Collier P, Rees I, Pocoe J and Espinoza D (2022). Mineral Project Risk and Orebody Knowledge - Quantifying the Value of Drilling using Decoupled Net Present Value Analysis. *Proceedings International Mining Geology Conference, Brisbane*. The Australasian Institute of Mining and Metallurgy: Melbourne.

Abstract

Orebody knowledge is the fundamental source of endogenous project financial risk and, consequently, is of critical importance in project financial evaluation.

With the exception of market-driven commodity prices, virtually all revenue and cost estimates *fundamentally* stem from the understanding and subsequent modelling of the orebody. A reliable estimate of the ore deposit grade and other geological value-drivers is the foundation upon which the business case for future mine development and operation is intricately dependent.

Furthermore, orebody knowledge is the fundamental driver of the mineral project cycle, influencing the progression of studies and consequently, the resource company's ability to declare Exploration Results, Mineral Resources or Ore Reserves which govern the sources and cost of funding available to the project.

Drilling provides a 'vector' to the true nature of the orebody and effectively buys time to manage the technical risk associated with the orebody. Despite its perceived high cost, in both time and money terms, drilling is the only available technology for acquiring the necessary orebody knowledge to support technical and economic studies and to minimise orebody-driven cashflow uncertainty and volatility.

Like all costs, pressure to minimise drilling budgets is ubiquitous across the minerals industry. Drilling is often regarded as a cost to be minimised, rather than an investment to be optimised. Furthermore, as future deposits get deeper and more complex, the collection of orebody knowledge is increasingly on the critical path for project development. The increasing cost of data collection pertaining to these deposits increases the temptation to minimise orebody knowledge gathering at the cost of long term value as the reduction or postponement of drilling results in greater orebody knowledge risk at all stages of the value chain.

Indeed the true cost of the decision to drill less is rarely known until the mine is in operation, well after the mine project evaluation team has moved on.

This paper aims to promote orebody knowledge as the fundamental source of endogenous project financial risk and, consequently, its critical importance in project financial evaluation. Furthermore, the paper presents experimental research into the development of an econometric model for valuing orebody knowledge.

Using the density of drilling data as a proxy measure of orebody knowledge, the proposed approach integrates well-established stochastic grade modelling techniques with the mathematical mechanics of Decoupled Net Present Value which, combined with stochastic grade modelling (conditional simulation), lends itself to the financial assessment of orebody knowledge risk. Based on this approach, a metric is formulated, representing the minimum value of the orebody knowledge added by additional drilling.