiple is applicable to valuation studies of several industries.
- ix. EV/Subscriber: Denominator is a non-financial metric and it shows active subscribers that use the platform frequently. The multiple is used mainly technology companies' valuations, such as YouTube or Netflix.

In addition to using market approach as valuation study, trading multiples can be also used as supportive indicators to other valuation approaches. However, there are some limitations in trading multiples approach. The most considerable limitation is that trading multiples approach does not reflect future expectations of the company management. It shows average of the industry that the company operates in. If the company management have more optimistic or pessimistic expectations for the company, trading multiples will misguide the practitioner and not provide a reasonable fair value. Another aspect is life stage of the company. If the company is founded recently and in start-up stage, future growth rate of the company will be greater than industry peers. As comparable companies are established before and have steady growth, median of peer analysis will be close to their multiples. Considering this circumstance, trading multiples approach will give a result of undervaluation.

2.2.2.2 – Transaction Multiples Methodology

In transaction multiples methodology, the practitioner aims to calculate fair value of the company by looking the multiples of past mergers and acquisitions. The most crucial approach in this methodology is to select related transactions in the market by

looking to industry-specific multiples, looking geographical location, time period and purchased shares.

- i. **Industry-Specific Multiples:** In similar to trading multiples, the practitioner should select proper industry-specific multiple to find fair value of the target company. In the target company is a financial institution, the practitioner should consider P/BV or P/E multiples in the valuation study.
- ii. **Geographical Location:** The practitioner should take a sample from location of the target company. If there are limited transactions in the location, the practitioner can extend the sample to markets that have a similar outlook to the target's location. If the target company has operations in financial software sector in Brazil and there are few transactions in the past, the practitioner can look at past transactions in developing countries.
- iii. **Time Period:** Defining time period for past transactions is critical to calculate fair value of the company. The practitioner should not include transactions, which take place in more than past five years, to the sample of past transactions. As businesses and their financials evolve in the long term, selecting a transaction from more than past five years will misguide the practitioner.
- iv. **Purchased Shares:** The practitioner should take into consideration a transaction that includes majority shares. In some circumstances, companies can increase their shares in an investment or there will be some intercompany transactions. There will a discount or premium in these transactions and purchase price may not reflect fair value of the company. Using intercompany transactions will misguide the practitioner in fair value calculation.

In addition to these considerations, the practitioner should exclude outlier transaction multiples from the sample of past transactions. Including the outlier multiples

to the sample will cause miscalculation in fair value of the target company. For instance, median result of the past transactions sample is 0.62x and there is a transaction that has 5.32x multiple, the practitioner should exclude this outlier from the sample.

There are some limitations in transaction multiples methodology regarding to criteria explained above except industry-specific multiple. There will be limited transactions considering geographical location, time period and shares purchased. Geographical location may be extended to greater areas; but if there are not any transactions in the light of time period and shares purchased, the practitioner should not try to find fair value of the target company by using transaction multiples methodology.

2.3. Cost Approach – Adjusted Net Asset Value Methodology

2.3.1 – Literature Review

The idea of using financial statements was based on reflection of reliable results in book values. As assets were purchased or cash flows were generated in free market conditions, values in financial statements were reliable. Daniels (1934) mentioned that measuring income is the first purpose of accounting and balance sheet valuation should not be considered as conservative approach (p. 121).¹³ Primary goal has become to find overvalued and/or undervalued companies by looking book value indicators in the middle of 20th century, which was led by Benjamin Graham. Chan et al. (1991) explained that book value valuations played a significant role in Japanese equities.¹⁴ However, this approach fell behind income approach and market approach in terms of preference and became the least preferred approach by practitioners according to researches and surveys mentioned in market approach section.

¹³ Daniels, M. B. (1934). Principles of Asset Valuation. *Accounting Review*, 114-121.

¹⁴ Chan, L. K., Hamao, Y., & Lakonishok, J. (1991). Fundamentals and Stock Returns in Japan. *The Journal of Finance*, 46(5), 1739-1764.

2.3.2 – Methodology

In adjusted net asset value methodology, the practitioner calculates fair value of the target company as of valuation date by using last available financial statements. Fernandez (2007) explained purpose of the methodology as to achieve fair value of the target company by reflecting the market value of non-operating assets (p. 5).¹⁵ Adjustments for the book value of non-operating assets, such as fixed assets of the target company, or the book value of subsidiaries owned by the target company is considered in the valuation study. This methodology is used in the valuation study of non-operating companies, as there will be not any business projections for the future or has no operations to consider any multiples.

This methodology is not applicable for any operating company, since potential value of the company will not be represented properly. Future operations and cash flows generated by them are not considered in this methodology.

¹⁵ Fernández, P. (2007). Company Valuation Methods. The Most Common Errors in Valuations. *IESE Business School*, 449.

CHAPTER III

SLOPE OF YIELD CURVE

In this chapter, slope of yield curve is explained and described as flattening, steepening and inverted yield curves. Yield curve shapes presents many economic indicators and expectations about the market and are significant guide for the practitioners. In addition to the introduction, slope of yield curve in developed and emerging markets are analyzed in the long term. United States is selected as developed market and the yield spread between 10-Year Treasury Bond and 3-Month Treasury Bill is analyzed. Four emerging markets are analyzed as emerging markets, which are Russia, Brazil, India and Turkey. The yield spreads between 10-Year Government Bond and 2-Year Government are analyzed for the selected emerging markets.

3.1 – Yield Curve Shapes

Yield curve represents yield to maturity of bonds issued by same debtor for different maturities. There are three main shapes of yield curve, which are flattening, steepening and inverted. In the following parts, these are explained in detail.

A yield curve displays expected rates for the future and indicates several expectations. Smets and Tsatsaronis (1997) analyzed the relation between slope of yield curves and economic activities of United States and Germany and found that the monetary policy of central banks plays direct and indirect roles (p. 23).¹⁶ Mehl (2006) examined 14 emerging markets in Europe and found that steepening of hundred basis points in yield curve indicates thirty basis points acceleration in growth and inflation (p. 28).¹⁷

¹⁶ Smets, F., & Tsatsaronis, K. (1997). *Why Does the Yield Curve Predict Economic Activity? Dissecting the Evidence for Germany and the United States*. Centre for Economic Policy Research.

¹⁷ Mehl, A. (2009). The Yield Curve as a Predictor and Emerging Economies. *Open Economies Review*, 20(5), 683.

In addition to mentioned indicators, the slope of yield curve provides an idea about borrowing rates of companies.

3.1.1 – Flattening Yield Curve

Narrow yield spreads are observed in a flattening yield curve. It is shown that short-term rates are at close levels to long-term rates. There is nearly no difference between short-term and long-term risks. It provides that strong economic activities will not be occurred in the long term. The acceleration of economic growth will be similar to current levels.

3.1.2 – Steepening Yield Curve

In a steepening yield curve, wide yield spreads can be observed. It is shown that long-term rates are at greater levels to short-term rates. There is a significant difference between short-term and long-term risks. It provides that strong economic activities will be occurred in the long term. Economic growth will be accelerated and greater than average levels.

3.1.3 – Inverted Yield Curve

Short-term yields are greater than long-term yield in the inverted yield curve and it generally occurs in crisis periods. Inverted yield curve represents that the economy is in a crisis period and the market faces greater risks in the short-term. It indicates that interest rates and inflation will decrease in the long term. Garner (1987) explained that greater required real interest rates and greater liquidity premiums will be expected by investor in an inverted yield curve conditions (p. 15).¹⁸ Cwik (2005) found that inverted yield curve can be observed a year before an economic slowdown or a recession (p. 21).¹⁹

¹⁸ Garner, C. A. (1987). The Yield Curve and Inflation Expectations. *Federal Reserve Bank of Kansas City Review*.

¹⁹ Cwik, P. F. (2005). The Inverted Yield Curve and the Economic Downturn. *New Perspectives on Political Economy*, 1(1), 1-37.

Unwise investment decisions lead to increase in producer prices and it triggers credit booms in the economy. McCown (1999) analyzed that short-term government bonds have the greatest risk premium and stocks have the least risk premium in the yield curve conditions (p. 119).²⁰

3.2 – Yield Spread Analysis of Selected Markets

In this part, slope of government bonds of developed and emerging economies will be analyzed in the long term. United States is selected as a developed economy. For emerging economies, four countries are examined, which are Brazil, Russia, India and Turkey. The analysis will start with United States, and analyses of Government Bonds of Brazil and Russia will follow. As final analysis, slope of Turkey Government Bond will be presented.

3.2.1. – United States

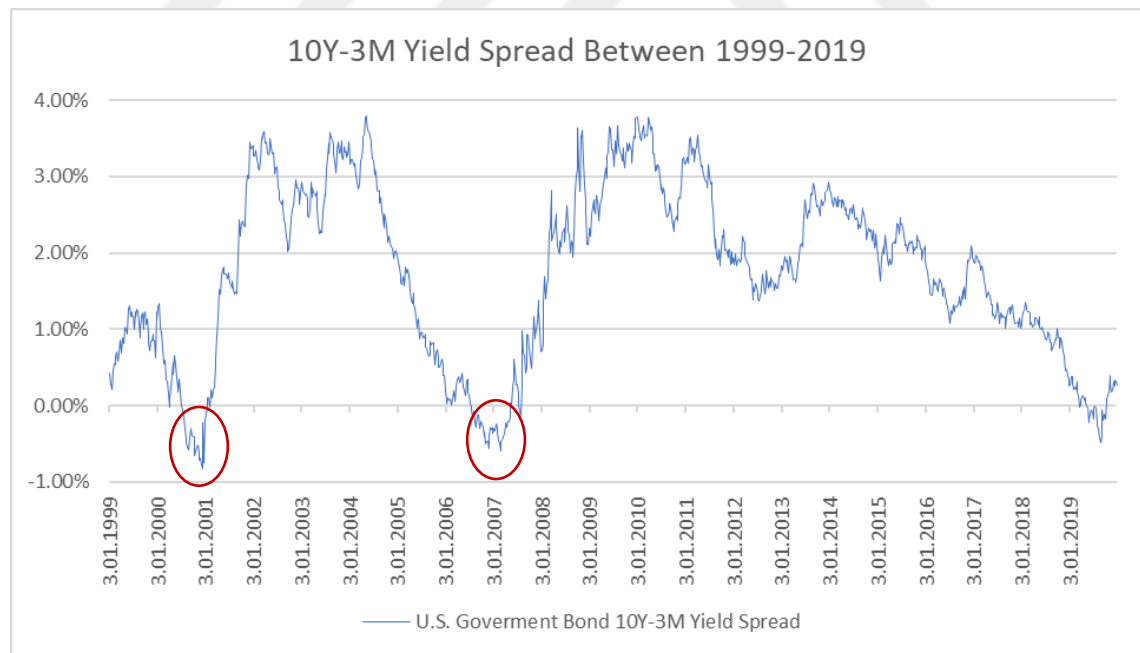


Figure 1: 10 Year - 3 Month Yield Spread of United States Government Bonds Between 1999 and 2019

²⁰ McCown, J. R. (1999). The effects of inverted yield curves on asset returns. *Financial review*, 34(2), 109-126.

Figure 1 shows 10 Year – 3 Month yield spread of United States Government Bonds between 1999 and 2019. The minimum point of the spread is -0.83% and the maximum point of the spread is 3.80%. Inverted yield curves are observed generally in crisis periods. First observation of the period occurs during Dot-Com Bubble and the second observation occurs during Subprime Mortgage Crisis. After end of crisis periods, the slope of yield curve reaches before crisis levels.

3.2.2 – Brazil

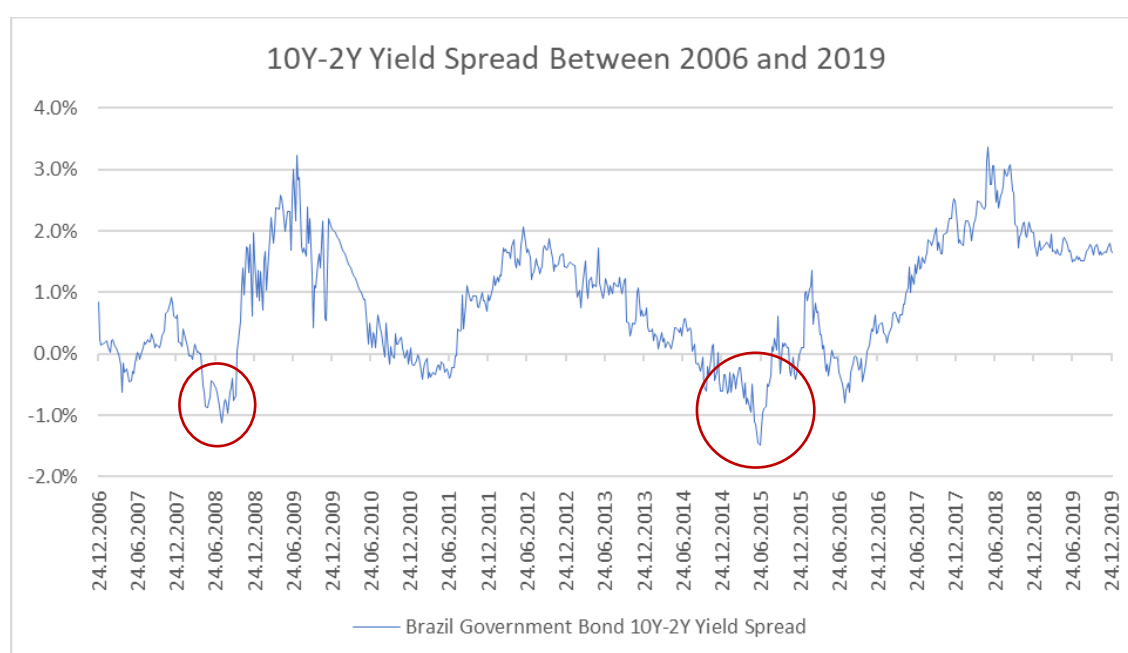


Figure 2: 10 Year – 2 Year Yield Spread of Brazil Government Bonds Between 2006 and 2019

Figure 2 displays 10 Year – 2 Year yield spread of Brazil Government Bonds between 2006 and 2019. The minimum point of the spread is -1.50% and the maximum point of the spread is 4.06%. Inverted yield curves are observed generally in crisis periods. Similar to observation in United States Government Bonds, first observation of the period occurs during Subprime Mortgage Crisis and the second observation occurs during commodity price shock 2014 and political crisis of impeachment of the president. After end of crisis periods, the slope of yield curve reaches to normal levels.

3.2.3 – Russia

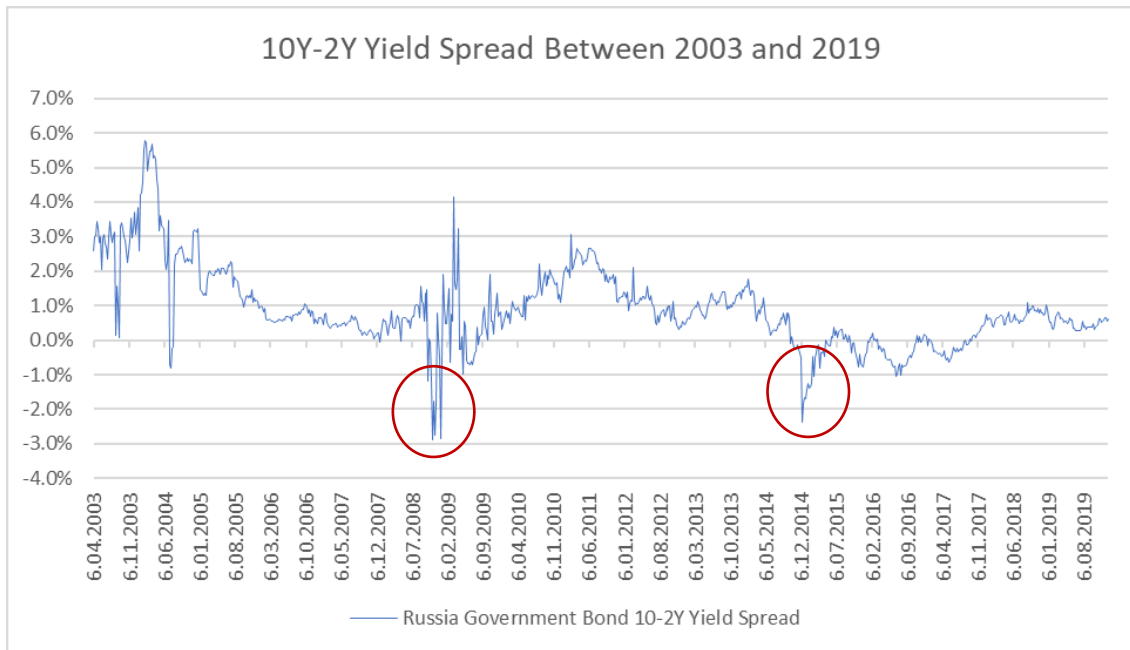


Figure 3: 10 Year – 2 Year Yield Spread of Russia Government Bonds Between 2003 and 2019

Figure 3 displays 10 Year – 2 Year yield spread of Russia Government Bonds between 2003 and 2019. The minimum point of the spread is -2.91% and the maximum point of the spread is 5.79%. Inverted yield curves are observed generally in crisis periods. Similar to observation in United States and Brazil, first observation of the period occurs during Subprime Mortgage Crisis and the second observation occurs during commodity price shock 2014. After end of crisis periods, the slope of yield curve reaches to normal levels.

3.2.4 – India

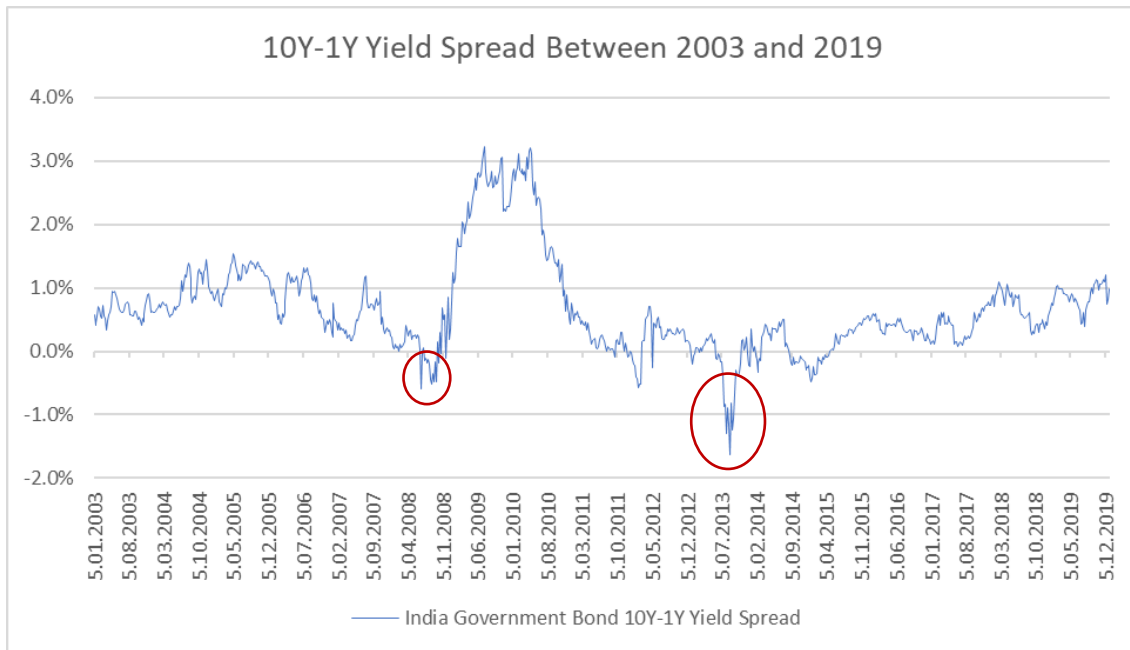


Figure 4: 10 Year – 1 Year Yield Spread of India Government Bonds Between 2003 and 2019

Figure 4 shows 10 Year – 1 Year yield spread of India Government Bonds between 2003 and 2019. The minimum point of the spread is -1.63% and the maximum point of the spread is 3.23%. Inverted yield curves are observed generally in crisis periods. Unlike to previous observations, the slope of yield curve is not very wide during Subprime Mortgage Crisis. Major inverted yield curve observation occurs during the second half of the 2013. The reasons behind are high current account deficit, capital outflows and outstanding external debt. After end of 2014, the slope of yield curve reaches to normal levels.

3.2.5 – Turkey

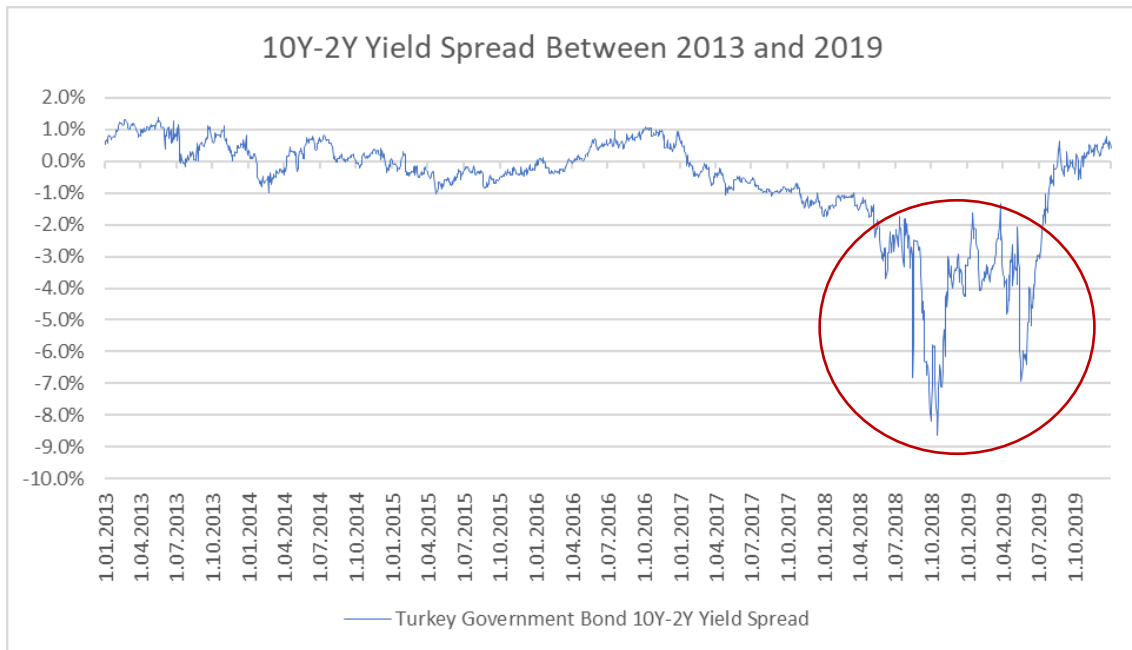


Figure 5: 10 Year – 2 Year Yield Spread of Turkey Government Bonds Between 2013 and 2019

Figure 5 presents 10 Year – 2 Year yield spread of Turkey Government Bonds between 2013 and 2019. The minimum point of the spread is -8.62% and the maximum point of the spread is 1.38%. Inverted yield curves are observed generally in crisis periods. Major inverted yield curve observation occurs during 2018 and 2019. The reasons behind are balance of payments and political tensions with United States. As Turkish economy is heavily dependent to external debt, it is fragile against the shocks. Turkish Lira depreciated heavily during this period and inflation increased in a short period. Central Bank of Republic of Turkey increased the policy rate sharply to prevent further shocks. By the end of 2019, the slope of yield curve reaches to normal levels.

Examples from both developed and emerging economies are presented in above. Inverted yield curve occurs in crisis periods and can be observed regardless of the level of economic development. However, it is more likely to be seen in emerging economies

due to the fragility of these economies, such as being dependent to commodity prices, capital outflows and external debt.



CHAPTER IV

WACC METHODOLOGY

In this chapter, the methodology of weighted average cost of capital (WACC) is explained with the breakdown of its components, which are cost of equity and cost of debt. In the first part, the main theme of weighted average cost of capital is presented. Then, the components and calculation of cost of equity and cost of debt are described in the second and third part of this section respectively.

4.1 – Weighted Average Cost of Capital

In discounted cash flow methodology, the practitioner discounts forecasted cash flows with a defined discount rate. Determining the discount rate is one of the most critical decisions in the valuation study, as it affects the net present value of future cash flows and terminal value. The discount rate is determined by using weighted average cost of capital concept.

There are two main funding resources for companies, which are equity and debt. Shareholders of the company invest their cash resources during foundation process. Investors will have shares of the company according to their investment. In case of funding necessity, shareholders can inject more equity or sale their shares to other investors in later stages. Companies can also fund their operations or investments with debt. There are several debt instruments in financial markets. The most preferred instrument for debt funding is using bank loans. Lenders select a benchmark rate, such as LIBOR, and add a company-specific rate to this benchmark. The company-specific rate is determined by financial stability of the company. If a company has unstable operations and problems with cash generation, the lender will apply a greater company-specific rate

as taking more risk. The second instrument is issuing corporate bonds. Issuer company will pay certain amounts to bondholders in specified dates. In most cases, issuing corporate bonds will be costlier to the company rather than bank loans due to underwriting fees. Debtholders have a higher seniority than shareholders in case of bankruptcy of the company, due to financial laws and regulations.

Weighted average cost of capital is constituted by cost of equity and cost of debt. It is a combination of expected return on equity and borrowing rate of debt with their weights.

Equation 3: WACC Formula

$$WACC = Re * We + Rd * Wd * (1 - T)$$

Re: Cost of equity

We: Weight of company's equity

Rd: Pre-tax cost of debt

Wd: Weight of debt of company

T: Corporate tax rate

Equation 3 presents the formula of weighted average cost of capital. The aim of a company in funding strategy is to reach the lowest point in cost of capital. Debt is tax deductible and companies tend to prefer debt funding over equity funding due to tax shield advantages of debt funding. However, there are several risks in leveraging the company more than adequate level. As explained above, the lenders are putting emphasis on repayment capability of the company. If a company use more debt to fund operations and investments, interest payments will sweep operational profit of the company. Another aspect of over-leveraging is that the lender will demand a greater interest rate, as the company has a riskier profile due to over-levering. Block (2011) explained the optimal debt-to-equity as 0.67 to 1.00. for avoiding increased risk by over-levering (p. 171).²¹

²¹ Block, S. (2011). Does the Weighted Average Cost of Capital Describe the Real-World Approach to the Discount Rate? *The Engineering Economist*, 56(2), 170-180.

First step of weighted average cost of capital calculation is to select comparable companies to the target company. As explained in valuation methodologies section, there are several considerations in peer selection. The most significant consideration is that peer companies must have similar operations with the target company. Other than business operations, there are several considerations like geographical location and company size. The practitioner should filter potential peer companies by these conditions in peer sample. However, there can be limitations in peer research, as it is not always easy to find adequate peer companies. First step in these circumstances is that the practitioner can consider including companies from similar geographical locations. If there are not adequate companies with similar company size, the practitioner may change company size consideration as the last step.

4.1.1 – Cost of Equity

Cost of equity is a required return of investing a company with shareholders' equity. An investor would like to expect a greater return when investing a company rather than fixed income instruments due to taking a higher risk. Mainly, risk and return models are used in business valuation practice in order to estimate cost of equity. In the investment theory, risk of an investment is calculated by the difference between actual returns and the expected return, which is standard deviation of sample size. If the standard deviation is greater than the expectation, investing to defined instrument is riskier.

There are several risks to investing a company, which are diversifiable and non-diversifiable risks. Diversifiable risks are defined as company-specific risks, which can be diversified with investing multiple sectors. Project risk, competitive risk and sector risk can be identified as the most significant risks in diversifiable risks. Companies have research and development (R&D) investments a certain amount of their revenues to extend or improve their products or services. If there is misjudgment in R&D investments,

the company cannot generate additional revenue stream from these investments. Competitiveness is a critical measure for a company, as more competitors create more risks for operations and profit generation of the company. Stable business environment and sector mean stable returns for a company. If a sector has a seasonal up and downsides or depends on specified supply and demand, these effects will bring instability to the sector and returns of the company will fluctuate more than expected. Non-diversifiable risks are that an investor cannot diversify with investing multiple companies like inflation, funding rate and growth in gross domestic product.

The most preferred risk and return model in valuation practices is capital asset pricing model (CAPM). CAPM is a well-accepted risk and return model by finance world. Fama and French (2004) explained why CAPM is accepted by many professionals as CAPM provides strong and satisfactory projections to calculate risk of an investment and its relationship with the expected return of an investment (p. 25).²² The formula of CAPM consists three main variables which are risk-free rate, beta of the asset and equity risk premium.

Equation 4: Formula of Capital Asset Pricing Model

$$R_i = R_f + \beta_i * ERP$$

R_i : Expected return of the asset

R_f : Risk-free rate

β_i : Beta of the asset

ERP: Equity risk premium (expected equity market return – risk-free rate)

- i. Risk-Free Rate: Generally, bonds that issued by governments are accepted as risk-free assets, as governments are the highest rank to guarantee for paying their debt.

There should not be any deviation in expected return and actual return to in a risk-

²² Fama, E. F., & French, K. R. (2004). The Capital Asset Pricing Model: Theory and Evidence. *Journal of Economic Perspectives*, 18(3), 25-46.

free asset. There are two main requirements to be a risk-free asset, which are not having any default risk and reinvestment risk. In valuation studies, government bonds that has the longest maturity are used as risk-free rate. 10-year government bonds and its yield are selected as risk-free rate in the valuation practice. Another significant aspect of selecting appropriate risk-free rate is that currency of the valuation study and the selected risk-free asset should match with each other. If there is a mismatch in these, fair value of the target company will not be calculated correctly. It is not hard to find a risk-free asset in local currencies, as many governments issue bonds that are denominated in local currencies. If the practitioner studies on the valuation of a local company in foreign currency, it will not be easy to apply the yield of local government bond. There can be some governments which may not issue bonds that are denominated in U.S. Dollar or Euro. In these conditions, Damodaran (2008) offered two approaches to eliminate this issue, which are using inflation differential and applying country default spread (p. 19).²³ In inflation differential approach, the practitioner can use own inflation expectations in both currencies or apply inflation expectations of independent research institutions. Equation 5 displays the formula of inflation differential.

Equation 5: Inflation Differential Formula

$$Rlc = (1 + Rfc) * \frac{(1 + EIlc)}{(1 + EIfc)} - 1$$

Rlc: Risk-free rate of local currency

Rfc: Risk-free rate of foreign currency

EIlc: Expected inflation of local currency

²³ Damodaran, A. (2008). What is the Riskfree Rate? A Search for the Basic Building Block. *A Search for the Basic Building Block* (December 14, 2008).

EIfc: Expected inflation of foreign currency

In country default spread approach, the practitioner can apply default spreads which are calculated from sovereign ratings by S&P, Fitch and Moody's. Equation 6 shows the calculation of risk-free rate of local government bond by using default spread.

Equation 6: Risk-Free Rate of Local Government Bond Formula

$$Rlg = Rfg + DSlg$$

Rlg: Risk-free rate of local government bond

Rfg: Risk-free rate of foreign government bond

DSlg: Default spread of local government

In case of the absence of local risk-free rates, the practitioner can apply the calculated risk-free rate by above approaches in local valuation studies.

- ii. Beta of the Asset: Beta coefficient presents systematic risk of the related asset to the market index. It is calculated with regression analysis of excess return of the asset and the market index to risk-free rate. Equation 7 displays beta calculation of an asset.

Equation 7: Calculation of Beta of an Asset

$$\beta_i = \frac{\text{Covariance}(R_i, R_m)}{\text{Variance}(R_m)}$$

R_i: Actual return of the asset

R_m: Actual return of the market index

If it is greater than 1.00, the asset is exposed to greater risk in comparison to the market. The expected return of the asset will be greater than the expected return of the market index. If beta of the asset is less than 1.00, the asset is exposed less risk in comparison the market. Due to the fact that, the expected return of the asset

will be less than the expected return of the market index. In some cases, beta of the asset can be equal to 1.00 and it shows that the asset is exposed equal risk in comparison the market. Therefore, the expected return of the asset will be equal to the expected return of the market index.

There are several approaches to calculate beta of the asset in terms of time period. The most preferred approaches are comparing 5-year monthly returns and 2-year weekly returns. The practitioner should select the approach that has greater median result of R-square. Also, significance of beta of comparable companies should be checked. Any comparable company that cannot pass required T-test result should be excluded from the sample group.

After obtaining equity beta of each comparable companies from regression analysis, the practitioner calculates unlevered betas of each comparable companies, which is asset beta. The practitioner uses relevered beta by using the debt to equity ratio, corporate tax rate and the median asset beta from the sample of comparable companies in cost of equity calculation. Equation 8 displays the calculation of levered beta of an asset.

Equation 8: Formula of Levered Beta of an Asset

$$\beta_l = \beta_u * (1 + \frac{D}{E} * (1 - T))$$

β_l : Levered beta of the asset

β_u : Unlevered beta of the asset

D: Debt of the company

E: Equity of the company

T: Corporate tax rate

- iii. Equity Risk Premium: The premium is obtained from the difference between expected equity market return and risk-free rate. The logic of analyzing equity

risk premium is to understand what percentage the investor will earn more investing in the equity market instead of risk-free rate. The investor tries to find average risk in equity market investment. As equity market investment is a riskier investment than risk-free investment, the investor will demand a greater return by investing in equities. Equity risk premium is one of key components in WACC calculation, so it is critical to make the assumptions logically. Measuring the risk in equity investment and converting this measure to the expected return are questions of debate between practitioners in practical and also theoretical terms. Damodaran (2008) presented three approaches to estimate equity risk premium, which are survey premiums, historical premiums and implied premiums (p. 14).²⁴ The aim of survey premium approach is to learn the expectations of equity market players, which are investors, finance managers and academics. A questionnaire is sent to related individuals and the practitioner tries to estimate equity risk premium by using the answers of equity market players. Damodaran (2008) divided investors in two groups as individual investors and institutional investors (p. 14). Individual investors are investing their resources and they invest small amounts in comparison to institutional investors. Institutional investors can be responsible from portfolio management or pension funds, which have great roles in equity markets. Finance managers of corporations, which are mainly chief financial officers, are responsible from corporate treasury, budgeting and compliance in their corporations. Due to managing corporate treasury, they have expectations from financial markets and also financial performance of the company. Academics do not have a significant role in financial markets like investors or finance managers. However, ignoring their expectations about the

²⁴ Damodaran, A. (2008). Equity Risk Premiums (ERP): Determinants, Estimation and Implications. *Estimation and Implications* (September 23, 2008).

equity market will not be a logical approach, since many investors and finance managers take advices from them. Survey approach can be the best way to learn expectations of market players; however, there are several limitations in this approach. The most observed problems are to create a sample group of the players who will represent the population ideally and how many of them will reply the questionnaire.

Historical premiums approach is most preferred approach by practitioners to calculate equity risk premium by comparing actual returns of equity market to yield of risk-free assets. There are two significant aspects in historical premiums approach, which are time period and index and risk-free asset selection. For time period selection, practitioners should decide on how further they should go. Many practitioners in developed markets use 10 or 20-year actual returns in their cost of equity calculations. However, using this time period might not be useful for emerging markets, since they are not mature markets and their returns may fluctuate a lot in comparison to developed markets. In order to eliminate this issue, Damodaran (2008) provided an approach that includes country risk premium to mature equity risk premium for calculating equity risk premium for emerging markets (p. 37).²⁵ As country risk premium, country bond default spread or relative equity market standard deviation can be used. Country bond default spread can be derived from country rating given by credit rating agencies. Relative equity market standard deviation can be derived from standard deviations of emerging market equity index and mature market equity index. Equation 9

²⁵ Damodaran, A. (2008). Equity Risk Premiums (ERP): Determinants, Estimation and Implications. *Estimation and Implications* (September 23, 2008).

presents the calculation of emerging market risk premium with country risk premium.

Equation 9: Emerging Market Equity Risk Premium Formula

$$EM\ ERP = MM\ ERP + CRP$$

EM ERP: Emerging market equity risk premium

MM ERP: Mature market equity risk premium

CRP: Country risk premium

Some practitioners prefer to use shorter time periods like 5-year actual returns and their rationale is that the perspective of an average investor can be changed over years and using shorter time periods will give more updated perspective. Selecting appropriate index and risk-free asset is critical for cost of equity calculation. Practitioners should consider the volume of indices in equity index selection, as more traded index will reflect a better perspective of market players. The selection and calculation of risk-free rate is explained in risk-free rate section.

Implied equity premiums will provide a forward looking perspective as opposed to historical premiums, which will provide a backward looking perspective. As the aim of practitioner is to find fair value of the target company with future cash flow projections, some practitioners use implied equity premiums in cost of equity calculation. Damodaran (2008) suggested that earnings yield of the selected equity, which can be obtained price-to-earnings (PE) ratio of the index, can be used in this approach (p. 51).²⁶ Equation 10 and Equation 11 presents implied equity premium formula and earnings yield of the index formula respectively.

²⁶ Damodaran, A. (2008). Equity Risk Premiums (ERP): Determinants, Estimation and Implications. *Estimation and Implications* (September 23, 2008).

Equation 10: Implied Equity Premium Formula

$$\text{Implied EP} = \text{Earnings yield of the index} - \text{Yield of riskfree asset}$$

Equation 11: Earnings Yield of the Index Formula

$$\text{Earnings yield of the index} = \frac{1}{\text{PE ratio of the index}}$$

In addition to above approach, Damodaran (2008) also analyzed the impact of yield curve in implied equity premiums (p. 56). 6-month treasury bill and 10-year treasury bond are used in the regression analysis. According to the regression analysis, 1.00% increase of 10-year treasury bond rate is increasing implied equity premium by 0.37% and slope of the yield curve has negative impacts on implied equity premium. This regression analysis explains why equity risk premiums should be changing, instead of constant premiums, and have links to yield curve.

4.1.2 – Cost of Debt

Cost of debt shows the borrowing rate of the company to fund its operations and investments. It also displays a detailed the perception of lenders, who provide funds to the company. If it is greater than the borrowing rate of competitors, the company has a greater default risk in comparison to competitors. Funding rates, which are decided by central banks, have an important role in borrowing rates. Since the debt market is funded by funds of central banks and time deposit owners, the level of funding is critical for companies that need funding.

Lenders apply a spread to the company when funding is needed. The spread is related with default risk of the company and is added to a reference rate, which can be obtained from financial markets like LIBOR, EURIBOR or yields of government bonds. Lenders can decide the spread by using the rating of the company which is given by a rating agency or previous funding history of the company. Not only governments, but also companies are rated by rating agencies. However, rating agencies evaluate only

major companies, not all of them. In case of absence of the rating, the lender or borrower can demand an evaluation from the agency in return for a certain fee. If any parties do not want to pay the rating fee, the lender can analyze the business or investment plan of the company and determine default spread of the company. If both parties have a long business relationship and the lender is familiar with operations of the borrower, the spread can be determined by previous funding history.

Funding operations or investments by debt can reduce cost of debt of the company, since interest payments are tax deductible and create a tax shield for the company. This circumstance provides an advantage to companies in cost of debt calculation. Equation 12 displays after-tax cost of debt formula.

Equation 12: After-Tax Cost of Debt Formula

$$\text{Pre-tax cost of debt} = \text{Reference interest rate} + \text{Default spread}$$

$$\text{After-tax cost of debt} = \text{Pre-tax cost of debt} * (1 - \text{Corporate tax rate})$$

CHAPTER V

TURKEY GOVERNMENT BOND YIELD CURVE AND BIST

100 INDEX ANALYSES

In this chapter, yield curves of TRY denominated Turkey Government Bond and the performance of Borsa Istanbul 100 Index are analyzed between 2013 and 2019. Yield curve and yield spread between 10-Year and 2-Year government bonds are presented and analyzed for the period that is stated above. Earnings yield of BIST 100 index and index performance against MSCI Emerging Markets index are presented and analyzed for the period between 2013 and 2019.

5.1 – Turkey Government Bond Yield Curve Analysis

TRY denominated Turkey government bonds between 2013 and 2019 are analyzed in this section. The main reason of yield curve and spread analysis is to determine which rates should be used in weighted average cost of capital calculation. In order to decide using a single rate or year-specific rate, yield curves and 10Y-2Y yield spreads are analyzed from 2013 to 2019. The duration of selected government bonds are 1-year, 2-year, 3-year, 4-year, 5-year and 10-year. Average of closing daily yields are used in yield curve analyses and daily yield spreads between 10Y and 2Y government bonds.

5.1.1 – Fiscal Year 2013

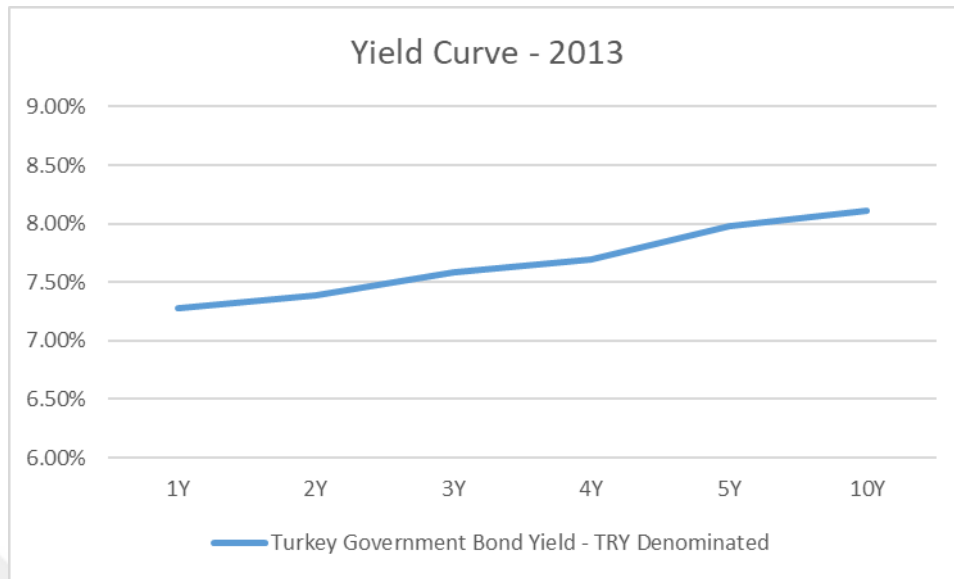


Figure 6: Yield Curve of TRY Denominated Turkey Government Bonds in 2013

Figure 6 shows average yield curve of TRY denominated Turkey Government Bonds in 2013. Yields of TRY denominated Turkey Government Bonds are calculated by taking average of daily close yields in Figure 6. Steepening yield curve can be observed in 2013, average yields of short term are lower than average yields of long term. This shape indicates that economic activities are strong and inflation expectations over next years are rising. S&P and Moody's announced Turkey's credit rating and outlook status on March 27 and May 16 respectively. S&P upgraded the rating from BB to BB+, however the outlook remained neutral. The level of the credit rating remained speculative grade according to S&P. Moody's upgraded the rating from Ba1 to Baa3 and changed the outlook from positive to neutral. The level of the credit rating upgraded from speculative grade to lower medium grade according to Moody's. The yields decreased by approximately 120 basis points with rating upgrades; however, they started to rise due to political and macroeconomic environment and increased by approximately 500 points at the end of 2013.

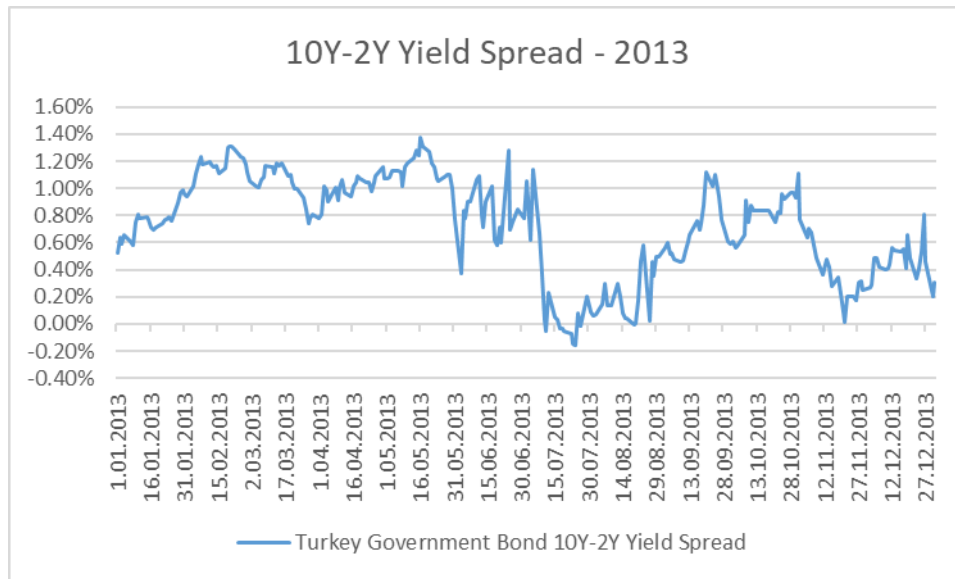


Figure 7: Turkey Government Bond 10Y-2Y Yield Spread in 2013

Figure 7 displays yield spread between 10-Year and 2-Year government bonds in 2013. The average of 10Y-2Y yield spread is 0.72% in 2013 and inverted yield curve is seen for a short period in 2013, mainly in July. The yield spread never exceeded 140 basis points during the year. The maximum value for yield spread is 1.38% and the minimum value is -0.16%.

5.1.2 – Fiscal Year 2014

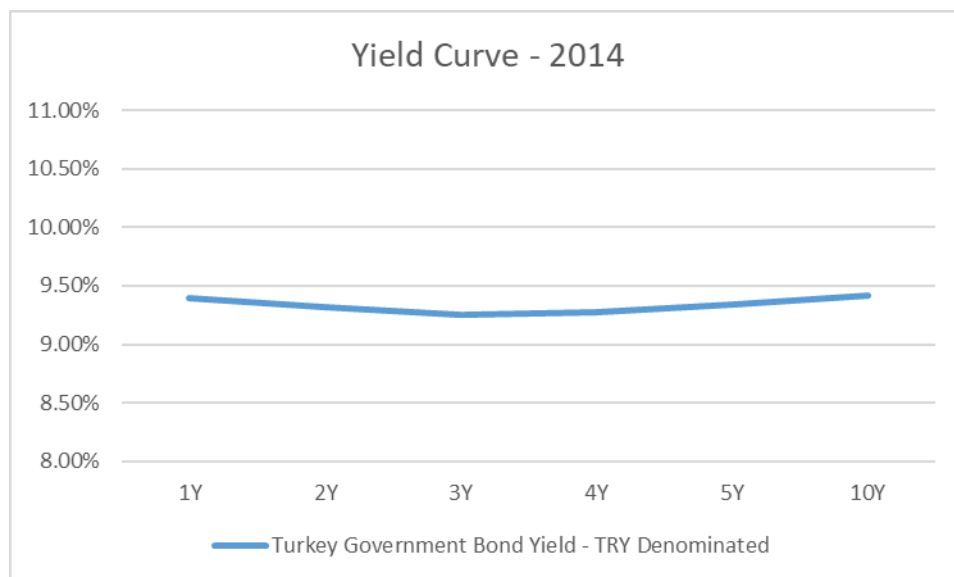


Figure 8: Yield Curve of TRY Denominated Turkey Government Bonds in 2014

Figure 8 displays average yield curve of TRY denominated Turkey Government Bonds in 2014. Yields of TRY denominated Turkey Government Bonds are calculated by taking average of daily close yields in Figure 8. Flattening yield curve can be observed in 2014, average yields of short term are close to average yields of long term. This shape indicates that economic activities are weak and inflation expectations over next years are not changing. S&P and Moody's announced Turkey's credit rating and outlook status on February 7 and April 11 respectively. S&P kept the rating as BB+, however the outlook was changed to negative. The level of the credit rating remained speculative grade according to S&P. Similar to S&P, Moody's kept the rating as Baa3 and changed the outlook from neutral to negative. The level of the credit rating remained lower medium grade according to Moody's. The yields increased by approximately 100 basis points with negative outlooks; however, they started fall decreased by approximately 310 points at the end of 2014.

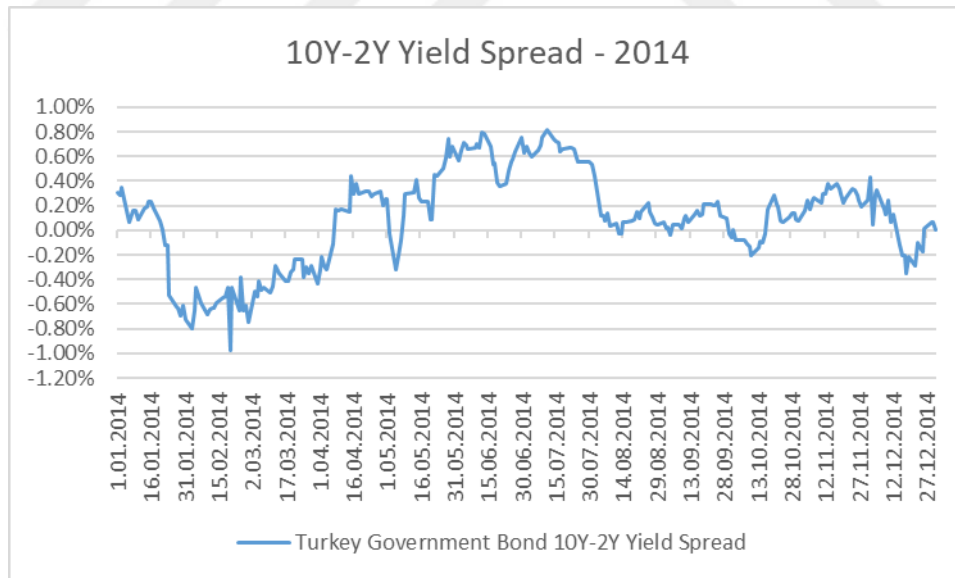


Figure 9: Turkey Government Bond 10Y-2Y Yield Spread in 2014

Figure 9 demonstrates yield spread between 10-Year and 2-Year government bonds in 2014. The average of 10Y-2Y yield spread is 0.10% in 2014 and inverted yield curve is seen mainly at the first quarter of the year and the last month of the year. The

yield spread never exceeded 100 basis points during the year. The maximum value for yield spread is 0.82% and the minimum value is -0.98%.

5.1.3 – Fiscal Year 2015

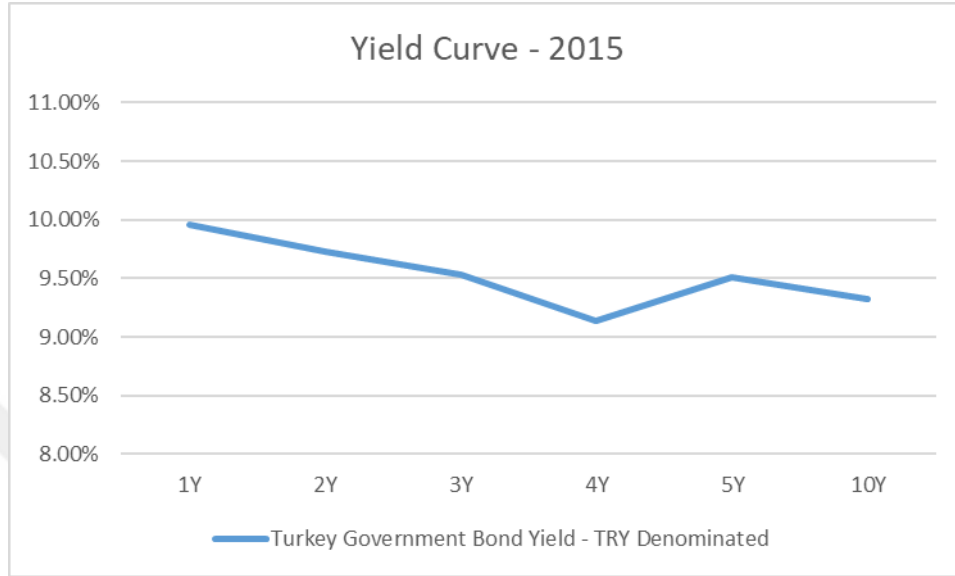


Figure 10: Yield Curve of TRY Denominated Turkey Government Bonds in 2015

Figure 10 shows average yield curve of TRY denominated Turkey Government Bonds in 2015. Yields of TRY denominated Turkey Government Bonds are calculated by taking average of daily close yields in Figure 10. Inverted yield curve can be observed in 2015, average yields of short term are greater than average yields of long term. This shape indicates that the economy is at a crisis situation and inflation expectations over next years are decreasing. Credit rating agencies held their position and did not update their credit ratings and outlooks during this year. The yields increased by approximately 185 basis points with the result of general election in June; however, they continued to increase by approximately 100 basis points at the end of 2015, even if the government was formed after general election in November.

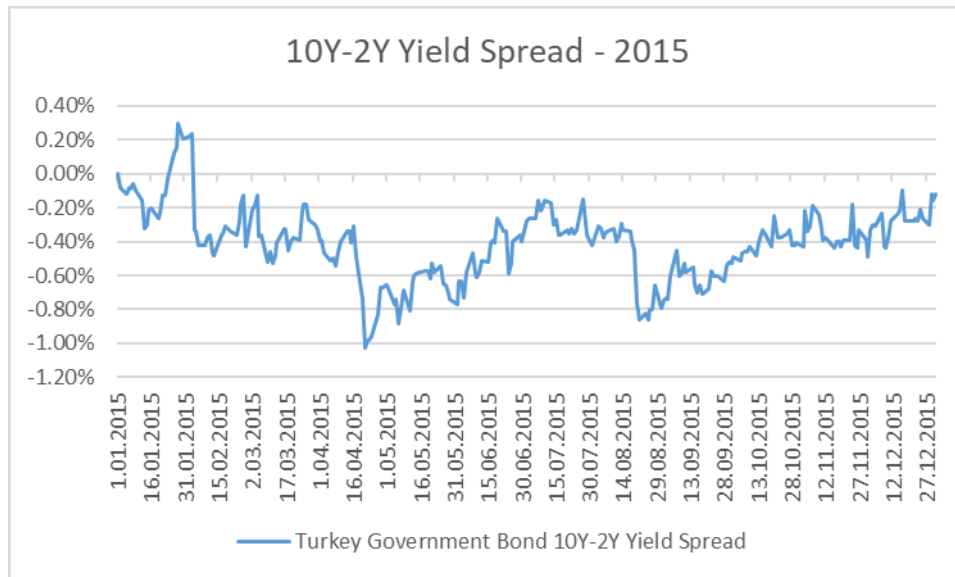


Figure 11: Turkey Government Bond 10Y-2Y Yield Spread in 2015

Figure 11 displays yield spread between 10-Year and 2-Year government bonds in 2015. The average of 10Y-2Y yield spread is -0.41% in 2015 and inverted yield curve is seen mainly during the year, except the last week of January. During the year, the yield spread exceeded 100 basis points only once, April 21. The maximum value for yield spread is 0.30% and the minimum value is -1.03%.

5.1.4 – Fiscal Year 2016

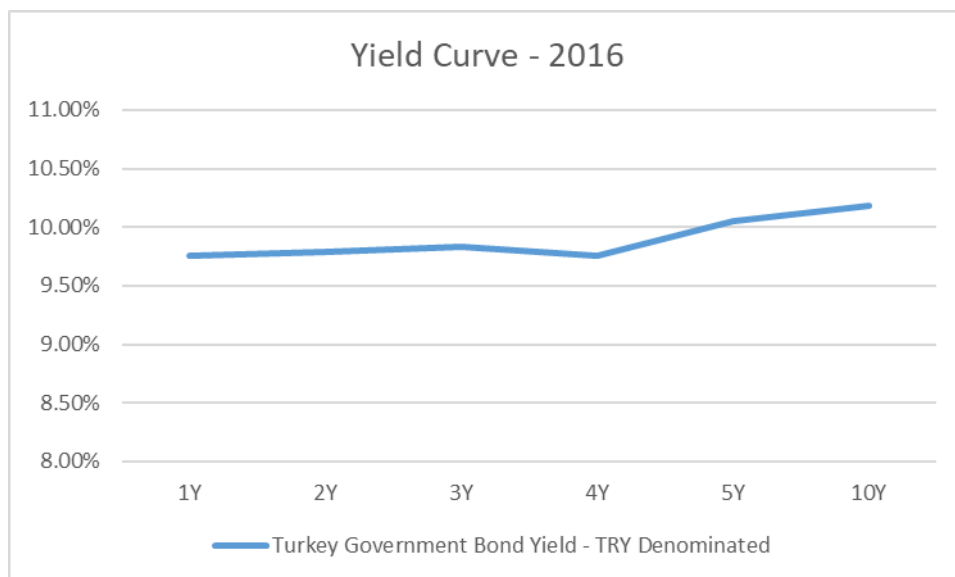


Figure 12: Yield Curve of TRY Denominated Turkey Government Bonds in 2016

Figure 12 presents average yield curve of TRY denominated Turkey Government Bonds in 2016. Yields of TRY denominated Turkey Government Bonds are calculated by taking average of daily close yields in Figure 12. Yield curve in 2016 can be observed as flattish, the difference between tails of the curve is only 43 basis points. This shape indicates that inflation expectations over next years are rising. S&P, Moody's and Fitch announced Turkey's credit rating and outlook status in this year. S&P was more active than Moody's and Fitch; and announced the ratings three times in this year. On May 6, S&P kept the rating as BB+ and the outlook was changed to neutral. After political developments in the mid-July, S&P downgraded the rating score to BB and updated the outlook as negative on July 20. Finally, S&P changed the outlook as neutral on November 4. The level of the credit rating remained speculative grade according to S&P. Moody's downgraded the rating to Ba1 and changed the outlook from negative to neutral on September 23. The level of the credit rating became speculative from lower medium grade according to Moody's. After four years, Fitch updated the outlook as negative and kept the rating as BBB-. The level of the credit rating remained as lower medium grade, unlike its peers. The yields decreased by approximately 190 basis points until political developments in mid-June; however, they increased by approximately 185 points at the end of 2016.

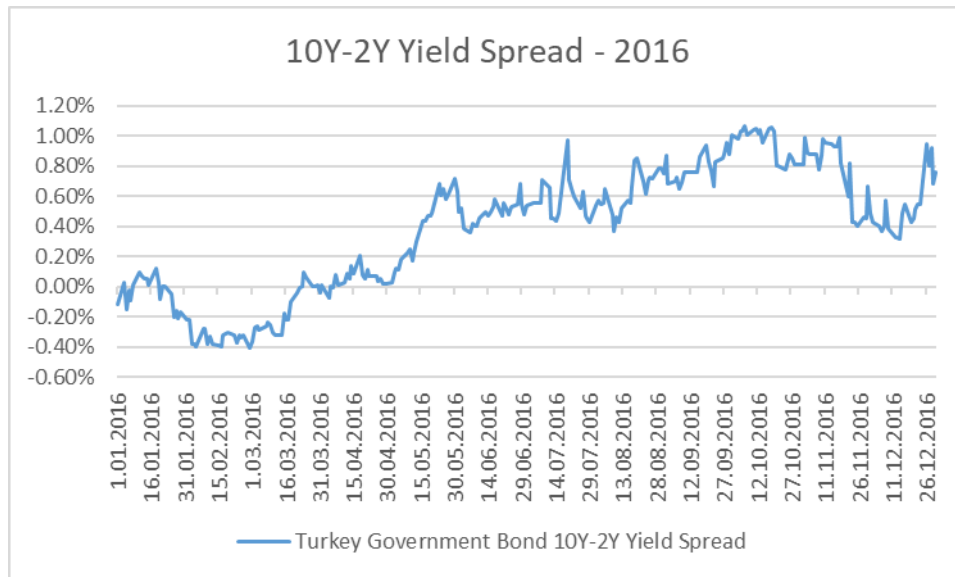


Figure 13: Turkey Government Bond 10Y-2Y Yield Spread in 2016

Figure 13 shows yield spread between 10-Year and 2-Year government bonds in 2016. The average of 10Y-2Y yield spread is 0.39% in 2016 and inverted yield curve is seen mainly at the first quarter of the year. During the year, the yield spread exceeded 100 basis points mainly in October. The maximum value for yield spread is 1.07% and the minimum value is -0.41%.

5.1.5 – Fiscal Year 2017

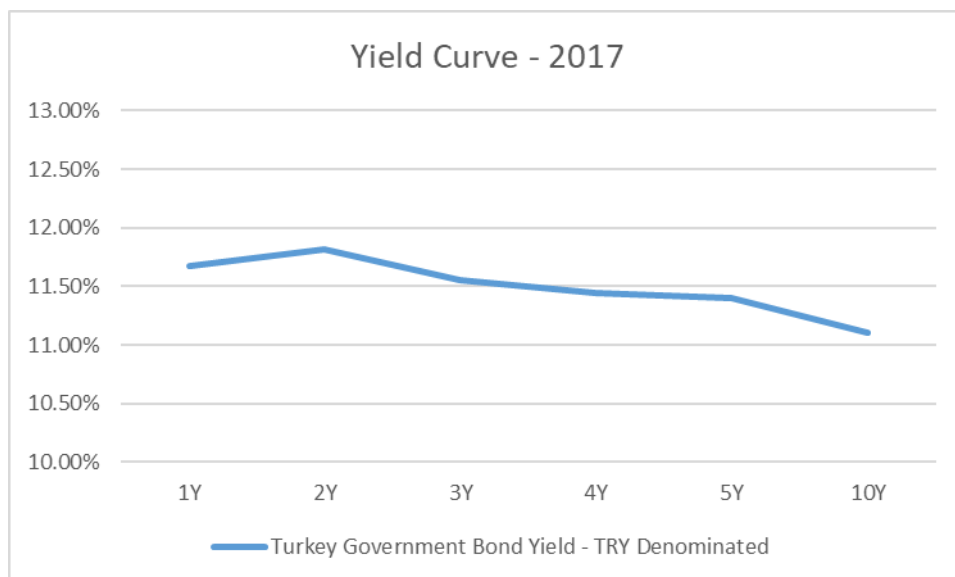


Figure 14: Yield Curve of TRY Denominated Turkey Government Bonds in 2017

Figure 14 shows average yield curve of TRY denominated Turkey Government Bonds in 2017. Yields of TRY denominated Turkey Government Bonds are calculated by taking average of daily close yields in Figure 14. Inverted yield curve can be observed in 2017, average yields of short term are greater than average yields of long term. This shape indicates that the economy is at a crisis situation and inflation expectations over next years are decreasing. S&P, Moody's and Fitch announced Turkey's credit rating and outlook status at the first quarter of the year. S&P and Fitch announced within the same day, January 27; and Moody's announced on March 17. S&P kept the rating as BB; however, the outlook was changed to negative. Similar to S&P, Moody's kept the rating as Ba1 and changed the outlook from neutral to negative. Fitch downgraded the credit rating to BB+ and updated the outlook as neutral. The level of the credit rating became speculative according to these three rating agencies. Due to political developments, the yield of 1Y government bond increased by approximately 200 basis points from the beginning of the year to mid-April; furthermore, the yields continued to increase by approximately 175 basis points at the end of 2017.

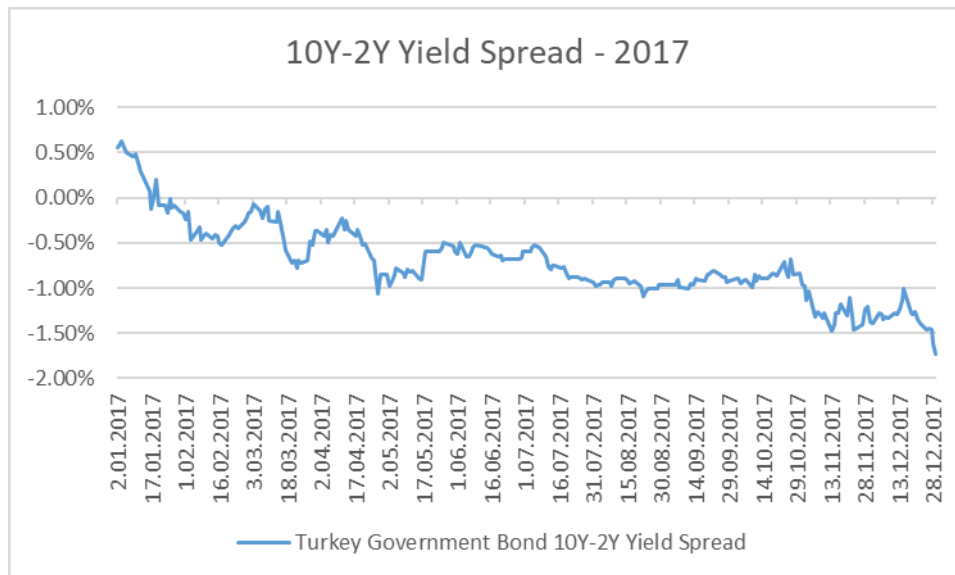


Figure 15: Turkey Government Bond 10Y-2Y Spread in 2017

Figure 15 presents yield spread between 10-Year and 2-Year government bonds in 2017. The average of 10Y-2Y yield spread is -0.71% in 2017 and inverted yield curve is seen mainly during the year, except the first half of January. During the year, the yield spread exceeded 100 basis points in the last two months of the year. The maximum value for yield spread is 0.62% and the minimum value is -1.73%.

5.1.6 – Fiscal Year 2018

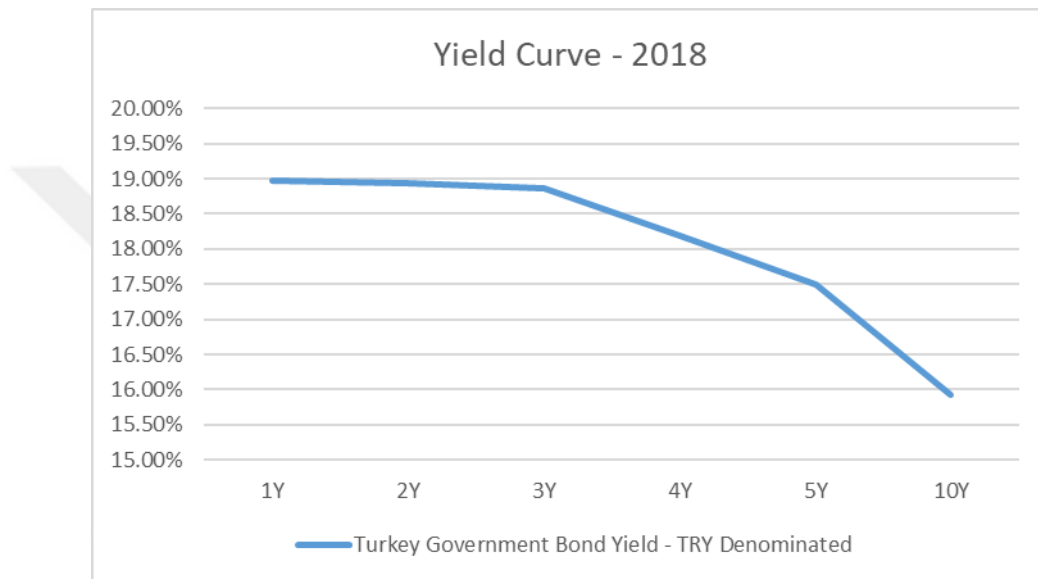


Figure 16: Yield Curve of TRY Denominated Turkey Government Bonds in 2018

Figure 16 presents average yield curve of TRY denominated Turkey Government Bonds in 2018. Yields of TRY denominated Turkey Government Bonds are calculated by taking average of daily close yields in Figure 16. Inverted yield curve can be observed in 2018, like 2017. Average yields of short term are greater than average yields of long term. This shape indicates that the economy is at a crisis situation and inflation expectations over next years are decreasing. S&P and Moody's announced Turkey's credit rating and outlook status twice in this year; and Fitch announced in July. Moody's downgraded the credit rating to Ba2 from Ba1 and updated the outlook as neutral from negative on March 7. On May 1, S&P downgraded the credit rating to BB- from BB and changed the outlook as neutral from negative. Within concerns about balance of payments

of Turkey and increase in political tension with U.S.A., Fitch downgraded the credit rating to BB from BB+ and updated the outlook as negative from positive on July 13. These developments led to heavy currency depreciation and sharp increase in credit default swaps. In addition to credit rating downgrade from Fitch, S&P and Moody's downgraded the credit ratings to B+ and Ba3 respectively. Unlike S&P, Moody's updated the outlook as negative. Due to macroeconomic and political developments, the yields increased by approximately 1,360 basis points from the beginning of the year to the end of August. With measures in response to economic crisis, the yields decreased by approximately 785 basis points at the end of 2018.

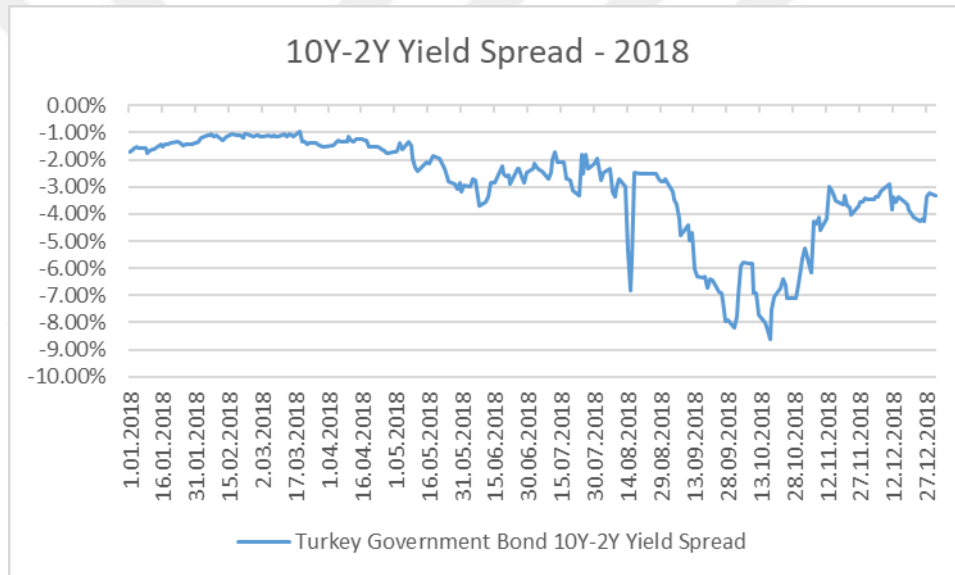


Figure 17: Turkey Government Bond 10Y-2Y Yield Spread in 2018

Figure 17 displays yield spread between 10-Year and 2-Year government bonds in 2018. The average of 10Y-2Y yield spread is -3.01% in 2018 and inverted yield curve is seen mainly during the year. The average in the first eight months is -1.99% and the average in the last four months is -5.10%. During the year, the yield spread exceeded 800 basis points twice. The maximum value for yield spread is -0.98% and the minimum value is -8.62%.

5.1.7 – Fiscal Year 2019

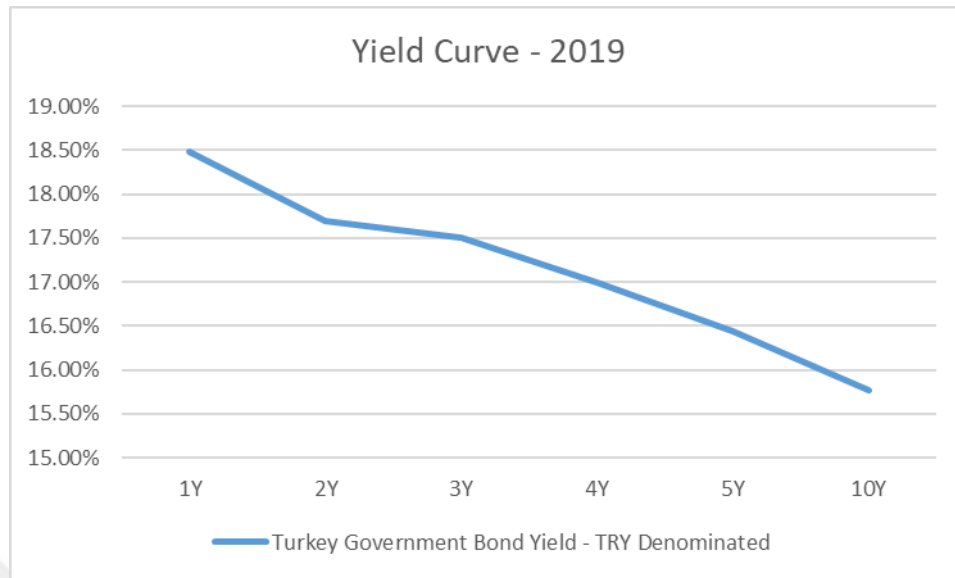


Figure 18: Yield Curve of TRY Denominated Turkey Government Bonds in 2019

Figure 18 shows average yield curve of TRY denominated Turkey Government Bonds in 2019. Yields of TRY denominated Turkey Government Bonds are calculated by taking average of daily close yields in Figure 18. Inverted yield curve is seen in 2019, like last two years. Average yields of short term are greater than average yields of long term. Fitch announced Turkey's credit rating and outlook status twice in this year; and Moody's announced in July. Fitch downgraded the credit rating to BB- from BB and kept the outlook as negative on July 13; and later, Fitch updated the outlook as neutral on November 2. Moody's downgraded the credit rating to B1 from Ba3 and kept the outlook as negative on June 15. With normalization process after economic crisis in the last year, the yields decreased by approximately 680 basis points from the beginning of the year to the end of the year.

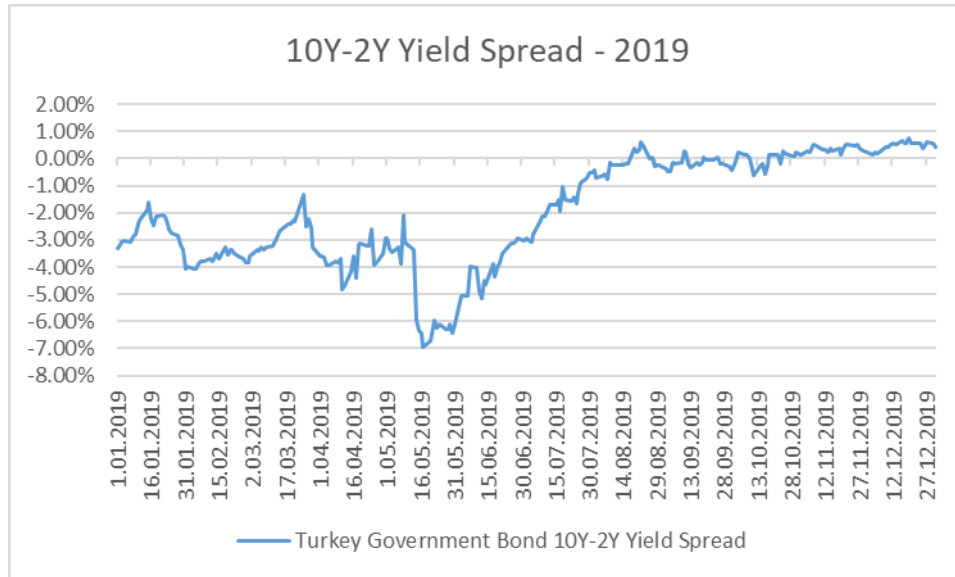


Figure 19: Turkey Government Bond 10Y-2Y Yield Spread in 2019

Figure 19 displays yield spread between 10-Year and 2-Year government bonds in 2019. The average of 10Y-2Y yield spread is -1.93% in 2019 and inverted yield curve is seen mainly in the first eight months of the year. The average in the first eight months is -3.39% and the average in the last four months is 0.10%. During the year, the yield spread exceeded 500 basis points twice. The maximum value for yield spread is 0.78% and the minimum value is -6.94%.

5.2 – BIST 100 Index Analysis

Borsa Istanbul 100 Index (BIST 100) between 2013 and 2019 are analyzed in this section. The analysis includes BIST 100 earnings yield analysis and BIST 100 performance against Morgan Stanley Capital International Emerging Markets Index (MSCI EM) performance. Earnings yield demonstrates per share profitability and can be used in equity risk premium calculation. The main reason of earnings yield analysis is to understand profitability of companies in BIST 100 over the last seven years. MSCI EM index is one of the most used indices to track the performance of stock exchanges in emerging markets and it includes nearly 15% of market capitalization in global. The

reason behind comparing BIST 100 to MSCI EM is to understand the performance of BIST 100 against overall emerging market indices.

5.2.1 – BIST 100 Index Earnings Yield



Figure 20: BIST 100 Index Earnings Yield between 2013 and 2019

Figure 20 presents earnings yield of BIST 100 index between 2013 and 2019. The earnings yield of BIST 100 is obtained by inverting BIST 100 best price-to-earnings ratio. It is seen that the earnings yield has an upward trend with increasing risk appetite until the end of first half of 2019. From the beginning of the second half of 2019, a downward trend in the earnings yield can be observed. Average of the earnings yield over the last seven years is 11.27% with a minimum point of 8.04% and a maximum point of 17.41%.

Table 1: Excess Return of BIST 100 Index between 2013 and 2019

<i>Year</i>	<i>Best P/E Ratio</i>	<i>Earnings Yield</i>	<i>10Y GB Yield</i>	<i>Excess Return</i>
2013	10.58	9.51%	8.11%	1.40%
2014	10.65	9.50%	9.41%	0.09%
2015	10.41	9.63%	9.32%	0.31%
2016	8.96	11.19%	10.18%	1.01%
2017	8.91	11.24%	11.10%	0.14%
2018	7.42	13.57%	15.92%	-2.35%
2019	7.05	14.31%	15.77%	-1.46%

Table 1 displays excess return of BIST 100 index for the period between 2013 and 2019. Despite of upward trend in the earnings yield over the last years, it is seen that positive excess return (difference between earnings yield and bond yield) cannot be reached due to greater increase in bond yields in the last two years.

5.2.2 – Performances of BIST 100 and MSCI EM Indices

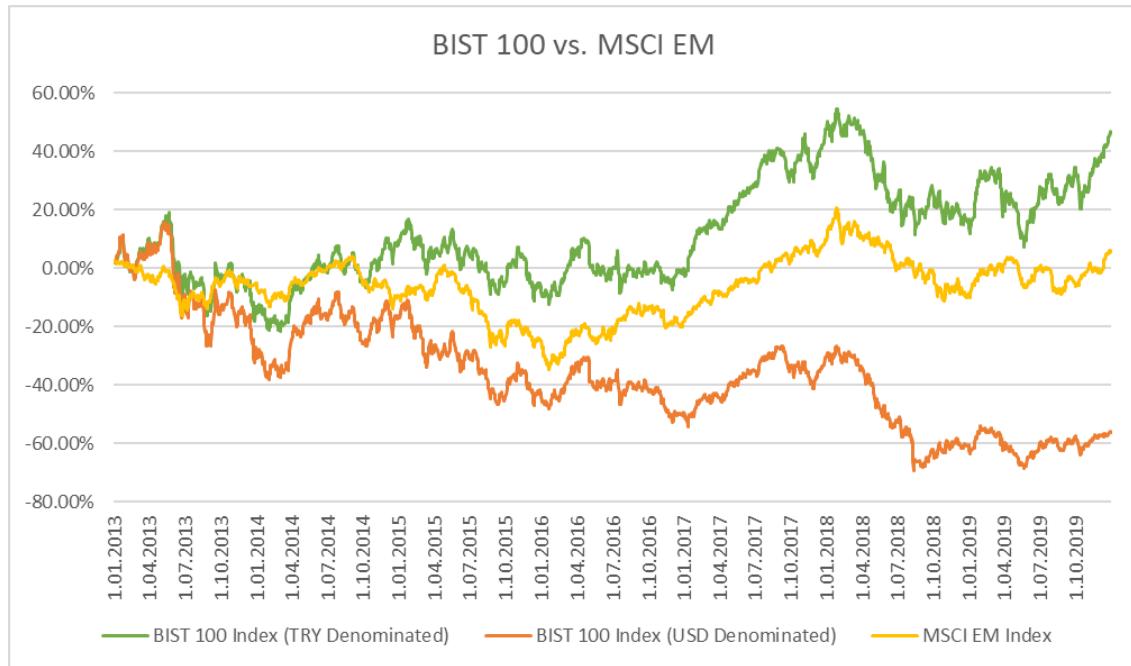


Figure 21: Performance Analysis of BIST 100 and MSCI EM Indices

Figure 21 presents the performance analysis of BIST 100 and MSCI EM indices. TRY denominated BIST 100 index outperformed against MSCI EM index over the last seven years. However, if BIST 100 index was analyzed in U.S. Dollar terms, MSCI EM index would outperform against BIST 100 index. Compounded annual growth rate of these indices (TRY denominated BIST 100 index, USD denominated BIST 100 index and MSCI EM index) is 5.59%, -11.10% and 0.78% respectively.

If an investor analyzed the investment performance in U.S. Dollar and invested in MSCI EM index instead of BIST 100 index in the beginning of 2013, an excess return of 61.71% would be achieved by the end of 2019. The correlation coefficient between BIST

100 index (USD denominated) and MSCI EM index is 0.42, which is close to a large correlation, for the period between 2013 and 2019.



CHAPTER VI

PEER SELECTION AND KEY PERFORMANCE INDICATORS ANALYSIS

In this chapter, peer selection for the valuation study and key performance indicators analysis are presented. First, peer selection principles are described; and selected peer companies and their general information are presented, such as location, market capitalization and total assets size. After that, key performance indicators of peer companies are analyzed in the second part of this section. Trading multiples and margin analyses are presented as key performance indicators of peer companies.

6.1 – Peer Selection and Key Performance Indicators of Peers

The selected company is Mavi Giyim Sanayi ve Ticaret A.Ş. (“Mavi” or “the company”) for the valuation study and the company is analyzed based on valuation perspectives in the next sections.

6.1.1 – Peer Selection

Operations of Mavi are focused on retailing of denim apparel for men, women and children. In addition to denim apparel, Mavi also produces and sales jackets, coats, sweaters, dresses, shirts, skirts, accessories and footwear made of woven and cotton. Since there are limited publicly traded companies that engages in the denim apparel retailing sector, the peer list includes twelve companies that engages in the apparel retailing sector from developed and developing countries.

Levi Strauss Co. and Kontoor Brands Inc. (Lee and Wrangler) might be perfect peers for Mavi, as both companies are focuses on retailing of denim apparel like Mavi and competitors of Mavi in several markets. However, they are not included in the peer

list; as their shares were started to trade in the stock exchange in 2019. As the selected valuation date of the study is 31.01.2019, it was not possible to include companies that mentioned above to peer list for beta calculation.

Main principles of selecting peer companies are having similar operations with Mavi, which is being denim apparel retailer; competing with Mavi in main operational locations, where Mavi as retailing operations; and having operations in locations that have similar characteristics in comparison to Turkey.

Table 2: Peer List for the Valuation Study

Company Name	Country	Market Cap	Total Assets
Urban Outfitters, Inc.	U.S.A.	3,477	2,161
American Eagle Outfitters, Inc.	U.S.A.	3,726	1,981
H&M Hennes & Mauritz AB	Sweden	25,698	13,044
Industria de Diseño Textil, S.A.	Spain	86,848	24,838
LPP SA	Poland	4,124	1,435
Cia. Hering	Brazil	1,381	440
HANDSOME Corp.	Korea	731	1,143
Fast Retailing Co., Ltd.	Japan	46,713	17,897
The Gap, Inc.	U.S.A.	9,704	8,173
Esprit Holdings Limited	Hong Kong	390	1,474
Solar Company S.A.	Poland	6	28
Abercrombie & Fitch Co.	U.S.A.	1,427	2,283
Mavi Giyim Sanayi ve Ticaret A.S.	Turkey	394	259

Table 2 presents the peer list for the valuation study, which includes company name, location of the headquarters, market capitalization in U.S. Dollar as of 31.01.2019. The peer list does not include companies from developing countries, as Mavi have operations in both developed and developing countries. Damodaran (1999) mentioned that creating a balanced and diversified peer list is one of the aims in the peer study.²⁷ There are seven companies from developed countries and five companies from developing countries, which are focuses on the apparel retailing sector.

²⁷ Damodaran, A. (1999). Estimating risk parameters.

6.1.2 – Key Performance Indicators of Peers

The last three fiscal years from the valuation date is selected for the multiple and margin analysis. In terms of enterprise value, the last three month average of enterprise value of the companies for corresponding periods is considered for the multiples that shown below. The selected multiples of Mavi for FY2016 cannot be provided, as the shares of Mavi were started to trade in 2017.

Table 3: Trading Multiples Analysis of the Peer Companies

Company Name	Country	EV/Revenue			EV/EBITDA			EV/EBIT		
		FY2016	FY2017	FY2018	FY2016	FY2017	FY2018	FY2016	FY2017	FY2018
Urban Outfitters, Inc.	U.S.A.	1.1x	0.7x	1.0x	7.3x	5.3x	8.9x	10.0x	7.5x	12.6x
American Eagle Outfitters, Inc.	U.S.A.	0.8x	0.6x	0.9x	5.6x	4.4x	6.9x	7.9x	6.5x	10.3x
H&M Hennes & Mauritz AB	Sweden	2.3x	1.8x	1.2x	13.8x	11.2x	9.0x	18.0x	14.9x	13.4x
Industria de Diseño Textil, S.A.	Spain	4.3x	4.0x	3.0x	19.4x	18.6x	14.0x	24.3x	23.0x	17.4x
LPP SA	Poland	1.9x	2.1x	2.2x	19.8x	24.7x	18.9x	36.4x	51.0x	29.4x
Cia. Hering	Brazil	1.6x	2.2x	1.9x	10.7x	15.7x	12.5x	13.1x	19.5x	15.3x
HANDSOME Corp.	Korea	1.0x	0.9x	0.7x	7.9x	7.9x	9.3x	9.6x	10.1x	14.0x
Fast Retailing Co., Ltd.	Japan	2.1x	1.8x	2.3x	18.8x	15.4x	16.9x	22.9x	18.2x	19.7x
The Gap, Inc.	U.S.A.	0.7x	0.6x	0.7x	5.0x	4.9x	5.8x	7.0x	6.8x	8.2x
Esprit Holdings Limited	Hong Kong	0.4x	0.3x	0.1x	134.1x	28.4x	2.6x	-16.6x	-11.1x	1.6x
Solar Company S.A.	Poland	0.2x	0.2x	0.1x	60.8x	27.8x	7.0x	-9.4x	51.8x	54.1x
Abercrombie & Fitch Co.	U.S.A.	0.3x	0.2x	0.4x	3.1x	3.7x	4.4x	11.4x	77.9x	23.8x
Mean		1.4x	1.3x	1.2x	25.5x	14.0x	9.7x	11.2x	23.0x	18.3x
Median		1.1x	0.8x	1.0x	12.3x	13.3x	8.9x	10.7x	16.6x	14.6x
Minimum		0.2x	0.2x	0.1x	3.1x	3.7x	2.6x	-16.6x	-11.1x	1.6x
Maximum		4.3x	4.0x	3.0x	134.1x	28.4x	18.9x	36.4x	77.9x	54.1x
Mavi Giyim Sanayi ve Ticaret A.Ş.	Turkey		1.7x	1.2x		12.7x	8.2x		17.0x	10.8x

Table 3 shows trading multiples analysis of the peer companies in the last three fiscal years. EV/Revenue, EV/EBITDA and EV/EBIT are selected as trading multiples analysis.

For EV/Revenue multiple, the median values are 1.1x, 0.8x and 1.0x for the periods. Inditex (Industria de Diseno Textil, S.A.) is leading the list for selected fiscal years. Esprit and Solar are at the back of the list for FY2016, FY2017 and FY2018 in terms of EV/Revenue. EV/Revenue multiple of Mavi is ahead of median values for FY2017 and FY 2018, however could not beat the peer average for FY2018.

For EV/EBITDA multiple, the median values are 12.3x, 13.33x and 8.9x. Esprit is an outlier and leading the list for FY2016 and FY2017, due to relatively low EBITDA. LPP is leading the list with 18.9x for FY2018. It is seen that EV/EBITDA multiple of LPP is around 20.0x for selected fiscal years. Abercrombie & Fitch is at the back of the

list for FY2016 and FY2017, and EV/EBITDA multiple of Esprit is the minimum point for FY2018. EV/EBITDA multiple of Mavi is lower than both median and average values for FY2017 and FY 2018.

For EV/EBIT multiple, the median values are 10.7x, 16.6x and 14.6x. Esprit is an outlier and at the back of the list for FY2016 and FY2017 with negative multiples, due to depreciation expenses and relatively low EBITDA. EV/EBIT multiple of Mavi is ahead of median value for FY2017 and lower than the median for FY 2018. In terms of average values, Mavi could not beat the peer average for FY2017 and FY2018.

Differently from multiple analysis, FY2016 margins are provided below, as the company published the audit report for the related period.

Table 4: Margin Analysis of the Peer Companies

Company Name	Country	EBITDA Margin			EBIT Margin			Net Income Margin		
		FY2016	FY2017	FY2018	FY2016	FY2017	FY2018	FY2016	FY2017	FY2018
Urban Outfitters, Inc.	U.S.A.	14.6%	13.4%	11.0%	10.5%	9.7%	7.5%	6.5%	6.2%	3.0%
American Eagle Outfitters, Inc.	U.S.A.	13.3%	14.2%	13.0%	9.2%	9.8%	8.7%	6.2%	5.9%	5.4%
H&M Hennes & Mauritz AB	Sweden	16.3%	14.4%	11.7%	12.4%	10.3%	7.4%	9.7%	8.1%	6.0%
Industria de Diseño Textil, S.A.	Spain	22.3%	21.5%	21.8%	17.7%	17.4%	17.5%	13.8%	13.5%	13.3%
LPP SA	Poland	8.4%	12.2%	13.9%	4.1%	8.2%	9.8%	2.9%	6.3%	6.3%
Cia. Hering	Brazil	14.2%	16.0%	16.2%	11.1%	12.8%	13.0%	13.5%	16.9%	15.6%
HANDSOME Corp.	Korea	12.5%	7.0%	10.2%	10.1%	4.5%	7.0%	7.9%	4.4%	5.6%
Fast Retailing Co., Ltd.	Japan	10.8%	11.7%	13.6%	9.0%	9.9%	11.8%	2.7%	6.4%	7.3%
The Gap, Inc.	U.S.A.	14.2%	13.1%	12.6%	10.5%	9.3%	9.1%	5.8%	4.4%	5.3%
Esprit Holdings Limited	Hong Kong	0.5%	2.5%	-2.8%	-3.2%	-1.2%	-6.4%	0.1%	0.4%	-16.5%
Solar Company S.A.	Poland	1.6%	-31.9%	2.7%	-1.1%	-34.6%	0.2%	-1.2%	-34.9%	0.0%
Abercrombie & Fitch Co.	U.S.A.	9.1%	6.0%	7.9%	3.0%	0.1%	2.3%	1.0%	0.1%	0.2%
Mean		11.5%	8.3%	11.0%	7.8%	4.7%	7.3%	5.7%	3.1%	4.3%
Median		12.9%	12.7%	12.2%	9.7%	9.5%	8.1%	6.0%	6.0%	5.5%
Minimum		0.5%	-31.9%	-2.8%	-3.2%	-34.6%	-6.4%	-1.2%	-34.9%	-16.5%
Maximum		22.3%	21.5%	21.8%	17.7%	17.4%	17.5%	13.8%	16.9%	15.6%
Mavi Giyim Sanayi ve Ticaret A.Ş.	Turkey	13.0%	14.1%	15.6%	9.5%	10.7%	12.6%	4.0%	5.1%	4.3%

Table 4 displays margin analysis of the peer companies in the last three fiscal years. EBITDA Margin, EBIT Margin and Net Income Margin are selected as margin analysis.

For EBITDA margin, the median margins are 12.9%, 12.7% and 12.2% for the periods. Inditex has the greatest margins in the list for selected fiscal years. Esprit and Solar are at the back of the list for FY2016, FY2017 and FY2018 in terms of EBITDA margin. EBITDA margin of Mavi is ahead of median and average margins for FY2016, FY2017 and FY 2018.

For EBIT margin, the median margins are 9.7%, 9.5% and 8.1% for the periods. Esprit and Solar are outliers and have negative margins (excluding FY2018 margin of Solar) for FY2016 and FY2017. Inditex is the top of the list, due to greater EBITDA generation. EBIT margin of Mavi is greater than the median margins, excluding FY2016.

For Net Income margin, the median margins are 6.0%, 6.0% and 5.5% for the periods. Unlike EBITDA and EBIT margin, Cia Hering is at the top of the list for FY2017 and FY2018, due to positive effects of non-operational income/(losses). Net Income margin of Mavi is lower than the median margin for the selected fiscal years. The gap between the margin of Mavi and the peer median got closer in FY2017; however, the gap widened by nearly 30 basis points at the end of FY2018.

CHAPTER VII

WACC CALCULATION

In this chapter, calculation of weighted average cost of capital is presented. WACC components, which are beta, risk-free rate and equity risk premium, are analyzed and calculated separately. After calculating WACC components, Changing WACC and Stable WACC are calculated accordingly.

7.1 – Calculation of WACC Components

In this part, beta, risk-free rate and equity risk premium calculation methodologies and selection principles are described and presented.

7.1.1 – Beta Calculation and Selection

2-year weekly and 5-year monthly returns of selected peers for the valuation of Mavi are considered for equity beta calculation. As there are 103 observations in 2-year weekly returns, selected T-test limit is 1.98. Since there are 59 observations in 5-year monthly returns, selected T-test limit is 2.01.

Table 5: 2-Year Weekly Equity Beta Calculation and Analysis

Company Name	Country	Selected Index	Index Currency	Beta	R-Square	Beta 1 (Weekly, 2 Year)		Significance
						T-Test Limit	T-Test Result	
Urban Outfitters, Inc.	U.S.A.	US: NASDAQ-100 Index	USD	0.31	0.03	1.98	1.68	Insignificant
American Eagle Outfitters, Inc.	U.S.A.	US: S&P 500 Index	USD	0.67	0.06	1.98	2.61	Significant
H & M Hennes & Mauritz AB (publ)	Sweden	SWEDEN: OMX 30 Index	SEK	0.70	0.09	1.98	3.23	Significant
Industria de Diseño Textil, S.A.	Spain	SPAIN: Ibex 35 Index	EUR	0.99	0.37	1.98	7.86	Significant
LPP SA	Poland	POLAND: WIG 20 Index	PLN	0.73	0.16	1.98	4.36	Significant
Cia. Hering	Brazil	BRAZIL: Brazil IBOVESPA Index	BRL	0.90	0.19	1.98	4.87	Significant
HANDSOME Corp.	Korea	SOUTH KOREA: Kospi Composite Index	KRW	0.32	0.02	1.98	1.34	Insignificant
Fast Retailing Co., Ltd.	Japan	JAPAN: TOPIX Index	JPY	0.99	0.25	1.98	5.90	Significant
The Gap, Inc.	U.S.A.	US: S&P 500 Index	USD	0.53	0.06	1.98	2.57	Significant
Esprit Holdings Limited	Hong Kong	CHINA: Hang Seng Index	HKD	0.37	0.02	1.98	1.54	Insignificant
Solar Company S.A.	Poland	POLAND: WIG 20 Index	PLN	0.40	0.02	1.98	1.50	Insignificant
Abercrombie & Fitch Co.	U.S.A.	US: S&P 500 Index	USD	1.32	0.08	1.98	3.06	Significant
				Mean	0.85	0.16		
				Median	0.81	0.12		

Table 5 presents 2-year weekly equity beta calculation and analysis of peer companies. Equity betas of Urban Outfitters, Handsome, Esprit and Solar are not statistically significant, as T-test results of these companies are lower than the limit.

Therefore, these companies should not be included to median equity beta calculation. The median equity beta is 0.81 and the median R-square is 0.12 by using 2-year weekly returns and excluding the companies that have statistically insignificant equity betas.

Table 6: 5-Year Monthly Equity Beta Calculation and Analysis

Company Name	Country	Selected Index	Index Currency	Beta	Beta 2 (Monthly, 5 Year)			Significance
					R-Square	T-Test Limit	T-Test Result	
Urban Outfitters, Inc.	U.S.A.	US: NASDAQ-100 Index	USD	0.28	0.01	2.01	0.91	Insignificant
American Eagle Outfitters, Inc.	U.S.A.	US: S&P 500 Index	USD	0.82	0.08	2.01	2.30	Significant
H & M Hennes & Mauritz AB (publ)	Sweden	SWEDEN: OMX 30 Index	SEK	1.12	0.23	2.01	4.22	Significant
Industria de Diseño Textil, S.A.	Spain	SPAIN: Ibex 35 Index	EUR	0.78	0.34	2.01	5.50	Significant
LPP SA	Poland	POLAND: WIG 20 Index	PLN	1.26	0.25	2.01	4.51	Significant
Cia. Hering	Brazil	BRAZIL: Brazil IBOVESPA Index	BRL	1.03	0.29	2.01	4.93	Significant
HANDSOME Corp.	Korea	SOUTH KOREA: Kospi Composite Index	KRW	0.12	0.00	2.01	0.45	Insignificant
Fast Retailing Co., Ltd.	Japan	JAPAN: TOPIX Index	JPY	1.13	0.27	2.01	4.69	Significant
The Gap, Inc.	U.S.A.	US: S&P 500 Index	USD	0.60	0.04	2.01	1.49	Insignificant
Esprit Holdings Limited	Hong Kong	CHINA: Hang Seng Index	HKD	0.71	0.09	2.01	2.51	Significant
Solar Company S.A.	Poland	POLAND: WIG 20 Index	PLN	1.27	0.17	2.01	3.56	Significant
Abercrombie & Fitch Co.	U.S.A.	US: S&P 500 Index	USD	0.62	0.03	2.01	1.40	Insignificant
				Mean	1.02	0.22		
				Median	1.07	0.24		

Table 6 displays 5-year monthly equity beta calculation and analysis of peer companies. Equity betas of Urban Outfitters, Handsome, Gap and Abercrombie & Fitch are not statistically significant, as T-test results of these companies are lower than the limit. Therefore, these companies should be excluded from median equity beta calculation. The median equity beta is 1.07 and the median R-square is 0.24 by using 5-year monthly returns and not including the companies that have statistically insignificant equity betas.

Equity betas which are calculated by 5-year monthly returns are used in the WACC calculation, since median R-square of 5-year monthly returns is greater than median R-square of 2-year weekly returns.

7.1.2 – Asset Beta Calculation and Selection

Peers that provide statistically insignificant beta are excluded from asset beta calculation, which are Urban Outfitters, Handsome, Gap and Abercrombie & Fitch. Net debt of a peer is limited at zero to prevent obtaining negative debt-to-equity ratio in the asset beta calculation. Tax rates are selected as corporate income tax rate of the country where the headquarter of a peer is located.

Table 7: Asset Beta Calculation and Analysis

Company Name	Country	Currency	Equity Beta	Debt/Equity	Tax Rate	Asset Beta
Urban Outfitters, Inc.	U.S.A.	USD				
American Eagle Outfitters, Inc.	U.S.A.	USD	0.82	0.0%	21.0%	0.82
H & M Hennes & Mauritz AB (publ)	Sweden	SEK	1.12	0.1%	22.0%	1.12
Industria de Diseño Textil, S.A.	Spain	EUR	0.78	0.0%	25.0%	0.78
LPP SA	Poland	PLN	1.26	0.7%	19.0%	1.26
Cia. Hering	Brazil	BRL	1.03	0.0%	34.0%	1.03
HANDSOME Corp.	Korea	KRW				
Fast Retailing Co., Ltd.	Japan	JPY	1.13	0.0%	30.9%	1.13
The Gap, Inc.	U.S.A.	USD				
Esprit Holdings Limited	Hong Kong	HKD	0.71	0.0%	16.5%	0.71
Solar Company S.A.	Poland	PLN	1.27	0.0%	19.0%	1.27
Abercrombie & Fitch Co.	U.S.A.	USD				
Mean			1.02	0.1%	23.4%	1.01
Median			1.07	0.0%	21.5%	1.07

Table 7 shows asset beta calculation of peer companies. By using equity betas that calculated by 5-year monthly returns and related corporate income tax rates, median asset beta is which is used in the WACC calculations is calculated as 1.07. Indicators of insignificant peers is excluded in Table 7.

7.1.3 – Risk Free Rate Calculation and Selection

Damodaran (2009) provided two estimation approaches for discount rate calculation in local currency valuations, which are using the local rate and using USD or EUR denominated rates and then applying inflation differential (p. 10).²⁸ Since TRY denominated rates are available, risk free rates, which are used in Changing WACC and Stable WACC calculations, are selected from TRY denominated Turkey Government Bonds. Three month average of the rates from the valuation date are used as risk-free rates in the WACC calculations. The reason behind using three month average of using three month average risk-free rate is to normalize the rates for avoiding daily volatilities. Damodaran (2008) mentioned that risk-free rates can be normalized if the practitioner

²⁸ Damodaran, A. (2009). Volatility rules: Valuing emerging market companies.

believes that the rates are too low or too high.²⁹ As shown below, an inverted yield curve can be observed at the end of 2018 and the beginning of 2019.

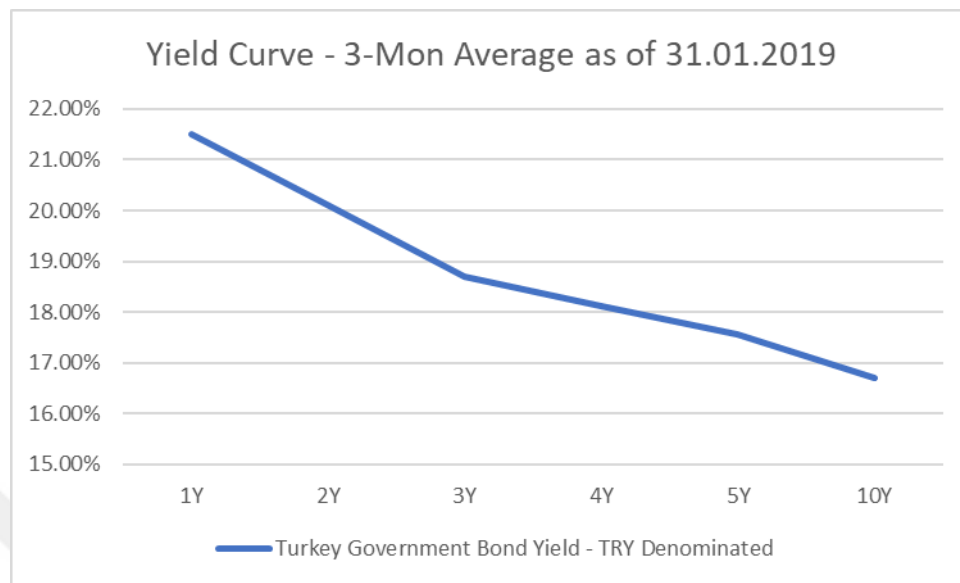


Figure 22: 3-Month Average Yield Curve of TRY Denominated Turkey Government Bonds

Figure 22 presents 3-month average yield curve of TRY denominated Turkey government bonds. Yields of TRY denominated Turkey Government Bonds are calculated by taking average of last 3-month daily close yields as of the valuation date in Figure 22 Average 10Y-2Y spread in the selected period is -3.41% with the minimum point of -6.15% and the maximum point of -1.63%.

Table 8: 3-Month Average Yields of TRY Denominated Turkey Government Bonds

	1Y	2Y	3Y	4Y	5Y	10Y
3-Month Average Yield	21.50%	20.11%	18.70%	18.12%	17.57%	16.70%

Table 8 displays 3-month average yields of TRY denominated Turkey government bonds. Rates of all durations from 1-year to 10-year in the curve are used in Changing WACC calculation, which are 21.50%, 20.11%, 18.70%, 18.12%, 17.57% and 16.70%

²⁹ Damodaran, A. (2008). What is the Riskfree Rate? A Search for the Basic Building Block. *A Search for the Basic Building Block* (December 14, 2008).

respectively. Only the rate of 10-year bond is used in Stable WACC calculation, which is 16.70%.

7.1.4 – Equity Risk Premium Calculation and Selection

Damodaran (2008) provided three approaches to calculate equity risk premium, which are using country bond default spread, relative equity market standard deviation and melded approach.³⁰ Country bond default spread and relative equity market standard deviation approaches are used in equity risk premium calculation. Melded approach is excluded, since it provided inconsistent results. Equal weights are assigned to the result of these methodologies in the weighted equity risk premium.

Average S&P 500 index return is calculated as 7.29% by using 5-year weekly returns and average yield of U.S. 10-year treasury bond is 2.35% for the selected period. By using average return of the index and average yield of 10-Year treasury bond, U.S. equity risk premium is calculated as 4.94%. The calculated U.S. equity risk premium is used in both approaches, since it is a building block for these approaches.

Turkey credit rating and volatility multiplier are used in country bond default spread methodology. Credit rating of Turkey assigned by Moody's was Ba3 at the end of 2018. According to Damodaran Country Default Spreads and Risk Premiums Database published in the beginning of 2019, default spread by using the credit rating is 4.06% and volatility multiplier of Turkey is 1.23x. Country risk premium of Turkey is calculated as 5.00% by multiplying default spread with volatility multiplier.

³⁰ Damodaran, A. (2008). Equity Risk Premiums (ERP): Determinants, Estimation and Implications. *Estimation and Implications* (September 23, 2008).

Table 9: Turkey Country Risk Premium Calculation by Country Bond Default Spread Methodology

	TUR CRP
Turkey Moody's Rating	Ba3
Rating-Based Default Spread	4.06%
Volatility Multiplier	1.23x
Turkey Country Risk Premium	5.00%

Table 9 presents the calculation of Turkey country risk premium by using country bond default spread methodology. Equity risk premium of Turkey is calculated as 9.94% by considering calculated U.S. equity risk premium as 4.94% and calculated Turkey country risk premium as 5.00%.

Annualized standard deviation of BIST 100 and S&P 500 indices are used in relative equity market standard deviation methodology. Annualized standard deviation of BIST 100 by using 5-year weekly returns is calculated as 20.63% and annualized standard deviation of S&P 500 by using 5-year weekly returns is 12.86%. Country risk premium of Turkey is calculated as 2.99% by using annualized standard deviation of BIST 100 and S&P 500 indices.

Table 10: Turkey Country Risk Premium Calculation by Relative Equity Market Standard Deviation

	TUR CRP
U.S. Equity Risk Premium	4.94%
BIST 100 Standard Deviation	20.63%
S&P 500 Standard Deviation	12.86%
Turkey Country Risk Premium	2.99%

Table 10 shows the calculation of Turkey country risk premium by using relative equity market standard deviation methodology. Equity risk premium of Turkey is calculated as 7.93% by considering calculated U.S. equity risk premium as 4.94% and calculated Turkey country risk premium as 2.99%.

Table 11: Turkey Equity Risk Premium Calculation

	US ERP	TUR CRP	TUR ERP	Weight
Country Bond Default Spread	4.94%	5.00%	9.94%	50.0%
Relative Equity Market Stdev	4.94%	2.99%	7.93%	50.0%
TUR ERP - Weighted Average	8.93%			

Table 11 presents the calculation of Turkey equity risk premium. As shown above, equal weights are assigned to calculated Turkey equity risk premiums in the weighted equity risk premium approach. Equity risk premium which is used in the WACC calculations is calculated as 8.93%.

7.2 – Changing WACC Calculation

As stated above, calculated median asset beta and debt-to-equity ratio from peer data is 1.07 and 0.0% respectively. Corporate income tax rate is considered 22.0% for FY2019 and FY2020 in line with approved provisional article for corporate tax legislation, as corporate income tax rate was increased to 22.0% from 20.0% for 2018, 2019 and 2020 fiscal years with the provisional article. Corporate tax rate is considered 20.0% for FY2021, FY2022, FY2023 and terminal. Three-month average rates of Turkey government bond yield curve are used as risk free rates for the projection period. Calculated weighted equity risk premium of Turkey is used for the first five year of the projection and standard equity risk premium of Turkey is used for the terminal.

Three-month average rates of Turkey government bond yield curve are accepted as borrowing rate and the multiplier of company specific borrowing spread is accepted as 20.0%.

Table 12: Funding Structure of the Company as of the Valuation Date

TRY 000	31.01.2019
Total Debt	376,044
Total Equity	337,168
Total Share of Debt	52.7%
Total Share of Equity	47.3%

Table 12 presents funding structure of the company as of the valuation date. Equity and debt weights are applied as 47.3% and 52.7% respectively by using the funding structure of the company as of the valuation date.

Table 13: Changing WACC Calculation for the Projection Period

Changing WACC	FY2019	FY2020	FY2021	FY2022	FY2023	Terminal
Median Asset Beta	1.07	1.07	1.07	1.07	1.07	1.07
Median Debt/Equity	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Corporate Income Tax Rate	22.0%	22.0%	20.0%	20.0%	20.0%	20.0%
Risk-Free Rate	21.5%	20.1%	18.7%	18.1%	17.6%	16.7%
Calculated Equity Beta	1.07	1.07	1.07	1.07	1.07	1.07
Equity Risk Premium	8.9%	8.9%	8.9%	8.9%	8.9%	6.5%
Cost of Equity Capital	31.1%	29.7%	28.3%	27.7%	27.1%	23.7%
Risk-Free Rate	21.5%	20.1%	18.7%	18.1%	17.6%	16.7%
Company Specific Borrowing Spread	4.3%	4.0%	3.7%	3.6%	3.5%	3.3%
Corporate Income Tax Rate	22.0%	22.0%	20.0%	20.0%	20.0%	20.0%
After Tax Cost of Debt	20.1%	18.8%	18.0%	17.4%	16.9%	16.0%
Weight - Equity	47.3%	47.3%	47.3%	47.3%	47.3%	47.3%
Weight - Debt	52.7%	52.7%	52.7%	52.7%	52.7%	52.7%
Weighted Average Cost of Capital	25.3%	23.9%	22.8%	22.3%	21.7%	19.6%

Table 13 shows Changing WACC calculation for the projection period. Due to inverted yield curve of Turkey government bond, applied WACC is decreasing gradually during the projection period in Changing WACC approach.

7.3 – Stable WACC Calculation

As stated above, calculated median asset beta and debt-to-equity ratio from peer data is 1.07 and 0.0% respectively. Corporate income tax rate is considered 22.0% for FY2019 and FY2020 in line with approved provisional article for corporate tax legislation, as corporate income tax rate was increased to 22.0% from 20.0% for 2018, 2019 and 2020 fiscal years with the provisional article. Corporate tax rate is considered 20.0% for FY2021, FY2022, FY2023 and terminal. Three-month average rates of Turkey government bond yield curve are used as risk free rates for the projection period. Calculated weighted equity risk premium of Turkey is used for the first five year of the projection and standard equity risk premium of Turkey is used for the terminal.

Three-month average rate of 10-year Turkey government bond is accepted as borrowing rate and the multiplier of company specific borrowing spread is accepted as 20.0%. As applying single borrowing rate for the projection period, stable spread is obtained as company specific borrowing spread.

Equity and debt weights are applied as 47.3% and 52.7% respectively by using the funding structure of the company as of the valuation date.

Table 14: Stable WACC Calculation for the Projection Period

Stable WACC	FY2019	FY2020	FY2021	FY2022	FY2023	Terminal
Median Asset Beta	1.07	1.07	1.07	1.07	1.07	1.07
Median Debt/Equity	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Corporate Income Tax Rate	22.0%	22.0%	20.0%	20.0%	20.0%	20.0%
Risk Free Rate	16.7%	16.7%	16.7%	16.7%	16.7%	16.7%
Calculated Equity Beta	1.07	1.07	1.07	1.07	1.07	1.07
Equity Risk Premium	8.9%	8.9%	8.9%	8.9%	8.9%	6.5%
Cost of Equity Capital	26.3%	26.3%	26.3%	26.3%	26.3%	23.7%
Borrowing Rate	16.7%	16.7%	16.7%	16.7%	16.7%	16.7%
Company Specific Borrowing Spread	3.3%	3.3%	3.3%	3.3%	3.3%	3.3%
Corporate Income Tax Rate	22.0%	22.0%	20.0%	20.0%	20.0%	20.0%
After Tax Cost of Debt	15.6%	15.6%	16.0%	16.0%	16.0%	16.0%
Weight - Equity	47.3%	47.3%	47.3%	47.3%	47.3%	47.3%
Weight - Debt	52.7%	52.7%	52.7%	52.7%	52.7%	52.7%
Weighted Average Cost of Capital	20.7%	20.7%	20.9%	20.9%	20.9%	19.6%

Table 14 presents Stable WACC calculation for the projection period. Due to announced decrease in corporate income tax rate, applied WACC is increased by 0.2% for FY2021, FY2022 and FY2023. With applying standard equity risk premium of Turkey, applied WACC is decreasing by 1.3% for the terminal period.

CHAPTER VIII

HISTORICAL FINANCIALS ANALYSIS OF THE COMPANY

In this chapter, last three fiscal year historical financials of the company are analyzed as of valuation date. Income statement is analyzed based on growth rates and margins in the first part of this section. Balance sheet is analyzed based on operating net working capital and cash conversion cycle metrics in the second part of this section.

8.1 – Analysis of Historical Financials

The selected period for analysis of historical financials of Mavi is the last three fiscal years as of the valuation date. In this section, both income statement and balance sheet of the company are analyzed based on key performance indicators, such as growth rates, margins, ratios and turnover days. The numbers that are shown in the below tables are in thousand Turkish Lira.

8.1.1 – Income Statement Analysis

Revenue generation of the company is based on domestic and international sales. The share of international sales was increased by around 4.2% in FY2017 and reached to 18.5%. As of FY2018, the share of domestic sales was 81.4% and the share of international sales was 18.6%. The revenue growth in FY2017 was provided by the growth in international sales, which was 75.9%. Growth rates of domestic and international sales were close to each other, which are 31.8% and 33.1% respectively in FY2018.

Table 15: Revenue Growth Rate and Gross Margin for FY2016, FY2017 and FY 2018

TRY 000	FY2016	FY2017	FY2018
Revenue	1,307,934	1,781,656	2,352,850
<i>growth, %</i>	<i>24.2%</i>	<i>36.2%</i>	<i>32.1%</i>
COGS	(640,915)	(875,313)	(1,144,905)
Gross Profit	667,019	906,343	1,207,945
<i>gross margin, %</i>	<i>51.0%</i>	<i>50.9%</i>	<i>51.3%</i>

Table 15 displays revenue growth rate and gross margin in the last three fiscal years. Gross margin of the company was stable during the last three fiscal years, which is around 51.0%.

Selling, General and Administrative Expenses had the greatest weight in the total operational expenses. The share of the expenses in OPEX were increasing gradually during the analysis period; however, it had a decreasing trend as of revenue in percentage. Personnel and rent expenses had the greatest weight in SG&A, which were 36.9% and 34.1% respectively in FY2018. Research and Development Expenses was around 3.0% during the analysis period and personnel expenses had the greatest weight in R&D, which was around 85.3%. Other Expenses/(Income) consisted of rediscounted interest income and FX income and expenses related to trade receivables and payables.

Table 16: Operational Expenses for FY2016, FY2017 and FY 2018

TRY 000	FY2016	FY2017	FY2018
Operational Expenses	(543,339)	(713,990)	(910,473)
<i>as of revenue, %</i>	<i>41.5%</i>	<i>40.1%</i>	<i>38.7%</i>
SG&A Expenses	(525,006)	(694,359)	(890,242)
<i>as of revenue, %</i>	<i>40.1%</i>	<i>39.0%</i>	<i>37.8%</i>
R&D Expenses	(18,657)	(23,058)	(22,448)
<i>as of revenue, %</i>	<i>1.4%</i>	<i>1.3%</i>	<i>1.0%</i>
Other Expenses/(Income)	324	3,427	2,217
<i>as of revenue, %</i>	<i>0.0%</i>	<i>0.2%</i>	<i>0.1%</i>

Table 16 presents operational expenses for FY2016, FY2017 and FY2018. OPEX as of revenue had a decreasing trend during the analysis period, thanks to efficiencies in SG&A expenses.

Table 17: Operating Profit for FY2016, FY2017 and FY 2018

TRY 000	FY2016	FY2017	FY2018
Gross Profit	667,019	906,343	1,207,945
Total OPEX	(543,339)	(713,990)	(910,473)
Operating Profit	123,680	192,353	297,472
<i>operating profit margin, %</i>	<i>9.5%</i>	<i>10.8%</i>	<i>12.6%</i>

Table 17 shows operating profit for FY2016, FY2017 and FY2018. Operating profit margin of the company has improved during the last three fiscal years, due to decreasing trend in Operational Expenses as of revenue percentage. The margin reached to 12.6% at the end of FY2018, by increasing around 180 basis points.

Gains/(Losses) from Investment Activities were related to gains or losses from fixed asset sales. Financial Income/(Expenses) were related to interest income or expenses from the operations. The reason behind the increase in Financial Income/(Expenses) in FY2018 was due to the increase in change in fair value of forward contracts.

Table 18: Net Profit for FY2016, FY2017 and FY 2018

TRY 000	FY2016	FY2017	FY2018
Operating Profit	123,680	192,353	297,472
Gains/(Losses) from Investment Activities	-	39	(359)
Financial Income/(Expenses)	(55,220)	(80,151)	(164,760)
<i>as of revenue, %</i>	<i>4.2%</i>	<i>4.5%</i>	<i>7.0%</i>
Profit Before Tax	68,460	112,241	132,353
Taxes Paid	(16,647)	(22,239)	(31,579)
Net Profit	51,813	90,002	100,774
<i>net profit margin, %</i>	<i>4.0%</i>	<i>5.1%</i>	<i>4.3%</i>

Table 18 presents net profit of the company for FY2016, FY2017 and FY2018. Net profit margin of the company has increased around 110 basis points in FY2017 mainly due to improvements in selling, general and administrative expenses. Increase in financial expenses in FY2018 had a major impact to the financials of the company in terms of net profit, and the net profit margin has decreased around 80 basis points.

Table 19: EBITDA & EBIT Margins and CAPEX Analysis for FY2016, FY2017 and FY 2018

	FY2016	FY2017	FY2018
EBITDA Margin, %	13.0%	14.1%	15.6%
EBIT Margin, %	9.5%	10.7%	12.6%
CAPEX as of Revenue, %	4.2%	3.9%	2.4%
CAPEX/Depreciation	117.6%	111.9%	81.9%

Table 19 displays EBITDA and EBIT margins and CAPEX analysis for FY2016, FY2017 and FY2018. In terms of EBITDA and EBIT margins, a similar trend is seen in comparison to operating profit margin, thanks to efficiencies in operational expenses. A decreasing trend is seen in capital expenditures in terms of both as of revenue percentage and as of depreciation.

8.1.2 – Balance Sheet Analysis

Average turnover days of Trade Receivables during the analysis period was 27 days. The increase in Trade Receivables in FY2018 was related to the increase in Notes Receivables around 18 million TRY.

Average turnover days of Inventories during the last three fiscal years was 148 days. The reason behind increase in Inventories in FY2018 was increases in Merchandise Inventory and Consignment Goods.

Other Receivables and Prepayments are included to Other Current Assets, since these items are related to operations of the company. Average Other Current Assets as of revenue was 3.7% during the analysis period.

Average turnover days of Trade Payables during the last three fiscal years was 106 days. The increase in Trade Payables in FY2018 was related to Payables to Non-Related Parties.

Other Payables and Deferred Revenue are included to Other Current Liabilities, since these items are related to operations of the company. Average Other Current

Liabilities as of COGS and OPEX, excluding Personnel Expenses, was 5.4% during the analysis period.

Table 20: Operating Net Working Capital for FY2016, FY2017 and FY 2018

TRY 000	FY2016	FY2017	FY2018
Trade Receivables	109,381	112,996	168,593
<i>days</i>	<i>31</i>	<i>23</i>	<i>26</i>
Inventories	287,844	320,351	457,229
<i>days</i>	<i>164</i>	<i>134</i>	<i>146</i>
Other Current Assets	57,476	60,721	77,114
<i>as of revenue, %</i>	<i>4.4%</i>	<i>3.4%</i>	<i>3.3%</i>
Trade Payables	299,515	366,455	510,284
<i>days</i>	<i>110</i>	<i>101</i>	<i>108</i>
Other Current Liabilities	108,452	34,064	44,736
<i>as of cogs&opex (exc. personnel), %</i>	<i>10.9%</i>	<i>2.6%</i>	<i>2.6%</i>
Net Working Capital	46,734	93,549	147,916
<i>as of revenue, %</i>	<i>3.6%</i>	<i>5.3%</i>	<i>6.3%</i>
Change in NWC	(13,867)	46,815	54,367

Table 20 presents Operating Net Working Capital for FY2016, FY2017 and FY2018. Net Working Capital as of revenue had an increasing trend during the analysis period, due to expansion and greater operations.

Table 21: Cash Conversion Cycle for FY2016, FY2017 and FY 2018

	FY2016	FY2017	FY2018
Trade Receivable Turnover Days	31	23	26
Inventory Turnover Days	164	134	146
Trade Payables Turnover Days	110	101	108
Cash Conversion Cycle	85	56	64

Table 21 shows Cash Conversion Cycle of the company for FY2016, FY2017 and FY2018. In terms of Cash Conversion Cycle, the company has shown improvements in FY2017 due to efficient inventory management and strong sell-through performance. In FY2018, the company could not make a progress and Cash Conversion Cycle has increased by around 8 days.

CHAPTER IX

ASSUMPTIONS OF THE VALUATION STUDY

In this chapter, explanation of assumptions used in the valuation study is presented. The essential assumptions for the valuation study are general, income statement, balance sheet and terminal period assumptions.

9.1 – Valuation Assumptions

In this part, valuation assumptions that are used in the valuation study are explained. There are three assumption parts in the valuation study, which are general assumptions, income statement assumptions, balance sheet assumptions and terminal assumptions.

9.1.1 – General Assumptions

Mid-year discounting approach is applied in the valuation study, due to free cash flow of the company will be generated over the projection years. Therefore, year assumption for discount years will start from 0.5 and end with 4.5.

As there are not any carried forward tax losses, corporate tax rate of 22.0% is used for FY2019 and FY2020 periods and corporate tax rate of 20.0% is used for remained projection periods.

9.1.2 – Income Statement Assumptions

Revenue of the company grew 24.2%, 36.2% and 32.1% respectively in FY2016, FY2017 and FY2018; and the expectation of revenue growth by the company management is 25.0% for FY2019, which is same growth rate expectation for FY2018. However, the revenue grew more than expectations by 7.1% in FY2018 and had a strong basis for FY2019. Therefore, expected revenue growth rate is projected as 20.0% for

FY2019. As the nature of growth, expected revenue growth will start to decline and the decrease in revenue growth rate is projected as 2.5% for each projection year. Compounded annual growth rate of revenue for the projection period is 14.9%.

Gross margin of the company was stable around 51.0% for actual periods. Due to stability of the margin, gross margin of the company is projected as three-year average of actual periods, which was 51.1%.

Operational expenses as of revenue was started to decline gradually in the last three years and reached to 38.7% in FY2018. However, the average was around 40.0% for longer periods; and three-year average of the selected actual period was 40.1%, which presented close results to long-term average. Due to finding close results, operational expenses as of revenue of the company is projected as three-year average of FY2016, FY2017 and FY2018.

Table 22: Income Statement Assumptions of the Valuation Study

TRY 000	Actual			Projection				
	FY2016	FY2017	FY2018	FY2019	FY2020	FY2021	FY2022	FY2023
Revenue	1,307,934	1,781,656	2,352,850	2,823,420	3,317,519	3,815,146	4,292,040	4,721,244
<i>growth, %</i>	24.2%	36.2%	32.1%	20.0%	17.5%	15.0%	12.5%	10.0%
COGS	(640,915)	(875,313)	(1,144,905)	(1,381,515)	(1,623,280)	(1,866,772)	(2,100,118)	(2,310,130)
Gross Profit	667,019	906,343	1,207,945	1,441,905	1,694,239	1,948,374	2,191,921	2,411,113
<i>gross margin, %</i>	51.0%	50.9%	51.3%	51.1%	51.1%	51.1%	51.1%	51.1%
OPEX	(543,339)	(713,990)	(910,473)	(1,132,313)	(1,330,467)	(1,530,037)	(1,721,292)	(1,893,421)
<i>as of revenue, %</i>	(41.5%)	(40.1%)	(38.7%)	(40.1%)	(40.1%)	(40.1%)	(40.1%)	(40.1%)
EBIT	123,680	192,353	297,472	309,593	363,771	418,337	470,629	517,692
<i>ebit margin, %</i>	9.5%	10.8%	12.6%	11.0%	11.0%	11.0%	11.0%	11.0%
Depreciation	46,529	61,893	69,723	99,803	117,269	134,859	151,717	166,888
EBITDA	170,210	252,087	367,130	409,396	481,040	553,196	622,346	684,580
<i>ebitda margin, %</i>	13.0%	14.1%	15.6%	14.5%	14.5%	14.5%	14.5%	14.5%

Table 22 presents income statement assumptions of the valuation study. EBITDA margin of the revenue was increased gradually for selected periods due to decreased share of operational expenses and reached to 15.6% in FY2018. EBITDA margin expectation of the company for FY2019 is 14.5%, which does not seem unreasonable expectation by taking into consideration operational expenses projections. Therefore, company expectation for EBITDA margin is used for the projection period.

9.1.3 – Balance Sheet Assumptions

Turnover days of Trade Receivables decreased to 23 days in FY2017; however, it increased to 26 days in FY2018. Due to the nature of the business and advancements and increased tendency in electronical payment systems; expected turnover days is projected as three-year average of actual turnover days, which was 27 days.

Turnover days of Inventories decreased to 134 days in FY2017; however, it increased to 146 days in FY2018. Expected turnover days is projected as three-year average of actual turnover days, which was 148 days and have close level to FY2018 actual result.

Other Current Assets as of revenue decreased to 3.3-3.4% levels in FY2017 and FY2018. The level of Other Current Assets for the projection period is projected as three-year average of actual levels.

Turnover days of Trade Payables decreased to 101 days in FY2017; however, it increased to 108 days in FY2018. Expected turnover days is projected as three-year average of actual turnover days, which was 106 days and have close level to FY2018 actual result.

FY2016 was an exceptional year for Other Current Liabilities, therefore two-year average of FY2017 and FY2018 is used for the projection period.

In light of balance sheet assumptions, Cash Conversion Cycle of the Company is projected as 68 days for the projection period.

Table 23: Operating Net Working Capital Assumptions of the Valuation Study

TRY 000	Actual			Projection				
	FY2016	FY2017	FY2018	FY2019	FY2020	FY2021	FY2022	FY2023
Trade Receivables	109,381	112,996	168,593	206,048	241,445	278,423	313,225	344,548
days	31	23	26	27	27	27	27	27
Inventories	287,844	320,351	457,229	559,831	656,004	756,471	851,030	936,133
days	164	134	146	148	148	148	148	148
Other Current Assets	57,476	60,721	77,114	104,278	122,527	140,906	158,519	174,371
as of revenue, %	4.4%	3.4%	3.3%	3.7%	3.7%	3.7%	3.7%	3.7%
Trade Payables	299,515	366,455	510,284	613,706	719,134	829,270	932,928	1,026,221
days	110	101	108	106	106	106	106	106
Other Current Liabilities	108,452	34,064	44,736	54,299	63,801	73,371	82,542	90,797
as of cogs+opex (exc. personnel), %	10.9%	2.6%	2.6%	2.6%	2.6%	2.6%	2.6%	2.6%
Net Working Capital	46,734	93,549	147,916	202,153	237,041	273,159	307,304	338,035
as of revenue, %	3.6%	5.3%	6.3%	7.2%	7.1%	7.2%	7.2%	7.2%
Change in NWC	(13,867)	46,815	54,367	54,237	34,888	36,118	34,145	30,730

Table 23 shows Operating Net Working Capital assumptions of the valuation study. Net Working Capital as of revenue is estimated around 7.2% for the projection period, which is more than around 90 basis points in comparison to FY2018 level.

Capital expenditures as of revenue of the company was around 4.0% in FY2016 and FY2017; and decreased to 2.4% due to economic crisis in Turkey at the second half of the year. This impact in FY2018 could be seen in CAPEX/Depreciation ratio, which was less than 100.0%.

Table 24: Capital Expenditures Assumptions of the Valuation Study

TRY 000	Actual			Projection				
	FY2016	FY2017	FY2018	FY2019	FY2020	FY2021	FY2022	FY2023
CAPEX	54,739	69,250	57,088	112,937	132,701	152,606	171,682	188,850
as of revenue, %	4.2%	3.9%	2.4%	4.0%	4.0%	4.0%	4.0%	4.0%
as of depreciation, %	117.6%	111.9%	81.9%	113.2%	113.2%	113.2%	113.2%	113.2%

Table 24 presents Capital Expenditures assumptions of the valuation study. The expected level of capital expenditure by the company management for FY2019 is 4.0%, which is close to pre-crisis period. Capital expenditures is assumed around 4.0% of revenue for the projection period.

9.1.4 – Terminal Assumptions

Table 25: Terminal Period Assumptions of the Valuation Study

	Terminal
<i>revenue growth, %</i>	6.0%
<i>ebitda margin, %</i>	14.5%
<i>ebit margin, %</i>	11.0%
<i>capex as of revenue, %</i>	4.0%
<i>nwc as of revenue, %</i>	7.2%

Table 25 displays terminal period assumptions of the valuation study. Terminal growth rate of revenue is projected as long-term inflation of Turkish Lira, which is around 6.0%. Terminal EBITDA and EBIT margins will be equal to FY2023 levels. Also, Capital Expenditure and Net Working Capital levels as of revenue will be equal to FY2023 levels.

CHAPTER X

RESULTS OF THE VALUATION STUDY

In this chapter, results of the valuation study are presented. The point estimate results are compared with market pricing as of the valuation date. The range estimate results are compared with market pricing for the next three-month period started from the valuation date.

10.1 – Valuation Results

In this part, valuation results that are calculated by both Changing WACC and Stable WACC approaches are explained. Daily enterprise values of the company are used to evaluate these WACC approaches. Selected period for the evaluation is the next three months, started from the valuation date, which is January 31, 2019.

10.1.1 – Changing WACC Approach

Enterprise value of the company by using Changing WACC approach is calculated as 2,095 million TRY. Discount rates are changing in each year in line with Changing WACC calculation that mentioned previously. Terminal value of the company is calculated as 2,900 million TRY and 19.6% is used as discount rate in discount factor calculation. The share of total discounted cash flows is 38.2% and the share of discounted terminal value is 61.8% in calculated enterprise value.

Table 26: Enterprise Value Calculation Based on Changing WACC Approach

TRY 000	FY2016	FY2017	FY2018	FY2019	FY2020	FY2021	FY2022	FY2023	Terminal
Revenue	1,307,934	1,781,656	2,352,850	2,823,420	3,317,519	3,815,146	4,292,040	4,721,244	5,004,518
growth, %		36.2%	32.1%	20.0%	17.5%	15.0%	12.5%	10.0%	6.0%
EBITDA	170,210	252,087	367,130	409,396	481,040	553,196	622,346	684,580	725,655
ebitda margin, %	13.0%	14.1%	15.6%	14.5%	14.5%	14.5%	14.5%	14.5%	14.5%
EBIT	123,680	192,353	297,472	309,593	363,771	418,337	470,629	517,692	548,754
ebit margin, %	9.5%	10.8%	12.6%	11.0%	11.0%	11.0%	11.0%	11.0%	11.0%
Tax				(68,110)	(80,030)	(83,667)	(94,126)	(103,538)	(109,751)
tax rate, %				22.0%	22.0%	20.0%	20.0%	20.0%	20.0%
Depreciation	46,529	61,893	69,723	99,803	117,269	134,859	151,717	166,888	176,901
Gross Cash Flow				341,286	401,010	469,529	528,220	581,042	615,904
CAPEX	(54,739)	(69,250)	(57,088)	(112,937)	(132,701)	(152,606)	(171,682)	(188,850)	(200,181)
as of revenue, %	4.2%	3.9%	2.4%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%
Change in NWC				(54,237)	(34,888)	(36,118)	(34,145)	(30,730)	(20,282)
Free Cash Flow				174,112	233,421	280,805	322,393	361,462	395,442
Year				0.5	1.5	2.5	3.5	4.5	
Discount Rate				25.3%	23.9%	22.8%	22.3%	21.7%	19.6%
Discount Factor				0.89	0.72	0.60	0.49	0.41	
Discounted Cash Flow				155,546	169,151	167,932	159,559	149,268	
Total Discounted Cash Flows	801,457								
Discounted Terminal Value	1,294,071								
Enterprise Value	2,095,528								
								Terminal Value	2,899,723

Table 26 presents enterprise value calculation based on Changing WACC Approach. Calculated EV/EBITDA and EV/EBIT multiples are 5.7x and 7.0x respectively.

WACC, Terminal Growth and EBIT Margin are selected as sensitivity factors in valuation range calculations. Change in Terminal Growth is limited from -0.5% to 0.5%; and Change in WACC and Change in EBIT Margin is limited from -1.0% to 1.0%.

Table 27: Range Estimate Based on Changing WACC Approach

TRY 000		Change in Terminal Growth		
Change in WACC		-0.5%	0.0%	0.5%
	-1.0%	2,211,993	2,268,144	2,328,921
	0.0%	2,048,905	2,095,528	2,145,700
	1.0%	1,907,769	1,946,898	1,988,795

TRY 000		Change in EBIT Margin		
Change in WACC		-1.0%	0.0%	1.0%
	-1.0%	2,213,810	2,268,144	2,322,478
	0.0%	2,039,012	2,095,528	2,152,044
	1.0%	1,888,733	1,946,898	2,005,063

Table 27 displays range estimate based on Changing WACC Approach. The calculated minimum and maximum enterprise values are 2,005 and 2,212 million TRY respectively. The range between minimum and maximum points is 10.3%.

10.1.2 – Stable WACC Approach

Enterprise value of the company by using Stable WACC approach is calculated as 2,124 million TRY. Discount rates are changing in each year in line with Stable WACC calculation that mentioned previously. Terminal value of the company is calculated as 2,900 million TRY and 19.6% is used as discount rate in discount factor calculation. The share of total discounted cash flows is 39.1% and the share of discounted terminal value is 60.9% in calculated enterprise value.

Table 28: Enterprise Value Calculation Based on Stable WACC Approach

TRY 000	FY2016	FY2017	FY2018	FY2019	FY2020	FY2021	FY2022	FY2023	Terminal
Revenue	1,307,934	1,781,656	2,352,850	2,823,420	3,317,519	3,815,146	4,292,040	4,721,244	5,004,518
growth, %		36.2%	32.1%	20.0%	17.5%	15.0%	12.5%	10.0%	6.0%
EBITDA	170,210	252,087	367,130	409,396	481,040	553,196	622,346	684,580	725,655
ebitda margin, %	13.0%	14.1%	15.6%	14.5%	14.5%	14.5%	14.5%	14.5%	14.5%
EBIT	123,680	192,353	297,472	309,593	363,771	418,337	470,629	517,692	548,754
ebit margin, %	9.5%	10.8%	12.6%	11.0%	11.0%	11.0%	11.0%	11.0%	11.0%
Tax				(68,110)	(80,030)	(83,667)	(94,126)	(103,538)	(109,751)
tax rate, %				22.0%	22.0%	20.0%	20.0%	20.0%	20.0%
Depreciation	46,529	61,893	69,723	99,803	117,269	134,859	151,717	166,888	176,901
Gross Cash Flow				341,286	401,010	469,529	528,220	581,042	615,904
CAPEX	(54,739)	(69,250)	(57,088)	(112,937)	(132,701)	(152,606)	(171,682)	(188,850)	(200,181)
as of revenue, %	4.2%	3.9%	2.4%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%
Change in NWC				(54,237)	(34,888)	(36,118)	(34,145)	(30,730)	(20,282)
Free Cash Flow				174,112	233,421	280,805	322,393	361,462	395,442
Year				0.5	1.5	2.5	3.5	4.5	
Discount Rate				20.7%	20.7%	20.9%	20.9%	20.9%	19.6%
Discount Factor				0.91	0.75	0.62	0.52	0.43	
Discounted Cash Flow				158,508	176,119	174,830	166,066	154,043	
Total Discounted Cash Flows	829,566								
Discounted Terminal Value	1,294,071								
Enterprise Value	2,123,637								
							Terminal Value		2,899,723

Table 28 presents enterprise value calculation based on Stable WACC Approach. Calculated EV/EBITDA and EV/EBIT multiples are 5.8x and 7.1x respectively.

WACC, Terminal Growth and EBIT Margin are selected as sensitivity factors in valuation range calculations. Change in Terminal Growth is limited from -0.5% to 0.5%; and Change in WACC and Change in EBIT Margin is limited from -1.0% to 1.0%.

Table 29: Range Estimate Based on Stable WACC Approach

TRY 000		Change in Terminal Growth		
Change in WACC		-0.5%	0.0%	0.5%
	-1.0%	2,240,954	2,297,104	2,357,881
	0.0%	2,077,014	2,123,637	2,173,809
	1.0%	1,935,061	1,974,190	2,016,087

TRY 000		Change in EBIT Margin		
Change in WACC		-1.0%	0.0%	1.0%
	-1.0%	2,239,590	2,297,104	2,354,619
	0.0%	2,064,032	2,123,637	2,183,241
	1.0%	1,913,024	1,974,190	2,035,355

Table 29 shows range estimate based on Stable WACC Approach. The calculated minimum and maximum enterprise values are 2,035 and 2,241 million TRY respectively. The range between minimum and maximum points is 10.1%.

10.2 – Evaluation of Changing WACC and Stable WACC Approaches

Calculated enterprise value of the company by closing share price is 2,062 million TRY as of January 31, 2019. The value deviation of Changing WACC Approach is 1.6% and the value deviation of Stable WACC Approach is 3.0%.

Table 30: Review of Point Estimates Calculated by Changing WACC and Stable WACC Approaches

TRY 000	31.01.2019
EV - Market Value	2,061,540
EV - Changing WACC	2,095,528
EV - Stable WACC	2,123,637
Deviation, % - Changing WACC	1.6%
Deviation, % - Stable WACC	3.0%
Delta - Changing vs. Stable	(28,109)
Delta, % - Changing vs. Stable	-1.4%

Table 30 presents the review of point estimates calculated by Changing WACC and Stable WACC Approaches. It is observed that calculated enterprise value of the

company by Changing WACC Approach provides a closer result by 1.4%. The gap is 28 million TRY in absolute terms.

The selected period for range values of market prices is the next three-month after the valuation date. Minimum and maximum points of enterprise value calculated by market prices are 1,908 and 2,241 million TRY respectively. The range between minimum and maximum points is 17.4%.

Table 31: Review of Market Pricing Range and Range Estimates Calculated by Changing WACC and Stable WACC Approaches

TRY 000	Min	Max
EV - Market Value	1,908,464	2,241,042
EV - Changing WACC	2,005,063	2,211,993
EV - Stable WACC	2,035,355	2,240,954

Table 31 shows the review of Market Pricing range and range estimates calculated by Changing WACC and Stable WACC Approaches. Minimum and maximum points of enterprise value calculated by Changing WACC Approach are 2,005 and 2,212 million TRY respectively. Minimum and maximum points of enterprise value calculated by Stable WACC Approach are 2,035 and 2,241 million TRY respectively.

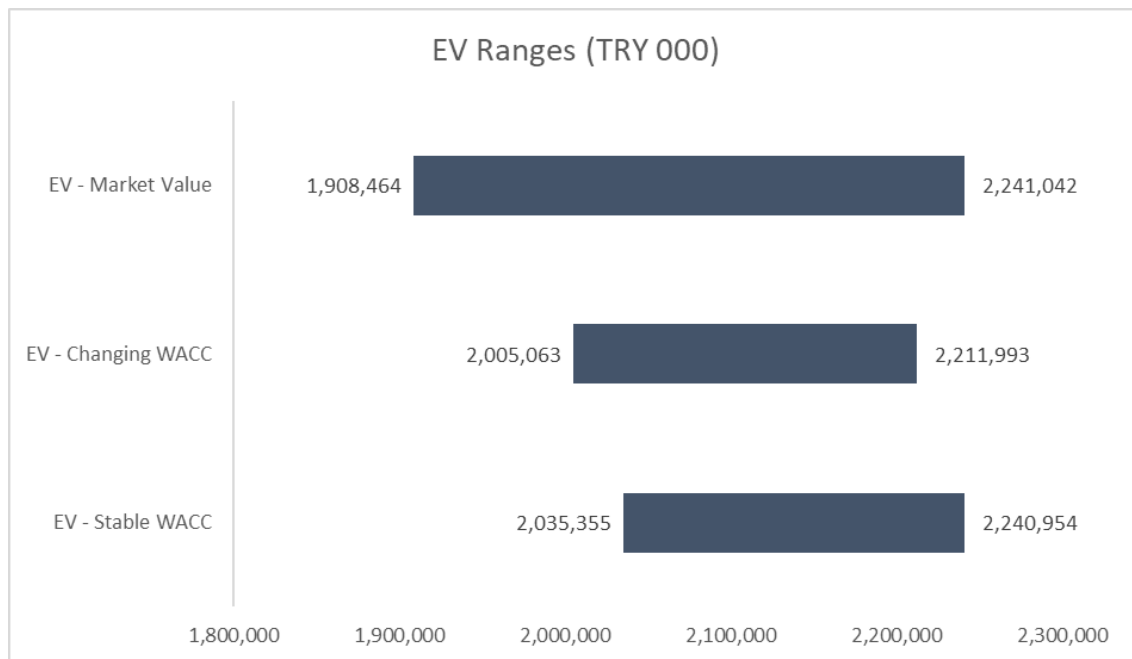


Figure 23: Review of Enterprise Value Ranges of Market Pricing, Changing WACC and Stable WACC Approaches

Figure 23 presents the review of enterprise value ranges of Market Pricing, Changing WACC and Stable WACC Approaches. Market Value Approach covers both Changing WACC Approach and Stable WACC Approach; however, Changing WACC Approach provides more central result.

Fama (1970) explained that market value reflects the fair value of the company in efficient markets, as all investors and money managers have same publicly available information (p. 384).³¹ In accordance with this, valuation ranges that are calculated by both approaches are analyzed with market value of the company.

Table 32: Market Pricing Covered by Changing WACC and Stable WACC Approaches in Days

# - days	Yes	No	Total
Changing WACC Range	45	40	85
Stable WACC Range	38	47	85

³¹ Fama, E. F. (1970). Efficient Capital Markets: A Review of Theory and Empirical Work. *The Journal of Finance*, 25(2), 383-417.

Table 32 displays Market Pricing covered by Changing WACC and Stable WACC Approaches in days. There are 85 trading days in three-month period after the valuation date. In this period, daily enterprise value of the company that calculated by Market Value Approach are covered by the valuation range of Changing WACC Approach in forty-five trading days out of eighty-five trading days. On the other hand, Stable WACC Approach covers daily enterprise value of the Company that calculated by Market Value Approach only in thirty-eight trading days out eighty-five trading days. The range of Changing WACC Approach projects the enterprise value correctly by seven trading days more.

Table 33: Market Pricing Covered by Changing WACC and Stable WACC Approaches in Percentage

% - days	Yes	No	Total
Changing WACC Range	52.9%	47.1%	100.0%
Stable WACC Range	44.7%	55.3%	100.0%

Table 33 presents Market Pricing covered by Changing WACC and Stable WACC Approaches in percentage. As percentage, the range of Changing WACC Approach covers the market value by 52.9% and the range of Stable WACC Approach will cover only by 44.7%. The range of Changing WACC Approach projects the enterprise value correctly by more than 8.0%.

10.3 – Conclusion of Results

Changing WACC Approach and Stable WACC Approach are tested in two parts. First test is the enterprise value check with Market Value Approach as of the valuation date. Enterprise value of the company that is calculated by Changing WACC Approach deviates by 1.6% from the market value. However, enterprise value of the company that is calculated by Stable WACC Approach deviates by 3.0% from the market value, which is more than 1.4% in comparison to Changing WACC Approach. Second test is the valuation range check with Market Value Approach for the next three-month period after

the valuation date. 52.9% of daily market values is covered by the valuation range of Changing WACC Approach. However; it decreases to 44.7% when the valuation range of Stable WACC Approach is applied.

Inverted yield curve occurs in crisis periods and can be observed regardless of the level of economic development. However, it is more likely to be seen in emerging economies due to the fragility of these economies, such as being dependent to commodity prices, capital outflows and external debt. It is found that WACC calculation varies depending on the slope of yield curve. Valuation practitioners, especially in emerging economies, should consider using Changing WACC Approach, when there is an inverted yield condition.

It is observed that Changing WACC Approach provides closer valuation results to market prices when there is an inverted yield curve with short term yields exceeding long term yields by more than 3.0-4.0%.

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