Abstract: Investments are risky. This is an accepted fact, commented upon and submitted to comparative analysis for the purpose of identifying a correct financial decision. The assessment of the investment projects in a certain background uses the time factor as a basic criterion of this process. To analyze investment projects in an uncertainty horizon means using a new reference criterion and that is risk.

There were researchers who stated that risk is comprised within the analysis based on the time factor, the fact that the update factor involves a risk premium being allocated in the determinations realized. Modern finances contradict this hypothesis and start from the premises that the investor wishes to maximize his fortune in conditions of minimum risk and constantly aims at determining the risk premium. After an accelerated development in the last years, at the end of 2008 it reached a decline period. Quantifying the investment decision becomes a fundamental issue within the present environment background.

Keywords: profitability, decision, risk, development, investments, crisis

1 Introduction
In December 2008 the National Bank of Romania published a conjuncture report concerning the deterioration of the economical perspective in 2009 in the industrial and constructions activity. The conjuncture survey is realized with the support of the National Bank of Romania branches and is based on a national sample representative at county level (both as percentage, and as structure per branches). Starting with August 2005, the sample structure was extended, the number of the selected units being at present of about 420. The report draw up was finished on the 22nd of December 2008. The aggregation and processing of the information supplied by the branches of the National Bank of Romania, the report draw up and computer processing were done by the Direction of Economic Studies. The survey results present the fact that there is an important crisis within the Romanian industry. According to the opinions expressed, the volume of industrial production in 2009 will accelerate its decrease up to -24% on the sector whole, respectively -37% in the processing industry. One also emphasized the existence of financial blockage danger, with negative influences on the economical activity, 11% of the answers total indicating this risk of the economical-financial activity. The investments in industry and constructions will decrease significantly as a result of the crisis situation and of the tense psychological state of potential consumers and of producers. December 2008 registered a deterioration of the perspective concerning the capital storages, especially in industry, sector for which the conjuncture balance lowered at -29%. After studying the answers given by the interviewed subjects, the pessimistic estimations regarding the evolution of the investments are more acute in the processing industry, where the opinion balance is placed at -37%. Although about 66% of the managers within the construction field state that they keep their investment projects, the abrupt decrease of the conjuncture balance (from -5% in November to -20% in the analyzed month) suggest the perspective deterioration at the level of this domain of activity as well. At the same time, reflecting the unfavorable anticipations regarding the production activity, massive reductions of the investment expenses are envisaged in the industry of oil processing, coal carbonization and nuclear fuels treatment (opinions balance: -64%), industry of constructions material (-
55%), metallurgy (-57%) and means of transportation industry (-43%).

2 Problem Formulation
The financial analysis emphasizes the economic agent performance in terms of profitability and risk, performance which ended the previous exercise and which will begin another one. The result and purpose of the financial analysis is to identify the tough and weak points of the economical organization in view of setting a new development strategy. Any development strategy must take into consideration the necessity of the future evolution prognosis for the firm financial activity, aiming at reaching the equilibrium of the financial activity and diminishing the risks associated to it. The characteristic risk of the firm financial activity represents an important indicator for the investment attractiveness for the potential investors and for the shares holders of a part of the profitability rate required under the form of risk premium.

The organization financial activity is permanently influenced by risk, both when choosing the financing structure and the financial investments executed for the operation cycle needs, for development or for the investment.

The principle profitability-risk defines the capital investment motivation based on the maximum profitability hope by assumed risk unit. The issuing firms must convince the capital investors that the future capital operation attracted by titles issue will offer a profitability hope superior to the capital cost.

The determination of the investments risk takes place by use of two established methods:
- Probabilistic calculus;
- Decisional tree.

a) Probabilistic calculus
Aims at determining some quantification values of the investment decision, starting from random variables formed as events and allocated probabilities.

These calculated values are:
1. Mathematical hope of VAN
   \[\text{VAN} = -I + \sum_{i=1}^{n} \text{CF}_i (1 + r)^{-i}\]
   where:
   \(\text{VAN}\) = net updated value of the investment project
   \(I\) = initial investment
   \(\text{CF}_i\) = cash-flow at I moment
   \(n\) = time period
   \(r\) = update rate.

If the variables used in the calculus are independent then the mathematical hope of VAN is equal to the VAN of the mathematical hope.
By determining these values one aims at selecting the best projects, all the projects having a negative VAN mathematical hope being rejected, and among those with a positive VAN hope one will choose that with a maximum value.

2. Deviation -type or risk
The criterion of the mathematical hope is not complete without the dispersion determination or the so called degree of spreading the value around the average value.

\[\text{Var}(1+t)^{-1} \times \text{Var}(CF)\]
\[\text{Var}(I) = 0\]
\[\text{Var}(\text{VAN}) = \frac{1-(1+t)^{-2t}}{(1+t)^{-2} - 1} \times \text{Var}(CF)\]
so:

The dispersion or VAN variant is a rejection criterion for the projects having a higher risk than the one set and a selection criterion, aiming at identifying those projects with minimum risk.

By combining the two criteria one can calculate the relations:
- Mathematical hope of VAN / VAN variance– which must be maximized;
- VAN Variance / Mathematical hope of VAN - which must be minimized.

b) Decisional tree
The investment decision can be divided by sectorial phases according to time and adopted at a certain moment. Such a present decision depends on the past decision and conditions the future decision. On the whole, the decision depends on the events generation. A decisional tree allows the graphic representation of a set of successive choices.

The representation conventions are based on two notions: decision and uncertainty.

The technique of the decisional tree allows the introduction of probabilistic calculus methods and updated price according to time in a sequential process of adopting the decision. This model is proper for the industry when we aim at optimizing the choice of the valid project among several possibilities.

3 Problem Solution
If the company wishes to develop an investment project with an initial amount of 1 100 000 euros, for the study it has to assign three possible
hypothesis, the pessimistic, optimistic and satisfactory one. The company must take into consideration the present economic situation and the previsions made by analyzing the hypothesis of a large number of specialists in the field. If we consider that after such an impact analysis we encounter the following probabilistic situation, the pessimistic hypothesis with the probability of 50%; the satisfactory hypothesis with the probability of 30%; the optimistic hypothesis with probability of 20% at an update rate of 10% we can determine the mathematical hope of VAN.

### Table 1

<table>
<thead>
<tr>
<th>Year</th>
<th>Pessimistic hypothesis</th>
<th>Cash-flows</th>
<th>Cash-flows up date</th>
</tr>
</thead>
<tbody>
<tr>
<td>2009</td>
<td>400 000</td>
<td>363636,33</td>
<td></td>
</tr>
<tr>
<td>2010</td>
<td>400 000</td>
<td>330578,51</td>
<td></td>
</tr>
<tr>
<td>2011</td>
<td>400 000</td>
<td>300525,92</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>1200000</td>
<td>994 740,76</td>
<td></td>
</tr>
</tbody>
</table>

### Table 2

<table>
<thead>
<tr>
<th>Year</th>
<th>Satisfactory hypothesis</th>
<th>Cash-flows</th>
<th>Cash-flows up date</th>
</tr>
</thead>
<tbody>
<tr>
<td>2009</td>
<td>600 000</td>
<td>545 454,54</td>
<td></td>
</tr>
<tr>
<td>2010</td>
<td>600 000</td>
<td>495 867,76</td>
<td></td>
</tr>
<tr>
<td>2011</td>
<td>600 000</td>
<td>450 788,88</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>1800000</td>
<td>1 492 111,18</td>
<td></td>
</tr>
</tbody>
</table>

### Table 3

<table>
<thead>
<tr>
<th>Year</th>
<th>Optimistic hypothesis</th>
<th>Cash-flows</th>
<th>Cash-flows up date</th>
</tr>
</thead>
<tbody>
<tr>
<td>2009</td>
<td>800000</td>
<td>727 272,72</td>
<td></td>
</tr>
<tr>
<td>2010</td>
<td>800000</td>
<td>661 157,02</td>
<td></td>
</tr>
<tr>
<td>2011</td>
<td>800000</td>
<td>601 051,84</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>2400000</td>
<td>1 989 481,58</td>
<td></td>
</tr>
</tbody>
</table>

\[ E(CF) = 0.5 \times 400\,000 + 0.3 \times 600\,000 + 0.2 \times 800\,000 = 540\,000 \]  
\[ E(VAN) = 0.1 \times 0.5 \times 994\,740,76 + 0.3 \times 1\,492\,111,18 + 0.2 \times 1\,989\,481,58 = 1\,342\,900,05 \text{ euros} \]

\[ \text{Deviation-type (VAN)} \approx 225076 \]

\[ \text{Risk coefficient} = \frac{225076}{242000,05} \approx 0,92 \text{ or } 92\% \]

The risk coefficient is very high, and the project is too risky because of the estimations concerning the economical evolution in constructions. This situation is characteristic at the moment in the field of industry and constructions investments in Romania. The model presented above helps us have a mathematical simulation tool for the investments execution. This tool can only measure the impact of a singular project.

To be able to choose among several possible variants the use of the investment tree becomes of actuality.

Thus, if an industrial company has to chose among three investment variants to continue its activity:

- The extension of the current production unit needing an investment of 830 000 euros, which allows the production capacity increase by 25%.
The construction of a new plant with an investment of 1,300,000 euros, resulting in the production capacity increase by 40%;

Not to make any investment.

The prevision horizon corresponding to the time of executing the 10 years investments has the following economical features:
- update rate of 10%
- probabilities associated to the possible economical situation because of the national and international context analysis are:
  10% for expansion; 40% for stagnation, 50% recession;
The cash-flow characteristic to the possible projects:

<table>
<thead>
<tr>
<th>Situation</th>
<th>CF project 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Expansion</td>
<td>200,000</td>
</tr>
<tr>
<td>Stagnation</td>
<td>90,000</td>
</tr>
<tr>
<td>Recession</td>
<td>-10,000</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CF project 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>30,000</td>
</tr>
<tr>
<td>15,000</td>
</tr>
<tr>
<td>-16,000</td>
</tr>
</tbody>
</table>

Starting from the above situation, one can build the decision tree by determining the VAN for the three situations

<table>
<thead>
<tr>
<th>Investment Value</th>
<th>Situation</th>
<th>Probability</th>
</tr>
</thead>
<tbody>
<tr>
<td>830,000</td>
<td>Expansion</td>
<td>10%</td>
</tr>
<tr>
<td>900,000</td>
<td>Stagnation</td>
<td>40%</td>
</tr>
<tr>
<td>1,150,000</td>
<td>Recession</td>
<td>50%</td>
</tr>
</tbody>
</table>

Cash Flow

\[
\begin{align*}
CF_{\text{act}} &= 200000 \times \frac{1 - (1.1)^{-10}}{0.1} = 1228920 \\
CF_{\text{act}} &= 90000 \times \frac{1 - (1.1)^{-10}}{0.1} = 553014 \\
CF_{\text{act}} &= -10000 \times \frac{1 - (1.1)^{-10}}{0.1} = -61446
\end{align*}
\]

Table 4

VAN= -830,000+50% \times 1,228,920 + 40% \times 921,690 + 10% (-98313,6) = -107,947,6 euros

3rd Situation

VAN=0

4 Conclusion

We are in the presence of another approach variant of investments, possible to be accomplished. One can note that the best investment variant would be for now to make no investment whatsoever and to try to keep the existent production capacities in function. Certainly, the best variant to render the productive activity more efficient would be by diminishing the costs, either because of introducing new technological methods or as a result of improving the organizational activity. Though there is an international crisis situation, saving the industry in Romania can be done only by the development of the investment activity. Thus, it is necessary to develop the simulation activity in order to correctly adjust the assumed risk and the possible gains. As a consideration, one can say that the one who does not risk, actually risks the most.

References

Theoretical and Applied Economics, nr. 10 / 2008


