

Mineral Sector Value and Risk in 4D: Discovery to Dismantling

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Despite a history that transcends not just generations but several millennia, the value that accrues and the quantum and nature of risk exposure in both the exploration and mining phases of the resources value chain remain poorly understood.

If we treat value and risk themselves as two related but separate dimensions to comprehend, we must then also look both to changes in these dimensions over time, such as across macroeconomic and microeconomic cycles (the 3rd dimension), and along the mining value chain from discovery through to mine closure (the 4th dimension).

A classification of mineral commodities as either “convex” or “concave” can explain much of the way that the resources sector digests the interplay of progressive value and risk in different commodity markets. That is, for those mineral commodities where the greatest value lies principally at the exploration/discovery phase of the value chain, prospects (should) accrue the most value as they are discovered: critically, it is mineral discovery itself that overcomes the principal technical risk along the mining value chain. As a result, the investment market, when acting in an efficient manner, will attribute significant value to overcoming this phase of the value chain for the project. Here we term such commodities “convex,” in that an X-Y chart of the value accrued (Y-axis) versus the mining value chain (X-axis) has that form. Diamonds and gold are good examples that capture value early. Once discovered in economic quantity, the residual technical risk in delivering the discovery to market is then modest.

In contrast, those commodities where discovery is not the critical element that offsets technical risk should not accrue great project value immediately upon mineral discovery. We term such commodities “concave,” in that an X-Y chart of value accrued (Y-axis) versus the mining value chain (X-axis) has a concave form, being little more than flat through the discovery phase but then steep when subsequent risks are overcome as the project is better understood and technical risks are mitigated. Typically, for many mineral commodities, the subsequent risks lie in mineral processing (a purely technical risk) to an acceptable intermediate or end product and then in market offtake to customers (technical and commercial risk). Rare earths and industrial minerals including graphite are good examples of concave mineral commodities.

It follows that, when the investment market treats what should be a concave commodity (little value early) in a convex way (granting material value at discovery close to the Net Present Value of the project), this can be considered one representation of a market bubble (or market inefficiency).

Nontechnical risks overlie the technical risk profile from exploration through to mine closure, and include the transient impact of governments, communities, and markets themselves for both commodity prices and currency exchange. Patterns exist in these risks along the value chain and, of course, with time

as the economic factors of supply, demand, and investment forces interact. These patterns are actually predictable—but not well understood or communicated.