



The effect of the proposed Royalty Bill on mineral property values

by E.V. Lilford*

Introduction

The South African Minerals Development Act ('the Act') has been promulgated and will come into full force and effect once it is gazetted. Thereafter, all Old Order mineral rights will have to be converted into New Order mineral rights within a 5-year period, probably by the end of 2008. The conversion of rights will be achieved only with the demonstrated inclusion of empowerment groups in the conversion applications.

In addition to the Act, the first draft of the proposed Royalty Bill ('the Bill') was released during the week beginning 17 March 2003. Comments on the Bill's contents had to be submitted before 30 April 2003. The contents were to be considered in terms of applicability and acceptability to the South African minerals industry, whereafter proposed comments and suggested amendments were to be submitted to the relevant State Treasury office.

Specifically referring to the Bill, the general response from the industry is one of concern. Since any royalty is tantamount to a tax, the general feeling is that the current mining taxation rates are already internationally competitive and to increase these effective rates, notably at differing rates depending on commodity type, will have an adverse impact on the South African mining industry. A number of these impacts can be mitigated to some degree, depending on the flexibility of the State to address the major concerns.

The Act and Bill

It is important to state that the recently promulgated Act provides for a number of approaches to economic empowerment within the mining industry. It is, however, the funding of a material equity stake in a large mining operation that remains the most challenging and enigmatic to both bankers and the mining companies alike. It is enigmatic because the empowerment companies require an equity return in the absence of providing equity funds. Hence the project promoters, which are often listed mining companies, cannot be expected to subsidize the return to the empowerment company without compromising the return to their own shareholders and, by implication, without their own share prices being adversely affected. In addition, the debt financiers will not finance an equity risk for a debt return, so the cost of financing could be higher in the absence of adequate security and/or recourse to the sponsor.

Regarding the new draft legislation, the reasons for the introduction of the Bill have been made clear. It is purported to be the final piece of legislation necessary to transform the

South African minerals industry. Its promulgation is stated to be aimed at:

- more closely aligning South Africa's resources industry with those of many other mineral-producing countries; and
- increasing the guaranteed contribution by mining companies to the nation's development, enhanced by direct contributions sourced from this country's non-renewable mineral resources.

In spite of its stated intentions, the current draft of the Bill will have to be amended so that certain issues are adequately addressed and specific uncertainty removed. In summary, some of the more important issues associated with the draft Bill, if implemented in its current form, are as follows:

- the proposed royalty has the effect of increasing the net taxation rate applicable to all mineral producers
- the fundamental values of all mineral properties will be reduced
- differing commodity producers will be treated differently in terms of the applicable royalty rates. This will result in prejudicial treatment of certain mining entities over others
- the continued success of all marginal operations will be compromised
- royalties will take precedence over debt redemption. Therefore, providers of finance may have to consider longer facility terms or require greater equity contributions by the sponsors. As a consequence, the greatest repercussion will be felt by black economic empowerment ('BEE') groups
- the royalty will cause an increase in an operation's pay limit, effectively resulting in 'higher-grading' of deposits, the sterilization of a percentage of the deposit and shortening of the life of the operation
- although income to the State will be increased, over the longer term unemployment will result earlier due to shorter mine-lives and will possibly negate these earlier benefits
- start-up projects may be compromised since revenues will be taxed as soon as they occur

* *Resource Finance, Investec Bank Limited, Sandown, Sandton.*

© *The South African Institute of Mining and Metallurgy, 2003. SA ISSN 0038-223X/3.00 + 0.00. Paper received May 2003; revised paper received Jun. 2003.*

The effect of the proposed Royalty Bill on mineral property values

- the return to shareholders will be reduced both in terms of distributable income (dividends) and capital appreciation
- the benefits to other stakeholders will be impeded and
- the operating assets will be impaired.

The Bill is to be introduced in addition to the Act and therefore cannot be considered in isolation. The combined effect of both the Bill and the Act needs to be considered, noting that they will be implemented almost simultaneously. As a result, a compounding impact on the South African mining industry can be expected. The impact that the combined legislation will have on mineral property and project values is significant. Naturally, the Bill has a very direct affect on values because it reduces the revenues of an asset due to the royalty. Alternatively, it has been construed by many that the royalty is tantamount to an additional operating cost.

The Bill and fair market value

There are three broad valuation approaches, each incorporating a number of valuation methodologies (Lilford and Minnitt, 2002). These are:

- the Market Approach which incorporates the US\$/oz and R/ha methods
- the Cost Approach which comprises the multiples of exploration expenditure and farm-in analysis methods; and
- the Income Approach which is the most commonly used approach and incorporates:
 - the discounted cash flow ('DCF') net present value ('NPV') method
 - the tail-margin method
 - real options valuations
 - decision tree analysis; as well as
 - stochastic valuations methods, such as Monte Carlo simulation.

It is advocated that more than one method should be used for any one valuation, since no specific method remains unchallenged. With the introduction of the Bill, the historical data used to regulate the use of the Market Approach will have to be redefined. That is, the reliance on historical transactions to estimate future values will have to be reassessed to take cognizance of the negative impact that the royalty will have on values. In addition, in terms of the valuation methods grouped under the Income Approach, cash flow derived values will be reduced for all mineral properties and projects.

Taxation and the grade curve

The returns to the State resulting from the introduction of the Bill will be higher than are currently being realized. This, quite simply, is due to the fact that the royalty is payable against the determined revenue generated by the asset as and when that revenues occurs. In addition, as currently proposed, even if a mining operation has an assessed loss or unredeemed capital expenditure, it will still be taxed according to the royalty rate. Therefore, the return to shareholders will be reduced commensurate with the income generated for the State. Unfairly, though, the effective tax rate tends to be higher the less profitable the operation is.

The most obvious reason why the proposed Bill will reduce the values of all mineral projects and properties is because the royalty is revenue based. Therefore, the proposed royalties will reduce the income generated by the sales of the commodity by an amount equivalent to that specific percentage of the revenue. Table I indicates the currently proposed royalty rates contained in the draft Bill.

On the basis of the tabled royalty rates, assuming the calendar 2001 year's actual minerals production figures are held relatively constant to end 2003 and using current spot commodity prices and a R/US\$ exchange rate of 7.35:1, Table II approximates the forecast royalties that would have been payable to the State assuming that the Bill was effective from 1 January 2003.

Group	Mineral	Royalty rate (%)
1	Salt, sand, sandstone, slate, gravel, clay, concrete, mortar, brick, dolerite, shale, gypsum, limestone, perlite and phosphate rock	1
2	Oil and gas: natural gas and natural gas condensate, petroleum, crude offshore production where the water depths are deeper than 500 metres	1
3	Alumino-silicates (andalusite, sillimanite, kyanite), asbestos, ammonium sulphate, barytes, zirconium oxide, uranium oxide, kaolin, talc, magnesite, mica, silica, sulphur, sodium sulphite, mineral pigment, pyrophyllite, dimension stone (granite, norite) and perlite	1
4	Anthracite and bituminous coal (low ash and steam)	2
5	Antimony, copper, iron, manganese, lead, zinc, cobalt, nickel, silicon, tin and vermiculite	2
6	Oil and gas: natural gas and natural gas condensate, petroleum, crude onshore and offshore production where the water depths are shallower than 500 metres	3
7	Gold, silver, vanadium, chromite and titanium dioxide (ilmenite, rutile)	3
8	Platinum group metals: platinum, palladium, rhodium, iridium, ruthenium and osmium	4
9	Amethyst, quartz (smoky quartz, citrine, rose quartz), cryptocrystalline quartz (jasper, opal), or chalcedony (blue lace agate, moss agate, onyx, rainbow chalcedony), tiger's eye, blue asbestos (crocidolite), beryl (emeralds, aquamarine,morganite, heliodor), chrysoberyl (cat's eye, alexandrite), corundum (rubies, sapphires), garnet (jade, hydro-grossular, spessartine), lolite, kyanite, sodalite, sugilite (royal lavulite or royal azel), tourmaline, verdite (serpentine) and topaz	5
10	Unpolished natural diamonds	8

The effect of the proposed Royalty Bill on mineral property values

Table II

Approximation of royalties payable to the State for 2003*

	Sales volumes 2001	Revenue R'million 2002	Royalty R'million f2003	Source
PGMs (4%)	228.7 tonnes	33371	1090	DME
Gold (3%)	393.5 tonnes	28676	970	GFMS
Coal (2%)	224 181 171 tonnes	25814	660	Minerals Bureau
Diamonds (8%)	11 162 630 carats	1291	730	DME
Silver (3%)	126.5 tonnes	142	4	Minerals Bureau
Other metallic minerals (2%)		10634	210	Minerals Bureau
Other minerals (1%)		4000	40	Minerals Bureau
		103928	3704	

*assuming the Bill was effective from 1 January 2003 to 31 December 2003

In the event that mining royalties were payable from the beginning of this year, the State would accrue approximately R3 704 million directly from existing mining operations. This figure excludes additional amounts that would be accrued through mining taxation.

Taking the resultant royalty of R3 704 million forward, the major assumption in Table III below is that the taxation burden attributable to the minerals sector in 2002 will be similar in 2003. Accepting this assumption, it can be calculated that the effective tax rate resulting from the suite of royalties will be increased by over 16%. This also assumes that the minerals industry pays tax at an across-the-board rate of 30%. Hence the effective tax rate will increase to nearly 35%. This takes into cognizance the fact that the royalty will be tax deductible in the payer's or operator's hands in the year in which it is incurred.

Naturally the above calculation assumes that the resultant effective tax rate will be equally applicable to all mineral producers and that all producers will therefore pay an effective tax of approximately 35%. Furthermore, the demonstrated increase in accruals to the State are annual whereas only one year's impact is demonstrated above. The reality of the tax rates will be more disparate than stated, with inequitable effective taxation increases levied against operations depending on which commodity they produce and therefore which royalty rate is applicable.

The increase in effective taxation will obviously reduce the value of a mineral asset due directly to the reduction in revenues (increase in taxes) due to the Bill. However, there are additional reasons why the proposed royalty will have a negative impact on value.

The values of mineral assets will be reduced as a result of shorter mining lives, resulting directly from the introduction of the Bill. It is not within the scope of this note to consider in detail the reasons supporting a reduction in an operation's life. Nevertheless, a simple explanation as to why a life-of-mine ('LoM') will be reduced follows.

The life of any operation is determined by the amount of reserves contained in its LoM plan and the rate of exploitation. That is, the volume of economically exploitable resources at a minimum specified cut-off grade that will be economically mined will be included in a LoM plan. The tonnage and grade determined above this cut-off grade are based on certain economic assumptions, the most important of which is the prevailing local commodity price. The commodity price tends to fluctuate more than working costs and capital expenditure expectations and hence its impacts

are given greater significance.

Mining at a specified rate will result in a certain life of the asset. The introduction of the Bill effectively reduces the commodity price received by the specific operation because it will be levied against revenue and not against profit. Alternatively the royalty will be deemed to have the affect of increasing costs. Either way, the Bill will directly affect the grade-tonnage curve, reducing the amount of tonnes available to be mined by forcibly increasing the mineral grade, or cut-off grade, above which the operation will be economical. The cut-off grade increases because the revenue per unit of commodity production has been artificially reduced by the royalty, or the cost to produce a unit of production has artificially been increased. That is, a lower economic tonnage is available so that at a consistent mining rate, the life of the operation will be reduced.

The Chamber of Mines ('COM') completed an exercise on the impact that the introduction of a 3% royalty in the gold sector would have on the availability of economic gold resources in South Africa. The COM specifically considered how the overall value would be affected on the Witwatersrand Basin, considering the impact on tonnes and grades as they relate to value.

According to Professor Morris Viljoen (Viljoen, 2003), approximately 50 000 tonnes of gold has been extracted from the Witwatersrand goldfields over time and a remaining 35 000 tonnes exists, some at significant depth. The COM estimates this resource at 45 000 tonnes (<http://www.bullion.org.za>) and suggests that 20 000 tonnes of this is inaccessible owing to technology restraints. Considering the two estimates, we will assume that around

Table III

Determination of the approximate effective tax rate for 2003

	R'million
Taxation (in 2002)	16100
therefore PBT (assumed 30% tax)	53667
less royalty (offset)	-3704
New PBT	49963
Less taxation (30%)	14989
Difference in mining taxation	1111
Additional tax i.t.o. the royalty	3704
Total taxation	18693
Average effective tax increase	16.10%
Effective overall tax rate	34.83%

The effect of the proposed Royalty Bill on mineral property values

20 000 tonnes of gold remains economically accessible in the Basin.

From the COM's report (<http://www.bullion.org.za>), it was determined that over a period of ten years to the end of 2002, the long-term gold price averaged around R80 630/kg, with gold being produced at an average cost of R318.60 per tonne milled. This translates to an average cut-off grade of 3.95g/t (the ratio of R318.60/t to R80.63/g). From this, consider Table IV formulated by the Minerals Bureau and the Government Mining Engineer, which is representative of the remaining gold ore in the Witwatersrand Basin.

Plotting the available tonnage, as a cumulative percentage, against the gold grade yields Figure 1.

Interpreting the Figure, we can see that at a cut-off grade of 3.95g/t, approximately 65% of the available tonnage will be economical to exploit. Therefore around 13 000 tonnes of gold will be recovered, at current production rates, over approximately 35 years. The COM estimated that the impact of the 3% royalty will be to effectively increase the average gold mine's working costs by 3.7%. That is, it will increase working costs from R318.60/t to R330.39/t. According to the COM's table (<http://www.bullion.org.za>, page 38), this will increase the cut-off grade from 3.95g/t to approximately 4.20g/t and commensurately reduce the economically exploitable gold to nearly 12 500 tonnes.

This suggests a reduction or sterilisation in economically exploitable gold of 500 tonnes, currently valued at R43.885 billion (US\$350/oz, R7.80/US\$), approximating R1.25 billion per annum over 35 years. This compares to the R0.970 billion per annum shown for gold royalties accruing to the State in Table II. That is, for the South African gold sector alone, the Bill in its current format will negatively impact our mining industry.

Naturally, this exercise should be completed for all of the mineral sectors of the South African mining industry. It will be deduced that the proposed royalties will have a deleterious impact on the South African minerals industry over the longer term, notably in terms of project values.

Considering the values of greenfields assets, royalty taxation has more of an impact on start-up projects than on existing operations. The examples set out in the Appendix verify this. Start-up projects need time after commissioning

Table IV

Witwatersrand Basin – Percentage Gold Grades

Average grade (grams per tonne)	Percentage of ore containing such grades	Cumulative percentage of ore at the different grades
32.46	0.95	0.95
32.48	0.46	1.41
24.51	0.96	2.37
21.75	1.38	3.75
18.08	3.21	6.96
14.88	2.12	9.08
12.91	3.19	12.27
10.95	4.61	16.88
9.40	6.90	23.78
6.68	11.67	35.45
5.41	9.40	44.85
4.47	13.78	58.63
3.46	14.18	72.81
2.51	13.28	86.09
1.60	10.38	96.47
0.49	3.53	100.00
	100.00	

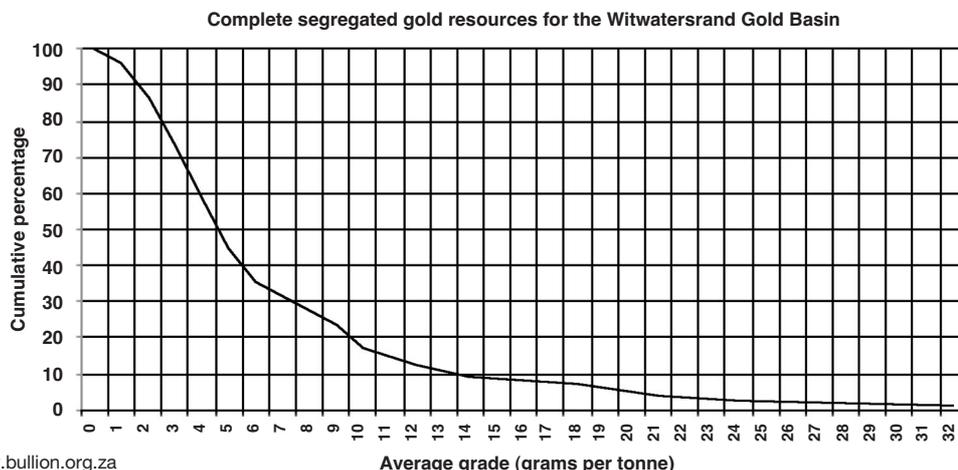
Source: <http://www.bullion.org.za>

to reach design input and output levels in terms of capacities and efficiencies. This is often referred to as the ramp-up period over which operations establish sustainable levels of production. The Bill, in its current form, suggests that as soon as even a start-up operation evidences income, it is liable to pay a royalty. This is significantly different from current taxation rules that are based on profitability and not on revenue. Intuitively, the impact on value that this has will be significant.

Consequential action

With the anticipated introduction of the Act and the Bill, certain courses of action can be expected to be followed by many of this country's mineral producers. Their anticipated actions will impact on the values of the mineral assets being exploited.

Existing operators will most likely maximize and not



Source: <http://www.bullion.org.za>

Figure 1—Witwatersrand Basin gold resources

The effect of the proposed Royalty Bill on mineral property values

optimize their returns and values over as short a period of time as possible. This must be considered in greater detail. With the adjustment in the required percentage equity participations in terms of the Act and the introduction of higher effective taxes due to the Bill, shareholders and other stakeholders will reconsider their mineral-related exposures and investments. In order to appease all stakeholders, the following scenario may ensue.

Mining companies and operators will tend to high-grade their deposits. They will maximize returns and profits at the expense of project optimization. They will want to realize as much value as possible before the implementation of laws that will dilute their returns. Due to the higher cut-off grades resulting from the implementation of Bill, the effect will be to shorten the lives of their operations and probably the entire South African mining industry's life. Since a five-year window exists before the conversion to New Order Rights has to take place, operators will aim to mine at significantly above the cut-off grade over this five-year period, and will therefore leave significant amounts of lower grade material *in situ*. The ore left behind may never again be economically exploited. In terms of value, this will ultimately impact negatively on the fiscus although obviously not over the short term. In the shorter term, higher effective taxes will be paid, but at the expense of taxation income over the longer term. Future generations will bear the brunt of today's actions, with diminishing employment, taxes to the State, etc., resulting. The uncertainty will result in the premise of sustainable development being void. Significant volumes of South Africa's natural resources will be sterilized. Finally, exploration activities will decline further in this country, which is unfortunately coming off a low base already.

Hedging

The draft Bill clearly states that the royalty calculations will be based on State-determined revenues. The State will make sure that any company that benefits from some form of transfer pricing will pay the due royalty based on the commodity's actual price. However, it is not clear what the position is regarding companies that have entered into forward contracts and positions on a specific commodity or on the currency. Due to its silence on the issue, the implication is that if a company has hedged some of its production, the resulting hedge-derived revenues will be ignored. The commodity's revenue will be calculated on the commodity's actual price (spot price) and not on the received revenue (hedge price). This is not a concern for either the State or the operator if the hedged price is identical to the spot price. However, this is unrealistic.

If the hedged price is above the spot price, the company will pay a lower effective royalty on its calculated revenue, playing into the operator's hands. On the other hand, if the hedged price is below the spot price, the royalty paid will be higher than it should be, granting higher income to the State at the expense of the operator. The impact that these scenarios have on value are obvious.

Conclusion

South Africa's income disparity is one of the largest in world, second only to Brazil and China. This must be of concern to any mining company invested or wanting to invest in a long-term project in South Africa as history has demonstrated that

extreme income disparities invariably lead to social and political instability. To ignore this fact is simply not taking cognizance of the realities of a unique South Africa. Black economic empowerment is an attempt to address this critical issue in an inclusive and participative manner by all stakeholders in the mining industry. In this regard, it can be considered that the new Act is a workable document and if implemented and managed wisely, should make a substantial contribution to enticing investments to South Africa. It should contribute materially to the distribution of income to the previously disadvantaged sector of our economy. This is ultimately in the interest of all of South Africa's citizens.

Of equal significance, the Royalty Bill is anticipated to spread the wealth generated from this country's natural resources. Unlike the Act, the Bill unfortunately seems to be rather punitive to the industry due to a number of factors:

- it will prejudice certain commodity producers more than others
- it has the affect of increasing taxation rates, despite the royalty being offset against taxable income
- it will reduce mineral property and mining operation values because:
 - the royalty will reduce revenues
 - operation's cut-off grades will be increased resulting in lower tonnages being mined at the higher grades
 - mining at the same rate, the life of the operations will be reduced.
- the cost of capital will increase, increasing the rates at which cash flows are discounted, resulting in artificially increased discount rates and hence reduced values.

Finally, prior to the implementation of the Bill, a few suggested solutions that can obviate some of the preceding issues include:

- amending the royalty legislation so that it is based on the profitability and not the income of an operating asset, or reducing the proposed royalty rates
- decreasing the disparate royalty rates among the differing commodities
- the granting by the State of a royalty holiday period, specifically for start-up ventures
- reduce the current mining taxation rates in order to partly negate the impact of the proposed royalties
- devise a structure that recognizes royalty contributions as a component of employment equity (contributes to 'score card')
- allowing an unredeemed royalty to be carried forward as with unredeemed capex/assessed loss; and
- the State reinvesting a large portion of the royalties into the mining industry, to 'subsidize' pay limits and to cater for the eventual social issues resulting from the introduction of the royalties (e.g. unemployment).

References

- LILFORD, E.V. and MINNITT, R.C.A. Methodologies in the Valuation of Mineral Rights. *Journal of the South African Institute of Mining and Metallurgy*. vol. 102, no. 7, October 2002, pp. 369-384.
- VILJOEN, M. Geology of South Africa's Mineral Resources and Future Potential. Colloquium, *The Mineral and Petroleum Royalty Bill*. 16 April 2003. <http://www.bullion.org.za/Level3/MediaSpeech/RoyaltyBillSubmission.pdf> ◆

The effect of the proposed Royalty Bill on mineral property values

Appendix

The following simple examples demonstrate the issues raised in the text above and consider the values, excluding the effects of discount rates, under the various scenarios.

Table I: No royalty, zero unredeemed balance

	Inflation rate	7.50%	1.000 1.075 1.156 1.242 1.335 1.436 1.543 1.659 1.783 1.917 2.061 2.216											
			year 1	year 2	year 3	year 4	year 5	year 6	year 7	year 8	year 9	year 10	year 11	year 12
Revenue	R'mill	500.00	537.50	577.81	621.15	667.73	717.81	771.65	829.52	891.74	958.62	1030.52	1107.80	
Royalty to State	R'mill	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Working costs	R'mill	450.00	483.75	520.03	559.03	600.96	646.03	694.49	746.57	802.57	862.76	927.46	997.02	
Operating profit	R'mill	50.00	53.75	57.78	62.11	66.77	71.78	77.17	82.95	89.17	95.86	103.05	110.78	
Capital expenditure	R'mill	10.00	10.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	
Profit before tax	R'mill	40.00	43.75	52.78	57.11	61.77	66.78	72.17	77.95	84.17	90.86	98.05	105.78	
Royalty for tax shield	R'mill	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Unredeemed capex	R'mill	10.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Total to be redeemed	R'mill	10.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Amount redeemed	R'mill	10.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
unredeemed balance	R'mill	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Taxable income	R'mill	30.00	43.75	52.78	57.11	61.77	66.78	72.17	77.95	84.17	90.86	98.05	105.78	
Taxation	R'mill	9.00	13.13	15.83	17.13	18.53	20.03	21.65	23.39	25.25	27.26	29.42	31.73	
Profit after tax	R'mill	31.00	30.63	36.95	39.98	43.24	46.75	50.52	54.57	58.92	63.60	68.64	74.05	
Distributable value (real)	R'mill	31.00	28.49	31.97	32.18	32.38	32.56	32.73	32.89	33.04	33.17	33.30	33.42	
Royalty	R'mill	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Taxation	R'mill	9.00	13.13	15.83	17.13	18.53	20.03	21.65	23.39	25.25	27.26	29.42	31.73	
Royalty (real)	R'mill	0	0	0	0	0	0	0	0	0	0	0	0	
Taxation (Real)	R'mill	9.00	12.21	13.70	13.79	13.88	13.96	14.03	14.10	14.16	14.22	14.27	14.32	
Effective tax rate	%	23%	30%	30%	30%	30%	30%	30%	30%	30%	30%	30%	30%	
Value of cash flow	R'mill	387.14												
Numerical sum - royalty (real)	R'mill	0.00												
Numerical sum - taxation (real)	R'mill	165.16												
Total income to State	R'mill	165.16												

Table II: 3% royalty, zero unredeemed balance

	Inflation rate	7.50%	1.000 1.075 1.156 1.242 1.335 1.436 1.543 1.659 1.783 1.917 2.061 2.216											
			year 1	year 2	year 3	year 4	year 5	year 6	year 7	year 8	year 9	year 10	year 11	year 12
Revenue	R'mill	500.00	537.50	577.81	621.15	667.73	717.81	771.65	829.52	891.74	958.62	1030.52	1107.80	
Royalty to State	R'mill	15.00	16.13	17.33	18.63	20.03	21.53	23.15	24.89	26.75	28.76	30.92	33.23	
Working costs	R'mill	450.00	483.75	520.03	559.03	600.96	646.03	694.49	746.57	802.57	862.76	927.46	997.02	
Operating profit	R'mill	35.00	37.63	40.45	43.48	46.74	50.25	54.02	58.07	62.42	67.10	72.14	77.55	
Capital expenditure	R'mill	10.00	10.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	
Profit before tax	R'mill	25.00	27.63	35.45	38.48	41.74	45.25	49.02	53.07	57.42	62.10	67.14	72.55	
Royalty for tax shield	R'mill	15.00	16.13	17.33	18.63	20.03	21.53	23.15	24.89	26.75	28.76	30.92	33.23	
Unredeemed capex	R'mill	10.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Total to be redeemed	R'mill	25.00	16.13	17.33	18.63	20.03	21.53	23.15	24.89	26.75	28.76	30.92	33.23	
Amount redeemed	R'mill	25.00	16.13	17.33	18.63	20.03	21.53	23.15	24.89	26.75	28.76	30.92	33.23	
unredeemed balance	R'mill	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Taxable income	R'mill	0.00	11.50	18.11	19.85	21.71	23.71	25.87	28.18	30.67	33.34	36.22	39.31	
Taxation	R'mill	0.00	3.45	5.43	5.95	6.51	7.11	7.76	8.45	9.20	10.00	10.87	11.79	
Profit after tax	R'mill	25.00	24.18	30.01	32.53	35.23	38.13	41.26	44.61	48.22	52.10	56.27	60.75	
Distributable value (real)	R'mill	25.00	22.49	25.97	26.18	26.38	26.56	26.73	26.89	27.04	27.17	27.30	27.42	
Royalty	R'mill	15.00	16.13	17.33	18.63	20.03	21.53	23.15	24.89	26.75	28.76	30.92	33.23	
Taxation	R'mill	0.00	3.45	5.43	5.95	6.51	7.11	7.76	8.45	9.20	10.00	10.87	11.79	
Royalty (real)	R'mill	15	15	15	15	15	15	15	15	15	15	15	15	
Taxation (Real)	R'mill	0.00	3.21	4.70	4.79	4.88	4.96	5.03	5.10	5.16	5.22	5.27	5.32	
Effective tax rate	%	60%	71%	64%	64%	64%	63%	63%	63%	63%	62%	62%	62%	
Value of cash flow	R'mill	315.14												
Numerical sum - royalty (real)	R'mill	180.00												
Numerical sum - taxation (real)	R'mill	61.24												
Total income to State	R'mill	241.24												

Table III: No royalty, R200 million unredeemed balance

	Inflation rate	7.50%	1.000 1.075 1.156 1.242 1.335 1.436 1.543 1.659 1.783 1.917 2.061 2.216											
			year 1	year 2	year 3	year 4	year 5	year 6	year 7	year 8	year 9	year 10	year 11	year 12
Revenue	R'mill	500.00	537.50	577.81	621.15	667.73	717.81	771.65	829.52	891.74	958.62	1030.52	1107.80	
Royalty to State	R'mill	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Working costs	R'mill	450.00	483.75	520.03	559.03	600.96	646.03	694.49	746.57	802.57	862.76	927.46	997.02	
Operating profit	R'mill	50.00	53.75	57.78	62.11	66.77	71.78	77.17	82.95	89.17	95.86	103.05	110.78	
Capital expenditure	R'mill	10.00	10.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	
Profit before tax	R'mill	40.00	43.75	52.78	57.11	61.77	66.78	72.17	77.95	84.17	90.86	98.05	105.78	
Royalty for tax shield	R'mill	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Unredeemed capex	R'mill	210.00	170.00	126.25	73.47	16.35	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Total to be redeemed	R'mill	210.00	170.00	126.25	73.47	16.35	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Amount redeemed	R'mill	40.00	43.75	52.78	57.11	61.77	66.78	72.17	77.95	84.17	90.86	98.05	105.78	
unredeemed balance	R'mill	170.00	126.25	73.47	16.35	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Taxable income	R'mill	0.00	0.00	0.00	0.00	45.42	66.78	72.17	77.95	84.17	90.86	98.05	105.78	
Taxation	R'mill	0.00	0.00	0.00	0.00	13.63	20.03	21.65	23.39	25.25	27.26	29.42	31.73	
Profit after tax	R'mill	40.00	43.75	52.78	57.11	48.15	46.75	50.52	54.57	58.92	63.60	68.64	74.05	
Distributable value (real)	R'mill	40.00	40.70	45.67	45.98	36.05	32.56	32.73	32.89	33.04	33.17	33.30	33.42	
Royalty	R'mill	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Taxation	R'mill	0.00	0.00	0.00	0.00	13.63	20.03	21.65	23.39	25.25	27.26	29.42	31.73	
Royalty (real)	R'mill	0	0	0	0	0	0	0	0	0	0	0	0	
Taxation (Real)	R'mill	0.00	0.00	0.00	0.00	10.20	13.96	14.03	14.10	14.16	14.22	14.27	14.32	
Effective tax rate	%	0%	0%	0%	0%	22%	30%	30%	30%	30%	30%	30%	30%	
Value of cash flow	R'mill	439.52												
Numerical sum - royalty (real)	R'mill	0.00												
Numerical sum - taxation (real)	R'mill	111.57												
Total income to State	R'mill	111.57												

The effect of the proposed Royalty Bill on mineral property values

The following simple examples demonstrate the issues raised in the text above and consider the values, excluding the effects of discount rates, under the various scenarios

Table VI: 3% royalty, R200 million unredeemed balance

Inflation rate	7.50%	Inflation rate											
		1.000	1.075	1.156	1.242	1.335	1.436	1.543	1.659	1.783	1.917	2.061	2.216
		year 1	year 2	year 3	year 4	year 5	year 6	year 7	year 8	year 9	year 10	year 11	year 12
Revenue	R'mill	500.00	537.50	577.81	621.15	667.73	717.81	771.65	829.52	891.74	958.62	1030.52	1107.80
Royalty to State	3%	15.00	16.13	17.33	18.63	20.03	21.53	23.15	24.89	26.75	28.76	30.92	33.23
Working costs	R'mill	450.00	483.75	520.03	559.03	600.96	646.03	694.49	746.57	802.57	862.76	927.46	997.02
Operating profit	R'mill	35.00	37.63	40.45	43.48	46.74	50.25	54.02	58.07	62.42	67.10	72.14	77.55
Capital expenditure	R'mill	10.00	10.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
Profit before tax	R'mill	25.00	27.63	35.45	38.48	41.74	45.25	49.02	53.07	57.42	62.10	67.14	72.55
Royalty for tax shield	R'mill	15.00	16.13	17.33	18.63	20.03	21.53	23.15	24.89	26.75	28.76	30.92	33.23
Unredeemed capex	200	210.00	200.00	188.50	170.39	150.54	128.83	105.12	79.25	51.07	20.40	0.00	0.00
Total to be redeemed	R'mill	225.00	216.13	205.83	189.02	170.57	150.37	128.27	104.14	77.82	49.16	30.92	33.23
Amount redeemed	R'mill	25.00	27.63	35.45	38.48	41.74	45.25	49.02	53.07	57.42	62.10	67.14	72.55
unredeemed balance	R'mill	200.00	188.50	170.39	150.54	128.83	105.12	79.25	51.07	20.40	0.00	0.00	0.00
Taxable income	R'mill	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	12.94	36.22	39.31
Taxation	30%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.88	10.87	11.79
Profit after tax	R'mill	25.00	27.63	35.45	38.48	41.74	45.25	49.02	53.07	57.42	58.22	56.27	60.75
Distributable value (real)	R'mill	25.00	25.70	30.67	30.98	31.26	31.52	31.76	31.99	32.20	30.37	27.30	27.42
Royalty	R'mill	15.00	16.13	17.33	18.63	20.03	21.53	23.15	24.89	26.75	28.76	30.92	33.23
Taxation	R'mill	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.88	10.87	11.79
Royalty (real)	R'mill	15	15	15	15	15	15	15	15	15	15	15	15
Taxation (Real)	R'mill	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.03	5.27	5.32
Effective tax rate	%	60%	58%	49%	48%	48%	48%	47%	47%	47%	53%	62%	62%
Value of cash flow	R'mill	356.15											
Numerical sum - royalty (real)	R'mill	180.00											
Numerical sum - taxation (real)	R'mill	18.91											
Total income to State	R'mill	198.91											

Table V: No royalty, zero unredeemed balance - increased revenue

Inflation rate	7.50%	Inflation rate											
		1.000	1.075	1.156	1.242	1.335	1.436	1.543	1.659	1.783	1.917	2.061	2.216
		year 1	year 2	year 3	year 4	year 5	year 6	year 7	year 8	year 9	year 10	year 11	year 12
Revenue	R'mill	1000.00	1075.00	1155.63	1242.30	1335.47	1435.63	1543.30	1659.05	1783.48	1917.24	2061.03	2215.61
Royalty to State	0%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Working costs	R'mill	450.00	483.75	520.03	559.03	600.96	646.03	694.49	746.57	802.57	862.76	927.46	997.02
Operating profit	R'mill	550.00	591.25	635.59	683.26	734.51	789.60	848.82	912.48	980.91	1054.48	1133.57	1218.58
Capital expenditure	R'mill	10.00	10.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
Profit before tax	R'mill	540.00	581.25	630.59	678.26	729.51	784.60	843.82	907.48	975.91	1049.48	1128.57	1213.58
Royalty for tax shield	R'mill	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Unredeemed capex	0	10.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total to be redeemed	R'mill	10.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Amount redeemed	R'mill	10.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
unredeemed balance	R'mill	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Taxable income	R'mill	530.00	581.25	630.59	678.26	729.51	784.60	843.82	907.48	975.91	1049.48	1128.57	1213.58
Taxation	30%	159.00	174.38	189.18	203.48	218.85	235.38	253.14	272.24	292.77	314.84	338.57	364.08
Profit after tax	R'mill	381.00	406.88	441.42	474.78	510.66	549.22	590.67	635.23	683.14	734.64	790.00	849.51
Distributable value (real)	R'mill	381.00	378.49	381.97	382.18	382.38	382.56	382.73	382.89	383.04	383.17	383.30	383.42
Royalty	R'mill	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Taxation	R'mill	159.00	174.38	189.18	203.48	218.85	235.38	253.14	272.24	292.77	314.84	338.57	364.08
Royalty (real)	R'mill	0	0	0	0	0	0	0	0	0	0	0	0
Taxation (Real)	R'mill	159.00	162.21	163.70	163.79	163.88	163.96	164.03	164.10	164.16	164.22	164.27	164.32
Effective tax rate	%	29%	30%	30%	30%	30%	30%	30%	30%	30%	30%	30%	30%
Value of cash flow	R'mill	4587.14											
Numerical sum - royalty (real)	R'mill	0.00											
Numerical sum - taxation (real)	R'mill	1965.23											
Total income to State	R'mill	1965.23											

Table VI: 3% royalty, zero unredeemed balance - increased revenue

Inflation rate	7.50%	Inflation rate											
		1.000	1.075	1.156	1.242	1.335	1.436	1.543	1.659	1.783	1.917	2.061	2.216
		year 1	year 2	year 3	year 4	year 5	year 6	year 7	year 8	year 9	year 10	year 11	year 12
Revenue	R'mill	1000.00	1075.00	1155.63	1242.30	1335.47	1435.63	1543.30	1659.05	1783.48	1917.24	2061.03	2215.61
Royalty to State	3%	30.00	32.25	34.67	37.27	40.06	43.07	46.30	49.77	53.50	57.52	61.83	66.47
Working costs	R'mill	450.00	483.75	520.03	559.03	600.96	646.03	694.49	746.57	802.57	862.76	927.46	997.02
Operating profit	R'mill	520.00	559.00	600.93	645.99	694.44	746.53	802.52	862.71	927.41	996.96	1071.74	1152.12
Capital expenditure	R'mill	10.00	10.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
Profit before tax	R'mill	510.00	549.00	595.93	640.99	689.44	741.53	797.52	857.71	922.41	991.96	1066.74	1147.12
Royalty for tax shield	R'mill	30.00	32.25	34.67	37.27	40.06	43.07	46.30	49.77	53.50	57.52	61.83	66.47
Unredeemed capex	0	10.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total to be redeemed	R'mill	40.00	32.25	34.67	37.27	40.06	43.07	46.30	49.77	53.50	57.52	61.83	66.47
Amount redeemed	R'mill	40.00	32.25	34.67	37.27	40.06	43.07	46.30	49.77	53.50	57.52	61.83	66.47
unredeemed balance	R'mill	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Taxable income	R'mill	470.00	516.75	561.26	603.73	649.38	698.46	751.22	807.93	868.90	934.45	1004.91	1080.65
Taxation	30%	141.00	155.03	168.38	181.12	194.81	209.54	225.37	242.38	260.67	280.33	301.47	324.19
Profit after tax	R'mill	369.00	393.98	427.55	459.88	494.63	531.99	572.15	615.33	661.74	711.63	765.26	822.92
Distributable value (real)	R'mill	369.00	366.49	369.97	370.18	370.38	370.56	370.73	370.89	371.04	371.17	371.30	371.42
Royalty	R'mill	30.00	32.25	34.67	37.27	40.06	43.07	46.30	49.77	53.50	57.52	61.83	66.47
Taxation	R'mill	141.00	155.03	168.38	181.12	194.81	209.54	225.37	242.38	260.67	280.33	301.47	324.19
Royalty (real)	R'mill	30	30	30	30	30	30	30	30	30	30	30	30
Taxation (Real)	R'mill	141.00	144.21	145.70	145.79	145.88	145.96	146.03	146.10	146.16	146.22	146.27	146.32
Effective tax rate	%	34%	34%	34%	34%	34%	34%	34%	34%	34%	34%	34%	34%
Value of cash flow	R'mill	4443.14											
Numerical sum - royalty (real)	R'mill	360.00											
Numerical sum - taxation (real)	R'mill	1749.71											
Total income to State	R'mill	2109.71											

The effect of the proposed Royalty Bill on mineral property values

Table VII: No royalty, R200 million unredeemed balance - increased revenue

Inflation rate	7.50%	Inflation rate											
		1.000	1.075	1.156	1.242	1.335	1.436	1.543	1.659	1.783	1.917	2.061	2.216
		year 1	year 2	year 3	year 4	year 5	year 6	year 7	year 8	year 9	year 10	year 11	year 12
Revenue	R'mill	1000.00	1075.00	1155.63	1242.30	1335.47	1435.63	1543.30	1659.05	1783.48	1917.24	2061.03	2215.61
Royalty to State	0%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Working costs	R'mill	450.00	483.75	520.03	559.03	600.96	646.03	694.49	746.57	802.57	862.76	927.46	997.02
Operating profit	R'mill	550.00	591.25	635.59	683.26	734.51	789.60	848.82	912.48	980.91	1054.48	1133.57	1218.58
Capital expenditure	R'mill	10.00	10.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
Profit before tax	R'mill	540.00	581.25	630.59	678.26	729.51	784.60	843.82	907.48	975.91	1049.48	1128.57	1213.58
Royalty for tax shield	R'mill	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Unredeemed capex	200	210.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total to be redeemed	R'mill	210.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Amount redeemed	R'mill	210.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Unredeemed balance	R'mill	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Taxable income	R'mill	330.00	581.25	630.59	678.26	729.51	784.60	843.82	907.48	975.91	1049.48	1128.57	1213.58
Taxation	30%	99.00	174.38	189.18	203.48	218.85	235.38	253.14	272.24	292.77	314.84	338.57	364.08
Profit after tax	R'mill	441.00	406.88	441.42	474.78	510.66	549.22	590.67	635.23	683.14	734.64	790.00	849.51
Distributable value (real)	R'mill	441.00	378.49	381.97	382.18	382.38	382.56	382.73	382.89	383.04	383.17	383.30	383.42
Royalty	R'mill	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Taxation	R'mill	99.00	174.38	189.18	203.48	218.85	235.38	253.14	272.24	292.77	314.84	338.57	364.08
Royalty (real)	R'mill	0	0	0	0	0	0	0	0	0	0	0	0
Taxation (Real)	R'mill	99.00	162.21	163.70	163.79	163.88	163.96	164.03	164.10	164.16	164.22	164.27	164.32
Effective tax rate	%	18%	30%	30%	30%	30%	30%	30%	30%	30%	30%	30%	30%
Value of cash flow	R'mill	4647.14											
Numerical sum - royalty (real)	R'mill	0.00											
Numerical sum - taxation (real)	R'mill	1905.11											
Total income to State	R'mill	1905.11											

Table VIII: 3% royalty, R200 million unredeemed balance - increased revenue

Inflation rate	7.50%	Inflation rate											
		1.000	1.075	1.156	1.242	1.335	1.436	1.543	1.659	1.783	1.917	2.061	2.216
		year 1	year 2	year 3	year 4	year 5	year 6	year 7	year 8	year 9	year 10	year 11	year 12
Revenue	R'mill	1000.00	1075.00	1155.63	1242.30	1335.47	1435.63	1543.30	1659.05	1783.48	1917.24	2061.03	2215.61
Royalty to State	3%	30.00	32.25	34.67	37.27	40.06	43.07	46.30	49.77	53.50	57.52	61.83	66.47
Working costs	R'mill	450.00	483.75	520.03	559.03	600.96	646.03	694.49	746.57	802.57	862.76	927.46	997.02
Operating profit	R'mill	520.00	559.00	600.93	645.99	694.44	746.53	802.52	862.71	927.41	996.96	1071.74	1152.12
Capital expenditure	R'mill	10.00	10.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
Profit before tax	R'mill	510.00	549.00	595.93	640.99	689.44	741.53	797.52	857.71	922.41	991.96	1066.74	1147.12
Royalty for tax shield	R'mill	30.00	32.25	34.67	37.27	40.06	43.07	46.30	49.77	53.50	57.52	61.83	66.47
Unredeemed capex	200	210.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total to be redeemed	R'mill	240.00	32.25	34.67	37.27	40.06	43.07	46.30	49.77	53.50	57.52	61.83	66.47
Amount redeemed	R'mill	240.00	32.25	34.67	37.27	40.06	43.07	46.30	49.77	53.50	57.52	61.83	66.47
Unredeemed balance	R'mill	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Taxable income	R'mill	270.00	516.75	561.26	603.73	649.38	698.46	751.22	807.93	868.90	934.45	1004.91	1080.65
Taxation	30%	81.00	155.03	168.38	181.12	194.81	209.54	225.37	242.38	260.67	280.33	301.47	324.19
Profit after tax	R'mill	429.00	393.98	427.55	459.88	494.63	531.99	572.15	615.33	661.74	711.63	765.26	822.92
Distributable value (real)	R'mill	429.00	366.49	369.97	370.18	370.38	370.56	370.73	370.89	371.04	371.17	371.30	371.42
Royalty	R'mill	30.00	32.25	34.67	37.27	40.06	43.07	46.30	49.77	53.50	57.52	61.83	66.47
Taxation	R'mill	81.00	155.03	168.38	181.12	194.81	209.54	225.37	242.38	260.67	280.33	301.47	324.19
Royalty (real)	R'mill	30	30	30	30	30	30	30	30	30	30	30	30
Taxation (Real)	R'mill	81.00	144.21	145.70	145.79	145.88	145.96	146.03	146.10	146.16	146.22	146.27	146.32
Effective tax rate	%	22%	34%	34%	34%	34%	34%	34%	34%	34%	34%	34%	34%
Value of cash flow	R'mill	4503.14											
Numerical sum - royalty (real)	R'mill	360.00											
Numerical sum - taxation (real)	R'mill	1689.60											
Total income to State	R'mill	2049.60											

It is clearly demonstrated in the previous Tables that a flat royalty rate has a greater negative impact on lower margin producers. It may therefore be suggested that, in much the same way that a formula tax rate is applied in the gold industry, the royalty rate applicable to all commodity types should also be formula derived.