ESTIMATING EQUITY RISK PREMIUM FOR VALUATING A ROMANIAN COMPANY. THE CASE OF ANTIBIOTICE SA

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Abstract: The estimation of the equity risk premium continues to create interesting debates in academic and practice fields. Many studies generated evaluation models, some of them with academic recognition, but few of them were really applied in practice. There was always the case of the necessity the models' adjustments in order to reflect more accurately the economic reality and the capital market's characteristics. In this paper we intend to apply some practical adjustments for the risk premium's evaluation, considering the characteristics of the Romanian economy and capital market (Bucharest Stock Exchange - BSE). The reconciliation of the values obtained by applying different models is a very important issue in searching the real value of the risk premium.

1. Introduction

The major objective for any investor is maximizing his own wealth, so that the investment decision is adopted if the expected rate of return for the project is greater than the return required by the investor. The rate of return required by the investors, also known as opportunity cost of capital, is a factor which determines the price for different kind of assets (real estate investments, treasury bills, stocks, bonds, etc.) on different markets (real estate, monetary and capital markets). So that the price of companies' shares listed on BVB reflects the required rate of return from investors – the price that an investor pays for a share is equivalent with the discounted value of cash flows (dividends and future price).

Starting from the model that determines the intrinsic value for a share by discounted future dividends, Geykdajy (1981) examined the evolution of the cost of equity for 28 multinational companies from USA, in the period 1965-1978. Siegel (1985) simplified the model of determining the cost of equity by considering a constant growth rate of dividends, sustained by the development of the company's activity. The conclusions of these studies showed that the dividend's growth rate is a determinant factor for the cost of equity, but the level of it is volatile depending on the forecasted growth rate within the model. Unfortunately, this model of determining the cost of equity, and implicitly the opportunity cost for an investment, can be applied only for mature companies. In addition, the transaction price for companies' shares on the capital market does not reflect the intrinsic value if the market is not liquid, or transparent. In consequence, for an emergent capital market, any financial analyst or appraiser have a dilemma regarding the estimation of the opportunity cost of the invested capital if there is no valid reference point from the perspective of the transactions on a particular capital market.

Therefore it has to be identified the risk assumed by investors in purchasing stocks and determined the correspondent return for this investment, in order to estimate the

opportunity cost of capital. There are many models which estimate the cost of equity in correlation with the investors' reward for the risk implied by the investment: i) CAPM model proposed by Sharpe (1964) and Lintner (1965), later adjusted by Black (1972); ii) APT model proposed by Ross (1976); iii) Fama-French model (1996); iv) other models which analyze the linear relationship between the investors' required rate of return on the capital market and the level of macro and micro indicators. In these models, the estimation of the risk premium for equity should be realized from the marginal investor point of view.

Depending on the structure of stakeholders for the analyzed company, the marginal investors are those who most likely would make transactions with the company's shares [Damodaran, 2006]. From this perspective, the evaluator should decide if it has to be taken into consideration only the systematic risk or both the systematic and specific risks, for determining the risk premium of equity.

For the case of developing capital markets, the reduce length of the transaction period, the low level of liquidity and transparency, make difficult, or even impossible, the valuation of the risk premium for equity.

As an alternative, analysts adjust the risk premium on a developed capital market (for example, NYSE). In this paper we present the difficulties of making and using such adjustment, for the specific case of Antibiotice stocks, traded on BVB, 1st category. Our paper is structured in four sections. In the first section we present some aspects regarding the valuation of opportunity cost of capital and risk premium for equity. In the second section we briefly present the evolution and characteristics of Romanian capital markets. In the third section we present the model for estimating the risk premium in the case of Antibiotice stocks. Section 4 contains the conclusions of the analysis for estimating the risk premium.

2. Evolution and characteristics of Romanian capital markets

The Romanian capital market, BSE – Bucharest Stock Exchange, was re-opened in 1995, after about 50 years from its closing time. The major objective for this was to sustain the developing of the market economy, by creating the organized framework for transactions of financial assets. Until 1997, the investors' interest for this capital market was low, in the year 1995 only 9 companies were listed on BSE, and in 1996 the number of the listed companies was only 17. The year 1997 represents the period of a growth of the trade volume and the number of listed companies (76). At the end of the year (22 September 1997) BET index was created for measuring the evolution of the market – 10 companies' shares are included in its structure, the selection of these companies is made through the greater value of market capitalization and liquidity. The financial investment companies were excluded from the BET structure, and the included companies were from different sectors of activity. The number of listed companies had grown up to 126 in 1998, and it was necessary to create a new index BET-C (16 April 1998) for measuring the overall performance of the BSE. In order to avoid the situation of a double inclusion for companies, the construction of BET-C doesn't contain the financial investment companies, because these companies' portfolio contains stocks of different listed companies. For monitoring the investments' performance on those 5 financial investment companies, it was created the index BET-FI, on 1 November 2000.

The period 1998-2000 was a difficult one for BSE. Even if the number of the listed companies was about 126 , the trade volume decreased, comparing with the level in

1997 (see Table 1). The political and economic events from that period (for example: mineriads, the Stand-by IMF Arrangement suspending at the beginning of the 1999 because of the low speed of structural reform) had negative consequences – the decrease of the investors' trust in the Romanian economy's opportunities. The interest of investors for Romanian capital market increased after the re-negociation with IMF, and by improving the macroeconomic indicators (economic growth rate, inflation rate, unemployment rate, etc.), and after CNVM regulations for improving the transparency and liquidity for BSE transactions.

Table 1

Bucharest Stock Exchange Characteristics 1995-2007

Year	No. shares traded per year (mil.)	Transactions total value (mil. USD)	Market capitalization (mil. USD)	Market capitalization /GDP (%)	BET (YTY)	BETC (YTY)	Market volatility (**)
1995	0,043	0,964	100,4	0,36%	-	-	-
1996	1,142	5,3	60,8	0,21%	-	-	-
1997	593,9	263,6	632,4	2%	-	-	-
1998	986,8	213,6	357,1	1,05%	-50,2%	-	25.60%
1999	1.057,6	89,5	316,8	1,05%	18,7%	-3,3%	20.51%
2000	1.806,6	86,9	415,9	1,35%	21%	8%	19.09%
2001	2.277,5	132,02	1.228,5	3,34%	39%	-5%	24.88%
2002	4.085,1	213,7	2.717,5	6,05%	120%	127%	21.71%
2003	4.106,4	302,2	3.710,2	6,40%	31%	26%	13.03%
2004	13.007,6	748,2	11.937,6	13,86%	101%	104%	15.53%
2005	16.934,9	2.672,7	18.184,8	19,52%	51%	38%	28.66%
2006	13.677,5	3.514,6	28.204,04	21,42%	22%	28%	19.44%
2007	14.234,9	5.680,6	35.326,04	21,24%	22,05%	32,6%	20.51%

Sources: www.bvb.ro, www.bnr.ro, www.insse.ro

(*) for the first quarter compared with the first quarter 2007

(**) Annualized daily volatility of BETC index (our own calculus: $\sigma_{year} = \sigma_{day} \times \sqrt{no.trading\,days}$ *)*

The process of improving the capital market regulations had continued after 2001, in 2004 was been adopted the new law of capital market (Law No. 297/2004), harmonized with EU legislation. Therefore, 2004 was a good year for BSE, the trade volume and the market capitalization being triple comparing with the previous years. The optimist expectations of the investors in 2004 determined a sharp rise of BSE index. After this period of long increase, in 2005 BSE was characterized by a high volatility, as a consequence of the trend-correction in the moment of panic for investors. The positive trend in macroeconomic indicators led to a greater confidence in the future opportunities of Romanian market development. As a consequence, plus the effect of the decrease of the reference interest rate of NBR, the trade volume tripled. In 2006, 2007 the annualized level of volatility had been stabilized around 20%, a level closed to the value communicated by Damodaran (2008) for the American capital market NYSE. But it's important to notice that the capital market volatility depends a lot on the market's liquidity. The lower the market liquidity, its measured volatility is at a greater distance from the real possible level in condition of a normal liquidity.

From the first year till now, only 10 initial public offers were made on BSE. Most of them were over / under subscribed, which indicates the investors' interest on placing

the financial resources in recently listed companies. At least for the moment, Romanian companies don't frequently use capital market for collecting financial resources. From this perspective, BSE may be considered a narrow market. The same conclusions are depicted from the low level of free-float capitalization (see Table 2).

Table 2

Capitalization and liquidity of the most important issuers listed at BSE (2006)

Issuer	Activity Sector	Free-float*	Liquidity (mil.EUR)	Capitalization (mil. EUR)	Capitalization (%)	Free-float capitalization (mil. EUR)
SIF Banat Crisana	Financial Investments	75,4%	175	522	1,7%	394
SIF Moldova	Financial Investments	89,6%	414	496	1,6%	444
SIF Transilvania	Financial Investments	84,1%	284	475	1,9%	400
SIF Muntenia	Financial Investments	54,6%	156	434	1,5%	237
SIF Oltenia	Financial Investments	81,2%	421	598	2,0%	486
BRD-GSG	Banks	11,4%	208	3765	15,9%	430
Banca Transilvania	Banks	70,9%	262	1160	4,5%	822
Petrom	Petrol şi gaze	6,2%	284	9345	35,0%	581
Rompetrol Rafinare	Petrol şi gaze	34,5%	155	539	2,2%	186
Antibiotice	Pharmaceutics	29,3%	21	228	0,9%	67
Biofarm	Pharmaceutics	61,3%	48	90	0,4%	55
Transelectrica	Utilities	10%	44	723	3,8%	72
Flamingo International	Retail	29,6%	16	81	n/a	24
Impact Developer& Contractor	Real estate	58,5%	31	171	0.9%	100
Tubormecanica	Engineering	31,8%	22	81	n/a	26

Sources: www.bvb.ro, BCR Research

From the previous table, it can be observed that Petrom and BRD-GSC market capitalizations represent 35% and 16% from the total market capitalization BSE. So that the capital market volatility is conditioned in a great extension by the evolution of these 2 important companies. Moreover, significant and important activity sectors are weak or not at all represented on the BSE (for example: IT, telecommunications, constructions materials, utilities etc.). From this perspective, investors can't diversify their portfolios of financial assets in order to reflect the Romanian economy structure and its dynamics. The systematic risk of the investments on BSE does't reflects the global risk of the Romanian economy.

Looking at the comparative evolution of BET-C index and S&P500 for the 36 previous months, we observe the higher level for BET-C and the higher volatility (see Figure 1).

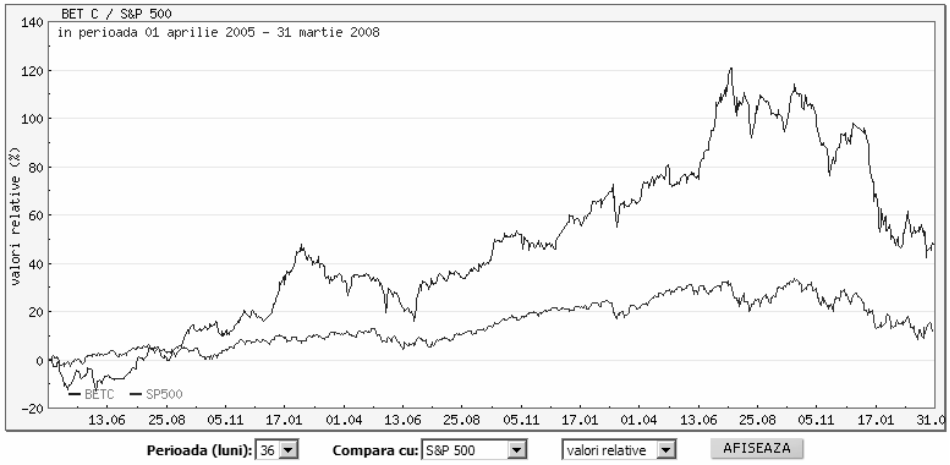

Fig. 1: Comparative evolution of stock index BET-C and S&P500 in the period 1 april 2005- 31 march 2008

Source: www.ktd.ro

The annualized volatility for this period has the level of 21%, in the case of BET-C, and a level of 13,9% in the case of S&P500. Also, the annual rate of return for BSE measured by BET-C for this period is 13,5% (geometric average), and 15,16% (arithmetic average). For the same period, the capital market return NYSE measured by S&P500 is 3,92% (geometric average), and 4,24% (arithmetic average). This information shows that, for Romanian capital market, it is difficult to identify a benchmark of the opportunity cost in the case of investments with a similar risk with the market portfolio. Consequently, the estimation of equity risk premium for a listed on BSE company is a mission almost „impossible".

3. Estimating the equity risk premium: case study Antibiotice stocks

The risk premium represents the excess percentage obtained over the risk free rate (yield for government bonds) in the case of investing in financial assets, with some degree of risk. The size of this premium is determined depending on the type and level of risk.

CAPM model, often criticized because of the restrictive hypothesis and the weak power of prediction, is the most used in practice (Graham & Harvey, 2002). This advantage is that it requires less information for estimation; the other models don't give better results, even if there are many factors considered.

But the simple CAPM equation is difficult to use in practice:

$$k = R_f + \beta \times \left(R_M - R_f\right) \quad (1)$$

where:

k = the opportunity cost of capital (the required rate of return);

R_f = the risk free rate (yield for government bonds);

β = the volatility coefficient, beta, which measure the systematic risk of investment;

R_M= the capital market rate of return;

(R_M- R_f) = the capital market risk premium.

There are some important questions to be answered in order to apply this model:

i) Which risk free rate has to be considered?

ii) For estimating the annual rate of return (risk free rate or capital market rate of return) using historical data, it should be used arithmetic or geometric average?

iii) What is the optimal length of the period of time for collecting data in order to estimate annual rate of return (risk free rate or capital market rate of return)?

iv) Which capital market index should be taken into consideration for estimating the level of capital market rate of return?

v) How it should be estimated the value of volatility coefficient beta?

vi) In which way the volatility coefficient beta should be adjusted in order to reflect the additional financial risk implied by company's financial leverage?

vii) In which way the volatility coefficient beta should be adjusted in order to reflect the additional operational risk of the evaluated company?

viii) In which way the volatility coefficient beta should be adjusted in order to reflect also the unsystematic risk of the evaluated company?

ix) Which is the level of capital market risk premium that should be taken into consideration in the CAPM model?

Damodaran (2006) shows that it is necessary a longer period (even 100 years) for estimating the annual capital market rate of return, in order to avoid the unsystematic fluctuations of its value. In the specific case of Romanian capital market, the current history has a short horizon and it's characterized by high capital market index volatility (and this is a normal situation for an emerging capital market). Therefore the applicability of CAPM model is useful for obtaining information about capital market risk premium. Using available data of the S&P500 index evolution for 80 years (1928-2007) Damodaran (2008) estimates the value of NYSE capital market risk premium (the geometric average): 4,79%. From this specific level characterizing a developed capital market, the level for the Romanian capital market could be determined by taking into consideration the high particular volatility. The method for the adjustment is proposed by Damodaran (2006):

$$\left(R_M - R_f\right)_{ROM} = \left(R_M - R_f\right)_{US} \times \frac{\sigma_{BET-C}}{\sigma_{S\&P500}} = 4{,}79\% \times \frac{21\%}{13{,}9\%} = 7{,}23\% \quad (2)$$

where:

(R_M- R_f)$_{ROM}$ = the Romanian capital market risk premium;

(R_M- R_f)$_{US}$ = the American capital market risk premium;

σ_{BET-C} = the standard deviation for the Romanian capital market annual rate of return;

$\sigma_{S\&P500}$ = the standard deviation for the American capital market annual rate of return.

This adjustment leads to the inclusion of the country risk premium into the Romanian capital market risk premium.

Taking into consideration the country risk premium also could be done by a separately estimation and by adding to the risk premium specific for a developed capital market. For this purpose, it is necessary to identify the spread between the yield to

maturity for the AAA rating government bonds and those for the Romanian government bonds. Analyzing the yield to maturity for investing in Eurobonds issued by Romanian government with the maturity on 22 June 2015, we observe that its level rises from 4,05% (the end of the 3rd quarter 2005) up to 6,06% (17 December 2007). This rising is caused by the growth of the default risk for Romanian economy, characterized by an actual rating of BBB- (S&P and Finch). Another similar Romanian issue of Eurobonds with AAA rating with the maturity on 1 April 2015 has an yield to maturity of 3,87%. Therefore, investments in Romanian Eurobonds are rewarded with 2,19 pp for the additional default risk. This spread represents a proxy for the country risk premium and it could be used for evaluating the Romanian capital market risk premium.

$$\left(R_M - R_f\right)_{ROM} = \left(R_M - R_f\right)_{US} + spread\ eurobonds = 4{,}79\% + 2{,}19\% = 6{,}98\% \quad (3)$$

It is necessary to determine the specific beta volatility coefficient in order to estimate the equity risk premium in the case of Antibiotice stocks. We determine its value by using daily ATB's rate of return for 5 years and by comparing with the daily BET-C's rate of return. The results of the regression are presented in the table 3.

Table 3

Estimation of the beta volatility coefficient for Antibiotice stocks

Dependent Variable: ATB_RETURN				
Method: Least Squares				
Date: 04/03/08 Time: 07:17				
Sample: 1 1485				
Included observations: 1485				
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
C	0.000520	0.000521	0.998035	0.3184
MARKET_RETURN	0.850726	0.037090	22.93686	0.0000
R-squared	0.261858	Mean dependent var		0.001947
Adjusted R-squared	0.261361	S.D. dependent var		0.023174
S.E. of regression	0.019917	Akaike info criterion		-4.993168
Sum squared resid	0.588270	Schwarz criterion		-4.986026
Log likelihood	3709.427	F-statistic		526.0996
Durbin-Watson stat	2.095501	Prob(F-statistic)		0.000000

The significance level for F test (Significance F) is less than the critical level of 0,05, validating the regression model, respectively the existent relationship between the return level of ATB stocks and the return level of BET-C index. 26% from the variation in the level of ATB return is explained by capital market return, this percentage represents the rate of the systematic risk on the total risk for the ATB stocks. T-test for the regression coefficient as the volatility coefficient beta shows that it is significant different from zero (t-stat >2, p-value<0,05), with a value of 0,85.

From a previous analysis for the period 9 July 2002 – 9 July 2007, beta volatility coefficient has similar level (0,84) and the regression has R^2 = 23,6%, which implies a stability of this relationship between those rate of returns.

Taking into account the value of beta coefficient which measures the systematic risk of investing in ATB stocks, we determine the equity risk premium for ATB (ERP_{ATB}).

$$ERP_{ATB} = \beta_{ATB} \times \left(R_M - R_f\right)_{ROM} = 0{,}85 \times 6{,}98\% = 5{,}93\% \quad (4)$$

The yield to maturity for AAA rated Eurobonds (issued by German government) with a maturity of 10 years is 4%, which represents the benchmark for the risk free rate level that should be used for estimating the ATB opportunity cost . We consider the maturity of 10 years because it is the most frequently period for this kind of bonds. During 2008 the Romanian government will issue Eurobonds with 10 years maturity. The yield of this Eurobond will contain a country risk premium. Therefore, if we consider this yield as a risk free rate, the capital market risk premium should not include the country risk premium (see equations 2, 3)

Consequently, the opportunity real cost for ATB estimated by applying CAPM model is approximately 9% (we consider the average inflation rate for Euro zone 1%).

$$k_{ATB} = R_{f\_reala} + \beta_{ATB} \times \left(R_M - R_f\right)_{ROM} = 3\% + 5{,}93\% = 8{,}93\% \quad (5)$$

By analyzing the current trades with ATB stocks and the level of PER multiplier, we may identify the implicit risk premium taken into account by the investors in ATB shares. Using the evaluation model for intrinsic value of a stock by discounting future dividends, we can observe the relationship between the current and the future level of the multiplier PER (at the beginning of mature phase of company's activity). If there is a benchmark for its level, it is possible to identify the implicit cost of opportunity for investing in ATB shares.

$$PER_0 = d \times \sum_{t=1}^{n} \frac{\prod_{t=1}^{n}\left(1+g_t\right)}{\left(1+k\right)^t} + \frac{\prod_{t=1}^{n}\left(1+g_t\right) \times PER_n}{\left(1+k\right)^n} \quad (6)$$

where:

d = dividend rate, considered to be constant at the level of 50% for the entire forecast period 2008-2011 (in 2006, this rate was 42%);

g = sustainable dividend growth rate for Antibiotice Iaşi in the forecast period 2008-2011;

n= year of forecast: 1 (for 2008), 2 (for 2009), 3 (for 2010), 4 (for 2011);

k = implicit opportunity cost for investing in ATB shares;

PER_n = the expected value of the multiplier PER at the end of the year 4 (2011) for a similar company (with the same financial performances and potential development as Antibiotice) at that moment;

PER_0 = the current value of the multiplier PER (on 31 March 2008), 23,37.

Taking into account the potential development of the Antibiotice SA activity, there are estimated the following dividend growth rate: 30% (for 2008); 28% (for 2009); 17,6% (for 2010); 11,7% (for 2011). The expected value of PER in the mature period of Antibiotice's activity is 20 (the estimated value of the median for a similar company, from Central and Western Europe). In equation (6) we use 20% for the implicit opportunity cost for ATB shares in nominal terms, and 16% in real terms (we considered the average inflation rate for the Romanian company of 4%).

Therefore, the implicit premium risk taken into account by ATB investors is 13% in real terms (we eliminate the real risk free rate). This level is greater by 7 pp than the estimated value by applying CAPM model.

Selecting one of these values implies that the evaluator make hypothesis about the evolution of the capital market in the next period. Therefore, in the context of the hypothesis that the future perspective about the value of the risk premium of the ATB investors will remain at the current level, it could be chosen as the reference level of 13%. This estimation of the risk premium is made in a period characterized by great depression of the European and Asian stock exchange, after the Fed's announcement that the interbank interest rate will decrease, and the Bank Bear Stearns' collapse „shaken" the investors' confidence in international capital markets.

For the moment, the specific investors' feeling for the capital market development is panic; the financial indicators reported by the listed companies on BSE are ignored in the process of decision-making for selling/buying. From this perspective, the level of 13% for the implicit risk premium may be considered as an over-valuated proxy for the real return corresponding with the assumed risk. A level of 6% (obtained by applying CAPM models) implies a stock trade for ATB with a PER equal to 29,5. In the context that the future equilibrium price for ATB shares implies that level for PER, the appraisers could use a risk premium of 6%. But in the context that the future equilibrium price for ATB shares implies a PER at the level of 27,5, the implicit risk premium is 8% (by applying equation (6) and considering the expected value of the dividend growth rate and PER for ATB for the end of 2011).

4. Conclusions

In conclusion, for estimating the equity risk premium, it should be taken into consideration the trades with the company's stocks on the capital market. Using current prices and level of multiplier PER, it could be estimated the implicit level of risk premium. But this value is very volatile, depending on the expected dividend growth rate and on the investors' reactivity in the panic moments.

In this context, the benchmark for the risk premium may be obtained by applying CAPM model. But there is an inconvenience: the estimation through this model uses only few information from that capital market, in the case of a developed capital market, so there is the possibility that the quantified premium risk does not reflect the investors' claims regarding return corresponding with the assumed risk of the investment.

From this point of view, comparing these two values obtained for the estimated premium risk and identifying the causes for any difference is the best solution. In this interval, the analyst should identify the premium risk level that better quantifies the expected return correlated with the overall risk taken by the marginal investors in the process of investing their resources buying evaluated company's stocks. The framing of a grill for identification and qualitative analysis of the risks would be very useful for guiding the evaluator in choosing a risk premium from that interval constructed through both models.

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