2.3 THE IMPORTANCE OF THE MINING INDUSTRY TO THE SOUTH AFRICAN ECONOMY

South Africa is blessed with an extraordinary wealth of minerals. For example, the country is ranked first in the world in terms of known reserves for, among other minerals, manganese, chromium, platinum group metals and gold. Table 2.2 is a summary of the country's mineral reserve base position and indicates its comparative advantage over many of its competitors for direct foreign investment. This advantage in endowment allowed the mining sector to become the engine of the modern South African economy. Although mining's contribution to the economy has declined from twenty per cent in 1960 to about eight per cent in 1997, it is still a very important sector of the South African economy because the indirect multiplier effect of the industry on the economy is about fifteen per cent (Chamber of Mines, 1997). If this percentage is compared with the contribution by the manufacturing sector, which is the largest contributor (23,8 per cent in 1996), one has a better understanding of mining's significance. In its statistical tables for 1997, the Chamber of Mines (1997) reported that mineral export sales accounted for thirty-seven per cent of total foreign exchange earnings. The mining industry also provided employment opportunities to 533 000 people in 1997, approximately ten per cent of all people employed in the formal sector of the South African economy.

Table 2.2 South Africa's 1996 mineral reserve base position [2.8]

MINERAL	RANKING	SHARE OF WORLD RESERVES (%)	COUNTRY RANKED FIRST
Manganese	1	81	South Africa
Chromium	1	68	South Africa
Platinum group metals	1	56	South Africa
Vanadium	1	45	South Africa
Gold	1	40	South Africa
Alumino-silicates	1	37	South Africa
Vermiculite	2	40	USA
Zirconium minerals	2	26	Australia
Titanium minerals	2	17	Australia
Antimony	2	5	Bolivia
Fluorspar	3	12	USSR
Phosphate rock	3	7	Morocco
Diamonds	4	Not available	Australia
Zinc	4	5	Australia
Coal	5	11	USA
Lead	6	2	Australia
Uranium	7	6	Australia
Silver	7	2	USA
Iron	8	6	CIS
Copper	12	2	Chile

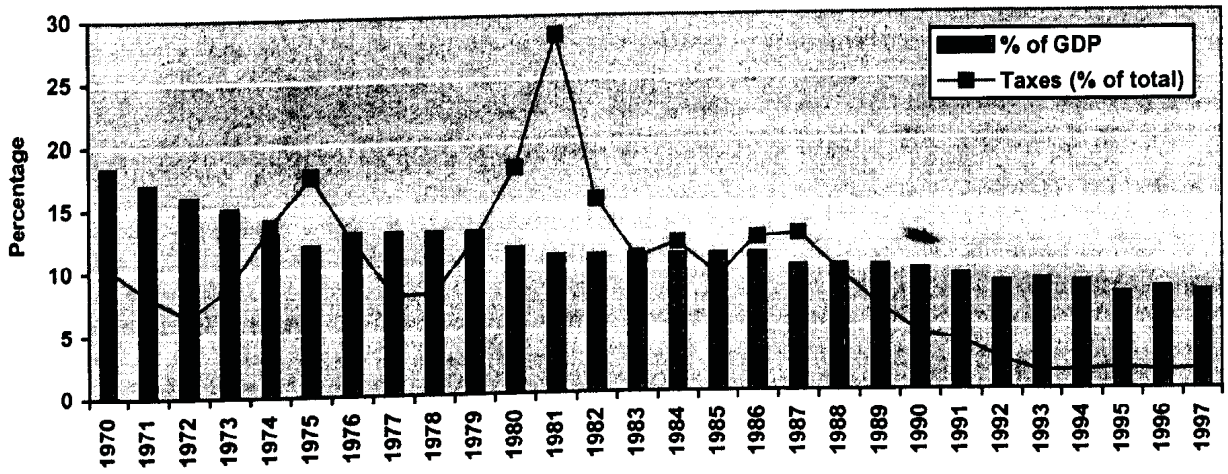
Source: Chamber of Mines of South Africa (1996)

2.8 The reserve base is the *in situ* demonstrated resource from which reserves are estimated. It includes those resources that are currently economic, marginally economic and those that have a reasonable potential for becoming economically viable.

2.3.1 Contribution to the economy

The mining data in table 2.1, which is also reflected in figure 2.4, show that the mining industry's contribution to the South African economy has declined steadily over the past twenty-seven years. The value of figure 2.4 lies in assessing the relationship between mining's contribution to the economy as measured by GDP and the fiscus. There should be a strong relationship between the contribution of the industry to GDP and its tax contribution. The lack of strong correlation between these factors (see figure 4.4) arises because the sliding-scale formula-type of taxation applicable to the gold mining sector, by far the greater contributor of the minerals industry, is such that the state receives a higher share when gold revenues are high and less when profit margins shrink. Consequently, there should be a better correlation between the contribution to the fiscus and the gold price because of its impact on revenue earned. The higher contribution to the fiscus in the early 1980s was because the gold price reached levels above 600 US dollars per fine ounce in 1980, but was offset by smaller contributions in the 1970s and, more significantly, the 1990s when the nominal gold price dropped below the pre-1980 levels.

Figure 2.4 Mining contributions to GDP and the fiscus



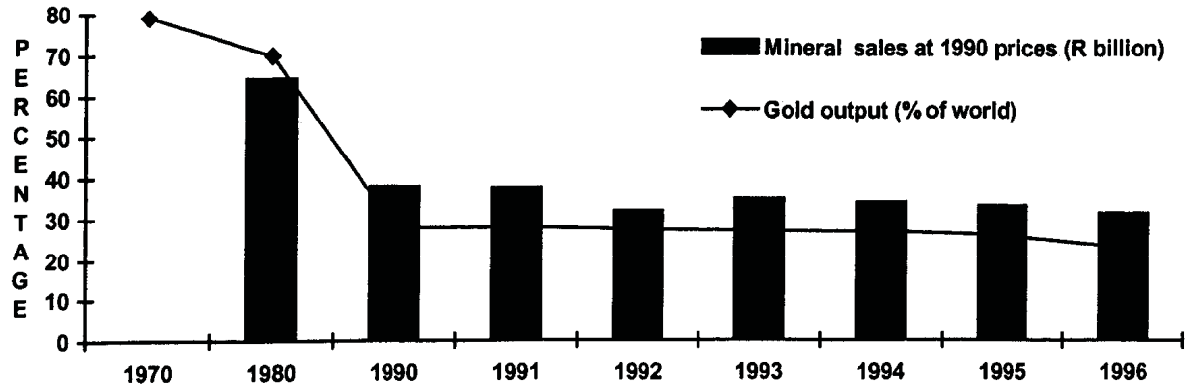
Source: Table 2.1

The gold price declined from an average of US$607,86 per fine ounce for 1980 (peaking at US$850) to $387,82 in 1996 and is still continuing its downward path at its current 1999 price below $300 per ounce. Adjusted by the US consumer price index, this represents a decline (in real terms) of 66,5 per cent over a sixteen-year period. However, the weakening of the rand against the US dollar certainly gave some shelter to gold producers against the declining gold price. The danger is that this could be interpreted as a solution to making the *'deep-level-high-cost'* gold reserves in South Africa more competitive. The strong demand for *'low-cost-short-payback'* mineral reserves in recent years has been demonstrated by the continuing surge in gold output elsewhere in Africa and the developing world [2.9]. Tilton (1992) found that, unlike other industries where competitiveness is measured by market share, competitiveness in mining and processing is based largely on production costs. An increase in the rand gold price therefore does not enhance the true competitiveness of the South African gold producers, but creates an apparent competitiveness. A good example of the non-sustainability of apparent competitiveness was demonstrated in 1996 when the sharp rise in gold mining revenues (largely associated with currency depreciation) was matched by rising production costs. Apart from the loss of competitiveness during the production stage, there is also a loss of domestic downstream beneficiation opportunities because the high rand price for gold increases input costs for local jewellery manufacturers.

Further proof of the decline in the South African minerals industry is evident from the data plotted in figure 2.5. The graph shows how real mineral sales and the South African share of world gold output in tons has shrunk over the years. The two variables show a good correlation because gold is still by far the most important foreign exchange earner for the country. It accounts for about half of total mineral sales value.

2.9 High growth rates in gold production were recorded in some developing countries over the past decade. For example, Indonesia, Peru, Ghana and Mexico more than doubled their production over the period. More information on growth in gold production, is given in chapter three.

Figure 2.5 Gold production and mineral sales value



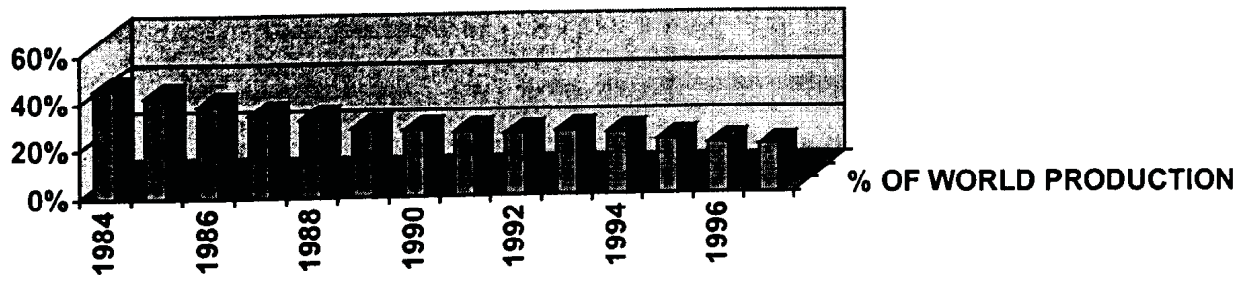
Source: Table 2.1

Based on measures, such as contributions to gross domestic product, tax revenue, world gold output, physical production volumes and employment, the minerals industry is in decline and mining is losing its importance as a contributor to the economy. Nevertheless, mineral exports still account for about forty per cent of total foreign exchange earnings despite depressed commodity prices and contribute eight per cent to the gross domestic product. Furthermore, the mineral sector employs about ten per cent of the formal work force and remains a significant sector in the South African economy.

2.3.2 Difficult times for the gold industry

Historically gold has been the most important source of foreign exchange earnings for South Africa. For example, Minerals Bureau statistics indicate that it accounted for more than fifty per cent of the total South African mineral sales value in 1996. Although the country is still ranked first in the world in terms of gold output, the gap is fast narrowing.

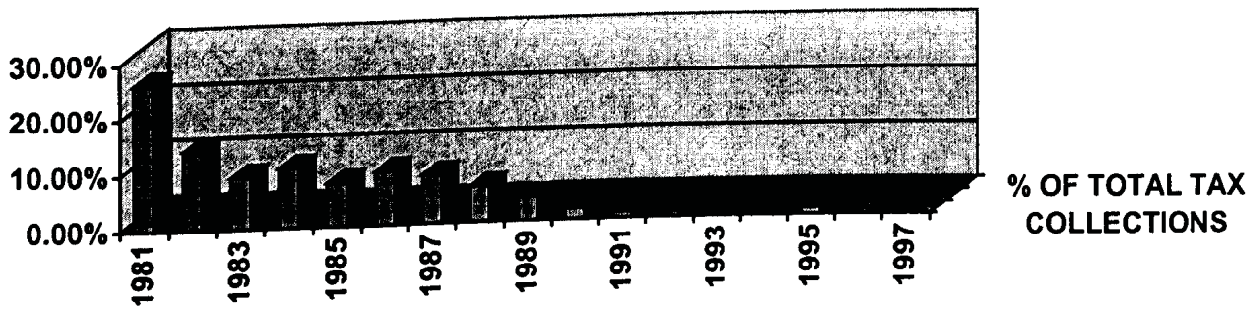
Figure 2.6 South African share of world gold production



Source Chamber of Mines (1997)

The message from the mining data listed in table 2.1 is that gold is losing its shine in the South African economy. As a source of tax revenue, its importance has declined to the extent that it almost disappeared in 1997, largely due to a decline in production, mill grades and the gold price.

Figure 2.7 Gold mining tax collections



Source Chamber of Mines (1997)

Apart from the drop in production, the changes in marginal tax rates over the last decade also contributed largely to the decline in tax revenue. For example, the marginal tax rate for gold

mines was seventy-five per cent in 1989. Since then it steadily declined to fifty-one percent in 1997. The most significant milestones in terms of changes to marginal tax rates since the start of the gold mining industry in South Africa are listed in chapter one, table 1.2. The initial impression is that government has gone a long way in assisting the mining industry through its recent tax reforms. However, simply comparing marginal tax rates without considering the *'fine print'* of the tax regime could be misleading. For example, as marginal tax rates came down, the portion of tax-free revenue shrunk from 12,5 per cent in 1935 to its current level of five per cent. The question that must still be answered is ... *'how does the combined impact of the South African mining tax system compare with that in other developing countries who are also competing for foreign investment?'*

Another cause for the substantial reduction in gold output is the decline in grades milled. Chamber of Mines (1997) statistics indicate that the milling grades, from 1910 to 1970 were consistently around ten grams per ton milled. Since 1970 there has been a marked fall in grades to the current 4,9 grams per ton. The result has been that more tons have had to be mined in order to maintain gold output, a tough call in an inflationary environment characterised by low productivity, labour unrest and political instability.

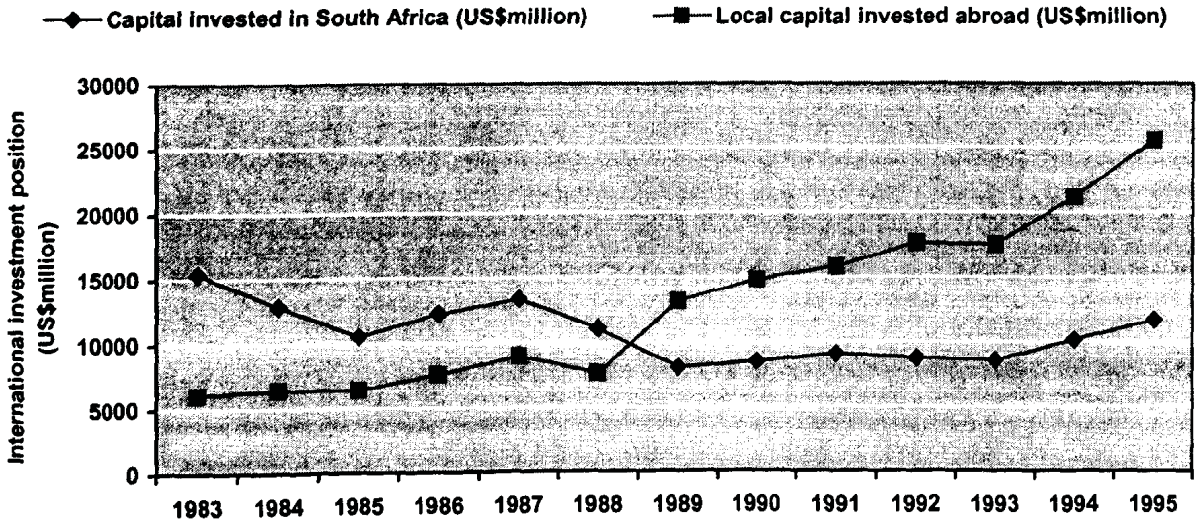
The decline in recovered grade, levels of production, revenue earned and size of the gold mining industry has created uncertainty about its future. Output is projected to continue falling unless the industry is rationalised further and productivity is improved. Most of South Africa's gold mines are old and reserves are greatly depleted. Mining takes place at great depths with long and increasing distances between mine workings and servicing shafts and, consequently, the gold reserves are reduced rapidly by the increasing cut-off grades. Capital investment in the areas of research and development, which effects technological advances and exploration funding, is essential for renewed growth in this industry.

2.3.3 Mining investment, capital expenditure and exploration patterns

The character of investment at the macro-economic level is illustrated in figure 2.8, which shows the flow of total capital into and out of South Africa. The turnaround in capital

spending between 1980 and 1990 and the growing tendency for local capital to be invested abroad rather than within South Africa, i.e. capital disinvestment, are clear from this figure.

Figure 2.8 Total capital in- and outflows



Sources: Table 2.1

International Monetary Fund (1997)

The most recent capital expenditure pattern of Chamber of Mines (1997) gold producers reflects the negative sentiment towards gold mining investment in South Africa. The data in table 2.3 indicates that capital expenditure budgets shrank by thirty eight per cent from 1990 to 1996 in real terms, in line with the declining output from the gold industry. However, domestic production measured by tons milled declined by only sixteen per cent during the corresponding period, suggesting that over time less capital has been spent (in real terms) per ton milled. This phenomenon has also been manifested in the way exploration budgets have been spent over the past decade. For example, Randgold planned to spend its entire 1997 exploration budget outside the borders of South Africa, while Gencor allocated only thirty per cent of its exploration budget to Africa, which includes South Africa (African Mining, 1997).

Table 2.3 Capital expenditure of Chamber gold producers

YEAR	Nominal Capex (R million)	Consumer prices (1990 = 100)	Real Capex (R million)	Tons milled per annum (10^6)
1990	2 475,2	100	2 475,2	111,175
1991	2 056.3	115	1 788,1	107,352
1992	2 172,6	131	1 658,5	106,400
1993	2 283,1	144	1 585,5	103,297
1994	2 620,1	157	1 668,9	98,852
1995	2 641,7	170	1 553,9	98,815
1996	2 815,9	183	1 538,7	93,724

Source: Chamber of Mines of South Africa (1997)

One must ask where are the South African mining houses investing if domestic exploration and development activities are so reduced. The 1996 annual reports of the leading mining houses reveal that they were actively seeking new mineral targets in Africa, Latin America and other parts of the world. For example, Gold Fields of South Africa has explored new mineral potential in Ghana, Namibia, Ecuador, Venezuela, Bolivia, Peru, French Guyana, Mexico, Brazil, Argentina and also plans to extend its activities into the Asian Pacific region. The Anglo American Corporation was active in Botswana, Sadiola, Mali, Burkina Faso, Côte d'Ivoire, Ghana, Tanzania, Mozambique and Angola. Apart from its interests in Africa, investments were also made in other parts of the world, most noticeably South America, under its Minorco umbrella. Johannesburg Consolidated Investments' exploration activities focused primarily on Africa. Investments were made in Ghana, Ethiopia, Tanzania, Zambia, Swaziland, Mali, Côte d'Ivoire, Eritrea, Uganda, Zaire, Tajikistan, Indonesia, Russia and Australia. The Gencor group explored possibilities in Ghana, Zambia, Mozambique, Australia (Queensland), Indonesia, India, Canada, Argentina, Ecuador, Brazil, Peru, Chile, Mexico and the CIS. Apart from Africa, which became the main focus for South African

exploration funds, South America and the Eastern Pacific region were viewed with increasing interest.

2.4 PROJECTING THE PRESENT SHAPE OF THE MINING INDUSTRY INTO THE FUTURE

The South African mining industry, like the country as a whole, has undergone significant changes since the 1994 general election. The huge gold industry has struggled in recent years due to escalating working costs, poor productivity, falling commodity prices and the discovery of low cost gold deposits in other parts of the world. These changes have narrowed South Africa's comparative advantage over many of its competitor countries for foreign investment. This chapter describes the current state of the South African mining industry by analysing its contribution to the gross domestic product, employment and tax revenue, as well as probing the exploration investment patterns of the South African mining houses. Successful geological exploration could replace current mineral reserves and secure the future of an industry with exhaustible resource inputs. Exploration budgets and capital spending on new greenfields projects clearly reflect the general mood and sentiment of investors towards a host country. The mood and sentiment of investors to South Africa is evident in the domestic investment pattern. The gross domestic fixed investment statistics for mining and quarrying reflect the pessimistic economic outlook in the build-up to the 1994 general election, followed by increased investment after the successful transfer of political power. Overall, the mining statistics of South Africa indicate a declining minerals industry, mainly because of low mineral commodity prices, poor investor sentiment and political instability in the early 1990s. However, the mining industry has responded positively by aligning its business towards globalisation. It would be more appropriate to view mining statistics from an *'industry in transformation'* point of view, rather than from an *'industry in decline'* point of view.

The country's favoured political status following its acceptance back into the global economic environment should be manifested in future economic indicators. Although there are positive

indications of economic recovery, South Africa must attract a greater share of world mining investment capital. The country's limited success in this area is an indication of the risk foreign investors attach to exploiting our mineral deposits. The ambitious objectives of the reconstruction and development programme will not be realised unless this trend is reversed. South Africa faces challenges in terms of its ability to provide land, labour and capital: the three factors of production essential for the development of a mining enterprise. The country is well endowed with highly prospective geological sequences, but obtaining access to some of this land is limited because of a complicated mineral rights system. Other constraints to the optimal exploitation of the country's vast mineral resources are the largely uneducated[2.10] labour force and a shortage of mining risk capital. Government policies such as the reconstruction and development programme, GEAR and the new mining code are aimed at addressing these constraints. The need is however for the creation of an investor-friendly climate aimed at reducing risk for potential investors. A positive perception about South Africa's domestic, political and commercial environments means investors will risk a larger percentage of their exploration budgets here. High levels of exploration improve the possibilities for the discovery and development of new mines which, in turn, create a more vibrant and growing mining industry and, in the process, convert our mineral resources into wealth.

A competitive taxation package allowing for equitable sharing of mineral rents is an integral part of an investor-friendly policy. The fiscal instruments necessary for collecting the government's share of the rent need to be understood in order to establish whether they will achieve the desired outcome. The next chapter will investigate these critical issues.

2.10 See Cronjé's work for an alternative view on the availability of labour (Cronjé, 1997). He suggested that trained labour skills were freely available in South Africa, largely because of the restructuring of the gold mining industry resulting in over 200 000 job losses.

CHAPTER THREE

MINERAL RESOURCE RENT AND COLLECTION INSTRUMENTS

Since the late 1970s the multinational investor has shown renewed interest in developing the mineral resources of those countries whose mineral and fiscal policies promised significant returns in exchange for investment. This trend emerged because of a shortage of mining capital in the developing world. In return for capital, the investor is offered highly rewarding partnerships. Motivated by the need to attract essential capital into their economies, approximately 90 developing countries revised their mining and fiscal policies from 1980 to 1995 to attract foreign investment and promote their mineral industries (Otto, 1995). This trend in mineral policy reform has resulted in the fiscal regimes of many countries becoming more and more similar as policy-makers focused on maximising competitiveness. Mineral policy plays an important role in optimising mineral rents. The general objectives of the mineral policy of any country are twofold. The first, as Tilton (1992) pointed out, is to ensure that the mineral industry makes an important contribution to the realisation of national objectives in social and political spheres. The second, as observed by Otto (1997), is to provide guidance to the minerals industry on the government's position on key issues in mineral development.

The design of mineral resource rent collection instruments requires a holistic approach. The ideal rent instrument must accommodate the unique characteristics of non-renewable resources, adhere to sound economic and efficiency principles, optimise wealth distribution patterns, recognise mineral rights and land ownership systems that may result in the rent being shared by many stakeholders and finally, attempt to achieve the political ideologies of the ruling government. The exclusive characteristics of mineral resources usually determine the degree of profitability of mineral projects and, consequently, the size of economic returns. However, the magnitude of the rent is not only influenced by location, size, shape, depth and grade of the resource, but also by non-technical issues, such as worker efficiency, good management, market forces and environmental considerations. Many benefits accrue to

nations that are richly endowed with minerals, other than a share of the rent. These include economic development, growth, employment opportunities, establishment of associated industries and the creation of other linkages for the local economy. Tilton (1992) identified some critical issues that influence the way in which wealth flowing from mineral projects could promote or inhibit economic development. He noted that a mineral resource was a dormant asset that contributed nothing to economic development as long as it remained in the ground. Economic models, such as those proposed by Hotelling (1931) which effectively state that a mineral resource would increase in value if left alone in the ground, bears little or no truth to the economic reality of mining. The truth is that the value of an exhaustible resource does not necessarily rise over time because new discoveries, technological advances and declining real mineral prices together contribute to an increase in the reserve base rather than an increase in scarcity. Tilton asserted that economic rents should be utilised in specific ways in order to stimulate economic growth. This required that rents be invested in health, education, infrastructure and other sectors of the economy in order to secure prosperity and provide the impetus for other positive spin-offs to the economy.

3.1 MINERAL RESOURCE RENT

Mineral production involves the transformation of non-renewable physical assets into reproducible capital. In the process returns on investment are produced. These returns are also termed economic rent, which definition can further be expanded to include mineral resource rent [3.1].

3.1 For a better understanding of economic rent and its relationship with minerals taxation, see Cordes (1995).

Before discussing the concept of economic rent and its application to the minerals industry, Von Below's (1990) views on economic rent in the South African context need to be scrutinised. He argued that there were at least six different types of economic rent in the mineral industry, that is scarcity, differential, monopolistic, quasi, windfall and policy rents. Scarcity rent arose from the exhaustibility of resources and reflected the relationship between the resource base and its rate of consumption. Differential rent arose from the differences in return because of variances in the unique characteristics from one mineral deposit to the next. When producers of mineral products created market imperfections, such as cartels, in an attempt to inflate returns, the excess returns were classified as monopolistics rents. Certain mineral types, for example South Africa's deep level gold reserves, needed a combination of high capital outlay and technical expertise before rent could be realised. The rent accrued this way was termed quasi rent. Sometimes mineral prices have responded suddenly to short-term scarcity in supply. Until new production have filled the gap in demand, current producers would earn windfall rents due to over pricing of production. Finally, policy rents referred to those additional producer returns when government policy supported domestic producers by introducing policy instruments, such as trade barriers, subsidies for local producers and tax holidays.

3.1.1 The concept of economic rent and its application to the minerals industry

Economic rent is the financial return over and above that required to induce the investment. Economic rents are also sometimes referred to as distributional surpluses. Alternatively, one can view rent from a tax perspective. For example, Cordes (1998) redefined economic rent as *"the magnitude of revenues that can be taxed without causing the pattern or resource use to be altered" p. 12.*

If the definition of economic rent is applied to the minerals industry, the wording may change as follows: *'Mineral rent is the present value of the future stream of net revenues that mineral deposits can generate over time, where net revenues are the difference between total*

revenues and total costs and costs include a competitive return on investment'. Hartwick and Olewiler (1986) observed that, according to the definition of rent, the term *'rent'* was actually compensation for land as an input factor of production. The two other factors of production, namely labour and capital, are reflected in the cost and return components of economic rent. This implies that *'mineral rent'* may be regarded as *'payment for mineral rights or the gifts of nature'* and it is no wonder that mineral economic literature frequently refer to mineral rent as *'mineral royalties'* or *'price of the mineral rights'*. However, this is not an accurate description because the term *'rent'* is much broader than the compensation payable to the owners of the mineral rights, albeit a very important component of mineral rent. Over the years several theories have influenced the understanding of mineral rent as the definition evolved from the economic theory of exhaustible resources.

The debate on mineral resource rent started when Smith (1776) adopted the classical view that the highest cost mine would determine the economic rent received by other mines. Mines whose costs were equal to mineral prices would receive no rent while others that mined higher-grade deposits or were located close to their markets, received rents. Smith's definition for rent closely resembled the current point of view. A drastic departure from Smith's way of thinking came when Ricardo (1821) argued that: *"Rent is that portion of produce of the earth which is paid to the landlord for the use of the original and indestructible powers of the soil" ibid, p.33*. Ricardo's understanding of rent led to the term *'mineral royalty'*, which is a facility to compensate the owners of mineral resources for the depletion of resources when they are mined and removed from the land. According to the definition of mineral rent, the current concept of mineral rent does not entirely fit Ricardo's interpretation. Other approaches to rent developed over the years that emulated these early contributions, all of which, to some extent, resembled the theories of either Smith or Ricardo, or a combination of the two. Carey (1837) supported Smith's work and explained how technological advances and capital investment could secure future mineral production and rents. Sorley (1889) published a paper that significantly shaped the understanding of mineral rent and its impact on mine profitability. According to Sorley, rent has two key components, namely fixed or Ricardian rent (periodic payments to the landlord regardless of the levels of

production) as well as excess rents determined by the relationship between the costs of production and the market price. He proposed that mineralised land be nationalised in an effort to stop greedy landlords from charging heavy royalties, thereby forcing marginal producers out of the market. Ideologies such as these resulted in the current international norm where most countries do not allow private ownership of mineral rights. Taussig (1911) expanded Sorley's concept that royalties were a combination of fixed payments (per ton) and variable payments according to the quality of minerals and ease of extraction. He argued that the fixed and variable components of a royalty together constituted rent. Taussig appreciated the reality that the owner of a high quality mineral resource was entitled to a higher royalty or mineral rent. This approach has led mineral resource owners to introduce excess rent capturing instruments similar to the present royalty regime in Ghana and the sliding scale taxation system in South Africa.

3.1.2 Mineral rent recipients

The recipients of mineral rent depend on the legal system of the host country. The simplest type of ownership is a system where private ownership of property and business are not allowed and the government, on behalf of the public, is entitled to all the rents. However, the demise of the former Soviet Union is proof that state intervention in the control and ownership of properties is not sustainable in the long run. The other extreme is private control of all categories of rights and property, allowing for little or no state control. The disadvantage of such a system is that many stakeholders share the rent, thereby reducing each recipient's portion. This is particularly true for South Africa where the mineral rights in some areas are subdivided into undivided shares resulting in large numbers of mineral right holders over the same piece of land.

The first recipient of mineral rent is the investor, who will demand some blue-sky returns to compensate for the risks involved. The host government, as custodian of a country's mineral wealth, is also entitled to a share of the mineral rent because the public will demand a return on the country's mineral resources. The next recipient is the mineral rights owner who will

expect payment for the depletion of its mineral resource. Because of its destructive nature, mining operations could severely impact on the quality of the land making the landowner, although not the owner of the mineral resource, a worthy and entitled recipient of mineral rent. Finally, the environmental and indigenous rights movements have become significant forces in deciding whether a minerals project will go ahead or not. This has resulted in rising costs which, by default, impact on the size of the mineral rent.

Recipients use a multitude of instruments to govern the size of the mineral rent they receive from mining projects. For example, the investor uses efficiency in production and good management, host governments use fiscal instruments, the mineral resource owners use a royalty, land owners use surface rental fees, environmental pressure groups use their influence on society to change the pattern of wealth sharing and, finally, local or aboriginal communities require compensation and contributions towards socio-economic programs.

3.1.3 Government's share of mineral rent

Essentially, any government has three ways in which to claim its share of mineral rent. The first is when the state owns the land and mineral rights and secures the rent either through leasing or selling the rights. The second is when the state imposes taxation to extract the rents. Finally, economic nationalism has led some governments to believe they are entitled to all of the rents generated by their mineral industries. Such ideologies have resulted in the creation of state mining enterprises through nationalisation of mineral assets or excessive state intervention in mine finance and management. Efficiency in production and economic principles in decision making are not generally synonymous with state mining enterprises, just as centrally-owned and managed minerals industries are not usually sustainable. Rents soon disappear when the costs of production exceed the revenue earned from mineral sales. There is currently a global shift away from nationalisation policies towards policies of free enterprise and privatisation. This has happened because host governments have realised that it is better to share mineral rents with investors rather than receiving no rent at all. Public policy will attempt to optimise a country's mineral resource by ensuring the best possible use

of the resource, that the split of rents is fair and the use of the resource is in the long-term interest of society.

3.2 THE ROLE OF MINERALS TAXATION IN CAPTURING RENT

Establishing a balance between a competitive taxation system while at the same time optimising the mineral resource is no easy task. Any attempt to accommodate the many divergent interests of the stakeholders may mean a loss of rigour and a rising component of subjective input in a study of this nature. Cordes (1998) says that no ideal or model regime is available for policy makers because each nation's circumstances, needs and objectives will shape its own unique minerals taxation policy. The evolution of any minerals taxation policy depends on government and company relationships and how they utilise their strengths and bargaining powers to serve their own interests. There is an inverse relationship between the size of the investor's share of the rent and that of the host government, which causes conflict in decision-making. Conflict between the two parties also stems from their perceptions of what constitutes a fair tax. For example, companies prefer to be taxed on profits because the tax burden is reduced in times when mineral revenues are down. Host governments take the opposite point of view and prefer to tax gross revenue as a type of insurance to protect its share of the rent when commodity prices fall or inefficient management results in suboptimal returns from the mining of the resource.

The growing informal small-scale sector in developing countries, in particular, should be considered when designing tax regimes. Here the emphasis should not be on collecting rent, but rather on introducing incentives to register permits, prevent smuggling activities and to establish and promote credible purchasing centres. Burke (1995) proposed a simple and transparent administrative system with no complex income or profit taxes. According to him, production or revenue-based royalties should make up the entire tax burden and that the level of royalties should be no more than five per cent.

3.2.1 Characteristics of a good minerals taxation regime

Over the years economists have identified five criteria for evaluating tax regimes under market conditions, namely neutrality, efficiency, equity, clarity and stability. These criteria would ensure equitable sharing of resource rents between the state and investors. According to Cordes, the *"selection of an effective minerals taxation system must begin with a clear understanding of its objectives and how they relate to the needs, opportunities and decisional criteria of potential investors" p. 6* (Otto, 1997). A brief discussion of each criterion is necessary in order to understand how they affect taxation.

Neutrality is a measure of the influence that taxes have on final investment decisions. When a tax is neutral, all sectors in an economy have an equal chance of attracting investment. The final allocation of resources is decided entirely by economic considerations, such as least cost and maximum return on investment. Tax provisions that violate the neutrality standard should be avoided except in unusual circumstances where its influence on a particular sector can be clearly justified.

Efficiency in resource allocation is the second element that needs explanation. Governments are legitimately concerned with social, political and economic objectives. By contrast, the private sector is concerned mostly with its own interests. The market's failure to internalise private sector socio-economic costs has led governments to design policies to encourage efficient utilisation of private sector resources. For example, governments can apply taxation to encourage employment opportunities and downstream beneficiation of raw minerals. The efficiency principle therefore accepts limited modification of the neutrality principle if these changes promote macro-economic stability or growth.

The *equity* standard recommends equitable allocation of tax burdens among all taxpayers. It reinforces the principle of neutrality and prefers tax instruments that reward managerial efforts and sound economic decision making in the private sector.

The fundamental principle of *clarity* refers to unambiguous administrative rules and regulations that must be understood clearly by both taxpayers and government officials. Ambiguity in interpretation, according to Cordes (1998) *"leads to increased perceptions of risk, opportunities for tax minimization strategies, and conflict"*. Clarity of the tax regime is another consideration when designing tax instruments. Governments must ensure they have the capacity to administer and monitor new taxes effectively. The World Bank (1991) identified the credibility of the tax regime as the key to success in any tax reform. Making tax changes without adequate consideration to administrative procedures undermines credibility. Finally, tax regimes should be *stable* and frequent adjustments avoided as they increase the perceived risk of investment.

Because the elements described in the preceding paragraph are general taxation principles, they apply equally to minerals taxation. However, the special characteristics (e.g. the presence of mineral rents, unusual risks faced by investors and depletion of national assets) of minerals may warrant special treatment for extraordinary projects. The incredibly high risks associated with mineral investment support arguments for tax relief, while the government as custodian of the national patrimony demands a higher return because a national asset is depleted in the process. This is a contentious issue when designing the fiscal regime and balancing the opposing views is compounded by the essential need for an internationally competitive taxation system.

3.2.2 Minerals taxation instruments

Minerals activities around the world are subject to a great variety of taxation instruments that can be divided into two broad categories, namely direct and indirect taxes. Direct taxes are those paid directly to government departments at any level and can be further subdivided into *in rem* taxes, *in personam* taxes and special provisions. Indirect or quasi taxes are those that contribute to the tax burden, but are of a hidden nature.

In rem taxes impact on both variable and fixed costs. The first instrument is the oldest form of minerals taxation, namely the royalty payment. The term *'royalty'* has its origin in medieval times where rates as high as twenty per cent, also referred to as the *'royal fifth'* was payable to the monarch (SA Mining, Coal and Base Minerals, 1993). A mineral royalty nowadays could be an *ad valorem* (based on income) or a unit royalty (fixed payment per unit of mineral extracted). Mineral royalties are mostly charged as a percentage of net smelter returns or gross income, which means that they have a major influence on the size of the distributable rent. For example, Schantz (1994) found that imposing royalties of five and 12,5 per cent would so impact the costs of exploration that it would reduce the number of gold discoveries on United States public land by twenty and sixty-six per cent respectively. Other variations of royalties include bonus payments (frequently encountered in private agreements) and severance taxes, a disguised *ad valorem* royalty. Mineral royalties deserve special attention and are discussed in more detail later in this chapter.

When mineral rights are privately owned, host governments may not charge mineral royalties on mineral production. To compensate for the loss of state revenue, a severance tax is sometimes levied on such production. Nuisance taxes such as a sales tax, value added tax, property tax, land usage or rental fees and duty charges also fall into the *in rem* category. These taxes must be paid regardless of mine profitability and levels of production. The objective of a land or property tax is generally to encourage optimal land use during land reform programmes. Exploration fees and surface rents are meant to compensate the landowner for use of the surface of the land. This rent may be a one-off payment in the case of an outright purchase of the land or it may be paid in rent instalments, usually based on area. Outright sale of the land is normally considered when mining activities prevent the landowner from using the land for normal purposes. Compensation to landowners for land degradation may be considerable and if it is a large surface mine, it would be better to transfer land ownership to the mine itself in order to prevent the landowner from receiving an excessive share of the rent.

In personam taxes are profit-based proportional taxes and include income or corporate taxes,

progressive or additional profits taxes, resource rent taxes and withholding taxes on interest, royalties and dividends. The two critical factors of profit-based taxes are first, the definition of taxable income and second, the rate applied to it. Progressive or windfall taxation systems have become attractive to governments either as a way to capture some of the resource rent from particularly rich mineral deposits or to share in the profits during periods of high prices and profitability. Garnaut and Clunies Ross (1975) are well known for their contribution to the theory and application of resource rent taxes. A resource rent tax, as practised in Papua New Guinea, applies a zero rate if the net present value of the project is less than or equal to zero and payment starts at progressive rates as the net present value increases above zero per cent. According to the World Bank (1990) there is a significant risk to the resource owner when adopting this style of taxation, because it is theoretically possible for the mineral asset to be exhausted without ever generating a single rent payment.

Indirect or quasi taxes are hidden taxes that add to the overall tax burden and include foreign exchange regulations, government equity, environmental expenses and special provision for local communities. Environmentalists have become a major force in mining law reform. Apart from calling for stricter environmental standards applicable to the minerals industry, they also demand a 12,5 per cent federal royalty (on gross income) in the United States. The environmental cost to the minerals company may be inflated considerably if the landowner is an environmentalist, because any bid by a mining company would reflect a willingness to pay for greater environmental protection. A good example would be the mining of the coal reserves in the Kruger National Park in South Africa. Environmental costs potentially have a severe impact on mine feasibility, especially if the mine is located in an environmentally sensitive area. In such cases the environmental costs may reduce the mineral rent to such an extent that it would be more appropriate to use the land for other purposes, for example tourism. Local communities and aboriginal land claims have become a significant factor in influencing the size of the rent in many countries and mining companies are expected to make contributions to expensive social upliftment programmes in addition to the usual royalty payments. Australia, Canada and South Africa are cases in point.

Another category of mineral taxation instruments is termed *special provisions*. They are normally implemented to achieve a specific policy goal such as the promotion of downstream beneficiation activities. Kumar (1995) refers to these special provisions as *'fiscal carrots'* (incentives, such as faster depreciation and investment allowances) and *'fiscal sticks'* (penalties, such as taxes on unprocessed material). The purpose of these provisions is to modify the timing and magnitude of revenue appropriations from *in personam* tax methods. Special provisions are frequently used as incentives to attract investment or to accommodate investor risks. Examples are capital allowances, depletion allowances, capital depreciation and amortisation allowances, interest deduction rules, loss carry over grants, tax credits, and tax holidays. Exchange control provisions influence repatriation of profits, debt servicing, importation of goods and finally, the export of mineral commodities. Nowadays many governments sign tax treatment agreements with other states to avoid double taxation of investor income in order to make investment more attractive. Furthermore, some states, for example Argentina and Peru, have tax stabilisation agreements with investors to lock in at an overall maximum tax burden for a specific period.

3.3 THE MINERAL ROYALTY: A MAJOR RENT CAPTURING INSTRUMENT

Most royalty instruments do not distinguish between private and public ownership of mineral rights and the discussion in this paragraph is therefore of equal value to private and state mineral resource owners. According to Kumar (1995), mineral royalties were the most popular fiscal instruments used by governments to collect mineral rent prior to World War II. Since then governments changed their fiscal policies from being royalty-dominant to systems relying more on profit-related instruments, such as income tax and additional profits tax.

Mineral royalties have the potential to impact significantly on mine profitability. Looking at it from a resource owner's perspective, royalties are very effective as a mineral rent collection instrument because they are simple and easy to administer. A further characteristic of a mineral royalty in the hands of government is its value as a policy instrument. For example, during the early days of mining in the western United States, the objective was to promote

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mineral exploration and to stimulate the establishment of new mines. The goal was achieved by the state forfeiting mineral royalty payments. With the maturing of the United States, environmental considerations became more important leading to pressure on the government to impose a mineral royalty on federal land and thereby constraining mine development.

3.3.1 The fundamentals of a mineral royalty

A mineral royalty, is by definition, payment to the holder of the mineral rights when minerals are extracted from the land and sold on the markets. If a country's legal system does not allow for private ownership of mineral rights, the mineral royalty will, by default, be payable to the state. It is the identity of the resource and not of the owner that is important when determining the amount applicable. Private sector royalties should therefore theoretically be equal to public sector royalties. Having said that, one should appreciate the vast differences in agendas between private owners and those of government officials administering the rights on behalf of the public. For this reason, there may be significant differences in the expected royalty for comparable mineral resources depending on the owner. This is because first, private owners of mineral rights negotiate the mineral royalty on a case-by-case-site-specific-basis while state-owned mineral rights are governed by an official royalty policy giving officials less room for negotiation. Second, the difference in royalty payment is that a private owner has only its own interests in mind when negotiating lease agreements while government royalties must support the national objective and still compete with the policies of other countries seeking investment.

The value of the minerals in the ground should be equal to the net present value of the royalties received by the owner of the mineral rights. To determine this value is a matter of much debate and great controversy. The price for the mineral rights is always measured in net present value terms (equal to the value of the rights) regardless of whether it is determined by sales agreement or royalty instalments. The structure of the agreement depends on the risk the owner of the mineral rights is prepared to take. If the owner is risk averse, it would prefer an outright sale of the mineral rights with some additional compensation disguised as

opportunity and user costs to cover the value of undiscovered minerals (opportunity) and future price increases due to scarcity (user cost). User cost is difficult to quantify because there has been a downward trend in real mineral commodity prices. Some economists argue that the future supply of minerals will not be affected by scarcity because the discovery of new deposits and technological advances adequately compensate for the depletion of current reserves. User cost is also influenced by adding to the information about a site's mineral potential. A mineral discovery in an area may increase the value of neighbouring mineral rights which will increase the user cost component and result in a speculative value being assigned to the mineral rights. On the other hand, if the owner of the mineral rights is prepared to share in the risk, royalty instalments will be the preferred method of payment. When royalty instalments are preferred, it will not be necessary to provide for any opportunity cost because the owner will benefit from future discoveries and price changes automatically.

Mineral royalties are frequently charged as a percentage of net smelter returns or gross income, which means that they have a large impact on the size of the rent and represent a significant cost to mineral producers. The observation by Schantz (1994) that high royalties will reduce the number of gold discoveries on United States public land significantly, is a good example. In most cases royalties must be paid regardless of profitability leading to a situation where most companies dislike them. Brower (1987) put the effect of royalties on profitability neatly in perspective by writing, *"they (royalties) serve to raise the cut-off grade in ore deposits and thereby lead to physical waste of resources" p. 37.*

It is also claimed that a royalty ought to cover costs related to environmental degradation caused by mining activities. However, assigning a value to the royalty becomes very complex when attempting to include social aspects in the calculation. This has led Schantz (1994) to question the appropriateness of a mineral royalty as the desired instrument of accounting for environmental costs. He argued that environmental considerations were virtually impossible to value and were too site-specific to incorporate into a standard royalty equation. He proposed a separate fund to compensate for environmental impacts, which could also be used to deal with pollution from abandoned mines. Schantz's point of view is correct in that

reclamation costs are now included in the company's cost structure while landowners receive separate compensation for the degradation of their land.

3.3.2 Selecting an appropriate mineral royalty

Before discussing the differences between royalty instruments, the findings of a World Bank (1990) study are worth noting. They concluded that, because the royalty was essentially a mechanism reflecting the trade-off position between the risk that the investor was prepared to accept against that of the resource owner, no single instrument was superior to another. Each country had different endowments and faced different risks.

The wide range of mineral royalties can be divided into three main categories, namely lump sum, production and profit royalties [3.2]. Lump sum royalties represent an outright purchase of the mineral rights. It is also sometimes called the bidding price. The method works well when private ownership of mineral rights is allowed and there is an active market that trades the mineral rights. When the mineral rights owner sells the rights, the structure of the royalty changes from a periodic instalment to a one-off payment equal to the selling price, which should cover expected opportunity, user and environmental costs. Opportunity costs are equal to the amount necessary to outbid the highest bid of alternative land users. User cost is a *'scarcity compensation'* to the seller that provides for a future time when the price for the rights could be higher. There is always a danger that the resource owner may lose out if the venture yields bonanza returns at a later stage. If the resource owner is a government it can be open to severe criticism by the public, which could ultimately lead to its downfall. There is of course no reason why a royalty policy need consist only of a single instrument. The resource owner may reduce its risk by connecting an initial payment to another royalty instrument provided the total compensation is reasonable. Table 3.1 provides a summary of periodic mineral royalties that are frequently encountered.

3.2 The approach taken in this paragraph differs slightly from that of Otto (1995) who divided mineral royalties into unit-based and *ad valorem* type royalties.

Table 3.1 Different categories of periodic mineral royalties

Description	Production royalties	Net smelter return type royalties	Profit royalties
Examples	1. Gross sales revenue 2. Unit royalties 3. Production costs 4. Unit-based sliding scale	1. Free on board 2. Free on rail 3. Net smelter returns	1. Working profit 2. Taxable income 3. Additional profits 4. Resource rent
Exposure to risk: **Resource owner** **Investor**	 Low risk High risk	 Medium risk Medium risk	 High risk Low risk
Advantages	1. Easy to calculate, collect and monitor 2. Inexpensive to administer	Compromise between production and profit royalties	1. Neutral instrument
Disadvantages	1. Marginal producers may become uneconomic 2. Encourage overmining of resource grades		1. Complex to calculate 2. Expensive to administer

Production royalties are calculated in any of the following two ways depending on the structure of the agreement.

$$\textit{Unit-based royalty} = \textit{production units} \times \textit{rate per unit}$$

$$\textit{Revenue-based royalty} = \textit{sales revenue} \times \textit{royalty rate}$$

Unit-based production royalties are one of the oldest mining taxes. They are usually easy to administer but their efficiency is restrained when a deposit has waste products and there are different grade categories of mineral product with variable price structures. In some cases it may be easier to charge mineral royalties on the sales value rather than on production units because first, sales records are readily available for auditing purposes; second, grade differences or penalties are already accommodated in the sales price. The rate of payment seldom exceeds ten per cent of revenue received but there are examples of higher rates in the United States petroleum industry.

Most companies prefer revenue-based to unit-based royalties because of the link to market prices. Unit-based (or production) royalties are insensitive to mineral prices. Resource owners frequently link unit-based royalties to an annual increment to prevent a decrease in the present value of the royalty. If the royalty is not linked to some measure of inflation, postponement of production becomes an attractive option for producers, which would be to the detriment of the resource owner. When revenue-based royalties are applied, resource owners are attentive for transfer pricing practices. Arm's length transactions in the selling of mineral production to a seller's subsidiary could result in the sales price being significantly below the ruling market price. In such cases it is not unusual to use a market price published by a reputable dealer such as the London Metal Exchange instead of the selling price for the purpose of calculating the royalty.

In South Africa the royalties for limestone producers who sell their production to their own cement factories are sometimes determined by using the total cost of production plus a premium for returns. This, as with most of the issues concerning mineral royalties, is somewhat debatable. The disadvantage of using costs as a base to determine mineral royalties is that each case must be negotiated on merit, resulting in high administration costs. Although the theory suggests that the identity of the resource owner is not an important factor in deciding on a price for calculating the mineral royalty, the real world shows that it is often not the case. If the mineral rights were privately owned, the resource owner would prefer the highest possible royalty. If the state owns the mineral rights, it may accept lower royalties because of its policies of promoting downstream beneficiation of minerals. However, not all governments will accept lower royalties. For example, Jamaica and Guyana base their royalties on the value of the end product after beneficiation – a major disincentive for establishing secondary industries.

Resource owners prefer production royalties for various reasons. The first is that there is virtually no risk of losing the asset without receiving adequate compensation. Second, the instrument provides for a stable income and because it is attached to production, the amount is certain and reasonably predictable. Finally, production royalties ensure a stable flow of

revenues over the life of the mine even when company profits are low or non-existent. On the other hand, investors do not favour production royalties because they are not based on the ability to pay principle and therefore fail the efficiency and neutrality economic criteria. Second, marginal deposits may become uneconomic to exploit because of the royalty burden and third, high grading may be encouraged in quality mineral deposits when the royalty is tonnage-based.

Sometimes revenue-based royalties allow certain deductions from the sales price to enable the calculation of the royalty. These are then called net smelter return royalties. Net smelter value means market price *less* transportation, handling, processing and marketing costs. Free-on-board (or rail) prices are calculated by subtracting transport costs (rail or shipping depending on the point of sale) from the sales price. Typically, the term *'free-on-board'* is used for export materials while domestically-consumed products will attract a free-on-rail value. Considering the differences in definition of the two methods, net smelter value will theoretically assume a higher royalty rate. However, this is rarely the case for government royalties because the royalty is a policy instrument promoting further downstream processing of mineral production. Another example is the Western Australian system that allows for a decreasing royalty, depending on the increased degree of processing (Mining Journal, 1994).

Royalties may also be claimed on profits or net income, rather than on revenue or production. Profit-based or net income royalties are normally imposed on the difference between market price and average operating expenses. The method allows for profits participation because both the resource owner and the producer share in the upward and downward fluctuations of mine profitability. The biggest advantage of this type of royalty is that it is a neutral instrument as it does not influence resource allocation in any way. Because it is based on *realised* net resource value, the method has the added advantage of using the value of the resource in the ground as the maximum royalty liability. A third advantage is the smaller impact on marginal mines. In exchange, resource owners generally require a higher percentage rate in order to receive the same revenue over the life of a mine as that of revenue-based royalties. Although profit-based royalties are fair to the investor because of their