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**AN OVERVIEW OF COMPANY VALUATION TECHNIQUES
AND AN APPLICATION**

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Yemin Metni

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ABSTRACT
Master Thesis
An Overview of Company
Valuation Techniques and an Application
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The selection of appropriate valuation methods has been the matter in the literature over the last years and will probably continue to be for many years. Analysts have used different methods which are discounted cash flow, relative valuation, dividend discount model, economic value added, residual income and real options models throughout the literature.

Even if all these models have advantages and disadvantages, analysts have admitted that the companies' specific properties influence which model to be used. Yet, they have concluded that the most appropriate model is the discounted cash flow model.

The aim of this paper is to find out the market value of a company (Ereğli Demir Çelik) traded in Istanbul Stock Exchange (ISE) using the Discounted Cash flow valuation method (DCF). The results are then compared to the actual market price of the company in order to determine whether the company is trading at a premium, at a discount or at par. The analysis tool is the financial statements covering 2005-2009 periods. It is found that, the company is undervalued which means that it is traded at a discount.

Keywords: 1)Valuation 2)Valuation Methods 3)Discounted Cash Flow Method 4)Proforma Financial Statements 5)Forecasted Financial Statement

ÖZET

Yüksek Lisans Tezi

Şirket Değerleme Tekniklerinin Genel Açıklaması ve Bir Uygulama

Yelda IŞIK

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İngilizce Finansman Programı

Uygun değerlendirme yöntemlerinin seçimi son yıllarda literatürde konu olmuştur ve muhtemelen uzun yıllar konu olmaya devam edecektir. Analistler, literatürde değişik değerlendirme yöntemleri kullanmışlardır. Bunlar; indirgenmiş nakit akımı yöntemi, göreceli değerlendirme yöntemi, indirgenmiş temettü modeli, ekonomik değer katma modeli, net gelir yöntemi ve gerçek seçenekler yöntemidir.

Bütün bu modellerin avantaj ve dezavantajları olsa da, analistler, şirketlerin spesifik özelliklerinin kullanılacak modeli etkilediğini savunmuşlardır. Yine de en uygun modelin indirgenmiş nakit akımı modeli olduğu sonucuna varmışlardır.

Bu çalışmanın amacı İstanbul Menkul Kıymetler Borsası'nda (İMKB) işlem gören bir şirketin (Ereğli Demir Çelik) indirgenmiş nakit akımları değerlendirme yöntemini (DCF) kullanarak piyasa değerini oluşturmaktır. Daha sonra değerlendirme sonuçları şirketin primli mi, indirimli mi yoksa başabaş değerden mi değerlendirilip değerlendirilmediğini belirlemek için şirketin piyasadaki değeri ile karşılaştırılmıştır. Analiz aracı olarak bağımsız denetimden geçmiş 2005-2009 dönemini kapsayan mali tablolar kullanılmıştır. Sonuç olarak Ereğli Demir Çelik'in indirimli değerden işlem gördüğü bulunmuştur.

Anahtar kelimeler: 1) Değerleme 2) Değerleme Yöntemleri 3) Nakit Akımı Yöntemi 4) Proforma Mali Tablolar 5) Mali Tablo Tahmini

AN OVERVIEW OF COMPANY VALUATION TECHNIQUES AND AN APPLICATION

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INTRODUCTION

Company's value is defined as discounting the company's cash flows. Ohlson (1991), Feltham and Ohlson (1995), Brief and Lawson (1992) and Edwards and Bell (1961) defined the value of company directly in terms of current and forecasted accounting numbers .

Value occurs if the company invests to ensure the return over the cost of company capital (Copeland, Koller, Murrin, 1996; 96). Increasing economic conditions and heavy competitive environment with each passing day makes it difficult for the companies to survive. Companies' resource requirements to realize their objectives increased as a result of increased prices of inputs. However, the companies turned to capital markets as the costs of the sources of funds provided by individuals and institutions increased. In countries where the capital markets are developed, companies determine their real values for finding appropriate resources and realizing continuous growth (Önal, Karadeniz, Kandır, 2005;370). Companies whose shares are traded on securities exchanges have to increase their market values to satisfy their shareholders.

Today, the correct determination of the companies' value is the major concern in order to provide the efficiency and confidence of the capital market thus the founded values should reflect the correct values. Determination of the company value is necessary for the initial public offerings. In addition, this determination is necessary when taking decision of buying companies' shares on stock purchase. The company's value must be calculated correctly to identify to what extend the resulting market price of the company reflects the real values. Otherwise, the risk taken will be much larger than expected. Determination of the company's value is also essential in terms of the companies which are not traded in the stock market, especially in the assessment of the company's investment performance (Önal and Karadeniz, 2004; 139). Company valuation in terms of management activities; helps company managers to determine realistic price policies by identifying company's current value

as well as how these values can be increased. Thus the capital needed by the company may be withdrawn to the company (Jones and Van Dyke, 1998; 9).

Analyzing whether the real value of an economic entity corresponds with the market value and to what extent it is equal to the market value can be defined as valuation process (Köse, 2003;1). There are different methods to determine the value of the company in this process. These methods can be divided into three main groups; discounted cash flow method, income valuation method and asset valuation method.

The purpose of valuing a company is to determine a representation of the overall worth of a company entity. Valuation is used for mergers, acquisitions, joint ventures, restructuring and the basic task of running companies to create value (Arumugam, 2007;12). The valuation of the company can be based on some selected valuation techniques. The use of these methods can affect the value as well as the information gained from the valuation process.

The remainder of this paper is structured as follows: Chapter I provide information about company value and valuation methods used in the literature. Theoretical background of discounted cash flow method is outlined in Chapter II. Chapter III constructs the application of the method on a steel company (Ereğli Demir Çelik) which is traded on ISE. The results of the valuation are explained and the conclusion is provided in this Chapter III.

CHAPTER I

COMPANY VALUATION AND VALUATION METHODS IN THE LITERATURE

1.1. Value And Company Valuation Process

1.1.1. What is Value?

To determine the value of a company, the meaning of value should be considered at first. Although there are various definitions of value, the exclusive definition is found in the term fair market value. Other definitions for company value include fair value, investment value, and intrinsic value (Pratt, Laro, 2005;1).

Fair Market Value: The definition of fair market value is the price, at which property would change hands between a buyer and a seller.

Fair Value: It is defined as a rational and estimate of the market value of an asset (or liability) for which a market price cannot be determined (usually because there is no established market for the asset).

Intrinsic Value: It refers to the value of a security which is contained in the security itself. The definition of intrinsic value is the value that an individual investor considers to be the true value based on an evaluation of the available facts.

Investment Value: It is the value that is based upon the needs and situation of an individual investor. This value may come into play in a merger or acquisition where the synergistic value to a particular investor is determined.

1.1.2. Company Value and Valuation Process

Company value is an economic measure reflecting the market value of the whole company. It is a sum of claims of all the shareholders. In this aspect, for the definition of company value, *fair market value* is used among the definitions of value.

Company valuation is a process and a set of procedures used to estimate the economic value of an owner's interest in a company. The valuation process includes understanding the company, analyzing the industry, determining a methodology and generating a report. Since valuation is effected by the current and future income streams of the company, general economic conditions of the industry should be considered in valuation process. Briefly, company valuation process is considered to be effected by; general economic factors, industrial factors and company structure (Institute of Management Accountants, 2009; 3).

General Economic Factors

The economic outlook of the economy has an impact on the valuation to varying degrees, depending on the nature of the business and its sensitivity to economic conditions. The size of the business, the geographic range of its customers, the nature of its competitors, and the source of its products all play a part.

Industrial Factors

The company's industry is influenced by five forces: rivalry, threat of new entrants, threat of substitution, bargaining power of customers, and bargaining power of suppliers. In valuation process all these forces should be considered and estimations should be performed considering the effects of these forces.

Company Structure

After gaining an understanding of the economic conditions facing the industry, the specific risk factors inherent to the company is considered. The attributes that are considered are information obtained from financial statements and financial analysis, including forecasts and ratios, along with non-quantitative information obtained through site visits to assess quality of management, quality of product, and customer satisfaction.

1.2 Valuation Methods

Valuation is the process that links risks and return to find the worth of a company asset or company (Gitman, 2000; 284). The fundamental characteristics of company assets are that they produce income flows. Sometimes this flow is easy to measure- the interest return on a bond is an example. At other times, the cash flows attributable to the asset must be estimated in the evaluation of companies.

Basis of company valuation is founded by Miller and Modigliani (1958). In their research of Miller and Modigliani published in 1958, a company's value is defined as the present value of the total cash flows after tax derived from company's operations. In this model, tax and bankruptcy issues were not considered so there is no change in equity cost although debt rate changes.

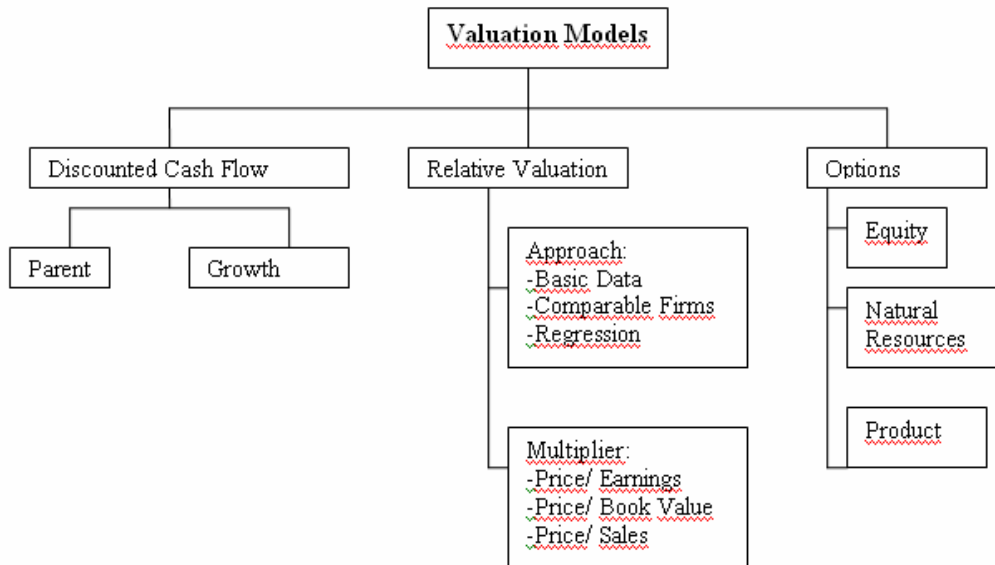
Damodaran (2002) identified three main techniques of company valuation developed and used in practice and explained them as;

- Discounted cash flow valuation measures the value of an asset based on the present value of future cash flows that it is expected to generate.
- Relative valuation estimates the value of an asset based on the values of comparable assets relative to a common variable such as book earnings, cash flows or number of customers.

- Contingent claim valuation relies on option pricing models to measure the value of an asset with option characteristics such as patents and reserves.

Categorization of the valuation method that was presented by Damodaran is as follows;

Figure 1 Valuation Models



.(Source: Damodaran, 1996; 502.)

Discounted cash flow valuation technique measures the value of an asset based on the present value of future cash flows that it is expected to generate. Relative valuation technique estimates the value of an asset based on the values of comparable assets relative to a common variable such as book earnings, cash flows or number of customers. Options pricing valuation technique relies on option pricing models to measure the value of an asset with option characteristics such as patents and reserves.

Besides the three classifications, it could be possible to divide the valuation methods into two parts; valuation methods based on historical data and valuation methods based on company performances. Valuation methods based on historical data are useful for the company that is going to take over another company. However; although a company's value is based on its past performances, its assets value and financial structures, in fact, a company's value is determined by its future performances.

Valuation method based on historical data could be useful for determining a company's lower bound or to find the company's value that is designated based on the future performances(Sarikamis,2003;148).Valuation methods based on historical data could be collected under the three headings, which are (Sarıkamış, 2003;130);

- Comparative Method
- Liquidation Value Method
- Reestablishing Method
- Price/Earnings Method

The valuation methods based on company performances are collected under three headings, which are (Sarıkamış, 2003;135-146);

- Periodical Revenue Method
- Profit Share Revenue
- Free Cash Flow Method

According to the study that is performed by Asquith (1983), the most used method in valuing stocks is relative valuation method. The results of his survey are presented below;

Table 1: Usage Rates of the Valuation Methods

<u>Valuation Method</u>	<u>Usage Rate (%)</u>
Earnings Multipliers	99
Price/ Earnings	97
Relative Price/ Earnings	35
Revenue Multipliers	15
Market Value/Book Value	25
Cash Flow Multipliers	13
Discounted Cash Flows	13
EVA	2
Other Models	4

(Source: Asquith, 1983; 51).

Although the results show that discounted cash flow usage is %13, due to the fact that the DCF method give more accurate results; in the following sections, discounted cash flow method is going to be analyzed in detail.

1.3 Valuation Methods In The Literature

Many studies investigate the company valuation methods both theoretically and empirically in finance literature. Although the most used valuation model is the discounted cash flow model, many researches have used different types of methods in their valuations. Valuation models in the literature will be examined in six headings; Discounted Cash Flow Method, Relative Valuation Method, Option Pricing Method, Dividend Discount Model (DDM), Economic Value Added (EVA), and Residual Income Valuation Model (Abnormal Earnings).

1.3.1. Discounted Cash Flow Method (DCF)

The most common way to measure the value of companies is called the 'discounted cash flow approach'. This method was put forward in 1930 by Irving Fisher. Discounted cash flow method determines the value of assets and cash flows by estimating. Due to the fact that it takes into consideration of time value of money, this method identifies the current values of the future cash flows that will be generated by assets. Hence this method illustrates the fact that the company's owned assets represent a value as long as they can generate cash. Discounted cash flow method is defined as the Company's future cash flow that is discounted by a specific discount rate. Therefore, valuation of the company is made by estimating cash flows (Ercan, Öztürk, Demirgüneş, 2003;5).

In this method, the discount rate that is used to discount the future cash flows is taken as the company's future aim of weighted average cost. In this method, forecast of cash flows are made by utilizing recent financials of the company. The projection of cash flows requires proforma balance sheet and income statements.

Kaplan and Ruback (1996), compared the market value of companies to the discounted value of their corresponding cash flow forecasts. For their sample of 51 companies between 1983 and 1989, the valuations of discounted cash flow forecasts are within 10 percent, on average, of the market values of the companies. For comparison, the authors also computed valuations with relative valuation method based on EV/EBITDA (enterprise-value-to-earnings before-interest-taxes-depreciation-and-amortization ratio) multiple. For their sample of 51 companies, they found that both the DCF and relative valuation methods similarly yielded satisfactory results with close precision levels with respect to actual market values. As a result, they have concluded that discounted cash flow valuation method provides reliable estimates of market value together with the relative valuation method.

Cornell (2000) used DCF (Discounted cash flow) valuation model in investigating the stock market response to Intel's press release in which the company announced that its revenue growth would be lower than analyst expectations. The DCF model used here is based on the weighted average cost of capital (WACC) approach to valuation. He has claimed that since Intel has almost no debt, there is no difference between the WACC approach, the adjusted present value approach, described by Kaplan and Ruback (1995), and the capital flows approach, used by Ruback (2000).

Penman (2001), Copeland et al. (2000), and Palepu et al. (2000) all prefer the valuation models based on either discounted cash flows or discounted residual income rather than valuations based on comparatives. These authors claimed that DCF is most widely used in practice, but that residual income is gaining in popularity. They also noted that both methods, properly applied, result in the same valuation. Again, Palepu et al. (2000) noted that properly constructed RIV and DCF models lead to identical valuations.

Olsson, Ribbing and Werner (2002) presented the shortcomings of the discounted cash flow (DCF) model as it is used in company valuation. The

implications of the shortcomings are discussed and methods to overcome them are argued for. In the literature study it was found that one way to improve the DCF model would be to forecast the future sales of the company.

Taner, Akkaya (2004) claimed that corporate performance with regard to assets is related to overall company value. They have examined three valuation approaches; net asset value, discounted cash flow, Price/Return and Market Value/Book Value and have concluded that DCF and the price/ return ratio is the most rational valuation methods that can be used.

Ülgen and Teker (2005) constructed the value of a company using the discounted cash flow technique. The results are then compared to the actual market prices in order to determine whether each company's stock is trading at a premium, at a discount or at par through 1995-2001 periods among ISE 100 companies. They found out that; the discounted cash flow method for valuation is better suited for practical applications than the asset based valuation method.

Arumugam (2007) made a survey and concluded that about 82.5% of respondents were of the opinion that discounted cash flow (DCF) valuation technique is better than the other valuation techniques. They were of the opinion that discounted cash flow (DCF) valuation technique counts its valuation on future free cash flows. Discounted cash flow (DCF) valuation technique acts as a management tool and helps them in the effective management of their companies. In addition, they were of the opinion that the forecast of free cash flows is the backbone of discounted cash flow (DCF) valuation technique. He concluded that while relative valuation ratios such as price earnings (P/E), enterprise value per earnings before interest, tax, depreciation and amortization (EV/EBITDA) and price to sales ratios are simple to calculate, they are not very useful if an entire sector or market is over or undervalued.

In his paper Fernández (2007), examined the four main groups comprising the most widely used company valuation methods: balance sheet-based methods,

income statement-based methods, mixed methods, and cash flow discounting-based methods. He concluded that the methods that are “correct” are those based on cash flow discounting.

In literature, four different types of discounted cash flow method is studied according to their discount rate usage.

1.3.1.1. Free Cash Flow (FCF)

The free cash flow to the firm is the sum of the cash flows to all claim holders in the firm, including stockholders, bondholders and preferred stockholders. In this method, company value is computed by subtracting capital expenditures from operating cash flow. Free cash flow (FCF) represents the cash that a company is able to generate after expensing the money required to maintain or expand its asset base. In this discounting cash flow method, WACC (weighted average cost of capital) is used as the discount rate.

FCF is calculated as:

$$\text{FCF} = \text{EBIT} (1 - \text{tax rate}) + \text{Depreciation} - \text{Capital Expenditure} - \Delta \text{Working Capital}$$

Since this cash flow is prior to debt payments, it is often referred to as an unlevered cash flow. Free cash flow to the firm does not incorporate any of the tax benefits due to interest payments.

Hunt (1975) introduced the Free Cash Flow theory, in which, the company’s capital expenditure, should be subtracted from the Cash flow from operations to get true result about the cash generating ability of the company.

1.3.1.2. Capital Cash Flow (CCF)

In this discounting cash flow method, WACCBT (weighted average cost of capital before tax) is used as the discount rate. Capital and free cash flow methods

are very similar except the way that they treat the tax benefits of deductible debt interest. In capital cash flow method, taxes are deducted on taxable income, whereas in free cash flow method, taxes are deducted after computed based on the EBIT. In free cash flow, it is considered that firms are all equity financed, that is there is no interest expense. Briefly, the difference is constituted of the tax treat.

Ruback (2000) presented the Capital Cash Flow (CCF) method for valuing risky cash flows. He showed that the CCF method is equivalent to discounting Free Cash Flows (FCF) by the weighted average cost of capital. He found that the CCF method is simpler when the forecasted debt levels and the debt-to-value ratios change throughout forecast period. He also compared the CCF method to the Adjusted Present Value (APV) method. He concluded that the Capital Cash Flow method is substantially easier to apply and, as a result, is less prone to error.

Arditti and Levy (1977) suggested that the company's value could be calculated by discounting the capital cash flows instead of the free cash flow. He has explained that the capital cash flows are the cash flows available for all holders of the company's securities, whether these are debt or shares, and are equivalent to the equity cash flow (ECF) plus the cash flow corresponding to the debt holders.

1.3.1.3 Adjusted Present Value (APV)

APV is the present value of a company that is financed solely by equity plus the present value of all the benefits of financing. APV valuation model is similar to free cash flow model. However, instead of weighted average cost of capital, cash flows are discounted at the unlevered cost of equity. The APV model for company valuation is similar to the FCF model in that it also uses the future free cash flows as valuation attribute. However, the present value of the forecasted FCF is in the APV model computed as if the company were all-equity financed.

The advantage of this approach is that it separates the effects of debt into different components and allows the analyst to use different discount rates for each component. In this method, debt ratio does not stay unchanged. In an APV valuation, the value of a levered firm is obtained by adding the net effect of debt to the unlevered firm value.

The APV model is originally used by Myers (1974) as a general approach for company valuation. He considered that a company's value is the sum of the company's projects which is calculated by summing the direct contributions of the company's projects returns. According to Myers, the value of the company is equal to the value of the company with no debt plus the present value of the tax saving due to the interest payments. He discussed that APV approach provides a basis for analysis of the lease vs. buy or lease vs. borrow decision.

Miles and Ezzell (1980) discussed about the two approaches to the valuation of a company in the literature; text book approach and The Modigliani and Miller approach. According to their study, the textbook approach assumes a constant cost of equity, a constant cost of debt, and a constant leverage ratio where as the Modigliani and Miller approach assumes only a constant cost of capital and a constant cost of debt. They concluded that the adjusted present value model developed by Myers is an implication of the Modigliani and Miller valuation approach. The analysis shows that the textbook approach is also an implication of the Modigliani and Miller approach and is, therefore, a special case of Myers' Modigliani and Miller -based APV model.

In his paper, Luehrman (1997) discussed the limitations of WACC model in valuing operations and explained the differences between the APV and WACC model. He discussed the advantageous of APV model and concluded that APV is a better tool for valuing operations. He concluded that APV approach analyzes financial issues separately and then add their value to that of the company. He added that APV method help managers analyze not only how much an asset is worth but

also where the value comes from. WACC is not good at handling financial side effects and It addresses tax effects only.

Inselbag and Kaufold (1997) compared two popular approaches to valuing a company, the Adjusted Present Value (APV) and the Weighted Average Cost of Capital (WACC) methods. The weighted average cost of capital (WACC) method, in which a company's value is determined by its unlevered cash flows discounted by WACC, appears to be the gaining importance among researchers. On the other side Adjusted Present Value (APV) technique values the company as an all-equity entity plus any incremental worth. They have shown that both valuation methods, give identical results under each of these financing alternatives. But, although the approaches are equivalent, their analysis also shows that it is more practical to apply the APV technique when the company targets a changing level of debt over time, and the WACC approach when the Company instead intends to maintain a fixed debt/value ratio.

1.3.1.4. Equity Cash Flow (ECF)

This is a measure of how much cash can be paid to the equity shareholders of the company after all expenses and debts are paid. In this discounting cash flow method, as a discount rate, required return to equity is used. Equity cash flow models focus on the how much cash flow that the equity holder will get from a specific company. Thus, the value of the company does not rely on how much money the company make, but on how much the equity holder gets from the company itself. This model is best in valuing company for takeovers or whenever there is a reasonable reason for corporate change control in near future.

Chambers, Harris & Pringle (1982) compared four discounted cash flow valuation methods: the equity cash flow (ECF) at the rate K_e (required return to equity); the free cash flow (FCF) at the WACC (weighted average cost of capital); the capital cash flow (CCF) at the WACCBT (weighted average cost of capital

before tax); and Myers' APV. They claimed that the first three methods give the same value if debt is constant, but different values if it is not constant. They also say that the APV only gives the same result as the other three methods.

1.3.2. Relative Valuation Method

The base of the relative valuation method known also as factor valuation method is to determine the value of the asset by taking the value of comparable assets into account. Relative valuation is the most commonly used method due to the easiness and reflection of market perception.

This method is commonly used because it requires less assumption and less time in comparison to discounted cash flow method and it is easy to understand and explain. In addition, this method is generally used together with the DCF method. The most widely used financial ratios can be listed as price/earnings (p/e), price/sales (p/s), price/book value (p/bv), enterprise value/sales(ev/s), enterprise value / earnings before interest and taxes, depreciation, and economic value added (Kim, 1997). The main principle when comparing financial multiple is a company more or less reflects the average financial performance -hence financial ratios- of its sector.

Boatsman and Baskin (1981) used relative valuation method for valuation of companies. They compared the accuracy of the valuation based on P/E (Price to Earnings Ratio) multiples of companies from the same industry. They found that, relative to randomly chosen companies, valuation errors are smaller when comparable companies are matched on the basis of historical earnings growth. This meant similar growth characteristics increased the accuracy of relative valuation.

Alford (1992) examined the accuracy of the P/E valuation method when comparable companies are selected on the basis of industry, company size, and earnings growth, to see which factor is the most important for valuation. His findings

showed that selecting comparable companies by industry is relatively effective. He also found a positive relationship between the company size and valuation accuracy.

Copeland, Koller and Murrin, (1990) described two major valuation approaches called relative valuation approaches and the discounted cash flow (DCF) approach. They claimed that DCF method does not base the valuation directly on accounting numbers for the reason that accounting numbers fail to reflect the timing of cash inflows. They have concluded that company value is equal to discounted expectations of future cash flows and accounting numbers should firstly be converted to cash flows.

Again, Weaver, Harris, Bielinski, MacKenzie (1991) discussed two basic approaches: the use of multiples and discounted cash flow methods. Whether based on publicly traded companies or being takeovers, the use of "multiples" to value companies is common. The multiple may be based on earnings, book value, cash flow or some other item. They have examined that relative valuation lacks the ability of capturing multiyear dimensions.

Bernard (1994) tried to show how company valuation could be implemented in terms of accounting numbers (earnings and book value). His approach was different from DCF, in terms of future cash flows and accounting-based valuation techniques in terms of it does not link between earnings and cash flows. He has found an approach called Edwards-Bell-Ohlson and defined company value directly in terms of book value and earnings which differs from more common two stages view of valuation that requires converting earnings into future cash flows and then those cash flows into company value. He has claimed that the advantage of this method is to relate company value directly to the same accounting profitability measures without taking into account the price/earnings relations.

Penman (1996) found out that equity valuation methods based on forecasting (accrual) earnings and book values have advantages over discounted cash flow analysis. He provided descriptions of the P/E and P/B ratios and their relationship to

each other. The P/E ratio indicated future growth in earnings which is positively related to expected future return on equity and negatively related to current return on equity. The P/B ratio reflects only expected future return on equity.

Beatty, Riffe and Thompson (1999) examined different combinations of value drivers derived from earnings, book value, dividends, and total assets. They found the best performance was achieved by using book and earnings multiples and earnings and book value methods.

Kim and Ritter (1999) discussed the use of multiples in valuing initial public offerings. They employed P/BV, P/S, EV/S and EV/CFO multiples in their analysis. They found that EV/EBITDA multiple yields the most accurate result for valuation. They concluded that P/E, P/BV and P/S multiples have a limited ability in valuation of initial public offerings due to the wide variation of these ratios in the industry.

Barker (1999) claimed that the price-earnings ratio is of primary importance and that DCF models, are of little practical importance to investment decisions. In his own survey, he found that the groups ranked the PE model as the most important, and they rated DCF as unimportant.

Cheng and McNamara (2000) compared the valuation accuracy of P/E, P/B and hybrid P/E and P/B multiples by selecting the comparable companies based on the industry membership, size and return equity as well as their combinations. They found that P/E multiples outperformed P/B multiples and their hybrid multiples outperformed each of P/E and P/B multiples. These results implied that, for their study period, earning based multiples were more accurate than asset multiples; however each of these two categories did not perfectly substitute each other.

Bradshaw (2002) studied the 103 U.S. analysts' reports to identify which valuation methods are mostly used. He found that valuations based on PE multiples and expected growth are more likely to be used.

Liu et al. (2002) evaluated the various multiples to explain the stock prices in 10 different countries. They used four classes of relative valuation multiples: Earning based, dividend based, cash flow based and sales based. They concluded that earning multiples gave the best results while sales multiples gave the worst results and dividend and cash flow multiples exhibited intermediate performance. Earning multiples were proven to be a reasonably accurate technique because for over half the companies in the different countries being within 30 percent of observed stock market valuations.

Park and Lee (2003) undertook empirical tests to assess the relevance of relative valuation model and different multiples in Japanese stock market. Their results showed that P/B multiple is the best in terms of prediction accuracy with respect to P/E, P/S and P/CFO multiples.

Demirakos, Strong and Walker (2004), adopted an approach to explaining the valuation practices of financial analysts by studying the valuation methodologies contained in 104 analysts' reports from international investment banks for 26 large U.K.-listed companies from the beverages, electronics, and Pharmaceuticals sectors. They found that:

(1) The use of valuation by comparatives is higher in the beverages sector than in electronics or Pharmaceuticals;

(2) Analysts typically choose either a PE model or a DCF valuation model as their valuation model;

(3) None of the analysts use the price to cash flow as their dominant valuation model; and

They concluded that the types of relative valuations used depend on characteristics of the company being analyzed.

1.3.3. Dividend Discount Model (DDM)

The Dividend Discount Model is a way of valuing a company based on the theory that a stock is worth the discounted sum of all of its future dividend payments. In other words, it is used to evaluate stocks based on the net present value of the future dividends. This model does not work for companies that do not pay out dividends.

This approach considers that the value of a company is the future expected stream of dividends discounted at an appropriate cost of capital. Dividend discount model give priority to profits and dividend in near future; it is tend to find share holdings that have low price/earning rate and high dividend revenue are cheap, share holdings that have high price/earning rate and low dividend revenue are expensive.

Penman and Haas (2001) contrasted dividend discount techniques, discounted cash flow analysis, and techniques based on accrual earnings. Comparisons of these methods showed that accrual earnings techniques dominate free cash flow and dividend discounting approaches. However, they have concluded that DCF techniques that involve (accrual) operating income are equivalent to residual income accrual accounting techniques.

Discounted cash flow method which calculates equity value is similar to the method of discounted dividends which generates firm value. To have the same company value in both of these methods is related to the realization of two requirements. These :

- The state of the dividends being equal to FCFE

- The state of having greater FCFE value than dividend but the difference between those should be invested in investments that have NPV equal to zero.

If FCFE is greater than dividends and the difference between has an earning rate less than market interest rate or invested in projects that have negative PV; the

value that has been calculated according to FCFE will be greater than the value that has been calculated by discounted dividends model. The best example for this case is a firm which has significant cash flow according to FCFE but with a less distribution of dividends use these funds for unreasonable corporate buy-outs. Besides, in case of using these funds to pay liabilities will cause liability/equity ratio to decline which will lowers the firm value. Distributable Net cash flows to shareholders are detailed in the table below.

1.3.4. Economic Value Added (EVA)

EVA can be measured as Net Operating Profit After Taxes (NOPAT) less the cost of capital. EVA, the economic value added, is a measure of how much value the company in a particular period has added to the existing invested capital. Thus, the total company value is obtained by adding the present value of all future years' expected EVA to the existing capital, and then the market value of debt is deducted to arrive at the equity value. The present value of all future years' EVA is commonly referred to as the market value added (MVA). EVA is a measure of performance that shows the increase in the economic value of a company during a specific time period (Stewart, 1991). In other words, EVA deducts the amount of the cost of capital invested in the period from accounting income. In practice EVA is used mainly as a performance assessment method; meaning that many companies compute the value of a project by applying DCF, and then they follow its performance with EVA method.

O'Byrne and Stewart (1996) showed that Economic Value Added (EVA), which is net operating profit after-tax (NOPAT) minus a charge for all capital invested in the company, provides an accurate value of the companies. The analysis suggested that earnings (NOPAT) and EVA have about the same level of success in explaining market value.

Fernandez (2001) examined the equity valuation using multiples. He analyzed 582 American companies using EVA, MVA, NOPAT and WACC data. He

has claimed that a company's value and the increase in the company's value over a certain period are basically determined by the changes in expectations regarding the growth of the company's cash flows and also by the changes in the company's risk, which lead to changes in the discount rate. He has found out that EVA is the most useful method to measure value creation. However, he has claimed that multiples are useful in as second stage of valuation: after performing the valuation using another method, a comparison with the multiples of comparable companies enables to examine the valuation performed and identify differences between the companies it is compared with.

In measurement of performance by EVA, Samiloglu (2004) has evaluated surplus value and accounting profit and analyzed the correlation between EVA and other performance criteria's based on accounting and share earnings. Based on the research which has been done between 1995–2002, %7 deviation of per share earnings of the manufacturing companies which are active in ISE is explained by EVA .In another work of Samiloglu (2005), the correlation between share earnings and EVA value has been examined. In the work that has been applied to the manufacturing companies, a significant correlation is determined between per share earnings and beta of stocks where as there could not be found any relation between share earnings and EVA values.

Uyemura et al. (1996), have calculated EVA values and tested the correlation between these values and EVA by using 100 significant banks data's of 10 years. In this work, the relation between shareholder value and other accounting based measures like net income, per share earnings, return on equity is measured. According to this analysis, EVA value shows the highest correlation and per share earnings shows the lowest one.

Stern (1997) stressed that accounting based standards are not seen as an explanatory of the variation of the market value. Instead, he claimed that EVA explains that variation. According to the results of the study, in which EVA and the

accounting based standards are compared, EVA is the only factor that explains the concept of value.

1.3.5. Residual Income Valuation Model (Abnormal Earnings)

Residual income is net income less a deduction for common shareholders' opportunity cost in generating net income. A residual income model values securities using a combination of book value of the company and a present value based on accounting profits. The value of a company is the sum of:

- the book value at the time of valuation, and
- the present value of the residual income: the amounts by which profits are expected to exceed the required rate of return on equity.

Abnormal earnings or residual income mean total earnings less normal earnings. This method assumes that current book value is a reasonably accurate measure of the real market value of assets. In this method equity value is calculated as the present value of all future abnormal earnings plus the book value of equity. Abnormal earnings simply mean earnings above (or below) the 'normal' level of earnings. The advantage of the residual income model is that it is entirely based on accounting measures of profit and value of assets.

The most obvious objection to the residual income model is that it is based on accounting numbers that often fail to reflect the true economic value of assets and cash flows. AE is, in fact, very similar to the EVA concept, but is more directly related to the equity of the company, since the capital charge here is calculated using book equity (instead of invested capital as in EVA) and the required rate is the cost of equity capital

This concept is found by Feltham and Ohlson (1995) and Ohlson (1995). Brief & Lawson (1992) used a modified version, where the abnormal earnings are measured as the above cost of capital return on book equity.

Dechow, Hutton, Sloan (1999) provided an empirical assessment of the residual income valuation model proposed in Ohlson (1995). They pointed out that residual income valuation model is generally similar to past applications of traditional earnings capitalization models. They have concluded that the model provides a framework for the valuation models using book value, short-term forecasts of earnings ratios.

Lee (1999) summarized the process of the valuation research to date and discussed its implications. He has focused on Residual Income Model (RIM), which has been used extensively by both empirical and theoretical researchers.

In his study Fernandez (2008) showed that the three Residual Income Models always give the same value as the Discounted Cash Flow Valuation models. He used for valuation purposes three parameters that have been proposed for measuring a company's "value creation" for its shareholders. He also showed that through the present value of EP, EVA and CVA he gets the same equity value as the discounting the equity cash flow or the free cash flow. Therefore, it is possible to value companies' by discounting EVA, EP or CVA, although these parameters are not cash flows and their financial meaning is much less clear than that of cash flows.

Francis, Olsson and Oswald (2000) provided empirical evidence on the reliability of three valuation models: the discounted dividend (DIV) model, the discounted free cash flow (FCF) model, and the abnormal earnings (AE) model. He has explained that the discounted dividend model, equates the value of a company's equity with the sum of the discounted expected dividend payments to shareholders over the life of the Company, with the terminal value equal to the liquidating dividend. The discounted free cash flow model substitutes free cash flows for dividends, based on the assumption that free cash flows provide a better representation of value over a short horizon. Free cash flows equal the cash available to the Company's providers of capital after all required investments. Using a sample of five-year forecasts for nearly 3,000 company observations over 1989-93 they

found that the AE value estimates are more accurate and explain more of the variation in security prices than do FCF or DIV value estimates.

1.3.6. Real Options Approach (ROA)

Real options analysis applies put option and call option valuation techniques to valuation decisions. A real option itself, is the right to undertake some business decision; typically the option to make. For example, the opportunity to invest in the expansion of a firm's factory, or alternatively to sell the factory, is a real option.

ROA is distinguished from other approaches in that it takes into account uncertainty about the future evolution of the parameters that determine the value of the project, and management's ability to respond to the evolution of these parameters. The combined effect of these makes ROA technically more difficult than its alternatives.

In real options valuation, focus is placed more in future company opportunities than in the present ones. The use of real options for valuing companies is in practice strongly limited by several factors. For instance, one problem is the modeling; it is not easy to detect whether an option is truly embedded in an investment project.

This model is applied whenever there is a 'strategic' reason that cannot be quantified by those models mentioned above. Option model focus on how much people will 'bet' on future price of a specific company. As a result, the real options valuation method is far from being popular among practitioners.

Haecker (2000) argued that internet start-up companies cannot be valued with traditional models, such as the DCF method or the market Multiple Method, due to their lack of profits. Instead, he used four valuation models for internet start-ups. The four methods are the Economic Value added method, the Benchmarking method, the Customer Contribution approach, and the Real options approach. Considering the

advantages and disadvantages of each method into account, the Real Options approach appears to be the most appropriate valuation approach, followed by the Customer Contribution method, the EVA method, and finally benchmarking method.

1.4 A General Evaluation of the Valuation Methods

The valuation methods are presented under six headings such as discounted cash flow valuation, relative valuation, dividend discount valuation, economic value added, residual income and real option methods. The fundamental of the discounted cash flow method stands on the present value rule. The most preferred DCF approach in practice is the free cash flow DFC Model. The other major models are adjusted present value model, equity DFC model and the capital discount model. In the method of free cash flows to firm, the value of the firm is calculated by discounting the cash which is created by the firm's operational activities. Then, financial and other liabilities are deducted from that value and cash and cash equivalents are added to it. The result is the value that is left for the shareholders. Equity cash-flow is obtained by deducting outgoings of the firm, tax obligations, interest payments and the capital paybacks. Shortly it is the fund which is used by the shareholders for any purposes.

The advantage of APV approach is that it separates the effects of debt into different components and allows the analyst to use different discount rates for each component. In this method, debt ratio does not stay unchanged forever. The difficulty of this model stands in estimating probabilities of default and the cost of bankruptcy. In fact, many analyses that use the adjusted present value approach ignore the bankruptcy costs. Again, in APV, company value will be overstated when adding the tax benefits to un-levered company value to get the levered company value, especially for some companies with high debt ratios.

The second method is the relative valuation method. The most frequently used ratios are; price-earnings ratio and price-book value ratio. This model is generally used with DCF method. The third method is the dividend discount model

which can be considered a sub-model of the equity cash flow. Value of the stocks corresponds to the value of the company's estimated net present dividend payments. The primary difference between the dividend discount models and the free cash flow to equity models lies in the definition of cash flows - the dividend discount model uses a strict definition of cash flow to equity, i.e., the expected dividends on the stock, while the equity cash flow model uses an expansive definition of cash flow to equity as the residual cash flow after meeting all financial obligations and investment needs. When firms have dividends that are different from the equity cash flow, the values from the two models will be different. In valuing firms for takeovers or in valuing firms where there is a reasonable chance of changing corporate control, the value from the equity cash flow provides the better estimate of value.

Economic value added is in fact a performance measuring model, where as in literature it was also used for valuing companies.

The Residual income model (RIM) approaches valuation differently. It starts with a beginning value, the book value or investment in equity, and then makes adjustments to this value by adding the present values of future residual income (which can be positive or negative). One key advantage to a residual income model over other models is the timing of the recognition of value. In DCF approaches most of the value is found in future dividends and in the terminal value computation. The longer the forecast period the higher the uncertainty that will exist regarding these future cash flows. Further, in many residual income valuation contexts the terminal value is considered to be zero. The determination of book value today is much easier than the determination of a terminal value ten or twenty years hence.

The last valuation model is the option pricing method which is not commonly used in Turkey.

Briefly;

- Residual income models, dividend discount models, and free cash flow models are all theoretically sound.

- The difference is that DDM and ECF models forecast future cash flows and find the value of stock by discounting them back to the present using the required return on equity.

According to the literature review that is summarized here, the main conclusion to take into account is that analysts appear to tailor their valuation methodologies to the circumstances of the industry. PE models remain the mainstay of valuation practice, but other forms of analysis complement these as circumstances demand. In some cases DCF models are used, and in others, more detailed analyses of price-to-sales multiples, growth options, or profitability analysis are used. Another finding is that use of the RIV model is extremely limited, but analysts frequently use accounting data in single-period comparative .Analysts appear to vary the choice of valuation methodology in understandable ways with the context in which the valuation is made.

Although analysts use various different kinds of valuations models, the most useful and convenient method is DCF method. The data required for this method can be obtained easily and accurately. In the application that is explained in Chapter III, DCF method will be used in order for finding the market value of a company (Erdemir) which is traded in ISE.

CHAPTER II

DISCOUNTED CASH FLOW METHOD

2.1 Discounted Cash Flow Method Defined

According to Coyle (2000), the most scientific and the most common valuation method is discounted cash valuation method. This method can be named also; free cash flow valuation method.

A company's value is related with its future cash flows. Discounted cash flow valuation involves calculating the present value of future cash flows generated by asset through discounting them with an appropriate discount rate. It can be generally defined with the Formula (1).

$$\text{Company Value} = \sum_{t=1}^{t=\infty} \frac{CF_t}{(1+k)^t} \quad (1)$$

Where CF_t is the company's cash flow in period t and k is the discount rate that reflects the risk level of the cash flow of the company. As seen in Formula (1), the main elements of a DCF valuation model are the discounted cash flows and the discount rate.

The cash flows of a company comprised of all the tangible assets like means of production; intangible assets like power of brand and all other assets beyond cash. In this sense, company's current and future financial and investment decisions could be reflected on the cash flows. Discounted cash flow method gives opportunity for the possible synergies to take place in the merging transactions. In addition, calculation includes goodwill values.

Discounted cash flow method has three basic components which are; cash flows, discount rate and growth rates (Damadoran, 2002;453).The most important

component is the discount rate. Nantell and Carlson (1975) define three main methods of DCF valuation technique for the discount rate as “Weighted Average Cost of Capital Method”, “Flows to Equity Method” and “Adjusted Present Value Method”. These methods employ different choices of valuation attribute and discount rate. WACC method is the most preferred method in the theory and the practice. With that respect, in this thesis, WACC method was selected for the implementation of DCF technique.

As for the valuation procedure, four steps are developed for the implementation of discounted cash flow valuation technique according to WACC method.

- Projection of cash flows
- Estimation of discount rate
- Determining of capital structure
- Determining the terminal value

2.1. 1. Projection of Cash Flows

Cash flows and discount rates are needed to be estimated to calculate company value in discounted cash flow method. The projected free cash flows include factors such as a new product development, product life cycles, competition and other value factors related with company operation. An assessment of historical performance is necessary. Long-term forecasts are also necessary to develop an adequate representation of the future economic benefits of the company, which in turn is dependent on the sales growth and the firm’s profit margin (Arumugam; 2007, 35).

In DCF approach, cash flow projections are built on the earning projections of the company. With that respect, the company’s earning projections should be developed on top-down basis throughout the projection period. By employing profitability assumptions, earnings are projected after deducting the production and operating expenses from the revenues. The first earning measure of a company is

“Gross Profit” which equals the profit of the company after cost of goods sold (Akbulut, 2006; 29).

$$Gross\ Profit(t) = NetRev(t) - COGS(t) \quad (2)$$

Where *Gross Profit(t)* is the gross profit in period *t*, *NetRev(t)* corresponds to the net revenues of the company in period *t* and *COGS(t)* corresponds to cost of goods sold for the Company in period *t*. From gross profit, the operating profit is calculated as follows:

$$Operating\ Profit(t) = Gross\ Profit(t) - OPEX(t) \quad (3)$$

Where *Operating Profit(t)* is the operating profit of the company in period *t*, *Gross Profit(t)* corresponds to the gross profit of the company in period *t* and *OPEX(t)* corresponds to operating expenses of the company in period *t*. Operating profit is also equivalent to earnings before interest and tax, which is abbreviated as EBIT.

$$Operating\ Profit(t) = EBIT(t) \quad (4)$$

Cost forecasts can be based upon a large set of assumptions. An approach is to estimate the costs based on their ratio to revenues in accordance with the historical calculation and expectations throughout the forecast period. Another approach would be to categorize all expenses in detail and implement a bottom-up approach by forecasting variable costs based on production units and unit costs and forecasting fixed costs separately. In practice, a combination of both methods is applied. As COGS and OPEX include non-cash expenses such as depreciation and amortization expenses, EBIT should be adjusted with such non-cash expenses in order to arrive at an approximation of cash flow from operations before interest and taxes. This measure is called earnings before interest, tax, depreciation and amortization expenses, which is abbreviated as EBITDA. (Akbulut, 2006;29).

$$EBITDA(t) = EBIT(t) + Depr(t) + Amort(t) \quad (5)$$

Where $Depr(t)$ corresponds to the depreciation charges in period t and $Amort(t)$ corresponds to the amortization charges in period t . Finally cash flows to company are calculated as (Damodaran, 1996):

$$CF(t) = EBITDA(t) \times (1 - T(t)) - \Delta WC(t) - CAPEX(t) \quad (6)$$

Where $\Delta WC(t)$ corresponds to the change in working capital, $CF(t)$ is cash flow to the company in period t and $CAPEX(t)$ is the capital expenditure in period t . Working Capital is found by subtracting the current liabilities from current assets. Change in working capital is calculated by taking the difference of the two following years.

As a summary components and factors of free cash flow method is shown in table below:

Table 2: Components and Factors of Cash Flow method

Free Cash Flow	Value Components
Income- Expenditure= Operating Profit-Tax= Net Operating Profit- Net Capital Expenditure- Working Capital Expenditure= Free Cash Flow	Growth in Sales Operating Profit Margin Tax Ratio Capital Asset Requirement Working Capital Requirement

Source: (Öztunalı, 2008;108)

Cash flow forecasts changes according to valuation calculation based on total company value or shareholder value level. In a case of company value calculation, required cash flow forecast is “Free Cash Flows” or “FCF”. On the other hand, in a case of direct equity value calculation, “Equity Cash Flows” “ECF” is required. So,

these two methodologies are used to find the company value, according to the discounted cash flows method in company valuations. In the first methodology FCF, the total value resulted from the company's operations is calculated. After that, financial debts and other liabilities are subtracted from this value and as a result the value that is remained to the shareholders is found. In the second methodology; ECF, the equity capital value that is remained to the shareholders is directly calculated. If the discount rates are chosen properly in order to reflect the cash flow risks, two methodologies give the same results (Copeland, Koller, Murrin, 1996:137). The two types of cash flows are explained below.

2.1.1.1. Equity Cash Flows (ECF)

Equity cash flow method involves discounting the cash flows available to the equity holders at the equity holders' required rate of return, or cost of equity in other words. Cash flows to equity holders are cash flows adjusted with net borrowing, which is equal to the net of debt withdrawals, principal repayments and interest payments. The discounting process yields the value of equity, as opposed to the case in FCF approach at which the discounting process yields the total of equity value and debt value, which is called as company value. Booth (2002) states that flows to equity method is most popular with leveraged leasing, leveraged buyout, real estate and project finance specialists at which the cash flows to equity holders can be forecasted with a higher degree of certainty.

This method is also called share value approach. The main point on this approach is to determine cash flows through projected financial statements which will be distributed to equity owners on next years. This approach is the calculation of present value of the dividend that the company will distribute to its shareholders before and after the projection period by using the cost of equity. The biggest difference between ECF and FCF is that, WACC is used in FCF as the discount method, whereas in ECF, cost of equity is used as the discount method. This approach is presented as below;

Table 3: Equity Cash Flow

Net sales
-Cost of Sales
Gross Profit
-Sales, Marketing Expense
-General Administrative Expense
EBITDA
-Depreciation Expense
EBIT
+ / - Extraordinary Income / (Expense)
Profit / (Loss) Before Tax
-Tax on EBIT – Provision for taxes on EBIT
Profit / (Loss) of the period
+Depreciation Expense
+ / - Change in Working Capital
- Investment Expenditures
+ / - Net Change in Other Assets and Liabilities
Free Cash Flow Related to Operations
-/+ Net Change in Cash and Cash Equivalents
FCF Generated By the Firm Within The Period

Source: Damodaran (1996;502).

Calculation of equity free cash flows is practical and easy valuation technique. This method is mostly used by financial intermediaries, banks, and insurance companies. The reason for this method is being used in these industries is due to the fact that in these industries interest income and expense is a part of their main operations.

Discounted cash flow model that directly calculates the share capital value is similar to the model that calculates the company value discounting the dividends. This approach is easy user and practical but is not as helpful as the FCF method except for the financial institutions. Discounting the equity cash flows do not supply accurate information about company's value creating factors and the effects of them (Copeland, Koller, Murrin,1996:153).

2.1.1.2. Free Cash flows (FCF)

As alternative of ECF model, this model focus on how much money that a company generated regardless on how much the shareholders receive. This model is best in estimating the value of a company without being deviated with the source of fund. Thus, financial institutions use this model mostly in loan decision.

Free cash flows are the after-tax cash flows that will be created by the activities of the firm in the future. Interest expenses, credit utilization or capital increase is not included in the free cash flows. In other words, free cash flows refer to those which are originated from the firm's operations and used to pay the dividends, interest, and principal repayments. The account of free cash flows is shown below.

Table 4: Free Cash Flow

Profit Before Interest and Tax (EBIT)
Minus: The tax on EBIT
Plus: Depreciation expense
Gross Free Cash Flows
Minus: Change in business capital
Minus: Investment expenses
Minus: Changes in other assets and liabilities
Free Cash Flows

Source: (Damodaran, 1996;502)

In this study, instead of directly calculating the equity value, FCF method which is more comprehensive has been chosen. Therefore, first of all, the total value of the company has been calculated, then the present value of the financial debts and liabilities are subtracted from this value. In this approach, since the cash flows are before debts, there is no need to determine the capital and interest amounts of the debts. On the other hand, in ECF method, these interest and capital amounts are need to be calculated and deducted from the cash flows (Üreten,Ercan,2000;55). In this

sense, FCF method is the most appropriate method for the companies which have high amount and variable debts.

The company's cash flows are discounted by WACC (weighted average cost of capital) when finding its value in FCF method. Due to the fact that the cash flows are before debts and interests, they are not affected by the company's indebtedness. The variable which is affected from the company's indebtedness is WACC.

2.1.2. Estimation of Discount Rate

Having projected the company's free cash flows for the next years, these cash flows' present value should be figured out. That means finding an appropriate discount rate, which can be used to calculate the present value of the cash flows. This is a crucial decision because a difference of just one or two percentage points in the cost of capital can make a big difference in a company's fair value (Arumugam;2007,43).

Weighted Average Cost of Capital (WACC)

Weighted average cost of capital (WACC) is the discount rate used to convert expected future cash flow into present value. It is the most preferred method of discounted cash flow valuation technique amongst practitioners. WACC method involves discounting pre-interest but after-tax cash flows at a rate that reflects the costs of the different sources of capital. If a company uses debt and equity as the sources of capital, then the weighted average cost of capital will be the weighted average of the cost of equity and the cost of debt, where the weights are the market values of debt and equity as percentages of the market value. The discounting process yields company value, or the value of operations which is equal to the total of value of equity and value of debt.

WACC method values the entire company, which includes, besides equity, the other claimholders in the company (bondholders, preferred stockholders,

etc.).The method involves discounting of the cash flows to company at the weighted average cost of capital, which is the cost of the different components of financing used by the company, weighted by their market value proportions. The method can be formulated as follows:

$$EV = \sum_{t=1}^{t=\infty} \frac{CF_t}{(1+WACC)^t} \quad (7)$$

Where EV is the company value of the company, CF_t is the cash flows to company defined as the residual cash flows after meeting all operating costs, investments, working capital changes and taxes, but prior to any payments to both debt or equity holders in period t and $WACC$ is defined as the weighted average cost of capital. WACC method defines the company value as the addition of value of held by the equity holders (equity value) and the value of debt held by the debt holders (debt value). Hence, the company's equity value can be calculated by subtracting the value of debt from company value.

$$EV = E + D \quad (8)$$

Where D is the value of debt, E is the value of equity and EV is the company value. If the company does not have an interest burdened debt, meaning that it is financed totally with share capital, the cost of share capital becomes WACC (Üreten, Ercan, 2000;61). There are a number of steps involved in calculating the weighted average cost of capital (WACC). These steps involve calculating the cost of equity, the cost of debt, and the determination of an optimal capital structure for the company using industry averages. In calculating WACC, the market values of debts and equity should be calculated. The WACC formula is (Hitchner, Mard, 2003:29).

$$WACC = We(Ke) + Wd(Kpt)(1 - t) \quad (9)$$

Where;

W_e = Percentage of equity in the capital structure (at market value)

K_e = Cost of equity

W_d = Percentage of debt in the capital structure (at market value)

K_{pt} = Cost of debt, pretax

t = Tax rate

Since WACC is essentially a combination of the cost of equity and the after tax cost of debt, cost of equity and cost of debt are need to be calculated at first.

2.1.3 Determining the Capital Structure

In order to calculate the WACC, at first the capital structure should be determined. When the capital structure is being determined, in stead of the current capital structure, company's targeted long term capital structure should be considered. If the company is traded in stock exchanges, the market value of the equity is found by directly multiplying the number of stocks with market value of the stocks (Üreten, Ercan, 2000;65).The determination of the cost of equity and cost of debt is explained below.

2.1.3.1. Determining the Cost of Equity

Cost of equity is equal to the required rate of return on equity. It is the minimum rate of return that assures the investors to buy its stocks. This internal rate of return consist of the time value of money and the risk premium(Shapiro, 1992;477).In order to estimate the opportunity cost of equity, generally Capital Asset Pricing Model (CAPM) or Arbitrage Pricing Model (APT) is used. Both of the model takes into account the expected inflation rate and the risk (Copeland, Koller, Murrin, 1996;265).

The two components of a firm's equity are share capital and retained earnings. It is most difficult to calculate the cost of equity, because equity is not a

contractual liability. The cost of equity is affected by inflation, interest rates and currency exchange rates. For instance, in case of an inflationary economy the real cost of capital is lower than the normal cost of capital. The high rate of inflation leads to high interest rates and interest rates directly affects the net present value in projects. Therefore, several approaches have been proposed in order to determine the cost of equity which is presented below; (Arumugam; 2007, 44).

- Capital asset pricing model approach
- Realized yield approach.
- Bond yield and risk premium approach.
- Earnings–price approach
- Dividend capitalization approach

CAPM model will be explained and used in the application due to the fact that this model is the most appropriate model in calculating cost of equity.

Capital Asset Pricing Model (CAPM)

CAPM is the most preferred model for estimating cost of equity in practice. The foundations of CAPM were laid by the work of Markowitz (1952) and Tobin (1958). As a basic assumption, the capital asset pricing model defines that the opportunity cost of equity is equal to the sum of the risk free returns of bills and the systematic risk of the company (beta) multiplied with the market risk premium. The equation of the cost of equity (K_e) is presented below (Corporate Finance and Portfolio Management, CFA Program Curriculum, 2007; 91).

$$K_e = R_f + \beta [(E_{Rm}) - R_f] \quad (10)$$

Where,

R_f = Risk free rate of return

β = the systematic risk of equity (beta)

E_{Rm} = the expected rate of return on market portfolio

$(E_{Rm}) - R_f$ = the expected market risk premium.

CAPM model breaks down the risk into two components: (i) Market risk which is systematic and undiversifiable and (ii) Specific risk which is company-specific and diversifiable. Beta is an asset's contribution to the risk of a fully diversified portfolio. Beta is calculated by regressing the asset's return against the market portfolio. Thus the beta of the market portfolio is 1.00.

Risk free rate of return is defined as the return of an asset that has no default risk. A common usage for the risk free rate is the yield on a default-free government debt instrument (Corporate Finance and Portfolio Management, CFA Program Curriculum, 2007; 91). In general, the interest rates of the 10-year Treasury bonds are used. (Copeland, Koller, Murrin, 1996; 267).

The expected market risk premium, or $(E_{Rm}) - R_f$ is the premium that investors demand for investing in a market portfolio relative to the risk-free rate. When using the CAPM to estimate the cost of equity, in practice, beta relative to an equity market index is estimated (Corporate Finance and Portfolio Management, CFA Program Curriculum, 2007; 92). Table 4 summarizes the latest bond ratings and appropriate default spreads for different countries. These numbers can be used as market risk premiums in the CAPM model. As seen in the Table 5, Turkey's market risk premium is 4.5%.

Table 5: Country Risk Premiums

Estimates of Country Risk Premiums			
Country	Long-Term Rating	Typical Interest Rate	Country Risk Premium
United States	Aaa	6.10%	0.00%
Argentina	Ba3	10.10%	4.00%
Australia	Aa2	6.75%	0.65%
Austria	Aaa	6.10%	0.00%
Belgium	Aaa	6.10%	0.00%
Brazil	B2	11.60%	5.50%
Bulgaria	B2	11.60%	5.50%
Canada	Aa2	6.75%	0.65%
China	A3	7.05%	0.95%
Colombia	Baa3	7.55%	1.45%
Denmark	Aa1	6.70%	0.60%
Finland	Aaa	6.10%	0.00%
France	Aaa	6.10%	0.00%
Germany	Aaa	6.10%	0.00%
Hong Kong	A3	7.05%	0.95%
Hungary	Baa2	7.40%	1.30%
Ireland	Aaa	6.10%	0.00%
Italy	Aaa	6.10%	0.00%
Japan	Aa1	6.70%	0.60%
Luxembourg	Aaa	6.10%	0.00%
Netherlands	Aaa	6.10%	0.00%
Poland	Baa3	7.55%	1.45%
Russia	B3	12.60%	6.50%
Turkey	B1	10.60%	4.50%
United Kingdom	Aaa	6.10%	0.00%

Source: www.sjsu.edu/faculty/watkins/countryrisk

Estimating the beta variable (systematic risk) differs according to the company's stocks being traded in stock exchanges. If the company is traded in stock exchanges, the broker institutions beta variables can be used. The company's beta variables differ according to their sectors, their level of fixed costs (operational leverage) and their debt level (financial leverage). If a company is sensitive to the market conditions, has a high level of fixed cost and debts, consequently has a high beta variable compared to the other companies in the market (Üreten, Ercan, 2000;69).

2.1.3.2. Determining the Cost of Debt

Cost of debt is defined as the effective rate that a company pays on its current debt. This can be measured in either before- or after-tax returns; however, because interest expense is deductible, the after-tax cost is seen most often. The cost of debt capital is what the firm must pay to the purchasers of its bonds.

Compared to cost of equity, cost of debt is much easier to calculate. The rate applied to determine the cost of debt (K_d) should be the current market rate the company is paying on its debt. As companies benefit from the tax deductions available on interest paid, the net cost of the debt is actually the interest paid less the tax savings resulting from the tax deductions interest payment. Therefore the after tax cost of debt is $K_d(1-t)$ where t is the corporate tax rate (Arumugam; 2007, 47).

Companies use bonds, loans, and other forms of debt for capital; this measure is useful because it indicates the overall rate being used for debt financing. To get the after-tax rate, the before-tax rate is multiplied by 1 minus the marginal tax rate (before-tax rate \times (1 - marginal tax)). For example, if a company's only debt was a single bond in which it paid 5%, the before-tax cost of debt would be 5%. If, however, the company's marginal tax rate was 40%, the company's after-tax cost of debt would be only 3% (5% \times (1 - 40%)).

When calculating the WACC, generally the company's current debts are considered and the present value of the possible future debts is considered to be zero. The cash inflows resulting from the debts will be equal to the present values of the future debt payments when discounted with the opportunity cost of the debts (Copeland, Koller, Murrin, 1996; 141).

2.1.4. Determining the Terminal Value

An important assumption in company value determination is assuming the company's time of life as infinite. Since companies are supposed to have infinite

lives, valuation is undertaken for two stages. First, cash flows to company are estimated in detail for the forecast period. Then, the value of cash flows to company after the forecast period is calculated at the end of forecast period. “Terminal Value” approach that involves making some assumptions about long-term cash flow growth is used in order to find the after forecast period of the company. The present value of the cash flows after the forecast period is called the terminal value. In this case, it enables the analyst to calculate for example the ten years period’s cash flows in detail, and then calculating the terminal value for the after ten years period (Üreten, Ercan, 2000;73). The terminal value formula is presented below;

$$X = \sum_{t=n+1}^{\infty} \frac{CF_t}{(1+WACC)^{t-n}} \quad (11)$$

Where X is the terminal value, CF_t is the cash flows to company in period t , n is the forecast period and $WACC$ is defined as the weighted average cost of capital. The discounting process yields the terminal value. Hence, company value can be expressed as;

Company Value=Present Value of the cash flows in forecast period+ Present value of the cash flows after forecast period

Accordingly, in order to employ $WACC$ method, the analyst should determine a forecast period and develop cash flow projections throughout this period. For the cash flows after the forecast period, the analyst should calculate terminal value.

Gordon growth model

There are several ways to estimate a terminal value of cash flows, but one well known method is to value the company as a perpetuity using the Gordon growth model (Arumugam;2007,42). Cash flow method assumes that the cash flows will continue growing at a constant rate forever. This allows application of perpetuity model. Assuming that the company generates a cash flow to company of CF_t at

terminal year t and such cash flow grows with a constant growth rate of g (stable) after terminal year, net present value of cash flows to Company after year t discounted at a discount rate of WACC can be calculated as follows:

$$X = \frac{CF_n(1 + g_{stable})}{WACC - g_{stable}} \cdot \frac{1}{(1 + WACC)^n} \quad (12)$$

Where X stands for the terminal value as at the beginning of forecast period. The model uses this formula;

$$\text{Terminal value} = \text{Final projected year cash flow} / (\text{Discount rate} - \text{growth rate}) \quad (13)$$

This formula rests on the big assumption that the cash flow of the last projected year will stabilize and continue at the same rate forever.

$$X = (\text{FCFn}) / (\text{WACC} - g) \quad (14)$$

Where: X :terminal value

FCFn : free cash flow generated by the firm in year n

n :last year of the projections

g :constant rate of increase in perpetual free cash flows

WACC :discount rate

The subject of growth rate can be analyzed in two aspects. Since cash flow values are estimated for each year separately (in 5 or 10 years period); growth rate is found by taking “Net Sales” into account. The increase in net sales is proportionally discounted to cash flows and EBIT after necessary additions and disposals. Furthermore, the growth rate (g) that is used in the measurement of terminal value (Öztunalı, 2008; 109).

This ratio has an important impact on continuance value and company’s value. The economic conditions of the country should be taken into the account while calculating this ratio. Mainly, growth rate that is lower than the country’s

expected growth rate is determined. In the above model, it is assumed that FCF will remain constant, “g” will be constant forever and WACC will remain constant.

In all these calculations, inputs should be consistent with each other. As an example, if cash flow values are nominal, then discount rates should be nominal.

2.1.5. Calculating Total Enterprise Value (EV)

Once the terminal value and cash flows to company have been estimated, they are discounted back to the present to yield the company value. Calculation of company value is formulated in the below formula (Akbulut, 2006; 29);

$$EV = \sum_{t=1}^{t=n} \frac{CF_t}{(1+WACC)^t} + \frac{X}{(1+WACC)^n} \quad (15)$$

where *EV* stands for company value, *CF_t* is the cash flow to company in period *t*, *n* stands for the forecast period for the company, *X* stands for the terminal value of the company as at the end of forecast period and *WACC* is the weighted average cost of capital.

2.1.6 Strengths and Weaknesses of Discounted Cash Flow Method

The mechanics of discounted cash flow analysis have been explained and strengths and weaknesses will be examined under this heading.

Discounted cash flow (DCF) analysis tries to find out the value of a company today based on projections of how much money it will generate in the future. The basic idea is that the value of any company is the sum of cash flows that it produces in the future, discounted to the present at an appropriate rate.

Discounted cash flow (DCF) analysis treats a company as a business rather than just a stock price, and it requires thinking through all the factors that will affect the company's performance. It produces the closest value to an intrinsic stock value.

The alternatives to discounted cash flow (DCF) are relative valuation measures, which use multiples to compare companies within a sector. While relative valuation variables such as price earnings (P/E), enterprise value to earnings before interest, tax, depreciation and amortization (EV/EBITDA) and price to sales ratios are simple to calculate, they are not very useful if an entire sector or market is over or undervalued. A carefully designed discounted cash flow (DCF) can be used as a management tool to grab the opportunities in order to maximize the shareholder value and to reduce the threats to the company.

Unlike relative valuation tools such as the P/E ratio, discounted cash flow (DCF) relies on free cash flows. Free cash flow is a trustworthy measure that avoids much of the errors involved in reported earnings.

Although discounted cash flow (DCF) analysis certainly has its advantages, it also has its shortcomings. If the inputs to the free cash flow forecasts which are discount rates and perpetuity growth rates are not correct due to uncertainties; the value generated for the company will not be accurate. The model is not suited to short term investing; it focuses on long-term value. A well-designed discounted cash flow (DCF) helps to avoid buying an overvalued company, but it may also miss short-term share price run-ups that can be profitable.

Giving the technical background of DCF method, in the following chapter III, an application for the discounted cash flow approach will be examined on a steel producer company (Erdemir) traded on Istanbul Stock Exchange.

CHAPTER III

APPLICATION OF THE DISCOUNTED CASH FLOW METHOD AT EREĞLİ DEMİR ÇELİK (ERDEMİR)

3.1. Aim and Importance of the Study

The objective of this study is to develop a procedure for the company valuation and to implement this procedure on Ereğli Demir Çelik (Erdemir) which is traded on Istanbul Stock Exchange. Erdemir is selected due to the fact that the company is publicly traded and has transparent information. Erdemir is characterized with high growth, high investment requirements and increasing competition. In addition, the company's large scale operations allow getting information from the global steel industry easily.

Discounted cash flow valuation technique is used in valuing Erdemir. This method measures the value of an asset based on the present value of future cash flows that it is expected to generate. In valuing the company a step by step procedure is applied. Firstly, the industry and company profile is examined in order to know the structure of the company before starting the valuation. Second, the historical financial statement of the company is analyzed in order to construct the proforma financial statement. With the help of the proforma financial statements the forecasted financial statements and cash flows are constructed and they are discounted to the year of 2009 in order to find out the company value. Finally, the present value of the cash flows ,namely the value of the company is compared with the fair market value.

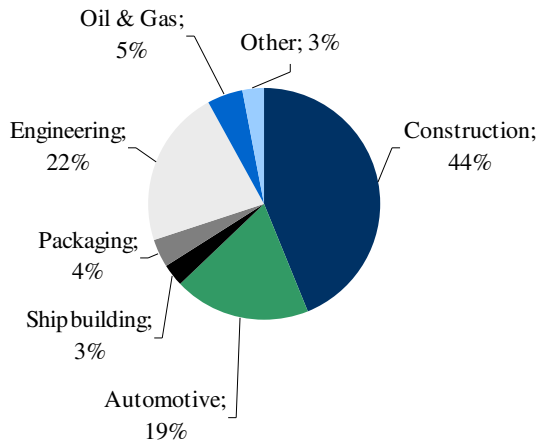
3.2 Industry and Company Profile

3.2.1 Global Steel Industry

Global steel industry's consumption is shaped by the construction and automotive sector followed by the engineering sector. As shown in Figure 2, construction sector consumes the most amount of steel among the other sectors. The

changes in construction sector automatically shape the steel sector's production and supply.

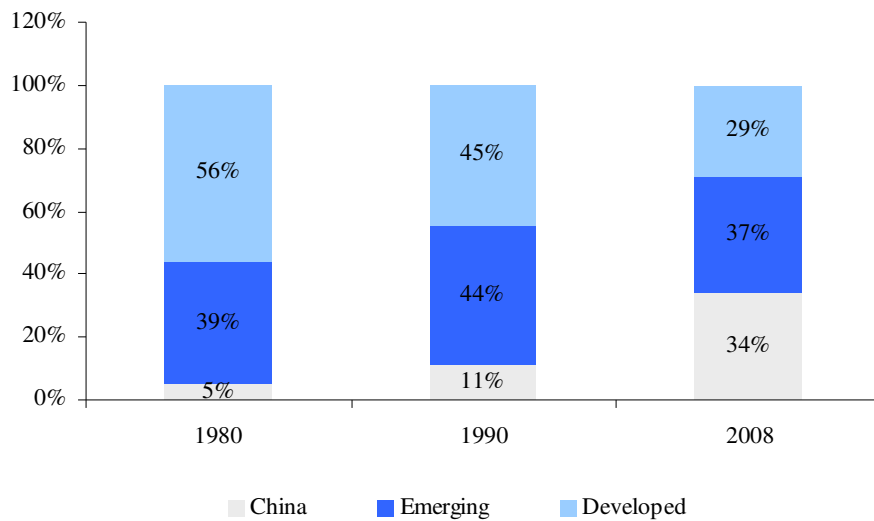
Figure 2: Steel Consumption by Sector - OECD Countries (2008)



Source: OECD

As shown in Figure 3, while the steel consumption in emerging countries increased to %44 in 1990 from %39 in 1980, it has decreased to %37 in 2008 due to the effect of global crises. The consumption in developed countries is more effected from the global crises than the emerging countries.

Figure 3: Global Steel Consumption by Countries (2008)



Source: OECD

On the contrary of the decrease in steel consumptions in developed and emerging countries, China has increased its consumption in 2008. The share of China in global steel consumption increased from 5% in 1980 to 34% in 2008. As of 2008, China and other emerging economies have a 71% share in global steel consumption. Hence, the pace of growth of emerging economies will be key for the recovery of the global steel industry. According to the World Steel Association's forecasts, steel demand in Brazil, Russia, India and China, is expected to fall 5.9% in 2009, with Russia, experiencing the weakest demand out of the four.

Table 6. World Bank Growth Forecasts

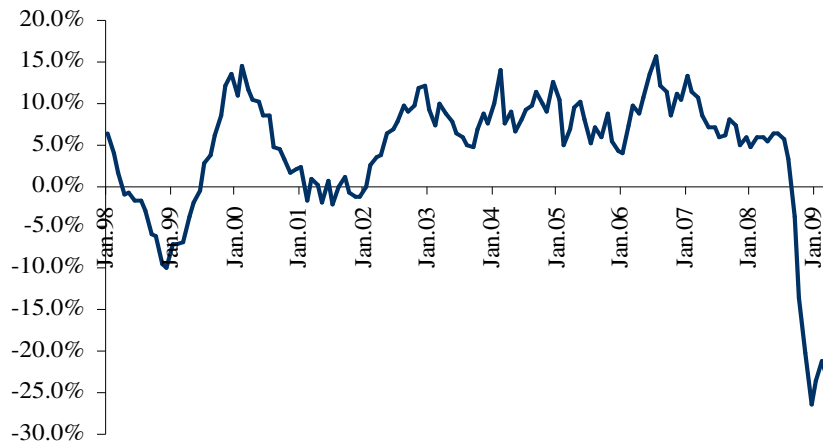
	2008	2009E	2010E
World	1.9	(1.7)	2.3
High income	0.8	(2.9)	1.6
OECD	0.7	(3.0)	1.5
Euro area	0.7	(2.7)	0.9
Japan	(0.7)	(5.3)	1.5
US	1.1	(2.4)	2.0
Non-OECD	2.8	(2.0)	2.9
Developing	5.8	(2.1)	4.4
East Asia and Pacific	8.0	(5.3)	6.6
E. Europe and Central Asia	4.2	(2.0)	1.5
Latin America	4.3	(0.6)	2.2
Middle East/N. Africa	5.5	3.3	4.3
South Asia	5.6	3.7	6.2
Developing countries exc China and India	4.6	0.0	2.7

Source: World Bank

According to the World Bank forecasts as shown in Table 6, high income countries will have negative growths in 2009; where as developing countries will have positive growths. In 2010 both of the high income and developing countries will have positive growth rates.

As shown in Figure 4, decrease in production started in the last quarter of 2008 and are expected to continue until the first quarter of 2009. World crude production declined by 20% in the last quarter of 2008. This followed a further 23% cut the first quarter of 2009. Global production is expected to fall by 19% in 2009.

Figure 4: World Monthly Crude Steel Production



Source: World Steel Association

In 2009, global steel demand is expected to show its largest percentage drop since World War II. As a result of financial and economic crisis, the demand in major steel consuming sectors (auto and construction) started to decline in the first quarter of 2008. This created a direct impact on steel consumption. As shown in Table 7, global steel consumption is expected to contract by 5% in 2009 and recover 10% in 2010. Steel consumption growth is expected to be normalized starting from 2011.

Flat steel and long steel prices are expected to decline by 38-41% in 2009 and there will be a slight recovery in the following years. The increase in prices in global steel industry which started in 2003 came to an end in the last quarter of 2008 and slowing demand led to sharp decline in steel prices. The estimated growth in flat steel price is 9% in 2010 and 3% in 2011. There will be only slight decline in pricing in 2012 and 2013 given the ongoing overcapacity. The annual growth rate estimates for the long steel prices are similar to flat steel.

Table 7:Global Steel Forecasts

Crude Steel Production (mn tons)	2003	2004	2005	2006	2007	2008	2009E	2010E	2011E	2012E	2013E
Europe	213	226	220	234	239	229	169	207	222	235	245
CIS	107	114	114	120	125	114	93	112	116	125	134
N. America	126	134	128	132	133	124	79	100	109	113	116
Asia Pacific	451	518	593	685	764	776	775	836	877	901	913
Other	73	77	78	79	83	81	74	89	100	110	119
World	970	1,069	1,133	1,250	1,344	1,324	1,191	1,344	1,424	1,484	1,526
% Change	7.3%	10.2%	6.0%	10.3%	7.5%	-1.5%	-10.0%	12.9%	6.0%	4.2%	2.8%
Finished Steel Consumption (mn tons)	2003	2004	2005	2006	2007	2008	2009E	2010E	2011E	2012E	2013E
Europe	180	194	189	216	230	211	162	195	207	220	233
CIS	36	38	42	48	57	50	39	42	44	47	49
N. America	138	157	145	160	147	132	92	111	117	123	127
Asia Pacific	461	511	573	609	680	694	739	791	830	854	880
Other	74	81	85	93	102	112	107	114	119	126	135
World	889	981	1,034	1,126	1,216	1,199	1,139	1,253	1,317	1,370	1,424
% Change	7.4%	10.3%	5.4%	8.9%	8.0%	-1.4%	-5.0%	10.0%	5.1%	4.0%	4.0%

Source:Wold Steel Association

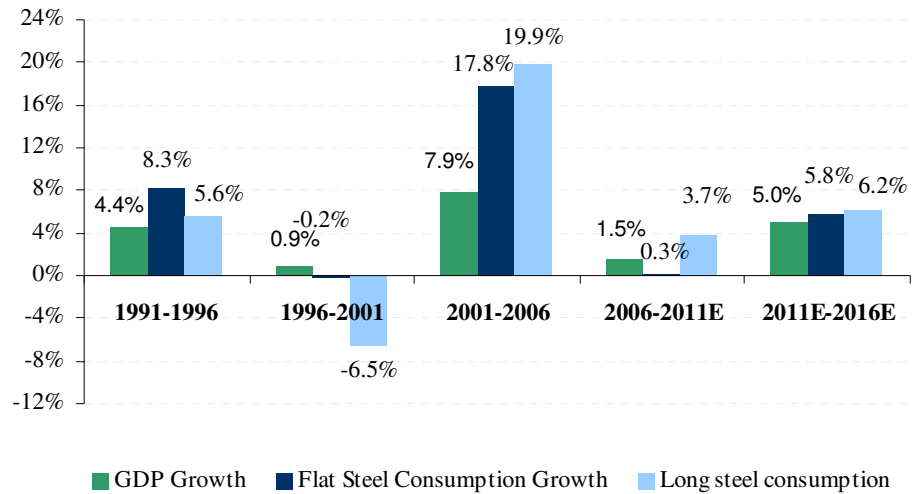
There are substantial price decreases in raw materials in 2009.2008 was an exceptional year for raw material suppliers as the price of iron ore and coking coal increased by 65% and 206%, respectively. However, the sharp contraction in demand and production decreases led to created bargaining power for steel producers. The expected price cuts in iron ore and coking coal will be 30% and 60%, respectively. It is expected that there will be a further 10% price decline in iron ore in 2010.

3.2.2 Turkish Steel Industry

Kardemir, Erdemir's Ereğli and Isdemir plants account for 26% of the total crude capacity of Turkey. According to World Steel Associations 2008 data, the Turkish steel industry, with its 26.8 million tons crude steel production, ranks 11th in global steel output and 3rd in Europe. Turkey is an importer in flat steel whereas exporter in long steel. Contrary to many developed countries, 83% of Turkey's crude steel production capacity is allocated to long products, 15% to flat products and 2% to special products. Hence, Turkey has been operating with excess capacity in long steel and has a capacity shortage in flat steel. The major export markets for long steel are the Middle East and Gulf region (48%) and the EU (33%).The supply shortage in flat steel increased the demand to produce this product by the Turkish flat steel sector in the past two years. Atakas and Russian MMK, Arcelor Mittal and Borusan, Borcelik, Colakoglu Metalurji and Kibar Holding started to establish flat steel production facilities. However, due to sharp decline in steel prices in the end of 2008 and beginning of 2009, some of these investments were not started and postponed. Only two investments Atakas-MMK and Colakoglu Metalurji have started and are expected to be operational in 2010 or 2011.

As shown in Figure 5, in Turkey, steel consumption is growing at a faster rate than GDP growth. As a fast growing emerging economy, Turkey's flat and long steel consumption had annual growth rate of 6.3% and 4.2%, respectively, in the past 10 years, whereas average GDP growth was 3.8% in the same period.

Figure 5: Turkey's Steel Consumption and GDP Growth



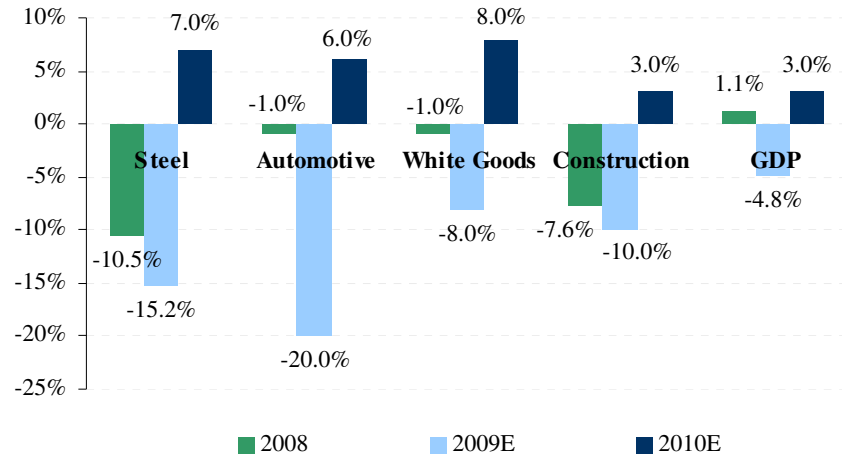
Source: <http://www.worldsteel.org/>

Where 2011E and 2016E represents the expected dates.

In the past five years, flat steel and long steel consumption growth rates had respective annual growth rate of 8% and 9.3% whereas the average growth rate in GDP was 5.6%.

As it is shown in Figure 6, it is expected that a 15% contraction and 7% growth in steel consumption will be realized in 2009 and 2010 respectively. The global financial crisis started to affect Turkish steel industry and its main drivers (automotive, construction and white goods sectors) in the second half of 2008. A %20 contraction in automotive industry and 8% contraction in white goods and %10 contraction in construction sectors are expected in 2009. As a result, it is estimated that a 15% decline in total steel consumption will be realized in 2009. 2010 is expected to be a recovery year, where automotive and white goods sectors are expected to grow by 6% and 8%, respectively, and construction sector to grow by 3%. Based on these forecasts, steel consumption is expected to increase by 7% in 2010.

Figure 6: Turkey's Steel Industry Annual Growth and The Growth in its Main Drivers



Source: <http://www.worldsteel.org/>

3.2.3. Company Profile

Ereğli Demir Çelik Fabrikaları T.A.Ş.(Erdemir) was incorporated on May 11, 1960 and commenced production with a capacity of 0.5 million tons of crude steel and 0.4 million tons of flat steel on May 15 ,1965. The main operating activities of the Company are producing iron, steel, alloy and non alloy steel, cast and pressing steel and coke. The main shareholder of the Company is Ataer Holding A.Ş. The Company completed the Capacity Expansion and Modernization Investments which was one of the biggest industrial investments of Turkey. Erdemir and Isdemir's products include plates, coils, tins, chrome and coated flat steel products .Erdemir is one of the major players of iron and steel industry with industrial facilities in Turkey and Romania and also owns 80% of iron ore reserves in Turkey.

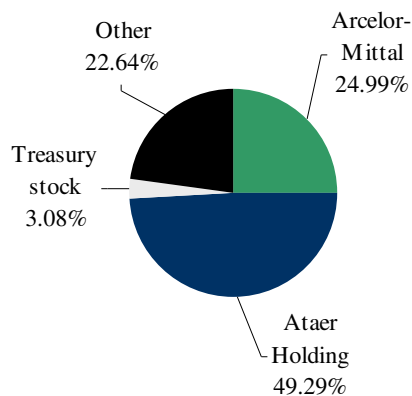
The Company produces panels, hot and cold rolled coil and tin, chrome and zinc coated flat steel products to international quality standards. Erdemir provides basic input with their products for fields such as the defense industry, construction, pipes, automobiles, ship building, durable household appliances, agricultural instruments, pressure vessels, food and packaging materials and office materials.

Erdemir has taken fundamental steps by acquiring plants established at home and abroad and erecting new plants in the framework of its growth strategies.

Erdemir is Turkey's first and Europe's seventh largest steel producer, with two plants located in Ereğli and Iskenderun. Located on the Black Sea coast, Ereğli plant is Turkey's sole flat steel producer, with a production capacity of 3.5million tons/year liquid steel. The Isdemir plant, which is located on the Mediterranean coast, is the country's second largest steel producer with an annual production capacity of 3.5million tons/year liquid steel. Erdemir acquired 91% of Isdemir from Turkish government in 2002. Erdemir and Isdemir's products include plates, HR and CR coils, tins, chrome and coated flat steel products.

Oyak Group (the Army Pension Fund) acquired 49.3% of the company from the government in February 2006. Erdemir has 10 subsidiaries, all of which are consolidated, except Arcelor Ambalaj Celigi and Borcelik. None of Erdemir's subsidiaries makes a material contribution to income, except for Isdemir and Erdemir Maden. The ownership structure is presented in Figure 7;

Figure 7: Ownership Structure of Erdemir

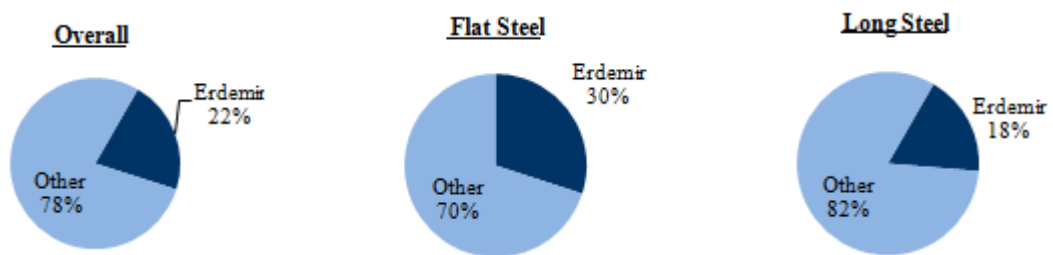


Source:ISE

Erdemir has 22% share in Turkish steel market. The Company has 30% share in the flat steel market, while the share of other local producers is 5-10%. Hence, 60-

65% of local flat steel demand is met through imports. Apart from Erdemir, only Borcelik (a joint venture between Borusan Holding and Arcelor Mittal) is a major flat steel player. In the long steel market, Erdemir's share is 18% and other local long steel producers have 72% share and rest of the demand (10%) is met through imports. As of 2008, exports had 21% and 28% share in Erdemir's flat steel and long steel sales volumes, respectively.

Figure 8: Market Share of Erdemir (2008)



Source: Erdemir Annual Report

The Company makes most of its sales to automotive, pipe and profile industry. The percentage of the industry in which the Company makes sales are presented in Table 8

Table 8: Industry of the Company's Customers

Industry	Percentage of the Customers (%)
Pipe & profile industry	24.0%
Automotive industry & suppliers	20.1%
Automotive industry	13.0%
Household & office appliances	12.0%
White goods industry & suppliers	6.5%
Heating equipment	4.9%
Packaging	4.0%
Exports	2.3%
e-rollers	2.0%
Steel service centers	1.9%
Electrics & electronics	1.9%
Construction	0.4%
Other	7.0%

Source: Erdemir Annual Report

As presented in Table 8, the sales of the company are affected by the sales' structures of the customers. Most of sales are made to pipe and profile industry, and automotive industry and supplies.

Table 9: Sales Volume of Erdemir

Million tons	2003	2004	2005	2006	2007	2008
Flat (Eregli)	3.6	3.6	3.6	3.9	4.3	3.9
Cold Rolled	1.4	1.6	1.6	1.7	1.7	1.5
Hot Rolled	2.1	1.9	1.9	2.1	2.4	2.2
Plate	0.0	0.1	0.0	0.1	0.2	0.2
Isdemir	2.0	2.0	2.0	2.1	1.9	2.0
Long	2.0	2.2	2.0	2.1	1.9	2.0
Hot Rolled	-	-	-	-	-	0.0
Iron ore (Erdemir Maden)	3.1	1.8	1.8	1.8	1.9	1.6
Pellet	3.1	0.8	1.1	1.1	1.3	1.1
Other	-	1.0	0.7	0.6	0.6	0.5

Source: Erdemir Annual Report

As shown in Table 9, sales volume of Erdemir shows a decreasing trend in 2008 due to the effect of financial crises.

Erdemir makes %77 of its sales to local customers and the remaining %23 constitutes the exports. In 2012, the company expects to increase its local sales ratio to % 84, whereas decrease the exports to %16. In 2008, its exports are majorly constitutes of Europe and USA by %55 and %23 respectively.

3.3 Valuation Methodology

When forecasting the financial statements of the company, both the Turkish industry and the global industry should be considered due to the fact that the owners of the company will shape their forecasting sales according to both the global industry and Turkish industry.

The valuation process will be examined in four steps; Projection of Cash Flows, Estimation of Discount Rate, Determination of Capital Structure, and Determination of Terminal Value.

3.3.1 Projection of Cash Flows

Projection of cash flows will be examined in four headings; Collection and Analyzing of Historical Financial Statements, Calculation of Industry Forecasts, Calculation of Capital Expenditure Working Capital Forecasts and Calculation of Free Cash flows.

3.3.1.1 Collection and Analyzing of Historical Financial Statements

Erdemir publishes financial information in accordance with International Financial Reporting Standards. Financials in Turkish Lira were converted into US Dollar in order to deprive the effect of inflation. Income statement was translated from the average exchange rate throughout the relevant period, whereas balance sheet was converted from the exchange rate as at the balance sheet date. Balance sheet and income statement information for Erdemir is provided in Table 10 and Table 11.

Table 10: Summary Balance Sheet of Erdemir

US \$ million	2005	2006	2007	2008
Cash	429	539	506	640
Marketable Securities	15	0	0	0
Trade Receivables	555	537	684	383
Due from Related Parties	82	39	114	70
Inventories	707	983	1,236	1,678
Other Current Assets	142	192	249	289
Current Assets	1,930	2,290	2,073	3,060
Net PPE	3,257	3,685	5,205	4,426
Long-term financial assets	29	31	27	20
Investment property	23	22	27	30
Intangible fixed assets	35	34	46	93
Deferred tax assets	90	116	154	153
Other non-current assets	10	4	58	66
Non-Curret Assets	3,444	3,891	5,517	4,787
Total Assets	5,374	6,181	6,175	7,847
Short Term Fin. Debt	447	385	615	1,498
Trades Payable	263	280	339	258
Provisions	119	126	101	151
Other payables and current liabilities	181	240	275	302
Current Liabilities	1,009	1,031	1,330	2,210
Long Term Fin. Debt	628	1,083	1,535	1,481
Provisions	50	63	93	77
Deferred Tax Liabilities	16	11	31	67
Other LT Liabilities	15	58	1	0
Total Long Term Liabilities	709	1,215	1,660	1,626
Minority Interest	78	94	137	110
Total paid-in capital	364	347	728	755
Inflation Adjustment to Share Capital	1,597	1,525	631	481
Treasury Shares (-)	(11)	(11)	(30)	(29)
Premium in excess of par	84	80	199	152
Profit Reserves	350	474	1,257	1,095
Retained Earnings	1,040	927	1,807	1,308
Net Profit for the Period	155	500	586	139
Total Equity	3,578	3,841	5,179	3,901
Total Lia. & Equity	5,374	6,181	6,175	7,847

Source:ISE

Table 11: Summary Income Statement of Erdemir

US \$ million	2005	2006	2007	2008
Net Sales	3,133	3,424	4,119	5,260
COGS	(2,794)	(2,724)	(3,425)	(4,615)
Gross Profit	339	701	694	645
Operating Expenses	(166)	(125)	(132)	(157)
Operating Profit	173	576	562	489
EBITDA	498	822	824	664
Other Income	80	50	(4)	(87)
Financial Expense	(59)	(75)	74	(181)
Minority Interest	8	(19)	(19)	(13)
Profit before tax(PBT)	202	531	613	207
Tax	(58)	(53)	(91)	(44)
Net Profit	144	478	522	163

Source:ISE

In order to forecast the future financial statements, historical financial statements should be examined according to the income statement and balance sheet ratios.

Table 12. Income Statement Analysis of Erdemir

	2005	2006	2007	2008
Gross margin	10.8%	20.5%	16.9%	12.3%
Operating margin	5.5%	16.8%	13.6%	9.3%
Op exp/net sales	5.3%	3.7%	3.2%	3.0%
EBITDA Margin	15.9%	24.0%	20.0%	12.6%
Net Margin	4.6%	14.0%	12.7%	3.1%

The Company averagely has % 15 gross margin and %18 EBITDA throughout the years. In addition net sales shows an increasing trend. After the year 2005, net profit reaches to 500 US \$ million , whereas due to the financial crises it decreased to 163 US \$ million in 2008.

When analyzing the historical financial statements, the most important issue to consider is the return on invested capital (ROIC).A Company can only create

value when the return of the invested capital (ROIC) is higher than the WACC. The major components of ROIC are;(Üreten,Ercan,2000;84)

$$ROIC = \frac{NOPLAT}{Capital\ Invested} \quad (15)$$

Where, *NOPLAT* is the net operating profit less adjusted taxes. Adjusted taxes include both the corporate taxes and the deferred taxes. Since the financial statements of Erdemir are published according to the IFRS, the taxes in the above tables represent the adjusted taxes.

Table 13: Balance Sheet Analysis of Erdemir

	2005	2006	2007	2008
Days Receivable	64	56	60	26
Days Payable	34	37	36	20
Days Inventory	91	130	130	131
Cash Conversion Cycle	121	149	154	137
Current Ratio	1.9	2.2	1.6	1.4
Debt to Equity	30%	38%	42%	76%
Operating Cash Flow	440	685	784	339
ROIC	-	12.4%	8.9%	7.0%
ROE	-	12.9%	11.6%	3.6%
ROA	-	8.3%	8.5%	2.3%
Debt/Equity	30.1%	38.2%	41.5%	76.4%

According to the balance sheet ratio analysis of Erdemir, ROIC,ROE and ROA ratios are in decreasing trend due to the decrease in NOPLAT.In addition investments related with the capacity increase has been realized in 2008, resulting in decrease in ROIC ratio in 2007 and 2008.On the contrary of the reduction in these ratios, debt on equity ratio increases due to the intend in getting more debt in order to finance the operations in financial crises.

Ignoring the effect of the financial crises which has more affect at year 2008, the Company shows an improvement in both balance sheet and income statement

sides. The growth rates are calculated according to the previous years and presented in the table below;

Table 14: Growth Rates of Erdemir

	2006	2007	2008
Net Sales	9.3%	20.3%	27.7%
EBITDA	65.1%	0.3%	-19.4%
Net Income	231.6%	9.2%	-68.7%

The increase in net sales is offset by the increase in operating expenses and as a result EBITDA and net income decreased in 2008.

Major investments related to the capacity in Isdemir which is being transformed from a long steel producer to a long and flat steel producer are completed as of 2008. As a result of these investments, Isdemir currently has 3.5mn tons flat steel and 5mn tons slab capacity. As shown in Table 3.10, while the production capacity was 2.2 million tons through 2005 and 2007, it has increased to 3.5 millions ton in 2008. Erdemir spent \$2.9 billion in the last couple of years for modernization, capacity, and flat steel conversion investments. Through these investments, Erdemir's flat steel production capacity increased from 4.2 million tons in 2006 to 4.8mn tons in 2007, and further to 8.3mn tons at the end of 2008. The Company increased its slab capacity from 5.8million tons in 2007 to 8.5million tons in 2008.

Table 15: Production Capacity of Erdemir

Million tons	2005	2006	2007	2008	2009E	2010E	2011E
Erdemir (Total)							
Liquid Steel	5.2	5.4	5.4	7.0	7.5	7.5	8.8
Slab	3.0	3.3	5.8	8.5	8.5	8.5	8.5
Flat Steel	3.5	4.2	4.8	8.3	8.3	8.3	8.3
Long Steel	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Billet	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Eregli Plant							
Liquid Steel	3.0	3.2	3.2	3.5	3.5	3.5	3.5
Slab	3.0	3.3	3.3	3.5	3.5	3.5	3.5
Flat Steel	3.5	4.2	4.8	4.8	4.8	4.8	4.8
Long Steel	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Iskenderun Plant							
Liquid Steel	2.2	2.2	2.2	3.5	4.0	4.0	5.3
Billet	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Slab	-	-	2.5	5.0	5.0	5.0	5.0
Flat Steel	-	-	-	3.5	3.5	3.5	3.5

Although the company cannot utilize the additional capacity in 2009 due to the contraction in demand, the affect of global crises is expected to diminish and it is expected that capacity utilization will increase in the next 3-4 years, leading to significant volume growth. With the increase in production capacity, it is expected that total sales volume to increase from 7 million tons in 2009 to 8.4 million tons in 2012, as shown in Table 16.

Table 16: Sales Volume Forecasts of Erdemir

Million tons	2007	2008	2009E	2010E	2011E	2012E
Sales volume	6.2	5.9	7.0	7.5	8.0	8.4
Eregli	4.3	3.9	4.4	4.6	5.1	5.3
Isdemir	1.9	2.0	2.6	3.0	2.9	3.1
Million tons	2013E	2014E	2015E	2016E	2017E	2018E
Sales volume	8.9	9.1	9.4	9.6	9.7	9.9
Eregli	5.5	5.6	5.9	6.0	6.0	6.1
Isdemir	3.4	3.5	3.6	3.6	3.7	3.7

3.3.1.2. Calculation of Industry Forecasts

In order to forecast the future financial statements of the Company, the Company's and the market's main growth indicators should be examined. The sales of Erdemir are affected by both the Turkish Steel Industry and the Global Steel Industry.

When forecasting financial statements, sales forecasts are firstly performed. Erdemir's sales forecast figures are obtained from the management of the Company and from the industrial expectations as well.

As shown in Table 16 and 17, due to sharp decline in steel prices and contraction in demand, Erdemir's sales volume in Eregli plant declined from 4.3 million of tons to 3.9 million tons in 2008. The increase in sales volume in 2009 can not offset the decrease in sales prices resulting in % 44 decreases in sales revenue forecasts in 2009.

The Company Management expected 35% growth in revenues mainly due to volume growth in flat production and sales. The main driver for sales growth is the result of the volume growth due to the capacity increase.

Table 17. Price and Revenue Forecasts of Erdemir

US \$ Million	2007	2008	2009E	2010E	2011E	2012E	2013E	2014E	2015E	2016E	2017E	2018E
Revenues	4,119	5,260	3,649	4,913	5,478	6,477	5,941	6,104	6,195	6,287	6,381	6,476
Long Steel	1,275	1,481	914	1,230	1,425	1,567	1,379	1,379	1,400	1,421	1,442	1,464
Flat Steel	1,685	2,167	1,880	2,575	3,186	4,226	3,951	4,108	4,169	4,232	4,295	4,360
Long Other	1,046	1,493	750	997	750	560	482	482	489	496	504	511
Other	113	118	106	112	117	123	129	136	137	138	140	141
Average Prices (\$/ton)	663	885	521	651	684	773	670	670	657	657	657	657
(%)	16.9	33.5	-41.1	24.9	5.0	13.0	-13.3	0.0	-1.9	0.0	0.0	0.0
Long Steel	755	1,007	609	723	798	878	773	773	702	702	702	702
(%)	21.8	33.3	-39.5	18.8	10.3	10.0	-12.0	0.0	-9.1	0.0	0.0	0.0
Flat Steel	646	891	537	670	674	755	649	649	649	649	649	649
(%)	4.5	37.9	-39.7	24.7	0.7	12.0	-14.0	0.0	0.0	0.0	0.0	0.0
Long Other	545	732	375	498	500	560	482	482	482	482	482	482
(%)	25.3	34.4	-48.8	32.9	0.4	12.0	-14.0	0.0	0.0	0.0	0.0	0.0

Source: Company Management

The management expects the sales volume to remain at the same level in 2009. In 2010, with the increase in sales volume (as a result of the capacity increase) and the increase prices, the sales revenue is expected to increase to \$ 4,097 millions in 2009 from \$ 3,413 millions in 2008. Another reason of the increase in sales volume expectations is due to the expected growth in local and European auto industries.

COGS expectations are made related with the sales projections. The structure of COGS shapes the COGS expectations. As presented in Table 18, COGS of Erdemir mainly consist of the raw materials by 56% and followed by labor (13%) and energy (6%). Since the raw materials have a big percentage in COGS, it effects the COGS at the most amount.

Table 18. COGS Percentage of Erdemir

COGS	(%)
Raw Materials	56.3%
Inventory write downs	16.6%
Labor	12.6%
Energy	5.8%
Other	5.0%
Depreciation	3.7%

Erdemir cost projections are based on proportions of sales forecasts. Management forecasts the cost projections as an average of %80 of the sales forecasts. The depreciation amounts in the forecasted cost of sales (COGS) are excluded from this account and presented separately in the cash flow. Cost projections for Erdemir are provided in Table 19.

Erdemir's management has been taking measures, such as reducing labor force and increasing energy efficiency, and achieved significant labor and energy efficiency gains in the last couple of years. The management aims further efficiency gains in 2009 and 2010.

Table 19. Cost and Expense Forecasts of Erdemir

US\$ Million	2009E	2010E	2011E	2012E	2013E	2014E	2015E	2016E	2017E	2018E	2019E
Net Sales	3,649	4,913	5,478	6,477	5,941	6,104	6,195	6,287	6,381	6,476	6,572
COGS	(3,301)	(3,981)	(4,213)	(5,024)	(4,755)	(4,903)	(5,040)	(5,113)	(5,159)	(5,229)	(5,298)
Gross Profit	348	932	1,265	1,453	1,185	1,202	1,156	1,174	1,222	1,247	1,274
Operating Expenses	(148)	(159)	(169)	(186)	(197)	(202)	(209)	(212)	(215)	(219)	(222)
Operating Profit	200	773	1,096	1,267	989	1,000	947	962	1,007	1,028	1,052
Other Income	(24)	(17)	(12)	(8)	(8)	(9)	(9)	(9)	(9)	(9)	(9)
Financial Expense	(180)	(134)	(121)	(111)	(101)	(91)	(81)	(72)	(62)	(53)	(43)
Minority Interest	(16)	(18)	(18)	(19)	(21)	(22)	(22)	(22)	(23)	(23)	(23)
Profit before tax	(20)	604	946	1,129	859	879	835	859	913	943	976
Tax	0	(117)	(189)	(226)	(172)	(176)	(167)	(172)	(183)	(189)	(195)
Net Profit	(20)	487	757	903	687	703	668	687	731	755	781
EBITDA	364	944	1,273	1,454	1,185	1,205	1,161	1,177	1,216	1,219	1,220
Depreciation	164	171	177	187	196	205	215	215	209	191	168

Source:Company Management

Operating expenses mainly include, general and administration expenses, marketing expenses, selling and marketing expenses. The depreciation and the amortization expenses are excluded from the general and administrative expenses and are presented separately in order to find the EBITDA. Management forecasts the operating expenses to be %3 of the forecasted sales revenue.

Financial expenses comprise of the interest expenses of the short term and long term financial debts. Management forecasts the interest expenses to be the %5 of the total long term and short terms. Minority interest refers to the portion of a subsidiary corporation's stock that is not owned by the parent corporation. Minority interest belongs to other investors and is reported on the consolidated balance sheet to reflect the claim assets belonging to other, non-controlling shareholders. Also, minority interest is reported on the consolidated income statement as a share of profit belonging to minority shareholders. Management forecast the minority expense will not change throughout the years.

The forecasted tax expense is determined as the %20 of the profit before tax (PBT). As the Company forecasts to have a loss at the end of 2009, there is not any tax expense forecasted for this year.

Based on the revenue and cost assumptions EBITDA margin is expected to increase from 10% in 2009 to 23.2% in 2011 with the decreasing effect of the financial crises.

The reason of the low level of operating expenses is attributable to the fact that management expects \$160million cost savings in 2009 due to a 35% cut in wages. Erdemir's management and trade union agreed to cut salaries and wages by 35% for all employees (including both white collar and blue collar employees) starting from May 2009. Erdemir's number of employees declined by 8% from 14,637 at the end of 2008 to 13,417 in May 2009.

Table 20. Proportion of Income and Expenses to Sales

Margins	2009E	2010E	2011E	2012E	2013E	2014E	2015E	2016E	2017E	2018E	2019E
Net Sales	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
COGS	-90%	-81%	-77%	-78%	-80%	-80%	-81%	-81%	-81%	-81%	-81%
Gross Profit	10%	19%	23%	22%	20%	20%	19%	19%	19%	19%	19%
Operating Expenses	-4%	-3%	-3%	-3%	-3%	-3%	-3%	-3%	-3%	-3%	-3%
Operating Profit	5%	16%	20%	20%	17%	16%	15%	15%	16%	16%	16%
EBITDA	10%	19%	23%	22%	20%	20%	19%	19%	19%	19%	19%
Other income	-1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Financial expenses	-5%	-3%	-2%	-2%	-2%	-1%	-1%	-1%	-1%	-1%	-1%
Minority Interest	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
PBT	-1%	12%	17%	17%	14%	14%	13%	14%	14%	15%	15%
Tax	0%	-2%	-3%	-3%	-3%	-3%	-3%	-3%	-3%	-3%	-3%
Net Profit	-1%	10%	14%	14%	12%	12%	11%	11%	11%	12%	12%

Table 21. Forecasted Margin Analysis of Erdemir

Margins	2009E	2010E	2011E	2012E	2013E	2014E	2015E	2016E	2017E	2018E	2019E
Gross margin	9.5%	19.0%	23.1%	22.4%	20.0%	19.7%	18.7%	18.7%	19.2%	19.2%	19.4%
Operating margin	5.5%	15.7%	20.0%	19.6%	16.6%	16.4%	15.3%	15.3%	15.8%	15.9%	16.0%
Op exp/net sales	4.0%	3.2%	3.1%	2.9%	3.3%	3.3%	3.4%	3.4%	3.4%	3.4%	3.4%
EBITDA Margin	10.0%	19.2%	23.2%	22.4%	19.9%	19.7%	18.7%	18.7%	19.1%	18.8%	18.6%
Net Margin	-0.5%	9.9%	13.8%	13.9%	11.6%	11.5%	10.8%	10.9%	11.5%	11.7%	11.9%

In 2008, fixed and variable operating costs had increased due to declining production and sales volume levels. The management targets to achieve cost saving in this year through various measures: Increasing labor efficiency, reducing spare parts, repair and maintenance material costs, increasing usage of scrap materials, increasing usage of energy sources and reducing working capital turnover.

3.3.1.3. Calculation of Capital Expenditure and Working Capital Forecasts

The management revised down its investment budget for the next couple of years. The Company plans to undertake US\$167million, US\$149million and US\$132million capital expenditures (capex) in 2009, 2010 and 2011, respectively.

Table 22: Erdemir -Capex Plan

US\$ million	2006	2007	2008	2009E	2010E	2011E	2012E
Eregli	130	824	37	60	1	0	0
Iskenderun	543	116	524	100	144	56	68
Erdemir Mining	-	-	27	7	4	76	132
Erdemir-Total	673	940	588	167	149	132	200

Source: Erdemir Annual Report

The company is also planning to expand its existing iron ore mining making operations and targets to start a new mine. However, economic crisis, the management postponed investment until after 2011.

Management has projected the capital expenditures until 2012. After 2012, the management forecasts the capital expenditures will be the same, as they will make capital expenditures amounting to \$ 200 till 2019.

As explained in Chapter II, working capital is found by subtracting the current liabilities from current assets. Change in working capital is calculated by taking the difference of the two following years. In Table 23 the 2007 and 2008

Table 23: Working Capital Forecasts

US\$ Million	2007	2008	2009E	2010E	2011E	2012E	2013E	2014E	2015E	2016E	2017E	2018E	2019E
+/- in ST Trade Receivables	147	(301)	2	133	60	105	(57)	17	10	10	10	10	10
+/- in ST Other Receivables	0	0	0	0	0	0	0	0	0	0	0	1	2
+/- in Inventories	253	442	(239)	127	(40)	108	(75)	41	38	20	13	20	19
+/- in Other Current Assets	57	40	43	7	7	7	7	7	7	7	8	8	8
+/- in LT Trade Receivables	0	0	0	0	0	0	0	0	0	0	0	0	0
+/- in LT Other Receivables	0	0	0	0	0	0	0	0	0	0	0	0	0
+/- in ST Trade Payables	59	(81)	(29)	47	16	56	(19)	10	10	5	3	5	5
+/- in ST Other Payables	35	27	6	6	6	6	7	7	7	7	7	7	7
+/- in Advances	0	0	0	0	0	0	0	0	0	0	0	0	0
+/- in LT Trade Payables	0	0	0	0	0	0	0	0	0	0	0	0	0
+/- in LT Other Liabilities	(57)	(0)	0	0	0	0	0	0	0	0	0	0	0
Increase (decrease) in NWC	420	235	(204)	213	4	158	(112)	48	39	26	20	26	27

Table 24: Free Cash Flows of Erdemir

US\$ Million	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
EBIT	200	773	1,096	1,267	989	1,000	947	962	1,007	1,028	1,052
EBITDA	364	944	1,273	1,454	1,185	1,205	1,161	1,177	1,216	1,219	1,220
-Taxes on EBIT	0	149	219	253	198	200	189	192	201	206	210
-Capital Expenditures	167	149	132	200	200	200	200	200	200	200	200
-Change in NWC	-204	213	4	158	-112	48	39	26	20	26	27
Free Cash Flow	402	432	918	842	899	757	734	759	795	787	783

figures are calculated from the audited financial statements of the company, the remaining figures are obtained from the company management. After 2014, the NWC and the components of NWC are assumed to remain unchanged as it is difficult to predict the NWC in long period of time.

3.3.1.4. Calculation of Free Cash flows

Throughout this chapter, the components of free cash flows are tried to be calculated in order to find the remained cash flows to the company. First of all, EBITDA is computed by predicting the sales and consequently cost of sales as a proportion of sales. Operating expenses and other expenses and income are all computed as a proportion of sales. As a result, EBITDA has been computed. Change in NWC and CAPEX has been estimated according to the investment plans of the Company and as well as considering the figures 2007 and 2008 years.

In order to have a consistency with the discounted cash flow valuation methodology, the cash flows after the forecast period are projected to have a stable growth rate. As Erdemir is a high-growth company, the forecast period should be long enough to make the stable growth assumption after the forecast period reasonable. With that respect, a forecast period of 10 years is selected for the valuation of Erdemir starting from 2010 until 2019.

As explained in Chapter II , free cash flows are calculated as;

$$CF(t) = EBITDA (t) \times (1 - T(t)) - \Delta W C(t) - CAPEX(t)$$

According to this equation, free cash flows of Erdemir are presented in Table 24. Free cash flows are estimated to make a sharp increase till 2012 and then stay unchanged till 2019. One reason of this, is that it is assumed that all the components of the free cash flow are estimated to be unchanged after 2012 as it is difficult to estimate the long time period. The other reason is that, the company is estimated make a huge jump in its sales due to the capacity increase and this will show its effects in the first four years time.

3.3.2 Estimation of Discount Rate

As explained in Chapter II, WACC will be used for the discount rate. Cost of equity and cost of debt and their relative weight should be estimated in order to calculate WACC. Cost of equity is calculated according to CAPM approach.

For the risk free rate, 10 years US bond's interest rate which is %7.5 is used. As Erdemir is a public company, beta is estimated from the historical correlations between the return of Erdemir stock and ISE. Since the stocks of Erdemir are traded on ISE, Beta coefficient is taken from the broker institutions' web sites. Calculation of cost of equity for Erdemir is provided in Table 25.

Table: 25 Cost of Equity Calculation of Erdemir

Risk Free Rate	7.5%
Beta	1.02
Market Risk Premium((ER _m)-R _f)	4.5%
Cost of Equity for the Company	12.09%

Cost of debt is considered to be the current average interest rate of the long term debts, which is 5.5%. Cost of debt after tax is found by ;

$$\text{Cost of debt after tax} = \text{Cost of debt} * (1 - \text{Tax rate})$$

$$5.5\% * (1 - 0.20) = 4.4\%$$

Cost of debt after tax is found as 4.4 % for Ereğli.

3.3.3 Determination of Capital Structure

Capital structure of Erdemir is comprised of the debt structure and the equity structure. Debt structure of the Company is found by;

$$D / (D + E) = (\text{Short term debt} + \text{Long Term Debt}) / \text{Total Equity}$$

Equity structure of Erdemir is found by;

$$E / (D + E) = 1 - [D / (D + E)]$$

The equity and the debt structure for the related years of Erdemir is presented in Table 26. The capital structure of the company shows that the company is financed with equity other than debt throughout the years.

Table 26: Capital Structure of Erdemir

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
E/(D+E)	62%	68%	72%	75%	79%	81%	84%	86%	89%	91%
D/(D+E)	38%	32%	28%	25%	21%	19%	16%	14%	11%	9%

The weighted average cost of capital is simply the weighted cost of the capital supplied by the debt and equity financiers at different costs. In order to compute WACC, the market value of debt and equity is calculated. WACC of Erdemir is calculated and is presented in the Table 27. The changes in WACC throughout the years are the result of the change in capital structure of the company. Risk free rate, beta and market risk premium are all considered to be unchanged, while the capital structure changes throughout the years.

When the WACC is computed, the calculated Free Cash Flows presented in Table 24 are discounted by WACC according to Present Value Formula 1. The computation is presented in the Table 28. As seen in Table 28, the present value of the free cash flows is calculated as 4,544 million dollars. With the increase in WACC and the decrease in FCF throughout the years, present value of the free cash flows decreases.

Table 27: WACC of Erdemir

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Risk free rate	7.5%	7.5%	7.5%	7.5%	7.5%	7.5%	7.5%	7.5%	7.5%	7.5%
Beta	1.02	1.02	1.02	1.02	1.02	1.02	1.02	1.02	1.02	1.02
Market Risk Premium	4.5%	4.5%	4.5%	4.5%	4.5%	4.5%	4.5%	4.5%	4.5%	4.5%
Cost of Equity	12.09%	12.09%	12.09%	12.09%	12.09%	12.09%	12.09%	12.09%	12.09%	12.09%
Cost of Debt after tax	4.4%	4.4%	4.4%	4.4%	4.4%	4.4%	4.4%	4.4%	4.4%	4.4%
WACC	9.2%	9.6%	10.0%	10.2%	10.4%	10.7%	10.9%	11.0%	11.2%	11.4%
E/(D+E)	62%	68%	72%	75%	79%	81%	84%	86%	89%	91%
D/(D+E)	38%	32%	28%	25%	21%	19%	16%	14%	11%	9%
Cost of debt	5.5%	5.5%	5.5%	5.5%	5.5%	5.5%	5.5%	5.5%	5.5%	5.5%
Tax rate	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%

Table 28: Discounting the Free Cash Flows by WACC

Eregli FCF Model	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	Total
	\$ mn	\$ mn	\$ mn	\$ mn	\$ mn	\$ mn	\$ mn	\$ mn	\$ mn	\$ mn	\$ mn
EBIT	773	1,096	1,267	989	1,000	947	962	1,007	1,028	1,052	
EBITDA	944	1,273	1,454	1,185	1,205	1,161	1,177	1,216	1,219	1,220	
-Taxes on EBIT	149	219	253	198	200	189	192	201	206	210	
-Capital Expenditures	149	132	200	200	200	200	200	200	200	200	
-Change in NWC	213	4	158	-112	48	39	26	20	26	27	
Free Cash Flow	432	918	842	899	757	734	759	795	787	783	
WACC	9.2%	9.6%	10.0%	10.2%	10.4%	10.7%	10.9%	11.0%	11.2%	11.4%	
PV of Free Cash Flow	396	764	633	610	461	400	369	344	302	266	4,544

3.3.4 Calculation of Terminal Value

Terminal value for Erdemir is calculated according to Formula 11. For the estimation of growth rate, it is assumed that the company's growth is bound to the overall growth of overall economy. With that respect, 1 per cent was taken as the growth rate for the terminal value calculation. Calculation of terminal value for Erdemir is set forth in the Table 29;

Table 29: Calculation of Terminal Value

WACC (%)	11.4%
Terminal Growth Rate (%)	1%
Cashflows to Company at 2019 (US\$ mn)	783
Terminal Value at 2019 (US\$ mn)	7,606
Years between 2010 – 2019	10.00
Discount Factor between 2010 and 2019	2.94
Discounted Terminal Value at 2005 end (US\$ mn)	2,585

After the forecasted period which is the year 2019 in Erdemir valuation, WACC is estimated to remain unchanged as %11.4.

3.4 Results of the Valuation

By adding the discounted cash flows between 2010 and 2019 (calculated in Table 28) to the discounted terminal value (calculated in Table 29), Company value is calculated as;

Table 30: Company Fair Value

DCF Results	\$ mn
+Present value of FCFs (2010-2019)	4,544
+Present value of terminal value	2,585
Enterprise Value	7,129
(-) Net Debt (2009E)	1,992
Estimated Fair Value	5,131

After the net debt in 2009 has been deducted, the fair value of the company became 5,131 \$ millions.

Table 31: Sensitivity Analysis

<u>(US\$ million)</u>		<u>Terminal Growth Rate</u>		
<u>Country Risk</u>	<u>WACC</u>	<u>1%</u>	<u>1.5%</u>	<u>2%</u>
<u>4.00%</u>	<u>10.9%</u>	5,499	5,614	5,796
<u>4.50%</u>	<u>11.4%</u>	5,131	5,275	5,434
<u>5.00%</u>	<u>11.9%</u>	4,839	4,966	5,106

Erdemir's current value on ISE is 4,809\$ million. The results obtained with the implementation of the valuation procedure are between the range of 4,839\$ millions and 5,796\$ millions which are above the market value observed within 2009. Within the country risk range from %4 to %5 and terminal growth rate from %1 to %2 ,the fair value of the company changes from 4,839 \$ to 5,796 \$.The value of the company is higher than the market value which shows that the company is undervalued and has the potential to be increased.

There can be two major reasons for lower market value 1) Although there is a downward trend in global steel industry, recovery in demand, and more importantly pricing will be realized due to excess capacity around the world. Signs of a recovery in global demand and pricing would be a key indicator for the value of the Company to be upgraded. 2) After a significant contraction in 2009, marginal growth in global steel and raw material prices is expected in the next couple of years. It is expected that 15% contraction and 7% growth in steel consumption in Turkey in 2009 and 2010 will be realized respectively. This will be driven by the 20% contraction in the automotive, and 8% contraction in the white goods and construction sectors in 2009. In line with this view, demand will recover in 2010 where it is expected that automotive and white goods and construction sectors will grow by 6%, 8% and 3%,

respectively. Based on these forecasts, steel consumption is expected to increase by 7% in 2010.

In addition ,major investments in Isdemir was completed in 2008. Erdemir spent \$2.9bn in the last couple of years for modernization, capacity increase and flat steel conversion investments. Through these, flat steel production capacity increased from 4.2mn tons in 2006 to 8.3mn tons at the end of 2008. Slab capacity was also increased from 5.8mn tons in 2007 to 8.5mn tons in 2008. These investments will provide these major benefits: a) Although the Company won't be able to utilize the additional capacity in 2009, it will increase the production in the next 3-4 years, leading to significant volume growth b) The share of flat steel sales in total to increase from 66% in 2008 to 88% in 2012, which is positive for margins.

These reasons all show that the Company is undervalued with its low market value. The stocks of the Company will be valued. It is found that, the Company is undervalued which means that it is traded at a discount.

CONCLUSION

Company valuation is a process and a set of procedures used to estimate the economic value of an owner's interest in a company. The valuation process includes understanding the company, analyzing the industry, determining a methodology and generating a report.

Many studies investigate the company valuation methods both theoretically and empirically in finance literature. Although the most used valuation model is the discounted cash flow model, many researches have used different types of methods in their valuations. Valuation models in the literature will be examined in six headings; Discounted Cash Flow Method, Relative Valuation Method, Option Pricing Method, Dividend Discount Model (DDM), Economic Value Added (EVA), and Residual Income Valuation Model (Abnormal Earnings).

The valuation methods are presented under six headings such as discounted cash flow valuation, relative valuation, dividend discount valuation, economic value added, residual income and real option methods. The fundamental of the discounted cash flow method stands on the present value rule. The most preferred DCF approach in practice is the free cash flow DFC Model. The other major models are adjusted present value model, equity DFC model and the capital discount model.

According to the literature review that is summarized here, the main conclusion to take into account is that analysts appear to tailor their valuation methodologies to the circumstances of the industry. PE models remain the mainstay of valuation practice, but other forms of analysis complement these as circumstances demand. In some cases DCF models are used, and in others, more detailed analyses of price-to-sales multiples, growth options, or profitability analysis are used. Another finding is that use of the RIV model is extremely limited, but analysts frequently use accounting data in single-period comparative. Analysts appear to vary the choice of valuation methodology in understandable ways with the context in which the valuation is made.

Although analysts use various different kinds of valuations models, the most useful and convenient method is DCF method. The data required for this method can be obtained easily and accurately. In the application, DCF method is used in order for finding the market value of (Erdemir) which is traded in ISE. The implementation required full understanding of the company's operations, its industry dynamics and financial performance.

In DCF valuation, cashflows to firm were projected by considering the industry dynamics, price and market share development, historical financial performance of the firm, investment requirement and working capital policy. Afterwards, an appropriate discount rate is calculated by considering the risk level of the country and company and financing mix. Projected cash flows were discounted to the end of year 2009 at the calculated discount rate in order to arrive at the enterprise value of the company. Finally, indebtedness is deducted from the enterprise value in order to calculate equity value.

Before evaluating the results of the valuation procedure, the following points should be emphasized for a correct analysis. Firstly, the success of the valuation procedure can not be measured by itself from its definition. The outcome obtained with a valuation study is dependent on the inputs. The analyst's own views with respect to the future development of the country, market and company is subjective. This can bring a bias to the results of a valuation study. Second, a valuation study is not timeless. Valuation procedure is affected from changes in input information with time. Continuous change in information brings continuous need for updating valuations.

Another point to consider is the level of error in any valuation. It is unrealistic to expect absolute certainty in valuation, since cashflows and discount rates are estimated with unavoidable error. This also means that a reasonable margin for error in making recommendations on the basis of valuations should always be considered.

due to the fact that the DCF assumes that future cash flow streams are highly predictable.

Again, the country risk premium attached by the stock market investors to Turkey can change significantly in short time periods and such changes in the country risk premium lead to a volatility in the stock market. In addition, Turkish stock market is not very liquid with respect to the stock markets in developed countries, as such, major money inflows to the stock market and outflows from the stock market affect the market values significantly in a very short time. Considering these factors, it may be claimed that the valuation procedure is more successful in identifying the long term valuation range of companies. As for Erdemir, the ten year period forecast has been selected in order to find a more accurate result. Discounted cash flow valuation is simple for companies with easily forecast able cash flows.

Erdemir's fair value is computed as 5,131 \$ millions while its current value on ISE is 4,809\$ million as of 31 December 2009. The value of the Company is higher than the market value which shows that the Company is undervalued and has the potential to be increased.

Further studies may include valuation on more detailed cash flow projections of the companies. In addition, the techniques which were not applied in this thesis such as relative valuation, dividend discount model or contingency claim valuation may be implemented on companies in Turkey. Another study would be to make parallel valuations in Turkish Lira and US Dollars and compare the results in order to assess the error by making the valuation in foreign currencies, which is generally a common case in Turkey. Finally, another approach could be to incorporate statistical forecasting models in the financial projection stage of DCF valuation technique and assess the results with the observed market values.

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