# Comparative transactions in project valuation

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The Market Approach is one of the key valuation methods and is possibly the most regularly used approach given that it is appropriate for both producing properties and exploration projects. However, particularly in a South African context, there are substantial challenges in finding a reasonable number of comparative transactions. It is often the practice for companies to use general market averages in the absence of sufficient comparable transactions that would facilitate a statistically robust conclusion. This paper argues that it is more appropriate for the Competent Valuator to use judgement and experience in interpreting, contextualizing and adjusting the more relevant transactions rather than arbitrarily applying average values.

#### INTRODUCTION

The SAMVAL Code recommends the methods shown in Table I for the valuation of mineral assets:

Valuation	Exploration	Development	Production	Dormant I	Properties	Defunct
Approach	Properties	Properties	Properties	Economically viable	Not viable	Properties
Cash Flow	Not generally used	Widely used	Widely used	Widely used	Not generally used	Not generally used
Market	Widely used	Less widely used	Quite widely used	Quite widely used	Widely used	Widely used
Cost	Quite widely used	Not generally used	Not generally used		Less widely used	Quite widely used

Table I. Valuation approaches.

It is clear from Table I that the Market Approach is always at least the second most commonly used approach for all property types. Given the central role that it plays in valuations, any uncertainty around the validity of the conclusions is of concern.

The SAMVAL Code defines the Market Approach as follow: 'The Market Approach relies on the principle of 'willing buyer, willing seller' and requires that the amount obtainable from the sale of the Mineral Asset is determined as if in an arm's-length transaction.'

Roberts (2006) gives the following definition of the Market Approach: 'In market comparable approaches to project valuation, market values for one or more selected comparable mining project(s) are applied to a project of interest to estimate its value.'

Experience suggests that adequate comparable transactions from which statistically robust conclusions can be drawn are seldom available. These comparable transactions should be for properties that are similar in geology, location, mineralization, and other modifying factors. The transactions should ideally be recent and in similar price environments. These restrictions are too onerous in practice if the intention is to mathematically and statistically prove the value determined, and hence the judgement of the Competent Valuator (CV) is implicit in any conclusion drawn.

#### TRANSACTIONS

Gold transactions in South Africa are selected to facilitate the discussion. South Africa is a globally significant source of gold and the associated mining industry is mature, extensive, and comparatively geologically consistent. In general, the Market Approach to valuation should be as likely to succeed in the gold industry in South Africa as for other minerals in any other jurisdiction.

The past five years have seen significant changes in exchange rate, price, and sentiment in commodities in general and gold in particular. Adjustments can be made to the price paid per ounce in the recorded transactions to make them more comparable.

Adjusting for price does not compensate for changes in sentiment or any strategic benefit that either the purchaser or seller may gain. Changes in sentiment could possibly be included if prevailing consensus price forecasts were considered or through a search of media articles. However, whether the CV would consider the adjustment for the ratio of the forecast prices to carry more weight than the adjustment for the ratio of the spot prices would be a subjective decision.

Furthermore, adjusting for sentiment is not the intended goal of the valuation since the intention is, according to Lawrence (2001), to determine the 'Value-in-Exchange' (or value in the marketplace) not 'Value-in-Use' (or value to the owner).

The prices recorded in readily available databases are those that were actually paid rather than the independent valuations of the CVs involved. These prices would have been affected by sentiment and strategic considerations and would often be thus the Value-in-Use rather than the Value-in-Exchange. Ideally, then, the underlying valuation reports should be considered rather than the prices paid. Further research may be warranted to explore whether there are substantial differences between the opinions of the CVs and the prices paid.

Lawrence (2001) also argues that if the value per ounce that has been paid is based on the NPV over the Resource base then the value per ounce from the transaction is not a Market Approach but rather an alternative Income Approach. In essence, if the price paid by the purchaser was based on the income they expected to receive, then the value per ounce is an arbitrary back-calculation that does not convey any fundamental information. This could be compared to technical trading rather than trading on fundamentals.

The enterprise value per ounce for a company such as Randgold Resources is substantially higher than for Harmony Gold, despite similar annual production rates and Harmony having larger Mineral Reserves and Resources. An argument can be made that the lower value per ounce for Harmony is a result of the lower margin per ounce produced or because the ounces to be extracted in later years are discounted to the point where they are no longer considered valuable. However, both of these rationales would imply that the dollar per ounce valuation is a variation on the Income Approach and not a true alternative valuation methodology.

Company targets for Return on Invested Capital (ROIC) and hurdle rates for investments also imply that projects and transactions would be valued for the associated income rather than the additional production or Reserves. This is not always applied in practice, but if it were accepted as typical then it would further the argument that the value per ounce in transactions was also Income-related.

#### GOLD TRANSACTIONS

Transactions from 2010 through to a base date of 30 September 2015 were downloaded from SNL<sup>®</sup>. The transactions shown are for gold assets where at least Resources were included. Transactions where no ounces are listed have been excluded. Table II shows the deal values and details on Mineral Reserves and Resources. Details on the transactions are included in Appendix A.

	Deal value (US\$ million)	Primary Reserves acquired (oz)	Primary Reserves acquired (kg)	Primary R&R <sup>1</sup> acquired (oz)	Primary R&R acquired (kg)
1	22.30	2 205 000	1 000 171	31 764 000	14 407 908
2	8.61	453 000	205 477	6 541 000	2 966 947
3	9.10	1 574 000	713 954	1 574 000	713 954
4	182.70	8 064 115	3 657 821	30 629 545	13 893 328
5	3.50	31 700	14 378	2 603 700	1 181 018
6	130.00	521 000	236 321	11 924 300	5 408 771
7	19.00	5 217 337	2 366 544	22 494 114	10 203 158
8	2.50	1 329 780	603 178	30 308 180	13 747 559

Table II. Gold transaction values and reserve and resource information.

<sup>1</sup> R&R refers to Resources inclusive of Reserves

Table III shows the price paid per gold ounce, the gold price at the time of the transaction, the exchange rate at the time of the transaction and the value per ounce when adjusted to reflect changes in the price of gold and the exchange rate subsequent to the transaction. The adjustment is made by multiplying the previous price paid per ounce by the gold price at the time of valuation and dividing by the gold price at the time of transaction.

Table III. Gold base values (US\$ per ounce and ZAR per kilogram and adjusted v
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	Price paid in US\$oz for	Price	Gold	ZAR/US\$	Price	Price	Adjusted	Adjusted
	Reserves at transaction	Paid in	US\$/oz at	at	Paid in	paid	ZAR/kg	ZAR/kg
		US\$/oz	transaction	transaction	ZAR/kg	in	for	for R&R
		for			for	ZAR/kg	Reserves	at
		$R\&R^1$			Reserves	for R&R	at	base date
							base date	
1	10.11	0.702	1704	6.82	2437	169	3275	227

2	19.01	1.316	1649	7.96	5346	370	6361	440
3	5.78	5.781	1725	7.95	1624	1624	1850	1850
4	22.66	5.97	1552	8.33	6669	1756	8059	2122
5	110.41	1.34	1251	7.24	28 246	344	48 723	593
6	249.52	10.90	1636	7.78	68 596	2997	84 200	3679
7	3.64	0.85	1795	7.92	1019	236	1120	260
8	1.88	0.08	1244	7.63	507	22	835	36
Mean	53	3	1570	7.70	14 306	940	19 303	1151
Median Std	15	1	1643	7.85	3892	357	4818	517
dev.	87	4	211	0.47	23 752	1068	30 716	1283

#### <sup>1</sup> R&R refers to Resources inclusive of Reserves

The final three rows of Table III are included to highlight the level of uncertainty associated with the transactions. The median price paid is substantially different from the mean price paid. The lower median is a result of the particularly high prices paid in two of the transactions skewing the distribution. Note that in several instances zero lies within one standard deviation of the mean.

The final two columns show the prices adjusted to the base date. The prices paid per kg of gold for Reserves and per kg for Mineral Reserves and Resources inclusive are adjusted by multiplying the original prices paid per kg with the current gold price in ZAR/kg and then dividing by the gold price in ZAR/kg at the time of the transaction.

#### ADJUSTMENTS AND ALTERNATIVES

It is possible to adjust for the prevailing commodity price at the time of the transaction relative to the current price. This adjustment does not take sentiment into account (whether the outlook is bullish or bearish at the time) and does not take any other strategic factors into account (a company looking for a base in a new jurisdiction or possibly looking to increase production to over one million ounces per annum, *etc.*).

In addition, some CVs have set up adjustment factors whereby the price paid can be adjusted for depth, grade, deposit size, and other significant factors. This is a rational approach but relies on the underlying price being correct. This is only the case if there are enough transactions to ensure statistical significance or where one or two clearly comparable transactions have been identified.

Adjusting for a combination of margin and the Life-of-Mine (LoM) is also intuitive. However, the accounting practices followed by mining companies are such that a very detailed evaluation is required in order to determine comparable margins. This is not practical, particularly where the CV is not an accounting specialist.

Furthermore, while a longer life would typically be attractive, the high levels of uncertainty and high discount rates in a jurisdiction such as South Africa make it likely that little value is ascribed to ounces that are not scheduled to be produced within fifteen years. This is further exacerbated by the nature of underground mining, where infrastructure constraints make it impossible to realize value from a sale of Mineral Resources or Reserves that must be extracted through the current shaft infrastructure.

The infrastructure constraints also generally lead to lower productivities and higher costs over time as distances to working places increase. Greater depths also lead to higher energy requirements as

increased losses and greater cooling requirements make more distant Reserves and Resources less economic.

However, historical and forecast margins can facilitate contextualizing the transaction information. enterprise value per ounce information from listed stocks can give some guidance as to the likely limits of the transaction values. Some limits are required since the high variances associated with the limited data-points means that negative numbers are often within one standard deviation of the mean, and thus alternate constraints are required.

Ellis (2011) discusses the potential for the Income Approach to produce misleading valuations in isolation and how the development of indirect sales comparisons overcomes some of the difficulties associated with the lack of directly comparable transactions. Indirect comparison involves converting the sales information to a common unit of measure like dollars per Reserve ounce. Further adjustments can be made to reflect the different nature of the assets.

In the same paper, Ellis lists the following adjustment factors that can be considered:

- Minority interest
- Project development status
- Deposit grad
- Deposit/project size
- Property control and security of tenure
- Capital investment requirement
- Operating cost/net operating income
- Production loss/recovery/metallurgical complexity
- Product quality
- Product market stability
- Discovery and expansion potential
- Location and access
- Infrastructure
- Permitting issues
- Reclamation
- Country risk;
- Project risk
- Taxes, royalties, levies.

Expected differences in cost and net operating income are key adjustments. The challenge here is that, as mentioned earlier, the sales approach begins to encroach on the Income Approach and that accurate cost and net operating income information can be difficult to obtain. Cook (2009) conducted a detailed investigation of cost reporting in mining companies and concluded that the only way to determine the actual production costs is from the cash flow model, where the calculated values can be traced to ensure that all relevant costs are included.

Real-terms adjustments to the spot price can be important. In a South African context, mining cost inflation has consistently been higher than official inflation. Initially adjustments were just made for the differences in exchange rate and gold price (in US dollars per ounce). Table IV shows the impact of inflation on the price where a price of R 500 000 per kilogram has been included for illustration for 2015.

Inflation	2010	2011	2012	2013	2014	2015
4.5%	401 226	419 281	438 148	457 865	478 469	500 000
6%	373 629	396 047	419 810	444 998	471 698	500 000
8%	340 292	367 515	396 916	428 669	462 963	500 000

$1 u u u e 1 v \cdot L f e c u o f infinition on the price.$	Table IV.	Effect	of inflation	on	the	price.
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If the CV assumes that the price needs to increase in line with the typical cost inflation experienced by South African miners then an equivalent price would probably be from the 8% row. Using the average of the official inflation target range of the Reserve Bank would lead to use of the 4.5% row. This assumption would already introduce substantial variation, and both are reasonable.

If the price per ounce or kilogram at the time of the transaction is adjusted for the ratio between the price then and the current price, the prices paid per ounce do not need to be adjusted for inflation as the price of the commodity would also adjust and the two adjustments would offset each other. However, if the CV is not adjusting for the relative gold prices then the price paid per ounce should be adjusted to reflect the price in real terms at the time of the transaction.

In addition, adjustments to the price based on margin or cost should follow a similar pattern and the CV should make the various adjustments to real terms for the valuation in case the approach does not automatically lead to the effect being incorporated.

The average enterprise value per ounce derived for listed shares is sometimes used instead of transaction values in order to overcome the absence of adequate data. However, this is also not ideal. In the South African gold sector, Sibanye Gold has recently begun to move towards being a diversified miner and Gold One has delisted. Harmony has a significant portion of its possible value associated with a copper asset in Papua New Guinea, and AngloGold Ashanti is predominantly based outside of South Africa.

Roberts (2006) suggests the use of Adjusted Market Capitalization (where the Market Capitalization is adjusted to reflect debt and other relevant variables) per NPV as the market typically adjusts NPV upwards or downwards. This is similar to using enterprise value per ounce, but basing it on NPV generated instead of ounces. Although this is intuitive, there is substantial uncertainty associated with NPV and there would likely be difficult obtaining consistent estimates across several companies where there is no formal requirement to publish NPV.

Roberts highlights the following factors to be taken into account when attempting to determine value:

- Commodity or product Commodities like gold tend to have higher enterprise value than is justified by their underlying NPV
- Date of the valuation data The premium or discount varies over time over and above that explained by the variation in the underlying price of the commodity

• Location

Some locations (*e.g.* North America) attract premiums, while others (*e.g.*. South Africa) are typically discounted

- Reserve size Larger Reserves usually attract a premium (the article does not mention this specifically but this does not apply to South African underground Reserves)
- Deposit type and mining method The market has varying preferences for certain types of mines and may, for example, prefer open pit to underground at times
- Processing methods The market may show a preference for free-milling over refractory ore
- Cost of production (grade) High-grade/low cost per ounce or ton will likely attract a premium
- Capital cost and infrastructure requirements Lower capital costs and lower infrastructure requirements will typically attract a premium.

All of the factors mentioned are areas where comparability is desirable in order to ensure that a premium or discount is not being incorrectly applied to the asset under consideration by the CV.

Roberts further lists factors that should be taken into account when considering a corporate transaction:

- Relative project to corporate value
  - Companies that are significantly diversified outside of mining are generally not suitable
- Management strength
  - Companies with strong, experienced and successful management teams may attract a premium
- Balance sheet
  - A strong balance sheet will generally trade at higher multiples as the company is more likely to weather a downturn and will have greater flexibility
- Hedging programme
  - Any hedging programme will have the potential to significantly affect future cash flows and should be carefully considered
- > Market capitalization and liquidity
  - Higher market capitalization and greater liquidity will tend to also receive a premium.

It is clear that identifying truly comparable projects is a difficult process and that some adjustment is likely to always be required. In the same way that there are too few transactions to be statistically certain of a true value per ounce, there are also likely to be too few companies to be able to prove that any adjustments made are statistically correct.

These factors are likely to make it difficult to develop opinions on the Market Value of assets that are readily defensible. Taking into account the inaccuracy of metal price and exchange rate forecasts and the uncertainty that this brings to the Cash Flow Approach, the valuation of assets will be heavily dependent on the ability of the CV to create a cogent argument.

CONCLUSIONS

Valuation using comparative transactions is dependent on the existence of adequate transactions from which to draw statistically significant conclusions. In the absence of an adequate transaction volume the interpretation of the prices paid becomes increasingly subjective. It is then necessary to attempt to identify the most comparable transactions and make suitable adjustments. Cost, operating income, and enterprise value per ounce can provide additional constraints.

A number of techniques are employed by valuators to attempt to adjust the prices paid to reflect the characteristics of the asset being valued. However, these are all premised on the price that is being adjusted being correct. Despite gold and platinum group metals being globally significant for South Africa, there are too few recent transactions to draw statistically meaningful conclusions.

In the absence of a clear price range that can be statistically defined the valuation becomes increasingly subjective. The onus then rests on the CV to make a cogent case for a price range with reference to subjective factors and those transactions that are available and most comparable. There are a range of factors that are outlined to consider when determining comparability. Along with the elimination of transactions that are not comparable, a range of adjustments need to be made and factors considered to arrive at a final range.

Historical and current price forecasts, changes in exchange rates and spot prices, and any relevant enterprise value per ounce information that can be obtained can be used to provide context for the valuation and justification for the selection of a final range. These should preferably be converted to real prices and exchange rates prior to use. Adjustment for other differences between deposits is also appropriate where possible.

Transactions where the price paid reflects strategic value or other value not related to value-inexchange should be adjusted or removed. Valuations should ideally be based on the price determined by the CV in a transaction rather than the price paid, given that this price would include both sentiment and strategic components. The underlying valuations will not always be readily available.

Ellis (2013) poses the question: 'If this deposit is worth that much, why hasn't it already been mined out?' This and related questions are important sanity checks in a valuation.

There is no substitute for the experience of the CV in developing a coherent argument for a range of prices within the existing constraints. The implicit subjectivity of the process is unavoidable given that arguments cannot be statistically proved. Careful consideration of all of the factors and a detailed and transparent description of the process followed by the CV, and the assumptions made will facilitate the reader of a valuation report drawing their own conclusions and is likely to constitute best practice.

#### REFERENCES

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## **Appendix A – Transactions**

### Gold Transactions from SNL©

## Table V. South African gold transactions from the SNL database.

	Buyer name/ target name	Target	Announce date
1	China African Precious Metals (Pty) Ltd	Armgold/Orkney	5 Aug. 2011
2	Investor Group	East Rand	17 Apr. 2012
3	Investor Group	West Witswatersrand	26 Jan. 2012
4	Pan African Resources Plc	Evander Gold Mines Limited	30 May2012
5	Stonewall Mining (Pty) Ltd	Transvaal Gold Mining Estates	9 Sep. 2010
6	Tannous Investment Group	Tau Lekoa	7 May 2012
7	Village Main Reef Ltd	Blyvooruitzicht	8 Nov. 2011
8	White Water Resources Ltd	ERPM	30 Jun. 2010