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## Article

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*Review*  
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# APPLICATION OF DIVIDEND DISCOUNT MODEL VALUATION AT MACEDONIAN STOCK-EXCHANGE

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## Abstract

Dividend discount model (DDM) is the simplest model for valuing equities in finance. Many analysts believed that DDM is outmoded, but much of the intuition that drives Discounted Cash Flow (DCF) valuation is embedded in the DDM model. There are also specific companies stocks where the DDM model remains a useful tool for estimating value. The basic task of these research is to examine if DDM models offer relevant and safe valuation of long-term securities at Macedonian Stock Exchange (MSE) through the process of empirical valuation of random chosen stocks. This research helped us to identify problems in use of DDM valuation models at MSE, to determine causes for differences between the intrinsic values and the stock market prices and to determine basic parameters for implementation of valuation on Macedonian financial market. We find that DDM models are usefull only as additional tool beside relative and DCF stocks valuation at MSE.

**Keywords:** valuation, securities, free cash flow, dividends, equity.

*Jel Classification:* G1; G12

## INTRODUCTION

Valuation plays a key role in many areas of finance - in corporate finance, mergers and acquisitions and portfolio management. The value of an asset comes from its capacity to generate cash flows. The value of the firm/asset is the present value of expected future cash flows generated by the firm/asset. When valuing assets and firms, we use discount rates that reflect the riskiness of the cash flows. The cost of debt has to incorporate a

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default spread for the default risk in the debt and the cost of equity has to include a risk premium for equity risk. It is crucial for analysts to measure default and equity risk, and more importantly to come up with default and equity risk premiums. (Damodaran 2011). The risk premium is a fundamental and critical component and measures what investor demand as a premium for investment in risky investment. However, the most critical input in valuation is the growth rate to use to forecast future revenues and earnings. The best way of estimating growth is to base it on a firm's fundamentals.

The simplest model for equity valuation is the Dividend Discount Model (DDM). Many analysts viewed it as outmoded, but much of the intuition that drives Discounted Cash Flow (DCF) valuation is embedded in the DDM model. There are also some sectors where the DDM remains a useful tool for estimating value.

The Free Cash Flow model (FCF) does not represent a radical departure from traditional DDM model. (Berk 2008). The versions of FCF valuation model are simple variant on the DDM model. Beside aforementioned, this study presents fundamental principles of relative valuation. In DCF valuation, the objective is to find the value of assets, given their cash flow, growth and risk characteristics. In relative valuation, the objective is to value assets, based upon how similar assets are currently priced in the market through use of multiplies.

The analysts faced the task of valuing a firm/asset or its equity has to choose among different approaches — DCF valuation or relative valuation and within each approach, they must also chose among different models. These choices will be driven largely by the characteristics of the firm/asset being valued – the level of its earnings, its growth potential, the sources of earning growth, the stability of its leverage and its dividend policy (Arnold 2008).

The basic task of these research is to present full proces of DDM stock pricing as well as to examine if DDM models offer relevant and safe valuation of long-term securities at Macedonian Stock Exchange (MSE). We use Gordon DDM model (model of constant dividend growth) as well as the two-stages DDM model for equity valuation at MSE. This research helped us to identify problems in use of DDM valuation models at MSE, to determine causes for differences between the intrinsic values and the stock market prices and to determine basic parameters for implementation of valuation on Macedonian financial market. In context of above mentioned aspects, this study can be viewed as a solid contribution for practical implementation of valuation models on financial market of the Republic of Macedonia.

## 1. LITERATURE REVIEW

DCF models, and the DDM in particular, have roots in John Burr Williams text "The Theory of Investment Value" published in 1938 (part of his Ph.D. thesis). He first articulate the theory of DCF valuation, and in particular, dividend based valuation. Copeland, Weston, and Shastri, (Copeland 2004), Damodaran (Damodaran 2001), among many others, present a broad and updated review of the large body of literature about these traditional valuation models. Concerning the fact that returns on emerging markets significantly differs from returns at developed markets (Geert 1995), we try to contribute with this paper to this literature by presenting DDM valuation at MSE as emerging markets.

One of the basic problems in using DDM model for valuation at MSE is non-consistency of companies' dividend policies which is *de facto* crucial for dividend models application. The significantly unstable companies' dividend policies was notified as a problem in Macedonia finance theory (Arsov 2011). This fact and dividends' behaviour affects determination of growth rate –  $g$ . In fact, it is not possible to determine precisely the growth rate as relation between dividend yield and ROE.

Macedonian companies do not have consistent dividend policy approach. It is difficult to identified one determined dividend policy which can be used for companies' stocks valuation. This mean that dividends' financial signalization effect does not function on Macedonian capital market. DCF model assumes constant long-term dividends' rate of growth after several years, which in terms of unstable dividend policy is almost impossible to be forecasted using relevant and accurate data from past period.

## 2. STOCKS VALUATION AT MSE WITH TWO – PHASES DDM MODEL

### 2.1. KMB stock valuation

We make valuation of Komercijalna Banka stocks (ISIN Code: KMB), using Two-Phases Growth Model — DDM Model. The finance theory and practice show that DDM are commonly used for stocks valuation, especially when it is difficult to determine companies' free cash flows to equity (FCFE). We usually use two phases growth model when we make forecasting that expected growth rate in the next period will be higher compared with the period of stable growth. Stocks issuer in this case is from banking sector and its stoks are quoted on market segment of stock-exchange quoatation. Komercijalna Bank has 2.279.067 stocks outstanding.

We use bank's audited financial statements to derive key data for the period 2008–2010 as follows:

**Table 1.** Derived data for Komercijalna Banka\*

(in 000 MKDdenars)			
Years	2010	2009	2008
Total Income	5.132.375	4.837.341	4.786.292
EBIT	1.413.583	1.058.005	1.537.178
Net Income	1.432.072	1.075.130	1.378.667
Equity	8.005.880	6.953.252	6.259.292
Total Liabilities	62.824.926	53.756.126	48.840.074
Total Assets	70.830.806	60.709.378	55.099.366
Market Capitalization	6.525.436	5.594.971	5.491.749

Source: \* [www.kb.com.mk](http://www.kb.com.mk)

Fundamental analysis of Komercijalna banka shows that Bank has 23,5 million euro Net Income in 2010 which is in fact 34% increase compared with 2009. In 2009, Bank has 17,5 million euro Net Income, which was decrease of 22% compared with 2008. This result in 2009 due to the influence of world economic crises which reach its pick at 2009 and was spread on Macedonian economy. Partially this was also influenced by Macedonian Central Bank restrictive monetary policy during the whole year. Bank Total Income has incerased for 6% in 2010, compared with 2009 when it has 13,6% decreased, and in the same time Bank operational expeces increase for 4,1%. Using data from financial statements, we make fundamental analysis and derive ratios necessary for

valuation, as well as make cross-sectional analysis using averages for Banks and banking industry averages in the region of South-East Europe (SEE), as present in next two tables:

**Table 2.** KMB Financial Ratios\*

Years	2010	2009	2008
EBIT /Sales (ROS)	27,54%	21,87%	32,12%
EPS	711,03	538,05	690,32
ROA	2,02%	1,77%	2,50%
ROE	17,89%	15,46%	22,03%
P/E	4,56	5,20	3,98
BV	3.974,98	3.479,75	3.134,14
P/BV	0,82	0,80	0,88
Dividend per Share	200,00	170,00	190,00
Dividend Yield	6,17%	6,07%	6,91%

Source: \* www.mojedionice.com, <http://www.belex.rs/trgovanje/hartija>

**Table 3.** Cross –Sectional Analysis of the banks from the region of SEE

	P/E	P/S	P/BV	ROE
KB	4,56	1,61	0,82	17,87
Komercijalna Banka – Belgrade	6,89	2,17	0,62	6,13
Zagrebacka Banka- Zagreb	10,10	1,93	0,91	10,67
Agrobanka -Belgrade	2,78	-	0,18	6,53
AIK Banka –Nis	3,19	-	0,40	12,65
Universal Banka -Belgrade	4,22	-	0,25	5,87
Privredna Banka- Zagreb	9,67	1,94	0,87	13,74

Using data from Bank financial statements as well as financial ratios we derive all necessary parametars for valuation. First, we determine Komercijalna Bank dividend payout ratios (28%), dividend yield, as ratio between current dividends and share market price (6,17%), as well constant growth rate (g) and evaluate cost of equity, as sum of dividend yield and growth rate. Results are presented in next table:

**Table 4.** Data for KMB valuation

EPS	711
Dividend payout ratio %Div	28%
Dividend	200
Price	2.900
Dividend Yield	0,0617
Rate of growth- g	5%
Required rate of Return- Re	11%

In order to determine expected growth rate, we are multiplied retention rate and return on equity (ROE). We use this rate for Net Income per Share forecasting for following years, until the year when we expect stable and constant growth. We also use as assumptions in our model 5% constant growth rate from fifth year. We determine Net Income forecasting per years in order to calculate dividends per year. In last year we calculate Terminal Value, using Gordon model for constant growth.

Stock intrinsic value will be determined with DDM for dividend with constant growth rate with formula as follows:

$$P_0 = \frac{Div_1}{1+r_e} + \frac{Div_2}{(1+r)^2} + \dots + \frac{Div_N}{(1+r)^N} + \frac{Div_{N+1}}{(r-g)}$$

In this model we have assumption that Bank will held same retention ratio as well as dividend payout ratio from Net Income per Share (EPS) in the following years.

Model Assumptions:

Retention Rate (RR) = 0,72;

Return on Equity (ROE) = 18;

Growth rate =  $0,72 \cdot 18 = 12,96$ .

**Table 5. KMB Dividends Forecasting**

	Valuation date 25.04.2011					
	1	2	3	4	5	6
% growth rate of Net Income per Share	13%	13%	13%	13%	13%	5%
EPS	803,43	907,88	1,026	1,159	1,310	1,375
% Div	28	28	28	28	28	28
Dividends	225	254	287	325	367	385
$P_0 = 4678,402236$						

In previous table we present assumptions that starting from first to fifth year, Bank Net Income per Share will have 13% growth rate and from sixth year, 5% constant growth rate forever. By multiplying EPS with dividend payout ratio we determine dividends for all six years. Finally, we use dividend in last year in order to calculate Terminal Value as follows:

$$P_5 = \frac{D_5}{r - g} = \frac{367}{0,11 - 0,05} = 6.113,2$$

$$PV = \frac{225}{1,11} + \frac{254}{1,11^2} + \frac{287}{1,11^3} + \frac{325}{1,11^4} + \frac{367}{1,11^5} + \frac{6113}{1,11^5} = 4.678,40$$

We discount dividends as well as Terminal value with cost of equity (11%) and derive stock intrinsic value. Compared with key bank ratios from the region of SEE as well as industry averages, as well as with valuation that we made using DDM, we determine that stock intrinsic value is 4.678,40 denars (MKD), which suggest that stock market price is undervalued compared with its value (3.200 MKD, April 2011).

## 2.2. ALK stock valuation

Next randomly chosen is stock of Alkaloid SC-Skopje (ISIN Code: ALK). We use same dividend model with two phases growth rate for valuation. Alkaloid is blue - chip company from Pharmacy industry, quoted on market segment of MSE, with total number of 1.431.35 outstanding common shares, where 8.507 are preference stocks (0,59% of total shares outstanding). Using data from company financial statements as well as ratios we derive all necessary parameters for valuation. As above already mentioned we determine dividend payout ratios (as percentage), dividend yield (as ratio between current dividends and share market price), as well as constant growth rate (g) and evaluate cost of equity, as sum of dividend yield and growth rate.

**Table 6.** Data for ALK valuation

Net Income per Share (EPS)	401
Dividend payout ratio %Div	41,5%
Dividend	166,66
Price	4.800
Dividend Yield	0,0345
Constant Rate of Growth (g)	5%
Required Rate of Return Re	9%

In this model we use same assumptions that Alkaloid will keep same retention ratio as well as dividend payout ratio from Net Income per Share (EPS) in the following years, as follows:

Model Assumptions:

Retention Rate (RR) = 0,59;

Return on Equity (ROE) = 8,70;

Growth rate = 5,16.

**Table 7.** ALK Dividends Forecasting

Valuation date 25.04.2011

	1	2	3	4	5	6
% growth rate of Net Income per Share	10%	10%	10%	10%	10%	5%
EPS	441.1	485.21	534	587	646	678
% Div	41.5	41.5	41.5	41.5	41.5	41.5
Dividends	183	201	221	244	268	281

P<sub>0</sub>=5.617,61

As presented in previous table, starting from first to fifth year, Alkaloid Net Income per Share (EPS) will have 10% growth rate and from sixth year, 5% constant growth rate forever. By multiplying EPS with dividend payout ratio we determine dividends for six years. We use dividends in last year in order to calculate Terminal Value as follows:

$$TV = \frac{268}{0,09 - 0,05} = 6.700,36$$

Finally, Terminal Value and dividend values in all sixth years are discounted with Cost of Equity = 9% and we derive ALK stock intrinsic value of 5.617 MKD.

### 3. STOCKS VALUATION AT MSE WITH DDM: GORDON MODEL

We proceed our stocks valuation using DDM – Gordon model for five years time horizon (2007–2011). We are using companies' financial data for paid dividends per years, and same discount rates and rates of constant growth, as previously determined for the purpose of use of the DDM model with Two- Phases growth rates.

Finally we compare results with previously determined values with the DDM model with two phases growth rates aswell as average stock market prices.

Using Gordon model, we determine stocks value from 2006–2011:

**Table 8.** KMB Valuation

KMB	g=5%	r=11%
Year	Dividends	$P_0=D_1/r-g$
2006	165	2.887
2007	190	3.325
2008	190	3.325
2009	170	2.975
2010	200	3.500
2011	200	3.500

**Table 9.** ALK Valuation

ALK	g=5%	r=12%
Year	Dividends	$P_0=D_1/r-g$
2006	80,5	1.207,5
2007	100	1.500
2008	123	1.845
2009	136	2.040
2010	150	2.250
2011	-	1.626

Based on data from MSE we derived the average stocks market prices for our two analyzed companies for the period 2006–2011, as follows:

**Table 10.** The Average stocks market price

	2006	2007	2008	2009	2010	2011
KMB	5.174	6.957	5.397	2.651	3.096	3.372
ALK	4.606	9.665	7.536	4.240	4.155	4.233

In next table (Authors calculation), we present all calculated values using two DDM valuation models and the average stock market prices for all years, in order to compare which of calculated values gravitated closer around stocks average prices:

**Table 11.** Summary of data

	2006	2007	2008	2009	2010	2011	Average
KMB (average price)	5.174	6.957	5.397	2.651	3.096	3.372	4.441
KMB (DDM Two Phase)						4.678	4.678
KMB (DDM)	2.887	3.325	3.325	2.975	3.500	3.500	3.252
ALK (average price)	4.606	9.665	7.536	4.240	4.155	4.233	5.739
ALK (DDM Two Phase)						5.617	5.617
ALK (DDM)	1.207	1.500	1.845	2.040	2.,250	1.626	2.093

In previous table, beside calculated intrinsic stock values with two valuation models, we added another column at the end with the average stock market prices for all years, in order to compare which of calculated values gravitated closer around average price. The final goal is to determine if DDM valuation model is reliable for stock valuation.

The use of this model for valuation of stocks of Komercijalna Banka shows that Gordon model is reliable and offer more relevant data for analysts for stock value calculation, except the period of “boom” at MSE. Valuation of both stocks with two-phase growth rate DDM shows that market value oscillated over stocks intrinsic value. On the other side, use of DDM Gordon model for calculation of stock value for Alkaloid offer results that have significant deviation from average market prices and average stock prices are significantly higher than their intrinsic values. Significantly big discrepancies between average prices and intrinsic values calculated using two valuation models in 6-years time series lead us to conclusion that DDM model can be used only as additional tool for equity valuation at MSE. DDM models are usefull tool for bank stocks valuation at MSE, while for other companies we suggest DCF and relative valuation.



## CONCLUSION

Valuation plays a key role in many areas of finance - in corporate finance, mergers and acquisitions and portfolio management. The simplest model for valuing equities is the DDM model. Many analysts viewed it as outmoded, but much of the intuition that drives DCF valuation is embedded in the DDM model. There are also specific companies where the DDM model remains a useful tool for estimating value. The analysts faced with the task of valuing a firm/asset or its equity has to choose among different approaches – DCF valuation or relative valuation and within each approach, they must also chose among different models. These choices will be driven largely by the characteristics of the form/asset being valued – the level of its earnings, its growth potential, the sources of earning growth, the stability of its leverage and its dividend policy. The basic task of these research is to present complete process and to examine if DDM model offer relevant and safe valuation of long-term securities at MSE. Empirical analyses and DDM valuation of two trading securities at MSE helped us to identify problems in use of DDM valuation models, causes for differences between valuation and market prices and to determine basic parameters for implementation of valuation on Macedonian financial market.

The valuation of KMB stocks proves that Gordon model is reliable and offer relevant data for analysts for stock value calculation, except the period of “boom” at MSE. Valuation of both stocks with two-phase growth rate DDM shows that market value oscillated over stocks intrinsic value. On the other side, use of Gordon model for calculation of ALK stocks value shows results that have significant deviation from average market prices and average stock prices are significantly higher than their intrinsic values. Significantly big discrepancies between average prices and intrinsic values calculated using two valuation models in 6-years time series lead us to conclusion that DDM models are usefull only as additional tool for valuation of stock quoted at MSE. DDM models are usefull tool for bank stocks valuation at MSE, while for other companies we suggest DCF and relative valuation.

In context of above mentioned aspects, this study can be viewed as a solid contribution for practical implementation of valuation models on financial market of the Republic of Macedonia.

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