**Professor Ion STANCU, PhD**
**E-mail: finstancu@yahoo.com**
**The Bucharest University of Economic Studies**
**Financial Studies Institute Vice-president**
**Professor Laura OBREJABRAŞOVEANU, PhD**
**E-mail: laura.brasoveanu@fin.ase.ro**
**The Bucharest University of Economic Studies**
**Professor Anamaria CIOBANU, PhD**
**E-mail: canamaria@yahoo.com**
**The BucharestUniversity of Economic Studies**
**KPMG, ANEVAR Editor of The Valuation Journal**
**Lecturer Andrei Tudor STANCU, PhD**
**Norwich Business School**

# ARE COMPANY VALUATION MODELS THE SAME? – A COMPARATIVE ANALYSIS BETWEEN THE DISCOUNTED CASH FLOWS (DCF), THE ADJUSTED NET ASSET, VALUE AND PRICE MULTIPLES, THE MARKET VALUE ADDED (MVA) AND THE RESIDUAL INCOME (RI) MODELS

***Abstract:*** *In this article, we analyze and compare several well-known methods of company valuation. In particular, we focus on the income approach (discounted cash flows, the market value added or residual income), the assets approach (net asset), and the market approach (based on value and price multiples) to value companies. This initiative aims to identify the hypothesis considered and to test the equivalence of the results obtained by these valuation methods.*

***Key words:*** *discounted cash flows, net asset, value and price multiples, the market value added, residual income.*

**JELClassification:D46; G12; G31.**

## 1. Introduction

The income approach to value the company's equity is based on the idea that the market price paid by the investors for its financial assets is proportional to the size of the economic benefits it generates. The financial market, like other free markets, offers a market price of traded financial assets (shares, bonds etc.). This market price is in fact provided by the stock exchange. Starting from this market price, the following questions come to mind:

- Are traded financial assets correctly valued?
- Are they undervalued or overvalued?

- What is their fundamental value? Does this value reflect the true profitability and risk of the company?

The answer to these interesting questions is crucial for traders operating in the financial market. They will exploit any arbitrage opportunity arising from differences in market prices, in time (at different periods) and in space (across various financial markets). In the case of an undervalued security, the investor will be well motivated to give up the present consumption in favour of an investment in that financial asset to take advantage of its future price growth. On the contrary, in the case of an overvalued security, the investor will „disinvest" or sell that financial asset as he prefers to make an investment in another (undervalued) security or to immediately consume the money.

As long as there is a difference between the purchase price of the security and its "correct" value, there will be an arbitrage opportunity to be made from these differences. Typically, the "correct" value of financial instruments is given by the present value of estimated future revenues to be received from holding that asset.

Even if the integration in the price of the new information is not complete or not immediate, the multiple operations of arbitrage made by investors to profit from the difference between the market price (which reacts slowly) and the intrinsic value of the security (of which more and more investors are aware) will, in the short term, move the market price toward the intrinsic value, reflecting thus all available information for that financial security. Investors with new information about the issuing company will logically seek to obtain a profit from this personal advantage and take advantage of any market inefficiencies.

The financial investment companies, mutual funds, brokerage firms etc. base their work on the collection, process and interpretation of information in order to detect the intrinsic value of the financial securities. The existence of these companies trading on financial markets is proof that the market is not fully efficient. Noteworthy, the problems of financial markets inefficiency were highlighted during the global financial crisis, which, in turn, were due to credit growth, on the one hand, and to the increasing asset volatilities, on the other hand.

According to economic theory, the value of financial assets is determined by the arbitrage opportunities available to financial market participants. In the first section of this article, we present different theories of financial arbitrage, which highlights the fundamental factors impacting the value of financial assets. The comparison between various methods for assessing the value of financial securities is discussed in the second section of the article, highlighting thus the determinants of value creation. The case study is based on the valuation of a financial securities investment companies (SIF). The article ends with conclusions and recommendations on the adequacy and consistency of valuation methods used to assess financial securities.

## 2. Research evolution of the cost of capital - financial arbitrage theories

Financial theory owes a lot to the creators of models that estimate the cost of capital from available arbitrage opportunities. Business valuation and securities valuation would not be possible without the existence and application of these models to estimate the cost of capital invested in companies or securities.

### 2.1. Arbitrage between holding shares of a levered company versus holding shares of an unlevered company (financial structure model Modigliani & Miller - 1958)

The authors[1]use for the first time the arbitrage theory in their quest to find an optimum financing structure for the company that would increase its value. Shareholder income from a levered firm($X^L$) is equal to net profit of an unlevered firm after tax [EBIT (1 - τ)] plus tax savings (Interest*τ). Consequently, the unlevered company registers the following two benefits:

1. the actual cost of the interest is reduced by tax savings and, thus, is equal to net interest tax;
2. the net profit increases by tax savings.

Tax savings favours the shareholders since they pay smaller income taxes on the same operating profit (EBIT, and, similarly, an unlevered company). Under these conditions, the following question naturally appears: what is the true value of our levered firm $V^L$? Correcting an error in their first article (1958), Modigliani and Miller (MM)respond in 1963:

*„... let $\rho^\tau$ be the rate at which the market capitalizes the expected returns net of tax of an unlevered company of size $\overline{X}$ in class k, i.e.,*

$$\rho^\tau = \frac{(1-\tau)\overline{X}}{V^U} \text{ or } V^U = \frac{(1-\tau)\overline{X}}{\rho^\tau};$$

*and let „r“ be the rate at which the market capitalizes the stream generated by debts...*

*Then we would expect the value of a levered firm size $\overline{X}$, with a permanent level of debt $D_L$ in its capital structure, to be given by:*

$$V^L = \frac{(1-\tau)\overline{X}}{\rho^\tau} + \frac{\tau \cdot R}{r} = V^U + \tau \cdot D_L \text{ “.}$$

[1] F. Modigliani and M. Miller, *The Cost of Capital, Corporate Finance and the Theory of Investment*, American Economic Review“, no. 48, 1958.

The levered firm's value ($V^L$) increases with its degree of indebtedness. This is equal to the unlevered company ($V^U$) plus the present value of tax savings ($\tau \cdot D_L$). MM structures these statements as an arbitrage process (i.e. the possibility of getting a profit without any capital investments and without risk) which involves:
(a) selling of the levered firm's shares (L) at a higher value;
(b) taking out a loan with the same rate of participation in levered firm's capital L, and
(c) purchasing of the unlevered firm's shares (U) cheaper using the proceeds from the sale of L's shares and from the loan.

The gain is possible due to leverage, i.e. the positive difference between the weighted average cost of capital and the interest rate on the loans requested. What makes the value of the levered company more expensive is nothing but the tax effect of the interest deducted from taxable profit.

### 2.2. Arbitrage between a risk-free asset and an efficient portfolio of risky assets (Asset Pricing Model, CAPM - Markowitz & Sharpe - 1964)

In the theory which followed, Markowitz2 and Sharpe3 were concerned about two issues: risk and return. According to this theory, the risk posed by a particular investment should be analysed, not as an overall level, but by contribution (covariance) to the total risk assumed by the investor. This idea leads Sharpe to design the CAPM model where the expected return of a security ($E_i$) is a function of the return rate of risk-free assets ($R_f$), the expected return of the market portfolio (market portfolio = $E_M$) or risk premium and the sensitivity coefficient $\beta_i$ of the security's return against market return ("Capital Assets Prices: a Theory of market Equilibrium under Conditions of Risk", 1964):

$$E_i = R_f + \underbrace{(E_M - R_f)}_{\text{risk premium}} \cdot \beta_i \qquad (1)$$

The only risk premium demanded by investors for the excess market return ($E_M$ - $R_f$) is named systematic risk, the security's return volatility to the market return ($\beta_i$), whereas the specific risk related to the individual characteristics of the security can be removed through portfolio diversification.

[2]H. Markowitz, *Portfolio Selection*, The Journal of Finance, March 1952, *Portfolio Selection: Efficient Diversification of Investments*" John Wiley 81 Sons, Inc. London, 1959.
[3] W. Sharpe, *Capital Assets Prices: a Theory of Market Equilibrium under Conditions of Risk*, Journal of Finance, September 1964, pp. 425-442 1964.

Using the CAPM leads to estimating the cost of equity ($k_e$), in order to determinate the weighted average cost of capital (WACC) of the entire capital used by the firm (own and borrowed):

$$k_e = E_i = R_f + (E_M - R_f) \cdot \beta_i \qquad (2)$$

$$WACC = k_e \frac{Eq}{Eq + D} + k_d \frac{D}{Eq + D} \qquad (3)$$

where, $k_d = R_{int}$ = interest rate of borrowed capital $\cdot(1-\tau)$

For financial analysts, estimating the cost of capital (weighted average or equity) is an important step in finding the value of the firm since this represents the discount rate specific to the company's free cash flows ("Free Cash Flow to Firm" - FCFF and "Free Cash flow to Equity "- FCFE)

Through its undeniable usefulness and simplicity, the CAPM model has lead researchers to:

- improve and adapt the model to specific conditions of the capital markets, i.e., by incorporating random variation of exchange rates (CAPM multi-periodical, RM Merton, 1973; CF Huang & R Litzenberger, 1988);
- test its validity (J. Bodurtha& N. Mark 1991; E. K. Fama& French, 1992; AC MacKinlay& P. Richardson, 1991), as well at the validity of its extensions: the three-factor model, (market return, small caps, and stocks with a low price-to-book ratio, Fama–French, 1996), orthe five-factor model (market return, small-big caps, high-low price-to-book ratio, big-small investments, and high-low profitability, Fama-French, 2013);
- and to critique its shortcomings (Roll & S. R. Ross, 1992). Despite this criticism, particularly related to the temporal variability of the volatility coefficient $\beta_i$, the CAPM model is still the most used model for business valuation and portfolio selection.

### 2.3. Arbitrage of several macroeconomic factors in determining the efficiency of financial assets (interest rate, GDP growth, inflation, etc.) - assessment by arbitrage theory, APT - Ross – 1976

The multifactor model developed by Ross[4]for estimating the profitability of financial securities is known in the literature as the APT (Arbitrage Pricing Theory) model:

$$k_e = E_i = R_f + \underbrace{\beta_1(E_M - R_f) + ... + \beta_n(E_n - R_f)} \qquad (4)$$

[4] S.A. Ross, *The Arbitrage Theory of Capital Asset Pricing*, Journal of Economic Theory, vol. 13, issue 3, pages 341-360, 1976

systematic risk premium multifactorial

in which:

$E_i$ = security's return "i" estimated by the APT model;

$R_f$ = risk-free rate of return;

$\beta_1$; $\beta_2$, ..., $\beta_n$ = sensitivity coefficients between the security's return "i" and unanticipated changes in macroeconomic factors;

$E_M$ ... $E_n$ = expected return of market portfolio, respectively, the expected portfolio return based on changes in the $n^{th}$ factor.

The main macroeconomic factors usually considered are: (1) the expected return on the capital market, (2) the evolution of GDP, (3) interest rates, (4) inflation, etc.

In this multifactor setting, the CAPM is a special case of APT. But the main drawback of APT model is the complexity of empirical testing which makes it difficult to be applied in practice when assessing financial securities.

### 2.4. Arbitrage between call/put options and underlying actives (share, firm etc.) – arbitrage pricing theory, (APT) - Black & Scholes model – 1973

Black and Scholes[5] formalized and tested the options pricing theory where a call/put option price (C = call; P = put) of the underlying asset (stocks, bonds, assets of a company) is determined by changes in the value of the underlying asset during the exercise of the option in relation to the predetermined strike price:

$$C = S \cdot N(d_1) - E \cdot e^{-R_f \cdot T} \cdot N(d_2) \qquad (5)$$

where:

S = the underlying asset;

N(d) = cumulative normal function of the distributions from -∞ to d;

$$d_1 = \frac{\ln\left(\frac{S}{E}\right) + \left(R_f + \frac{1}{2}\sigma^2\right)T}{\sigma\sqrt{T}},$$

E = the strike price at which to buy or sell the underlying asset when exercising the option;

Rf = the risk-free return rate (a safe government bond rate);

T = fractions of the calendar year (weeks, for example) until option maturity;

σ = standard deviation of the underlying asset's annual return (calculated in weekly steps, for example);

$d_2 = d_1 - \sigma\sqrt{T}$ .

The Black & Scholes model restructures portfolio selection theory since the arbitrage is now made between two components of the portfolio:

[5] F. Black și M. Scholes, *The Pricing of Options and Corporate Liabilities*, The Journal of Political Economy, Volume 81, Issue 3, 637—654, 1973

- option (call or put)value and
- the underlying asset (stocks, bonds, firm or investment projects).

According to this theory, we can build a free-risk portfolio from the shares of the underlying asset and a number of options on this asset. The model has great merit since it high lights the option price determinant factors and their impact: the underlying asset price, option strike price, the option maturity, the variation of underlying asset return, the free-risk rate, and the dividend yield. The pricing model is used in the business valuation practice by evaluating real option to hold shares in a company with an exercise price equal to the debt.

### 2.5. Arbitrage between the interests of shareholders, managers and creditors of the company to minimize agency costs (representing the representative interests) - Jensen &Meckling model – 1976

Company managers have inside information as opposed to shareholders or potential financial investors. The latter receive the necessary information with a certain delay and a cost of their communication. In addition, certain information does not benefit shareholders who can take the first opportunity (general assembly) to appeal the decisions made by managers. Meanwhile, competition can take this information and can "sneak" spurious signals through the channels of communication. Consequently, the asymmetry of information is the generator of two categories of risk:

1 - moral hazard risk;

2 - adverse selection risk.

The consequences of these two categories of risk on investment decisions and their impact on firm value were analysed for the first time by Jensen and Meckling[6]. They are the authors of the agent theory (mandate), which aims to structure the contractual relations between the company's "actors"(e.g. managers, shareholders, creditors, employees, suppliers, etc.). These relationships give rise to conflicts of interest, but may be harmonized in order to maximize their beneficial effects and, therefore, to maximize firm value.

In this light, the company structure is more complex through reference to objective agency conflicts (empowering) and through trying to minimize agency costs (mandate). Not all company actors have the same objective. This is normally reflected in the existence of conflicts of interest that lead to loss of company value.

[6] M. Jensen şi W. Meckling,*Theory of the Firm: Managerial Behavior, Agency Costs and Capital Structure*, Journal of Financial Economics, Volume 3, Issue 4, Pages 305–360, 1976

The objective of agency theory is to empower the relations structure mandate which minimizes costs and losses. However, this theory is difficult when applied in practice since quantifying the factors that impact firm value is not straightforward.

## 3. The equivalence of the valuation models for financial securities - DCF, NA, EV / EBITDA and PER, MVA and RI

### 3.1. Fundamental factors of company value

In their investment decision process, market participants do not only consider the determinant factors of intrinsic company value / shares price (i.e. profitability, risk, investment duration, etc.). In addition, investors take into account also their expectations regarding the behaviour of other market participants(the arbitrage opportunities). As a result, the intrinsic value is analysed rather in terms of the estimations' persistence and level than from the value creation process. The determinant factors of value are represented by investment profitability and risk.

However, the valuation of companies / financial securities raises the following questions: Do financial markets have the ability to correctly assess the securities? Do market participants have an entirely rational and consistent behaviour to predict prices at the intrinsic value of financial assets? Answering these questions motivates us to analyse the fundamental factors for the intrinsic value of financial assets and the valuation models.

Financial theory and practice generated four valuation methods:

1. discounting future cash-flows valuation (DCF)
2. valuation through adjusted net asset and liquidation value (AN)
3. relative valuation through price and value multiples (EV / EBITDA and PER)
4. valuation of growth opportunities and real options (MVA and RI).

In what follows, we intend to analyses these valuation models to estimate the intrinsic value of a SIF financial security. Through this case study we intend to highlight the differences between the valuation models used and to find out which one is best depending on how investors choose the determinants of value.

An investment decision raises the further question. Which is the required return on investment in relation to(1) the risk-free rate (the interest on treasury bills or government' bonds) and(2) the investment risk premium for the company? Note that the risk premium refers to the market risk of that company since specific risk can be eliminated through diversification.

**The discount rate** for the free cash flows to shareholders ($k_E$) ***could be*** determined using CAPM by starting from the risk-free interest rate ($R_f$) and adding the systematic (market) risk of the company's shares [$(E_M - R_f) \cdot \beta_E$ ]:

$$k_E = R_f + (E_M - R_f) \cdot \beta_E = R_f + ERP \cdot \beta_E \quad (6)$$

Where ERP = Equity Risk Premium = $(E_M - R_f)$.

We saw that that the discount rate ***could be*** determined because its estimation for each company is accompanied by measurement errors, especially when we use a small data sample. Eliminating these errors can be done only by evaluating a portfolio of companies with similar risks to those of the analysed company. The $\beta_E$ coefficient is estimated based on historical data for company's returns and the overall profitability of the capital market.

For our estimation we assume a Romanian risk-free rate $R_f$ = **2.76%** (5-Year Bond Yield Romania, see Annex), a market risk premium of **9.28%** = ERP[7], and a beta coefficient of **0.98** (Thomson Reuters, beta 5yr Monthly). Thus, the SIF's cost of equity for the period 2016-2020 is estimated at 11.85%:

$$\mathbf{k_E} = 2.76\% + 0.98 \cdot 9.28\% = \mathbf{11{,}85\%}$$

*The discount rate for free cash flows to the firm is the company's weighted average cost of capital. The SIF's invested capital at the beginning of 2016 is entirely financed by equity, so that the weighted average cost of capital is equal to the cost of equity.*

We will now proceed to our first model which is based on discounting future cash-flows of the company.

### 3.2. Discounted Cash Flow Model (DCF)

The DCF model for determining the value of the company ($V_0$)also highlights the main drivers of the company's value: expected free cash flows (FCF) to be realized in the future and the cost of capital (i.e. the discount rate k):

$$V_{0\ SIF} = \sum_{t=1}^{n} \frac{FCF_t}{(1+k)^t} + \frac{TV_n}{(1+k)^n} \qquad (7)$$

$$FCF_t = NI_t - \Delta\text{Long term assets}_t - \Delta NWC_t \qquad (8)$$

Assuming the company activity continues after the explicit forecast period, the residual value is:

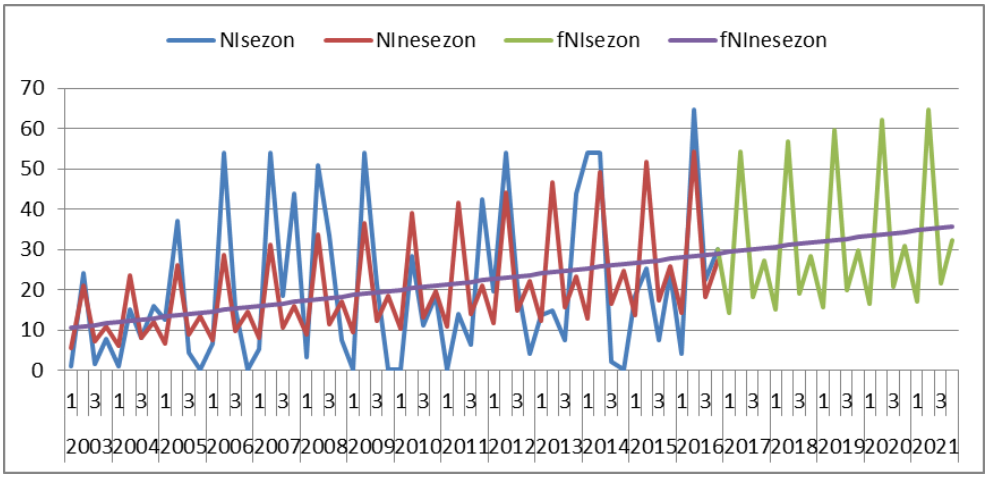
$$TV_n = FCF_{n+1} / (k - g) \qquad (9)$$

[7]Conformhttp://pages.stern.nyu.edu/~adamodar/ mai 2016

| Country | Moody's rating | Rating-based Default Spread | Total Equity Risk Premium (based on rating) | Country Risk Premium (based on rating) |
|---|---|---|---|---|
| **Romania** | Baa3 | 2.44% | **9.28%** | 3.28% |

where g = the average growth rate for the period 2017 – 2021

In order to estimate the cash-flows, we forecasted their determinants:NI = net income, ΔLong term assets$_t$ = long term assets, and ΔNWC$_t$ = change in non-cash working capital.For the net income, we use quarterly data (NIsezon) to detect a trend during 2003-2016 (NInesezon) and its extrapolation for the period 2017-2021 (fNInesezon), including quarterly net profit (fNIsezon):




**Graphic No. 1: Net income trend - SIF**

The same methodology is followed to get the forecasts for the variations of the long term assets (ΔLong term assets) and change in working capital requirements (ΔNWC).

The terminal value (TV$_5$) at the end of 2021 was estimated usingthe Gordon & Shapiro model which is based on the forecasted net profit for 2021 (135.6 million lei), the cost of capital (k = 11.85%), and the growth rate (g = 4%). The average of these rates is thus estimated for the period 2017-2021:

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **g =** | **0.04** | g/an = | -0.05 | 0.06 | 0.07 | 0.06 | 0.06 |

Consequently, the free cashflows and present value for SIF at the beginning of 2017are estimated as follows:

**Table No. 1: FCF and the value of discounted FCF –SIF(mil.lei)**

| Year | 2016 | 2017 | 2018 | 2019 | 2020 |
|---|---|---|---|---|---|
| NI | 71.9 | 76.1 | 81.2 | 86.4 | 91.6 |
| ΔFixed Ass | 31.6 | 34.0 | 34.0 | 34.0 | 34.0 |
| ΔNonCashWC | -0.4 | -0.4 | -0.4 | -0.4 | -0.4 |
| **$FCF_t$ =** | **40.6** | **42.4** | **47.6** | **52.8** | **57.9** |
| **$VT_5$ =** | **1228** | | | | |
| **k =** | **11.85%** | | | | |
| **g =** | **4.09%** | | | | |
| **$V_{0(DCF)}$ =** | **872** | **mil lei** | | | |

Considering the number of shares of the issuer SIF, we estimate that the present value per share is **2.5896 lei/share**. For comparison, we present in the following table the net asset value, the discount, the net asset value per share and the market capitalization of the SIF at 12.30.2016 and the date of this valuation:

**Table No. 2: Net asset unitary value (NAUV) and market capitalisation – SIF end of 2016 and valuation date**

| | | |
|---|---|---|
| $NAUV^*_{31.12.15}$ | 3.3541 | lei/act |
| *) according ASF regulations | | |
| Discount | 50.3% | |
| $P/BV_{31.12.16}$ | 0.5033 | |
| | | |
| Net $Actif/act_{31.12.16}$ | 3.2592 | lei/act |
| | | |
| **Market $Capitalization_{31.12.16}$** | **926.5** | mil lei |

For the case of a perpetual and constant free cash flow we have:

$$V_{0\,(firm)} = \frac{FCF}{WACC} \qquad (10)$$

The Gordon - Shapiro model identifies a complementary factor. This is the constant growth rate ***g*** of the free cash flow:

$$V_{0\,(firm)} = \frac{FCF}{WACC - g} \qquad (11)$$

### 3.3. Net asset and net asset value(AN)

Although SIF shares are traded at a significant discount in the market, determining the company's net asset value is an objective accounting valuation that is based on audited financial statements. For comparison, we present in the following table the net asset value determined in accordance with Romanian Financial Supervisory Authority (ASF) regulations:

**Table No. 3: Net asset**

| | | |
|---|---|---|
| Total $Assets_{31.12.16}$ | 1942 | mil lei |
| Total $debts_{31.12.16}$ | 153 | mil lei |
| Cash and $equivalents_{31.12.16}$ | 151 | mil lei |
| $Equity_{31.12.16}$ | 1789 | mil lei |
| **Net Asset (without cash)** | **1637** | mil lei |
| Net Asset Value*$_{31.12.16}$ | 1841 | mil lei |
| *) conforming ASF regulations | | |

Comparing between the DCF model share value and the market value of the shares, we note, as expected, a stationary interest for SIF shares by investors which is mainly due to the 5% threshold of share ownership for any SIF.

### 3.4. Relative valuation based on multiples of value (EV / EBITDA) and price (PER)

This class of valuation models is based on representative multiples of the financial investment sector. We start from the valuation process from the EBITDA of SIF at end of 2015:

**Table No. 4: EBITDA - SIF**

| | | |
|---|---|---|
| $EBIT_{31.12.16}$ | 88.34 | mil lei |
| $Depreciation_{31.12.16}$ | 2.58 | mil lei |
| $EBITDA_{31.12.16}$ | 90.92 | mil lei |

The formula recommended by financial theory and practice to calculate enterprise value is:

*EV = market value of common stock + market value of debt – cash and equivalents*

Consequently, EV and EV / EBITDA for SIF are:

**Table No. 5: Enterprise value**

| | |
|---|---|
| EV = | 775.1 |
| $EV/EBITDA_{SIF}$ | 8.52 |

Market references for the EV/EBITDA multiple lead us to conclude that this multiple is below the multiple for the financial services industry in Romania

and even below those of SIF in general: 8.52<11 and 8.52<9.92. Using these references[8], the relative value of SIF is:

| | |
|---|---|
| $V_{0(EV/EBITDA)SIF}$ = | **1000.1** |
| $V_{0(EV/EBITDA)FinInv}$ = | **901.9** |

Considering the net profit from 2016 and the P/E multiple, the relative value of SIF is estimated as follows:

**Table No. 6: SIF valuation using P/E**

| | | |
|---|---|---|
| Net $Income_{31.12.16}$ | 75.3 | mil lei |
| P/E | 12.3 | |
| $V_{0(P/E)}$ = | **926** | mil lei |

### 3.4.1. Market value added(MVA)

Since its launch in 1989 by Stern Stewart & Co., EVA® = economic value added (or economic profit) is the most widely used indicator by firms and financial advisors to measure the company's performance. EVA's popularity is supported by financial theory (since it has as objective the maximization of investor wealth) and by capital investment evaluation principles (since it is based on the opportunity cost of capital).Similar to the net present value, the economic value added expresses the additional value that the company gains from its capital investments which have a performance above the sector average.

**Economic Value Added** (***EVA®***) is the company's net operating profit (EBIT · (1 – τ)) minus the opportunity cost of invested capital. For our case study, EVA® is an estimate of the economic profit of the company or the extent to which net profit of SIF is greater than the minimum return that investors would require forany investment with similar risk.

The return on equity (ROE)for SIF in 2016 is less than the cost of capital (k) and, in consequence, the market value of invested capital will be reduced relative to its value at the beginning of 2015.

$$\mathbf{EVA^{®} = Invested\ capital \cdot (ROE - k)} \qquad (12)$$

To proxy for the equity invested, we consider the book value at the beginning of the analysis in 2016:

[8]These references are taken from the following website: http://www.infinancials.com/fe-EN/40009ER/SIF-Banat-Crisana-S-A-/market-valuation

**Table No. 7: Value of SIF**

| | | |
|---|---|---|
| Invested Capital$_{01.01.16}$ | 1540 | mil lei |
| ROE = | 5.4% | |
| EVA = | -99.4 | mil lei |
| | | |
| MVA = | -838.3 | mil lei |
| **$V_{0(MVA)}$ =** | **701.7** | mil lei |

As a result, the market value of SIF is estimated based on the invested capital and MVA:
701.7mil.lei

**The market value added** (**MVA**) is the present value of EVA assuming the simple perpetuity (i.e. the ratio of EVA and cost of capital k):

$$MVA = EVA / k \quad (13)$$

The low value of SIF that we estimate according to MVA can be explained by the fact that investors do not discount (yet) the growth opportunities that SIF has created from reinvesting its net profit in development projects (if the Romanian market will encourage them).

EVA and MVA valuation methods take into account the managerial efficiency and, as a result, these are used for managers' compensation in case they succeed to generate positive returns. EVA and MVA calculation reveals two other fundamental factors of value: the return on equity (ROE) and cost of equity ($k_E$). For levered companies we also have the tax rate as a complementary factor in determining the company's value. It has an impact on tax shields resulting from interest expenses being deducted.

### 3.4.2. Equity valuation model based on residual income (RI)

The authors of this model are Edwards and Bell (1961), Peasnell (1982) and Ohlson (1995). The residual income valuation model is very similar to the EVA and MVA models. In the EVA® model, we consider some adjustments for operating profit before calculating EVA. The net profit expected by investors is based on the cost of equity ($k_E$):

$$\text{Expected net profit} = \text{Equity} \cdot k_E \quad (14)$$

Using the book value of equity as a proxy for equity, we have:

$$\text{Residual profit} = \text{Net profit} - \text{Expected profit} = \text{Equity} \cdot (ROE - k_E) \quad (15)$$

Then, the present value of the residual profit ($V_0$ (RI)), assuming the simple perpetuity, is equal to:

$$V_0 (RI) = \text{residual profit} / k_E \quad (16)$$

Finally, the market value of equity ($V_0$ (E)) will be equal to the book value at the beginning of the year ($E_0$) plus the present value of the residual profit:

$$V_0 (E) = E_0 + V_0 (RI) \quad (17)$$

In our case study, where capital investment is equal to equity, the valuation of the SIF's equity using the residual income model (RI) leads to the same result as when using the MVA valuation method.

**Conclusions**

By applying several methods of firm valuation (discounted cash flows, net assets, multiples of value and price, and market value added or residual income), we obtain the following values for the SIF's equity:

**Table No. 9: The value of SIF using different methods**

| Valuation Method | DCF | NA | EV/EBITDA | PER | MVA | ***Average*** |
|---|---|---|---|---|---|---|
| SIF value (mil lei) | 872 | 1637 | 902 | 926 | 702 | ***1008*** |
| Value per share (lei/share) | 1.5896 | 2.9833 | 1.6433 | 1.6875 | 1.2785 | ***1.8365*** |

Excluding the net asset valuation which indicates a 50.3% premium for the market value of SIF, the results from the other valuation models are close. This indicates that the hypotheses which stand at the core of each valuation method are consistent. Therefore, we find evidence that valuation models give similar results under a specific set of assumptions. The selection of one of these valuation methods depends on how the value determinants are considered by investors when making their investment decision.

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