

THE OPERATIONAL-STRATEGIC MANAGEMENT DECISION, RELATIVE TO THE FUNDAMENTAL VALUE AND THE STOCK EXCHANGE VALUE OF THE ECONOMIC ORGANIZATION OF PRODUCTION AND SERVICES

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ABSTRACT

The current study focuses on the investment decision on the capital market of economic organizations of production and services, with the final goal of optimizing the strategic financial value.

The proposed approach takes into consideration two distinctive evaluations of the economic organization: (i) the fundamental value, and, (ii) the financial value, both being quantified in various conditions such as no uncertainty phenomena, uncertainty with complete financial markets and uncertainty with incomplete financial markets. The discussions proposed in European currencies (RON and Euro) can be extrapolated to blockchain technologies that allow fast, secure and decentralized transactions.

KEYWORDS: *fundamental value, stock value, uncertainty market phenomena, complete and incomplete financial markets*

JEL CLASSIFICATION: *G1*

Figure 1. INTRODUCTION

The maturing of the Romanian capital market, the imminent passage of the status of the Bucharest Stock Exchange from "Border Market" to "Emergent Market", according to the standards M.S.C.I.Inc. (Morgan Stanley Capital International and M.S.C.I. Barra), with all the benefits resulting from this up-grading, bring the open economic organizations to a new perspective, the capital market becomes a coherent and consistent alternative to the financing of economic actors in the Romanian business environment, a competitor of a banking system that is not always adapted to the business plans developed by the top decision maker.

Investors analyze, under performance conditionalities and profit generation, the economic organizations present on the regulated market, the elaboration of the investment strategies requires the rigorous analysis of the two significant values of the economic organizations, the fundamental value and the stock exchange value, the subsequent concentration of the capital flows, resulted from a greater international visibility (Bachelier, 1995 ; Etner and Granger, 2011 ; Dana and Jeanblanc-Picque, 1998), they increase the attractiveness of the financing of the economic organizations present at the Bucharest Stock Exchange (B.V.B.).

The process of evaluating the economic organizations shows a number of fundamental hubs, which are identifiable as: anticipation strategies, profit/risk ratio, equilibrium price, present (current) value, cost of capital. Figure 1 depicts schematics of a the key components relevant for the fundamental value of the economic organization of production and services, and the decisional

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process as function of various parameters. Figure 2 captures the same process for the stock exchange value of economic organization of production and services at various time horizons on the real capital market.

Fundamental Value of the Economic Organization



Figure 1. Schematics of a the key components relevant for the fundamental value of the economic organization of production and services.

Source: authors analisys

Stock Exchange Value of the Economic Organization

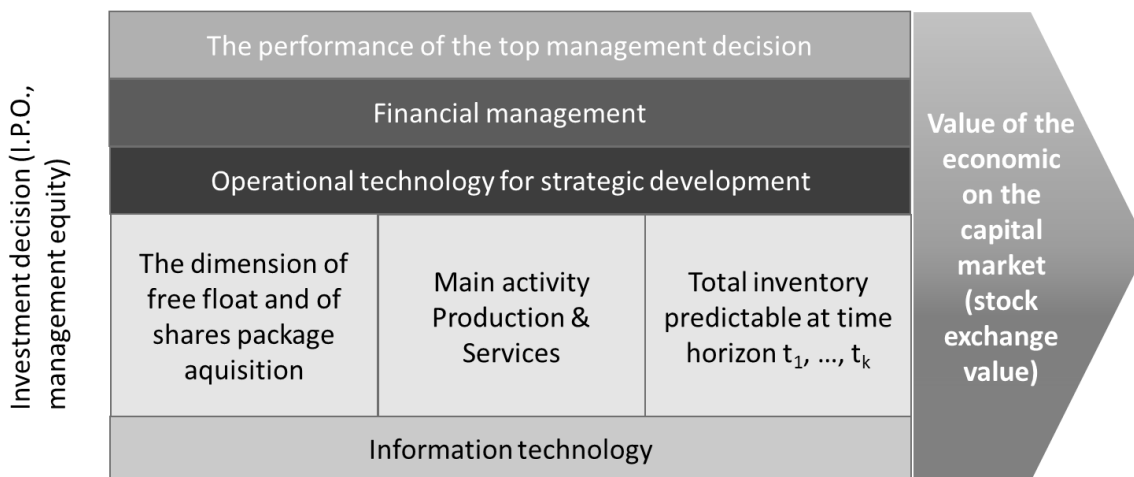


Figure 2. Process for the stock exchange value of economic organization of production and services at various time horizons on the real capital market.

Source: authors analisys

The economic organizations of production and services present within their operability exogenous characteristics, so an organizational development within the business environment, in which they are actors, the financing of this type of economic organization is possible in a double hypostasis, from external sources or from own generated profits (Black and Scholes, 1973; Caballero, 2006).

In the specialized scientific applications, it is necessary to mention the approach at a theoretical level, the comparative approach, the mixed approach of the evaluation of the economic organization of production and services, each of these approaches is applicable to either the equity capital or the economic asset, the three approaching possibilities and the two assessment objects introduce six

possibilities in which the financial assessment methods are used (Allen and Gale, 1998; Allen and Gale, 2009).

The economic paradigm in which the economic organization of production and services is positioned is structured on theoretical principles and economic practices; we identify the strategic goals required by the decision-making, rational, the taxes are balanced, the business environment presents a state of balance and predictability, there is a potential for both an intensive organizational growth, improving the performance of the studied entity, as well as extetenisv, increasing the potential portfolio of clients, the study carried out has two broad operational-strategic assumptions, determined by the existence of a "business partner" factor, the "lack of uncertainty" and "uncertainty" (Dreze, 1974; Grandmont, 1983; Hull, 2007; Durlauf and Blume, 2008).

2.LACK OF UNCERTAINTY PHENOMENA

Given the lack of low or high economic uncertainty, the value of the economic material goods and services organization is shared by its stakeholder (interest groups) of which there are nominated: creditors (physical and legal entities, financiers of the developed business at the level of the economic organization), the shareholders (owners of the economic organization), the employees (employees of the studied economic organization)

2.1.Value of the economic organization

At a certain fixed time t , belonging to a broader T horizon, the analyzed economic organization has a certain amount of own capital, the trend of the strict decisions developed by the top responsible management is to maximize the added value of its net products, in certain time horizons strategically defined, short, medium, long.

The top decision-maker, monitored by the steakholderd of the economic organization, develops an exhaustive scenario of all possible development strategies, for the totality of investment programs, optimizes the way in which the available equipment is transposed into operation; noting with $y(t)$, the cash-flow at the level of the existing economic organization at (t) date, which is characteristic of the optimization of the organizational development strategy program, are thus identifiable, the accumulated capital up to the specified time, as well as the assimilation of the new production technologies, developed at the level of the economic organization, the Reserch & Development Department or purchased from the technological economic organizations that develop such tools (technologies, patents, licenses), the developed analysis follows the influences of some factors specific to the business macro-environment but also to the exogenous causes.

We introduce r , the short-term rate of financing of the economic organization's programs. In this case, $V(t)$ the net updated value (or VAN, "Fundamental Value") is obtained when the economic organization maximizes the generated product, updated, on t :

$$V(t) = y(t) + \frac{y(t+1)}{1+r} + \dots + \frac{y(T)}{(1+r)^{T-t}} \quad (1)$$

Maximizing the value of the expression takes into account the value of the capital of the economic organization at the end of the time horizon T , starting from an initial volume of capital of $K(t-1)$.

In a macroeconomic environment that lacks uncertainty, the forecasts $y(t+\tau)$ are validated in the date $(t+\tau)$, provided that the macroeconomic environment variables have a degree of maximum anticipation, possibly 100%, the optimal decisions of investment and operationalization of the strategic production process are independent of the financial strategic, the net products $y(t)$ are interpretable as exogenous, they determine that at date 0 they do not vary depending on the financial decisions already taken.

2.2 The value of the open economic organization, the capital market (shares), equity

The cash flow, "net product" has a positive or negative value, according to the capacity or inability of the economic organization to finance its own investments that are subsequently transposed over a period of time t , a financial instrument often used by economic organizations are loans on short term, the net financial product y and the necessary current loans B , allow the repayment of the previous debts, denominated B_{-1} and the distribution of dividends, positive value, d , $y(t) = d(t) - B(t) + (1 + r_{t-1})B(t-1)$, $d(t) \geq 0$, $t = 0, 1, \dots, T$, so the net updated value, VAN, noted with $V(t)$ is:

$$V(t) = y(t) + \frac{y(t+1)}{1+r} + \dots + \frac{y(T)}{(1+r)^{T-t}} = \left[d(t) + \frac{d(t+1)}{1+r} + \dots + \frac{d(T)}{(1+r)^{T-t}} \right] + [1 + r_{t-1}B(t-1)] - B(T)/(1+r)^{T-t} \quad (2)$$

If the rate to be paid, r , is not constant, the substitution of the expression $1/(1+r)^t$ with the usual update coefficients of the date τ , we define the concept of "Stock Exchange Value of the Economic Organization" S as the mathematical formalism:

$$S(t) = d(t) + \frac{d(t+1)}{1+r} + \dots + \frac{d(T)}{(1+r)^{T-t}} \quad (3)$$

The final debt $B(T)$ is absolutely necessary null in the finite horizon and $(t) = V(t) - (1 + r_{t-1})B(t-1)$, the T horizon is one which is supposed to be infinite in the total reasonings developed at this level of our study, under the condition that the V and S series are always defined, the necessary and sufficient condition so that the cumulative debt B is known, the net products and dividends grow relatively a little in relation to the interest rate if the time horizon on which the analysis is done is infinite, the duty of the economic organization must satisfy the "non-Ponzi condition":

$$\lim\{B(T)/(1+r)^{T-1}, T = \infty\} \quad (4)$$

In order to preserve an appropriate degree of reliability, through shares issues, *I.P.O. (Initial Public Offering)*, or using other financing procedures, a constraint on the indebtedness of the economic organization is introduced, we define the concept of "Inter-Temporary Budget Constraint": the size of the loan according to the financial payment capacity, the complete knowledge of the financial markets from which the loan is accessed, the net value of the economic organization is non-negative, the approach for the consumer requires the inclusion of a stochastic discount factor ϕ_t , and

$$B_t \leq E_t \sum_{s=1}^{\infty} \beta^s \frac{\phi_{t+s}}{\phi_t} (Y_{t+s} - C_{t+s}) \quad (5)$$

for any sustainable financial plan, it defines its constraints, thus we identify the constraint for a budgeted period of time, the terms "Non-Ponzi" have the following forms:

$$C_t \leq Y_t - \beta^{-1} \phi_t^{-1} B_{t-1} + B_t \quad (6)$$

$$\lim_{T \rightarrow \infty} E_t [\beta^T \phi_{t+T} B_{t+T}] \leq 0$$

It is necessary to verify at time t , for future contingent values, with all known occurrence probabilities, for a value of C_t , arbitrarily chosen and in the vicinity of value 0, the value of the traded assets, it implies:

$$B_t \leq E_t \sum_{s=1}^{\infty} \beta^s \frac{\phi_{t+s}}{\phi_t} Y_{t+s} \quad (7)$$

The identification of *non-Ponzi* conditions involves a *hybrid* construction for *Inter-Temporal Budget Constriction* and $B \leq B^-$, the conditionality is applicable to incomplete market situations, a rigorous identification algorithm with constraints is not identifiable for a single period of budget, $B_t = C_t - Y_t + R_{t-1} B_{t-1}$, it results:

$$B_t = \sum_{s=1}^T (\prod_{v=1}^s R_{t+s-v}^{-1}) (Y_{t+s} - C_{t+s}) + (\prod_{s=1}^T R_{t+s-1}^{-1}) B_{T+1} \quad (8)$$

if the last term in the previous expression tends towards 0 as $T \rightarrow \infty$, a mathematical expression equivalent to (3) is obtained, this type of equivalences are referred to in the specialty literature as "*Non-Ponzi Conditions*", it is important to note that the last term in the expression (4) tends toward 0, as $T \rightarrow \infty$, and the specialized studies developed later identify important differences between (3) and (4), as follows: the condition is often presented without previous waiting operator;

- positioning the operator E in front warns of the occurrence of the risk. Phenomenologically, it is likely that the scheduled payments will face a blockage, this situation is offset by an increase in the probability function of the existence of the financial organizational resources related to scheduled payments;

- the non-existence of operator E at the beginning of the expression is extremely restrictive, the economic organization cannot access any risk-free loan, in the worst case scenarios, it must have an adequate degree of solvency in order to pay the debts in due time.

- the discount factor approach is made using the identifiable return rates in the real financial market, R_t , not for a purely theoretical construction which is an ideal market that presents a stochastic discount factor;

Thus, the fundamental value of the economic organization, $V(t)$ is its market value at the beginning of the period t , but without taking into account the possible existing debts, the hypothesis is that in the case of the acquisition of the economic organization without repaying the debt $(1+r)B(t-1)$, so of the professional organizational skills and productive capital, it is perfectly possible to obtain the $V(t)$ current value, which is possible due to the financing (loans) guaranteed by the net products to be produced; because the developed reasoning is made in conditions of uncertainty, the investment in the said production organization of the financial value $V(t)$, in order to develop within a specified timeframe (year) of a selling strategy with a price equivalent to $V(t+1)$ leads to an equivalent performance generated by a short-term financial deposit rate, we note that the following relation is verifiable.

$$\frac{(1+r)y(t)+V(t+1)}{V(t)} = 1 + r \quad (9)$$

The above-mentioned thinking paradigm involves the acquisition of the economic production organization at the beginning of the time period t , so that the induced immediate benefit of the product $y(t)$ for the acquisition made at the end of the period t , induces a first benefit $y(t+1)$, and the fundamental value of an economic organization at the end of the period t is:

$$V^+(t) = \frac{V(t+1)}{1+r} = \frac{y(t+1)}{1+r} + \dots + \frac{y(T)}{(1+r)^{T-t}} \quad (10)$$

From this approach it results that the acquisition of the economic production organization at the present moment and its subsequent sale, with a one-year time horizon, reports the same yield as the short-term interest (temporality, one year), the following way:

$$\frac{y(t+1)+V^+(t+1)}{V^+(t)} = 1 + r \quad (11)$$

We note with $S(t)$ the stock exchange value of the economic organization at the beginning of the period t , if the economic organisation's share package is entirely acquired at the beginning of the time period t , a dividend flow is generated equivalent to the current S amount calculated, without the opportunity of arbitrage, and S is the searched market value, the previous reasoning assumes the possibility of acquiring share packages of the economic production organization at the beginning of the time period t , which allows to benefit from $d(t)$ dividends, if they are paid before the possibility to purchase or sale the titles for the period t , so the first affordable dividends are $d(t+1)$, we calculate the stock exchange value of the economic organization at the end of the period t as

$$S^+(t) = \frac{S(t+1)}{1+r} = \frac{d(t+1)}{1+r} + \dots + \frac{d(T)}{(1+r)^{T-t}} \quad (12)$$

The acquisition of all the shares during the period t and the resale within the one-year time horizon presents the same financial characteristics as a risk-free short-term placement, which is equivalent to $\frac{d(t+1)+S^+(t+1)}{S^+(t)} = 1 + r$, the way to define S^+ si V^+ allows to write $S^+(t) = V^+(t) - B(t)$, at the end of the period, the stock value S^+ is equal to the fundamental value V^+ of which the debts B are subtracted, we deduce that the fundamental value belongs to the creditors partially to the shareholders, to the total of the economic organizations' financiers.

It is the market value that determines the course of the titles $P(t)$, the short-term yield of a title held in date t , $\frac{P(t+1)+d^-(t+1)}{P(t)} = 1 + r$, the notation $d^-(t+1)$, represents the dividends with titles $\frac{d(t+1)}{N}$, in the case of uncertainty-free financial markets, the present value of the stock or the current securities flow are not influenced by strategies or future financial decisions; a financial decision, at date t , implies the determination of the debt $B(t)$, but also the positive dividends $d(t)$, complying with the formalism $y(t) = d(t) - B(t) + (1 + r_{t-1})B(t-1)$.

So, V^+ , the fundamental value of the economic organization is of exogenous type, the future financial strategies do not influence it, $S^+(t) = V^+(t) - B(t)$, so the current stock value is not modifiable in case of change of future financial strategies, operationally it has the same nature as $P(t) = \frac{S^+(t)}{N}$.

2.3 Capital growth, vector for the development of the economic organization

"The financial strategy developed by the top organizational management is influenced or not by the decision to increase the capital of the economic organization, argued by the financing of the future development?", it is the challenge that we answer in the following reasoning.

A specific way of financing the open economic organisations, listed on the capital market, is the process of issuing new shares, for the tradable "Free-Float" with the value of N is taken the decision to create ΔN shares sold at a market price P .

If Δf is the resulted increase of own funds, then $= P\Delta N$, if the economic organization redeems its own shares, Δf is negative, the financial relation is $y(t) = d(t) - B(t) - \Delta f(t) + (1 + r_{t-1})B(t - 1)$, results by summing up:

$$V(t) = y(t) + \frac{y(t+1)}{1+r} + \dots + \frac{y(T)}{(1+r)^{T-t}} = \left[d(t) - \Delta f(t) + \frac{d(t+1) - \Delta f(t+1)}{1+r} + \dots + \frac{d(T) - \Delta f(T)}{(1+r)^{T-t}} \right] + (1 + r_{t-1})B(t - 1) \quad (13)$$

There is a new approach to S value using the formalism

$$S(t) = d(t) - \Delta f(t) + \frac{d(t+1) - \Delta f(t+1)}{1+r} + \dots + \frac{d(T) - \Delta f(T)}{(1+r)^{T-t}} \quad (14)$$

Under the same conditions as for S^+ , we assume that the first net dividends received are

$$d(t+1) - \Delta f(t+1),$$

$$S(t) = V(t) - (1 + r_{t-1})B(t - 1) \text{ si } S^+(t) = V^+(t) - B(t). \quad (15)$$

We note that the new $S(t)$ index measures the stock value of the economic organization at the beginning of the period t , the increase of the capital $\Delta f(t)$ takes place before receiving the dividends $d(t)$, the new index $S^+(t)$ quantifies the stock value of the economic organization at the end of the period t .

This starts with the payment of dividends generated by the economic organization, following the possibility of increasing the capital of the economic entity, the financial process continues with the purchase and sale of securities that determine the $P(t)$ course.

We notice that the capital increase at $(t+1)$, in certain expected value constraints, does not change the level of securities, nor the performance of the economic organization on date t , a special approach of the structure of the financial capital of an organization, so also the one of the economic organization of production and services is identifiable within the thinking paradigm developed by "Lema Modigliani-Miller."

The way of thinking is structured on the following theoretical premises: the organizational investment strategy is stable, the transparency for the investors, the tax on dividend is null, but also the capital gains, but also on the capital gains, the selling, purchasing of the capital securities are free of charge, the investors and the decision-making management have access to the same information, there are no additional costs associated with the property or the securities.

This approach is purely theoretical, free of charge, additional costs generated by limit economic phenomena (insolvency, bankruptcy), asymmetric information, there are management errors in the decision making process resulting from the superficial knowledge of sustainable corporate financing, such as the transformation of debts to creditors into capital, given that many of them have a stable position in the respective economic organization's shareholding, they do not represent losses for them, but the reality of the business models used demonstrates the opposite, the structure of the economic organization's capital is that it is not affected by the financing strategy's elaboration method, so the issuance of future debts (bonds), the primary offer of shares (I.P.O.), the sale of already existing shares (Equity) are equivalent.

3. ADDRESSING THE CONDITIONS OF UNCERTAINTY, COMPLETE FINANCIAL MARKETS

A financial market is termed full, if the totality of "European-type options" are the simulable, the financial concept of "Option", defines the derivative product that establishes a contract between a seller and a buyer, he or she has the right but not the obligation to purchase, "Call", or sale, "Put", of base asset at a price previously established, "Strike", over a given time span, or at a time specified as the maturity date, this type of contract is made in a speculative or insurance optics.

If the economic organization of production and services is positioned on a financial market, the changed assets are financial assets, shares, bonds, the option gives the buyer the right to acquire or sell the financial asset defined in the contract, the price previously set, the duration of the existence of the option are defined in the contract, the seller is committed to complying with the contract if the buyer exercises his option, if it is not exercised, the seller has a gain equivalent to the share price, so we identify the "Axioma of Viability" that is neutral to the nature of the markets, a mathematical feature, it is demonstrable that all the options are simulable with well-developed strategies.

Most often the model presented by the "Full Financial Market" is provided by modeling with the "Black-Scholes Equation" equation, thus taking into account many time moments, for each of them there are several states of the business environment in which the economic organization carries out its operational-strategic activity; we impose the working hypothesis that it does not induce the risk of bankruptcy.

3.1 Values of the economic organisation

In the case of positioning the economic organization on a complete financial market, the phenomology is equivalent to the values on date t , in the case of lack of uncertainty, updated with a mathematical coefficient $(1+r)^{-t}$, are replaced by values which represent a state of the world's environment $e(t)$, updated by a $\beta(e)$ state price, the economic organization maximizes, at each e state, where the sum of its future products (f) is positioned, updated with the state conditional prices $\beta(f|e)$, this maximization does not depend on financial decisions, and if we write with $V(e)$, then the fundamental value resulted, then

$$V(e) = \sum_{f \gg e} \beta(f|e)y(f) \quad (16)$$

By the formalism $f \gg e$, a known state passes immediately or not, in a certain identifiable state; using conditional probabilities with a neutral risk Π , more likely like the conditional state prices β , in order to formulate more intuitive formulas, we introduce the definition of the fundamental value, the stock exchange value, the values of the end of the temporary period studied, with the help of a higher degree of rigor, as follows:

(1) We define the fundamental value of an economic organization $V(e)$ for a state $e(t)$, at the beginning of the time period t the following way

$$V(e) = E_{\Pi|e(t)} \left\{ y(e) + \frac{\tilde{y}(t+1)}{1+r} + \dots + \frac{\tilde{y}(T)}{(1+r)^{T-t}} \right\} \quad (17)$$

The use of the "tilde" symbol means that the future net products are of the type of random variables, the value of the economic organization at the beginning of the t period is therefore equal to the expectation of the neutral risk of the amount of future net benefits up-dated by the risk-free rate.

(2) By noting the dividends with $d(e)$, the variation of our own financial funds with $\Delta f(e)$, we define the market value $S(e)$ for a state $e(t)$ at the beginning of the date t by

$$S(e) = E_{\Pi|e(t)}\left\{d(e) - \Delta f(e) + \frac{d^{\sim}(t+1) - \Delta f^{\sim}(t+1)}{1+r} + \dots + \frac{d^{\sim}(T) - \Delta f^{\sim}(T)}{(1+r)^{T-t}}\right\} \quad (18)$$

(3) We define, as in case of lack of uncertainty, the values $V^+(e)$ si $S^+(e)$, subtracting the terms $y(e), d(e), \Delta f(e)$, corresponding to date t , in the relations which present on $V(e)$ and $S(e)$

$$\begin{aligned} S(e) &= [d(e) - \Delta f(e)] + S^+(e) \\ V(e) &= y(e) + V^+(e) \end{aligned} \quad (19)$$

These are the values of the end of the period interpreted as in the case of lack of uncertainty, positioning us in the hypothesis that all the loans made by the economic organization of production are made on the short term, we introduce the next lemma.

Lemma 1: If $B(e)$ is the loan made by the economic organization placed in state e , then the basic formula is $(e) = d(e) - B(e) - \Delta f(e) + (1+r)B(e^-)$, where e^- is the state immediately preceding the state e , it results $S(e) = V(e) - (1+r)B(e^-)$, $S^+(e) = V^+(e) - B(e)$.

We study the operation of the lemma for a state ϵ , at the time t , assuming the future zero interest rate, which returns, updating the state ϵ for all the values taken into account, the basic formula is verified as an identity, expressing in the corresponding updated currency, *EURO* or *RON* for a successive state e , in the immediate vicinity of the initial state ϵ , $d(e) = y(e) + B(e) - B(e^-)$, deducts for all times $\theta \geq t + 1$

$$E_{\Pi|\epsilon}[d^{\sim}(\theta)] = E_{\Pi|\epsilon}[y^{\sim}(\theta)] + E_{\Pi|\epsilon}[B^{\sim}(\theta)] - E_{\Pi|\epsilon}[B^{\sim}(\theta - 1)] \quad (20)$$

The loans made by the economic organization, with no up-to-date risk, fully checks the e states on date $\theta \geq t + 1$, relation $E_{\Pi|\epsilon}[B^{\sim}(e^+)] = B(e)$, so $E_{\Pi|\epsilon}[B^{\sim}(\theta + 1)] = E_{\Pi|\epsilon}[B^{\sim}(\theta)]$, resulting

$$E_{\Pi|\epsilon}[B^{\sim}(\theta)] = E_{\Pi|\epsilon}[B^{\sim}(\theta - 1)] \quad (21)$$

$$\text{So } E_{\Pi|\epsilon}[\sum_{\theta \geq t+1} d^{\sim}(\theta)] = E_{\Pi|\epsilon}[\sum_{\theta \geq t+1} y^{\sim}(\theta)] - [B(\epsilon)] \quad (22)$$

In conclusion, $S^+(e) = V^+(e) - B(e)$ and, similarly, $S(e) = V(e) - (1+r)B(e^-)$.

3.2. Analysis of the bankruptcy of the economic organization, actor within the complete financial markets

Supposing there is a state e where the immediate successors, e^+ are states in which the economic production and services organization goes into bankruptcy, so it is insolvent, it is not eligible for loans to cover historical debts, the capacity for maximum indebtedness is the fundamental value, which corresponds to the liquidity of the economic organization, the state $f > e$ is therefore a state of bankruptcy, If $V(f) - [1+r(e)]B(e) < 0$, where $r(e)$ is the short-term rate granted to the economic organization in state e and we notice that it is different with the risk-free interest, conventionally noted, r_0 , we identify in the developed study the particularities of the bankruptcy state, such as the processes of selling the assets of the economic organization, to cover historical debts with the value $V(f)$, the old shareholders lose their property rights on the economic organization, partially or totally, until the creditors recover the financial value, $V(f)$, the loan 1, the monetary unit, *EURO*, *RON*, on short-term *RON* in the state e , means:

- to get $1 + r(e)$, money units, *EURO*, *RON*, in state f , to which the economic organization is located at that time, which follows if $V(f) \geq [1 + r(e)]B(e)$;

-the recovery $\frac{V(f)}{B(e)}$, otherwise;

We note that the loan of a cash unit in the state e is equivalent to receiving

$\min \left\{ \frac{V(f)}{B(e)}; 1 + r(e) \right\}$, in all states $f > e$, it results that $r(e)$ is not the risk-free interest rate r_0 ; is a rate marked with $r_f(e)$, the indicative f signifying the possible state of bankruptcy.

A short-term rate $r_f(e)$, from which an economic organization can borrow on date t , is defined and computable as follows:

$$1 + r_0(e) = E_{\Pi|e} \left[\min \left\{ \frac{V^-(t+1)}{B(t)}; 1 + r_f(e) \right\} \right] \quad (23)$$

3.3. Spread rate and probability of bankruptcy

A conceptual approach is needed for the economic organizations of production and service in the case of the simultaneous acquisition of a single security and the requirement to sell a related guarantee, the financial transactions studied are most of them executed with *futures contracts*, this is done to achieve a position on the financial markets whose value, generically named *spread*, depends on price differences.

If the V/B re-coverage rate is null, a creditor does not recover anything in case of bankruptcy of the economic organization, the previous mathematical formula knows a major simplification, we denote by $\Pi_{f(e)}$ the probability of the neutral risk of bankruptcy, the period immediately following the state e , it results $1 + r_0 = (1 - \Pi_f)(1 + r_f)$, the following approximation is possible, $r_f - r_0 \approx \Pi_f$, which raises the reasoning that if an economic organization has a zero re-coverage rate, then the spread rate that can be accessed (requested) shows the quantifiable (countable) level of the probability of bankruptcy, mutually, with the utmost generality, the probability of neutral risk of bankruptcy, noted with Π_f , evaluating the rate spreads $r_f - r_0$, when the market of the bonds issued by an economic organization of production and services must take into account the estimated re-coverage rate.

3.4. Updating the future gains and the bankruptcy state

Making the working hypothesis as the time 0, the economic production organization and services are predicting a financial benefit z , except for the state of bankruptcy, in which case the financial gain does not exist; the problem of the financial value (gain) generated by the economic production and service organization $v(0)$ occurs on date 0.

We have $R_0 = 1 + r_0$ the risk-free yield accumulated between the two standard data 0 and t , assuming that the risk-free rates are deterministic, so is the final causality of a chain of previous economic and financial events, analogue $R_f = 1 + r_f$ the yield generated and cumulated in the case of a loan on date 0 and having a horizon t for the economic organization under study, with a zero re-coverage rate, introducing Π_f the probability of neutral risk in the case of bankruptcy at date t , conditioned by the date 0: $v(0) = \frac{1}{R_0} [(\Pi_f)0 + (1 - \Pi_f)z] = z/R_f$

The economic processes are being carried out with an update of the future gains of the economic organization for production and services with the bankruptcy rate instead of the risk-free rate.

3.5. Updating the future gains and the bankruptcy state

Making the working hypothesis as the time 0, the economic production organization and services are predicting a financial benefit z , except for the state of bankruptcy, in which case the financial gain does not exist; the problem of the financial value (gain) generated by the economic production and service organization $v(0)$ occurs on date 0.

We have $R_0 = 1 + r_0$ the risk-free yield accumulated between the two standard data 0 and t , assuming that the risk-free rates are deterministic, so is the final causality of a chain of previous economic and financial events, analogue $R_f = 1 + r_f$ the yield generated and cumulated in the case of a loan on date 0 and having a horizon t for the economic organization under study, with a zero re-coverage rate, introducing Π_f the probability of neutral risk in the case of bankruptcy at date t , conditioned by the date 0: $v(0) = \frac{1}{R_0} [(\Pi_f)0 + (1 - \Pi_f)z] = z/R_f$

The economic processes are being carried out with an update of the future gains of the economic organization for production and services with the bankruptcy rate instead of the risk-free rate.

3.6. Bankruptcy and insurance

We evaluate the expected *payoff*, if in state e there is a loan $1/(1 + r_0(e))$ without risk, and the loan equivalent to $1/(1 + r_f(e))$ is likely to induce a bankruptcy risk for the economic organization, with a zero re-coverage fee; the operational hypothesis is elaborated on a vision set on two anchors (hubs), the state of organizational bankruptcy or it does not pay any interest in a state of non-bankruptcy in which it pays a monetary unit to the shareholders, they are required to repay a monetary unit in each of the two agreed states, bankrupt and non-bankrupt to obtain a risk-free loan, if the economic organization is in a state of non-bankruptcy, the total *payoff* is null, and the financial effort is -1 in case of bankruptcy, the whole process is carried out similarly to the existence of an insurance agreement with premium, $P_f = \left[\frac{1}{1+r_0(e)} \right] - \left[\frac{1}{1+r_f(e)} \right]$, with damage of one monetary unit, In the period when the economic organization is bankrupt.

In the developed thinking paradigm, there are only two future states, so two "*financial titles*" are enough to have a complete financial market, without arbitrage opportunity, we find a redundant title between the three possible choices, the risk-free credit, the bankruptcy risk credit, the insurance agreement in the state of bankruptcy.

In the operability of the contracted insurance capital markets are financial instruments that are well represented, formally these are *swaps*, called C.D.S. (*Credit Default Swaps*), if a market price P_f of these contacts is fixed and there is no mandatory market price, with a sufficient degree of liquidity, it is perfectly possible to determine the r_f risk rate according to the risk-free rate r_0 which are basically agreements, concept developed by the *J.P. MORGAN* investment bank, in which the seller of the product compensates the buyer (the reference loan creditor) in the case of non-payment of the loan or other unforeseeable event involving crediting, in case of non-fulfillment of the financial obligations the buyer of *C.D.S.* receives damages, the nominal value of the loan, the seller of *C.D.S.* will be in possession of the loan granted.

3.7. Market value and bankruptcy

Consider the particular case of an economic organization at time t with a $B(t)$ debt that presents a high degree of bankruptcy risk over a period of time; the owners of the shares are positioned in a situation that is symmetrical with that of the creditors, the hope of a strategic-operational future is related to the avoidance of declaring the economic organization's bankruptcy procedure, thus a positive *payoff* $V(t+1) - (1 + r_f)B(t)$, equal to what is obtained through the sales operation, they will not receive anything in case of declaring the bankruptcy, so mathematically, the payoff is computable $\max\{V(t+1) - (1 + r_f)B(t); 0\}$, the owner of an action is equivalent to a buying option for the future value $V(t+1)$ of the economic organization with price of exercising the debt value $(1 + r_f)B(t)$, we deduce that the future *payoffs* of the shareholders are computable $B(t) \max\left\{ \frac{V(t+1)}{B(t)}; (1 + r_f) \right\} - (1 + r_f)B(t)$, the actual value of the $S^+(t)$ shares is assimilable

with hope of neutral risk for the updated, with the rate under financial security, null risk, of these types of *payoffs*, from which it results:

$$[1 + r_0(e)]S^+(t) = B(t)E_{\Pi|e} \left[\max \left\{ \frac{V^-(t+1)}{B(t)}; 1 + r_f(e) \right\} \right] - (1 + r_f)B(t) \quad (24)$$

Thus, the relationship between the fundamental value and the stock exchange value of the economic organization is identified.

Lemma 2 Even if there is the theoretical possibility for an economic organization of production and services to reach the state of bankruptcy, if the financial markets from which it provides its financial sustainability are complete, in the totality of the states $S^+(e) = V^+(e) - B(e)$

Comment: The two mathematical relations previously introduced, (15) and (16) are subjected to a linear calculation process and it results $((1 + r_0)B(t) + (1 + r_0)S^+(t) = E_{\Pi|e}[V^-(t + 1)] = (1 + r_0)V^+$, which implies the final relation $B(t) + S^+(t) = V^+(t)$.

3.8 Application: concrete examples and calculations concerning risk minimization

In this section we show, with concrete examples of calculations, what is the correct process in formulating managerial decisions for risk minimization in case of errors in the financial strategies. We consider three relevant time moments 0, 1, 2 and two states in data 1: an initial state (') and the next state (') with a single successor in data 2 and the with the interest rate $r_0 = 0$.

We suppose that the economic organization has an initial debt $B(-1)$ that is zero and the expected net financial products $y(e)$ are presented in the next diagram, having a need of funding in *data 0*.

The economic organization, at the level of top decision management decides to significantly invest in *data 0* in view of high profit rates in first stage and moderate profit in second stage. It can be verified that the only significant prior values are generated when the investors are neutral concerning the financial decisions. In the following we propose two financial strategies.

A) Analysis of a managerial decision for a risky strategy

For a management organizational decision of a loan $B(0) = 6$ at time 0, to ensure the strategic funding of development project and of attractive dividend for investors, this type of management behavior is creating for the economic organization a risk of bankruptcy in data 1, which impose selling the economic organization at the price $V''(1) = y''(1) + \left[\frac{y''(2)}{1} + r_0 \right] = 1 + 1 = 2$, as value from the creditors, which results in a recovery rate: $\tau = \frac{2}{6} = \frac{1}{3}$, supposing that the creditors are ready to accept the loan to the economic organization. This means a rate $r_f = \frac{2}{3}$, and therefore a spread of $\frac{2}{3}$, this being a rate generated by the financial market and which cannot be priory calculated.

The value of the money invested according to the financial strategy of the economic and service organization, as reflected in the current mathematical modeling, is equal to the hope of the updated neutral risk to reimburse, with a probability of the bankruptcy neutral risk of $\Pi_f = \frac{1}{2}$, verifying the relationship: $I = (1 - \Pi_f) \left[\frac{1 + r_f}{1 + r_0} \right] + (\Pi_f)[(1 + r_0)]$. Here one can observe that in initial stage, the economic organization reimburses: $(1 + r_f)B(0) = 10$, and we make the assumption that the economic organization will not borrow anymore. We also observe that, in case of bankruptcy, the economic organization will not disappear but is yielded of the new shareholders at a price $V''(1)$, which means a flux of capital $V''(1) = 2$, given to the creditors.

The strategic decision of the top management is to avoid any new loan and the financial product $y''(1)$ is generated as the dividend $d''(1) = 1$, and the new shareholders will receive a novel set of dividends $d''(2) = y''(2)$. In the following, we present, as an example, the specific calculation of the dividends generated by the economic organization of service and production:

$$V(0) = 10, V^+(0) = 11$$

$$S(0) = d(0) + (1 - \Pi_f)[d'(1) + d'(2)] + \Pi_f[d''(1) - \Delta''(1) + d''(2)] = 10 \quad (25)$$

$$S^+(0) = S(0) - d(0) = 5.$$

The following conditions are fulfilled:

$$S^+(0) = V^+(0) - B(0), S(0) = V(0) - (1 + r_0)B(-1). \quad (26)$$

B) The scheme of a funding with high degree of risk

The proposed scheme for this case is detailed below.

$$\left\{ \begin{array}{l} y(0) = -1 \\ B(0) = 6 \rightarrow \\ d(0) = 5, \text{ old shareholders} \\ y'(1) = 10 \\ \left\{ \begin{array}{l} d'(1) = 0, \text{ old shareholders} \rightarrow \\ \text{Bankruptcy state} \end{array} \right. \left\{ \begin{array}{l} y'(2) = 10 \\ d'(2) = 10, \text{ old shareholders} \\ y''(1) = 1 \rightarrow \\ d''(1) = 1, \text{ new shareholders} \end{array} \right. \left\{ \begin{array}{l} y''(2) = 1 \\ d''(2) = 1, \text{ new shareholders} \\ d = 0, \text{ old shareholders} \end{array} \right. \end{array} \right. \quad (27)$$

In this formalism (see also section A) the mathematic index S encompasses both the dividends of the old shareholders $d(0), d'(1), d'(2)$, and of the new shareholders, $d''(1), d''(2)$, acting like a bridge between a capital flux and own funds, from old and new shareholder.

C) Analysis of the sustainability of riskless financial strategy

Here we assume that a shareholder of the economic organization of service and production, at data 0, is declining the adoption of any high-risk strategy to avoid any bankruptcy risks, with a minimal degree of debt $B(0) = 1$, which is providing the financial support at time 0. This type of loan is one without risk, with a negotiated rate r_0 . In this case, the operational and strategic process developed by the economic organization will involve dividends with a high degree of caution as presented in the next section D).

D) The scheme of a riskless funding

The proposed scheme for this case is detailed, as an example of calculations, below.

$$\left\{ \begin{array}{l} y(0) = -1 \\ B(0) = 1 \rightarrow \left\{ \begin{array}{l} y'(1) = 10 \\ d'(1) = 9 \rightarrow \left\{ \begin{array}{l} y'(2) = 10 \\ d'(2) = 10 \end{array} \right. \\ y''(1) = 1 \\ d''(1) = 1 \rightarrow \left\{ \begin{array}{l} y''(2) = 1 \\ d''(2) = 0 \end{array} \right. \end{array} \right. \\ d(0) = 0 \end{array} \right. \quad (28)$$

Such a shareholder with a riskless investment behavior has the possibility of covering some high risk financial decisions of the organizational management, and, in our example we will consider that this shareholder has the totality of the shares. As shareholder, he will receive all the old dividends, as previously mentioned, supposing the following operations concerning the risk coverage:

- borrow and acquisition at time $t = 0$, for 6 Euros of bonds with risk of the economic organization with the rate $r_f = \frac{2}{3}$;

- borrow at $t = 0$, 1 Euro with a rate without risks $r_0 = 0$;
- borrow at $t = 0$, is the positioning is in the second state, 1 Euro with a rate without risks $r_0 = 0$;

Concerning the resulting payoffs following this strategy, the procedure stands as below.

Positioning in data 0:

He receives 5 Euros, as shareholder, he buys for 6 Euros bonds and he borrows 1 Euro; it results that the shareholder has a payoff of 0 value; financially speaking, this position is identical to the one of what receives a shareholder if the management implements a prudent strategy.

Positioning in data 1:

He receives 0 Euro, as shareholder of the economic organization which adopts a strategy with high degree of risk.

He receives 10 Euros as creditor of the economic organization.

He returns 1 Euro as debtor.

The shareholder has a positive financial balance of 9 Euros, a situation that is identical to the one of the shareholder of an organization where the manager of the departments implements a prudential strategy.

We observe that, whatever the states in which is positioned the organization of service and products, with a prudential strategy the desired payoff is obtained, covering the risk corresponding to the high-risk financial strategy.

The financial coverage at shareholder level can be partial or total against the risk of incapacity of payment if it is decided that the financial strategy is too risky.

If the organization is not acting according to the operational strategic principles, as discussed, there is a clear possibility of an 'ex-post' situation of a financial policy that is inducing losses in a certain state of the economic organization of products and services.

For the shareholder that has been used as an example, the overall financial policy is equivalent 'ex-ante', the results presented being a particular case of the Modigliani-Miller Lemma, as previously presented.

4. ADDRESSING THE CONDITIONS OF UNCERTAINTY, INCOMPLETE FINANCIAL MARKETS

The scientific analysis developed at this level is for the economic organization of production and services on the financial markets without arbitrage opportunity, incomplete, and the price is specific for each state where the neutral risk probabilities exist, they are not unique, and contain within the developed rationale the future revenue flows belonging to the Spans of the available titles, which are capitalized in a unique way using neutral risk probabilities, the problem that arises for this new operational framework is whether the previously developed rationals are valid for future earnings that are positioned inside or outside the Span, as available titles, there must be presented the finding that a Future Income Vector is in Span if it admits a duplicate.

4.1 Incompleteness and conflicts of interest

For the economic organizations of production and services, the operational top management's decisions may sometimes not coincide with the interests of the *Corporate Stakeholders*.

In the case of financial markets with a certain degree of incompleteness, it is possible that the objectives of the two operational-strategic power factors, the *Decision-making Top Management* and the *Corporate Stakeholders*, are not conciliable; we consider an economic organization of production and services that must value its investment strategy at every time t , so the level at which the productive capital must lie, the organizational strategy is developed for the realizable investments in the total possible future states, so it is thus desirable that the economic organization use the optimal billing technology equipment that provides a financial product $y(e)$ in the state (s) ,

if the vector of the future net products provided by the technology implemented at the organizational level, the prices of the involved factors and the resulting products are not recoverable together with the investments provided in the *Spans* of the available titles, so they cannot be valued uniquely by a measurable value $V(e)$ and therefore the optimal investment strategy is not a single choice of the organizational decision makers.

A top executive manager chooses the development strategy also depending on other critical factors, not being constrained by the absolute uniqueness condition, in the same paradigm type, if the vector representing the future dividends $d(e)$, which are provided for each *share* is not positioned within the *Span*, cannot be valued by the unique manner through a quantifiable numerical value, $S(e)$, the behavior of the *shareholders*, regarding the maximization of the estimated stock market value is one with a high degree of unpredictability the various sources of objective conflicts disappear if the operational and organizational strategic component is positioned within a complete market, we also identify this possibility for incomplete financial markets if the net product vectors and the dividend vectors are duplicable.

In this case, we identify the value V , which involves future net products, they are subjected to a large strategic operational process of maximization, managed by the *Organizational Decision-Making Top Management*, the same value S identifies the interest of the shareholders of the respective economic organization in the punctual case in which V and S are numerically equal to the historical debts of the economic organization, the objectives of the decision-making management is identical to that of all the shareholders' structure, the strategy is to invest in the maximization of the stock value, the financing method of such a strategy with multiple approach trends, we continue the scientific analysis developed with two possible real operational-strategic situations, on which we apply the concepts and the developed thinking paradigm.

4.2 Incompleteness and bankruptcy

We consider the existence of two value titles in date 0, the property title of the economic organization of production and services and a risk-bearing bond issued by the same economic organization of production and services, with maturation degree $t = 1$, thus the financial markets are of an incomplete kind.

Once chosen the strategies net products of type $y(e)$ shall result, the economic organization has a loan equal to 6 in date 0, $r_f = 2/3$, the subsequent loans being no longer possible, and it shall result the value of the dividends $d(e)$.

Aggressive financing scheme (with high risk)

$$\left\{ \begin{array}{l} y(0) = 0 \\ +B(0) = 6 \\ = d(0) = 0 \end{array} \right. \rightarrow \left\{ \begin{array}{l} y = 10, -(1 + r_f)B(0) = -10, = d = 0 \\ y = 10, -(1 + r_f)B(0) = -10, = d = 0 \\ \text{Bankruptcy, } y = 1, d' = 0 \end{array} \right. \rightarrow \left\{ \begin{array}{l} y = 11, = d = 11 \\ y = 9, = d = 9 \\ y = 1. = d = 1 \end{array} \right. \quad (29)$$

In the case of bankruptcy, the sale of the economic organization allows the recovery of 2 units of money, *RON*, *EURO*, by the creditors, the obligation on the date 0 has a recovery rate equal to $1/3$, and the *payoff* is presented below.

Bond with Risk

$$-6 \rightarrow \begin{cases} 10 \\ 10 \\ 2 \end{cases} \quad (30)$$

By making the strategic decision-making hypothesis that the shareholders in the date 0 adopt the following behavior: they keep the stock portfolio, acquire today for 6 units of money (*EURO*,

RON), bonds issued by the economic organization, acquire the economic organization from the liquidator should it be in a bankruptcy state, we notice that the shareholders on the date 0 benefit from the exact *payoff* necessary for the economic organization in order to not be indebted on the date 0, these dates financially refer to the net products, so the fundamental value V of the economic organization in date 0 is determinable by an arbitration process; This is identical to the situation of complete markets, 6 units of money (EURO, RON) for the B bonds in date 0, it results $V = S + B$. the reasoning developed is similar to *The Modigliani Miller Theorem*, for incomplete markets, with certain particularities detailed as follows:

- the financial strategy developed by the top decision-maker is not relevant to the shareholders, what is indeed significant is the flow of the induced net financial products;
- the vector of this flow is positioned within the *Span* t of the available financial titles, it is the one that defines the fundamental value V without ambiguity;
- relation $V = S + B$ remains true in incomplete market conditions;
- the shareholders may be covered against all financial policies considered unconvincing;

All the interest groups involved in the good strategic and operational functioning of the economic organization, shareholders and creditors, are totally unaffected by the "ex-ante" financial strategy, the deviations from a certain type of financial strategy by a certain group of organizational interests are manifested only "ex-post", a top managerial decision, we identify significant differences between the prospective and the retrospective approach of the algorithms which quantify economic measures, exemplifying the incomes, the savings, the costs and investments and, at theoretical level, the alternative dual is limited by significant strategic trends.

The quantities defined in the thinking paradigm of the of actual measurement are called in the specialized scientific literature, "ex post" while the quantities which are subject to certain planned actions for a defined period are those called "exante".

4.3 Incompleteness and investment decision

We consider that the flows of net financial products $y(t)$ are exogenous, so the future investment decisions up to the end of the studied period are already taken, the initial production capital is considered to be quantitated with a "date" value, we consider two dates 0, 1, and two states of the nature of the economic organization on the date 1, we make the hypothesis with the economic entity that is "created" (possibly "start-up"), so the initial indebtedness is null, so it is necessary to decide if on the date 0 the investment is made I or J , therefore resulting financial flows associated with the net y products on date 1.

Choosing the investments

$$y = \mathbf{0}, \text{ choice } I \rightarrow \begin{cases} y = \mathbf{1} \\ y = \mathbf{0} \end{cases} \quad y = \mathbf{0}, \text{ choice } J \rightarrow \begin{cases} y = \mathbf{0} \\ y = \mathbf{1} \end{cases} \quad (31)$$

We note that there is only one risk-free title and the rate r_0 , so the markets are incomplete.

If the economic entity makes the choice I , the investors will deduct the future dividends, or even more, they know that the flow of future dividends is equivalent to the flow of the expected net products, therefore it results a S_I value of the issued corporate titles, so $V_I = S_I + B = S_I$, choice J , induces an initial calculation of neutral risk probability Π , of a favourable event, $\Pi = (1 + r_0)S_I = (1 + r_0)V_I$, evaluating the J choice with $V_J = \frac{1-\Pi}{1+r_0}$, this being preferable to the I choice, if $V_J < V_I < -> (1 + r_0)S_I > 1/2$, all calculations are not possible unless S_I is known, the I choice is already performed and valorisation within the market occurs with each strategic choice made, and it is elaborated a continuous improvement (optimization) process; a high degree of complexity has the punctual case of many periods and certain strategic trends should be excluded for rational reasons in order to anticipate the future alternatives, such as $I(e)$ and $J(e)$, it is unrealistic to

assume that elections are rigorously anticipated on date 0, the answer being previously known; the financial (capital) market is the one that values the anticipated income of the economic organization in a unique and inimitable way, a continuous process up to the next innovative approach, thus the importance of the economic organization in the investment strategies is relevant.

5. CONCLUSIONS

If the economic organization has established its core strategies, the production technology, the portfolio and product quality, its trading prices, it being an actor in a market where the decisions envisaging the production phenomena impose the fundamental value of this economic organization in a unique form, and even in the case of incomplete financial markets the shareholders, in such case, have convergence of decisional interests with the top organizational decision-maker, independent of the strategy and financial policy chosen, under the hypothesis that taxation is absolutely neutral and that the bankruptcy does not induce specific additional costs; If it is not possible to anticipate the operational-strategic decisions, neither the fundamental value of the economic organization nor its market value is determined in a unique way, the latter showing the policies of the decision-makers, the structure and the peculiarities specific to the respective markets.

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