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EVALUATING CORPORATE STRATEGIC PLANS: A RISK-BASED APPROACH

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Abstract

Stemming from a systemic approach to corporate strategic planning and management which considers the firm as a viable system, the aim of our paper is to describe a conceptual and analytical model to assess corporate strategic plans exposure to risk. Analyzing the firm plan through the systemic framework, our approach, named **Risk Compliant Valuation,** focuses on qualifying the plan, and assessing the coherence of the plan, placing it in a matrix of development alternatives. Finally, it focuses on making assumptions about probability distributions for the relevant parameters in each period over the life of the plan and then uses these distributions to calculate the maximum possible present loss concerning the plan.

Key words: Corporate Strategic Planning; Risk Compliant Evaluation Model
JEL Classification : C12; D81; G3; G31

Introduction

The study of the risks characterizing entrepreneurial activity has long been an important feature of the Italian and international academic approach to the study of firms. According to Zappa, risk is a characteristic element of every investment and pervades all business activities[1]. The importance of risk and the need for detailed study is further highlighted by Fazzi who confirms that risk – a determining factor of entrepreneurial behaviour – is a phenomenon which business science can neither ignore nor examine at a merely superficial level[2]. Merlani adds that, as far as possible, the aim of administrative science must be to discern the sources of risk and find the most effective means of defence[3]. According to Ferrero, risk pervades all business activity and, when viewed from an economic point of view, is correlated to the uncertainty which permeates the future of every firm. Indeed, Ferrero maintains that risk is a condition for the existence of all firms, whatever their business purpose and means of operating[4].

Over time, founding Italian and international research has been developed through various detailed studies pursued in several different areas of study[5]. More in particular the following seem to be the main approaches which are being developed - -

First, approaches can be found focusing on the basis for risk management theories and corporate risk management, and in particular stressing market imperfections as the basis for various positive theories about the economic impact of corporate risk management on firm value[6];

Second, authors focusing on risk measurement, which point out different issues such as analytic models vs. simulation, mono-period vs. multi-period estimates, etc. And also

The authors own full responsibility for the contents of the paper.

procedures for model building and techniques to for model validation[7];

- Third, among studies based on the risk managements some focus on financial risk management, some others on business risk management or both. Recent studies stress integrated or firm or organization-wide risk management approaches[8]. In this context research also deepens the sharing concept, referred to specific investment projects[9], business groups[10], national and international asset allocation[11], etc;
- Finally, many industry specific studies can be found or also research concerning particular kinds of projects or firms (e.g., SMEs vs. large corporations)[12].

Viewing risk within the systemic approach to the government of enterprise in its most recent formulations consents to build a generalized and unifying approach to risk assessment and government, combining the cultural heritage of the Italian tradition of business economics and the various lines pursued by detailed analytical studies. Adopting a systemic approach to the study of the firm, our study aims to develop a series of guidelines according to which it is possible to evaluate the riskiness of the industrial plan. Generally speaking, the riskiness of a corporate plan can be defined as an estimate of the probability of verification of the underlying hypotheses, that is the likelihood that the objectives established will be fulfilled.

Our approach sees an evaluator express a well-founded opinion regarding the likelihood that the objectives underlying the development dynamics of the firm may be effectively fulfilled. When set forth in a plan, this development can be seen as a series of states (snapshots of the structure of the firm) which progress with time from the initial state to the objective state. The dynamics of the development of the system – set forth in the plan and articulated by the changes of state – are defined by a risk content, e.g., it is possible that negative events may influence the system and thus lead to a departure from the expected goal. Allowing a risk analysis of both the initial state and the projected developments of the firm and taking into consideration the possibility that the governing body may implement actions to counter the origins and consequences of risk, the flowchart provides a well-founded evaluation of the riskiness of the plan.

Standardization of the Plan

Distinction between Structure Costs and Costs of Use of Structure

Standardization requires a re-examination of the plan according to the systemic approach to firm management and thus implies that the cost items of each chosen unit of evaluation shall be re-classified by distinguishing between structure costs and costs of use of structure*. Structure costs represent the highly specific skills considered necessary by the governing body in relation to a pre-defined organizational set-up in order to pursue the development of the firm. Basic structure costs refer to services provided by components whose role is to support the governing body such as the research department, the planning and control office, the general director, heads of department, etc. Secondary structure costs include services providing highly specific skills which, although they may overlap with operations, are nevertheless considered necessary by the governing body and thus remunerated during the development of the firm, often regardless of the level of activity, as they are considered essential for fulfillment of the corporate objectives.

In this context, it should be noted that structure costs are not affected by the means of negotiation and internal and external qualification of the components who provide the flows of strategic services. Thus, the acquisition of services from an external party according to an outsourcing arrangement may, in some cases, lead to costs which can be considered structure costs as the services acquired from the external party play a strategic role in the firm's survival. Generally, an enterprise whose business purpose is to produce a determined output must acquire, use and, thus, consume resources. This consumption can be quantified under costs of use of structure. Costs of use of structure also refer to the services necessary to allow the functioning of the enterprise and, unlike structure costs, vary with the state of development of the firm (according to the plan).

Identification of the States and the Relative Characteristic Variables of the fFirm

Having re-classified the cost items of the plan into structure costs and costs of use of structure, it is possible

* Costs of structure represent a different category as compared to fixed costs. While the former are defined considering the quality of the flux of services originated (in particular if they are strategic in order to achieve firm goals), the latter are defined with criteria relating to contractual considerations. Costs of structure are also different from overhead costs, which are defined with criteria relating to imputation and represent indirect expenses of running business not associated with a particular item or product sold.[13]

to identify an initial state, an objective state and the expected development trajectory (the succession of states from the initial state to the objective state) of the firm. Each state is governed by a function which varies according to the characteristic variables of the firm:

- TC is the rate of contribution: the quantum per each monetary unit of revenue needed to cover the structure costs. TC is obtained by comparing the difference between the unit revenue p and the unit cost of use of structure c_u with the unit revenue p;
- R is the level of revenue the firm considers it is able to reach;
- R is the level of revenue necessary to ensure a perfect balance between total costs and revenues (and is equal to the ratio between structure costs and the rate of contribution).

On the basis of these variables, profit may be represented by the following formula:

$$P(R)=TC(R-\bar{R})$$

The changes of state expected according to the plan – which lead to variations in the characteristic variables of the firm – show the presence of governance and management activities designed to change the way in which the enterprise develops. These modifications lead to actions which are frequently incorporated in projects. In relation to the quality of the actions and their mutual composition, these projects often have a different approach towards the fulfillment of the profit objective as far as risk events are concerned.

Qualifying the Plan

In order to complete a primary study of the riskiness of the plan, it is necessary to understand the peculiarities of the pattern with which the characteristic variables will develop according to the plan and to compare their variations with significant macroeconomic indicators. In this way it will be possible to verify the coherence of the criteria adopted in configuring the characteristic variables of the development trajectory. Having qualified the plan, we will focus on determining the range of variation of profit in order to evaluate the risk of the development trajectory.

- **Matrix of Development Alternatives**

The firm's industrial plan identifies a profit objective. This objective is based on choices of an industrial and financial nature designed to permit the planned development and is the result of the variations in characteristic variables – $\Delta TC, \Delta R, \Delta \bar{R}, \Delta CS$ – deriving from managerial actions. In order obtain more specific details of the profile of the development trajectory, it is necessary to evaluate both the incidence of each variation on fulfillment of the profit objective and the relations between the various variations foreseen in the plan. Thus it is necessary to refer to the following indicators:

- contribution lever (CL), which expresses the expected ability of the rate of contribution to absorb variations in costs of structure and is defined by the following ratio:

$$\frac{\Delta TC/TC}{\Delta CS/CS}$$

- profitable sales lever (PSL), which indicates the firm's ability to transform revenue variations into profitable sales and is represented by the following function:

$$\frac{\Delta(R-\bar{R})}{R-\bar{R}} \Big/ \frac{\Delta R}{R}$$

The matrix of development alternatives is created by intersecting the aforementioned dimensions. In this way it is possible to identify four classes of management actions with which to compare the firms development trajectory. As far as structural enhancement actions ($\Delta CS>0$; $CL<1$; $PSL<1$) are concerned, the critical variable underlying the development trajectory is represented by costs of structure. A plan defined using this alternative is characterized by a considerable increase in costs of structure with respect to the expected increase in rate of contribution.

With regard to growth actions ($\Delta CS>0$; $CL<1$; $PSL>1$), variation in expected sales is a critical element of the system's development trajectory. Growth actions are characterized by – often large – increases in revenues, due to the fact that the increase in costs of structure is higher than the increase predicted by the rate of contribution. In the case of development actions ($\Delta CS>0$; $CL>1$; $PSL>1$), a critical role is played by variations in both the rate of contribution and expected sales. Unlike growth actions, development actions are characterized by a more emphatic use of capabilities incorporated within the firm and thus have important positive effects on the rate of contribution. Finally, rationalization actions ($\Delta CS>0$; $CL>1$; $PSL<1$) place considerable importance on the rate of contribution. Rationalization actions are characterized by decreases in

revenues as a result of the use of capabilities incorporated within the firm. This leads to larger increases in the rate of contribution with respect to cost of structure (e.g., focusing on more valid products and models or improving the supply chain).

In addition to the hypotheses contemplated in the matrix of development alternatives, possible trajectories distinguished by a decrease in costs of structure ($\Delta CS<0$) should also be considered. This hypothesis involves at least three different cases.

- Firstly, it is possible to consider an action of "reorganization". This would lead to economies of costs of structure in relation to a contraction in some cost items, e.g., the positive effects of outsourcing strategic skills through the creation of stable relations with specialized suppliers instead of the hierarchy mechanism;
- Secondly, the possibility of actions involving the definitive "removal" of strategic skills would lead to a consequent elimination of relative cost of structure items, e.g. elimination of centralized management centres, R&D departments, etc;
- Finally, the possibility of setting up actions to "re-qualify" skills no longer considered strategic in the firm's context. In accounting terms, such re-qualified skills no longer generate costs of structure, but rather contribute to costs of use of structure, e.g., a unit of specialized labour which the governing body no longer considers to be skill which affects the probability of survival of the system in relation to the expectations and pressures of the environment.

- **Analysis of Coherence**

At this point an analysis of coherence has to be done in order to identify critical areas both with regard to the forecasts included in the plan regarding general economic trends and in relation to the criteria adopted in configuring the characteristic variables of the development trajectory. Prior to performing an analysis of coherence it is necessary to identify the macroeconomic indicators with which to compare the variations in characteristic variables expected at each state (from the initial state to the final state) of the development trajectory.

Once the macroeconomic indicators have been identified, they shall be compared with the variations in characteristic variables predicted by the plan. Should differences emerge between determined variables and determined indicators, possible critical points may be identified. As far as the analysis performed by the evaluator is concerned, special focus shall be placed on positive differences regarding both price-revenue and sellable quantity and negative differences regarding the price-cost. Furthermore, the evaluator shall also verify that the criteria used to determine the variables expected with regard to revenues find a corresponding criteria with regard to costs, e.g. should the evaluator find that expected inflation has been only been adjusted with regard to price-revenue and not with regard to price-cost, the price-cost area will be highlighted as a critical area.

Risk Analysis of the Plan with Reference to the Initial State and the Planned Development Trajectory

As previously observed, the risk characterizing the planned development trajectory lies in the possibility of differences being verified with respect to the profit objective. These differences may be due to "unawareness" and insufficient skill in analyzing "aleatory" risk*. Thus aleatory events – as far as they are analyzed and managed – do not play an important role in determining the possibility of differences being verified with respect to expectations.

In order to measure possible differences between effective and expected results, we shall identify a means of comparison (a profit benchmark, indicated by P_β) with which to compare the profit objective (P_o) characterizing the state objective s_o of the plan. This benchmark – created using probabilistic methodologies – reflects, to a certain degree of probability, the worse result the firm can achieve, considering the risk management actions implemented and should the adverse events be traceable to unawareness verify. Comparing the plan objective and the profit benchmark, it is possible to determine the range of profit and thus to express an opinion regarding the overall risk involved in the development trajectory of the firm.

- **Identification of Risk Events and Definition of the Characteristic Variables which Impact on the Profit Objective**

In order to estimate the profit benchmark Pβ, it is necessary to draw up a profit exposure map that defines a series of interconnected variables whose performance – in relation to the possible verification of risk events and

* Aleatory risks concern events whose probability can be calculated, *ex ante* or *ex post*. Risk connected to unawareness is essentially what is generally defined as uncertainty, but regarded in a subjective manner; it is a relative uncertainty, relative as to the cognitive potential of the observer.

the actions necessary to manage such events – positively and negatively conditions the firm's ability to fulfil the profit objective. The risk events which may reflect on the variables can be classified according to different criteria. According to J.P. Morgan's technical document entitled **Corporate Metrics™** – widely accepted as standard source of reference – the risks faced by a firm can be divided into four categories: business risks, market risks, credit risks and operating risks[14].

- **Using a Probabilistic Approach to Estimate the Characteristic Variables which Impact on the Profit Objective**

At this point, estimation of the profit benchmark P_β requires the setting up of a probabilistic model. This model must be able to define a probability distribution function for each characteristic variable (e.g., R specified in its components such as unit price, market share and total quantity demanded) which reflects its possible performance in relation to both risk events and risk management actions. This distribution function can be represented by a Beta type function[15]. The choice of this type of function is based on the fact that, although normal, this function allows us to take account of the evaluator's opinion regarding the possible effect of risk events on the characteristic variables*[16]. Furthermore, by calibrating the various parameters, it is possible to account for an asymmetric distribution of the possible results around the mean[17].

Determination of the Beta parameters, and thus the probability distribution function, is based on the assumption that a sufficiently realistic assessment of the possible values of the characteristic variables can be obtained from three estimates made by the evaluator. We refer to the following values:

- extreme upper value (ES), which represents, as to revenues, an estimate of the best value a determined characteristic variable can assume as a result of its impact on profit. As to costs, the extreme upper value represents an estimate of the worst value a determined characteristic variable can assume;
- normal value (m_o), which represents an estimate of the most probable value a characteristic variable can assume, if normal conditions are verified;
- extreme lower value (EI), which represents, as to revenues, the worst value a determined characteristic variable can assume as a result of its impact on the profit. As far as costs are concerned, the extreme lower value represents the most favorable value.

Thus according to the three estimates, the mean and the standard deviation are determined for each characteristic variable. These values are given by the two following equations:

$$M(.) = (ES + 4m_o + EI) / 6 \text{ **}$$

$$\sigma(.) = (ES - EI) / 6 \text{ ***}$$

The profit exposure map is based on the laws of distribution of the characteristic variables conditioning the fulfillment of the profit objective. Determination of the map requires further specification of the aforementioned laws in the light of both risk events and risk management actions.

Profit Exposure Map in the Light of Risk Management Actions

In order to determine the map and the profit distribution function, it is necessary to estimate both the values of the characteristic variables and the relative distribution functions and the relations between the aforementioned functions. In order to do this, the evaluator may adopt various methods of defining the values, e.g., empirical surveying of transactions completed on large, regulated markets or subjective estimates made by the evaluator and supported by a panel of experts or interviews with the top management of the firm under analysis[18]. Taking into account the analysis of risk events, estimation of the values of the characteristic variables

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* Other probability distribution functions may be used if the evaluator considers them more suitable.

** Calculation of the mean according to the equation shown in the text, rather than via the exact expression $M(.) = m_o \times(\alpha + 1) / (\alpha + 2\ m_o)$ leads to error. The greatest error (33%) is found with regard to the extreme values of α and m_o. Assuming that $1 \le \alpha \le 6$ and $(1/2 - m_o) \le 1/6$, the error is reduced to 4%.

*** As far as the standard deviation is concerned, use of the equation shown in the text in lieu of the exact expression, $\sigma(.) = \sqrt{(\alpha + 1) \times(\gamma + 1) / (\alpha + \gamma + 2)^2 \times(\alpha + \gamma + 3)}$, leads to an error which, for the extreme values of α and m_o, stands at approximately 17%. Assuming that $1 \le \alpha \le 6$ e $(1/2 - m_o) \le 1/6$, the error is reduced to 7%.

and their relationships cannot ignore, but rather must find its foundations in, the specificity of the firm system and, more particularly, in an assessment of its ability to manage risk.

Analysis of Risk Management Actions

In order to estimate the extreme upper, normal and extreme lower values and determine the range of each characteristic variable, it is necessary to consider the fact that the characteristic variables and the relative laws of distribution could be influenced – especially considering the risk events analyzed – by the risk management actions characterizing the established development of the firm. Risk management is a fundamental concept of both Italian and foreign business studies[19].

For our purposes such actions may be considered to include only contractual transfer or retention. As far as contractual transfer is concerned, it is possible to distinguish by the nature of the counterpart involved, transfer to insurance companies from transfer to other parties. With regard to the former, we refer to the signing of insurance policies involving activities such as the payment of a premium and the completion of deeds by the insured party on verification of a risk event according to the obligations of the contract and so on. As far as contractual transfer to third parties other than insurance companies is concerned, we refer to contracts or individual clauses which specifically authorize the partial or whole transfer of the burden of verifying certain risk events to third parties, such as customers, suppliers, employees. With regard to actions which may be considered as retention, it is possible to identify forms of self-insurance and the capabilities incorporated in the firm which are able to protect it from possible risk events or their consequences.

Self-insurance is a form of internal insurance which, regardless of the accounting approach adopted, involves the provisioning or allocation of capital to a risk fund which may be used in order to cover the negative consequences of aleatory events. As far as the capabilities incorporated in the firm are concerned, considering by means of example the managerial and operating skills of the human components of the marketing unit, the evaluator can analyze such skills according to a series of specially identified aspects such as the specific functional and sectoral experience of each of the components, the control mechanisms and benefit schemes established, the results posted in the past and so on*. By adequately assessing the aforesaid capabilities and taking into account the risk management actions mentioned, the evaluator can estimate the characteristic variables, their probability distribution functions and the relationships between such functions.

Definition of Risk Management Actions in Order to Determine the Profit Exposure Map

As previously observed, the risk management actions characterizing the firm under consideration influence the way in which the evaluator defines the profit exposure map. Indeed, these actions condition two aspects: the definition of the range of variation of the characteristic variables and the determination of the probability distribution functions. As far as the first aspect is concerned, reference should be made to the fact that both the contractual transfer and retention actions assessed by the evaluator allow the fixing of the extreme upper, normal and extreme lower values by the evaluator and thus allow the identification of a determined field of variation referring to one or more characteristic variables. For example, the forms of contractual coverage assessed by the evaluator referring to the cost price of a certain input determine the range of variation of the characteristic variable. Thus, these contractual tools have the effect of blocking the range of variation referring to the cost price of a determined input. Similarly, coverage of exchange rate risks or interest rate risks define the range of variation of the revenue price of a determined product. Furthermore, risk management actions may justify the elimination of the range of variation and thus the attribution of a determined value to the characteristic variable considered, for e.g., fixed long-term sales contract which establishes the sales price of a product or the purchase price of an input.

With reference to the second aspect, the relationships between the various distribution functions should be considered. For example, in defining the profit exposure map regarding a firm which is able to transfer (at least partially) increases in the cost price of determined inputs onto the revenue prices of determined outputs, the evaluator must take into account the correlations

* With regard to the concepts of resource, capability and competency see the research connected with the Resource-Based Theory or Resource-Based View.

between the characteristic variables.Consideration of the relationships between the distribution functions referring to characteristic variables is necessary in order to take into account the operating reality of the firm. Furthermore, consideration of the aforementioned relationships leads to identification of variables which must be considered interdependent, determination of the positive or negative nature of the correlation and measurement of its intensity.

Determination of Capital Allocated through Identification of the Range of Variation of Profit

Having determined the profit exposure map by estimating the extreme upper, normal and extreme lower values referring to the characteristic variables and the relative probability distribution functions and taking into account any interdependence, it is now possible to determine the profit distribution function $\varphi(P)$ and the cumulative probability function $\phi(P)$ and, thus, the profit benchmark P_β. By comparing the profit benchmark with the profit objective P_o it is possible to determine the range of profit and thus to measure the capital allocated.

- **Measurement of Risk through Use of a Simulation Mode**

In order for the evaluator to be able to determine the profit probability function with reference to the objective state and according to the profit exposure map defined, it is necessary to use simulation models[20]. In order to pursue our study, we shall adopt the Monte Carlo simulation model[21]. The Monte Carlo simulation model randomly selects a specific value from the probability distribution function of each characteristic variable and thus determines a value of profit at the objective state. By repeating the procedure a certain number of times and aggregating the profit results obtained, the model is able to determine the profit probability distribution function*[22].The number of repetitions to be considered shall be established by the evaluator; however, this number must be based on the number of repetitions necessary to obtain a certain convergence of results or a distribution of profit probability which further repetitions are unable to modify in any significant way.

- **Analysis of Possible Errors in Determining the Profit Distribution Function**

While performing the analysis necessary to determine the profit distribution function, the evaluator must consider that the profit exposure map may well include errors regarding the hypotheses and the estimates on which it is based. These errors may be traced to:

- Use of a Beta type function, when distribution of the characteristic variables could be of a different type;
- Assumption of extreme upper, normal and extreme lower values for characteristic variables based on subjective estimates made by the evaluator;
- Supposition of interdependences between distribution functions of characteristic variables which do not reflect their real relationships.

These errors may have more or less serious effects on the ability of the profit distribution function to capture the impact of possible risk events on the characteristic variables and thus on profit[23]. Evaluation of the importance of such errors can be based on a sensitivity analysis. This analysis allows the evaluator to assess the correspondence between data generated by calculation and the input data on which the calculation is based.

For the purposes of this study, the sensitivity analysis focuses on determining the effect on the profit probability distribution function with the variation of one or more of the hypotheses and estimates underlying the creation of the profit exposure map. Thus, with specific reference to the hypotheses or estimates which most significantly affect the profit probability distribution function, the evaluator can assess where it is necessary to complete a detailed study in order to increase the grounds for such hypothesis or estimates.For example, should the evaluator find that the profit distribution function is particularly sensitive to variations in the price of a certain output, it will be necessary to consider the grounds upon which the hypothesis underlying the distribution of values of the characteristic variable are based.

- **Determination of the Capital Allocated**

Accurately specified and integrated in the light of the error analysis, the considerations made regarding the profit map and the model of simulation may be used to identify the profit distribution function necessary to determine the capital allocated. As mentioned, this function allows identification of the range within which – to a certain degree of approximation – the profit the firm is able to make will be included. According to the level of confidence adopted, this profit may be identified within a range of:

* Generally speaking, satisfactory results can only be obtained by considering no less than 1000 repetitions.

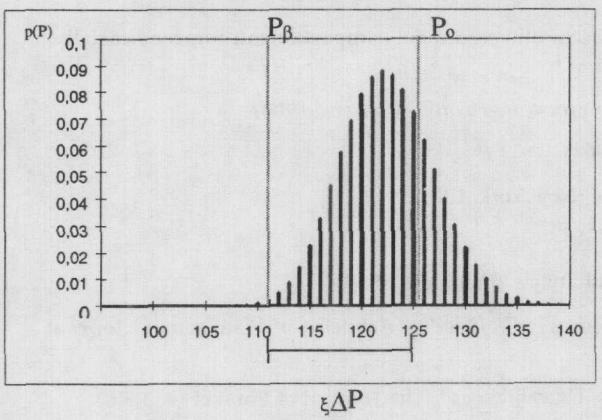
- level of confidence of 95 per cent : lower extreme = 5° percentile; upper extreme = 95° percentile;
- level of confidence of 99 per cent : lower extreme = 1° percentile; upper extreme = 99° percentile.

Having identified the range of variation of profit in relation to the chosen level of confidence, the lower extreme of the distribution is critical in our approach.

Indeed, assuming an interval of confidence of 99 per cent, which is practical certainty, it is possible to define the profit benchmark P_β* .Thus by comparison of the profit benchmark P_β with the profit objective P_o established by the plan, it is possible to identify the range of variation of profit at the objective state (**Figure**):

$$\xi\Delta P = P_o - P_\beta$$

FIGURE
PROFIT BENCHMARK, PROFIT TARGET AND RANGE OF PROFIT



Where positive, $\xi\Delta P$ defines the maximum possible difference (MPD) between the effective profit and the objective of the plan following the occurrence of risk events and taking into account the risk management actions which the evaluator has weighted in the definition of the profit exposure map. In order to determine the capital allocated, the range of variation of profit referring to the objective state must be considered as qualifying the development dynamics of the firm system even following the objective state - - this given the unavailability of any other element of evaluation.

Hypothesizing the aforementioned range of variation on the basis of perpetual income, it is possible to determine the capital allocated[24] :

$$CA = \frac{\xi\Delta P}{i}$$

Where:

$\xi\Delta P$ represents the range of variation of the profit at the objective state;
i represents a coefficient chosen by the evaluator, e.g., the weighted average cost of capital[25].

However, determination of the capital allocated according to the aforementioned approach does not consider the co-evolutionary dimension of time which means the processes of learning/unlearning which define the operations of the firm. On one hand this is related to the emergence and consolidation of processes of self-organization stimulated by the governing body. On the other, it depends on the emergence of new variety connected to the development of the environment and its expectations and pressures.

Thus the approach under examination, which is based on repetition of the conditions of operativity of the firm even after the state s_o, can lead to inaccurate results[26]. Consequently, where the co-evolutionary processes of learning/unlearning are considered important, it is necessary to incorporate the effects in the hypotheses and estimates underlying the profit exposure map**. Nevertheless, even with the simplifications deriving from failure to consider the co-evolutionary dimension of time, this approach offers a reasonable estimate of the capital allocated in the case of firms which are able to evolve in harmony with the dynamics of their surrounding context

Conclusions

On the basis of the concepts underlying the system approach to firm studies, it is considered that treating the risk of unawareness or, in other words, coverage of capital allocated as determined above, leads to shareholders' equity. The difference between shareholders' equity and capital allocated can be identified as excess/shortage of capital (ESC):

* The decision to consider only the lower extreme value is based on the interpretation of concept of risk in terms of negative difference with respect to an expected value.

**For example, by using inter-temporal correlation coefficients between the characteristic variables.

$$ESC = E - CA$$

Any negative difference between the shareholders' equity and capital allocated (shortage of capital) indicates that the financial structure of the firm's development trajectory sees lenders sustaining part of the risks which should be sustained by shareholders' equity. In this case, the development trajectory of the firm with the structural changes planned by the governing body shows a financial structure which is not balanced with respect to risk. Vice versa any positive difference between the above terms (excess of capital) indicates a financial structure characterized by an excess of shareholders' equity. On one hand this excess legitimizes the implementation of modifications involving a greater risk content and, on the other, opens the way for an increase in profitability for shareholders through a reduction in equity. From this point of view, equity becomes a variable entity whose variations depend on the riskiness defined in the planned development trajectory of the firm.

Thus the capital allocated appears as an instrumental feature in the formulation of well-founded opinions regarding the correct capitalization of the firm with respect to risk as well as, ultimately, the good quality of the development path established in the plan. This quality has to be evaluated not only referring to the risk analysis, but also to the expected return. From the joint consideration of risk and return then results a well-founded assessment of the plan's credibility.

REFERENCES

1. Zappa, G., **Le produzioni nell'economia delle imprese** (Milano, 1956)
2. Fazzi, R., **Il contributo della teoria delle funzioni e dei rischi allo studio dei comportamenti imprenditoriali** (Pisa, 1957)
3. Merlani, C., **Lineamenti dell'impresa industriale e dell'impresa mercantile** (Padova, 1963)
4. Ferrero, G., **Istituzioni di economia d'azienda** (Milano, 1968)

5(i) Willet, A.H., **The Economic Theory of Risk and Insurance** (New York, 1901)
(ii) Knight, F.H., **Risk, Uncertainty and Profit** (New York, 1921)
(iii) Hardy, C.O., **Risk and Risk-Bearing** (Chicago, 1923)
(iv) Oberparleiter, K., **Funktionen und risikenlehre des warenhandels** (Frankfurt, 1930)

6. Aaker, D.A., Jacobson, R., Role of Risk in Explaining Differences in Profitability, **Academy of Management Journal** (2: 1987)
7. Joyce, J.M., Vogel, R.C., The Uncertainty in Risk: is Variance Unambiguous?, **The Journal of Finance** (1: 1970)
8. Deloach, J.W., **Enterprise-Wide Risk Management, Strategies for Linking Risk and Opportunity** (London, 2000)
9. Beidleman, C.R., Fletcher, D., Veshosky, D., On Allocating Risk: The Essence Of Project Finance, **Sloan Management Review** (Spring 1990)
10. Yafeh, Y., Khanna, T., **Business Groups and Risk Sharing Around the World**, Harvard Business School Competition & Strategy Working Paper Series (Boston, 2000)
11. Crucini, M.J., Hess, G.D., **International and Intranational Risk Sharing** : Working Paper, CESifo (Munich, 1999)
12. AA.VV., Risk Management, **Sinergie** (35: 1994)
13. Golinelli, G.M., **L'approccio sistemico al governo dell'impresa** (Padova, 2000)
14. Morgan, J.P., **Corporate Metrics™: The Benchmark for Corporate Risk Management**, Technical Document (5: 1999)
15. Golinelli, G.M., **Il pert. Una nuova tecnica di pianificazione e controllo dei programmi di lavoro** (Milano, 1967)
16. Glantz, M., **Scientific Financial Management : Advances in Financial Intelligence Capabilities for Corporate Valuation and Risk Assessment** (New York, 2000)

17. Matten, C., **Managing Bank Capital** (New York, 2000)

18. Solomon, E., **The Theory of Financial Management** (New York, 1963)

19(i) Corsani, G., **La gestione delle imprese mercantili ed industriali** (Padova, 1941);
(ii) Borghesi, A., **La gestione dei rischi di azienda** (Padova, 1985: 211);
(iii) Deloach, J.W., **Enterprise-Wide Risk Management. Strategies for Linking Risk and Opportunity** (London, 2000: 129);
(iv) Young, P., Tippins, S., **Managing Business Risk** (New York, 2001)

20. Hertz, D., Risk Analysis in Capital Investment, **Harvard Business Review** (January-February, 1964)

21(i) Clark, D., Monte Carlo Analysis: Ten years of Experience, **Cost Engineering** (43, 2001);
(ii) Park, C. S., Sharp-Bette, J.P., **Advanced Engineering Economics** (New York, 1990).

22. Lorance, R., Wendling, R., Basic Techniques for Analyzing and Presentation of Cost Risk Analysis, **Cost Engineering** (43: 2001

23. Panati, G., I calcoli di convenienza tecnico economica, In Ardemani, E. (ed.), **Manuale di amministrazione aziendale** (Torino, 1974)

24. Golinelli, G.M., **L'approccio sistemico al governo dell'impresa** (Padova, 2000)

25. Matten, C., **Managing Bank Capital** (New York, 2000)

26. Hurley, W., On the use of Martingales in Monte Carlo Approaches to Multiperiod Parameter Uncertainty in Capital Investment Risk Analysis, **The Engineering Economist** (43, 1998).