



Valuation Methods of Mineral Resources

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Outline of Presentation

Mineral Resource Valuation Approaches and Methods

Market Value Approach

Income Approach:

Net Price Method

EI Serafy Method or User Cost Method

Net Present Value

Current rent I and II - NPV Variations of US BEA

Appropriation method

Cost Approach

Appraised Value Method





The Market Value Approach

- assets are valued by applying the prevailing prices observed in the market by the quantity of assets/goods produced or placed in stock.**



Advantages of the Market Price Method

- Price, quantity and cost data are relatively easy to obtain for established markets
- The method uses observed data of actual consumer preferences.
- Standard, accepted method



Limitations of Market Value approach

- Market data is not available for non traded resource
- True economic value of goods or services may not be fully reflected in market transactions, due to market imperfections and/or policy failures



The Income Approach

Uses proxy / indirect measure of the market value

- Take into account future benefits/income streams that can be derived from the mineral assets over its entire economic life



Net Price Method

- The value of the resource stock can be calculated simply as the current resource rent per unit of resource times the size of the stock
- Corresponds to the NPV method but assumes that resource rent will rise at a rate equal to the rate of discount
- Found to overestimate the market value of subsoil assets.



Advantage of the net price method

- Simple

Limitations

- The assumption of the Hotelling model that under perfect competition, the rents would rise in line with the discount rate may not hold in reality due to market imperfection.
- The rent used may include other forms of rent, e.g. rent due to the differences in the cost of production, monopoly rents



El Serafy Method or User Cost Method

- makes a distinction between the “true income” and the “gross receipts” generated by an asset
- defines true income as the amount of income that would be sustained indefinitely regardless of the actual finite lifetime of the asset by suitably investing a portion of the gross receipts generated which can be the depletion cost, otherwise referred to as the user cost



Limitations of the user cost method:

- In order to calculate the user costs, several assumptions are needed
- The current level of receipts is held constant during the lifetime of the resource
- rate of extraction is also held constant until the final exhaustion of the resource
- assumes a constant discount rate.



Net Present Value (NPV)

- forecasts the stream of future net revenues a mineral resource would generate, and discounts this revenue stream using an appropriate discount rate
- Under certain conditions - such as no taxes - the sum of the discounted revenue values from each time period will equal the market value of the resource.
- Based on the survey conducted by the sub-soil assets group, almost all countries adopted the NPV method except for the Philippines.



Advantages of NPV

- **Time aspect**

NPV recognizes the concept that a dollar earned today is worth more than a dollar earned five years from now.

- **Risks.**

NPV incorporates the risks associated with a resource via the expected income flows and/or discount rate.

- **Flexibility.**

NPV provides flexibility and depth, since the NPV equation can adjust for inflation and be used with other analytical tools such as Scenario analysis.

- **Consistent.**

Consistent with maximizing the value of a firm and is used by investors in the evaluation of a company or in capital budgeting decisions



Limitations of NPV

- Determining the Income flow which represents the forecasted Net Benefits during the lifetime of the resource is not easy
- Choosing an appropriate discount rate is crucial to the NPV calculation.
- Calculated in a static manner that does not allow for any future changes
- The capital requirements may change over time, requiring decisions along the way that may change the risk profile



BEA NPV – Current Rent Method I

Method:

1. Gross rent is calculated as total revenue less current operating expenditures.
2. The resource rent is obtained by subtracting the rent to capital (both depreciation and a normal rate of return for capital) from the gross rent
3. The per-unit rent to the resource equals the resource rent divided by the physical quantity extracted
4. The value of the resource equals the per unit rent times the physical quantity of reserves



BEA NPV – Current Rent Method I

Advantage

- relatively straightforward and requires few assumptions

Disadvantage

- an explicit assumption must be made regarding the appropriate rate of return
- In addition to the conceptual and empirical problems in identifying an appropriate rate, pre-specification of a rate does not allow for relatively low or high rates of return in the mining industry due to conditions specific to the industry



BEA-NPV Current Rent Method II

Method:

1. **Gross rent/unit derived by dividing gross rent by the physical quantity of extraction.**
2. **Total value of the mineral reserve (the resource and the associated invested capital) equals the gross rent per unit times the quantity of reserves.**
3. **Value of the resource equals the total value of reserves less the current replacement value of the net stock of invested capital.**
4. **Resource rent per unit equals the value of the resource divided by the quantity of reserves.**



Advantage of Current Rent Method II

Does not require an explicit assumption about the return to invested capital associated with the resource.



Appropriation Method

- Assumes that governments collect the entire rent derived from extraction of the resources through fees, taxes and royalties levied on companies that carry out extraction



Disadvantages

1. in practice, fees, taxes and royalties tend to understate resource rent as they may be set by governments with other priorities in mind;
2. the rate of payments to government may not move in line with market prices for the extracted product though one would expect the true economic rent to do so.



The Cost Approach

The Appraised Value Method

Basic tenet is that an asset is worth the meaningful past exploration expenditures plus warranted future cost.

- Only past expenditure which are considered as *productive* are included
- Productive means that the results of the work give sufficient encouragement to warrant further work by identifying the potential for the existence and discovery of an economic mineral deposit.



Appraised Value Method

Advantage:

Exploration cost information and technical data are **readily available** for most exploration properties and marginal development properties. It is a good way of comparing the relative values of exploration properties.

Disadvantage:

experienced judgment is required to separate the past expenditures considered to be productive from those considered not to contribute to the value of the property, and to assess what is a reasonable future exploration program and cost. This leaves the method **open to misuse and possible abuse**



Question:

With the various valuation methods presented, what should be the best valuation method for mineral resource?





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(THANK YOU)*

