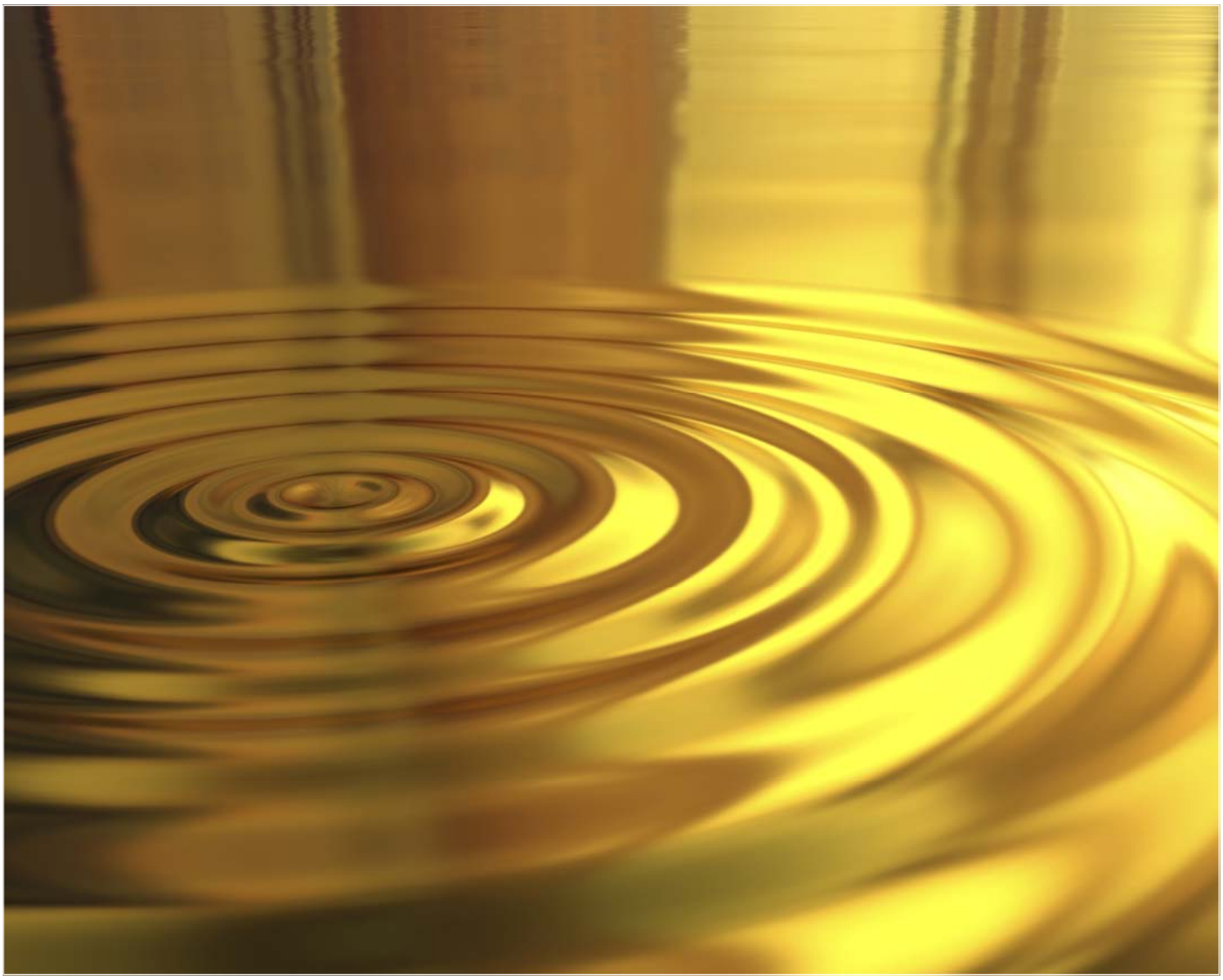
EDISON



Gold

Gold – US$2070 by 2020

Sector report, November 2013

Published by Edison Investment Research

Gold – US$2070 by 2020

QE3 tapering and higher rates already discounted

"The price of gold has more to do with the supply of dollars than it does with the supply of metal."

- Anon

20 November 2013

Companies in this report

Canadian (23)	218Moz
UK (22)	32Moz
Australian (22)	44Moz
Total (67)	294Moz

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Edison predicts US$1,642/oz in 2015

At the time of writing the market is narrowly focused on the possibility of the Federal Reserve's tapering of QE3 and the assumption that this is inherently bad for the gold price. This report, by contrast, argues that the price of gold is already at a discount to that implied, given the implicit relationship between the two, by the expansion of the US monetary base and that, far from tapering causing the gold price to fall, it will merely cause it to rise less quickly. Currently, Edison calculates a fair value of gold in excess of US$2,000/oz, although it recognises the likelihood of a period of drag while western economies (and the United States in particular) unwind their debt burdens. Key to the prospects for gold will be the interplay between interest rates and inflation. Given the extent of quantitative easing to date, Edison calculates a long-term US dollar inflation rate of 10.7% (discounting a future, sharp reduction in the monetary base), under which circumstances it forecasts the price of gold rising to US$1,642/oz in 2015 and US$2,070/oz by 2020 if real interest rates remain negative. By contrast, a restoration of positive real interest rates would depress the price of gold, and inflation, such that Edison calculates a price of US$1,604 in 2015 and US$1,804/oz in 2020.

In-situ value of mean exploration oz falls 49% in year

Compared to August 2012, Edison calculates that the average value of average ounces has declined 49.2%, from US$45.36/oz to US$23.02/oz. Within that, the values of 'measured' and 'inferred' ounces have decreased the most, while the value of 'indicated' ounces have demonstrated themselves to be relatively robust. Once again, Australia has shown itself to be the market that gives the highest overall rating to gold explorers, although this is specifically restricted to the relatively early stage 'inferred' and 'indicated' resource categories, while London has once again reprised its role as giving a premium valuation to 'measured' ounces. At global average costs of discovery, the delineation of 'inferred' ounces is value destroying across all three markets, while the delineation of 'measured' ounces is value enhancing only in London. By contrast, only the conversion of 'inferred' ounces to the 'indicated' category is value enhancing in all markets.

Discount rates rise by 7 percentage points

Compared to 2012, Edison has observed a broadening and (perhaps counter-intuitively) a shallowing of the risk profile in bringing a project into production. That is to say, implied discount rates (as applied to predicted future dividend flows) at the producing end of the spectrum of Edison's universe of stocks have risen by c 7% on average, while those at bankable stage or before have actually declined. Edison interprets this as reflecting a) a change in the constituents of the sample such that lower quality or distressed companies have been replaced by higher quality ones and b) a tendency by the market to apply long-term pricing assumptions to early stage companies, but spot pricing assumptions to later stage ones.

Contents

Investment summary: Gold price, value and risk

This report is constructed in four distinct sections. In the first, Edison considers the macroeconomic environment within which gold exists and, in particular, the interrelation (both historic and future) of quantitative easing, inflation and interest rates, which it then uses to predict the price of gold until at least 2020. In the second part, Edison updates the *in-situ* value of exploration resource ounces listed in London, Canada and Australia, differentiated by category (ie whether 'measured', 'indicated' or 'inferred') and compares these with previously calculated global average costs of discovery. In Part III, Edison updates its analysis of mining companies under coverage to derive three series of risk-adjusted discount rates for companies and projects at different stages of development. Finally, in Part IV, Edison combines all of these parameters to create a notional gold mining company, NonSuch Gold Ltd, which it then values at each stage of its development from initial capital raising to treating stockpiles at the end of the life of operations and unwinding working capital and then compares this with the same analysis last year.

Part I – Gold price

While gold appears unlikely to challenge its recent peak of US$1,895/oz reached in September 2011 in the short term, except under extreme circumstances, at current levels it appears to be discounting both the imminent tapering of QE3 and a return to an unequivocally positive real interest rate environment.

In Gold – New benchmarks for old, published in November 2012, Edison put forward three theories to predict the future price of gold. The first, the Standard theory, analysed the gold price with respect to historic and projected future inflation rates and concluded that it should "average US$1,727/oz in 2013, before falling back to trade in the range US$850-1,300/oz for the following 21 years". The second, the Revised theory, analysed the price of gold within the context of its statistically significant correlation over the past 41 years and thereby calculated (depending on the extent of QE3) a fair value for gold of US$1,446/oz as at December 2012 and US$1,676/oz as at December 2013, which became Edison's updated long-term gold price. The analysis was subsequently updated to account for the expansion of QE3 from US$40bn per month to US$85bn per month, although our long-term price remained unchanged at the time, at US$1,676/oz. The third analysis considered the effect on the gold price of a sustained period of negative real interest rates.

Rather than accepting the seemingly contradictory conclusions of the Revised theory and the Standard theory, this report rationalises the two in terms of the future inflation rate required for them to become aligned given the extent of quantitative easing thus far experienced (and forecast) in the United States. In this case, the long-term inflation rate to rationalise the two can be calculated to be 10.7%. While this appears high by the standards of recent history, it could be rationalised as 4.4% (being the average rate in the period of fiat currencies to date, 1972-2012) plus c 5.5% in order for prices to catch up to those implied by the recent increases in the total monetary base over c 25 years (see Exhibit 21). In this respect, note that the total US monetary base has declined only twice since 1959 – once in 1960 and once again in 2000. This being the case, Edison's medium- and long-term forecasts for the gold price are as follows, in both a positive and negative real interest rate scenario:

Exhibit 1: Edison forecast gold price range, 2014-2020

	2014	2015	2016	2017	2018	2019	2020
Gold price (US$/oz, negative real interest rates)	1,511	1,642	1,627	1,643	1,805	1,996	2,070
Gold price (US$/oz, positive real interest rates)	1,434	1,602	1,392	1,249	1,470	1,800	1,804
Difference (US$/oz)	77	40	235	394	335	196	266
Difference (%) *	5.4	2.5	16.9	31.5	22.8	10.9	14.7

Source: Edison Investment Research. Note: * Negative vs positive.

As such, the likely 2013 average gold price of c US$1,421/oz appears to already discount future economic drag in the western world (and the United States in particular) and the near-term re-imposition of positive real interest rates. Otherwise, the current gold price may be interpreted as discounting a contraction in the monetary base to US$2,392bn – ie reversing all of QE3 and some of QE2.

Part II – The in-situ value of gold

Over the past 12 months, all ounces have de-rated across all major markets with the exception of 'inferred' ounces listed in London and 'measured' ounces listed in Canada. As a result, values have converged in these categories across all three markets, although they have diverged in the 'indicated' category. Australia continues to provide the highest overall valuations to explorers, although this is particularly true of early stage exploration companies and projects. London provides the highest valuations for 'measured' (ie later stage) projects and companies.

In previous reports, Edison has used companies with different resource bases to derive values for 'measured', 'indicated' and 'inferred' ounces (a more detailed explanation of this methodology is included in the appendices on page 40). In Part II of this report, Edison extends and updates the work done in its earlier studies to derive average values for 'measured', 'indicated' and 'inferred' ounces in three different centres of mining finance (London, Canada and Australia). Note that, in this particular case, Witwatersrand ounces were specifically excluded from the analysis owing to their unique nature and valuations and will be the subject of a subsequent report. In addition – and as confirmed in Edison's last report, *Gold – New benchmarks for old*, published in November 2012 – producers' ounces have been specifically excluded as their valuations depend on a combination of historic investment, reserve-resource conversion ratios, future margins and capex etc and are therefore unique to each individual project. Note that these values are still appropriate to apply to the undeveloped assets of producers; however, they should not be used for producing companies themselves nor for resource extensions that are capable of being mined from existing infrastructure.

A detailed description of the methodology used is included in the appendices to this report. A summary of the companies analysed in each of the three markets is as follows:

Exhibit 2: Summary of resource ounces analysed, by category and listing

	Number of companies	EV	Measured	Indicated	Inferred	Total			EV/total oz
		US$m	Moz	Moz	Moz	Tonnes (kt)	Grade (g/t)	Moz	(US$/oz)
London market									
Inferred only	4	(4.69)	0.000	0.000	1.324	24,770	1.66	1.324	(3.54)
Indicated & inferred	7	322.47	0.000	0.824	9.245	470,544	1.16	17.480	18.45
Measured, indicated & inferred	11	422.08	3.507	3.474	6.059	153,142	2.65	13.040	32.37
Total	22	739.86	3.507	11.709	16.628	648,456	1.53	31.844	23.23
Canadian market									
Inferred only	4	10.31	0.00	0.00	4.75	206,692	0.71	4.75	2.17
Indicated & inferred	7	160.60	0.00	8.24	11.47	690,383	0.89	19.71	8.15
Measured, indicated & inferred	11	3,392.97	36.70	117.59	39.00	8,723,782	0.69	193.29	17.55
Total	23	3,563.88	36.70	125.83	55.22	9,620,857	0.70	217.75	16.37
Australian market									
Inferred only	6	15.322	0.00	0.00	4.17	58,258	2.23	4.17	3.67
Indicated & inferred	7	359.055	0.00	4.51	4.46	140,600	1.98	8.97	40.04
Measured, indicated & inferred	9	918.419	8.89	13.04	8.82	1,674,450	0.57	30.74	29.88
Total	22	1,292.796	8.89	17.54	17.45	1,873,309	0.73	43.88	29.46

Source: Edison Investment Research

Of note is the significantly greater number of total ounces listed in Canada compared to Australia and London, although that this is largely (71%) attributable to three 'super-explorers'. Note also the materially higher average grades in London (with companies with 'measured' ounces having the highest overall grades) and the reverse pattern in Australia whereby companies with 'inferred' ounces only have the highest overall grades (and companies with 'measured' ounces the lowest overall grades).

The results of the analysis to determine differentiated valuations for 'measured', 'indicated' and 'inferred' resources by market listing are then as follows:

Exhibit 3: Global average value of in-situ explorers' resources, by listing

	August 2013				August 2012				Variance (%)			
	Measured	Indicated	Inferred	Total	Measured	Indicated	Inferred	Total	Measured	Indicated	Inferred	Total
London market	83.74	43.14	(3.54)	23.23	94.54	50.21	(5.04)	26.33	(11.4)	(14.1)	29.7	(11.8)
Canadian market	37.39	16.46	2.17	16.37	(37.06)	52.63	3.84	24.52	200.9	(68.7)	(43.4)	(33.3)
Australian market	(11.80)	76.01	3.67	29.46	236.33	83.52	8.33	85.24	(105.0)	(9.0)	(55.9)	(65.4)
Arithmetic mean	**36.44**	**45.20**	**0.77**	**23.02**	**97.94**	**62.12**	**2.38**	**45.36**	(62.8)	(27.2)	(67.8)	(49.2)
Geometric mean	**(8.74)**	**37.68**	**2.04**	**19.07**								

Source: Edison Investment Research

Of note is the decline in the values of all ounces with the exception of 'inferred' ounces listed in London, which now carry a less negative valuation than previously, and 'measured' ounces listed in Canada, which now exhibit a more conventional relationship to 'indicated' and 'inferred' ounces than in the past (not least on account of the de-rating of 'indicated' and 'inferred' ounces). By contrast, the value of Australian 'measured' ounces has collapsed (albeit to a level consistent with the last time that gold was at similar levels in H210 – see Exhibit 67), although the value of Australian 'indicated' ounces has held up well.

Note that over the same timeframe, the price of gold has fallen by approximately 17.2%, from an average of US$1,626/oz in August 2012 to US$1,347/oz in August 2013.

The analysis demonstrates a convergence in the valuations of 'measured' and 'inferred' ounces across the three markets since the publication of *Gold – New benchmarks for old* in November 2012, but a divergence in the valuations of 'indicated' ounces on account of their devaluation in the Canadian market, and relative resilience in the Australian one.

Part III – Measuring risk with respect to stage of development

In general, the past year has witnessed a broadening of the range of discount rates applied to companies at varying stages of development. Somewhat counter-intuitively, however, this is especially true of companies at the producing end of the spectrum. As a result, there has also been an apparent shallowing of the risk profile as companies develop their projects, such that producers no longer necessarily command the same premium to developers that they did in October 2012.

Edison uses its universe of stocks under detailed coverage to derive average discount rates to apply to companies at different stages of development, which it then applies to its notional gold producer, NonSuch Gold Ltd. The average discount rates thus derived are as follows:

Exhibit 4: Discount rates to be applied to companies at different stages of development, by methodology*

Development stage	Scoping study	PFS	BFS	Development	Ramp-up	Full production
Discounted dividend flow rate (%)	35	33	30	27	24	17
Discounted cash-flow rate (%)	29	26	22	27	22	17
DCF re standardised project cash-flow**	36	31	25	19	15	6

Source: Edison Investment Research. Note: * Edison interpretation; ** See page 24.

In general, in the past year, there has been a broadening of the range of discount rates applied to companies at varying stages of development (at Edison's long-term metal price assumptions), particularly at the production end of the spectrum. Arguably, there has also been a shallowing of the slope of the lines, with early stage development companies holding their value well relative to producing companies.

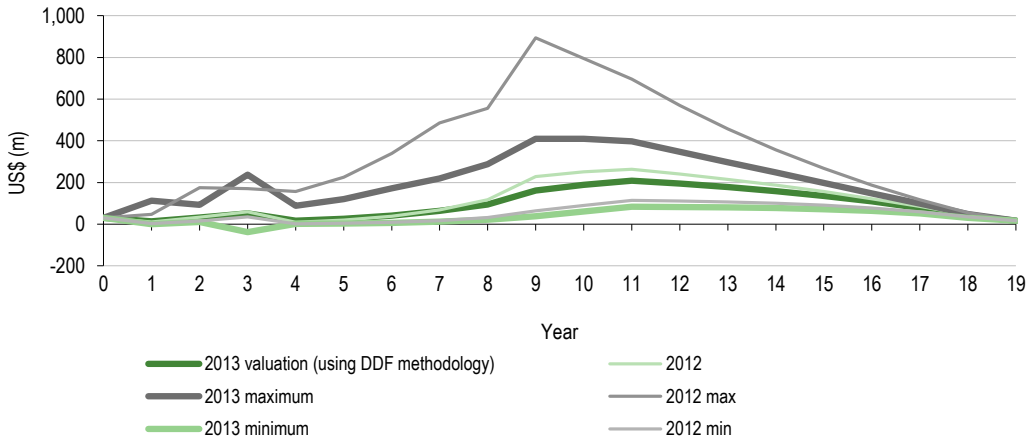
For companies directly comparable in 2013 relative to 2012 (ie the same company at the same stage of development) the average increase in the discount rate over the course of the past year has been 9.2%, with a maximum increase of 23.2% and a minimum of -1.3% (ie a discount rate 1.3% lower than the previous year). Only two companies recorded lower discount rates in October 2013 relative to October 2012.

While the average increase has been 9.2% at Edison's long-term metals prices, however, it has been negligible when the same analysis is conducted at spot prices – implying that the market in general appears to hold little store by analysts' long-term metals prices and merely values companies based on the spot price of the metal, the last reasonable estimate of costs, likely dilution and the company's stage of development. One possible refinement to this thesis, however, is to observe that companies at earlier stages of development appear to have a greater opportunity to be valued at long-term metals prices, whereas those in production tend to be valued at spot prices.

Part IV – NonSuch Gold Ltd

Applying the updated discount rates to NonSuch Gold Ltd generates a valuation profile for the company over its life of operations as shown in Exhibit 5 (overleaf). In general, the increase in discount rates has resulted in a 20-30% decline in the valuation of the company over the course of the prior year, although the maximum valuation that it could hope to attain is 55% lower. Once dilution has been taken into account, this translates into a share price that is up to 38% lower than 2012 (depending on the stage of development). This compares with a decline in the FTSE Gold Mines Index of 49.2% over the course of the past year and a decline in the FTSE/JSE Africa Gold Mining Index of 43.4% (source: Bloomberg).

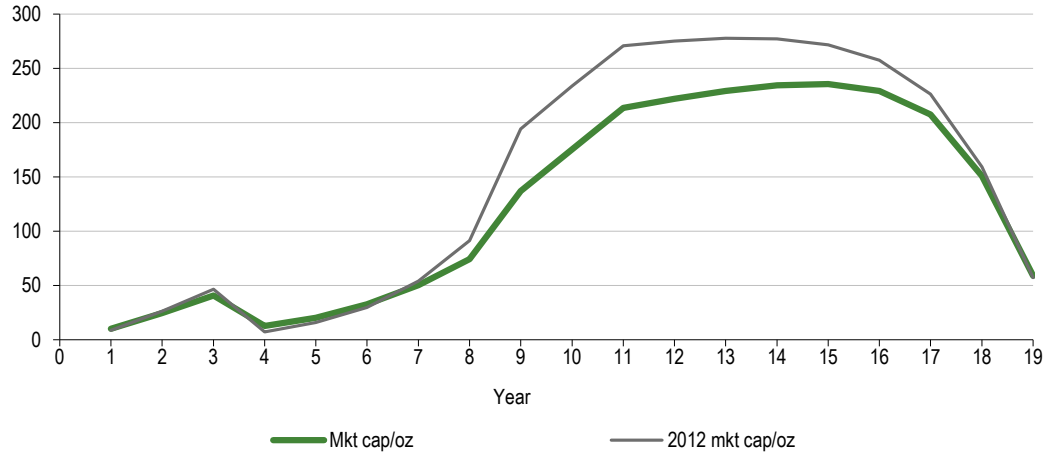
Exhibit 5: NonSuch Gold Ltd potential valuation range, 2013 vs 2012



Source: Edison Investment Research

Similarly, the average company valuation per resource ounce (ie market capitalisation per resource ounce) over the life of operations is US$124.18/oz in 2013, compared to US$146.37/oz in 2012, with a maximum of US$229.08/oz (cf US$277.71/oz in 2012):

Exhibit 6: NonSuch Gold Ltd valuation per total resource oz, 2013 vs 2012, US$/oz



Source: Edison Investment Research

Part I

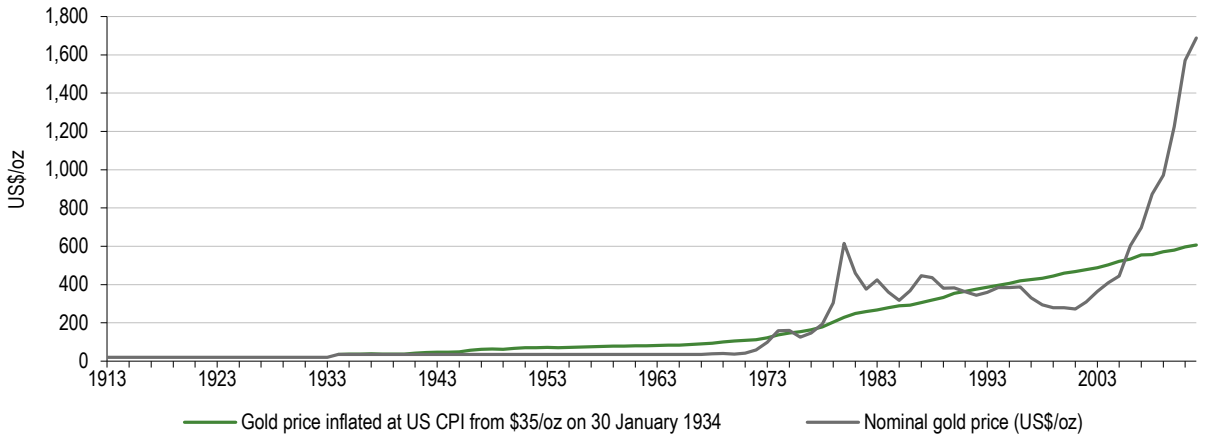
Introduction

In its report *Gold, New benchmarks for old*, published in November 2012, Edison posited three theories on the future potential direction of the gold price. The first (the Standard theory) looked at the gold price with respect to US consumer price index (CPI) inflation. The second (the 'Revised' theory) looked at the gold price within the context of the total US monetary base, with which it has a statistically significant historical correlation. The third considered the possible effect on the gold price of a prolonged period of benign negative real interest rates. This report looks in more detail at the Standard and Revised theories and attempts to rationalise the apparent discrepancies between them. Summaries of the two theories are as follows:

Standard theory

According to the Standard theory, the price of gold may be predicted in terms of its divergence from its January 1934 price of US$35/oz indexed to current levels using the US CPI.

Exhibit 7: Gold price (1913-2012), nominal and indexed from January 1934, US$/oz



Source: Edison Investment Research, South African Chamber of Mines, US Department of Labor. Note: Prices are annual averages.

Between 1945 and 1971, the gold price was inextricably linked to the US dollar. Towards the end of this period, however, the US began both to run twin deficits and expand the money supply. As a result, international creditors (particularly France) began to sterilise dollar foreign exchange reserves into gold, which put upward pressure on the price of gold and downward pressure on the dollar. After a series of initiatives aimed at preserving the Bretton Woods order, President Nixon finally abandoned the link in 1971 (described in some quarters as 'the greatest default in world history').

The subsequent devaluation of the dollar had the effect of importing inflation into the United States, which jumped from a containable 3.4% in 1972 to a virtually unprecedented (as far as the peacetime economy was concerned) 8.7% in 1973. The Federal Reserve reacted to this conventionally by tightening monetary policy, which burst the credit bubble of the internal US economy and sucked markets into a debilitating debt-deflation spiral in 1973-74. During this period, the Dow Jones Industrials average lost 45% of its value, while the US economy slowed from 7.2% real GDP growth in 1972 to a 2.1% contraction in 1974. Now facing the prospect of a depression, the world's authorities reacted conventionally by reducing interest rates to a minimum and by expanding the US monetary base. Inevitably, this put further downward pressure on the value of the

dollar and imported price rises, leading to a second peak in inflation later in 1979. This was only brought under control at the expense of a further debilitating domestic recession in the US (and UK) in the early 1980s, after Paul Volcker's decision to raise interest rates to defend the value of the dollar in international foreign exchange markets. Positive interest rates having once again been re-imposed in the US, international markets returned to something approaching normality, albeit with the dollar (and, to some extent, sterling) at permanently lower levels compared to the currencies of international creditor nations such as Germany, France and Japan.

As positive real interest rates reasserted themselves in 1980, so currency markets stabilised and gold returned to a bear market phase (analogous to the period of 1945-68), which lasted until 2001. Hence, whereas the German mark appreciated by 66% against the US dollar during the 1970s, in 1999 the DEM/US$ rate was almost the same as it had been in 1980.

As the new millennium dawned, however, (and after a period of relative economic stability), the US once again began to run twin deficits as a result of a combination of the War on Terror and the rise of a new economic competitor in the form of China, which resulted in:

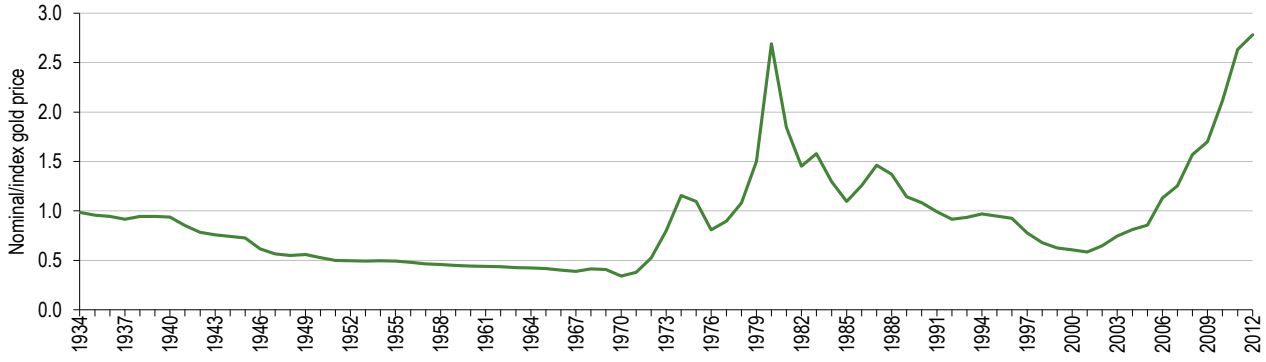
- a return of negative real interest rates in 2001;
- inflation and a subsequent rise in interest rates in 2007;
- banking failures and the beginnings of a debt-deflation spiral in 2007-08 (Bear Stearns, Lehman Brothers etc); and
- unconventional monetary policy, ie QE1, QE2 and QE3 intermittently from 2008 to the present.

Since 1945 therefore, gold can be seen to have undergone two distinct multi-year bull and two distinct multi-year bear market periods.

- A bear market between 1945 and 1967 (a period that was characterised by inflation and positive real interest rates).
- A bull market phase between 1968 and 1980 (a period of negative real interest rates).
- A bear market phase from 1980 to 2001 (positive real interest rates).
- A bull market again from 2001 to the present (again characterised by negative real interest rates).

These may be most easily observed by comparing the nominal gold price to its 1934 indexed level, as shown below:

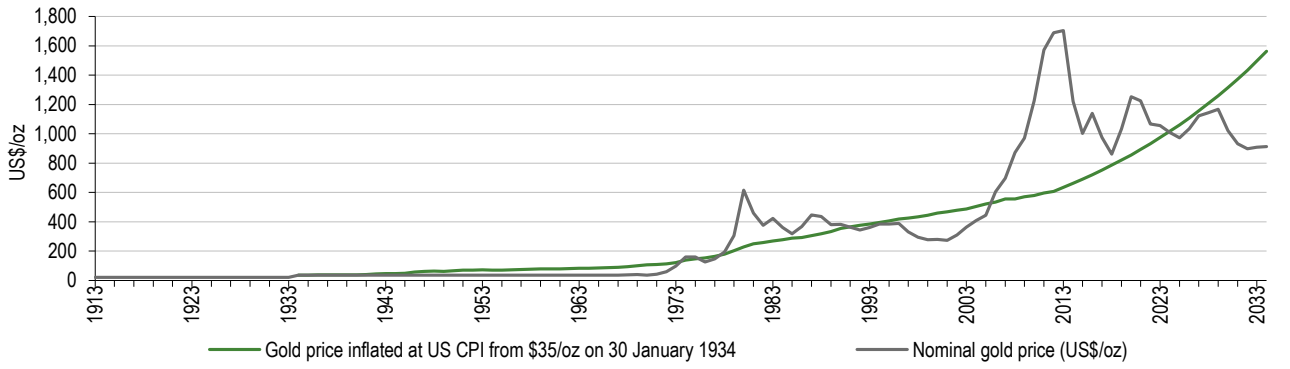
Exhibit 8: Nominal gold price/indexed gold price, 1934-2012



Source: Edison Investment Research, South African Chamber of Mines, US Department of Labor

On this basis, it may be concluded that the nominal gold price is close to its historic peak in 1980. If it were then to repeat the same cycle in 2013-2034 as it experienced in 1980-2001 relative to its 1934 indexed price, it could be expected to fall back into the range US$1,075/oz (±US$225/oz) for the next 21 years, as shown in the graph below:

Exhibit 9: Gold price, historic and forecast with respect to 1934 indexed price, 1913-2034



Source: Edison Investment Research, South African Chamber of Mines, US Department of Labor. Note: Prices are annual averages

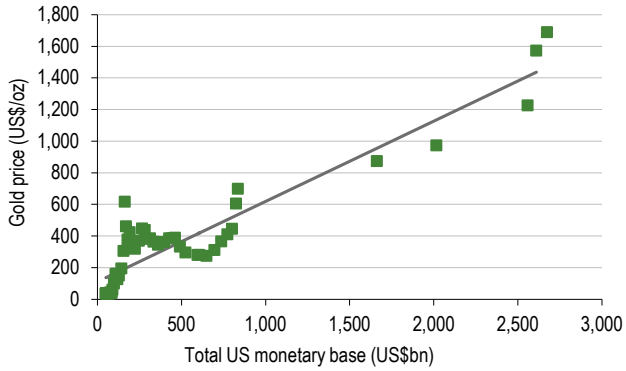
The indexed price (from which the future nominal price is derived) is assumed to increase at the same average annual rate as in the period 1971-2012.

Note that whether the peak occurs in 2012 or 2013 is a matter of opinion. In this case it is shown as occurring in 2013, although recent moves in the gold price (especially since April 2013) suggest that the market believes that the peak was actually reached in 2012.

The Revised theory

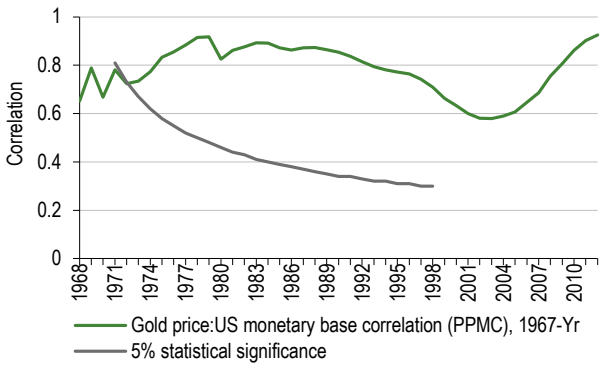
The Revised theory, by contrast, is based on the (statistically significant) correlation between the gold price (acting as a proxy for the total value of US gold reserves) and the total US monetary base, as shown in the graphs below over the periods shown:

Exhibit 10: Gold price vs total US monetary base regression analysis, 1959-2012



Source: Edison Investment Research, dollardaze.org, Federal Reserve; Note: PPMC = Pearson product-moment coefficient.

Exhibit 11: Correlation between gold price and total US monetary base, 1968-2012



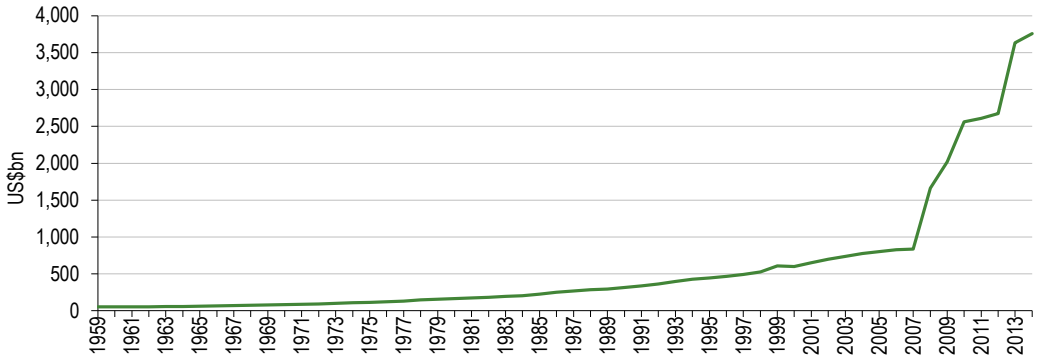
Source: Edison Investment Research, dollardaze.org, Federal Reserve.

Not only is the Pearson product-moment coefficient of 0.92 at a record, but it also indicates that there is less than a 5% chance the relationship is coincidental and that this has been the case since as long ago as 1973.

This analysis becomes significant at a time when the US monetary base is increasing. Even by the standards of the unconventional monetary policy employed in the 1970s, it can be seen that the degree of stimulus applied to the US economy in the seven years between 2007 and 2014 is without precedent (see Exhibit 12). Between 2007 and 2010 (under the influence of QE1 and QE2), the total US monetary base increased from US$0.8tn to US$2.6tn. It then remained ostensibly flat for 2011 and 2012. In the context of a stubbornly high unemployment rate, however, on 13 September 2012 Ben Bernanke announced that the Federal Reserve would re-start purchases of mortgage-backed bonds at a rate of US$40bn per month to stimulate the housing market and keep

long-term interest rates low. Unlike QE1 and QE2, moreover, he stated that the Federal Reserve would persist with the policy until the outlook for the job market improved substantially. The rate of bond purchases was subsequently increased to US$85bn per month such that, as of May 2013, the total US monetary base was US$3.1tn. Moreover, assuming tapering of US$10bn per month from September (ie purchases of US$75bn in October, US$65bn in November and US$55bn in December), it will reach US$3.6tn by the end of the year and (assuming purchases of US$45bn in January, US$35bn in February, US$25bn in March, US$15bn in April and US$5bn in May) US$3.8tn by the end of 2014, as shown in the graph below:

Exhibit 12: Total US monetary base, 1959-2014e

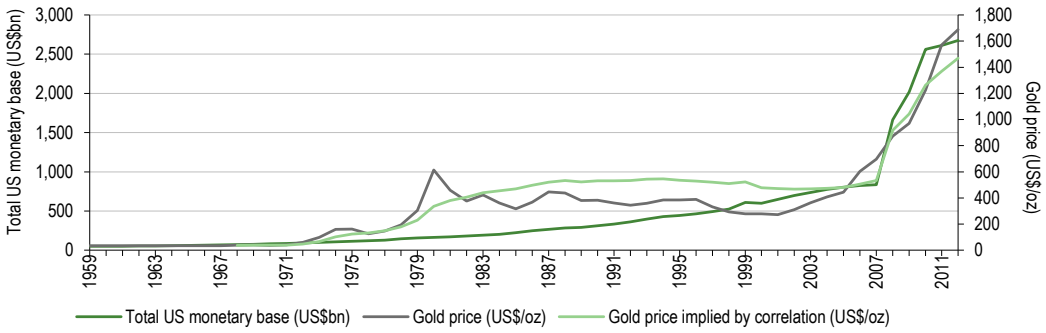


Source: Edison Investment Research, dollardaze.org, Federal Reserve

Note that over the whole course of the 55-year period depicted, the total US monetary base has contracted only twice, once in 1959-1960 and once again in 1999-2000, arguably suggesting an inherent bias towards inflation over time by the Federal Reserve.

Exhibit 13 shows what the gold price would have been predicted to be, had the prediction been based solely on the US monetary base. Note that the prediction is based on the relationship as it would have been perceived in the year shown.

Exhibit 13: Actual and predicted gold price (wrt total US monetary base), 1959-2012

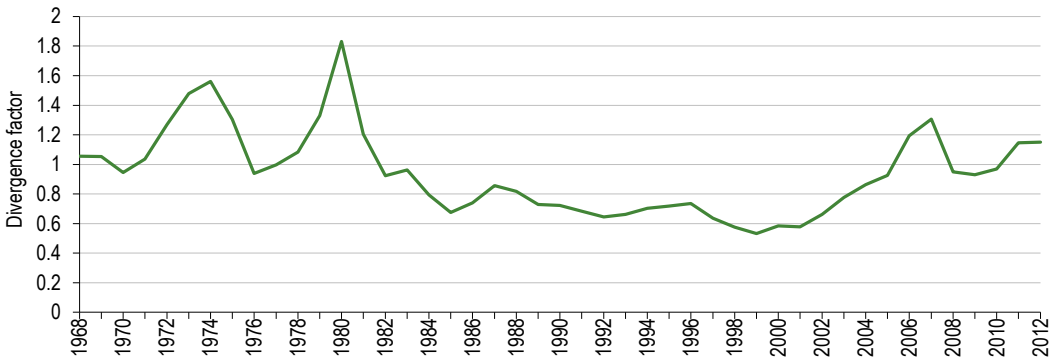


Source: Edison Investment Research, dollardaze.org, Federal Reserve

Given the historic relationship between the two, a monetary base of US$2,675bn in December 2012 was consistent with a gold price of US$1,469/oz, while one of US$3,116bn was consistent with US$1,692/oz in May. Expansion to US$3,635bn by December 2013 would then be consistent with a gold price of US$1,956/oz and expansion to US$3,760bn by December 2014 consistent with US$2,019/oz.

Statistically, the error of estimation of the regression analysis is ±US$136/oz, although historical analysis reveals that the gold price has traded at a premium to its implied price of up to 83% (in 1980) and at a discount of up to 47% (in 1999):

Exhibit 14: Gold price over/under-valuation wrt to price implied by total US monetary base



Source: Edison Investment Research, dollardaze.org, Federal Reserve. Note: wrt = with respect to

Of note is that the current gold price (US$1,325/oz at the time of writing – implying an annual average price of US$1,421/oz in CY13) is at a 27% discount to the price implied by its correlation with the total US monetary base as at end-December, which is more consistent with the bear market of the 1980s and 1990s than the bull market of the 2000s.

Crucially also, given that it is at a discount to its implied price, tapering is consistent not with absolute falls in the price of gold but merely a decline in the rate of increase. Currently the rate of bond purchases of US$85bn (and hence an increase in the total US monetary base of US$85bn per month) is consistent with an increase in the long-term price of gold of US$43/oz per month.

Alternatively, under the Revised theory, the current price of gold can be interpreted as discounting a contraction in the monetary base to US$2,392bn (ie reversing all of QE3 and some of QE2).

Rationalising the Standard theory with the Revised theory – the inflation paradox

The obvious rationalisation of the two theories is that the increased money supply observed in the Revised theory has not manifest itself as inflation in the US CPI in the manner in which monetarists would conventionally expect and expressed in Milton Friedman's famous phrase, "Inflation is always and everywhere a monetary phenomenon, in the sense that it cannot occur without a more rapid increase in the quantity of money than in output."

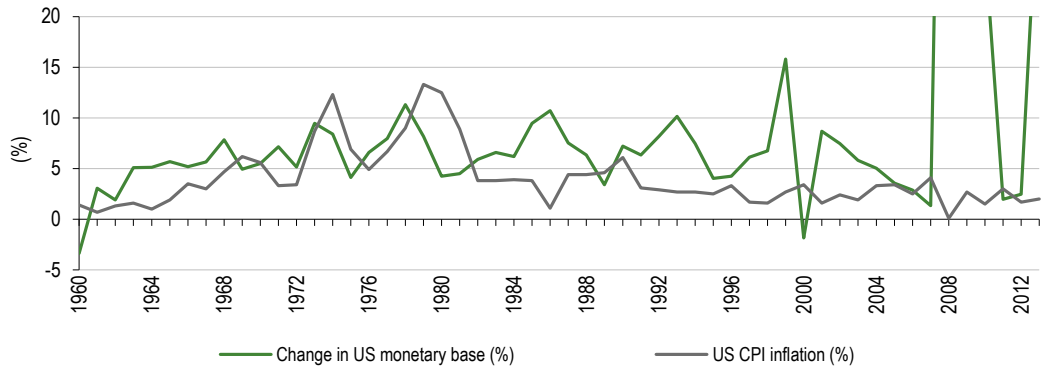
The question therefore is whether it will manifest itself in such a way this time around and, if so, by how much?

Inflation, prices and the monetary base

Historic relationship between inflation and changes in the monetary base

A graph comparing US CPI inflation with changes in the total US monetary base is as follows:

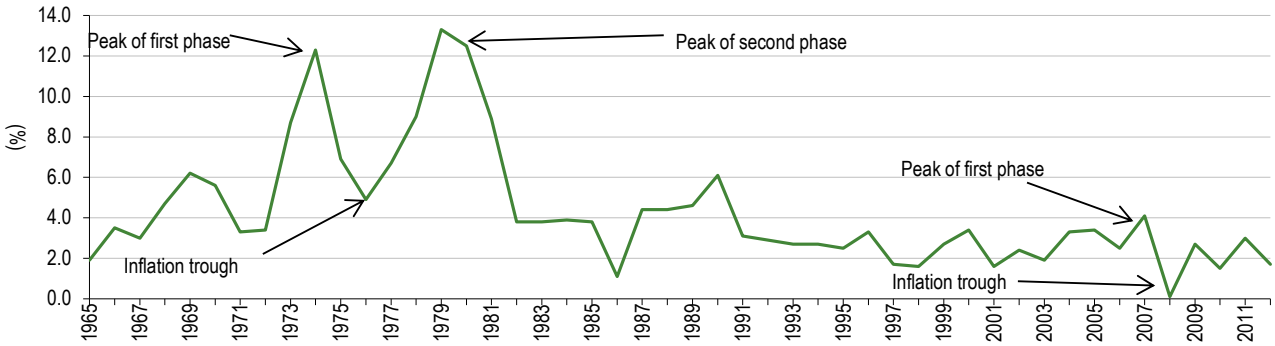
Exhibit 15: US CPI inflation vs change in monetary base, annually, 1960-2013e



Source: Edison Investment Research, dollardaze.org, US Department of Labor, Federal Reserve

Immediately apparent is the coincidence of twin peaks in inflation and monetary expansion in the 1970s. In the first peak, burgeoning inflation (catalysed by twin US deficits) was combated by the authorities with monetary tightening, which conspired to suck financial markets into a debilitating debt-deflation spiral in 1973-74. During this period, the Dow Jones Industrials Average lost 45% of its value, while the US economy slowed from 7.2% real GDP growth in 1972 to a 2.1% contraction in 1974. As a result, the world's authorities reacted by adopting unconventional (and arguably excessively stimulative) monetary policies to counteract the resulting recession and thereby created a distinctive second peak in inflation later in the decade, in 1979.

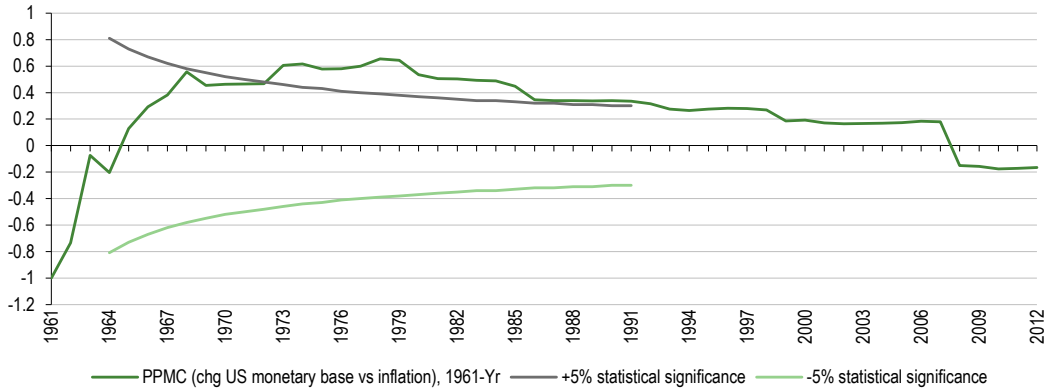
Exhibit 16: US consumer price index, change year-on-year, 1965-2012



Source: US Department of Labor

Quantitatively, the correlation between the two can be represented by the Pearson product moment coefficient (PPMC) over time, as follows:

Exhibit 17: Correlation of inflation with change in total monetary base, 1961-Yr

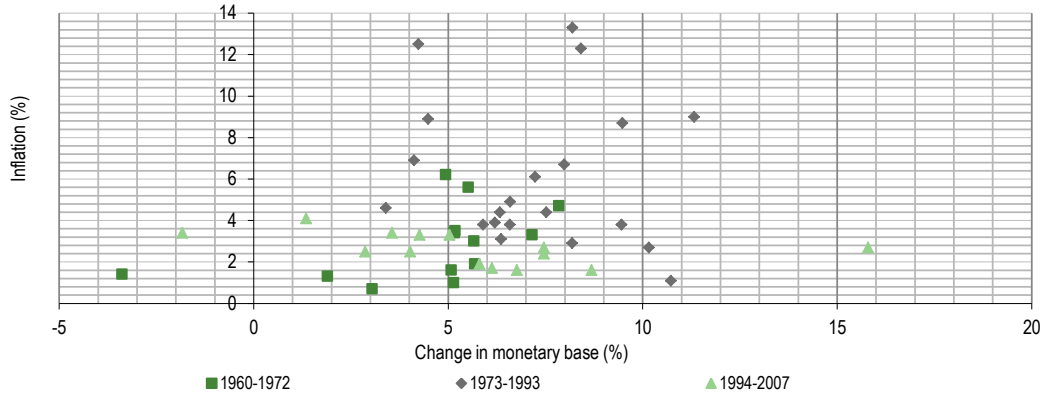


Source: Edison Investment Research, US Department of Labor, dollardaze.org, Federal Reserve

Of note is the fact that the correlation between the two is statistically significant between the years 1973 and 1993 (corresponding with the period of unconventional monetary policy and its aftermath), but not before 1973 or after 1993. Also apparent is the complete breakdown of the relationship since 2007 (the last year of conventional monetary policy in the current cycle).

Qualitatively, this pattern is also borne out by analysis of the related scattergram, with low increases in the monetary base and low inflation in the early 1960s giving way to higher increases in the monetary base and higher inflation in the late 1960s and then even higher increases in the monetary base and inflation in the 1970s and 1980s before being brought under control in the 1990s and 2000s.

Exhibit 18: Scattergram, US CPI inflation vs change in total US monetary base, 1960-2007



Source: Edison Investment Research, US Department of Labor, dollardaze.org, Federal Reserve

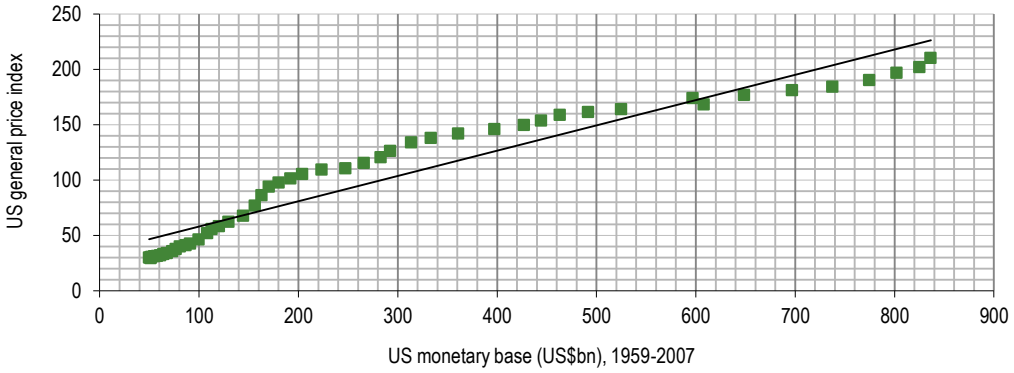
Of note that, once inflationary pressures are in the system (eg the late 1960s), they subsequently appear to become difficult to control – that is to say, small increases in the US monetary base in period 1973-1993 were still characterised by relatively high inflation. Note that this is suggestive of a 'lagged' relationship between changes in the monetary base and inflation.

Also apparent is the observation that increases in the monetary base in excess of 4% appear to carry a risk of disproportionately high inflation (within that context, note that the annual increases in the total US monetary base in the past six years to 2013 have been 99%, 21%, 27%, 2%, 2% and an estimated 36%).

The historic relationship between prices and the monetary base

The relationship is equally well (and arguably better) demonstrated by an analysis of prices (rather than inflation) against the monetary base (rather than changes in the monetary base), which to some extent overcomes the effect of a 'lagged' relationship. In this particular case, it can be seen that the correlation between prices, as measured by the US CPI, and the total US monetary base has been extremely close, historically, with a correlation coefficient of 0.96 for the period 1959-2007:

Exhibit 19: Scattergram of total US monetary base vs US consumer price index, 1959-2007

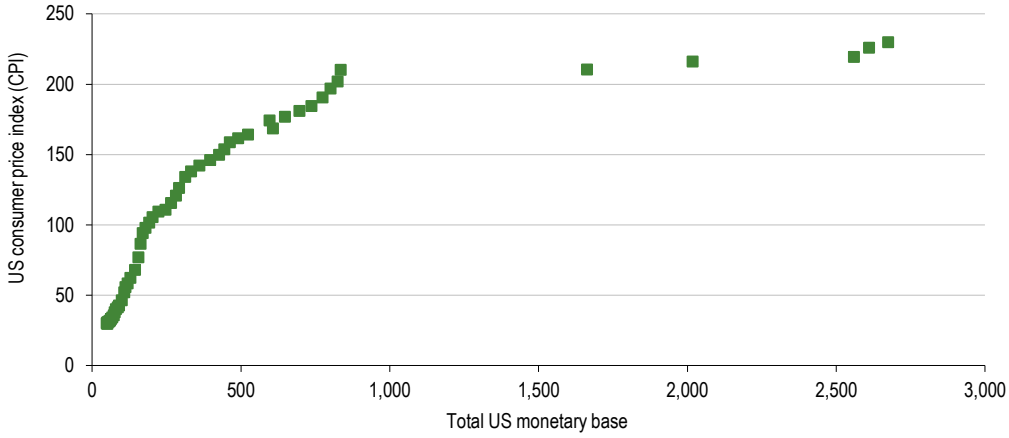


Source: Edison Investment Research, US Department of Labor, dollardaze.org, Federal Reserve

Periods of greater than-average inflation are recognisable by an above-average gradient. Periods of below average inflation are recognisable by a below-average gradient.

Within the context of this line, what has followed since 2007 is remarkable:

Exhibit 20: Scattergram of total US monetary base vs US consumer price index, 1959-2012



Source: Edison Investment Research, US Department of Labor, dollardaze.org, Federal Reserve

Note that the first 49 data points in the series are identical in Exhibits 19 and 20. Also, the next data point, for 2013, will be at approximately (3635, 236) – ie considerably to the right and only fractionally higher up than the preceding point in the top right.

This analysis would then seem to bear out the observation that the money printed in the US has not yet expressed itself in inflation in the price of the everyday basket of goods in the manner conventionally expected. In fact, if the historic relationship is to be recovered, then the US CPI will have to rise to 895 – ie 3.8x the current level – for zero increase in the total monetary base above US$3,760bn (the predicted level in December 2014, see pages 10-11).

In an article published in the *Financial Times* on 26 June 2009, former Federal Reserve chairman, Alan Greenspan, asserted that it takes approximately three-and-a-half years for the effects of quantitative easing to become apparent in inflationary statistics. That was certainly true of the 1970s economic crisis, when 1974 represented the year of debt-deflation and 1979 the year of peak, 'second-phase' inflation (see Exhibit 16). To date, it has proved not to be true of the 2000s crisis. Rather than disproving the theory, however, this may merely suggest that the cycle is evolving over a longer timeframe. If it is true that "inflation is always and everywhere a monetary phenomenon' and that we live in a world of a perpetually increasing monetary base, then the likelihood exists that significant inflationary forces have been unleashed by the Federal Reserve, even if they have yet to manifest themselves. If history is any guide, that they will do (excepting the possibility of a sharp reduction in the monetary base) should not be doubted.

Future gold price scenarios

Given the recent expansion of the total monetary base therefore, it is possible that the extrapolation of the indexed price of gold (see Exhibit 9) at the average rate of inflation for the period of fiat currencies (1972-2012) materially underestimates future inflation. If prices do indeed have to rise by 3.8x from the current level, this may be achieved by the following inflation rates over the following periods of time:

Exhibit 21: Inflation rate required over number of years to increase prices by 3.8x

Inflation rate (%)	Years
30.5	5
14.2	10
9.3	15
6.9	20
5.5	25
4.5	30

Source: Edison Investment Research

Compared to the 4.4% assumed in the extrapolation of the indexed price of gold in Exhibit 9 therefore, there exists the possibility that the rate will be materially higher, in which case the right hand side of the graph will be skewed upwards relative to the left hand side – ie implying a higher overall future gold price scenario, notwithstanding a repetition of the same cycle.

Exhibit 22 therefore considers three possible gold price scenarios in the light of the recent increases in the total US monetary base (note that, in each case, the monetary base is assumed to revert to its long-term growth rate of 6.6% after the tapering to June 2014, as previously described on page 11):

1. The gold price rapidly achieves the price implied by its empirical correlation and then increases in lockstep with the total US monetary base thereafter.
2. The gold price repeats the same cycle with respect to the monetary base correlation in 2013-2039 that it experienced in 1981-2007 (as depicted in Exhibits 13 and 14).
3. The gold price repeats the same cycle with respect to inflation in 2013-2039 that it experienced in 1981-2007 (as depicted in Exhibits 7, 8 and 9) but with the inflation rate adjusted such that this analysis dovetails with the monetary base relationship expressed in scenario 2 in 2038 (ie after approximately one further cycle). In this case, the long-term inflation rate can be calculated to be 10.7%. While this appears high by the standards of recent history, it could be rationalised as 4.4% (being the average rate in the period of fiat currencies to date, 1972-2012) when the monetary base was growing in excess of 6% per year, plus c 5.5% for prices to catch up to those implied by the recent increases in the total monetary base over c 25 years (as depicted in Exhibit 21).

The results of this analysis are shown in the graph below:

Exhibit 22: The gold price predicted wrt the total US monetary base and rationalised with predicted inflation, 2013-2039

Source: Edison Investment Research, dollardaze.org, Federal Reserve, US Department of Labor, South African Chamber of Mines

Several features of the analysis are of note:

a. A steady inflation rate is assumed to bring prices in line with those implied by the recent increases in the monetary base in 2038, whereas comparable history in the 1970s and early 1980s suggests that inflation resulting from unconventional monetary policy expresses itself in the form of higher rates earlier on, tapering downwards with time – ie the second inflation peak as depicted in Exhibit 16 in the 1979-2003 cycle). Stated alternatively, much of initial increase in prices purely as a result of increases in the total monetary base may be expected to express themselves rapidly in the form of high inflation rates early on. As such, the lower line in Exhibit 22, entitled 'Gold price derived wrt inflation' may be expected to be higher in the earlier years and therefore, in its current form, represents something of a minimum price of gold at the current time.
b. An inflation rate of c 10% is in the interests of western world governments inasmuch as they are able to keep their borrowings in check in nominal terms, in that it will approximately halve debt to GDP ratios within the course of a decade (assuming nominal GDP growth at least in line with inflation).
c. The principle risk associated with the analysis is workers' demands for earnings increases to keep pace with inflation and the associated effect on interest rates. If inflation increases to c 10%, but workers are content to accept low earnings increases (ie to become poorer in real terms), central banks should be able to maintain a low interest rate environment and therefore negative real interest rates, which is a strongly supportive environment for real assets (eg gold). This scenario would tend to see gold rise to the level implied by the monetary base correlation (ie to the top of the range depicted in Exhibit 22). If workers demand inflation-beating earnings settlements, however, it could lead to an uncontrolled inflationary spiral, which will only be brought under control by the re-imposition of positive real interest rates and, probably, a severe recession akin to 1980-1982 – in which case the gold price will tend to fall to the bottom of its range, derived with respect to inflation, as depicted in Exhibit 22).

As such Edison's forecast trading range for gold for the next seven years, until 2020 is as follows:

Exhibit 23: Edison forecast gold price range, 2013-2020e (US$/oz)

	2013	2014	2015	2016	2017	2018	2019	2020
Monetary base correlation	1,956	2,019	2,146	2,281	2,424	2,578	2,741	2,916
Monetary base correlation & cycle	2,357	1,866	2,065	1,810	1,636	1,909	2,348	2,384
Top of the range	**2,357**	**2,019**	**2,146**	**2,281**	**2,424**	**2,578**	**2,741**	**2,916**
Middle of the range*		**1,511**	**1,642**	**1,627**	**1,643**	**1,805**	**1,996**	**2,070**
10.7% long-term inflation	1,374	1,197	1,442	1,308	1,227	1,558	2,006	2,082
4.4% long-term inflation (bottom of range)	**1,221**	**1,003**	**1,139**	**974**	**862**	**1,032**	**1,252**	**1,225**

Source: Edison Investment Research; Note: * Simple average of top and bottom of the range.

Note also that the likely 2013 average gold price of US$1,421/oz is within US$200/oz (or 17%) of the bottom of Edison's bottom of the range forecast, but US$936/oz (or 40%) below the top of the range forecast – ie there is considerably more upside potential in the price than downside potential.

Given that the 2.0x expansion of the monetary base in the 1970s gave rise to an era in which inflation averaged 4.4% from 1972 until 2012, Edison regards it as unlikely that the 3.8x expansion of the monetary base in the period 2008-2014 will lead to an era with a lesser inflation rate in the next 30 years, given the proportionally greater extent of the increase, unless there is a future sharp future contraction (the total US monetary base has contracted only twice since 1959, once in 1960 and once again in 2000).

Note that a re-imposition of positive real interest rates (as potentially envisaged in scenario c on page 17) would result in Edison's recalibrating its 'top of the range' forecast to become that implied by both the correlation and the cycle in Exhibit 23 above, in which case its forecasts would be as follows:

Exhibit 24: Edison forecast gold price range, 2013-2020e (US$/oz)

	2013	2014	2015	2016	2017	2018	2019	2020
Monetary base correlation & cycle	**2,357**	**1,866**	**2,065**	**1,810**	**1,636**	**1,909**	**2,348**	**2,384**
Middle of the range*		**1,434**	**1,602**	**1,392**	**1,249**	**1,470**	**1,800**	**1,804**
10.7% long-term inflation	1,374	1,197	1,442	1,308	1,227	1,558	2,006	2,082
4.4% long-term inflation (bottom of range)	**1,221**	**1,003**	**1,139**	**974**	**862**	**1,032**	**1,252**	**1,225**

Source: Edison Investment Research; Note: * Simple average of top and bottom of the range

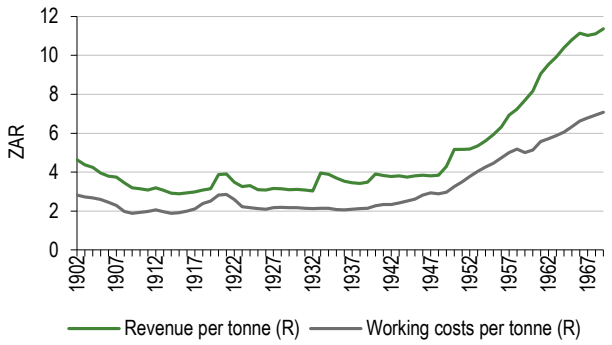
As such, it can be seen that the switch from negative to positive real interest rates on a long-term basis is worth up to c US$400/oz on the gold price.

Otherwise, as noted previously, the current gold price may be interpreted as discounting a contraction in the monetary base to US$2,392bn (ie reversing all of QE3 and some of QE2).

A cautionary tale for investors

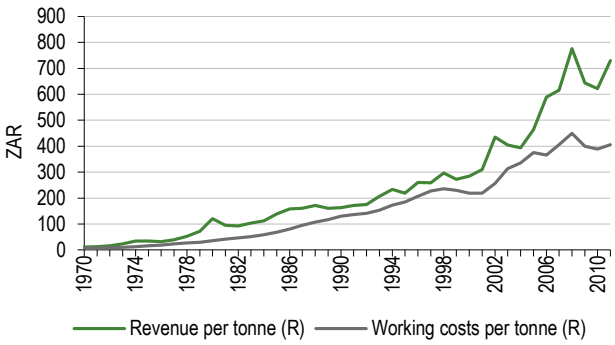
While a higher gold price (as suggested/predicted in Exhibit 23 in particular) would probably be welcome among gold mining companies, investors should be aware that, historically, revenues and costs have demonstrated high correlations and it is rare for the two to diverge appreciably over significant periods of time. For the South African gold mining industry for example (as represented by the South African Chamber of Mines), there is a 0.98 correlation between unit costs and unit revenues, expressed in local currency, for the 109 years from 1902 until 2011. Moreover, there is scarcely any less correlation (0.96) in the modern era (being defined as since 1980, for these purposes). Clearly both of these results are highly statistically significant.

Exhibit 25: SA CoM revenue/t vs cost/t, 1902-1969



Source: South African Chamber of Mines (SA, CoM), Edison Investment Research

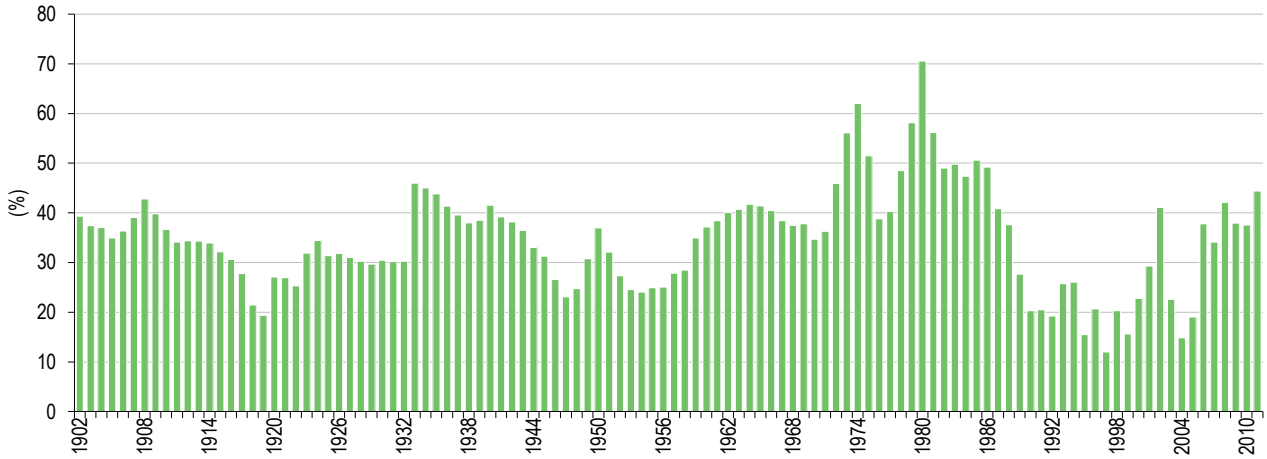
Exhibit 26: SA CoM revenue/t vs cost/t, 1970-2011



Source: South African Chamber of Mines (SA, CoM), Edison Investment Research

As a result, margins exhibit a tendency to revert to a mean over time. Since 1902, average South African mining margins have been 34.8%, with a standard deviation of 10.2%:

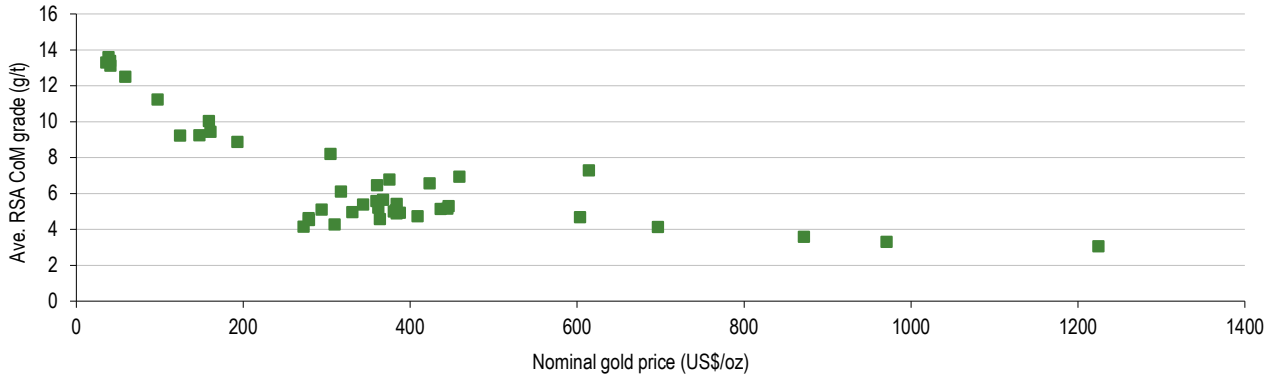
Exhibit 27: South African gold mining margins, 1902-2011



Source: South African Chamber of Mines, Edison Investment Research

To some extent this may be attributed to the correlation between input costs (particularly in the form of other commodities – eg fuel, power, water, cyanide etc) and the gold price. However, as the graph below implies, there is also evidence of active grade management in the form of a statistically significant inverse (but not necessarily linear) relationship between the average grade of ore mined and the nominal gold price, expressed in US dollars:

Exhibit 28: Scattergram of average grade mined in South Africa (g/t) vs nominal gold price (US$/oz), 1968-2011



Source: South African Chamber of Mines (RSA CoM), Edison Investment Research

Note that the Pearson Product Moment Coefficient between the nominal gold price in US dollars and the average grade of ore mined, as depicted in Exhibit 28, is -0.76.

As such, higher gold prices are often accompanied by higher costs, lower grades and lower-than-forecast margins. Moreover, while the analysis above applies to South Africa over 100 years, similarly statistically significant relationships can be observed over shorter periods of time for non-South African companies as well.

Part II

The in-situ value of exploration gold

In November 2012, Edison analysed 125 producing and exploring companies with combined resources totalling 1.7bn ounces to calculate an average in-situ valuation of gold of US$108/oz (vs US$159/oz in January 2010). In addition, it analysed average discount rates for companies at different stages of development (see page 22) and was thereby able to create and value a notional gold mining company, which it called NonSuch Gold Ltd, at every stage of its development. During the course of that analysis, it was demonstrated that the in-situ value of producers' ounces depends critically on reserve-resource conversion ratios, capital expended and to be expended in the project and margins, among other things. Given that these are uniquely different for different projects, it calls into question the appropriateness of comparing companies in production in particular with those that are exploring. As a result, Edison has refined its methodology for this report to exclude producers and to focus exclusively on the value of in-situ ounces to explorers, where the principle asset of the company is its undeveloped resource base. Note that these values are still appropriate to apply to the undeveloped assets of producers; however, they should not be used for producing companies themselves nor for resource extensions that are capable of being mined from existing infrastructure.

Detailed descriptions of the methodology used and the companies analysed are included in the appendices. The results are as follows:

Exhibit 29: Global average value of in-situ explorers' resources, by listing and categorisation (US$/oz)

	August 2013				August 2012				Variance (%)			
	Measured	Indicated	Inferred	Total	Measured	Indicated	Inferred	Total	Measured	Indicated	Inferred	Total
London market	83.74	43.14	-3.54	23.23	94.54	50.21	(5.04)	26.33	-11.4	-14.1	29.7	-11.8
Canadian market	37.39	16.46	2.17	16.37	(37.06)	52.63	3.84	24.52	200.9	-68.7	-43.4	-33.3
Australian market	-11.80	76.01	3.67	29.46	236.33	83.52	8.33	85.24	-105.0	-9.0	-55.9	-65.4
Arithmetic mean	**36.44**	**45.20**	**0.77**	**23.02**	**97.94**	**62.12**	**2.38**	**45.36**	-62.8	-27.2	-67.8	-49.2
Geometric mean	**-8.74**	**37.68**	**2.04**	**19.07**								

Source: Edison Investment Research

Note that over the same timeframe, the price of gold has fallen by approximately 17.2%, from an average of US$1,626/oz in August 2012 to US$1,347/oz in August 2013.

Of note is the decline in the values of all ounces with the exception of 'inferred' ounces listed in London, which now carry a less negative valuation than previously, and 'measured' ounces listed in Canada, which now exhibit a more conventional relationship to 'indicated' and 'inferred' ounces than in the past (not least on account of the de-rating of 'indicated' and 'inferred' ounces). By contrast, the value of Australian 'measured' ounces has collapsed (albeit to a level consistent with the last time that gold was at similar levels in H210 – see later), although the value of Australian 'indicated' ounces has held up well.

The analysis demonstrates a convergence in the valuations of 'measured' and 'inferred' ounces across the three markets since the publication of *Gold – New benchmarks for old* in November 2012, but a divergence in the valuations of 'indicated' ounces on account of their devaluation in the Canadian market, and relative resilience in the Australian one in particular.

The evolution of value in exploration companies

In the January 2010 publication, *Gold – Valuation benchmarks are obsolete*, Edison and BDO calculated global discovery costs of US$7.16 for 'inferred' ounces, US$10.50 for 'indicated' and US$36.82 for 'measured' ounces.

On this basis, it can be seen that the conversion of cash into 'inferred' ounces is value destroying (on average) in each of the three markets under review.

For an incremental investment of US$3.34/oz to upgrade an 'inferred' ounce to an 'indicated' one, the London market will add US$46.68/oz in value, the Canadian market will add US$14.29/oz and the Australian market will add US$72.34/oz (ie all are extremely value adding in percentage terms).

For an additional incremental investment of US$26.32/oz to upgrade the 'indicated' ounce to a 'measured' one, the London market will add an additional US$40.60/oz in value, while the Canadian market will add only US$20.93/oz and the Australian market will subtract US$87.81/oz.

Considered alternatively, the budget required to delineate a resource of 100oz in the proportions 21 'measured' to 57 'indicated' to 23 'inferred' (being the global average of companies will all three categories of resources) is US$1,519. For the purposes of this example, it will be assumed that the resource is delineated as follows:

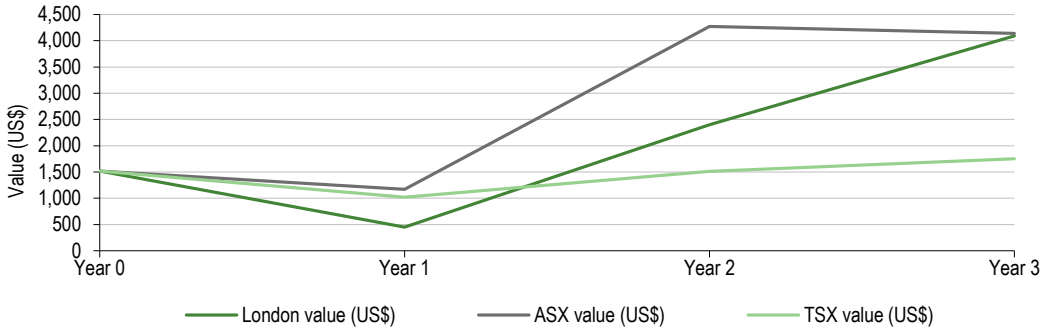
Exhibit 30: Theoretical explorer's resource evolution by year (oz)

Resource category	Year 0	Year 1	Year 2	Year 3
Measured	0	0	0	21
Indicated	0	0	45	57
Inferred	0	100	55	23
Total	**0**	**100**	**100**	**100**

Source: Edison Investment Research. Note: Totals may not add up owing to rounding.

Then assuming that the ounces drilled in each centre of mining finance carry the values calculated previously (see Exhibit 29) and that an exploration company is valued solely on the basis of its cash plus resource, the company's valuation will develop, depending on whether it is listed in London, Canada or Australia, as shown below:

Exhibit 31: Valuation of explorer developing 100oz resource, by year and market (US$)



Source: Edison Investment Research

As such, the London and Australian markets will convert cash of US$1,519 into a resource valued at US$4,095 and US$4,141 respectively (ie just over US$40 per total oz), whereas the Canadian market will convert it into a resource valued at US$1,755 (ie US$17.55/oz). That said, the proportion of value carried in the London and Canadian markets is approximately 50% in the 'measured' category and 50% in the 'indicated' category, whereas it is 100% to the 'indicated' category alone in Australia.

Part III

The evolution of value in producers and developers

While companies at the exploration stage are typically valued with respect to their resource base and their blue-sky exploration potential (as analysed previously), development and production companies are typically valued in relation to the value of future cash flows expected to be derived from the mine over the life of operations, discounted to present value.

Edison has approximately 60 mining companies under full-time coverage at every stage of development, from resource definition to production. From this sample, it is possible to determine the implied discount rates applied to each company by the equity market at any one time in order to justify their share prices. If the companies are then sorted according to the developmental stage of their projects, it is then possible to determine the range of discount rates applied to projects at a certain stage.

For the purposes of the statistical analysis, the following numerical monikers have been used:

1 – Scoping study

2 – Pre-feasibility study (PFS)

3 – Bankable feasibility study (BFS)

4 – Development (ie funding raised and in the process of constructing the project)

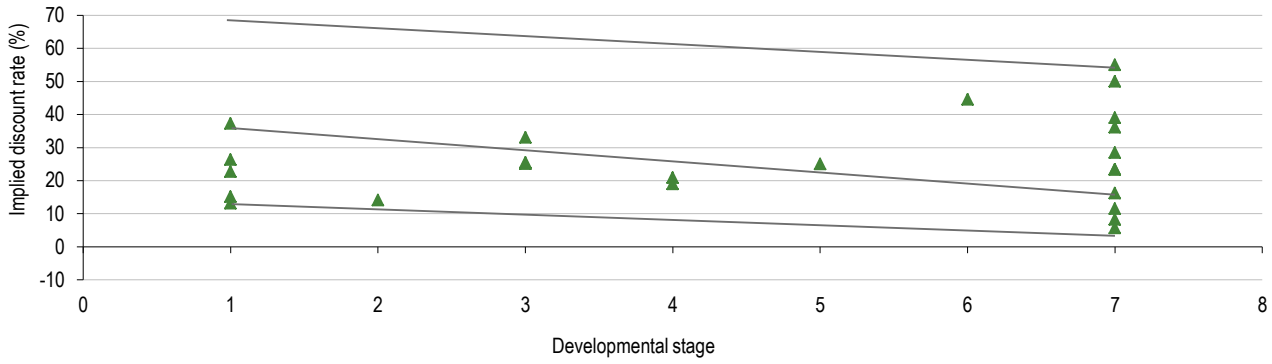
5 – Production ramp-up

6 – Production from subsidiary asset (ie not the main asset)

7 – Full production from main asset

In the case of Edison's clients, this analysis has now been performed three times (once in October 2011, then again in October 2012 and finally once again in October 2013). The results from this analysis (including Edison's interpretation of the upper, lower and mean trend lines) are as shown in Exhibit 32 below.

Exhibit 32: Implied discount rates applied to companies at varying stages of development

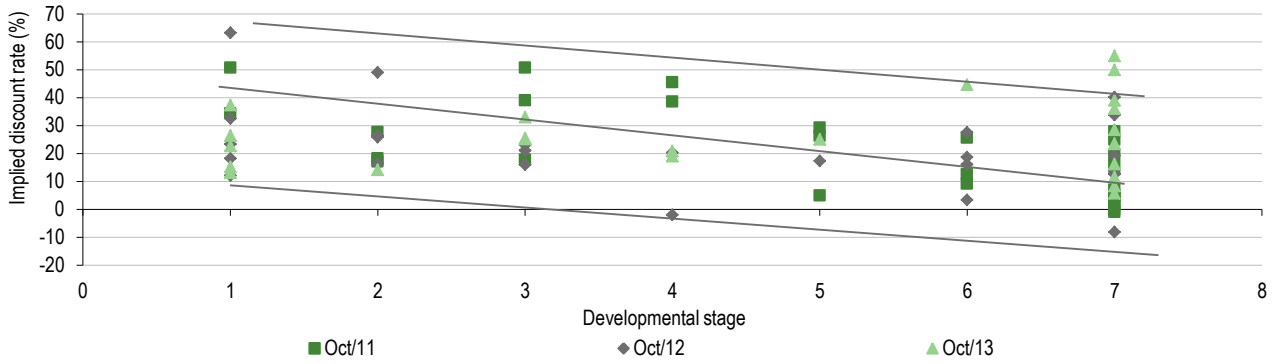


Source: Edison Investment Research. Note: Discount rates applied relative to discounted dividend flow valuation.

Note that these discount rates are applied relative to a discounted dividend flow valuation of the companies in question. See later for equivalent discount rates relative to a standardised discounted cash-flow valuation, as typically performed by third-party consultants.

The analysis for October 2013 compares with that of October 2012 and October 2011, as follows:

Exhibit 33: Implied discount rates for companies at varying stages of development (Oct 13 vs Oct 12 & Oct 11)



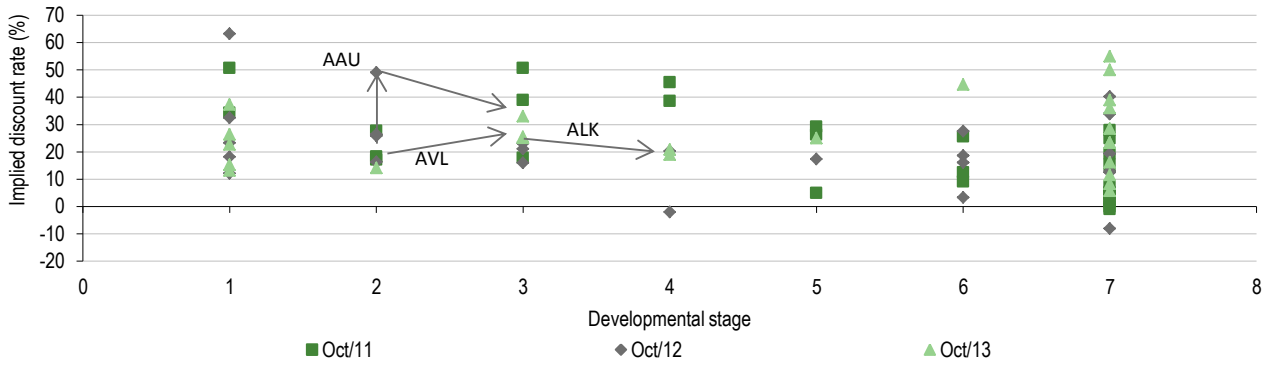
Source: Edison Investment Research

Note that the lines shown in Exhibit 33 are those postulated in Edison's October 2012 analysis. Immediately apparent therefore is a broadening of the range of discount rates applied to companies at varying stages of development (at Edison's long-term metal price assumptions), particularly at the production end of the spectrum. Arguably, there has also been a shallowing of the slope of the lines, with early-stage development companies holding their value well relative to producing companies.

For companies directly comparable in 2013 relative to 2012 (ie the same company at the same stage of development) the average increase in the discount rate over the course of the past year has been 9.2%, with a maximum increase of 23.2% and a minimum of -1.3% (ie a discount rate 1.3% lower than the previous year). Only two companies recorded lower discount rates in October 2013 relative to October 2012.

In addition, three companies have advanced their stage of development: Ariana, Avalon and Alkane. Of these, Alkane recorded a fractionally lower discount rate; the other two were between 9% and 16% higher, albeit Ariana's implied discount rate reduced by c 16% over the period actually covered by the transition (see below):

Exhibit 34: Implied discount rates with respect to development stage, Oct 11, 12 & 13, highlighting transitions



Source: Edison Investment Research

Given that in its previous report *Gold – New benchmarks for old*, published in November 2012, Edison calculated discount rates declining by approximately 5% per stage of development advanced, an overall increase is consistent for companies advancing by one development stage, but within an environment in which the discount rate for each stage has increased by c 9%.

In summary, Edison's interpretation of the maximum, mean and minimum discount rates for companies at each stage of development in October 2013 relative to October 2012 (and how they have changed) is given in the table below:

Exhibit 35: Discount rate for companies by development stage, Oct 13 vs Oct 12 (percent)

Development stage	Scoping study	PFS	BFS	Development	Ramp-up	Subsidiary production	Production from main asset
Numerical moniker (as above)	**1**	**2**	**3**	**4**	**5**	**6**	**7**
October 13							
Maximum discount rate (%)	69	66	64	62	60	57	55
Mean discount rate (%)*	35	33	30	27	24	20	17
Minimum discount rate (%)	15	13	10	8	5	3	0
October 12							
Maximum discount rate (%)	65	61	58	54	49	45	40
Mean discount rate (%)*	42	36	31	26	20	16	10
Minimum discount rate (%)	9	6	2	-2	-4	-8	-11
Change (percentage points)							
Maximum discount rate (%)	4	5	6	8	11	12	15
Mean discount rate (%)*	-7	-3	-1	1	4	4	7
Minimum discount rate (%)	6	7	8	10	9	11	11

Source: Edison Investment Research. Note: *As interpreted by Edison Investment Research.

Note the apparent 'pivot point' around the bankable stage, with companies at earlier stages of development apparently enjoying relatively higher valuations (after adjusting for revised costs etc, if appropriate) and companies at later stages of development generally suffering from lower valuations, on average.

Discounted cash-flow (DCF) versus discounted dividend flow (DDF)

As discussed in *Gold – New benchmarks for old*, published November 2012, it is inappropriate to apply the same discount rate to a discounted cash-flow analysis as a discounted dividend flow analysis. All of Edison's discount rates derived hitherto relate specifically to discounted dividend flow analyses. The following table demonstrates the discount rates that must be applied to cashflows to achieve the same result:

Exhibit 36: Mean discounted dividend flow discount rates, by development stage, and equivalent DCF rates

Development stage	Scoping study	PFS	BFS	Development	Ramp-up	Full production
DDF discount rate (%)	35	33	30	27	24	17
Equivalent DCF rate (%)	29	26	22	27	22	17

Source: Edison Investment Research

Standardised discounted cash-flow discount rates

It is also possible then to calculate that average, maximum and minimum rates that should be applied to a standardised DCF of the type that might be performed by an external consultant in a PFS or BFS. In this case, discounting cash flows from Year 7, when capital expenditure starts, at a standardised rate of 10%, results in a value (including residual study and central costs) of NonSuch's project of US$144.1m. The appropriate rates to apply to project cash flows to rationalise the project and company valuations are then as follows:

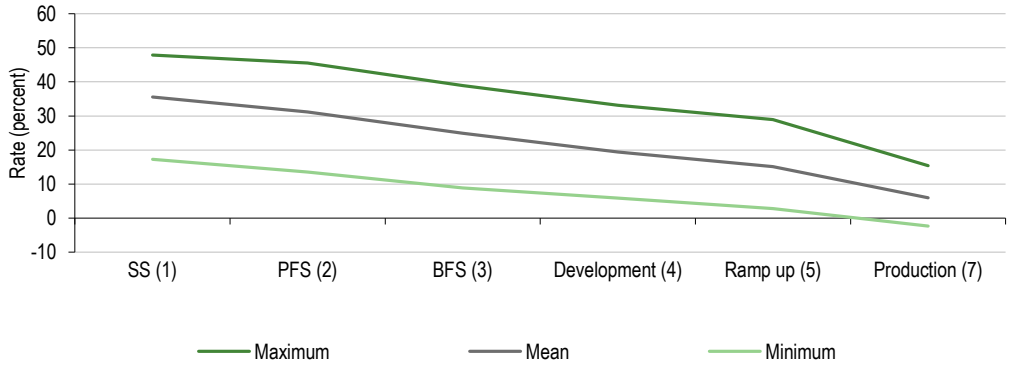
Exhibit 37: Mean, maximum and minimum discount rates to apply to standardised project cash flows (%)

Development stage	Scoping study	PFS	BFS	Development	Ramp-up	Full production
Maximum	48	46	39	33	29	15
Mean	36	31	25	19	15	6
Minimum	17	14	9	6	3	-2

Source: Edison Investment Research

This may be depicted graphically as follows:

Exhibit 38: Mean, max & min discount rates to apply to standardised project cash flows



Source: Edison Investment Research

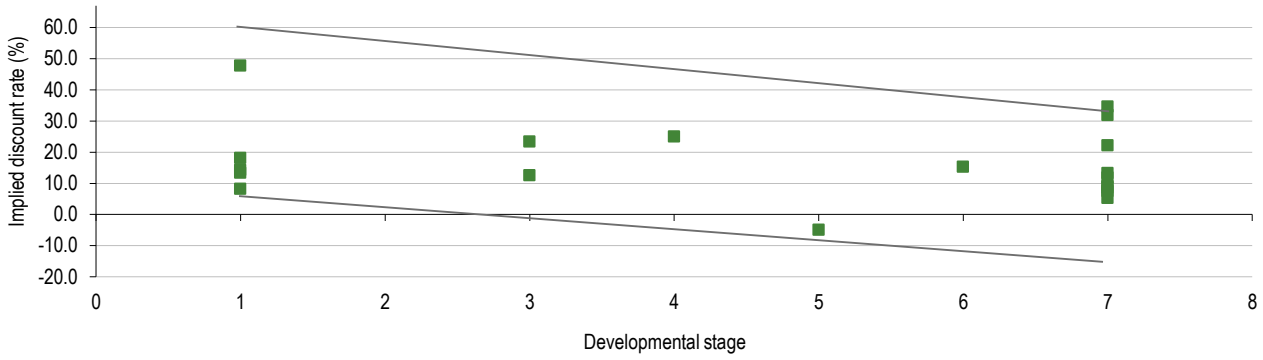
Note the early-stage asymmetry of the mean line within the range bounded by the maximum and minimum, which decreases with time, reflecting the potential for early stage overvaluation of a project/company, among other things. Note also the disproportionately sharp fall in the discount rate as a project moves from ramp-up to full production, implying a particularly sharp re-rating of the company – in line with normal practice in the sector as 'execution risk' is observed to fall away from the company/project.

Spot prices versus long-term prices

The analysis above was conducted at Edison's long-term metals prices and, in particular, a long-term gold price of US$1,676/oz. When it was conducted last in October 2013, the gold price was trading at close to Edison's price – hence the spot price and the long-term price analysis were effectively identical. Currently, however, the spot gold price is trading at a substantial (c 22%) discount to Edison's long-term price, which gives us the opportunity to conduct the same analysis but with different metals prices.

In this case, the results of exactly the same process, but using spot prices rather than long-term metals prices are as follows:

Exhibit 39: Implied discount rates for companies at varying stages of development, Oct 13, spot metals prices



Source: Edison Investment Research

Note that the lines shown in Exhibit 39 are those in Edison's equivalent analysis in October 2012 (there is one statistical outlier at point (7, 89) which has been excluded on the basis that it is company specific rather than reflective of the general pattern). In this instance, however, what is immediately apparent is the similarity of the two analyses when conducted at spot prices, implying that the market in general appears to hold little store by analysts' long-term metals prices and

simply values companies based on the spot price of the metal, the last reasonable estimate of costs, likely dilution and the company's stage of development.

One possible refinement to this thesis, however, is to observe the group of companies with relatively low discount rates at relatively early stages of development (eg scoping study, numerical moniker 1). When coupled with the apparent increase in valuations of companies at early stages of development relative to those at later stages (ie Exhibit 32), this might be taken as evidence that such companies 'enjoy' the benefit of being valued at long-term metals prices, whereas those in production tend to be valued at the spot price.

Part IV

NonSuch Gold Ltd

Applying the updated discount rates to NonSuch Gold Ltd results in a 20-30% decline in the valuation of the company over the life of its operations (albeit specifically dependent on the stage of development), although the maximum valuation that it could hope to attain is 55% lower. Once dilution has been taken into account, this translates into a share price that is up to 38% lower than 2012, compared with a decline in the FTSE Gold Mines Index of 49.2% over the course of the past year and a decline in the FTSE/JSE Africa Gold Mining Index of 43.4% (source: Bloomberg).

Having calculated average benchmark valuations for both exploration and development companies, in its last report, *Gold – New benchmarks for old*, published in November 2012, Edison conceived a notional company (called NonSuch Gold Ltd), which it then valued at each stage of its development, from first capital raising to treating stockpiles at the end of the life of the mine and unwinding working capital. Key characteristics of the company are as follows:

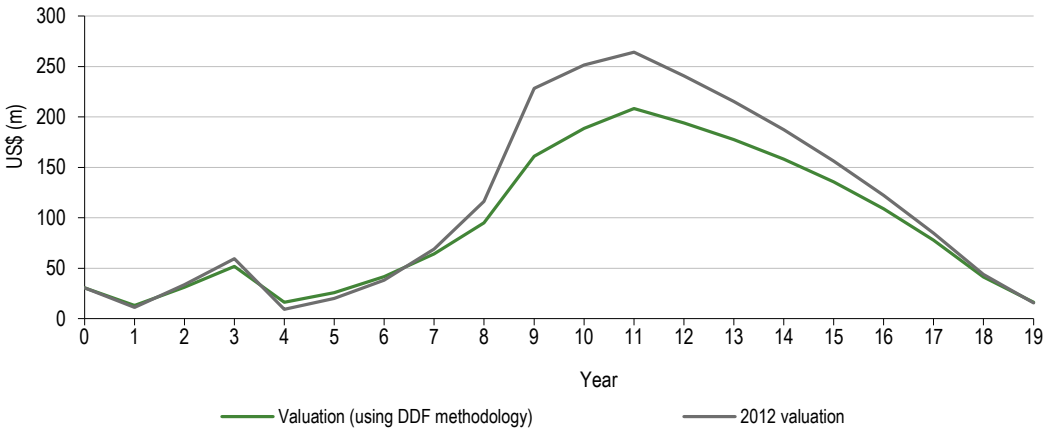
- It will ultimately delineate a resource of 1.276Moz, of which 1.0Moz will be converted into reserves and mined at a rate of 100koz per year for 10 years. It will be deemed to be listed in London and there will be three rounds of equity funding in year 0 (initial capital for exploration), year 4 (to progress scoping, pre-feasibility and bankable feasibility studies) and year 7 (for development).
- The company raises equity funds in year 0 for exploration purposes. It delineates an 'inferred' resource in year 1, an 'indicated & inferred' resource in year 2 (in the ratio 40:60 'indicated':'inferred') and a 'measured, indicated & inferred' resource in year 3 (in the ratio 18:60:22 'measured':'indicated':'inferred'). It then raises additional equity funds and commissions a scoping study, a pre-feasibility study and a bankable feasibility study in years 4, 5 and 6, respectively. In year 7 it raises a final round of equity funding in addition to debt funding, such that its peak leverage (debt/(debt+equity)) peaks at 50%, and embarks on the first of three years of capital expenditure. Production ramp-up begins in year 8 and full production is achieved in year 9. Full production is maintained from year 9 to year 18 inclusive (ie 10 years). Working capital is released in year 19 when the company reverts to being an exploration entity with cash and an 'inferred' resource.
- In years 0 to 3, the company is valued according to a combination of its resource (at the appropriate categorisations, assuming a London listing) plus cash. Note that the London-listed assumption affects only years 1 to 3; Canadian- and Australian-listed explorers would have the profiles shown in Exhibit 31 on page 21. In years 4 to 18, NonSuch Gold Ltd is valued according to the discounted dividend flow method at the mean discount rates (as interpreted by Edison) defined and set out in Exhibits 32 and 35 plus the (undiscounted) value of the residual 'inferred' resource. Working capital is released in year 19, such that the company reverts to being an exploration entity with cash and an 'inferred' resource only.
- Unit costs of discovery are those set out in the section entitled 'The evolution of value in exploration companies' on page 21, ie US$7.16 per 'inferred' ounce, US$10.50 per 'indicated' ounce and US$36.82 per 'measured' ounce.
- Of the company's 1.276Moz resource, 1.0Moz are in the 'measured' and 'indicated' categories, which are assumed to have a 100% conversion ratio into reserves.
- Study costs are estimated at 1.5% of capex (ie US$1.5m in total) and are deemed to be cumulative, ie scoping study costs contribute towards PFS costs and PFS costs towards BFS costs.

- Central, general and administrative costs amount to US$4m per year until the company enters production, when they increase to US$7.5m per year.
- Equity fundings are conducted at the implied value of the equity, given the state of advancement of the project, ie no discount to the prevailing share price is assumed.
- Capex amounts to US$100 per annual ounce of production, ie US$100m, or US$100 per reserve ounce.
- Debt peaks at the end of year 8 (ie the year before full production is achieved), when gearing (ie debt/equity) reaches 100% and leverage (debt/(debt+equity)) reaches 50%.
- The cost of debt is set at 11%; return on cash deposits at 0.5%.
- A gross cash profit margin of US$725/oz has been assumed during the mine's producing phase. This could be interpreted as the current spot price of gold of US$1,325/oz and unit cash costs of production of US$600/oz.
- Profits are taxed at 28% (after depreciation); there is no write-off for past exploration expenses.

On the basis of the assumptions set out above, the undiscounted value of the dividends paid out to shareholders is US$410.7m, comprising cash flow from operations (US$459.8m), minus total life-of-operation capex (US$120.1m), plus total equity funding (US$88.2m) minus terminal cash balances (US$17.2m). Full financials for the company are provided on page 42.

Valued at the benchmarks derived previously, the valuation of the company then evolves with time according to the profile shown below:

Exhibit 40: NonSuch Gold Ltd valuation, 2013 vs 2012

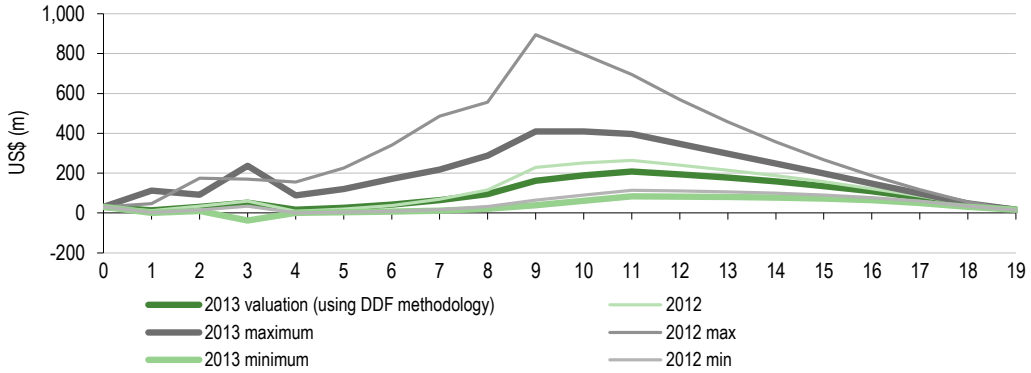


Source: Edison Investment Research

Immediately apparent is the general 20-30% discount at which the company will now trade in its producing years compared to the valuation that it could have expected in 2012.

More striking is the decline in maximum value that a company could expect to attain in 2013 vs 2012. Whereas in 2012 a company with NonSuch's profile could achieve a valuation US$894, in 2013 the maximum value that it could reasonably hope to attain is 55% less, at US$410m:

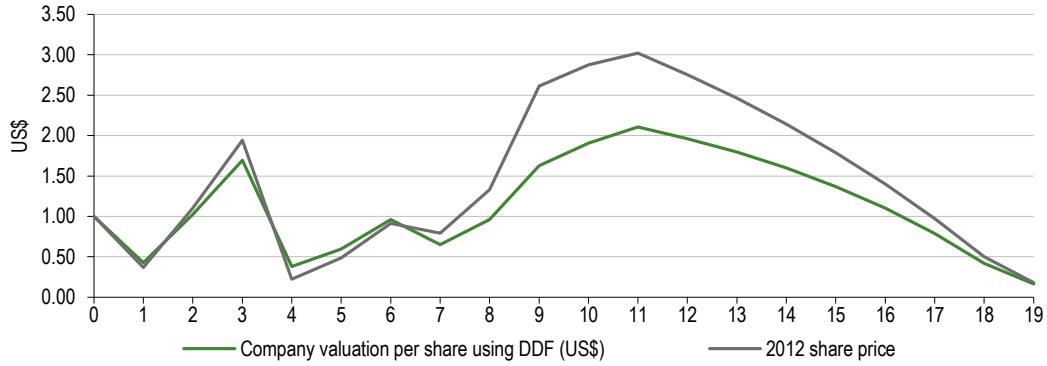
Exhibit 41: NonSuch Gold Ltd potential valuation range, 2013 vs 2012



Source: Edison Investment Research

Similarly, NonSuch's share price will be up to 38% lower in 2013 compared to 2012, all other things being equal, with the reduction in value particularly apparent in the producing years:

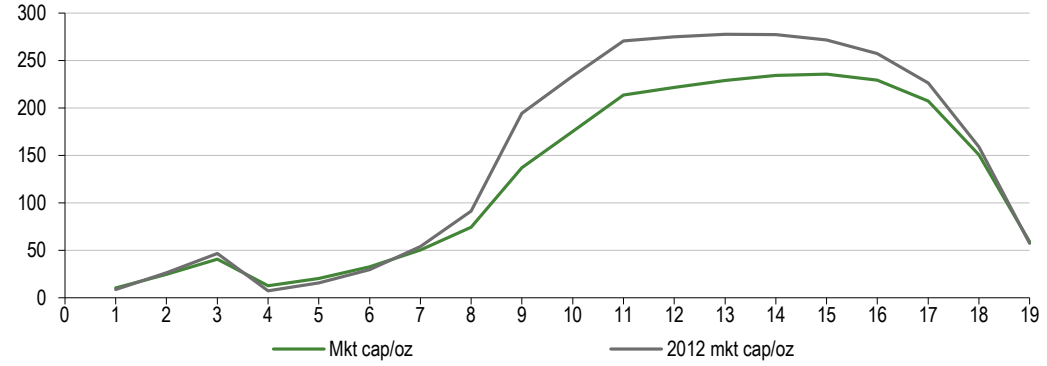
Exhibit 42: NonSuch Gold Ltd share price, 2013 vs 2012, US$



Source: Edison Investment Research

Finally, the average company valuation per resource ounce (ie market capitalisation per resource ounce) is US$124.18/oz in 2013, compared to US$146.37/oz in 2012, with a maximum of US$229.08/oz (cf US$277.71/oz in 2012):

Exhibit 43: NonSuch Gold Ltd valuation per total resource oz, 2013 vs 2012, US$/oz



Source: Edison Investment Research

The in-situ value of exploration gold: Market summary

The Australian market continues to provide the best overall valuations for resource company ounces, despite experiencing the largest overall decline in values. However, the London market has reprised its role as providing the best valuations on average for companies at later stages of development with proportionately more 'measured' ounces. By contrast, the Canadian market hosts the cheapest ounces, overall – and notably within the 'indicated' category.

Over the past two years, initially the value of total ounces increased with the gold price before de-rating ahead of a subsequent gold price decline, in a pattern that was largely replicated by 'inferred' ounces as well (see Exhibits 45, 47, 54, 55, 62 and 64). As a result, the principal interplay in value between different categories of resource ounce has been between the value of 'indicated' and the value of 'measured' ounces, with the value of 'indicated' holding up in Australia, but falling in Canada (with the result that the value of 'measured' ounces therefore fell in Australia but rose in Canada, such that the Australian market is now 'backwardation' with the value of 'indicated' ounces greater than the value of 'measured' – a condition previously observed in Canada). The London market, by contrast, has demonstrated the least volatility in the value of different categories of resource ounces.

Notable within the discussion is the fact that the overall grade is highest in the London market (eg 1.5g/t vs 0.7g/t for Canada and Australia) and that this is particularly the case for companies with all three categories of resource ounces. The grade is approximately uniform in Canada (0.7g/t ±0.2g/t) across all three categories. In the Australian market, by contrast, the grade is highest for companies with 'inferred' ounces only (2.2g/t) but lowest for companies with 'measured, indicated & inferred' ounces – arguably contributing to the discounting of the value of 'measured' ounces with respect to 'indicated' ones in that market.

London market summary

A summary of the companies, cash and assets analysed in the London market is as follows:

Exhibit 44: London-listed gold explorers' sector summary with respect to resources

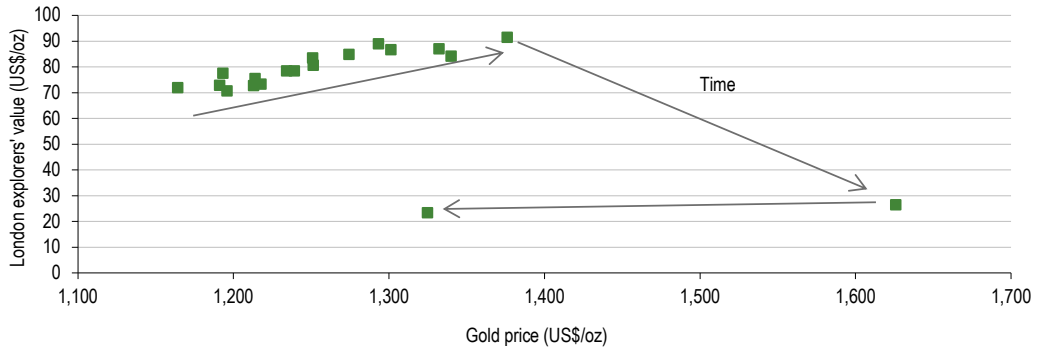
Resource categorisation	Inferred	Indicated & inferred	Measured, indicated & inferred	Total
Number of companies	4	7	11	22
Percent (%)	18	32	50	
Market cap (US$m)	26	361	444	831
Percent (%)	3	43	53	
Net cash (US$m)	31	38	22	92
Percent (%)	34	41	24	
Enterprise value (US$m)	-5	322	422	740
Percent (%)	-1	44	57	
Total oz (m)	1.3	17.5	13.0	31.8
Percent (%)	4	55	41	
Market cap per total oz (US$)	20.20	20.63	34.06	26.11
EV per total oz (US$)	-3.54	18.45	32.37	23.23

Source: Edison Investment Research. Note: Totals may not add up owing to rounding.

Of note are the relatively high levels of cash held by companies with 'inferred' and 'indicated & inferred' ounces only (in contrast to the Canadian and Australian markets – see below).

In general, average ounces in London have undergone a substantial de-rating since mid-2010, as shown in Exhibit 45, below:

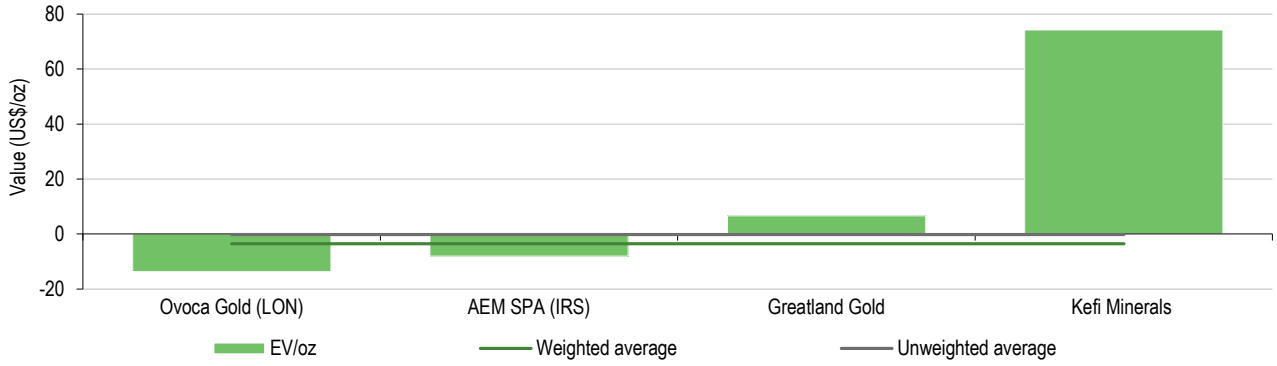
Exhibit 45: Value of average oz listed in London vs gold price (US$), Jul 10 – Aug 13



Source: Edison Investment Research

Also apparent is the negative aggregate enterprise value for companies with 'inferred' ounces only, giving rise to a negative overall valuation for this resource category, the constituent parts of which are as follows:

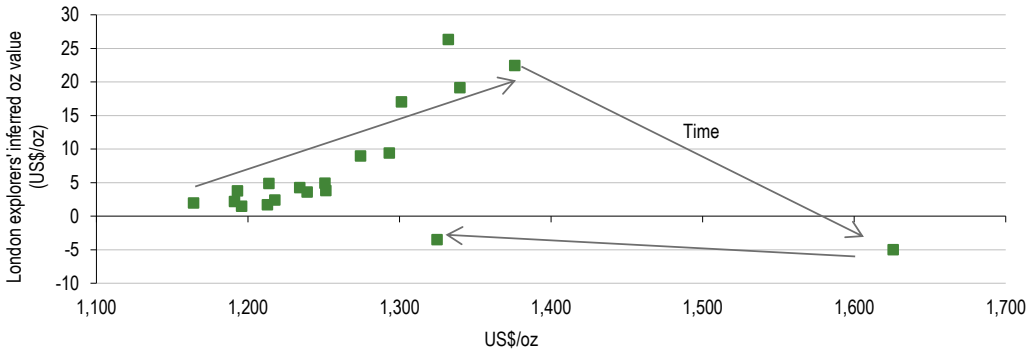
Exhibit 46: Implied value of 'inferred' ounces in the London market (US$), by company and averages



Source: Edison Investment Research

However, the negative aggregate value of 'inferred' ounces appears not wholly inconsistent with past experience:

Exhibit 47: Value of London-listed 'inferred' oz vs gold price, 2010-2012

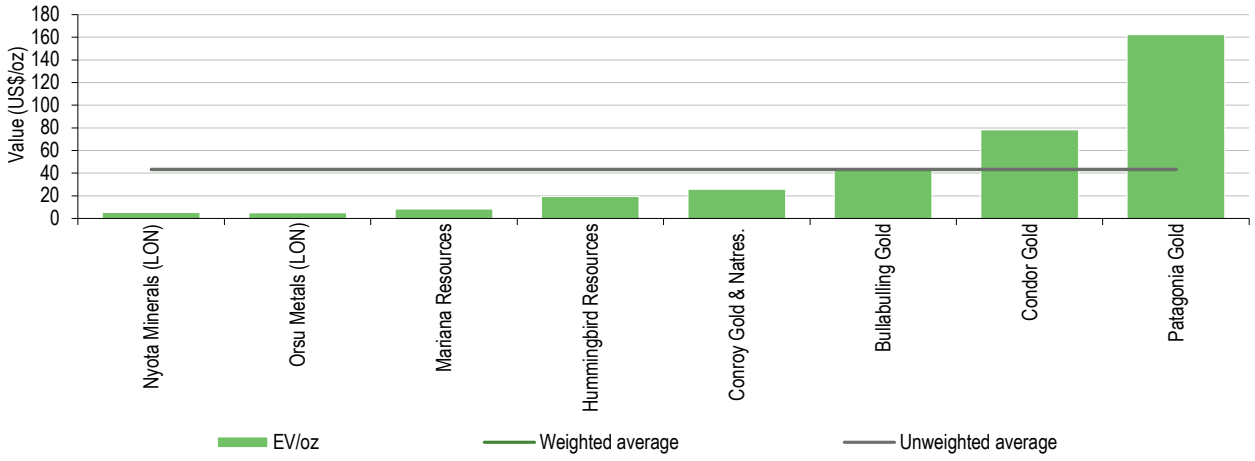


Source: Edison Investment Research, Bloomberg

Of note is the fact that, notwithstanding their relative negative valuation, a figure of minus US$3.54/oz nevertheless represents a relative re-rating since August 2012 when the equivalent figure was minus US$5.04/oz.

An average value for 'inferred' ounces of minus US$3.54/oz leads to an average value for 'indicated' ounces, similarly calculated, of US$43.14/oz:

Exhibit 48: Implied value of 'indicated' ounces in the London market (US$), by company and averages

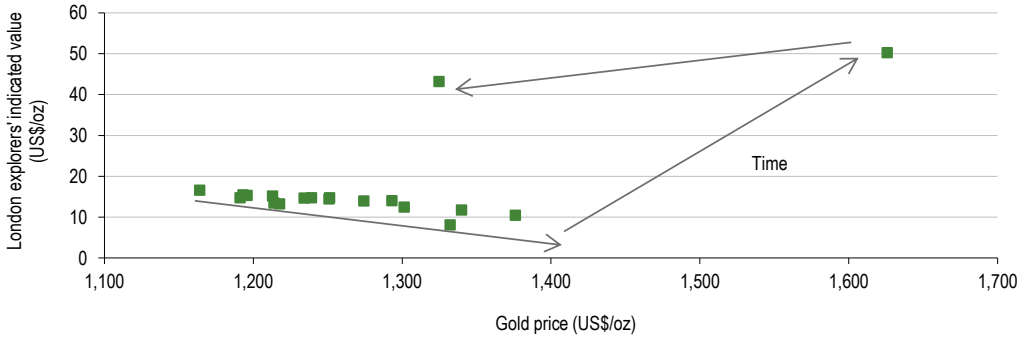


Source: Edison Investment Research

Note that, in this case, the weighted and the un-weighted averages are almost identical, giving confidence in the calculated number.

Interestingly, within the context of the gold price historically, 'indicated' ounces listed in London have held their value relatively well:

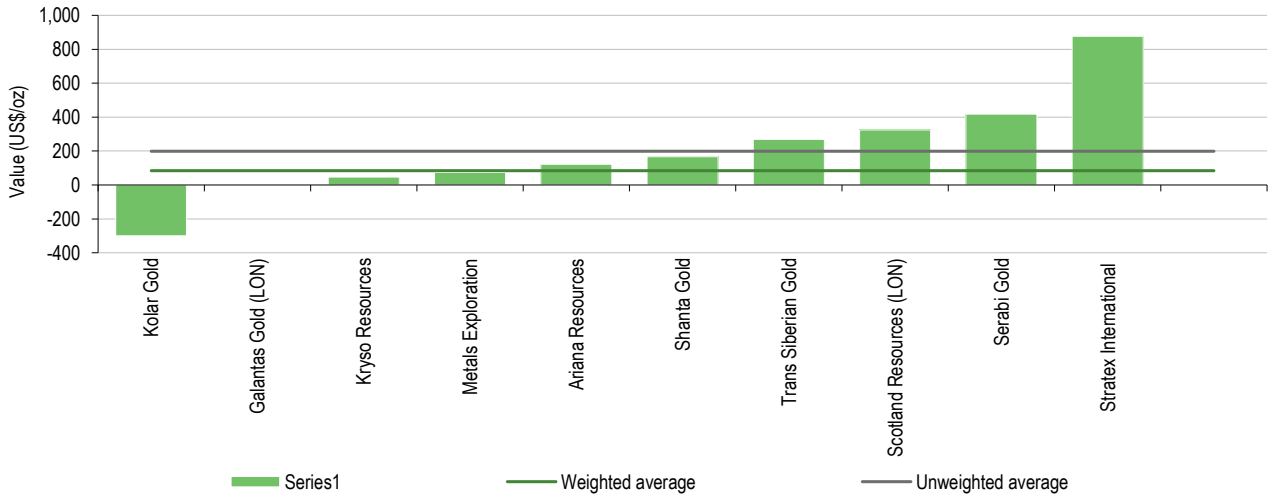
Exhibit 49: Value of London-listed 'indicated' oz vs gold price, 2010-2012



Source: Edison Investment Research

Similarly, average values for 'inferred' and 'indicated' ounces of minus US$3.54/oz and US$43.14/oz, respectively, give rise to an average value for 'measured' ounces of US$83.74/oz, as shown below:

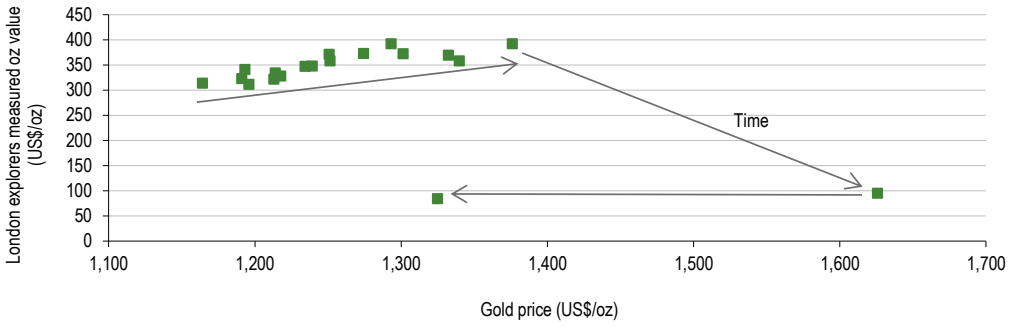
Exhibit 50: Implied value of 'measured' ounces in the London market (US$), by company and averages



Source: Edison Investment Research. Note: See Appendices.

Note the similarity of the evolution of value in London-listed 'measured' ounces compared to the gold price with that of total ounces and also 'inferred' ounces:

Exhibit 51: Value of London-listed 'measured' oz vs gold price, 2010-2012



Source: Edison Investment Research

Canadian market summary

A summary of the companies, cash and assets analysed in the Canadian market is as follows:

Exhibit 52: Canadian-listed gold explorers' sector summary with respect to resources

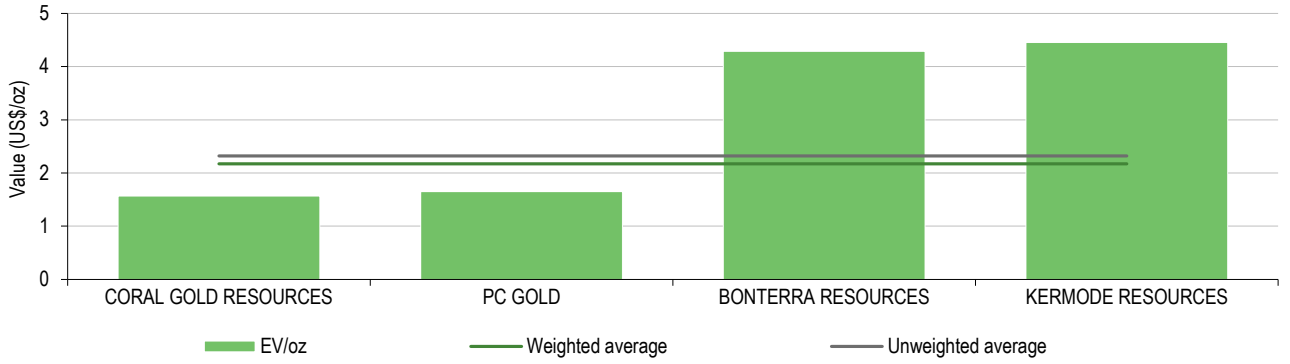
Resource categorisation	Inferred	Indicated & inferred	Measured, indicated & inferred	Total
Number of companies	4	7	11	22
Percent (%)	18	32	50	
Market cap (US$m)	12	222	3,562	3,796
Percent (%)	0	6	94	
Net cash (US$m)	1	62	169	232
Percent (%)	0	27	73	
Enterprise value (US$m)	10	161	3,393	3,564
Percent (%)	0	5	95	
Total oz (m)	4.8	19.7	193.3	217.8
Percent (%)	2	9	89	
Market cap per total oz (US$)	2.48	11.28	18.43	17.43
EV per total oz (US$)	2.17	8.15	17.55	16.37

Source: Edison Investment Research. Note: Totals may not add up owing to rounding.

Immediately apparent compared to the London market is the much lower holding of aggregate cash for companies with 'inferred' ounces only and the much higher aggregate holdings of cash for companies with all three categories of resources. Also apparent is the much higher aggregate value of the sector in Canada and the much higher resource base. In this case, these may be attributed to three 'super-explorers' – Novagold, Detour Gold and Seabridge – which account for 74% of the market capitalisation of companies with 'measured' ounces and 71% of their total ounces. They also add US$236m in net debt to this sub-sector's balance sheet.

As a result of their lean aggregate holdings of cash, companies with 'inferred' ounces only contribute to a higher average value for these ounces, on average, in the Canadian market than in the London one:

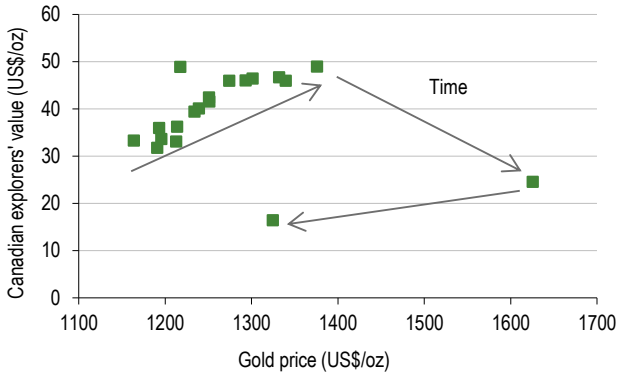
Exhibit 53: Implied value of 'inferred' ounces in the Canadian market (US$), by company and averages



Source: Edison Investment Research

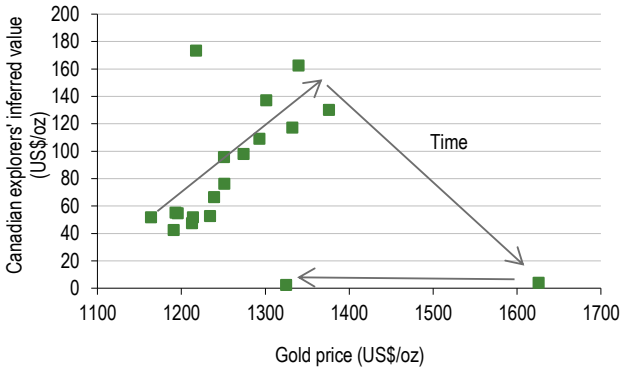
Note the similarity of the weighted and un-weighted averages, once again providing confidence in the resulting numbers. Note too the similarity in terms of the degree and 'pattern' of Canadian ounces' re-valuations and de-valuations with respect to the gold price and London ounces' revaluations and de-valuations (ie Exhibits 45 and 47):

Exhibit 54: Value of average oz listed in Canada vs gold price (US$), Jul '10 – Aug '13



Source: Edison Investment Research

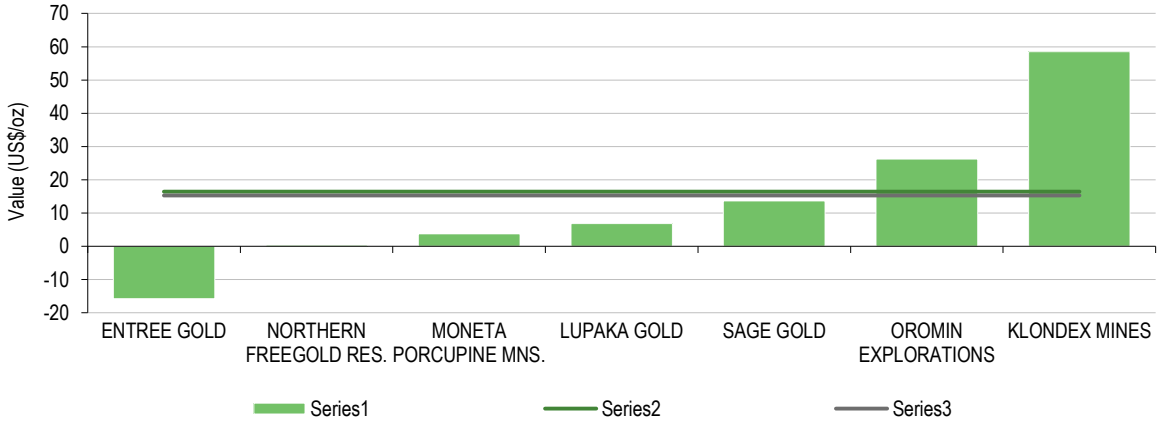
Exhibit 55: Value of 'inferred' oz listed in Canada vs gold price (US$), Jul '10 – Aug '13



Source: Edison Investment Research

An average 'inferred' ounce valuation of US$2.17/oz then gives rise to an average 'indicated' ounce valuation of US$16.46/oz, as follows:

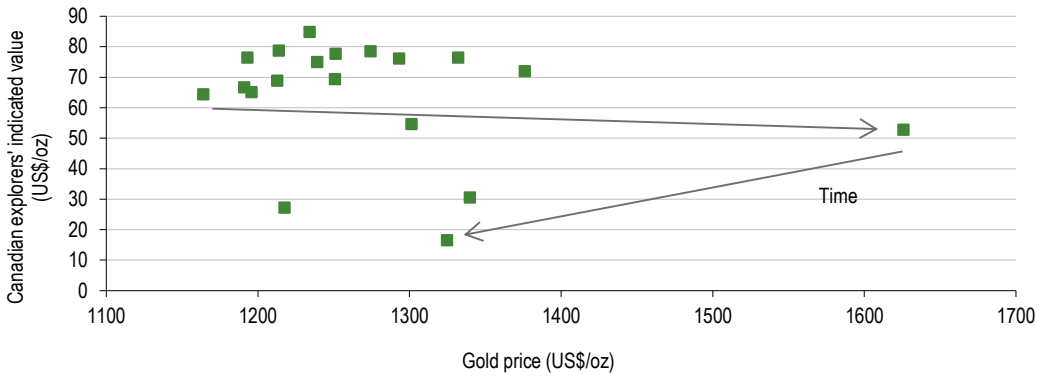
Exhibit 56: Implied value of 'indicated' ounces in the Canadian market (US$), by company and averages



Source: Edison Investment Research

Note, once again, the closeness of the weighted and un-weighted averages of the sample. In contrast to the London market, however, 'indicated' ounces in Canada have undergone a substantial de-rating over the course of the past year:

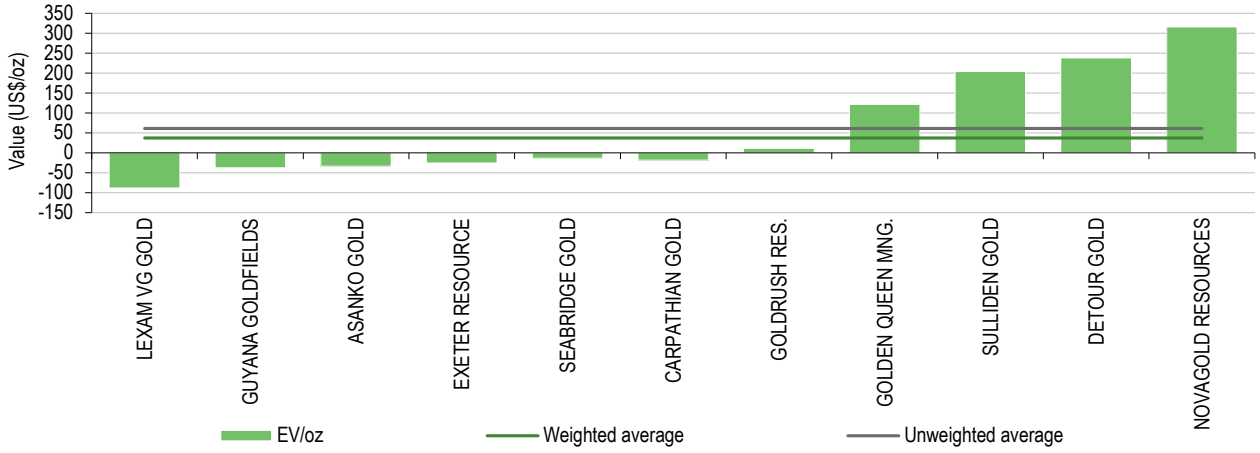
Exhibit 57: Value of 'indicated' oz listed in Canada vs gold price (US$), Jul 10 – Aug 13



Source: Edison Investment Research

Average values of US$2.17/oz and US$16.46/oz for 'inferred' and 'indicated' ounces respectively then give rise to an implied average value for 'measured' ounces of US$37.39/oz:

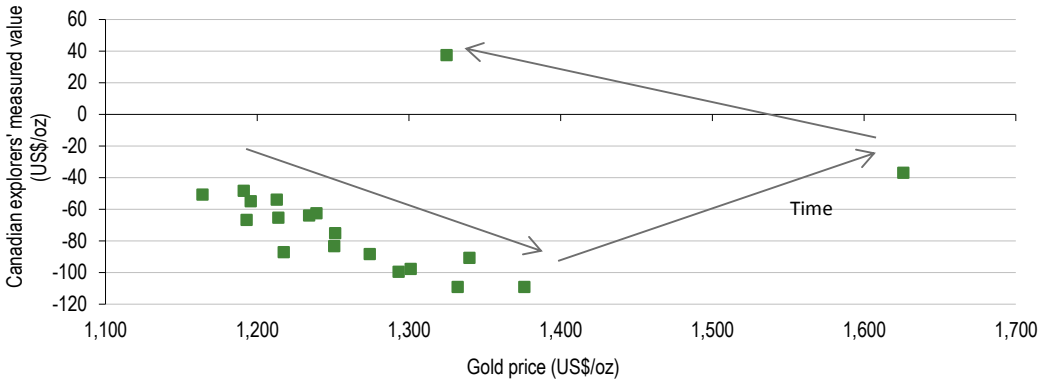
Exhibit 58: Implied value of 'measured' ounces in the Canadian market (US$), by company and averages



Source: Edison Investment Research

Note the much lower standard deviation within this sample of implied 'measured' ounces' valuations in the Canadian market (US$129/oz) compared to the London market (US$294/oz). Note also that this is the first time in two years that Canadian 'measured' ounces have achieved a positive valuation and therefore a more logical relationship with their 'indicated' and 'inferred' peers:

Exhibit 59: Value of 'measured' oz listed in Canada vs gold price (US$), Jul 10 – Aug 13



Source: Edison Investment Research

Australian market summary

In many ways, the Australian market lies between the Canadian and London markets in terms of its aggregate enterprise value and resource base. This is also true of its 'super-explorers'. Whereas the three largest explorers in the Canadian market account for 85% of the sector's enterprise value and 71% of its resources, in Australia the three largest explorers account for 78% of EV and 38% of resources (cf London 47% and 30% respectively). One obvious observation therefore is that super-explorers in Australia are afforded a discernible premium with respect to their resources compared to Canada and London. Otherwise, a summary of the companies, cash and assets analysed in the Australian market is as follows:

Exhibit 60: Australian-listed gold explorers' sector summary with respect to resources

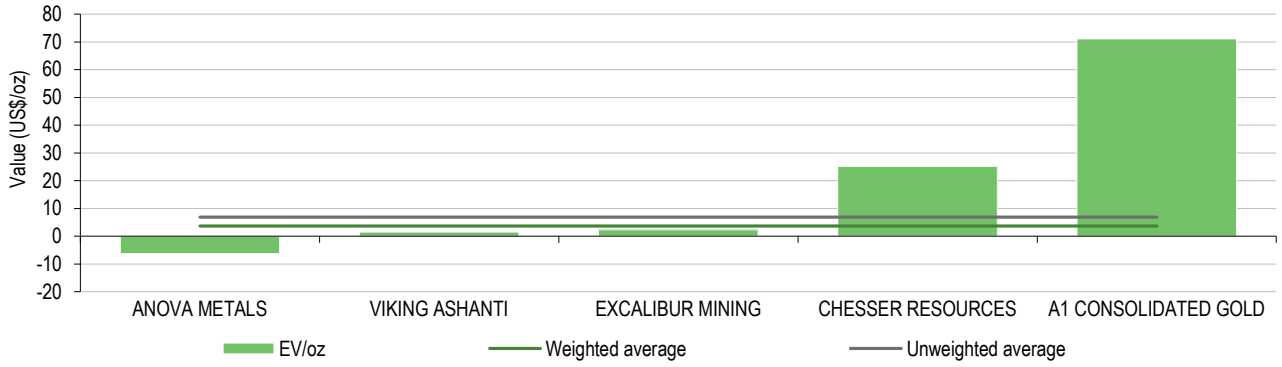
Resource categorisation	Inferred	Indicated & inferred	Measured, indicated & inferred	Total
Number of companies	6	7	9	22
Percent (%)	27	32	41	
Market cap (US$m)	41	426	1,081	1,548
Percent (%)	3	28	70	
Net cash (US$m)	26	67	163	256
Percent (%%)	10	26	64	
Enterprise value (US$m)	15	359	918	1,293
Percent (%)	1	28	71	
Total oz (m)	4.2	9.0	30.7	43.9
Percent (%)	10	21	70	
Market cap per total oz (US$)	9.81	47.55	35.17	35.29
EV per total oz (US$)	3.67	40.04	29.88	29.46

Source: Edison Investment Research. Note: Totals may not add up owing to rounding.

Immediately apparent from this summary is the fact that companies with all three categories of resources have a lower rating per total ounce than companies with 'indicated & inferred' ounces only – immediately implying a disproportionately high valuation for 'indicated' ounces relative to 'measured'.

As with the other two markets, the average value of 'inferred' ounces (US$3.67/oz) is less than the global average cost of discovery of such ounces. Like the London market, however, the range is relatively wide:

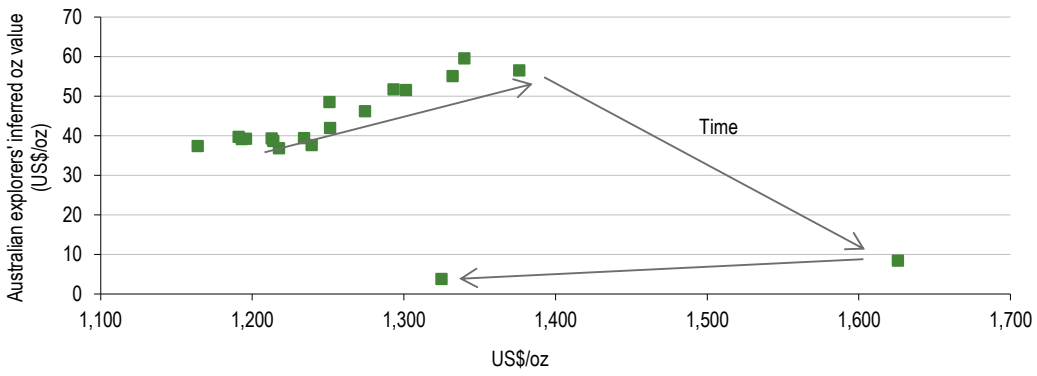
Exhibit 61: Implied value of 'inferred' ounces in the Australian market (US$), by company and averages



Source: Edison Investment Research

While still higher in absolute terms, the value of 'inferred' ounces in the Australian market has nevertheless declined more than those in the Canadian and London markets over the past year:

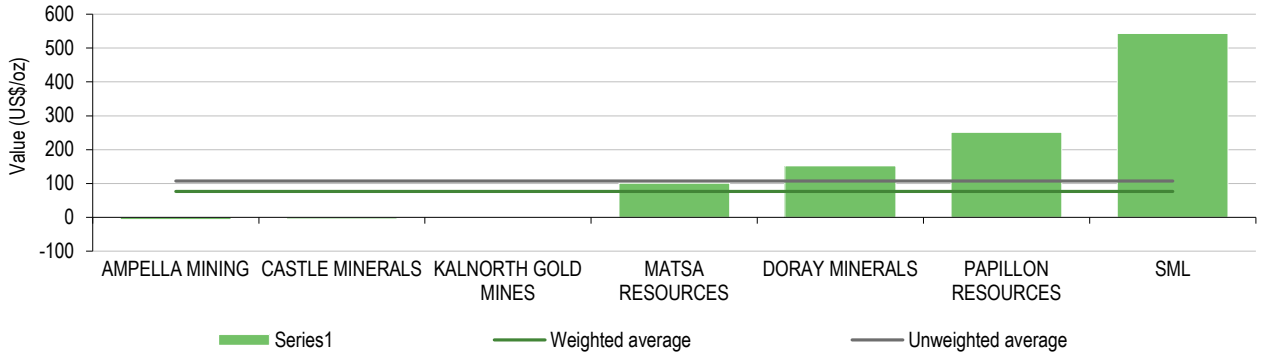
Exhibit 62: Value of 'inferred' oz listed in Australia vs gold price (US$), Jul 10 – Aug 13



Source: Edison Investment Research

Among other things, this decline has supported the aggregate value of 'indicated' ounces listed in Australia. While these were valued at a premium to those listed in London and Canada a year ago, this premium has nevertheless widened appreciably.

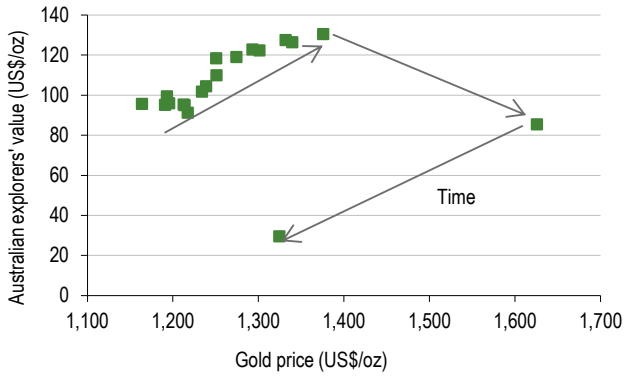
Exhibit 63: Implied value of 'indicated' ounces in the Australian market (US$), by company and averages



Source: Edison Investment Research

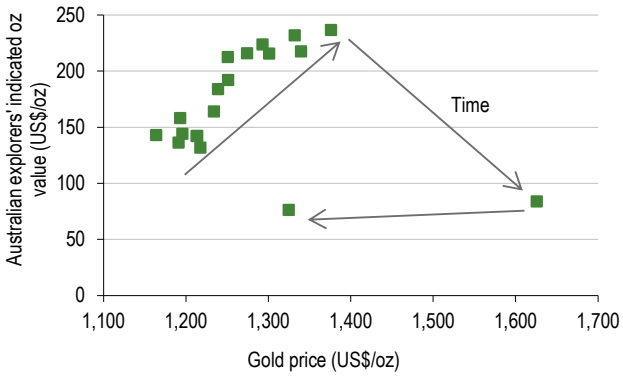
In this respect, it can be seen that the pattern of revaluations and devaluations of Australian-listed 'indicated' ounces is similar to those of 'total' and 'inferred' ounces (in contrast certainly to the London market and arguably to the Canadian market as well).

Exhibit 64: Value of 'total' oz listed in Australia vs gold price (US$), Jul 10 – Aug 13



Source: Edison Investment Research

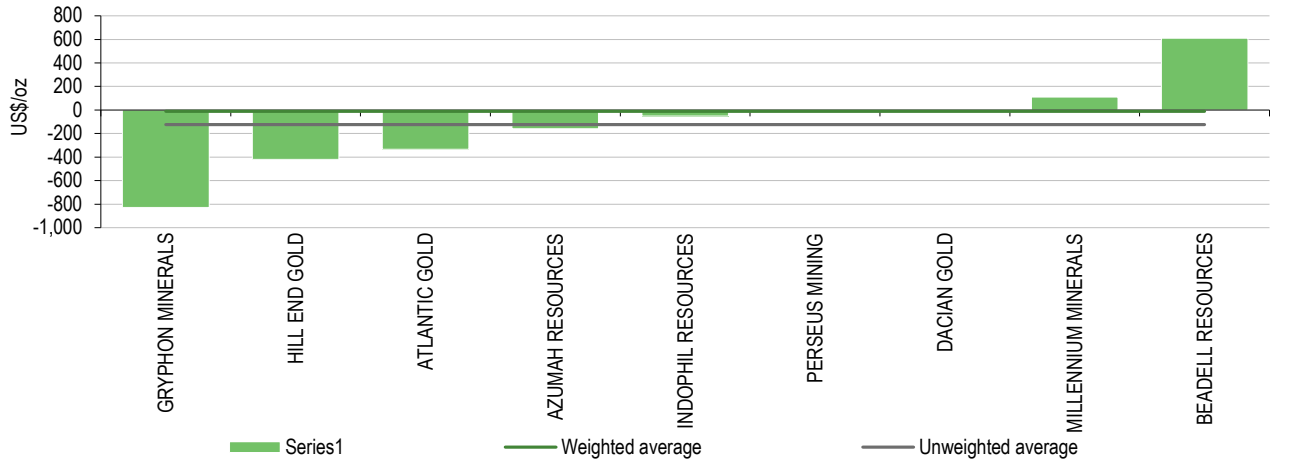
Exhibit 65: Value of 'indicated' oz listed in Australia vs gold price (US$), Jul 10 – Aug 13



Source: Edison Investment Research

Support for the value of 'indicated' ounces in turn had a depressive effect on the average value of 'measured' ounces listed in Australia, which has now become negative:

Exhibit 66: Implied value of 'measured' ounces in the Australian market (US$), by company and averages

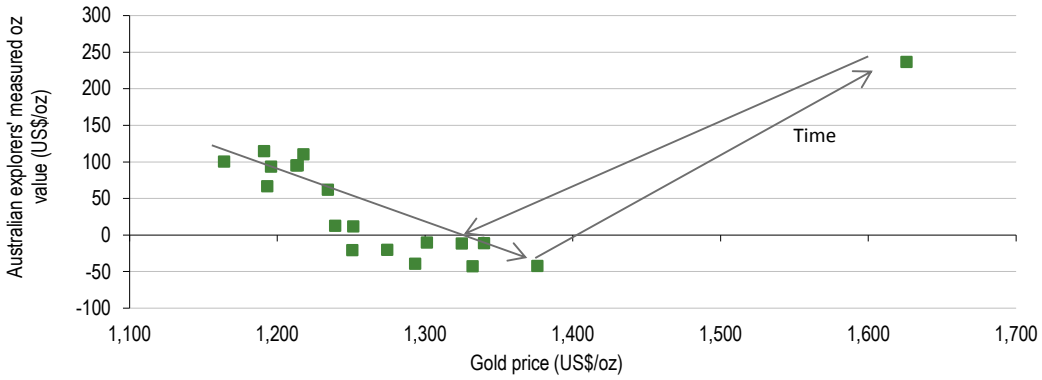


Source: Edison Investment Research

Note that the standard deviation of the sample of companies with 'measured' ounces listed in Australia is the largest of all of the three markets, at US$373/oz cf London US$294/oz and Canada US$129/oz.

While at first glance non-sensical, a negative value for 'measured' ounces listed in Australia is in line with the situation in Canada until recently (see Exhibit 59). It is also not out of line with recent historical experience in Australia itself:

Exhibit 67: Value of 'measured' oz listed in Australia vs gold price (US$), Jul 10 – Aug 13



Source: Edison Investment Research

Note that if the value of Australian-listed 'indicated' ounces were to reduce by 50%, to US$38.01/oz, then the implied value of 'measured' ounces would increase to US$43.95/oz – ie the Australian market would largely normalise with respect to the London and Canadian ones. In part this is evidenced by the fact that, while at a premium to the other two markets, the overall, average value of Australian-listed ounces (US$29.46/oz) is not out of line with those of London and Canada (US$23.23/oz and US$16.37/oz respectively – see Exhibit 29). As noted previously, however, the higher average value of ounces for companies with 'indicated & inferred' resources compared to those with 'measured, indicated & inferred' resources (Exhibit 60) is strong evidence in support of the fact that 'indicated' ounces in Australia are indeed overvalued with respect to 'measured' ounces at the current time.

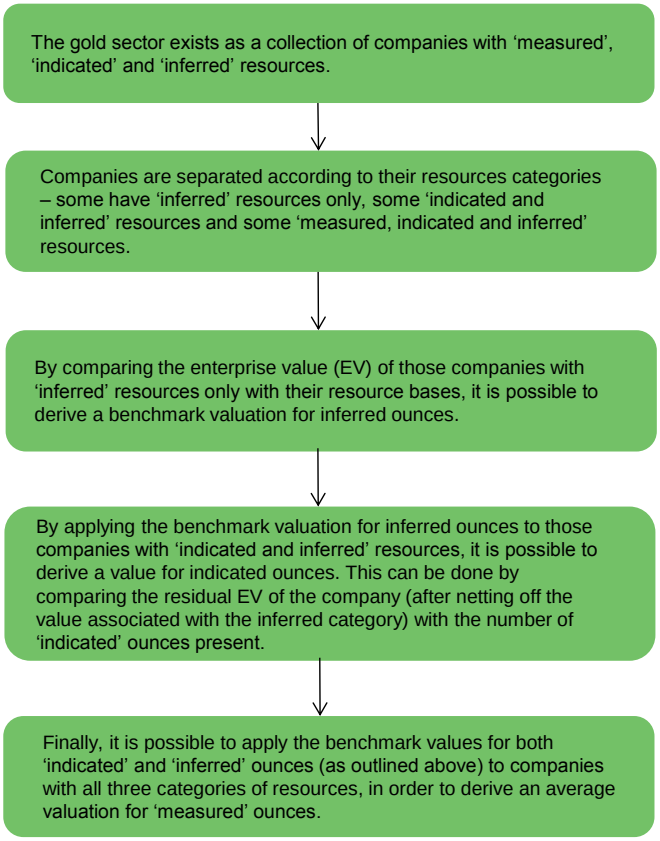
Appendices

Method used to value distinct resource categories

A recap of the methodology used to derive separate valuations for each category of resource ounces is given below.

Under JORC-style reporting standards, resources are sub-divided into three categories, according to the level of confidence and knowledge in their geology. In ascending order, these categories are 'inferred', 'indicated' and 'measured'. While historically these have often been considered together and companies valued with respect to the total number of ounces in their resource bases, there is a considerable degree of difference in the geological confidence attached to each category. The schematic depiction below demonstrates the methodology we have used to determine the differences in the implied valuations of these ounces with respect to their categorisation:

Exhibit 68: Schematic representation of methodology used



Source: Edison Investment Research

Discovery cost estimates

In addition to analysing the value of each category of resource ounces, this report also quotes discovery costs per ounce. This analysis was conducted by BDO in collaboration with Edison and was detailed in our report, *Gold – Valuation benchmarks are obsolete*, published in January 2010. Included in each of the samples are some companies with 'inferred' resources only and some with 'indicated & inferred' ounces only. By calculating the discovery cost of 'inferred' ounces first and assuming this cost to be the same for all companies with higher resource categories (ie using the same methodology as above for differentiated resource valuations), it is thereby similarly possible to estimate the industry-wide costs of the discovery of 'indicated' ounces and then, subsequently (by adopting the same methodology) 'measured' ounces.

Exhibit 50: Implied value of 'measured' ounces in London market

Note that, for the purposes of this analysis, Chaarat has been excluded from the sample contributing to the average value of 'measured' ounces. The rationale for the omission is that the company is valued at close to cash and is therefore relatively undervalued compared to its resource base. However, applying all of the undervaluation to the 0.3% of resources in the 'measured' category results in an implied negative value for its 'measured' resource of minus US$6,209.46/oz, which is self-evidently non-sensical. By contrast, re-classifying the tiny portion of its 'measured' resource to the 'indicated' category results in an implied 'indicated' valuation for Chaarat of US$4.11/oz – ie cheap, but consistent with the order of magnitude expected for companies with 'indicated & inferred' resources only (where Chaarat has been historically classified). If Chaarat were classified as 'indicated & inferred' only again, rather than 'measured, indicated & inferred', with the 'measured' portion of the resource reclassified to 'indicated', then the overall average value of 'indicated' ounces across the London market as a whole falls to US$33.11/oz, thereby increasing the overall average value of 'measured' ounces to US$93.67/oz. Including Chaarat in the 'measured' sample, by contrast, reduces the overall 'measured' valuation to US$52.02/oz – notably lower, but still at a premium to either the Canadian or Australian markets.

Exhibit 69: NonSuch Gold Ltd financials (US$m, except where otherwise indicated)

	Explorer				Developer					Producer										
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
P&L																				
Sales	**0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**135.0**	**135.0**	**135.0**	**135.0**	**135.0**	**135.0**	**135.0**	**135.0**	**135.0**	**135.0**	**0.0**
Cost of sales	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	62.5	62.5	62.5	62.5	62.5	62.5	62.5	62.5	62.5	62.5	0.0
Central, general & administrative costs	0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	0.0
EBITDA	**0**	**(4.0)**	**(4.0)**	**(4.0)**	**(4.0)**	**(4.0)**	**(4.0)**	**(4.0)**	**(4.0)**	**65.0**	**65.0**	**65.0**	**65.0**	**65.0**	**65.0**	**65.0**	**65.0**	**65.0**	**65.0**	**0.0**
Depreciation	0	0.0	0.0	0.0	0.0	0.0	0.0	(2.8)	(7.3)	(9.0)	(9.0)	(9.0)	(9.0)	(9.0)	(9.0)	(9.0)	(9.0)	(9.0)	(9.0)	0.0
Depletion	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	(1.5)	(1.5)	(1.5)	(1.5)	(1.5)	(1.5)	(1.5)	(1.5)	(1.5)	0.0
Amortisation of study investment	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	(0.2)	(0.2)	(0.2)	(0.2)	(0.2)	(0.2)	(0.2)	(0.2)	(0.2)	(0.2)	0.0
EBIT	0	(4.0)	(4.0)	(4.0)	(4.0)	(4.0)	(4.0)	(6.8)	(11.3)	55.9	54.4	54.4	54.4	54.4	54.4	54.4	54.4	54.4	54.4	0.0
Net interest	0	0.2	0.1	0.1	0.0	0.1	0.1	0.0	0.0	(5.1)	(3.8)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Profit before tax	**0**	**(3.8)**	**(3.9)**	**(3.9)**	**(4.0)**	**(3.9)**	**(3.9)**	**(6.7)**	**(11.3)**	**50.7**	**50.6**	**54.4**	**54.4**	**54.4**	**54.4**	**54.4**	**54.4**	**54.4**	**54.4**	**0.0**
Tax	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	14.2	14.2	15.2	15.2	15.2	15.2	15.2	15.2	15.2	15.2	0.0
Marginal tax rate	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28
Profit after tax	0	(3.8)	(3.9)	(3.9)	(4.0)	(3.9)	(3.9)	(6.7)	(11.3)	36.5	36.4	39.2	39.2	39.2	39.2	39.2	39.2	39.2	39.2	0
Retained earnings	0	(3.8)	(3.9)	(3.9)	(4.0)	(3.9)	(3.9)	(6.7)	(11.3)	36.5	24.3	(10.6)	(10.6)	(10.6)	(10.6)	(10.6)	(10.6)	(10.6)	(10.6)	0
EPS (US$)	**0.00**	**(0.13)**	**(0.13)**	**(0.13)**	**(0.09)**	**(0.09)**	**(0.09)**	**(0.08)**	**(0.13)**	**0.42**	**0.42**	**0.45**	**0.45**	**0.45**	**0.45**	**0.45**	**0.45**	**0.45**	**0.45**	**0.00**
DPS (US$)	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.14**	**0.57**	**0.57**	**0.57**	**0.57**	**0.57**	**0.57**	**0.57**	**0.57**	**0.00**
B/S																				
Non-current assets																				
Property, plant & equipment	0	0.0	0.0	0.0	0.0	0.0	0.0	30.6	73.2	80.9	71.9	62.9	53.9	44.9	36.0	27.0	18.0	9.0	0.0	0.0
Mineral exploration	0	9.1	10.8	18.6	18.6	18.6	18.6	18.6	18.6	18.6	17.1	15.7	14.2	12.8	11.3	9.8	8.4	6.9	5.5	5.5
Study investment	0	0.0	0.0	0.0	0.2	0.7	1.5	1.5	1.5	1.4	1.2	1.1	0.9	0.8	0.6	0.5	0.3	0.2	0.0	0.0
Total non-current assets	**0**	**9.1**	**10.8**	**18.6**	**18.8**	**19.3**	**20.1**	**50.7**	**93.3**	**100.9**	**90.3**	**79.7**	**69.1**	**58.5**	**47.9**	**37.3**	**26.7**	**16.1**	**5.5**	**5.5**
Current assets																				
Debtors	0	0	0	0	0	0	0	0	0	11.1	11.1	11.1	11.1	11.1	11.1	11.1	11.1	11.1	11.1	0
Debtor days	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30
Stocks	0	0	0	0	0	0	0	0	0	11.3	11.3	11.3	11.3	11.3	11.3	11.3	11.3	11.3	11.3	0.0
Stock turn	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12
Cash	30.6	17.6	12.0	0.3	17.7	13.2	8.5	7.3	(46.7)	(34.9)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	17.2
Total current assets	**30.6**	**17.6**	**12.0**	**0.3**	**17.7**	**13.2**	**8.5**	**7.3**	**(46.7)**	**(12.5)**	**22.3**	**22.3**	**22.3**	**22.3**	**22.3**	**22.3**	**22.3**	**22.3**	**22.3**	**17.2**
Current liabilities																				
Creditors	0	0	0	0	0	0	0	0	0	(5.1)	(5.1)	(5.1)	(5.1)	(5.1)	(5.1)	(5.1)	(5.1)	(5.1)	(5.1)	0
Creditor days	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30
Short-term debt	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total current liabilities	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**(5.1)**	**(5.1)**	**(5.1)**	**(5.1)**	**(5.1)**	**(5.1)**	**(5.1)**	**(5.1)**	**(5.1)**	**(5.1)**	**0**
Net assets	**30.6**	**26.8**	**22.8**	**18.9**	**36.4**	**32.5**	**28.6**	**58.0**	**46.7**	**83.2**	**107.5**	**96.9**	**86.3**	**75.7**	**65.1**	**54.5**	**43.9**	**33.3**	**22.7**	**22.7**
Equity																				
Shareholders' funds	30.6	30.6	30.6	30.6	52.1	52.1	52.1	88.2	88.2	88.2	88.2	88.2	88.2	88.2	88.2	88.2	88.2	88.2	88.2	88.2
Retained earnings	0.0	(3.8)	(7.8)	(11.7)	(15.7)	(19.6)	(23.5)	(30.3)	(41.6)	(5.0)	19.2	8.6	(2.0)	(12.6)	(23.2)	(33.8)	(44.4)	(55.0)	(65.6)	(65.6)
Total equity	**30.6**	**26.8**	**22.8**	**18.9**	**36.4**	**32.5**	**28.6**	**58.0**	**46.7**	**83.2**	**107.5**	**96.9**	**86.3**	**75.7**	**65.1**	**54.5**	**43.9**	**33.3**	**22.7**	**22.7**
No of share in issue (m)	30.6	30.6	30.6	30.6	44.0	44.0	44.0	87.2	87.2	87.2	87.2	87.2	87.2	87.2	87.2	87.2	87.2	87.2	87.2	87.2
NAV per share	**1.00**	**0.87**	**0.75**	**0.62**	**0.83**	**0.74**	**0.65**	**0.66**	**0.53**	**0.95**	**1.23**	**1.11**	**0.99**	**0.87**	**0.75**	**0.62**	**0.50**	**0.38**	**0.26**	**0.26**
Net debt	30.6	17.6	12.0	0.3	17.7	13.2	8.5	7.3	(46.7)	(34.9)	0	0	0	0	0	0	0	0	0	17.2
Gearing	(100.0)	(65.9)	(52.6)	(1.6)	(48.5)	(40.7)	(29.6)	(12.6)	100.0	41.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	(75.9)
Leverage	N/A	0.0	(110.8)	(1.6)	(94.1)	(68.8)	(42.1)	(14.4)	50.0	29.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	(315.0)
CFI																				
Profit after tax	0.0	(3.8)	(3.9)	(3.9)	(4.0)	(3.9)	(3.9)	(6.7)	(11.3)	36.5	36.4	39.2	39.2	39.2	39.2	39.2	39.2	39.2	39.2	0.0
Depreciation	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.8	7.3	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	0.0
Depletion	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	0.0
Amortisation of study investment	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.0
Change in debtors	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	(11.1)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	11.1
Change in stocks	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	(11.3)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	11.3
Change in creditors	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	(5.1)
Operational cash-flow	0.0	(3.8)	(3.9)	(3.9)	(4.0)	(3.9)	(3.9)	(4.0)	(4.0)	28.5	47.0	49.8	49.8	49.8	49.8	49.8	49.8	49.8	49.8	17.2
Investment																				
Capex	0.0	0.0	0.0	0.0	0.0	0.0	0.0	(33.3)	(50.0)	(16.7)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Exploration	0.0	(9.1)	(1.7)	(7.8)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Study investment	0.0	0.0	0.0	0.0	(0.2)	(0.5)	(0.9)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Investment total	**0.0**	**(9.1)**	**(1.7)**	**(7.8)**	**(0.2)**	**(0.5)**	**(0.9)**	**(33.3)**	**(50.0)**	**(16.7)**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
Financing																				
Funds raised from equity	30.6	0.0	0.0	0.0	21.5	0.0	0.0	36.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total financing	**30.6**	**0.0**	**0.0**	**0.0**	**21.5**	**0.0**	**0.0**	**36.1**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
Total cash-flow	**30.6**	**(13.0)**	**(5.6)**	**(11.7)**	**17.4**	**(4.4)**	**(4.8)**	**(1.2)**	**(54.0)**	**11.8**	**47.0**	**49.8**	**49.8**	**49.8**	**49.8**	**49.8**	**49.8**	**49.8**	**49.8**	**17.2**
Cash at start of period	0.0	30.6	17.6	12.0	0.3	17.7	13.2	8.5	7.3	(46.7)	(34.9)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cash at end of period (before dividend)	30.6	17.6	12.0	0.3	17.7	13.2	8.5	7.3	(46.7)	(34.9)	12.1	49.8	49.8	49.8	49.8	49.8	49.8	49.8	49.8	17.2
Dividend	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	12.1	49.8	49.8	49.8	49.8	49.8	49.8	49.8	49.8	0.0
Cash at end of period (after dividend)	30.6	17.6	12.0	0.3	17.7	13.2	8.5	7.3	(46.7)	(34.9)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	17.2
Cash-flow per share (US$)	**0.0**	**(0.4)**	**(0.2)**	**(0.4)**	**(0.1)**	**(0.1)**	**(0.1)**	**(0.4)**	**(0.6)**	**0.1**	**0.5**	**0.6**	**0.6**	**0.6**	**0.6**	**0.6**	**0.6**	**0.6**	**0.6**	**0.2**

Source: Edison Investment Research

List of companies used in analysis

Exhibit 70: List of companies used in analysis

A1 Consolidated Gold	Klondex Mines
AEM SPA (IRS)	Kolar Gold
Ampella Mining	Kryso Resources
Anova Metals	Lexam vg Gold
Ariana Resources	Lupaka Gold
Asanko Gold	Mariana Resources
Atlantic Gold	Matsa Resources
Azimuth Resources	Metals Exploration
Azumah Resources	Millennium Minerals
Beadell Resources	Moneta Porcupine mns.
Bonterra Resources	Northern Freegold res.
Bullabulling Gold	Novagold Resources
Carpathian Gold	Nyota Minerals (Ion)
Castle Minerals	Oromin Explorations
Chaarat Gold	Orsu Metals (Ion)
Chesser Resources	Ovoca Gold (Ion)
Condor Gold	Papillon Resources
Conroy gold & Natural Resources	Patagonia Gold
Coral Gold Resources	PC Gold
Dacian Gold	Perseus Mining
Detour Gold	Sage Gold
Doray Minerals	Scotland Resources (Ion)
Entree Gold	Seabridge Gold
Excalibur Mining	Serabi Gold
Exeter Resource	Shanta Gold
Galantas Gold (Ion)	SML
Golden Queen mng.	Strated International
Goldrush Res.	Sulliden Gold
Greatland Gold	Trans Siberian Gold
Gryphon Minerals	Viking Ashanti
Guyana Goldfields	
Hill End Gold	
Hummingbird Resources	
Indophil Resources	
Kalnorth Gold Mines	
Kefi Minerals	
Kermode Resources	

Source: Edison Investment Research

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