Mining Financial Model & Valuation
Learning objectives

- Read a technical report / feasibility study and gather the important economic information
- Run sensitivity analysis on the value of that asset
- Input all assumptions into a robust and dynamic financial model
- Calculate the value of a mining asset
Key Valuation Metrics
Mining valuation – NPV

Mining assets are essentially one big NPV analysis

- **Engineering and technical reports**
  - Provide a very detailed plan

- **No terminal value in a non-renewable industry**
  - Last years are negative cash flow

- **Any mining project/asset with a study is a perfect DCF candidate**

- **Early stage is much harder to value**
**Equity value metric**

- Net Asset Value (NAV)
- The value of all mining assets
- Minority interest / equity investments
- Cash & equivalents
- NPV of corporate overhead
- Debt

Expressed as P/NAV

Each mining asset valued independently

Corporate adjustments are made at the end
## Mining Assets

### NAV Breakdown ($M)

<table>
<thead>
<tr>
<th>Mining Assets</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>NPV Sauder Mine</td>
<td>3,000</td>
</tr>
<tr>
<td>NPV Keevil Mine</td>
<td>2,500</td>
</tr>
<tr>
<td>NPV Chan Mine</td>
<td>2,000</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>7,500</strong></td>
</tr>
</tbody>
</table>

### Plus: Other Assets

<table>
<thead>
<tr>
<th>Cash</th>
<th>500</th>
</tr>
</thead>
<tbody>
<tr>
<td>Equity Investments</td>
<td>250</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>750</strong></td>
</tr>
</tbody>
</table>

### Less: Corporate Adjustments

<table>
<thead>
<tr>
<th>NPV Corp. G&amp;A</th>
<th>(500)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Debt</td>
<td>(2,000)</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>(2,500)</strong></td>
</tr>
</tbody>
</table>

### NAV

<table>
<thead>
<tr>
<th>Net Asset Value</th>
<th>5,750</th>
</tr>
</thead>
<tbody>
<tr>
<td>Market Capitalization</td>
<td>6,120</td>
</tr>
<tr>
<td><strong>P/NAV</strong></td>
<td><strong>1.1x</strong></td>
</tr>
</tbody>
</table>
Why would a company trade at a premium to its Net Asset Value?

I.e. Why would you pay more than it’s “worth”

This is a phenomenon with gold companies

Currently senior gold miners trade from 0.7 – 1.5x NAV
Equity Value Metric

“Adjusted Operating Cash Flow” of the business

Cash Flow

Net Cash from Operating Activities

After interest (equity metric) | After taxes
Before capital expenditures | Before changes in working capital

Free Cash Flow
Enterprise value metric

Values all gold in the ground

Not a good indicator of economic value

Does not take into account cost to extract metal

Crude valuation technique

Total Resource, total ounces contained in the ground

Used more for early stage projects

Physical metric
Total Acquisition Cost

“Build it up” to get the total cost of gold

\[
\text{TAC} = \text{Cost to acquire asset } \$/\text{oz (EV/Resource)} + \text{Cost to build mine } \$/\text{oz} + \text{Average cost to mine gold } \$/\text{oz (All-in sustaining cost - AISC)}
\]
Total Acquisition Cost

Example

$100/oz to acquire asset + $200/oz to build mine + $900/oz to produce gold = $1,200/oz TAC

Typically want TAC to be <80% of spot price
Financial Model - Assumptions Section
Assumptions Section

- Allows for a single location of inputs
- Easier for other users to understand
- Simplifies model structure
- Sensitivity Analysis
- Has to be conducted on same tab as the input
- Simplifies sensitivity analysis

All prices and figures are typical in **REAL DOLLARS**
Assumptions Section

Major assumptions include:

- Ore (tonnes)
- Grade (g/t)

Resource details

- Metal prices
- Capital cost
- Payability & Terms
- Milling rate
- Recovery
- Operating costs (unit costs)
Financial Model - Mining Section
Mining Section

Contains the full production schedule

Ore > mined material > processed material > metal

Often very detailed and complicated

- Multiple ore types
- Stockpiling of ore
- Multiple products - dore and/or concentrate
- Penalty items
2 main approaches include:

**Mineral Inventory approach**
Slowly deplete reserves at a constant rate and grade

**Detailed Mine Schedule approach**
Specific volume and grade each year
Mining Section

- Ore
- Waste
- Total material Moved
- Grade each Year (g/t)
- Metal Contained each year (oz)
- Amount of metal contained in material

Mining Section
Financial Model - Financial section
Financial Section

- Royalties:
  - Metal

- Revenue:
  - A % of revenue

- Operating costs:
  - Unit operating costs x tonnes of ore

- Depreciation schedule:
  - Based on % of production schedule

- Tax schedule:
  - Certain tax regimes are quite complicated

- Working capital schedule:
  - Not material in most costs
  - Simplified approach in this model
  - Typically no real inventory build up in mining
Discount rate

Certain tax regimes are quite complicated. Not material in most costs. Build up from Net income or down from EBITDA. Simplified approach in this model. Typically no real inventory build up in mining. Unlevered at the asset level. Nor NPV formula in Excel. Calculate discount factor for each year.
Currently lots of debate over discount rates

- 5% (real) is tradition in gold industry
- WACC over long term is about 5-6% (real)
- Gold companies have a low beat
- Country risk premiums should be considered

Discount factor formula:

\[
\frac{1}{(1 + \text{Discount rate})^{\# \text{years}}}
\]
Sensitivity Analysis
There is not “one number” for value

Once the model is setup sensitivity can be analyzed

All the key inputs should be sensitized

- Metal prices
- Capital cost
- Payability & Terms
- Payability & Terms
- Milling rate
- Recovery
- Operating costs (unit costs)
- Operating costs (unit costs)
Sensitivities – Data Tables

1. Link cell to desired output (i.e. NVP)
   - Must be a formula / output

2. Input the range of assumption(s) you wish to test
   - Must be a hardcoded (i.e. gold price: $1,200; $1,300; etc)

3. Link to original assumption(s)
   - Data > What if Analysis > Data section
## Sensitivities – Data Tables

<table>
<thead>
<tr>
<th>EBITDA Margin (%)</th>
<th>Enterprise Value (SM)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>6.00</td>
</tr>
<tr>
<td>45%</td>
<td>-1,036</td>
</tr>
<tr>
<td>50%</td>
<td>-880</td>
</tr>
<tr>
<td>55%</td>
<td>-734</td>
</tr>
<tr>
<td>60%</td>
<td>-590</td>
</tr>
<tr>
<td>65%</td>
<td>-447</td>
</tr>
<tr>
<td>70%</td>
<td>-304</td>
</tr>
<tr>
<td>75%</td>
<td>-161</td>
</tr>
</tbody>
</table>
Thank you

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