Systematic risks for the financial and for the non-financial Romanian companies

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SYSTEMATIC RISKS FOR THE FINANCIAL AND FOR THE NON-FINANCIAL ROMANIAN COMPANIES

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ABSTRACT: The systematic risk is considered as one of the most important factors that influence the investment in financial assets. Usually, it is evaluated in the framework of the Capital Asset Price Model. The systematic risk associated to firm equities is affected by some firm's characteristics, among them being the particularities of its activity. In the last decade the financial markets from Romania experienced a substantial development interrupted by the recent global crisis that provoked significant changes for the financial risks. In this paper we study, using CAPM betas, the systematic risk for the Romanian companies listed at the Bucharest Stock Exchange. We find significant differences between the financial and the non financial companies' systematic risks.

INTRODUCTION

The financial theory divides the risk associated to the variation of a security price in two components: unsystematic and systematic risks. The unsystematic risk could be diversified through a portfolio that includes other securities. The systematic risk, which could not be diversified, is one of the most important elements of the investment decisions. Usually it is analyzed in the framework of the Capital Asset Price Model (CAPM).

Some characteristics of a firm could have a substantial influence on the behavior of its stock price. This situation could lead to significant differences among the systematic risks of the securities from different industries. Such differences could be amplified during the turbulences from the financial markets.

In this paper we study the differences between the systematic risks for the financial and for the non financial Romanian companies. To our knowledge there are no other papers approaching this matter. The main explanation of this situation is given by the quite recent history of the Romanian stock market. The Bucharest Stock Exchange (BSE) was established in 1995. During the quite long period of transition its activity was not very significant. In the last five years the economic recovery and the removal of the barriers to the foreign capital stimulated the Romanian stock market.

Since 2008 the Romanian stock market has been affected by the global crisis. After a drastic drop in the stock prices in 2008 the market recovered since 2009, but this revival is still fragile.

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We study the systematic risk for eight financial stocks and seven non financial stocks during the period March 2009 – February 2010. We evaluate the systematic risk for these stocks in a CAPM framework and we compare the results.

The remaining part of this paper is set out as follows. The second part approaches the relevant literature. The third part describes the data and methodology. The empirical results of our investigation are presented in the fourth part and the fifth part concludes.

LITERATURE REVIEW

The main approaches of the systematic risks are related to the portfolio optimization model developed by Markowitz (1959). The classical CAPM, based on the works of Sharpe (1964), Lintner (1965) and Black (1972), is described by the equation:

$$E(R_i) = R_f + [E(R_M) - R_f] \beta_{IM} \tag{1}$$

where:
- $E(R_i)$ is the expected return of an asset i;
- R_f is the risk free rate;
- $E(R_M)$ is the expected return of the market;
- β_{IM} is a coefficient (commonly known as beta) reflecting the sensitivity of the expected return of the asset to the difference between the expected return of the market and the risk free rate.

The beta coefficient is considered as a measure of the systematic risk. From the beginning CAPM was a very controversial subject. Some empirical researches failed to validate it, while others confirmed it. There were critics that CAPM assumptions were unrealistic and some relevant factors were not included in its equation.

Roll (1977) proved that marked conditions could influence substantially the values of the beta assets. Braun et al. (1995) identified a different behavior of the CAPM betas in the good news and in the bad news circumstances. Their conclusions were confirmed lately by Ang and Chen (2003) and by Woodward and Anderson (2003). Banz (1981) found significant deviations from CAPM explained by the impact of the firm size. However, despite the numerous critics, CAPM is still the main instrument for handling the systematic risk.

DATA AND METHODOLOGY

In this paper we evaluate the systematic risk for 15 stocks. There are eight stocks of financial companies: three banks and five so called SIFs, big financial institutions which have substantial participations in many Romanian corporations: CARPATICA Bank (BCC), BRD - GROUPE SOCIETE GENERALE Bank (BRD), TRANSILVANIA Bank (TLV), SIF BANAT CRISANA (SIF1), SIF MOLDOVA (SIF2), SIF TRANSILVANIA (SIF3), SIF MUNTENIA (SIF4) and SIF OLTENIA (SIF5). We also use data from seven non financial companies from different industries: AZOMURES (AZO), BIOFARM (BIO), IMPACT DEVELOPER & CONTRACTOR (IMP), ROMPETROL RAFINARE (RRC), OMV PETROM (SNP), C.N.T.E.E. TRANSELECTRICA (TEL) and S.N.T.G.N. TRANSGAZ (TGN). These companies are among the biggest in Romania. As a measure of market evolution we use the BET – XT index which reflects the evolution of the most liquid 25 shares traded on BSE.
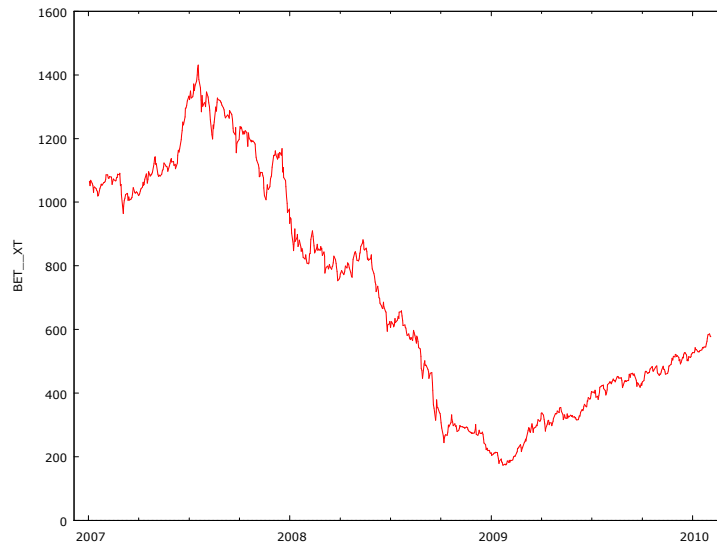
Figure 1 - Evolution of BET-XT index between
January 2007 and March 2010

We employ daily values of BET – XT index and of the 15 stocks provided by BSE. Our sample covers the period of time between March 2009 and February 2010. In this period of time the stock prices experienced an ascendant trend after the decline from the precedent months (see Figure 1). We compute the daily returns as:

$$R_t = \ln (P_t) - \ln (P_{t-1}) \qquad (2)$$

where:

- R_t is the return at time t;
- P_t is the price at time t;
- P_{t-1} is the price at time t-1.

The descriptive statistics of the 16 returns are presented in the Table 1. Most of them displayed significant values of the standard deviations skewness and kurtosis.

We analyze the normality of the returns using four tests: the Doornik – Hansen test, the Shapiro – Wilk test, the Lilliefors test and the Jarque – Bera test. The results, presented in the Table 2, fail to confirm the normality hypothesis for the 16 returns.

We investigate the stationarity of the 16 returns using the classical Augmented Dickey – Fuller Test (Dickey and Fuller, 1979). Based on graphical representations we used first only constant and trend as deterministic terms. The results, presented in the Table 3, indicate that all the 16 returns could be considered as stationary.

We estimate the systematic risks for the 15 stocks using two forms of CAPM: a single factor model and a multifactor one. The single factor model is based on the equation:

$$R_t = \alpha + \beta \, Rm_t + u_t \qquad (3)$$

where:

- Rm_t is the market return at time t;
- u_t is an error term, $u_t \sim N (0, \sigma^2)$.

The multifactor model, designed to capture the asymmetric behavior of beta in the bull and bear market conditions, is described by the equation:

$$R_t = \alpha + \beta^+ D^+ Rm_t + \beta^- D^- Rmt + u_t \qquad (4)$$

where:
- β^+ are betas corresponding to the bull market conditions;
- β^- are betas corresponding to the bear market conditions;
- D^+ is a dummy variable with the value 1 if Rm is positive or 0 otherwise;
- D^- is a dummy variable with the value 1 if Rm is negative or 0 otherwise.

EMPIRICAL RESULTS

The coefficients of the single factor CAPM for the financial companies are presented in the Table 4. The values of Beta are between 0.556 and 1.453. For all the SIFs the values of Beta are higher than 1. Except for the Carpatica Bank, and BRD – SG Bank the values of R-squared are higher than 0.7.

In the Table 5 there are presented the coefficients of the single factor CAPM for the seven stocks of the non financial companies. The values of Beta are between 0.519 and 1.141. Only for two of them Beta is higher than unit. For all seven stocks the R-squared is lower than 0.6.

The coefficients of multiple factor CAPM for the financial companies are presented in the Table 6. The values of coefficient β^+ are between 0.475 and 1.502, while the values of coefficient β^- are between 0.645 and 1.401.

In the Table 7 are presented the coefficients of multiple factor CAPM for non financial companies. The values of coefficient β^+ are between 0.482 and 1.132, while the values of coefficient β^- are between 0.566 and 1.151.

CONCLUSIONS

In this paper we approached the systematic risk for some of the most important financial and non financial Romanian companies. As a measure of their systematic risks we used CAPM betas.

We found significant differences between the values of CAPM betas for the financial and non financial companies. In general, these values are higher for the financial companies. A notable exception is Carpatica Bank, the only one with a negative mean of the returns. Other significant differences regard the R-squared values for the CAPM equations. It resulted the financial companies returns were much more sensitive to the evolutions of BET – XT.

From the multiple factor CAPMs we found that betas of the financial companies displayed more asymmetrical responses to the bull and bear markets in comparison with the non financial companies.

The values of the CAPM betas indicate that, in general, the systematic risks for the financial companies were higher than for the non financial ones. This situation could be explained by the evolution of the Romanian stock market in the period of our analysis. Between March 2009 and February 2010 most of the stock prices experienced an ascendant trend after the decline from the previous months. However, the markets were still very nervous in the context of uncertainty regarding the future development of the global crisis. There are justified the

perceptions the activity of the financial companies is highly connected with the stock market evolution.

Since the actual global crisis is far from the end, this research should be completed by taking into consideration the future evolution of the Romanian stock market. A comparison with the situation from other countries would be also useful.

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Table 1 - Descriptive statistics for the 16 returns

Stock	Min.	Max.	Mean	Std. Dev.	Skewness	Ex. Kurtosis
BET-XT	-0.0802	0.0930	0.0029	0.0232	-0.1160	1.3300
BCC	-0.0846	0.0944	-0.0015	0.0246	-0.0836	2.1190
BRD	-0.1163	0.0858	0.0034	0.0273	-0.6730	2.4690
TLV	-0.0953	0.1324	0.0028	0.0292	0.3899	2.5630
SIF1	-0.1278	0.1398	0.0023	0.0344	-0.0554	1.6390
SIF2	-0.1335	0.1368	0.0037	0.0368	0.0295	1.2380
SIF3	-0.1123	0.1391	0.0036	0.0356	0.0121	1.5690
SIF4	-0.1108	0.1368	0.0014	0.0310	-0.0902	2.1420
SIF5	-0.1001	0.1386	0.0033	0.0342	0.0618	1.1870
AZO	-0.1342	0.1542	0.0028	0.0376	0.9317	3.7810
BIO	-0.1237	0.1364	0.0054	0.0357	0.5575	2.4940
IMP	-0.1302	0.1501	0.0072	0.0395	0.6545	2.4400
RRC	-0.0903	0.1624	0.0045	0.0344	0.6731	2.6240
SNP	-0.0711	0.1062	0.0034	0.0281	0.3542	0.8140
TEL	-0.0834	0.1080	0.0026	0.0244	0.1013	1.7270
TGN	-0.0698	0.1004	0.0029	0.0204	0.6464	4.6340

Table 2 – Normality tests for the 16 returns

Stock	Doornik - Hansen test	Shapiro-Wilk test	Lilliefors test	Jarque-Bera test
BET-XT	15.32 [0.001]	0.98 [0.001]	0.08 [0.001]	16.33 [0.001]
BCC	31.34 [0.001]	0.95 [0.001]	0.15 [0.001]	40.48 [0.001]
BRD	26.03 [0.001]	0.96 [0.001]	0.10 [0.001]	71.50 [0.001]
TLV	35.82 [0.001]	0.96 [0.001]	0.10 [0.001]	64.88 [0.001]
SIF1	21.50 [0.009]	0.98 [0.001]	0.07 [0.010]	24.40 [0.001]
SIF2	14.01 [0.001]	0.99 [0.001]	0.05 [0.001]	13.89 [0.001]
SIF3	20.20 [0.001]	0.98 [0.001]	0.07 [0.001]	22.27 [0.001]
SIF4	32.03 [0.001]	0.97 [0.001]	0.08 [0.001]	41.78 [0.001]
SIF5	13.09 [0.001]	0.99 [0.051]	0.07 [0.021]	12.88 [0.001]
AZO	40.52 [0.001]	0.91 [0.001]	0.11 [0.001]	179.90 [0.001]
BIO	32.21 [0.001]	0.95 [0.001]	0.10 [0.001]	76.20 [0.001]
IMP	28.67 [0.001]	0.94 [0.001]	0.12 [0.001]	78.91 [0.001]
RRC	29.87 [0.001]	0.96 [0.001]	0.08 [0.001]	84.42 [0.001]
SNP	8.31 [0.001]	0.99 [0.001]	0.04 [0.001]	11.93 [0.001]
TEL	25.25 [0.001]	0.98 [0.001]	0.09 [0.001]	30.88 [0.001]
TGN	77.28 [0.001]	0.93 [0.001]	0.09 [0.001]	235.27 [0.001]

Table 3 – The results of Augmented Dickey – Fuller tests of stationarity for the 16 returns

Variable	Deterministic terms	Lagged differences	Test statistics	Asymptotic p-value
BET-XT	Constant and no trend	18	-4.59314	0.0001286
	Constant and trend	18	-4.60124	0.0009785
BCC	Constant and no trend	23	-5.39085	0.00001
	Constant and trend	23	-5.39195	0.00001
BRD	Constant and no trend	18	-3.68839	0.004301
	Constant and trend	18	-3.87808	0.01291
TLV	Constant and no trend	19	-4.46731	0.0001
	Constant and trend	19	-4.55845	0.00116
SIF1	Constant and no trend	24	-3.28649	0.01553
	Constant and trend	24	-3.19313	0.08573
SIF2	Constant and no trend	23	-3.47784	0.008603
	Constant and trend	23	-3.43501	0.0468
SIF3	Constant and no trend	11	-4.40793	0.0001
	Constant and trend	11	-4.39358	0.002185
SIF4	Constant and no trend	10	-6.06246	0.0001
	Constant and trend	10	-6.14336	0.0001
SIF5	Constant and no trend	23	-3.3477	0.01291
	Constant and trend	23	-3.29708	0.06667
AZO	Constant and no trend	16	-5.09877	0.0001
	Constant and trend	16	-4.94821	0.0001
BIO	Constant and no trend	14	-14.5417	0.0001
	Constant and trend	14	-15.0633	0.0001
IMP	Constant and no trend	12	-4.032	0.001253
	Constant and trend	12	-4.25003	0.003693

RRC	Constant and no trend	14	-5.1762	0.0001
	Constant and trend	14	-5.37531	0.0001
SNP	Constant and no trend	14	-3.79976	0.002925
	Constant and trend	14	-10.9939	0.0001
TEL	Constant and no trend	15	-3.85952	0.002366
	Constant and trend	15	-3.78977	0.01699
TGN	Constant and no trend	5	-6.89782	0.0001
	Constant and trend	5	-6.90392	0.0001

Note: The number of the lagged differences was chosen based on Schwartz Information Criteria.

Table 4 - Single Factor CAPM coefficients for the eight stock returns of the financial companies

Stock	Coefficient α	Coefficient β	R-squared	F-test
BCC	-0.00307658 (-2.4378) [0.01560**]	0.556035 (8.0275) [0.00001***]	0.273988	64.44138 [0.00001***]
BRD	0.00062613 (0.7127) [0.47683]	1.00598 (15.2947) [0.00001***]	0.721598	233.9266 [0.00001***]
TLV	0.000179837 (0.1229) [0.90232]	0.90232 (12.0883) [0.00001***]	0.523399	146.1278 [0.00001***]
SIF1	-0.00139005 (-1.3239) [0.18693]	1.3088 (16.8936) [0.00001***]	0.755049	285.3944 [0.00001***]
SIF2	-0.000399644 (-0.3690) [0.71252]	1.45309 (29.5980) [0.00001***]	0.810020	876.0436 [0.00001***]
SIF3	-0.000229291 (-0.2152) [0.82983]	1.36964 (22.5138) [0.00001***]	0.771336	506.8714 [0.00001***]
SIF4	-0.00187075 (-2.0270) [0.04390**]	1.1711 (13.6724) [0.00001***]	0.744648	186.9332 [0.00001***]
SIF5	-0.000574563 (-0.7004) [0.48443]	1.37372 (27.2653) [0.00001***]	0.839133	743.3946 [0.00001***]

Notes: Values in the round brackets represent t-ratios;
Values in the square brackets represent p-values.
*, ** and ** * denote significance at 10%, 5% and 1% levels, respectively.

Table 5 - **Single Factor CAPM coefficients for the seven stocks of non financial companies**

Stock	Coefficient α	Coefficient β	R-squared	F-test
AZO	-0.000412453 (-0.2322) [0.81655]	0.713079 (5.8228) [0.00001***]	0.219263	33.90557 [0.00001***]
BIO	0.000232216 (0.1705) [0.86479]	1.1409 (12.1776) [0.00001***]	0.596494	148.2929 [0.00001***]
IMP	0.00238853 (1.1607) [0.24688]	1.06566 (10.1768) [0.00001***]	0.435668	103.5671 [0.00001***]
RRC	0.000917525 (0.6061) [0.54501]	0.760537 (9.2096) [0.00001***]	0.305833	84.81740 [0.00001***]
SNP	-0.000484747 (-0.4183) [0.67611]	0.863523 (13.1011) [0.00001***]	0.568863	171.6396 [0.00001***]
TEL	-0.000248763 (-0.2311) [0.81740]	0.634485 (10.1570) [0.00001***]	0.398433	103.1653 [0.00001***]
TGN	0.000503848 (0.5327) [0.59471]	0.518938 (7.2931) [0.00001***]	0.401063	53.18939 [0.00001***]

Notes: Values in the round brackets represent t-ratios;
Values in the square brackets represent p-values.
*, ** and ** * denote significance at 10%, 5% and 1% levels, respectively.

Table 6 - Multiple Factor CAPM coefficients for the eight stock returns of the financial companies

Stock	Coefficient α	Coefficient β^+	Coefficient β^-	Adjusted R-squared	F-test
BCC	-0.00160639 (-0.7777) [0.43759]	0.475147 (4.1128) [0.00006***]	0.645253 (5.7410) [0.00001***]	0.276846	35.10851 [0.00001***]
BRD	0.00303307 (1.8844) [0.06087*]	0.873674 (9.1883) [0.00001***]	1.15326 (10.1039) [0.00001***]	0.727744	141.6256 [0.00001***]
TLV	-0.00209748 (-0.9016) [0.36831]	1.05368 (6.5970) [0.00001***]	0.787468 (8.2280) [0.00001***]	0.528167	105.0303 [0.00001***]
SIF1	-0.00106505 (-0.6726) [0.50194]	1.29057 (11.5948) [0.00001***]	1.3284 (13.0498) [0.00001***]	0.755118	143.5155 [0.00001***]
SIF2	-0.00126498 (-0.7742) [0.43969]	1.50163 (17.0254) [0.00001***]	1.40091 (14.2883) [0.00001***]	0.810445	428.5533 [0.00001***]
SIF3	0.000293393 (0.1713) [0.86417]	1.34032 (14.0761) [0.00001***]	1.40116 (16.4870) [0.00001***]	0.769367	256.7552 [0.00001***]

SIF4	-0.00160108 (-0.9669) [0.33468]	1.15597 (10.2860) [0.00001***]	1.18736 (8.4283) [0.00001***]	0.742320	94.90023 [0.00001***]
SIF5	-0.00192863 (-1.4242) [0.15585]	1.44966 (18.4854) [0.00001***]	1.29206 (19.9156) [0.00001***]	0.838848	416.6150 [0.00001***]

Notes: Values in the round brackets represent t-ratios;
Values in the square brackets represent p-values.
*, ** and ** * denote significance at 10%, 5% and 1% levels, respectively.

Table 7 - Multiple Factor CAPM coefficients for the seven stock returns of the non financial companies

Stock	Coefficient α	Coefficient β^+	Coefficient β^-	Adjusted R-squared	F-test
AZO	0.00339062 (1.0239) [0.30690]	0.530003 (2.3362) [0.02031**]	0.942387 (4.8118) [0.00001***]	0.220692	24.18256 [0.00001***]
BIO	0.000403088 (0.1965) [0.84437]	1.13243 (7.4996) [0.00001***]	1.15114 (8.5077) [0.00001***]	0.593177	78.28252 [0.00001***]
IMP	0.00165135 (0.4964) [0.62008]	1.10155 (5.7218) [0.00001***]	1.02095 (7.4683) [0.00001***]	0.431312	65.34701 [0.00001***]
RRC	0.00456323 (1.8067) [0.07211*]	0.588566 (4.4984) [0.00001***]	0.97757 (8.7682) [0.00001***]	0.308353	64.98424 [0.00001***]
SNP	-0.00171227 (-1.0135) [0.31182]	0.92284 (7.4756) [0.00001***]	0.789218 (7.3086) [0.00001***]	0.566786	87.98780 [0.00001***]
TEL	0.00294334 (1.5777) [0.11593]	0.482242 (4.2773) [0.00003***]	0.834789 (8.8711) [0.00001***]	0.406480	77.37359 [0.00001***]
TGN	0.00128306 (0.8066) [0.42069]	0.482069 (4.3669) [0.00002***]	0.56626 (4.9621) [0.00001***]	0.397230	27.27972 [0.00001***]

Notes: Values in the round brackets represent t-ratios;
Values in the square brackets represent p-values.
*, ** and ** * denote significance at 10%, 5% and 1% levels, respectively.