

# VALUATION – FOR WHAT IT'S WORTH

## THE UNCERTAIN SCIENCE OF PRICING PROJECTS



by R. J. McDONALD

*Valuing resource companies may be an inexact exercise, but it is necessary to do the best possible job by using the best possible methods.*

Resource analysts face perplexing financial issues when valuing Australian resource companies and projects. For example, why is the market capitalisation of an emerging producer often less than studies might indicate, yet higher for an established producer? Or why is a company with adaptable business policies worth more than one with less flexibility?

Questions such as these can be answered confidently only with an understanding of industry dynamics and the rigorous application of sound financial techniques. This paper introduces some advanced financial concepts but also shows how familiar concepts can be better applied to produce appropriate valuation results.

Valuation is a forward-looking exercise, relying on informed estimates and assessments. For that reason, analysts are necessarily dealing with an uncertain future and working with the knowledge that outcomes may differ from expectations. However, the fact that forecasts may not eventuate does not diminish the need for valuations which can be used in making investment decisions.

Four important aspects that can affect forward estimates are the selection of a planning horizon, most-likely outcomes, management credibility and the use of information from capital markets.

An uncertain future does not mean that cashflow studies for valuation

purposes should stop short at, say, 10 years, as is often the practice. To illustrate the importance of this, take a project costing \$50 million to develop, with real-term net cashflows expected to be \$10 million annually. Assuming a 10 per cent discount rate, a 10-year **planning horizon** would value the project at around \$11 million. But with a 20-year planning horizon, the same project would show a net worth more than three times higher at \$39 million.

Nor should the planning horizon always be restricted to the life of the existing reserve base. Valuers can gain useful information by questioning technical staff about their expectations of continuing exploration, and can make experienced judgments about the potential for additional reserves.

As well as reporting reserves in accordance with AusIMM guidelines, professionals should be encouraged to give their "probabilistic" assessment of further discoveries. In a recent public valuation report we prepared, about one-third of the value of a mine was attributed to the likelihood of further reserves.

Experienced valuers and investors are not likely to be comfortable with a development study that assumes everything will go according to optimistic expectations. For example, in a project where the chances of success are three in four (and of disaster one in four), a

*Robert McDonald is director and principal of Resource Finance Corporation Ltd. This is an edited version of his address to the AusIMM mining and petroleum valuation conference in September.*

valuation should not present success as the **most-likely outcome**, even though success is three times more likely than failure. A certainty equivalent approach, giving a 25 per cent weighting to failure, would be appropriate.

It is not usually possible, however, to quantify outcomes so simply. Discrete factors such as price, operating costs or capital expenditure are each subject to an individual range of probabilities.

Focusing on these various input parameters, their probability distributions and their relationships with one another will enhance the quality of the resulting assessment. The objective when building up a most-likely case for valuation purposes is to incorporate the mean of the distribution for each parameter – a figure which is neither optimistic nor pessimistic.

It is relatively straightforward, particularly using personal computers and statistical software packages, to undertake a Monte Carlo simulation, randomly drawing from the probability distributions for each of the input parameters. This produces a probability distribution of the expected outcomes, but it is the mean of this distribution that is of most interest for current valuation purposes.

It must be recognised that there is always a 50 per cent chance of tomorrow's valuation being higher or lower than the current estimate. This leads to a situation that no body of statistics can address: it is most unlikely that an investment decision will be made on the day of the assessment. By the time a board or a shareholder makes a decision, perhaps three months after the assessment, a different most-likely case would apply.

While there are methods, using risk-management techniques, to replicate current economic conditions at some point in the future, there is a more practical way to help the decision-maker. Rather than simply stating the net present value of the net cashflow, an assessment should give a present value for each component, such as revenue, operating cost, capital cost etc, to simplify valuation updates.

For example, instead of a report that puts the net present value of a development project at \$50 million, doesn't the breakup (see box) provide a more powerful insight on valuation?

	Present value (\$m)	% of revenue
Revenue	650	100
Operating costs	325	50
Capital costs	175	27
Taxation	100	15
NPV	50	8

In this example, the valuation is only a fraction of the revenue stream. Uncertainties about metal prices and exchange rates mean that revenue is volatile: a 10 per cent change in price alters the revenue stream by \$65 million. After some allowance for tax, this change either virtually doubles the current net present value (if the change is an increase) or reduces it to zero (if it is a fall).

This degree of sensitivity is no surprise to experienced valuers. Unless valuers intend to comment on the ability of companies to respond to volatility, the sensitivity of valuation results to various input factors is of limited use in valuations.

A phenomenon called the "value creation curve" has been observed in the resources industries – particularly the gold industry. It means that the value of a company increases as it changes from being an explorer to a developer, and then to a producer.

Mathematically, this should happen because of the investment of capital and the proximity of cashflows. However, the reason has as much to do with the way certainty equivalents change during the process.

For example, the marketplace will not automatically assume that an emerging producer will obtain finance for project development; but when it does and this uncertainty is resolved, a market re-rating occurs. Similarly, the market will wait for successful production before re-rating the emerging producer as a producer. This re-rating is not automatic. It occurs only if the performance is there.

Credible companies with **good management**, however, will get earlier recognition for value creation. When a company such as Placer Pacific, which has successfully commissioned a number of mines in recent years, announces a new development plan, it is reasonable to expect the company to achieve, or surpass, its objectives. Such companies can profit by acquiring less credible companies with good projects.

In a reasonably open economy such as Australia's, capital markets provide **useful information** on future economic conditions, particularly interest rates, exchange rates and the value of financial assets. Indeed, it is difficult to think of more neutral and unbiased estimates of long-term interest rates, future gold prices or expected exchange rates than those provided by the capital markets.

A rigorous valuation approach will attempt to incorporate these generally sophisticated expectations. If a valuer chooses to use other than market information in his planning model, he should explain why he believes the market to be wrong.

In the case of gold, for example, the market prices the metal today to offer a yield equivalent to the expected return on other assets of similar risk, such as government bonds. To use a forecast other than that on which gold is priced in capital markets is to suggest that the valuer's view is superior to that of the participants who make up a particularly deep and sophisticated market.

## Intangibles, growth and flexibility

Most cashflow valuations tend to underestimate the value of corporations because they focus on the worth of existing projects. But a resource company usually has a number of growth options in addition to its existing portfolio of projects. As well as the potential to expand or contract operations, the potential exists to add value through exploration and acquisition.

A company whose real-term profitability is increasing at 2 per cent a year is likely to be worth 20-25 per cent more than a similar company with no growth prospects. An expert valuer must therefore give an opinion on growth prospects even if there are no specific growth programs in hand. As much as anything, this requires an assessment of management calibre.

Cashflow analysis of marginal and sub-marginal projects can also underestimate true value. For example, if the cost of extraction in a gold project is higher than the gold price, it is tempting to conclude that the project has a negative worth. But it is rare for an asset to have negative value, because management can abandon the project. And old-timers in the industry know that it is always worthwhile having reserves, even if they are presently uneconomic.

Option pricing theory, as used to

value options on securities and commodities, can be applied to marginal resource projects. Again using a gold company as an example, assume extraction costs of \$550 an ounce and a current price of \$500. The gold company is to lose its right to mine the gold in one year. What is the value of this resource to the company?

Consider a 12-month call option at \$550/oz. strike price when the spot price is \$500. Of course, the producer will let the option to call production at \$550/oz. expire if the gold price stays below this level for 12 months. However, gold prices are volatile. As long as there is a chance of the price rising above \$550 during the option period, the option must have a positive value.

Conventional option pricing techniques, using a statistical measure of gold's volatility, show that the value of the call option – and therefore the current value of the in-ground gold – is at least \$20/oz., even though the deposit is uneconomic to mine. The option value of the deposit will be increased if the period of the right to mine is extended.

### Cost of equity capital

Clearly, doing business in a turbulent environment demands flexible management and adaptable business policies, and companies able to respond to change will be worth more than companies with limited flexibility. But how does one measure the benefits of flexibility? Normally they will be presented under the "strategic factor" label – a catch-all for factors otherwise difficult to define. The challenge for resource analysts in the 1990s is to find better ways to describe mathematically the real worth of strategic factors and flexible decision-making.<sup>1</sup>

A powerful tool for determining the appropriate discount rate for cashflow analysis is the capital asset pricing model (CAPM). In its conventional form, the CAPM relates required rates of return to risk according to the following formula:

$$R_n = R_f + B (R_m - R_f)$$

where  $R_n$  is the required rate of return on a risky investment

$R_f$  is the risk-free rate of return

$B$  is the relative risk of an investment against a well diversified portfolio

$R_m$  is the average return on the market.

$[(R_m - R_f)$  has averaged around 6% over many years]

This model incorporates a concept of relative risk known in financial liter-

ature as the beta factor. As an aside, most shareholders already have a wide-spread portfolio of interests; therefore diversification moves by corporates, say by acquisition, need to be justified by reasons other than "risk reduction".

While the CAPM is well known in concept, it is routinely misapplied, generally resulting in lower-than-observed market valuations for resource companies. A rigorous application of the CAPM requires the valuer to identify the price-making investor. For the larger resource companies, the marginal investor is probably foreign. The appropriate relative risk factor, or beta, is therefore the co-variance between the return on the resource company's shares and the return on a well diversified foreign portfolio, as represented by, say, the Morgan Stanley Capital Index. While resource stocks appear to be of higher-than-average risk for an Australian investor, they are actually of lower-than-average risk for an international investor. For example, the observed beta for an Australian gold stock is around 1.6 measured against the ASX All Ordinaries Index but only 0.6 against the MSCI. Broadly speaking, the relative risk of Australian resource stocks for an international investor is half that as measured for an Australian investor.

In other words, the cost of equity capital for a foreign investor is lower than for an Australian investor. With long-term bond rates of around 13 per cent and assuming long-term inflation rate of 7.5 per cent, the approximate discount rate to use with real-term, ungeared \$A cashflows in appraising an Australian gold or base metal investment is around 13-14 per cent for an Australian investor and 8 per cent for a foreign investor. (Australia's tax system has an important impact on the application of such discount rates.)

As well as determining the marginal investor, valuers need to incorporate the following considerations in a proper discount-rate selection.

Australia operates under a unique taxation system, with the removal of one layer of tax for an Australian investor in 1985. (The international investor still effectively operates under the classical tax system.) This change in the tax regime for Australian investors necessitates various changes to the conventional CAPM formula, and it is only if the equity beta equals unity that the adjusted formula gives the same result as the conventional approach. Otherwise, the adjustment

procedure could increase or decrease the discount rate by several percentage points.

Beta factors observed in the market place are for *leveraged* firms. The resultant discount rate should be applied only to leveraged cashflows. The adjustment procedure for leverage produces a lower discount rate for ungeared cashflows. With normal gearing levels the adjustment can be several percentage points to the discount rate. There remains a wrong tendency, however, to apply a single discount rate irrespective of the level of financial gearing.

Market rates of interest include the market's view of long-run inflation. The CAPM therefore produces a nominal discount rate to be applied to cashflow forecasts incorporating inflation. There is an adjustment procedure to convert the discount rate for use in a real-term analysis which is not simply a case of deducting inflation estimates from the nominal discount rate.<sup>2</sup>

In a technical sense this difference in the cost of equity capital between different classes of investor helps explain why size may lead to value enhancement. The argument in the gold industry would go as follows: foreign investors, with a lower cost of equity capital, will invest only in well established gold producers, with proven track record, substantial production in excess of 100,000 ounces a year and with market liquidity. Smaller producers need to look to the Australian investor for their capital, which is available only at a higher cost. Through merger and acquisition smaller companies may combine to capture the attention of the international investor, qualifying for re-rating because the value of the combination is greater than the sum of the parts. The successful re-rating of Dominion Mining after its acquisition of Whim Creek earlier this year was an example of this. Valuers must be careful in pushing this argument too far, although it remains a very real argument in the Australian gold industry for as long as the industry continues free of corporate taxes.<sup>3</sup>

### Appropriate cash flows

As mentioned earlier, Australia has a unique tax system. The traditional approach of discounting after-tax cashflows must now be modified to reflect the fact that the Australian shareholder will enjoy imputation credits

*Continued page 36*

**Gill, Glynn**, Swap Financing (book review, with Jeff Goss), December.

**Gillin, E. F.**, Economics (book review), September; Handbook of Australian Corporate Finance (book review), September; Economics (book review), December; Principles of Money, Banking and Financial Markets (book review), December.

**Goss, Jeff**, Swap Financing (book review, with Glynn Gill), December.

**Green, Don**, Another twist in the tax maze (with Michael Frazer and Alan Smith), September.

**Green, John M.**, The good and bad of buy-backs, December.

**Hoffmann, John**, Portfolio research wins JASSA Prize, March; Enterprise & Venture Capital (book review), September.

**Hutchins, James**, In defence of the chartists (letter), March.

**Knox, David**, Sharpe Index: is it out of place? (with Rohan Prowse), June.

**Lawlor, Brendan**, Exploring the options issues, March.

**Layard-Liesching, Ronald**, How safe is

the Japanese market? (with Andrew Agnew), September.

**Lonergan, Wayne**, Making sure the price is right (with Tom Fenton), September.

**MacLaren, Peter**, Australia gets Asian analysts' thumbs-down, December.

**McDonald, R. J.**, Valuation – for what it's worth, December.

**Moulin, Donald J.**, Accountancy in a global village, March.

**Mullens, F. H.**, Rights, wrongs of cash issues, September.

**Nam, Sang-Woo**, Problems ahead – and big prizes, December.

**Okumura, Ariyoshi**, Japan: engine of change, June.

**Pentony, Brendan**, Coming down on the insiders (with Roman Tomasic), March.

**Powell, Clive**, Time to focus on integrity (Editorial), June; Education the key to quality (Editorial), December.

**Prowse, Russell**, Sharpe Index: is it out of place? (with David Knox), June.

**Rickards, David**, Volatility – the elusive factor, March.

**Rutledge, David**, Share Markets and Portfolio Theory (book review), September.

**Saunders, David**, Debt – Damned if you don't, June.

**Sharp, Roger**, Kiwis are down but not out, June.

**Sinclair, Norman**, Do-it-yourself index funds? December.

**Spencer, Terry**, EPS: it depends what you mean (with Chris Westworth), June.

**Smith, Alan**, Another twist in the tax maze (with Don Green and Michael Frazer), September.

**Sutton, Michael**, Europe: 1992 and all that, March.

**Tomasic, Roman**, Coming down on the insiders (with Brendan Pentony), March.

**Walker, Geoff**, Imputation: the real differences, September.

**Warner, Bill**, The Predators' Ball (book review), March.

**Westworth, Chris**, EPS: it depends what you mean (with Terry Spencer), June.

**Wright, Nick**, What blissful ignorance! (Editorial), September. □

## KOREA

From page 9

primary securities market are still very rigid and unresponsive to market conditions, indicating that the Korean financial market is still far from being fully integrated and operating purely on a competitive basis. This phenomenon seems to be partly due to the limited scope of interest rate deregulation and partly to inertia and mentality of the past when most financial institutions were run like public enterprises.

Last December, a timetable was also announced for opening the Korean capital market to foreign investors. Beginning in 1992, foreigners will be allowed to

invest in stocks in the domestic market. Foreign securities firms may open branch offices or joint ventures by 1991. Even before then, equity participation of foreign securities firms in existing Korean securities companies may be increased from the current maximum of 5 per cent to 10 per cent individually and from 10 per cent to 40 per cent collectively.

Because of the large current account surpluses of recent years, the government is also gradually liberalising overseas securities investment by Korean investors. Starting with overseas securities funds, investment restrictions on institutional investors will continue to be relaxed, which will be followed by gradual

allowance of purchases of foreign securities by corporations and, from 1992, by individual investors. Last year, with the substantial relaxation of foreign exchange controls, Korea joined the nations observing IMF Article VIII.

To minimise misunderstandings and conflicts concerning exchange-rate management, Korea is considering reforming the system of exchange-rate determination, allowing the rate to be more flexibly determined by market forces. This will be difficult, however, because Korea's foreign-exchange market is still in a primitive stage, due largely to remaining regulations on foreign-exchange transactions. □

## VALUATIONS

From page 30

on dividends flowing from cashflows on which corporate tax has already been paid. Under imputation a corporate tax should be considered as a withholding tax on behalf of the shareholder. From an Australian investor viewpoint, we argue that the appropriate cashflows for discounting are those before corporate taxes. Put crudely, Australian assets are now worth more to Australian investors than previously.<sup>†</sup>

The foreign investor, unable to enjoy franking credits, is still effectively subject to the classical or double-tax system. For the foreign investor, cashflows after

corporate taxes remain relevant.

It is important, therefore, to apply the correct combination of pre or post corporate tax cashflows and discount rates depending on the marginal investor assumed. Using discount rates derived from Australian equity markets on post-tax cash flows, as was appropriate before September 1985, will now clearly produce a lower valuation than observed in the marketplace. □

### NOTES

1. A recent article in *The Economist* (August 12, 1989) titled "What Price Freedom?" canvasses the option-pricing concepts that can be employed to value flexibility and the freedom of choice by management.

2. There is a need for valuers to be more

rigorous in their treatment of inflation. A real-term analysis, for example, must produce the same result as a nominal-term analysis. However, because of an inadequate recognition of the real-term impact of inflation on working capital and capital allowances, differences between the two methods continue to be reported.

3. Merger activity between resource companies may lead to a reduction in overheads and rationalising of production facilities, as in the case of Pasminco. Value creation is more to do with such savings than with a possible lowering of the cost of equity capital.

4. With dividend imputation also came a capital gains tax, which is a form of double tax. As Australian resource companies seek to avoid double taxation, an increasing dividend payout ratio can be expected.