Overview of Mining Costs

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Outline

1. Factors Influencing Cash Costs
2. Major Cost Components
3. South African Gold Mining
4. Metals Prices and Costs
5. Costs and Mine Supply
Primary Factors Influencing Cash Costs
Two Distinct Set of Factors Drive Mining Cash Costs:

- The first set of factors relates to the **actual costs of inputs**: Skilled labor, mining materials, equipment, reagents, structural steel, and everything else that goes into running a mine.

- The second set of factors relate to the **price of the underlying metal** of the mine.
  - higher metal prices *encourage mining lower grade properties* driving higher the cash cost curve
  - the price of the metal also influences input costs
Other Factors Influencing Cash Costs
Deep-Level Mining Boosts Cash Costs

- This type of mining inherently pushes higher the mining cash costs because
  - Of the need for more skilled labor (to deal with increased complexities associated with such mining)
  - Intricate infrastructure
  - Increased electricity costs (for cooling deep underground shafts)
  - Overall increase in overhead and maintenance costs

- In the case of some metals, like platinum, depth of mining is rising as metal available at shallow levels has for the most part already been extracted.
Reduced Production Raises Cash Costs

- There is an inverse relation between the level of production and the per ounce cash cost.

- Higher production helps reduce the fixed cost components.

- Lower production can result from:
  - Safety related production stoppages
  - Technical problems
  - Lower grades
However...

- Most cash cost components are variable costs.
- As a result of this, the rate at which these costs rise (input cost inflation) plays an important role in influencing the overall cash costs.
Input Costs
Labor Costs are the Largest Mining Cash Cost Component

Typical Gold Mining Cash Cost Breakdown

<table>
<thead>
<tr>
<th>Component</th>
<th>Range</th>
<th>Typical</th>
</tr>
</thead>
<tbody>
<tr>
<td>Labor</td>
<td>30% - 55%</td>
<td>50%</td>
</tr>
<tr>
<td>Fuel</td>
<td>8% - 10%</td>
<td>9%</td>
</tr>
<tr>
<td>Utilities</td>
<td>8% - 11%</td>
<td>10%</td>
</tr>
<tr>
<td>Parts &amp; Supplies</td>
<td>8% - 15%</td>
<td>12%</td>
</tr>
<tr>
<td>Consumable</td>
<td>14% - 23%</td>
<td>7%</td>
</tr>
<tr>
<td>Other</td>
<td>7% - 15%</td>
<td>12%</td>
</tr>
</tbody>
</table>

100%
South African Gold Mining Cash Costs
Wages Have Been Rising Faster than the Benchmark

- The benchmark is inflation plus two percent.
- Premium/Discount is the difference between the actual average wage inflation less the benchmark.

Wage Inflation: Benchmark and Premium/Discount of Actual Wage Increase to Benchmark
Sharp Increases in South African Electricity Tariffs

Annual Increases in Eskom's Electricity Tariff Rates

Eskom's Annual Electricity Increases

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Methodology to Calculate Input Cost Inflation

- Determine the inflation of each component.
- This inflation then needs to be weighted by the weighting of that component in the cash cost breakdown.
- The sum of the above then needs to be weighted by production at
  - Mine level
  - Country level
Price of Underlying Metal
Gold prices are expected to remain high by historical standards, going forward.
Investment Demand

• Investors have been *purchasing gold for a variety of reasons* over the past decade.

Just some of these reasons are:

- increased concerns regarding major reserve currencies
- negative real interest rates
- concerns of inflation
- poor management of issues related to trade, debt, and deficit imbalances

• These problems are real and some are *expected to take several years to be resolved*.

• Investors are expected to continue adding to their holdings in historically large volumes!

• They are **not**, however, *expected to chase gold prices higher* as was seen during the past few years. Instead investors are expected to *add to their holding on prices declines*.

• *This is expected to both weigh on gold investment demand and the price of gold.*

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Inverse Relation between Gold Price and Gold Grades

The graph illustrates the inverse relation between the grade of gold and its price over time. The black line represents the grade, while the red line indicates the gold price (RHS) in $/Ounce. The graph shows fluctuations in both parameters, with periods of high grade corresponding to lower gold prices and vice versa. This inverse relationship is evident from the 1950s to the 2000s, highlighting significant changes in the market dynamics.

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Gold Mining Has Become Extremely Profitable Again

The Price of Gold and Cash Operating Costs of Production
Quarterly, Through Fourth Quarter 2011

Gold Price
CAGR: 20%

Production Cost
CAGR: 13%

Cash Cost
CAGR: 14%

Margin between Gold Price and Total Production Costs and Cash Cost
Quarterly, Through Fourth Quarter 2011

Gold Price minus Total Cost
Gold Price minus Cash Cost
Gold Mining Cash Profit Margins in the 1980 and 1990s

The Price of Gold and Cash Operating Costs of Production
Annual Data, Through 2011

Gold

Cash Costs

Margin between Gold Price and Cash Cost
Annual, Through 2011

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Cash Costs and Mine Supply
Most Gold Production Is Profitable Below $1,000

90% of global gold production from primary gold mines was produced at cash costs lower than $1,033 per ounce during the third quarter of 2011.

The flatness of the gold cash cost curve makes gold production relatively less sensitive to changes in the price of the metal.
Cash Costs and Mine Production

There is a lag effect between the margin between cash costs and prices and the increase/decrease in supply.
Gold Mine Production Forecast to Rise

Estimated Annual Gold Mine Production Capacity Gross Additions

Note: Post 2015 data refers to 2016 through 2021.

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