

DETERMINISTIC METHODS USED IN FINANCIAL ANALYSIS

Melania Elena MICULEAC
Persida CECHIN – CRISTA
„Drăgan” European University in Lugoj
Faculty of Economics Sciences
miculeacmelly@yahoo.com
persidacc@yahoo.com

Abstract: *The deterministic methods are those quantitative methods that have as a goal to appreciate through numerical quantification the creation and expression mechanisms of factorial and causal, influence and propagation relations of effects, where the phenomenon can be expressed through a direct functional relation of cause-effect. The functional and deterministic relations are the causal relations where at a certain value of the characteristics corresponds a well defined value of the resulting phenomenon. They can express directly the correlation between the phenomenon and the influence factors, under the form of a function-type mathematical formula.*

Keywords: *deterministic methods, factors of influence, financial rates.*

1. DEFINITION AND TYPOLOGY OF METHODS USED IN FINANCIAL ANALYSIS

The **method** means the research mode of a phenomenon or process. It is a theoretical, abstract process through which a certain conception regarding the studying mode of an objective is established in order to get knowledge regarding its form or its composition. The method is made up of the procedures used in reaching the objective. The **procedure** consists in the systematic mode of action in order to reach the desired objective. All the specific procedures define the **techniques**.

When classifying in classic and modern techniques, we guided ourselves after the principles mentioned by George Foster, professor of financial analysis at Stanford University (Foster, 1996).

The financial analysis uses several methods and techniques, which can be classified according to several criteria.

1. From the point of view of the sector they belong to, we can have:
 - methods specific to financial analysis;
 - methods borrowed from other sectors.
2. From the point of view of investigation methods of the phenomenon we can have:
 - qualitative methods, which aim at investigating the essence of the phenomenon, identifying the mechanisms of creation and action, and which are based on scientific abstraction;

- quantitative methods, which have as a goal to appreciate through numerical quantification the phenomenon, the mechanisms of creation and expression of factorial and causal relations, the mechanisms which influence and spread effects.

3. From the point of view of the manifestation form of the interdependence between economic phenomena:

- deterministic methods, where the phenomenon can be expressed through a form of functional relation of cause-effect type;

- statistic methods, where the phenomenon can be expressed through several relations of cause-effect type.

4. From the point of view of the research method of phenomena evolution, the methods can be:

- static methods, which analyze the characteristics of the phenomena at a given moment;

- dynamic method, which analyze the characteristics in their dynamics.

5. From the point of view of the moment they appeared in time:

- classic methods, appeared with the first researches, till the information revolution;

- modern methods, appeared after this period, which investigate the phenomena with advanced principles of calculation.

The classification in quantitative or qualitative methods is a delimitation a little bit forced, and it has at the basis a methodological predominance. In fact, the majority of methods are mixed.

2. MAIN DETERMINISTIC METHODS USED IN FINANCIAL ANALYSIS

Main deterministic methods used in financial analysis are:

- balancing method;

- decomposition method of a phenomenon variation on factors of influence through iteration;

- method of marginal calculation;

- method of flows;

- method of rates.

These methods are not exclusive. They can apply more or less (under the initial form or a little changed) in the case of statistic relations. But their main utility is more emphasized in the case of functional deterministic relations.

2.1. Balancing method

The balancing method allows reflecting the quantitative interdependences between the constitutive elements or the influence factors of the analyzed phenomenon, when between the elements of the studied phenomenon there are deterministic relations of the sum and/or difference type.

The general theoretical model of this type of relations is:

a) The simple model: $F=A+B-C$

$$b) \text{ The aggregate model: } F = A + B - C = \sum_{j=1}^{\alpha} a_j - \sum_{k=1}^{\beta} b_k - \sum_{l=1}^{\lambda} c_l = \sum_{i=1}^n a_i + \sum_{i=1}^n b_i - \sum_{i=1}^n c_i$$

where: A, B, C are factors of influence;

a, b, c the constitutive elements of A, B, C factors of influence;

i = the number of constitutive elements, taken as the maximum of j, k, l in order to allow the appreciation.

An example of indicator from this category is the final balance of stocks (Sf), resulted by the addition of the initial balance (Si) to inputs (I) relative to the period and by the deduction of the outputs (E) relative to the same period.

$$Sf = Si + I - E$$

The influence of the change to the comparative basis is established depending on the modality the change is expressed.

2.2. Decomposition of a phenomenon variation on factors of influence through iteration

The method of decomposition of a phenomenon variation on factors of influence through iteration, respectively the quantification of factors of influence on the change of indicators had three development phases and it has the following methods:

- method of isolated influences of factors (M.I.I.F.);
- chain substitution method (M.S.L.);

It was developed on the basis of decomposition principles of indexes variation. The problem is to decompose the absolute or relative change of the indicator on two comparable periods of time (usually consecutive).

2.2.1. The method of phenomenon decomposition on the isolated influences of factors

The first method initially used was the method of isolated influences of factors (the method of un decomposed remainder).

The general theoretical model of the phenomenon (F) made up of factorial variables (f_i) is:

$$F_t = f_t^1, \dots, f_t^i, \dots, f_t^n$$

According to the phenomenon made up of several constitutive elements, the complex variable directly put together is:

$$\sum F_t = \sum f_t^1, \dots, f_t^i, \dots, f_t^n$$

The order in which the factors are written according to the general principles used to build the indicators starts with the quantitative ones (which reflect the volume effect), continues with the structural ones, then the qualitative ones (from the same nature as the indicator), with the extensive ones to the intensive ones.

The method consists in decomposing the absolute increase of an indicator on factors of influence using weights only in the basic period, thus resulting an un decomposed remainder.

The method decomposes the variation of a phenomenon into $2^n - 1$ influences, (n is the number of factors) from which:

- n individual influences, of each factor in part;
- $[(2^n - 1) - n]$ simultaneous influences of factors taken together (the un decomposed remainder).

It implies the following working rules: (Van Horne & Wachowicz, 2005).

- the factors are arranged according to economic conditioning;
- the factors substitute themselves successively using weights only in the basic period;
- a substituted factor goes to the basic level;
- the last factor that results is the un decomposed remainder of the combined factors.

2.2.2. The method of chain substitutions

The most used method to quantify the influence of changed factors on the indicators change, which assigns the un decomposed remainder to the qualitative factor, is the method of chain substitutions. It is used especially in the case of deterministic-type relations where the dependence of factors is materialized in mathematical relation of product or report.

The method of chain substitutions consists in: (Lala-Popa & Miculeac, 2012).

- identifying the factors which influence the deviation of the economic phenomenon;
- establishing the causal relations between factors and phenomenon;
- measuring the factors influence, establishing the sense and intensity of their action.

The method supposes to obey the following conventional working rules:

- the factors are arranged in the order of economic conditioning (quantitative-structural-qualitative or extensive-intensive);
- the factors substitute themselves successively; first the quantitative (extensive) factors, then the qualitative (intensive) ones;
- a substituted factor maintains itself at the effective level in the following operations;
- the last substituted factor is the qualitative-type factor.

The main restriction of this model is that it presupposes the successive change and then the maintenance of the factors at the effective level, which practically means that first a factor changes while the other remains constant, and then it remains at that level, waiting to change the indicator only on the basis of the second factor etc. This shortcoming is expressed by the allocation of the whole un decomposed remainder to the qualitative factor. This fact can be easily emphasized by applying the method of impact diagram for the example with two factors in relation of product.

2.3. The method of marginal calculation

The method of marginal calculation reflects the changes that take place in a phenomenon as consequence of a change in a unit in another phenomenon. The method of marginal calculation is based on the use of several categories of indicators. The marginal changes are useful for the calculation of elasticity coefficients.

Depending on the elements taken into consideration, the marginal calculation may reflect: (Emery, et al., 2004).

- an association, when it reflects the change in a phenomenon compared to the change with a unit of another phenomenon;
- an influence, when it shows the phenomenon change caused by the change with a unit of a factor of influence;
- a possibility of substitution, when it shows the change of a factor compared to the change with a unit of another factor;
- an influence, when it shows the change of a factor compared to the change with a unit of the phenomenon.

The method facilitates the analysis of the dynamic evolution of the company's financial situation.

It lies at the basis of the calculation of alternative risks and decisions.

Depending on their place in the financial analysis, the most used are:

- additional expenses, incomes and profits generated by the change with a unit in the activity volume;
- the treasury variation which is obtained through the variation with a unit of the patrimony element (assets and liabilities);
- changes in gains generated by the change with a unit in the risk.

Its utility is relative to two aspects:

- the efficient dimension of the activity from the point of view of the activity volume and financial structure;
- the calculation of the operating, financial and total risk on the basis of activity volume and financial structure.

For this goal, the marginal indicators are submitted to the comparison with average indicators.

2.4. The method of flows

The method was adopted in the theory and practice of financial analysis beginning with the '60, in Western countries, in Anglo-Saxon companies, which had to relate the nominal account (a dynamic instrument) to the balance sheet (a static instrument). It developed under various forms in different countries.

The method analyzes the dynamic evolution of a company's financial situation.

With this method are built the flows charts, which are modern instruments of the financial analysis:

- financing chart;
- treasury variation chart;

- financial flows chart.

In a company, as well as in the relations with the external environment, a series of complex economic flows are developed. Having a continuous activity and being permanently in contact with the environment, the company will permanently have flows inside and outside it. From these flows, the most important ones are with the company's stakeholders.

The financial flows represent all the movements that have an immediate or future impact on the company's results and liquidity. They are diverse, heterogeneous, being generated by operating, financial and investment activities. The totality of financial flows, their volume, dynamics and structure define, finally, in a sensitive way, the financial profile of the company.

2.5. The method of rates

The financial rates represent a ratio between two logical and economical comparable measures, being used very frequently in financial analysis.

The main principle which lies at the basis of rates is that their informational value is greater than that of indicators taken separately and it allows a better comparison in time and space. A rate has a meaning when it brings together elements that can be associated from an economic point of view, and when these elements, acting together, reflect a phenomenon.

The main advantage of rates is that various measures with different economic content can be associated, in order to reflect an economic phenomenon. In practice, although various rates can be created, the rates which reflect the best the analyzed phenomenon must be found.

The method of rates makes possible a better evaluation of the company's status, performances and potential.

The rates represent a ratio between two coherent measures with logical economic content.

Although they are very useful in the comparisons used by financial analysis, there are specific criteria to evaluate rates, which must be taken into consideration for safety reasons, which can be materialized in the following aspects:

- the proportionality hypothesis which presupposes that reporting the values from numerator and denominator would reduce the differences related to the business dimension and reporting period, but there are parts of the dimension (such as large savings) which cannot be eliminated, and some elements do not evolve proportionally in reality (the stocks compared to the turnover);
- the basis of comparison must be unitary, while the interests of financial analysis users are different (high liquidity is in favor of short-term creditors, but for shareholders it may represent a bad management of money);
- the analyzed period must be unitary, the beginning and the end of the exercise is standardized at the level of the whole economy, giving not only a strong static character to the rates, but also a certain level of irrelevance (some activities are highly seasonal,

which makes the calculated rates irrelevant for the operating activity, endangering the relevance);

- the management techniques, which on one side should be unitary, fact valid only at the level of a company, within the sector they being various, and on the other side, they should not “cosmeticize” the financial situation;
- the accounting methods, whose periodical change together with financial techniques such as reevaluations of patrimony elements may distort the rates relevance at the company’s level as well as at the sector level;
- the unitary basket, which means that the average is made from all the constitutive elements of the phenomenon, fact which can distort the average value by the presence of negative numbers.

1.STRUCTURAL RATES		3.RELIABILITY RATES		4.MANAGEMENT RATES
PATRIMONIAL		GLOBAL		ASSETS
- of assets; - of liabilities;		SOLVENCY		- permanent; - current; - operating; - outside operating.
OPERATIONAL		LIQUIDITY		LIABILITIES
- of incomes; - of expenses; - of results.				- permanent; - current; - own; - debt; - on activity.
GLOBAL		FINANCIAL RATES		
- of financial flows.				
2.EQUILIBRIUM RATES				5.PROFITABILITY RATES
PERMANENT				PROFITABILITY
- of financing; - of flows.				- of incomes; - of expenses.
CURRENT		6.VALUE RATES		RETURN
- of financing; - on activities;		PATRIMONIAL		- of assets; - of liabilities.
GLOBAL		FINANCIAL		EFFICIENCY
- of financing; - of treasury flows.		TRADING		- trading; - non-trading.
		MIXED		

Chart 1.The main categories of financial rates

Financial rates are used to evaluate the status and the potential of a certain criterion used to analyze and diagnose the company’s status and potential. In this sense, their utility is limited at the criterion they evaluate.

The analysis with rates was initially conceived to supply information to the capital investors, especially to creditors and shareholders. Nowadays, the company’s management and other stakeholders benefit of the informational power of rates.

The goal of the rates analysis is to measure comparatively the profitability in correlation with the risk, in order to facilitate coherent management decisions, in current financial management and on medium and long term, especially on investments and credit.

Thus, depending on the informational power, the sector they refer to and the beneficiaries of information, we can talk about the following aspects as example: (Palepu, et al., 2010)

- investors (shareholders) are interested especially in the information supplied by the profitability rates and the financial profitability rates;
- creditors, depending on the term the credit is given, are interested in the equilibrium rates, especially in the reliability rates which refer to liquidity and solvency;
- managers are interested in all types of rates.

3. CONCLUSIONS

The necessity to use the rates is a consequence of the need to standardize. Companies differ one from the other from the point of view of dimension, business volume, space of action, as well as from the point of view of concrete organization of business.

Thus it appears the need that at least for the companies belonging to the same sector may be issued value judgments on the basis of some indicators.

The main advantages of the use of financial rates are:

- it eliminates the differences of dimension between companies within the same sector;
- it allows to evaluate the status and potential on main areas of analysis and diagnosis;
- it ensures a good comparison in dynamics.

The main disadvantages of the use of financial rates:

- there are significant differences between sectors, regarding the setting of some optimum limits, and within the same sector, the industrial average or data related to the main competitor can sometimes be irrelevant;
- the fluctuations during a year and the seasonal phenomenon do not surprise, being based on the linearity hypothesis of factors which make up the indicator, fact caused by the moment the balance sheet and the additional annexes are made;
- the global (synthetic) evaluation of a company's financial situation on the basis of rates is more difficult, because the construction of indicators is limited to the specific criterion of analysis and diagnosis (disadvantage partially eliminated through factorial models built on the basis of explicative rates, or through the method of profile diagrams).

References

- [1] Berstein, L., Wild, J.J., Subramanyam, K.R., (2001), *Financial Statement Analysis 7TH Edition* McGraw – Hill Irwin;
- [2] Brealey, R., Myers, S., Allen F., (2006), *Corporate Finance*, Published by McGraw Hill, New York;
- [3] Emery, D.R., Finnerty J. D., Stowe J. D., (2004), *Corporate Financial Management Second edition*, Prentice Hall, Pearson Education LTD;
- [4] Foster, G., (1996), *Financial Statement Analysis*, PrenticeHall, EglewoodCliffs

- [5] Lala Popa, I., Miculeac, M.E., (2012), *Analiză economico – financiară. Elemente teoretice și studii de caz*, Ediție revizuită și adăugită, Editura Mirton, Timișoara;
- [6] Miculeac, M.E., (2007), *Analiză economico – financiară. Concepte teoretice, aplicații și teste grilă*, Editura Mirton, Timișoara;
- [7] Palepu K., Healy P., Peek E., (2010), *Business Analysis and Valuation, IFRS Edition*, published by South – Western, a division of Cengage Learning.
- [8] Van Horne J.C., Wachowicz J. M. JR., (2005), *Fundamental of Financial Management Twelfth edition*, Pearson Education Limited, Financial Times Prentice Hall.