

# *Valuation of Slovene Publicly Traded Companies with a Valuation Model Based on Expected Earnings and Growth Opportunities*

Igor Stubelj

The article sheds light on valuating Slovene publicly traded companies. The research aim is to solve the problems about company valuation in an emerging market, such as the Slovene market certainly is. The critical point is how to evaluate the variables to put in the valuation model. The chosen methodology deals with these problems, and minimizes the analyst's subjective judgment and the bias the analyst puts into the valuation. Twenty Slovene publicly traded companies are valued with a valuation model based on expected earnings and growth opportunities. The research provides the assessment and the usefulness of valuation with the model and the conclusions from the valuation results.

*Key Words:* company valuation, earnings, investments, capital, cost of equity capital

*JEL Classification:* G30, G34

## **Introduction**

Investors and managers very often have to ask themselves how much the worth is of their business, their company, the competitive company or maybe the company in which they intend to invest their capital. The managers' primary objective should be to increase the value of the investors' equity capital. To do so, they must know the factors that influence the value of the company and their impact on the share price. Without this knowledge they will not be able to know the consequences of their decisions, and the influence on the share price of the company (Glen 2005). Because of the market imperfection and the investors' perceived expectations there is a difference between the market and the internal price of a company. From Bertonecel's perspective (2006), the internal value of the company is based on the profound analyses and the judgment of the company. The internal value is often expressed as a present value of expected cash flows from operations, discounted at

*Igor Stubelj is a Lecturer at the Faculty of Management Koper,  
University of Primorska, Slovenia.*

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the present value with a proper discount rate. We can call the internal value the 'right' or 'real' value of the company.

From the perspective of many experts, valuating a company on the basis of present and past data is nonsense. Moreover, Jerman and Manzin (2008) argue that financial accounts often do not provide evidence for all the capabilities for future growth and future earnings, as many intangibles do not meet the criterion for their recognition. Damodaran (2006) comments that with financial data and appropriate methodology it is possible to forecast the value for most assets, albeit with error, and that the forecast value is not very different from the market value in the long term. He also comments that the difficulty of valuation is the bias the experts put into the models. They often have an idea of the value of the company before putting the numbers in the models. In this case, the result of the valuation is the product of their expectations. In the process of valuation we must pay attention to the possible bias introduced by the valuers, the unpredictable future, and the complexity that modern technology and simple access to information insert into the analysis.

The paper is organized as follows. After the introduction the aims of the research are presented, followed by the theoretical background of dynamic equity valuation. Further we explain the methodology used, the market properties and present the data. Last are the results and conclusions. In addition we make suggestions for further research.

### **Aims of the Research**

The valuation models are more or less 'simple' in theory, but the estimation of the variables to be inserted into the models is not simple in practice. The evaluation of the variables is very important and critical for the results of the valuation. The value of variables is often a subjective choice of the analysts. We propose the method used, e. g. kernel estimator, based on historical data to forecast the expected variables. We also propose the method to evaluate the cost of equity capital for Slovene companies, which is problematic due to the short history of data and the characteristics of a new and developing Slovene capital market. We have tried to reduce the subjectivity with the methodology used in our valuation.

The aim of the research was to evaluate Slovene publicly traded companies' valuation with a model, based on expected earnings and growth opportunities. We have chosen a 'simple' model which uses financial data

from the balance sheet and income statement. The data used for the valuation are public and accessible.

With the help of statistical methods, on the sample of twenty Slovene publicly traded companies, we have evaluated the usefulness and the possibility of valuating Slovene publicly traded companies with the model based on expected earnings and growth opportunities and the chosen methodology.

The objective was to find the difference between the calculated internal value and the market value of the company and the variance of the market value that the model can explain. However, we have expected a low explained variance and small usefulness of the model on the developing and fast changing Slovene equity market.

### **Dynamic Equity Valuation: Theoretical Background**

Company's valuation is a utilitarian activity. Because of the value of a good valuation, the experts have developed several models based on different presumptions and determinants of value.

For the investor the value of an investment in financial terms is the present value of expected cash flows the investment (asset) will generate in the life time. Different valuation models have different presumptions about which are the relevant cash flows to discount at a present value. In the literature we can find at least four more or less distinct approaches to the valuation of shares (Miller and Modigliani 1961): (1) the discounted cash flow approach; (2) the current earnings plus future investment opportunities approach; (3) the stream of dividends approach; (4) the stream of earnings approach. Miller and Modigliani (1961) have demonstrated that these approaches are, in fact, equivalent.

One of the first and simplest valuation tools is the Gordon model (1962). The Gordon model is based on the presumption that the future cash flows an investor receives from a stock are cash dividends growing at a constant growth rate. However, the Gordon model cannot be used if we do not expect dividends (frequent in start-ups firms) in the near term or when the growth rate is bigger than the cost of equity (frequent in fast growing firms) but we expect that competition influence will diminish it in the future. The model is not a perfect descriptor of reality; however, it helps to reduce the range of uncertainty around key value drivers (Harris, Eades, and Chaplinsky 1998). The model was used by Fama and French (2002) and Harris and Marston (1992; 2001) to estimate the equities and market risk premiums. Foerster and Sapp (2005)

in their research found out than over the entire sample period (more than 120 years) dividend-based models perform well at explaining actual prices; they perform better than commonly used earnings-based models. The major drawback of the dividend models is that they require estimation of the expected dividends (see Sorensen and Williamson 1985; Rozeff 1990). Estimation became increasingly difficult for companies with varying growth rates or irregular dividend payouts. In such cases, earnings based valuation approaches may be more useful (French, Subramaniam, and Trapani 1998).

The discounted Free Cash Flow Models (FCFM or DCF) are not very different to the dividend discount models. The FCFM consider potential dividends an investor can gain from the investment. There are simple FCFM models in which dividends grow at a stable sustainable growth rate to infinity, the costs of capital are constant and two or multi-stage models based on different presumptions of growth in different time intervals. In these latter models also the cost of capital can differ at different stages. Copeland, Koller and Murrin (2000) argue that managers who use the discounted cash flow approach for valuation focusing on increasing long-term free cash flow will ultimately be rewarded by higher share prices. They also argue that the evidence from the market is conclusive. Naïve attention to accounting earnings will often lead to value-destroying decisions. The greater risk in the use of DCF models is reliance on subjective analyst input of the many critical variables required (Rawley and Schostag 2006).

A very prominent valuation method is residual income valuation (RIV). It is theoretically equivalent to the discounted 'free-cash-flows-to-equity' model as well as the original dividend discount model from which both are derived. The model expresses total common equity value as the sum of the book value of stock-holders' equity and the present value of residual income (RI). RI is defined as the difference between reported net income and the product of book value of equity and the firm's cost of equity capital (Halsey 2001). The problems with the use of RIV were analyzed by Ohlson (2000). The reason for a widespread acceptance of the RIV model is the importance the model gives to accounting data in equity valuation. On the contrary, traditional equity valuation models, which are based on future cash flows, suggest a general irrelevance of future earnings and other accounting data (Ohlson 2005). The residual income is in principle the same on the level of equity capital as Economic Value Added or Economic Profit (EVA) on the level of total

capital. A variant of the RIV model with the fade rate assumption or with the perpetuity assumption is explained in Bradshaw (2004).

In the last years several research studies have been done with the purpose of comparing the RIV an FCFM based valuations, see Bernard (1995), Francis et al. (2000), Frankel and Lee (1998). On the balance, the RIV is more accurate in forecasting the share value than the FCF based valuation (Halsey 2001). Lundholm (1995) and Lundholm and O'Keefe (2001) proved that with both models we get satisfying results and that the proven superiority of the RI model and the difference between the results is due to the use of incorrect presumptions.

Beside all the models discussed above, analysts have developed other less known variants of equity valuation models based on different presumptions and determinants of value.

## **Methodology and Data**

### THE VALUATION MODEL

In a previous research we have used three models with equal methodology for the valuation of companies on the Slovenian equity market (see Stubelj 2008). We used the models on 20 Slovenian publicly traded firms. The first was the Residual Income Valuation model (RIV), the second was the expected stream of earnings approach in valuation (Miller and Modigliani 1961), and the third was the Thomas J. O'Brien model (2003). With the first model we obtained results for 14 (of 20) companies. In the case of 6 companies the growth rate of the residual income exceeds the cost of capital. In this case the result did not make have any sense. With the second model we got the results for just 9 companies. The problems with this model arise when the growth rate of net income exceeds the cost of capital, which was the case of these 11 companies. The results in such case did not make sense. The problem with the first two models is that companies in emerging markets and also in transition economies have a great volatility of data in the financial reports due to the transition process (see also Kavčič and Tavčar 2008) and also to possible fast growth. The reason for instable financial data lies not just in companies' operations but rather in the necessity to adapt to changing conditions and frequent law changes, which is the case for the Slovene market. With the O'Brian model we have obtained the results for all 20 companies. We conclude that the model could be used in emerging markets. However we have not used all the possible dynamic valuation models in the research,

but O'Brien's results provided the rationale to use the his model in this research and test the explanation power on an emerging equity market (see Stubelj 2008). The O'Brien (2003) formula may lend itself to application to many real-world cases of supernormal, but declining earnings growth and with no current dividend payments, and may avoid the need to resort to complex spreadsheet or real options models. We did not find any research that has tested this model for the valuation of companies in emerging equity markets. Therefore we believe the proposed method is being used for the first time in one of the emerging economies.

The model is based on the Miller and Modigliani (1961) formulation of an asset's value as the sum of two present values. The first is the present value of the current operations. The second is the present value of growth opportunities.

The O'Brien formula emphasizes that the fundamental drivers of a firm's expected future earnings stream are:

- the expected investment outlay in the next period,
- the expected growth rate of future investment outlays,
- the expected rate of convergence of the new investments' return on equity (ROE) to the firm's cost of equity, if competition is expected to gradually erode the excess ROE.

The formula is simple, because it assumes that the expected growth rate of future investment outlays and the expected convergence of their ROE's to the firm's cost of equity capital are constant (O'Brien 2003).

The formula may be applicable for some reasonable earnings and free cash flow patterns not possible with the Gordon model. For example, by not requiring a firm's new investment to be a constant plowback percentage of earnings, the model may be applied to a firm that requires external funds in excess of earnings in the near term, while forecasted to pay net dividends in the future. The formula may also be applied to firms with declining earnings growth patterns and even to firms with negative near-term earnings (O'Brien 2003).

O'Brien states that the value of the firm may be expressed as:

$$V = \frac{E_1}{k} = \frac{I_1}{k} \left( \frac{R_1 - K}{k + d} \right), \quad (1)$$

$$d = f - g_1, \quad (2)$$

where:  $E_1$  – annual earnings expected from the assets currently in place,  $k$  – firm's cost of equity capital,  $I_1$  – incremental equity capital investment

outlay expected a year from now,  $R_1 - \text{ROE}$  expected on  $I_1$ , the expected incremental income level (from investing  $I_1$ ) divided by  $I_1$ ,  $R_1 = \Delta E_2 / I_1$ ,  $d$  – expected annual decay rate in the net present values of the firm's future growth opportunities,  $d = f - g_1$ ,  $f$  – annual fade rate at which the ROE's for new investments are expected to converge toward the firm's cost of equity capital, and  $g_1$  – expected annual growth rate of incremental investment outlays;  $IN = I_1(1 + g_1)^N$ ,  $N = 2, 3, \dots$

The estimation of  $f$  and  $g_1$ , as well as the estimation of the expected earnings, expected investment outlays, expected growth rates and other variables present the most difficult part in using the formula. The source of errors lies in the imprecision of their estimation.

In the research, Fama and French (2000) have proved that in a competitive environment the profitability is mean reverting. This is in line with standard economic arguments which say that in a competitive environment competitive forces produce mean reversion in profitability. In a simple partial adjustment model they have discovered that the rate of mean reversion is about 38% year. But the mean reversion is highly non-linear. Mean reversion is faster when profitability is below its mean and when it is far from its mean in either direction.

In the O'Brien formula it is considered that competition would diminish the excess ROE and plowback opportunities in the future. The erosion of the growth opportunities is gradual and perpetual. The erosion is defined by the decay rate in the formula.

#### THE COST OF CAPITAL

The cost of equity capital represents the minimum return investors request on their invested capital. For this reason we use it as a discount factor for the future earnings and cash flows from the new investment opportunities. A small change in the cost of capital is reflected in bigger change of value. The profitability on the level of the capital cost is not an added value, it is a cost of the invested capital. It is a profitability that investors demand for the risk they bear.

The equity capital is not 'working' for free, for its use we must pay a certain price to its owners. It is a scarce good. In aggregate it is limited to the amount that people in the whole world are willing to save (invest). The task of earning a capital cost is not a question of company financing or – worse defined – subordinated to other company goals, as many managers think. To earn a cost of capital is the market mandate (Stewart 1999).

In the oft-cited publication *Stocks, Bonds, Bills, and Inflation*, Ibbotson and Sinquefeld wrote: ‘Estimating the cost of capital is one of the most important and difficult tasks performed by financial analysts. There is no clear consensus on the best way to approach this problem. Because of the impact that the cost of capital can have on valuation and financial decision making, the analyst should typically use at least two methods to derive the cost of equity.’ (Borgman and Strong 2006.)

Many models and techniques have been developed to estimate the cost of equity capital, such as: the Capital Asset Pricing Model (CAPM) (Black 1972; Lintner 1965; Ross 1976; Sharpe 1964), the Fama and French Three Factor Model (Koller, Goedhart and Wessels 2005; Estrada 2005), the Arbitrage Pricing Theory and others. Mishra and O’Brien have studied (2004) the empirical perspective on the issue of a global investor’s cost of capital for an emerging market investment.

The primary conclusion of the CAPM (3) is that the relevant risk of an individual stock is its contribution to the risk of a well diversified portfolio. The CAPM is calculated as follows:

$$r_i = r_f + \beta_i(r_m - r_f), \quad (3)$$

where:  $r_i$  – required rate of return,  $r_f$  – risk free rate,  $\beta_i$  – beta coefficient,  $r_m$  – market rate of return, and  $(r_m - r_f)$  – market risk premium.

Several shortcomings arise from the following assumptions on which CAPM is based: (a) asset returns are linearly related to their covariance with the market’s return, (b) assets with higher systematic risk have a higher return than do assets with lower systematic risk, and assets with the same systematic risk should give the same return, (c) there is no relationship between firm-specific risk and returns, because specific risk can be eliminated through diversification (Gunnlaugsson 2006), (d) the total risk of a stock is a combination of systematic (market) and non-systematic (specific) risk (Antunović 1999). McNulty at al. (2002) found three central shortcomings of CAPM: (a) the validity of beta, (b) the reliance of historical data, (c) the indifference of holding period (Zellweger 2007). Surveys have found that the CAPM approach is by far the most widely used method (Brigham and Ehrhardt 2005). The CAPM is, almost certainly, the most widely used model in finance for a very simple reason: it yields an essential magnitude, the return investors should require from an asset given the asset’s risk (Estrada 2005). Interesting are the results of the study that Gunnlaugsson (2006) made on the validity of the CAPM on the small Icelandic stock market. They indicate that the CAPM



has worked well on the small Icelandic stock market and that it, or the beta coefficient, does explain returns better than on larger foreign stock markets. A strong relationship between the beta and stock returns was found in the research. Further, the stock returns with high betas were higher than one would expect, according to the CAPM. Nagel, Peterson and Prati (2007) have conducted empirical tests on the different cost of equity estimation methods based on historical returns. In the direct comparisons of these methods, they have found that the best ex ante estimation method available to financial managers is essentially the CAPM with beta restricted to one; that is, a naïve model where the cost of equity capital equals the risk-premium added to the risk-free rate. For the above stated facts we decided to use the CAPM for the estimation of the cost of equity capital.

#### DATA AND METHODOLOGY

For the estimation of the cost of equity capital we have used stock prices for the last five years, applying the data from 1st April 2002 to 1st April 2007. For the measurement of movement of the Slovene capital market we have used the index SBI 20. The returns of stock prices and the index SBI 20 have been calculated for every five market working days.

With the regression analysis we have evaluated a coefficient of systematic risk  $\beta$  which was needed for calculating of the cost of capital. Different financial institutions, like Thomson Financial, Bloomberg and Yahoo, calculate betas in different ways and their betas are different for the same companies. Most analysts use four to five years of monthly returns, some use 52 weeks of weekly returns (Brigham and Ehrhardt 2005). We have used the market risk premium from the estimated risk premiums on the Aswath Damodaran web site (<http://pages.stern.nyu.edu/~adamodar/>). We have calculated the risk free rate as the sum of the Yield to Maturity the of 30-year inflation indexed Treasury Bond, which we found on the Bloomberg web site, and the Slovene inflation, which we obtained from the Statistical Office of Republic of Slovenia web site (Statistični urad Republike Slovenije 2007).

From the historical data we have estimated the expected earnings of the valuated companies, the expected investment outlay of equity capital, the expected investments growth rate and the expected return of new investments outlays of equity capital. For the estimation of the annual fade rate, at which the ROE's for new investments are expected to converge toward the firm's cost of equity, we have used the aggregate data of

valuated companies. The aggregate data are less volatile. The big volatility of the data used has made impossible the estimation for the individual companies in our case. This procedure has added a certain level of error in our results. Because of the drawbacks of trend methodology that arise from its anticipated linearity and the least squares methodology as such, we have used a kernel estimator for the estimation of the expected value of the parameters mentioned in this paragraph.

In order to estimate the empirical density, we made use of kernel density estimators. The goal of the density estimation is to approximate the probability density function  $f(x)$  of the random variable  $X$  (Schoutens 2003). The outcome of this operation is a smoother empirical probability density function (Meucci 2005). Assume, that we have  $n$  independent observations  $x_1, x_2, \dots, x_n$  from the random variable  $X$ . The kernel density estimator for the estimation of the density  $f(x)$  at point  $x$  is defined as (4) (Schoutens 2003):

$$\hat{f}_h = \frac{1}{nh} \sum_{i=1}^n K\left(\frac{x_i - x}{H}\right), \quad (4)$$

where:  $K((x_i - x)/h)$  – kernel function,  $x$  – random variable,  $n$  – number of observations, and  $h$  – bandwidth.

We typically use the so-called Gaussian kernel (5):

$$K(x) = \frac{e^{-\frac{(x_i-x)^2}{2h^2}}}{\sqrt{2\pi}}. \quad (5)$$

In the above formula we also have to select the bandwidth  $h$ . We use Silverman's (1986) rule of thumb value (6):

$$h = 1.06\sigma n^{-\frac{1}{5}}, \quad (6)$$

where:  $\sigma$  – the standard error of the random variable. Due to the transition of the Slovene companies to the International Financial Reporting Standards (IFRS 2008), the reported book value of the equity capital in the 2006 is smaller due to different accounting rules. For certain companies are even smaller in comparison to 2005, although the companies have positive earnings and have retained a certain amount of them. This would also have an influence on the valuation, like a smaller expected investment outlay; therefore we have modified these data for the year 2006. Most companies have reported, together with the balance sheet for 2006, also the balance sheet for the year 2005 in accordance with the new

standards for the purpose of comparison. We have calculated the index of change of the book value of equity capital. With this index we have multiplied the reported book value for the year 2005 in accordance with the old standards, and have obtained the estimated book value of the equity capital for the year 2006, which the firms would have reported if the standards had not changed. With this method we have preserved the continuity of the course of the book value of equity capital in the time series of data, and have also improved the estimation of the expected growth of the equity capital investment outlays.

The valuation results were compared with the market value of the valuated companies. By the use of linear regression we have calculated how much variance of the ratio of the market value and the book value of the equity capital of the companies can be explained by the ratio of the estimate value and the book value of the equity capital.

In the research we have presumed that the companies preserve an optimal capital structure and use a target capital structure also in new investments. This is significant, because it means that the cost of capital is a constant and it will not change in the future.

### **Market Properties and Valuated Companies**

Valuation in emerging markets is difficult. This is because of risk and obstacles to business, including great economic uncertainty, illiquid capital markets, controls of flow of capital into and out of the country, less rigorous accounting standards and disclosure levels, and high levels of political risk (Koller, Goedhardt and Wessels 2005). The problems with the valuation of companies on the Slovene market arise from the smallness of the market and from the small number of public traded companies. Many changes in the Slovene financial area that occurred in the period of transition indicate a short history of usable data for the analysis. The data used from the balance sheets and income statements are very volatile and are not a result of long-term growth and companies' tax policy. For these reasons the valuation is aggravated.

The reason for instable financial data lies not just in companies' operations but rather in the need to adapt to changing conditions and in the frequent law changes on the Slovene market. In Slovenia an intensive process of accepting new concepts of economic actions in the direction from a semi command toward a market economy took part in the period of transition (Novak 2003).

Some important properties of the Slovene equity capital market are:

- The Slovene equity capital market is small compared to developed capital markets. The market capitalization of the three biggest companies represents 50% of the entire market capitalization of shares which trade on the Ljubljana stock exchange. Measured on 5th April 2007.
- It is relatively inefficient as are other segments of financial markets in Slovenia (Dolenc 2007) and has been mostly driven (at least in its beginning) by privatization transactions (Dolenc 2006).
- Liquidity has risen in Slovenia in recent years, but is still low in comparison with developed financial markets, if we compare the turn of the market capitalization for more liquid stocks.
- Only a small number of financial instruments are present on the market.

#### VALUATED COMPANIES

We have valued twenty Slovene publicly traded companies, the biggest publicly traded companies in Slovenia with shares quoted on the Ljubljana Stock Exchange (2007), measured by market capitalization (the market value of stocks on 5th April 2007). The shares of the selected companies represent 85.5% of market capitalization of all quoted shares on the Ljubljana Stock Exchange, measured by the market value of stocks on 5th April 2007.

### Results

#### THE COST OF EQUITY CAPITAL

For a developed (mature) equity market we can calculate the risk premium from the historical data (historical risk premium). We can compute the premium from the difference between average returns on stocks and average returns on risk-free securities. In this case we need data over an extended period of history to get a reasonable standard error of risk premium estimates. Damodaran (2006) suggests long periods, 50 years or more.

In most emerging markets, we have not had a long history of available data. This is also the case for Slovenia (we have data for just about 15 years and these data are under question because of big changes in the market during the period of transition and a low liquidity of the market), so we decided to calculate the risk premium using the method and data we have found on the Damodaran web site (<http://pages.stern.nyu.edu/~adamodar/>) as follows:

TABLE 1 The valuated companies

Company	(1)	(2)	(3)	(4)	(5)	(6)
ACH, d. d.	2,886,877	93,114	56.01	161,694	20,123	1.74
Aerodrom Ljubljana, d. d.*	1,936,229	87,564	75.82	146,805	30,501	3.29
Delo, d. d.	667,464	26,200	134.00	89,440	16,974	3.41
Gorenje, d. d.	12,200,000	270,168	35.37	431,514	751,744	1.60
Helios, d. d.	219,861	67,411	1392.91	306,247	18,703	4.54
Intereuropa, d. d.	7,902,413	156,894	36.36	287,332	131,500	1.83
Iskra avtoelektrika, d. d.	1,608,313	49,032	57.05	91,754	169,943	1.87
Istrabenz, d. d.	5,180,000	178,472	67.06	347,371	23,530	1.95
Krka, d. d.	3,542,612	622,683	882.91	3,127,808	601,308	5.02
Lesnina, d. d.	76,495	75,847	1850.00	141,516	84,429	1.87
Luka Koper, d. d.**	7,140,000	286,367	77.05	550,137	105,034	3.77
Mercator, d. d.	3,765,361	571,551	260.70	981,630	106,328	1.72
Merkur, d. d.	1,312,585	203,613	259.48	340,590	814,080	1.67
Petrol, d. d.	2,086,301	398,456	578.83	1,207,614	1,892,644	3.03
Pivovarna Laško, d. d.	8,578,391	233,072	51.97	445,819	87,048	1.91
Salus, d. d.	134,980	43,807	837.18	113,003	189,234	2.58
Sava, d. d.	2,006,987	350,162	291.32	584,675	44,167	1.67
Telekom Slovenije, d. d.	6,535,478	1,071,888	383.11	2,503,807	455,971	2.34
Terme Čatež, d. d.	597,916	83,893	220.50	131,840	27,507	1.57
Žito, d. d.	355,792	59,300	215.43	76,648	87,917	1.29

NOTES Column headings are as follows: (1) number of shares of the company quoted on Ljubljana stock exchange dated 31/12/2007, (2) book value of equity capital of the company dated 31/12/2006 in 1000 EUR, (3) market value of a share dated 5/4/2007 in EUR, (4) market capitalization of a company dated 5/4/2007 in 1000 EUR, (5) overall sales of a company in year 2006 in 1000 EUR, (6) market-to-book value ratio of equity capital of a company. \* 1,860,298 preference shares (unquoted), \*\* 6,860,000 preference shares (unquoted).

$$RP_s = P_{Ttn} \left( \frac{\sigma_{gd}}{\sigma_{go}} \right) = 0.5\% \cdot 1.5\% = 0.75\%, \quad (7)$$

where:  $RP_s$  – additional risk premium for Slovene market on the risk premium for a mature market – US market,  $P_{Ttn}$  – additional default risk premium,  $\sigma_{gd}$  – standard deviation of stock returns for the global market,  $\sigma_{go}$  – standard deviation of bond returns for the global market.

We have added the above calculated additional risk premium for the

TABLE 2 The betas and the calculated cost of equity capital

Company	Calculated betas										Cost of equity capital
	5 years of data		4 years of data		3 years of data		ave. $\beta$	$\sigma$			
	5 days	10 days	5 days	10 days	5 days	10 days			20 days		
Aerodrom Ljubljana, d. d.	0.76	0.71	0.82	1.14	1.27	1.11	1.21	1.35	1.05	0.23	10.77%
Delo, d. d.	0.63	0.58	0.69	0.71	0.81	0.72	0.65	0.59	0.67	0.07	8.65%
Gorenje, d. d.	1.10	1.20	1.21	1.23	1.22	1.04	1.25	1.23	1.17	0.08	11.48%
Helios, d. d.	0.77	0.81	0.84	0.83	1.01	0.82	0.84	0.93	0.85	0.07	9.63%
Intereuropa, d. d.	1.00	1.00	0.70	1.14	0.78	1.28	1.52	0.94	1.06	0.25	10.85%
Istrabenz, d. d.	1.14	1.23	1.15	1.27	1.33	1.14	1.26	1.13	1.23	0.10	11.78%
Krka, d. d.	1.19	1.08	1.19	1.04	0.99	1.04	0.84	1.05	1.03	0.13	10.66%
Luka Koper, d. d.	1.05	1.27	1.12	1.30	1.62	1.35	1.72	1.60	1.41	0.25	12.83%
Mercator, d. d.	1.09	1.09	1.20	1.07	1.16	1.03	1.06	1.16	1.10	0.06	11.06%
Merkur d. d.	0.71	0.76	0.82	0.69	0.83	0.65	0.71	0.88	0.76	0.08	9.10%
Petrol, d. d.	1.14	1.03	1.00	1.25	1.09	1.27	1.06	1.01	1.10	0.10	11.07%
Pivovarna Laško, d. d.	0.76	0.71	0.74	0.76	0.85	0.68	0.86	0.83	0.78	0.07	9.27%
Salus, d. d.	0.53	0.76	0.76	0.49	0.73	0.44	0.63	0.69	0.64	0.13	8.48%
Sava, d. d.	0.73	0.79	0.78	0.76	0.84	0.79	0.89	0.70	0.78	0.06	9.24%
Terme Čatež, d. d.	0.63	0.63	0.51	0.71	0.69	0.82	0.82	0.83	0.71	0.11	8.86%
Žito, d. d.	0.58	0.60	0.66	0.47	0.63	0.49	0.51	0.67	0.57	0.07	8.07%

*Betas for industry for Europe from Damodaran online (2007)*

ACH, d. d.

Retail-Automobile

0.81

9.41%

Telekom Slovenije, d. d.	Telecom services	1,03	10,66%
Lesnina, d. d.	Retail-Home Furnishings	0,90	9,92%
Iskra Avtoelektrika, d. d.	Electric Products	0,71	8,85%
Cost of capital of the aggregate*			10,57%

NOTES \* We have calculated the cost of capital of the aggregate with the weights multiplied by the cost of capital for the single company. The weights are the ratio of the book value of a single company and the overall book value of the valued companies.

TABLE 3 Kernel estimation of the expected fade rate

	$x_1$	$x_2$	$x_3$	$x_4$	$x_5$	$x_6$	$x_7$	$x_8$	
Calculated historical fade rates $f$	$x_i$	1.1971	-0.1986	-1.9222	-0.1140	0.4568	4.7058	-0.9552	-19,9160
$P_j = e^{-(x_i-x)^2/2\sigma^2} / \sqrt{2\pi}$	$P_j$								$\sum P_j/nh$
	$P_1$	0.3850	0.3850	0.3338	0.3867	0.3951	0.3184	0.3665	0,0523
	$P_2$	0.3850	0.3779	0.3779	0.3990	0.3959	0.2567	0.3949	0,0529
	$P_3$	0.3338	0.3779	0.3779	0.3758	0.3597	0.1782	0.3923	0,0483
	$P_4$	0.3867	0.3990	0.3758	0.3967	0.3967	0.2606	0.3939	0,0530
	$P_5$	0.3951	0.3959	0.3597	0.3967	0.3967	0.2865	0.3847	0,0531
	$P_6$	0.3184	0.2567	0.1782	0.2606	0.2865	0.2216	0.2216	0,0364
	$P_7$	0.3665	0.3949	0.3923	0.3939	0.3847	0.2216	0.0005	0,0516
	$P_8$	0.0001	0.0003	0.0010	0.0003	0.0002	0.0000	0.0005	0,0001
	$\sum \sum P_j/nh$								0,3478
Expected fade rate for the aggregate data of the valued companies $f_i$									0,2831

Slovene market to the risk premium for the US market to get the risk premium for the Slovene market.

$$RP = (r_m - r_f) = RP_{zt} + RP_s = 4.91\% + 0.75\% = 5.66\%, \quad (8)$$

where:  $RP = (r_m - r_f)$  – market risk premium,  $RP_{zt}$  – market risk premium for the US market,  $RP_s$  – additional risk premium for the Slovene market on the risk premium for a mature market – the US market.

We have calculated the risk free rate as the sum of the Yield to Maturity of the 30-year inflation indexed Treasury Bond, which we found on the Bloomberg web site, and the Slovene inflation, which we found on the Statistical Office of Republic of Slovenia web site (Statistični urad Republike Slovenije 2007) as follows:

$$r_f = YTM_a + i_s = 2.43\% + 2.4\% = 4.83\%, \quad (9)$$

where:  $r_f$  – risk free rate,  $YTM_a$  – Yield to Maturity of the 30-year inflation indexed US Treasury bond,  $i_s$  – inflation in Slovenia in April 2007, measured as an average annual index.

We could use a Slovenian treasury bond for the risk free rate but we prefer to calculate it with the above method. The reason is that we add a country risk premium in the calculation of a risk premium, and if we used a Slovenian treasury bond we considered the country risk premium twice.

With the statistical method of regression analysis we have evaluated a coefficient of systematic risk  $\beta$  which we needed to calculate the cost of capital. To reduce the subjectivity we have calculated the average  $\beta$  out of the nine estimated betas with a different choice of data. We have used past data for 3, 4 and 5 years and returns for 5, 10 and 20 days. For the companies with a too short history data of stock returns we have used the betas for Europe industry which we found on the Damodaran web site (<http://pages.stern.nyu.edu/~adamodar/>). The results are presented in table 3.

In developed markets, like the US market, we can also calculate betas with the above method, or simply we just look for the betas for the companies or for industry areas on the web pages of Bloomberg, NYSE, Damodaran online or other financial web sites.

#### ESTIMATION OF THE FADE RATE

For estimation of the annual fade rate, at which the ROE's for new investments are expected to converge toward the firm's cost of equity we



have used the aggregate data of valuated companies. The aggregate data are less volatile. The relatively high volatility of the data used has made impossible the estimation for the individual companies in our case. The high volatility of reported data of the companies is due to the nature of a fast changing emerging equity market, such as the Slovenian one, and presumably is also true for most emerging markets. We have calculated the fade rate from the aggregate historical data for the last 11 years for the valuated companies with the following formula:

$$f = - \left( \left( \frac{R_{t+1} - k_a}{R_t - k_a} \right) - 1 \right), \tag{10}$$

where:  $f$  – annual fade rate at which the ROE’s for new investments are expected to converge toward the firm’s cost of equity capital,  $R_{t+1}$  – ROE on new investments of the aggregate of the valuated companies in a year  $t + 1$ ,  $R_t$  – ROE on new investments of the aggregate of the valuated companies in a year  $t$ , and  $k_a$  – cost of capital of the aggregate.

With the kernel estimator we have evaluated the expected fade rate from the calculated historical fade rates.

$$f = \frac{1}{\sum K} \sum_{i,j=1}^n (p_j x_i) = 28.31\%. \tag{11}$$

The expected fade rate is very high. This means that every investment outlay of the valuated companies will in the future earn a smaller added value in every next period.

INVESTMENT OUTLAY OF THE EQUITY CAPITAL

$$I_t = \text{KVKL}_t - \text{KVKL}_{t-1}, \tag{12}$$

where:  $I_t$  – investment outlay of the company equity capital in the year  $t$ ,  $\text{KVKL}_t$  – book value of the company equity capital in year  $t$ , and  $\text{KVKL}_{t-1}$  – book value of the company equity capital in year  $t - 1$ .

ROES OF THE NEW INVESTMENT OUTLAYS OF EQUITY CAPITAL

$$R_t = \frac{E_{t+1} - E_t}{I_t}, \tag{13}$$

where:  $R_t$  – ROE of new investment outlays of equity capital in year  $t$ ,  $E_t$  – earnings of the company in year  $t$ ,  $E_{t+1}$  – earnings of the company in year  $t + 1$ , and  $I_t$  – investment outlay of equity capital in year  $t$ .

## EARNINGS GROWTH RATE

$$g_d = \frac{E_t}{E_{t-1}} - 1, \quad (14)$$

where:  $g_d$  – earnings growth rate,  $E_t$  – company earnings in year  $t$ , and  $E_{t-1}$  – company earnings in year  $t - 1$ .

## INVESTMENT OUTLAYS OF EQUITY CAPITAL GROWTH RATE

$$g_i = \frac{I_t}{I_{t-1}} - 1, \quad (15)$$

where:  $g_i$  – growth rate of investment outlays in year  $t$ ,  $I_t$  – investment outlay of equity capital in year  $t$ , and  $I_{t-1}$  – investment outlay of equity capital in year  $t - 1$ .

We have estimated with the kernel estimator the expected values from the calculated historical values for the next variables: ROE of the investment outlays, the earnings growth rates, and the investment outlays of equity capital growth rates. With the expected variables and the data from the last year we have calculated the expected earnings and the expected investment in the next period.

## EXPECTED EARNINGS

$$E_1 = E_0(1 + g_{d1}), \quad (16)$$

where:  $E_1$  – expected earnings in the year 2007,  $g_{d1}$  – estimated expected earnings growth rate, and  $E_0$  – earnings of the company in the year 2006.

## EXPECTED INVESTMENT OUTLAYS

$$I_1 = I_0(1 + g_{i1}), \quad (17)$$

where:  $g_{i1}$  – estimated expected growth rate of investment outlays,  $I_0$  – investment outlay of equity capital in year 2006, and  $I_1$  – expected investment outlay of equity capital in the year 2007.

## EXPECTED DECAY RATE OF NPV'S OF THE FIRM'S FUTURE GROWTH OPPORTUNITIES

$$d = f - g_{i1}, \quad (18)$$

where:  $g_{i1}$  – estimated expected growth rate of investment outlays,  $f$  – annual fade rate at which the ROE's for new investments are expected to converge toward the firm's cost of equity capital.

TABLE 4 Calculated and estimated variables for the valued companies

Company	(1)	(2)	(3)	(4)	(5)	(6)
ACH, d. d.	8,799.21	15,089.54	0.1153	0.1991	0.1223	0.1678
Aerodrom Ljubljana, d. d.	9,713.99	5,844.22	0.0935	0.1829	0.1036	0.1896
Delo, d. d.	2,083.69	1,112.69	-0.1270	-0.1444	0.0443	0.4101
Gorenje, d. d.	13,142.47	-1,884.84	0.0103	0.0985	0.0850	0.2728
Helios, d. d.	9,667.89	12,404.32	0.1451	0.1706	0.2441	0.1380
Intereuropa, d. d.	4,583.46	3,811.98	0.2391	0.1914	-0.0162	0.0440
Iskra avtoelektrika, d. d.	2,693.32	1,053.79	-0.1854	0.1052	0.1180	0.4685
Istrabenz, d. d.	2,302.40	11,701.01	-0.0239	-0.1488	0.0020	0.3070
Krka, d. d.	139,750.36	129,373.38	0.2843	0.2386	0.2364	-0.0012
Lesnina, d. d.	9,605.25	11,224.23	0.0749	0.1423	0.1412	0.2082
Luka Koper, d. d.	22,030.82	22,245.07	-0.0294	0.1454	0.1041	0.3125
Mercator, d. d.	26,612.18	127,614.00	0.3802	0.0106	0.1047	-0.0971
Merkur, d. d.	15,024.53	26,841.92	-0.0121	0.0618	0.1778	0.2952
Petrol, d. d.	47,074.08	48,389.99	0.3359	0.2039	0.1858	-0.0528
Pivovarna Laško, d. d.	6,196.92	22,512.59	0.1698	0.0443	0.0170	0.1133
Salus, d. d.	6,743.86	3,333.43	0.0524	0.0944	0.0572	0.2307
Sava, d. d.	28,720.98	23,287.61	-0.2684	0.1215	0.2061	0.5515
Telekom Slovenije, d. d.	115,993.13	84,469.42	-0.0829	0.0053	0.2017	0.3660
Terme Čatež, d. d.	3,506.49	1,509.21	-0.4198	-0.2473	-0.0789	0.7029
Žito, d. d.	5,806.31	1,791.88	0.2389	-0.9117	0.5677	0.0442

NOTES Calculated variables: (1)  $E_1$  – expected earnings for the next period (1000 €), (2)  $I_1$  – expected investment outlays of equity capital (1000 €). Estimated variables: (3)  $g_n$  – expected investment outlays of equity capital growth rate, (4)  $R_1$  – expected ROE of new investment outlays of equity capital, (5)  $g_{D_1}$  – expected growth rate of earnings, (6)  $d = f - g_n$ .

We can see from table 4 that the expected decay rates for most companies are high (Luka Koper, d. d., for example have a decay rate of 31.25%). We can conclude that the value of expected new investments (the second part of the O'Brien formula) will have a small impact on the estimated value of these companies.

The estimated values range from -842% of the market value for Mercator, d. d., to 98% of the market value for ACH, d. d. Such deviation for the company Mercator, d. d., is due to a negative decay rate which is close to the estimated cost of equity. We have removed Mercator, d. d.

TABLE 5 Results of the valuation, estimated value of equity capital of the valuated companies

Company	(1)	(2)	(3)	(4)	(5)	(6)
ACH, d. d.	93,113.69	161,693.98	1.74	157,663.48	0.98	1.69
Aerodrom Ljubljana, d. d.	87,564.20	287,852.68	3.29	103,929.70	0.36	1.19
Delo, d. d.	26,199.90	89,440.18	3.41	18,118.96	0.20	0.69
Gorenje, d. d.	270,167.68	431,514.00	1.60	114,514.06	0.27	0.42
Helios, d. d.	67,411.00	306,246.59	4.54	141,322.07	0.46	2.10
Intereuropa, d. d.	156,893.91	287,331.74	1.83	61,303.07	0.21	0.39
Iskra avtoelektrika, d. d.	49,031.94	91,754.26	1.87	30,794.61	0.34	0.63
Istrabenz, d. d.	178,471.71	347,370.80	1.95	-42,801.91	-0.12	-0.24
Krka, d. d.	622,682.81	3,127,807.56	5.02	2,831,419.23	0.91	4.55
Lesnina, d. d.	75,846.59	141,515.75	1.87	112,609.06	0.80	1.48
Luka Koper, d. d.	286,367.32	1,078,700.00	3.77	178,499.28	0.17	0.62
Merkur, d. d.	203,613.44	340,589.56	1.67	142,741.35	0.42	0.70
Petrol, d. d.	398,456.34	1,207,613.61	3.03	1,129,359.44	0.94	2.83
Pivovarna Laško, d. d.	233,071.99	454,615.47	1.95	9,796.47	0.02	0.04
Salus, d. d.	43,807.00	113,002.56	2.58	80,774.33	0.71	1.84
Sava, d. d.	350,161.95	584,675.45	1.67	322,047.43	0.55	0.92
Telekom Slovenije, d. d.	1,071,888.16	2,503,806.98	2.34	918,326.79	0.37	0.86
Terme Čatež, d. d.	83,892.92	131,840.48	1.57	32,347.17	0.25	0.39
Žito, d. d.	59,299.70	76,648.27	1.29	-104,523.41	-1.36	-1.76
Standard error (Mercator, d. d., excluded)					0.5159	1.2967

NOTES Column headings are as follows: (1) book value of equity capital of a company dated 31/12/2006 in 1000 EUR, (2) market value of a share dated 5/4/2007 in EUR, (3) market-to-book value ratio of equity capital of a company, (4) Estimated value of equity capital of a company with the O'Brian model, (5) estimated value to market value ratio of equity capital of a company, (6) estimated value to book value ratio of equity capital of a company.

from the further analysis. All the companies have been valuated lower than the market value. The mean (Mercator, d. d., excluded) of the estimated value to market value ratio was 33.9%. Above the mean of the estimated value to market value ratio were the companies: Petrol, d. d., ACH, d. d., Aerodrom Ljubljana, d. d., Helios, d. d., Iskra Autoelektrika, d. d., Krka d. d., Lesnina, d. d., Merkur, d. d., Salus, d. d., Sava, d. d., Telekom Slovenije, d. d., and the standard error of the estimated value to market value is 51.59%. For the companies Žito, d. d. and Istrabenz, d. d. the

estimated values are negative. The reason is that the estimated expected return on new investment outlays is lower than the estimated cost of capital, which is decreasing the value of the equity capital of the companies.

We have been interested in how much variance of the market value of the valuated companies we can explain with the estimated value. We have done a linear regression of the market-to-book value ratio, i. e. the dependent variable and the estimated value to book value ratio of the companies, i. e. the independent variable.

The resulting adjusted  $R^2$  was 0.451. This means that we can explain 45.1% of variance of the market-to-book value of the equity capital ratio with the estimated value to book value of the equity capital ratio.

### **Conclusions**

The aim of the research was to evaluate Slovene publicly traded companies' valuation with an O'Brian (2003) model, based on expected earnings and growth opportunities. We have chosen a 'simple' model which uses financial data from the balance sheet and income statement. The data used for the valuation are public and accessible. We have expected a low explained variance and small usefulness of the model on the developing and fast changing Slovene equity market. The estimated values for the companies were very low; the estimated value of all the companies is below the market value. The model has explained 45.1% of variance of the market-to-book value ratio of the equity capital with the estimated value to book value ratio of equity capital. We can say that the model has some-altogether small-explanation power in our case.

The model is based on the expected earnings and growth opportunities and we have concluded that the estimated Slovene companies' earnings and growth opportunities are too small. That is why the estimated value is in general much lower than the market value. It is possible that in the observed years the companies have exploited to the maximum the possibility of income tax relief and have lowered the earnings. In order to exploit income tax relief the companies have invested in less interesting projects with low returns. A possible solution to the problem of lowering the earnings for the tax reasons lies in the use of a model of free cash flows to equity for the valuation.

The lower earnings in the observed years have been due to the agent relations. The undefined property of the companies is causing the intentional lowering of the reported earnings, and in consequence the value of the company, with the purpose of obtaining a smaller purchase value.

The earnings have been presumably lowered due to the high agency costs on the level of owners-managers, also due to the undefined property. Till this day in many valuated companies that we have dealt with in this research the state has a large share of ownership.

The data for the model are drawn from the balance sheets and income statements of the companies. The data are subject to accountant creativity. For this reason the valuation with such a model is under question. To diminish this problem we have used the data for a longer period, because the exaggerated accountant creativity is difficult to sustain. But the data can be corrupted in certain years, thus destroying the continuity.

Taking into account the facts, we can conclude as follows. The estimation of the internal value of the equity capital of the chosen companies is not reliable. Beside this, the fact is that earnings and growth opportunities of the estimated Slovene companies are too low to confirm the market value. The market value of the companies can be higher due to the insider information which certain investors have, and this information points to the higher potential of the companies than is shown by the data from the balance sheets and income statements. The market value can be higher due to the expected takeover at a higher price. The value of the company as an independent economic subject is, with regard to its potential, much smaller. The market values can be boosted by purchasing in the market for speculative reasons of investors, or thinking to sell in a short term at prices higher than the buying prices. The high market price of the chosen companies might be higher due to the few investment opportunities for investors on the Slovene capital market.

### **Suggestions for Further Research**

The cash flows from the investments are usually irregularly distributed through time – for this reason it would be interesting to repeat the research every year.

It would be also useful to estimate ‘comparable’ foreign companies and compare the results with those of the Slovene companies.

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