

ABSTRACT

Lithium demand has historically been predominantly driven by its use in lithium-ion (Li-ion) batteries in consumer electronics. However, the lithium market has undergone a paradigm shift over the past two years, with its future supply and demand dynamics being inextricably linked to the seemingly unstoppable adoption of Battery Electric Vehicles (BEVs) by global auto-manufacturers. Numerous factors are driving the rapid commitment to the development of BEVs by many major auto manufacturers, including environmental considerations, technological progress, consumer experiences, and political mandates.

Driven by the continuing positive rhetoric from major auto-manufactures, lithium prices increased sharply between 2016 and 2018, with the commonly quoted Lithium Carbonate Equivalent (LCE) price climbing by as much as 240% (for delivery in China) over the period. Consequently, many lithium-focused mining and project development companies have experienced significant growth in their share price and market capitalisation as interest around lithium and BEVs intensified.

The aim of this research study is twofold. Firstly, the current state of the lithium commodity market is analysed, with a particular focus on the demand and supply dynamics and the consequent impact the relationship between these two factors have on the lithium price. Evaluating and understanding the fundamentals behind the lithium price is critical, as the price is one of the key drivers to which the intrinsic value of a lithium mining company is very sensitive. Secondly, this research study aims to calculate the intrinsic value of a specific market participant, namely, Galaxy Resource Ltd (Galaxy or GXY), by conducting a fundamental Discounted Cash Flow (DCF) valuation using both a deterministic (i.e., static valuation) and a probabilistic (i.e., Monte Carlo Simulation) approach. The robustness of the valuation is improved by using Real Options Analysis (ROA) to account for Galaxy's one undeveloped asset, while the use of scenario analyses tests the sensitivity of the deterministic valuation to changes in key variables. Galaxy is used as a proxy for the lithium market as the company has a diverse portfolio of assets that provides a robust understanding of the primary types of lithium resources. For example, Galaxy owns an operating Australian-based hard-rock mine; a Definitive Feasibility Study (DFS) stage brine operation located in Argentina; and, a Pre-Feasibility Study (PFS) stage hard-rock project in Canada. The outcome of the valuation is used to discuss whether investment in the lithium market currently offers acceptable risk-adjusted returns considering the share price volatility experienced in 2018. The volatility is primarily due to bearish views published by many market participants of an impending lithium oversupply and a consequent long-term commodity price weakness.

The base case valuation output indicates that the decline in share prices in 2018 has resulted in a market that appears to be undervalued, assuming the valuation inputs are correct. However, the valuation proves to be extremely sensitive to the potential materialisation of a 'bear case' long-term lithium price scenario, which may result in significant share price downside compared to current levels. Furthermore, the utilisation of a discount rate that caters for the contribution from cash flows originating in riskier jurisdictions, such as Galaxy's Argentinian brine asset, has a significant impact on the valuation and suggests Galaxy is at best fairly valued compared to its August 2018 share price.

However, the commodity price weakness experienced in 2018, driven primarily by fears of an impending lithium oversupply, and the consequent decline in lithium mining company share prices, has resulted in attractive valuations for companies such as Galaxy Resources, depending on the validity of the so-called lithium bear case proposed by many market participants. The potential for long-term share price outperformance within the lithium market remains an appetising prospect, with many factors suggesting lithium commodity demand may surprise to the upside while the success rate of bringing new lithium supply online may disappoint, resulting in the potential for attractive returns for investors patient enough to wait for the market to develop. However, a clearer view of the long-term lithium price and the validity of a bear case scenario is required and therefore needs further investigation. Furthermore, the utilisation of a weighted average cost of equity that considers the relative contribution to Galaxy Resources' cash flows from riskier jurisdictions, such as Argentina, has a significant impact on the valuation when compared to using a simpler static cost of equity that considers only cash flows from Galaxy's country of incorporation, namely Australia. The use of such a weighted approach appears uncommon, despite the inclusion of riskier cash flows into the calculation of a discount rate being intuitively correct.

Section 1 of the research study provides an introduction to the volatility the lithium market has experienced over the past two years and highlights the significant valuation increases that many market participants have exhibited, despite the recent fears surrounding the sustainability of the currently high LCE price. Furthermore, the primary aim and purpose of the research study are discussed.

Section 2 explores the dominance and importance of lithium-ion within the battery market and provides an introduction to the fundamentals of the lithium commodity market, such as how lithium is mined and processed, its geology and the critical demand and supply drivers.

Section 3 discusses the validity of using an income-based valuation approach, and more specifically a DCF valuation methodology, to determine the intrinsic value of the selected mining

company. The common difficulties encountered when valuing a cyclical commodity company is also addressed. The key valuation inputs utilised in a DCF model are introduced with a focus on typical mistakes made in their definition and calculation.

Section 4 introduces Galaxy Resources and the company's various projects, with Section 5 outlining the valuation methodology employed, namely, a deterministic Net Present Value (NPV) calculation, scenario analyses, a probabilistic Monte Carlo Simulation, as well as a Real Options Analysis (ROA) for the one long-dated project.

Section 6 presents the valuation outputs and discussion, with Section 7 providing a conclusion and recommendations for further research.