THE POTENTIAL VALUE OF A MINING PROPERTY

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ABSTRACT: *By analyzing the possibility of using traditional valuation models (asset-based and discounted income-based) in the particular case of mining companies in Romania, conclusions were reached showing their non-applicability, at least in certain forms and in specific situations. Thus, the value of specialized assets in mining companies cannot be assessed except in the context of continuing exploitation activities and in a close relationship with the mineral reserves from which the exploitation activities generate profit. Due to this specific feature of the production factors - capital and the mineral deposit - a cash-flow-based approach, as an economic value, seems more appropriate. At present, however, the vast majority of mining companies in Romania operate at a loss, and these losses are partially or totally covered by state subsidies. This economically improper mode of operation creates insurmountable barriers to the use of valuation models based on discounting future cash flows. Under these circumstances, it becomes necessary to develop new valuation models capable of providing a relevant picture, closer to reality, of the value of an operating enterprise or of a mining perimeter that is partially developed. Such a model is developed below.*

KEY WORDS: *mining property, valuation models, potential value*.

JEL CLASSIFICATIONS: *D24, D46, G12, L72, Q32, Q38.*

1. INTRODUCTION

In Romania, company valuation is an issue that has emerged relatively recently (and was imposed by the structural changes that occurred in the economy. The connection of the mining sector to the new economic system took place late; issues related to restructuring, increasing efficiency, and privatization are, even at present, far from being completely solved. Therefore, a certain lack of attention at a methodological and procedural level that affected the problem of mining property valuation can be considered justified.

Traditional valuation models - asset-based and discounted income-based - cannot, however, be applied in the case of new or partially developed mining perimeters.

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Mainly, these represent a particular case of mining property valuation due to the uncertainty related to the volume and quality of reserves (a deposit of useful mineral substances is fully known only when the reserves are exhausted), global economic conditions (continuous and sometimes unforeseeable variation in the prices of raw mineral materials), technological developments (some of which are imposed by the increasingly limited character of certain mineral reserves), political stability and government actions (a certain fiscal and social policy), and the evolution of ecological actions and programs.

New and partially developed mining perimeters are organically related to the concept of "potential use value", which is encountered, in an approximate form, in most resource economics literature, but is inaccurately defined and incompletely explained. Any mining perimeter that is new or partially developed has a certain potential value (even because useful mineral reserves represent a special form of capital). Technological and economic changes have imposed a continuous migration of the boundary that separates exploitable reserves from marginal or sub-marginal ones. The economic results of exploiting a useful mineral deposit vary over time, but the potential value of the deposit is related to its commissioning. The value of the deposit exists at any moment, but it can be higher or lower, according to the economic and technological conditions.

2. MODEL FOR DETERMINING THE POTENTIAL VALUE OF A MINING PROPERTY

Analyzed from the perspective of financing needs, the time required to reach profitable operation, and foreseeable economic potential, a new or partially developed mining perimeter resembles a company in difficulty but recoverable. A recoverable company in difficulty would continue its initial activity or start a new one in the so-called recovery period, a period that lasts many years and during which the company operates below capacity, having positive or transient results; the recovery procedure can fail at any moment.

The new mining perimeter will be researched, prospected, explored, and developed; the first production facilities will be commissioned, later reaching the designed production output. Throughout this period, similar to the recovery period of a company in difficulty, capital will be invested with the aim of obtaining profit in the future. Sometimes, the recovery procedure fails. Similarly, not every mining perimeter will be brought into a profitable exploitation state: if the preliminary assessments do not confirm profitability, the perimeter may enter conservation or closure, regardless of the stage of exploitation or development works.

For the purpose of valuing recoverable companies in difficulty, specialized literature unanimously recommends using the value-at-a-future-date model. Due to the similarity between a new or developing mining perimeter and a recoverable company in difficulty, the value-at-a-future-date model is considered suitable for determining its potential value.

The application of this valuation model is based on forecasts regarding:

- the time interval required to establish a profitable mining company with relatively constant results;

- the evolution of annual mining company results (emphasizing yearly financing needs);
- capital investments needed to bring the new mining perimeter into a profitable operating state.

The potential value of a new or partially developed mining perimeter is determined using the following formula:

$$VPT = \frac{VT}{(1+r)^n} - INVA \qquad (1)$$

where:
VPT = the potential value of the mining perimeter;
VT = value at the future date;
r = discount rate for the value at the future date;
n = number of years required to establish a profitable mining company;
INVA = the discounted value of the sums that need to be invested in order to bring the new or partially developed mining perimeter into the state of a profitable mining company.

The value at the future date represents the value of the established mining company in the first year of the profitable operating period, when it has relatively constant results. In order to determine the value at the future date, the capitalization method is used, according to which:

$$VT = \frac{B_n}{r^*} \qquad (2)$$

where:
B_n = net profit in the first year of profitable operation with relatively constant results;
r* = capitalization rate, which basically differs from the discount rate r.

The capitalization rate r* is chosen by comparison with the return on invested capital shown by similar mining companies (in terms of mineral substance exploited, size, methods, and applied technologies).

The discount rate r comprises a base rate and a risk premium, namely:

$$r = a\,(1 + p) \qquad (3)$$

The base rate a can be the yield of bonds, either in the public or private sector, or the return on shares of similar companies. The risk premium p expresses the specific risk of transforming a new or partially developed mining perimeter into a mining company with profitable operations. The size of this premium is determined taking into account the following:

- risks of not meeting forecasts regarding financial results;
- risks related to the reliability of volume and mineralization data (available at the valuation date);

- risks related to the applicability of "recognized" mining methods and technologies (for which good practice exists);
- risks related to future developments in raw mineral material markets;
- risks related to future developments in mining-related taxation.

The final value adopted for this rate should express the differentiated risk shown by the newly established mining company compared with similar mining companies.

The sums that need to be invested to bring the mining perimeter into a profitable operating state with relatively constant results are distributed over time in a certain manner. Consequently, they must be discounted to the valuation date. The discount rate used is r, and the term INVA has the following form:

$$INVA = \sum_{t=1}^{n} \frac{I_t}{(1+r)^t} \qquad (4)$$

Here, I_t represents the sum that needs to be invested for development in year t (from today into the future).

It must be noted that applying this valuation model should not be confused with applying the discounted cash flow model. The valuation model based on discounting future results does not capture the "sunk cost" character of many investments required to establish a mining company. The value at a future date model ignores the sums invested up to the valuation date (confirming their "sunk cost" character: past costs definitively incurred, regardless of the options regarding the mining perimeter's future). It is considered that, in this way, the proposed valuation model brings a superior quality to preliminary assessments used to support decisions on the future development of a mining perimeter, thus aligning with the new valuation concept that should be promoted in the mining sector.

3. STUDY OF A CASE: DETERMINING THE POTENTIAL VALUE OF A MINING PROPERTY

The stated objective of the case study is to exemplify the use of valuation models in determining the potential value of a mining property. The case study is developed based on an apparently simple example and considers certain hypotheses specific to the economic environment in Romania.

Geological prospecting and exploration led to outlining a new mining perimeter, thus confirming the existence of an industrial reserve of approximately 13,000,000 tons of hard coal. The exploitation of the hard coal reserves will be carried out underground. The project to exploit the hard coal reserves was started 4 years ago, investing 8,000,000 EUR in it (prospecting and exploration works, design, mine constructions), with the following distribution over time: year 1 - 500,000 EUR, year 2 - 1,500,000 EUR, year 3 - 2,000,000 EUR, year 4 - 4,000,000 EUR. The first year of production is year 5 (100,000 tons).

The designed production capacity is 600,000 tons/year, and it is estimated to be reached in year 9 (after which the mining unit will operate at this production capacity for another 19 years). During the first years of exploitation, production will have the following dynamics: year 6 - 200,000 tons, year 7 - 300,000 tons, year 8 - 400,000 tons.

The estimated price is 63.80 EUR/ton, and the mining royalty is 4%. The capital required for investments is as follows: mining constructions - 35,750,000 EUR (year 5 - 6,250,000 EUR, year 6 - 9,000,000 EUR, year 7 - 10,000,000 EUR, year 8 - 10,500,000 EUR), machinery and equipment - 21,000,000 EUR (year 5 - 2,000,000 EUR, year 6 - 4,000,000 EUR, year 7 - 6,000,000 EUR, year 8 - 9,000,000 EUR), working capital - 5,000,000 EUR.

Operating expenses (direct and indirect), as well as general and administrative expenses, were estimated by comparison with mining units in operation (belonging to the same company). The amortization of investments in mining constructions will be realized with reference to the amount of reserves, and that of machinery and equipment will be based on a normal useful lifetime (7 years). The corporate income tax is 16%. The valuation takes place at the beginning of year 5 (the time of commissioning).

The potential value of a mining property expresses the efficiency of its future exploitation, taking into account the capital expenditures required to bring it into a position of profitable exploitation.

In a previous section, the value at a future date model was proposed in order to determine the potential value of a new or partially developed mining perimeter. The model will be applied below using the data regarding a mining property.

The value at the future date represents the value of a mining company in the first year of its profitable activity with basically constant results, determined on the basis of the capitalization method, i.e.:

$$VT = \frac{B_n}{r^*}$$

where:

B_n = net profit in the first year of profitable operation with mainly constant results;

r* = capitalization rate.

Using the data in the example, it results:

$$VT = \frac{13,660,440}{0,12} = 113,837,000 \text{ EUR}$$

The potential value of the mining perimeter is determined with the formula

$$VPT = \frac{VT}{(1+r)^n} - INVA$$

where:

r = discount rate for the value at the future date;

n = number of years required to establish a profitable mining company;

INVA = discounted value of the sums that need to be invested to bring the new or partially developed mining perimeter into the position of a profitable mining company. The discount rate r comprises a base rate and a risk premium:

$$r = a(1 + p)$$

The base rate is equal to the capitalization rate, i.e. a = 12%. For the risk premium, a value of 75% is adopted. Consequently:

$$r = 12(1 + \frac{75}{100}) = 21\%$$

The sums that need to be invested to bring the mining perimeter into a position of profitable operation with mainly constant results are distributed over time. For the example data:

$$INVA = 45{,}929{,}259 \text{ EUR}$$

The potential value of the mining perimeter results

$$VPT = \frac{113{,}837{,}000}{(1 + 0{,}21)^3} - 45{,}929{,}259 = 18{,}328{,}760 \text{ EUR}$$

It should be noted that the value at a future date model does not produce very different results compared with the well-known discounted profit model. However, a much greater influence is observed: the influence of the way in which the risks implied by the specific mining perimeter being valued are quantified.

4. CONCLUSIONS

The mining perimeter represents a well-defined area that is subject either to mineral resources exploration activities for the purpose of underground or surface exploitation of these resources, or to exploitation and valorization activities for deposits of useful mineral substances already known.

In valuing mining properties, a fundamental aspect must be taken into account: their value is conditioned, but not wholly determined, by the quantity and quality of useful mineral resources underground (i.e., by the characteristics of the production factor "deposit"). This is because exploiting the reserves requires material and other efforts, consuming resources in a process with an economic dimension expressed mainly through capital expenditures, revenues, and operating expenses.

In addition, even if the final aim of the process is to establish a fair value of the mining property, it may be necessary to provide concrete answers to other questions as well, such as:

- what is the total value of capital investments required to bring the mining perimeter to a certain level of efficiency?

- what is the time required to reach efficiency?
- what is the expected annual profit and what part of it will be used to remunerate shareholders (distributed as dividends)?
- what is the time interval required to ensure recovery of all initial capital expenditures involved?
- what is the annual level of expenses required to maintain the production capacity of the perimeter?
- what is the expected rate of return of the mining perimeter development project?
- what are the possibilities to extend the reserves known with certainty at the valuation date?
- in a given market context and economic conjuncture, what would be the market value of the mining perimeter?

Finding the answers to such questions increases the difficulty of the mining property valuation process, adding an obvious qualitative dimension to it.

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