

THE ECONOMICS OF GOLD MINING TAXATION

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SUMMARY

Currently the gold mining industry is taxed differently to other industries. It is taxed on a two-tier system. The nature of the gold mining tax formula encourages the mining of marginal gold ores. Firms that are involved in the mining of gold are subjected to a "tax tunnel", which is a tax free revenue portion. This is against the equity principle of taxation because it separates companies on the basis of what they produce and not on the basis of income generated. The South African government is in the process of implementing a revenue-based royalty system. The majority of firms in the gold mining industry feel that for the benefit of economic growth the government must consider implementing a profit-based royalty system. This study analyses the gold mining tax formula in comparison to the flat rate tax. It also analyses the reasons for the differential treatment of the gold mining industry.

Key terms:

Gold mining taxation, Economics of gold mining, Natural resources, Renewable resources, Non-renewable resources, Taxation, Gold production, Tax revenue, Economic importance, Gold mining tax formula

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CHAPTER ONE

INTRODUCTION

1.1 BACKGROUND

The economic, political and social history of South Africa has been shaped and guided to a large extent by the discovery and subsequent exploitation of gold. As De Kiewiet (1941:89) put it "South Africa has advanced politically by disasters and economically by windfalls". The gold mining industry has decreased in economic importance since the 1980s but continue to play an important role in the South African economy in terms of economic growth, employment, exports, and the contribution to government tax revenue. In 2004, the gold mining industry contributed 1.4 percent to nominal GDP and it was the biggest employer in the mining sector employing 180 448 compared to a sector total of 404 000. The gold mining industry was the second biggest contributor to total mining exports contributing 32.3 percent compared to 32.9 percent contributed by the platinum mining industry and 16.2 percent contributed by the coal mining industry. Its contribution to total exports in 2004 was approximately 8 percent.

Although its relative contribution to total government revenue has declined significantly, in 2002, the gold mining industry paid R3 billion in taxes. The industry is also important to the development of South Africa in terms of capital formation, infrastructure development and urbanisation. The industry is also linked to other industries in the economy and changes in the gold mining industry have a multiplier effect on the rest of the economy.

The gold mining industry is taxed differently to other industries in South Africa and even the mining sector in general. In contrast to other industries, it has been taxed on a formula basis since 1936. All other mineral resource industries are taxed at a flat rate in terms of the Income Tax Act, 1962 (Act Number 58 of 1962). In recent times the tax authorities have indicated their intention to introduce a revenue-based royalty system to tax gold mining revenue in 2009. This action underlines the special dispensation meted out to the industry in South Africa's public finances.

The revenue-based royalty system holds serious consequences for the industry. Such a system has a cost-increasing effect that may increase the cost of doing business and lead to job losses in the long run. Project risks may also increase, making it difficult for new entrants in the industry to raise debt finance. The revenue-based royalty system can also sterilise gold reserves and decrease investment in South Africa. According to Cawood and Macfarlane (2003:228), the revenue-based royalty system may sterilise R1.6 billion worth of gold resources by raising the cut-off grade.

The revenue-based royalty system is a fixed cost which raises the pay limit and raises the cut-off grade. The result may be that the ore below the cut-off grade will not be mined, thereby reducing the life-span of the mine and bypassing marginal gold ores resulting in mine closures and retrenchments. Marginal mines are major employers in the gold mining industry and are also linked to different suppliers in the economy. The revenue-based royalty system may further threaten South Africa's international competitiveness in the mining industry as far as securing investment in exploration is concerned.

Small-scale mining firms, new entrants to the mining industry and firms operating marginal mines could be the hardest hit by a revenue-based royalty system. With the rand gold price declining due to a strong rand, the proposed 3 percent royalty on gold mining revenue could make marginal mines uneconomical. Large mining companies have more flexibility than small mining firms. Large mining companies can stop production in the case of a decrease in the price of gold and an increase in the cost of production and restart only if it is economical to do so.

The revenue-based royalty system could result in huge revenue losses. It has been estimated that R33 billion will be lost in revenue over the economic life-span of the gold mining industry. Including the current effects of the rand and adding back the benefits of higher gold prices, the cumulative economic impact to the gold mining industry as a whole may result in revenue loss of R214 billion. It is clear that the merits of the revenue-based royalty system must be carefully weighted against alternative royalty systems such as the profit-based royalty system.

1.2 PROBLEM STATEMENT

The aim of this dissertation is to examine the taxation of the gold mining industry. In the process, the dissertation attempts to provide answers to the differential tax treatment of the gold mining industry. The origins of the formula-based taxation of gold mining are investigated, analysed and reviewed. At the same time the purpose and merits of the proposed royalty system for gold mining are considered.

1.3 METHOD

The method used in the dissertation is a literature review, using a combination of primary and secondary sources. The method involves the critical analysis of policies and practices using economic theory and principles. Where appropriate, tables, graphs and formula are used to illustrate, explain and compare different aspects of gold mining and natural resource taxation.

1.4 OUTLINE OF THE STUDY

This study attempts to provide an economic analysis of the differential treatment of gold mining taxation. It is realised that mining taxation is a technical topic which has been the domain of tax accountants and tax lawyers for some time. The aim is to at least suggest a framework for analysing gold mining taxation.

The dissertation consists of seven chapters supported by a number of tables, a graph and formula. The introductory chapter provides the background, problem statement, method and the outline of the study. Chapter two discusses the economic importance of gold mining in South Africa. The chapter discusses the contribution of gold mining to economic growth, employment, exports and government tax revenue. Attention is also given to the linkages between the gold mining industry and other sectors in the economy. Supply and use tables are used for this purpose and a use coefficient is calculated.

In chapter three the principles of taxation are identified and discussed. A brief discussion of the equity principle of taxation, the benefits-received principle, the ability-to-pay principle, economic efficiency and administrative efficiency and other aspects of

taxation is presented. The incidence of a tax is discussed towards the end of the chapter. These principles are then applied to gold mining taxation.

Gold and other minerals are non-renewable natural resources. Chapter four analyses the economics of natural resources and the taxation of natural resources. The chapter discusses the characteristics of renewable and non-renewable resources and the role of the government. It also discusses the reasons for taxing natural resources. Certain methods are used when taxing natural resources. These methods are investigated in chapter four.

In chapter five the taxation of minerals in different countries is considered. We note that revenue generation and the regulation of taxpayer behaviour are the two main reasons for the taxation of minerals. The chapter also discusses tax discrimination and the categories of mineral taxation around the world. The discussion in chapter five has been limited to ten countries which contribute significantly to world mineral production and their practices can be regarded as a benchmark.

Gold mining taxation in South Africa is investigated in chapter six. Firstly gold mining taxation in South Africa from 1875 to 1936 is summarised. In 1936 the gold mining tax formula was introduced. This formula has been the focus of the mining tax debate in South Africa ever since. We analyse and report on the findings of the Margo Commission (1987) and the Marais Committee (1988) in this regard. Thereafter, ring-fencing is evaluated and the advantages and disadvantages of ring-fencing are discussed. Finally, the proposed gold mining royalty system in South Africa is described, analysed and compared to that of other countries that use royalties to generate revenue from gold mining. A revenue-based royalty system is compared to the profit-based system and the advantages and disadvantages of both taxes are discussed.

Finally, chapter seven concludes and highlights findings about the economics and taxation of the gold mining industry.

CHAPTER TWO

ECONOMIC IMPORTANCE OF GOLD MINING IN SOUTH AFRICA

2.1 INTRODUCTION

The discovery of gold in 1886 laid the foundation for economic development in South Africa. For decades the gold mining industry dominated the South African economy. The economy underwent structural change from an agricultural to a mining economy to an industrial economy and is now becoming service-sector oriented.

The aim of this chapter is to discuss structural changes in the economy and to determine the changing importance of the mining sector. In particular the focus will be on how the relative importance of the gold mining industry has changed since its inception in 1886.

Section 2.2 looks at the contribution made by the gold mining industry to GDP. Section 2.3 focuses on the gold mining industry and the contribution made to total employment. The contribution to employment made by the platinum group metals, diamond as well as the coal mining industries will be compared to that of gold mining. The contribution of the gold mining industry to total exports is discussed in section 2.4. Section 2.5 gives attention to the impact of the gold mining industry on the rate of development in South Africa. In section 2.6 the interrelationship between the gold mining industry and the different economic sectors is analysed. Supply and use tables are used in this analysis. The last section focuses on the contribution made by the gold mining industry to total government revenue. Reference is made to the contribution made to total government revenue by personal income tax, value added tax, secondary tax on companies and company taxation.

2.2 GOLD MINING CONTRIBUTION TO GDP

In this section we investigate the contribution of the gold mining industry to GDP over the 1950-2004 period. The analysis focuses on the contribution of gold mining to the

mining as well as the contribution made to nominal GDP. The manufacturing industry's contribution to GDP will also be looked at as will be the contribution of the service industry to GDP. This will assist us to get the picture of the importance of gold in South Africa and an attempt will be made to explain the changes over time.

Table 2.1 Sectoral contribution to nominal GDP 1950-2004

Year	GDP R Million	Mining R Million	Gold R Million	Mining as % of GDP	Gold as % of GDP	Manufacturing R Million	Manufacturing as % of GDP	Services R Million	Services as % of GDP
1950	2 626	393	290	15	11	470	17.9	470	17.9
1960	5 258	684	536	13	10.2	1 023	19.5	1 070	20.3
1970	12 791	1 207	830	9.4	6.5	2 830	22	3 157	24.7
1980	62 730	12 146	10 369	19.4	16.5	12 758	20.3	13 166	21
1985	127 598	16 717	15 291	13	12	25 576	20	33 198	26
1990	263 151	24 107	18 994	9.2	7.2	28 742	10.9	78 498	29.8
1995	548 100	34 830	23 465	6.4	4.3	106 180	19.4	176 683	32.2
2000	808 017	54 951	25 266	6.8	3.1	149 380	18.5	317 724	39.3
2001	887 093	66 808	27 686	7.5	3.1	163 880	18.4	346 442	39.1
2002	998 854	80 586	41 386	8.1	4.1	186 604	18.7	386 939	38.7
2003	1257 000	84 258	22 628	6.7	1.8	221 652	17.6	470 903	37.5
2004	1387 000	87 493	18 745	6.3	1.4	236 822	17.1	524 127	37.8

Note: Services consist of financial intermediation, insurance, real estate and business services, general government services, community, social and other personal services.

Sources: Department of Statistics (1976, 1980); Central Statistical Service (1990, 1992); Statistics South Africa (2002, 2005).

Over the 1950-2004 period, the relative contribution of the gold mining industry to total GDP has been falling (see table 2.1). In 1911 the contribution or share of gold mining to GDP was approximately 22.7 percent, whereas that of manufacturing was 4 percent (Statistics South Africa 1995). Since 1950 the relative share of gold mining has continued to decline. The biggest five-year decrease in the relative contribution of the gold mining industry to total GDP occurred during the 1985-1990 period where the contribution of the gold mining industry to total GDP fell from 12 percent in 1985 to 7.2 percent in 1990. While the contribution of the gold mining industry to total GDP

continued to fall after 1990, it has been at a slower rate. For example, the contribution of the gold mining sector to total GDP fell from 4.3 percent in 1995 to 3.1 percent in 2001. The percentage contribution to GDP increased to 4.1 percent in 2002 but fell again from 1.8 percent in 2003 to 1.4 percent in 2004.

On the other hand, the contribution of the manufacturing sector to total GDP increased slightly over the 1950-2002 period (see table 2.1). The contribution of the manufacturing sector to total GDP increased from 17.9 percent in 1950 to 18.7 percent in 2002. From 2003 there has been a slight decline in the contribution of the manufacturing sector to GDP, from 17.6 percent in 2003 to 17.1 percent in 2004. The manufacturing sector, unlike the gold mining sector, was not subject to severe fluctuations as far as its contribution to total GDP is concerned.

In contrast to the mining sector, the contribution of the service sector to GDP increased significantly from 1950 to 2004. The contribution of the service sector to GDP was 17.9 percent in 1950 and in 2004 it was 37.8 percent (see table 2.1).

The overall fall in the contribution to GDP of the gold mining industry can be attributed to the maturity of the industry as total gold production continues to fall with time (Department of Minerals and Energy 2005). The mining sector contribution to GDP more than halved from 15 percent in 1950 to 6.3 percent in 2004. This drastic fall in the mining sector's contribution to GDP is as a result of the decline in the contribution of the gold mining industry to total GDP (Fedderke and Pirouz 2002). Some indication of the maturity of the gold mining industry can be gained from the declining trend in gold output. Table 2.2 shows production volumes in tonnes. Changes in the dollar and rand price of gold also impacted on the share of the gold mining industry. For example, the contribution of the gold mining industry to nominal GDP increased dramatically between 1970 and 1980. This improvement can be attributed to the sharp increase in the price of gold in 1980. The average dollar price peaked in this year at \$612,94 (see table 2.3).

In 1911, the gold mining industry contributed 81.9 percent to the mining sector GDP. This figure fell to 21.4 percent in 2004. In relative terms the gold mining industry is however, still a major player in the mining industry. Compared to coal, gold contributed 4.1 percent to GDP in 2002, whereas coal contributed only 1.5 percent to GDP.

Table 2.2 Gold production 1980-2004

Year	Gold Production (tonnes)
1980	675,1
1985	672,9
1990	605,1
1995	523,8
2000	430,8
2001	395,0
2002	398,5
2003	373,2
2004	337,3

Source: Department of Minerals and Energy (2005).

Table 2.3 Gold price 1950-2004

Year	Gold price	
	Rand	US Dollar
1950	24.80	35
1960	25.40	35
1970	25.67	35
1980	476,80	612,94
1985	710,63	317,29
1990	991,88	383,58
1995	1 393,48	384,17
2000	1 932,51	279,08
2001	2 338,18	271,08
2002	3 242,30	310,16
2003	2 739,97	363,65
2004	2 637,10	409,33

Source: South African Reserve Bank *Quarterly Bulletin* (December 2005; June 2001; December 1975; September 1969; December 1959).

2.3 GOLD MINING CONTRIBUTION TO EMPLOYMENT

During the early years of economic development the gold mining industry was the biggest employer in the entire economy. For example, in 1896 the gold mining industry employed 54 000 workers. The total number of people employed by the gold mining industry increased to 220 308 in 1910 (Natrass1988).

Table 2.4 Total employment by sector 1980-2004

Year	Total em- ployment	Mining	Gold	Coal	Diamonds	Platinum	Manu- facturing
1980	8 112 584	792745	476398	128149	23 372	77 404	1 421 400
1985	7 679 466	806760	527972	120959	18 352	73 880	1 428 988
1990	6 486 195	779727	489963	103808	22 982	97 373	1 537 511
1995	8 069 000	598845	380086	62 064	15 548	91 528	1 437 553
2000	12 238 000	586000	216982	51 346	15 018	96 273	1 311 000
2001	11 181 000	550000	201634	50 675	16 294	99 575	1 393 000
2002	11 296 000	553000	199378	47 489	16 571	111 419	1 438 000
2003	11 424 000	550000	197059	47 249	18 589	127 672	1 351 000
2004	11 643 000	404000	180448	50 858	21 426	150 629	1 486 000

Sources: Statistics South Africa (2001, 2002, 2005); Department of Minerals and Energy (2005).

The mining employment numbers declined during the 1980-2004 period, mainly due to a decline in the employment figures for the gold mining industry. On the other hand, the platinum industry experienced an increase in its employment numbers during the same period but this increase could not stop mining employment from falling. Total employment numbers for the whole economy showed an increase from 2001 to 2004. Employment numbers for the manufacturing industry did not fluctuate very much as compared to the gold mining industry (see table 2.4). Employment numbers for the coal and diamond mining industries declined by a big margin from 1980 to 1995 and thereafter employment for the two industries stabilised.

Table 2.5 Employment by sector or industry as percentage 1980-2004

Year	Employment per sector as % of total employment			Employment per industry as % of mining sector employment			
	Mining	Manufacturing	Gold	Gold	Coal	Diamonds	Platinum
1980	9.8	17.5	5.9	60.1	16.2	2.9	9.8
1985	10.5	18.6	6.9	65.4	15	2.3	9.2
1990	12	23.7	7.6	62.8	13.3	2.9	12.5
1995	7.4	17.8	4.7	63.5	10.4	2.6	15.3
2000	4.8	10.7	1.8	37	8.8	2.6	16.4
2001	4.9	12.5	1.8	36.7	9.2	3	18.1
2002	4.9	12.7	1.8	36.1	8.6	3	20.1
2003	4.8	11.8	1.7	35.8	8.6	3.4	23.2
2004	3.5	12.8	1.5	44.7	12.6	5.3	37.3

Sources: Statistics South Africa (2001, 2002, 2005); Department of Minerals and Energy (2005).

Table 2.5 shows that the gold mining industry's contribution to employment is following a downward trend. The gold mining industry's contribution to total employment fell from 5.9 percent in 1980 to 1.5 percent in 2004. The gold mining industry's contribution to mining employment also fell during the same period. The contribution fell from 60.1 percent in 1980 to 44.7 percent in 2004. The fall in the contribution of the gold mining industry is not surprising because production fell during the above mentioned period. As mentioned earlier, the gold mining industry is reaching maturity, resulting in gold mining production falling. The other factor that led to the decline in production during the 1980-2004 period is the increase in the cost of production. An increase in the cost of mining inputs together with an increase in the cost of labour increased the cost of doing business in the gold mining industry, thereby decreasing the quantity of gold produced. For example, in 2004, total production costs averaged R 85 200 per kilogram. This increased to R89 130 per kilogram in 2005 (Chamber of Mines 2006:1). The decrease in the international price of gold also led to a decrease in the volume of gold produced as producers anticipated a decrease in their profitability.

The contribution of the gold mining industry to total employment fell sharply from 7.6 percent in 1990 to 1.8 percent in 2000. The contribution to mining employment by the gold mining sector fell from 63.5 percent in 1995 to 37 percent in 2000. This decline is attributed to the decline in production shown in table 2.2. Ninety-five percent of South Africa's gold mines are underground operations, reaching depths of over 3.8 kilometres. Declining grades, increased depth of mining and a decrease in the gold price are pushing up costs and as a result production is gradually falling. To reduce costs, mines have

undergone major business restructuring. The process unfortunately involved the retrenchments of several thousands of workers (MBendi Information for Africa 2006:1). The low rand gold price in the late 2004 and early 2005 and continued upward pressure on costs necessitated the restructuring of shafts and mines, a number of which were closed. The size of the economically recoverable ore reserves declined in these circumstances (Chamber of Mines 2006:1). The cost of labour contributes significantly to the cost of production and to cut production cost, workers are therefore normally retrenched. For example, wage income in the mining sector amounted to R33,81 billion in 2004 (Department of Minerals and Energy 2005:10). The employment numbers in the gold mining industry are declining but the total remuneration is on the increase (Department of Minerals and Energy 2005:30).

The same overall declining trend can be observed in the coal mining industry. Coal mining's contribution to mining employment fell from 16.2 percent in 1980 to 12.6 percent in 2004. It was a different story for the diamond mining industry where the contribution to total employment increased from 2.9 percent in 1980 to 5.3 percent in 2004. The most dramatic shift in importance regarding employment is to be found in the platinum industry. In 1980, the contribution of the platinum mining industry to mining employment was 9.8 percent. The figure increased to 37.3 percent in 2004. Platinum mining industry production increased from 114.3 tonnes in 1980 to 286.2 tonnes in 2004 (Department of Minerals and Energy 2005:2). The increase in platinum production during the 1980-2004 period largely explains the significant increase in the contribution of platinum to total mining employment.

The contribution of the manufacturing industry to total employment decreased during the 1980-2004 period. The manufacturing industry contributed 17.5 percent to total employment in 1980 and the figure decreased to 12.8 percent in 2004 (Statistics South Africa 2005).

From table 2.5 it is clear that the gold mining industry is still the biggest contributor to mining industry employment, followed by the platinum group metals. The coal mining industry is in third place. Even though the gold mining industry contributes about half of the mining industry employment, the contribution is declining in relative terms. On the other hand, the contribution of the platinum mining industry to total mining employment has been increasing since 1980. Table 2.3 also shows that the manufacturing industry outstrips the gold mining industry as far as the contribution to total employment is concerned. For example in 2004, the manufacturing industry contributed 12.8 percent to total employment compared to 1.5 percent contributed by the gold mining industry during the same year (see table 2.5).

2.4 GOLD MINING CONTRIBUTION TO EXPORTS

Before December 1997 gold producers in South Africa were obliged to sell the bulk of their gold production to the South African Reserve Bank and were paid in US dollars. In December 1997, the Minister of Finance announced that gold producers could apply for exemption from the relevant Exchange Control Regulations if they wished to sell their own gold output themselves. The gold producers have used this opportunity and they are currently selling much of their output using the Rand Refinery as their agent. The South African Reserve Bank however still purchases some gold and still has to make decisions about the reserve composition (South African Reserve Bank 2002). No private individual can trade in gold other than gold coins. Private individuals can trade in Krugerrand coins because they are regarded as legal tender. The bulk of gold produced is exported and very little is used domestically.

Table 2.6 Sectoral contribution to total exports 1980-2004 (at current prices)

Year	Total exports R Million	Mining exports R Million	Services exports R Million	Manufacturing exports R Million	Mining exports as % of total exports	Services exports as % of total exports	Manufacturing exports as % of total exports
1980	22 635	13 848	2 300	6 040	61.2	10.2	26.7
1985	42 343	23 425	4 494	12 209	55.3	10.6	28.8
1990	73 243	32 975	9 801	28 922	45	13.4	39.5
1995	125 867	44 145	16 750	64 972	35.1	13.3	51.6
2000	257 011	76 304	34 950	145 757	29.7	13.6	56.7
2001	305 584	89 943	39 752	175 889	29.4	13	57.6
2002	382 269	109 357	49 018	223 894	28.6	12.8	58.6
2003	346 975	86 809	56 431	203 735	25.0	16.3	58.7
2004	365 188	89 714	53 426	222 048	24.6	14.6	60.8

Sources: South African Reserve Bank *Quarterly Bulletin* (June 2000, September 2005); Department of Minerals and Energy (2002, 2005).

The mining industry contribution to total exports fell from 61.2 percent in 1980 to 24.6 percent in 2004 as shown in table 2.6 above. On the other hand, the contribution of the services sector to total exports increased from 10.2 percent in 1980 to a high of 14.6 percent in 2004. According to the information in table 2.6 above the contribution of the manufacturing industry to total exports has been increasing since 1980. In 1980 the contribution of the manufacturing industry to total exports was 26.7 percent. The

contribution went up to 60.8 percent in 2004. It is quite clear from these figures that the mining sector's role in the economy is diminishing, whereas the roles of the services and manufacturing sectors are on the increase.

In table 2.7 below we compare the exports of selected mining industries. The focus is on the contribution of gold, coal and the platinum group metals' contribution to total mining exports.

Table 2.7 The contribution of gold, coal and platinum to total mining exports 1980-2004 (at current prices)

Year	Total mining exports R Million	Gold exports R Million	Coal exports R Million	Platinum exports R Million	Gold as % of total mining exports	Coal as % of total mining exports	Platinum as % of total mining exports
1980	13 848	10 395	714	851	75.1	5.2	6.1
1985	23 425	15 291	3 148	1998	65.3	13.4	8.5
1990	32 975	18 994	4 027	5 164	57.6	12.2	15.66
1995	44 145	23 211	6 479	6 573	52.6	14.7	14.9
2000	76 304	25 055	11 203	24 646	32.8	14.7	32.3
2001	89 943	28 654	17 032	29 381	31.9	18.9	32.7
2002	109 357	40 933	18 697	30 459	37.4	17.1	27.9
2003	86 809	32 776	13 491	25 554	37.8	15.5	29.4
2004	89 714	28 983	14 494	29 527	32.3	16.2	32.9

Sources: South African Reserve Bank *Quarterly Bulletin* (June 2000, September 2005); Department of Minerals and Energy (2002, 2005).

Like the contribution to total employment, the contribution of the gold mining sector to total mining exports fell. It declined from 75.1 percent in 1980 to 32.3 percent in 2004. The fall in the contribution of the gold mining sector to total mining exports over the 1980-2004 period was also caused by the fall in gold production, mainly due to the maturity of the industry and the increase in the cost of gold mining production (Department of Minerals and Energy 2003:15.) The high gold price in the 1980s led to an increase in export earnings. The price of gold started to decrease in the 1990s, which led to a decrease in export earnings from 1990 to 2004 (Department of Minerals and Energy 2003:15). On the other hand, an increased demand for platinum products led to an increase in platinum production and hence an increase in the contribution of platinum to total mining exports during the 1980-2004 period. The platinum contribution to total mining exports increased from 6.1 percent in 1980 to 32.9, in 2004 as shown in table 2.7

above. When the declining contributions of the mining sector to total exports are to be explained, it is evident that the rate of increase of gold mining exports from 1980 to 2000 is decreasing. The average increase for the five-year period from 1980 to 1985 was 47 percent. From 1995 to 2000 it increased by only 8 percent. In contrast, the importance of platinum as a generator of export earnings is also noticeable.

2.5 IMPACT OF GOLD MINING ON THE DEVELOPMENT OF SOUTH AFRICA

2.5.1 Introduction

The change in the economic structure of a poor nation to that of rich society involves changes in the composition of demand, production, trade and employment (Chenery 1977:458). South Africa is no exception. The production of South Africa changed from an agricultural society to one dominated by mining and later by the secondary and tertiary sectors. Trade also takes place with the outside world. Initially trade was a domestic affair. After the discovery of gold, the demand for South African products became global. Gold is mainly an export commodity as we have seen in the preceding section. In this section the focus will be on the role played by the gold mining sector in terms of capital formation, infrastructural development and urbanisation.

2.5.2 Capital formation

Capital accumulation occurs when some proportion of present income is saved and invested in order to augment future income and output (Todaro & Smith 2003:79). New machinery, factories, equipment and materials increase the physical stock of the nation and make it possible for production to be increased. The investment in human resources can improve its quality and thereby increase the production of goods and services. Formal schooling, vocational and on the job training programmes and adult and other types of informal education may all improve human skills.

Unlike the diamond mines, which were profitable from the early years and produced the major portion of capital invested in the industry from surpluses earned, the early development of gold mining required large amounts of capital inputs. The gold ores were of low grade and were found at deep levels, hence the heavy demand for capital. During the early stages of development the economy was not sufficiently developed to be able to provide the capital from domestic sources. The development of the gold mines saw the influx of capital from the outside world. The first shares were sold in London in 1887 by Consolidated Gold Fields. The transaction raised one hundred thousand pounds. Between 1887 and 1934 some two hundred million pounds were

invested in the gold mining sector, 60 percent of which came from foreign sources (Nattrass 1988:144).

The gold mining industry also made a significant contribution to South African capital accumulation through its capacity to earn foreign exchange. A nation seeking to develop the manufacturing sector often does not have enough foreign exchange. The developing economy does not have enough capacity to produce capital goods that are needed by the manufacturing sector. Therefore the only option is to import such capital goods. The capital goods can be imported only if there is enough foreign exchange. South Africa, however did not face the foreign exchange problem, as the gold mining industry generated enough foreign exchange.

For more than a century the gold mining sector was the main destination of capital from the developed world like Europe. Approximately half of the private-listed capital from abroad has been directly invested in the gold mining sector. From 1886 to 1960 the gold mining sector raised one thousand two hundred and twenty million pounds and an additional four hundred and seventy million pounds appropriated out of profit for capital purposes. Had South Africa depended on domestic savings only, economic growth would have been slower (Houghton 1976).

The inflow of foreign capital into the gold mining industry enabled domestic savings to be channelled to other developmental projects in the South African economy. The gold mining sector also attracted men and women with vision, skills and dedication from abroad. Other countries battled to attract skilled workers to their countries. In South Africa these workers were attracted by the gold mining industry (Houghton 1976:111).

The essential feature of capital formation involves the trade-off between present and future consumption, consuming a little now so that more can be had in the future (Todaro & Smith 2003:80). Capital formation may involve the adding of new resources, for example, the buying of totally new machinery, or the upgrading of existing resources, for instance, the training of miners in understanding new mining techniques, that is, the upgrading of the existing human capital (Todaro & Smith 2003:80).

The gold mining sector had an immediate impact on capital accumulation. This took place through the generation of outputs allied to the needs of the industry itself, such as pit props, explosives, miners' boots, food and liquor as well as the provision of services such as those provided by transport riders. In some instances there was a direct link between the growing mining sector and infant manufacturing activity. For example, a De Beers-owned explosives manufacturing plant was set up at Somerset West in the Cape. In 1919 Goldfields started to produce explosives as well.

2.5.3 Infrastructure

Capital formation is supplemented by investment in infrastructure, like roads, electricity, water and sanitation and communications, which facilitates and integrates economic activities (Todaro & Smith 2003:79). For example, investment by a gold mining company in new machinery may increase the total output of gold produced. But without enough transport facilities to take the products to the market, the investment made may not add value to gold production.

The location of the railway system in South Africa was determined mainly by the gold and diamond mining industries, who were the main providers of finance for the construction of the road and railway system. The railway system was designed to link the interior with the ports for export purposes. The current road system also owes its existence to the gold and diamond mining industries. Today the transport system extends towards all directions of the country including areas which are of no mining significance, thereby making the whole country accessible for further economic development.

As the gold mining industry grew, electricity was generated for use in the capital-intensive gold mines around the Witwatersrand. Many of the people who came to work on the gold mines were sourced from as far as Malawi and Mozambique. Migrant labour necessitated the development of accommodation around the gold mining areas. As the gold mining industry grew, the Rand Water Board came into being so that it could supply water to the mining community. Today Rand Water is the biggest supplier of water in the Johannesburg Metropolis. The other infrastructural component of significance was the development of sanitation facilities to cater for the increasing population around the mines.

The communication system also developed as the gold mining industry grew. The telecommunication system was put in place to facilitate easy contact between the gold mining industry and different stake holders. The communication system was also very important for the purpose of marketing gold overseas.

2.5.4 Urbanisation

Before the discovery of gold, the interior of South Africa was underdeveloped with little modern activity. The economy was mainly agricultural and the lifestyle was mainly rural. Modern development was concentrated mainly in Cape Town. The discovery and exploitation of gold and diamonds led to the economic transformation and the

dispersion of white settlers throughout the region. Gold was discovered in the 1880s, first in the Eastern Transvaal in the Barberton area and subsequently on the Witwatersrand in 1886. From 1860 to 1920 the white population grew by over 3 percent per year, reflecting the massive immigration as people were attracted by the gold mining industry.

The growth of the towns was even more spectacular. In 1860 about 13 percent of the Cape population lived in urban areas. By 1904 the percentage had increased to 53 percent in the case of South Africa's whites, to 51 percent for Asians, 37 percent for coloureds and to 10 percent for Africans. Only a year after the discovery of diamonds Kimberley was the biggest town in South Africa apart from Cape Town and in 1887 Kimberley had a white population numbering 50 000. Johannesburg which did not exist prior to 1880 had a population of over 290 000 by 1921 (Nattrass1988:130).

Rapid urbanisation took place in the middle of the silent Highveld. Johannesburg was populated mainly by foreigners who came from all over the world. The majority of these foreigners were British. Johannesburg was the first large urban centre in the Transvaal. The gold mining sector led to the growth of one of Africa's economic hubs. The need for cheap energy to use in the gold mines led to a hunt for coal as a source of cheap energy. The biggest coal deposits were found in Witbank. The users of coal have since increased rapidly. They are no longer confined to the gold mining industry. Coal is now used by low-income groups as a source of energy.

Pretoria continued as the administrative capital, while Johannesburg developed as the commercial capital. As the search for gold continued, explorers stumbled across different minerals leading to the growth of new urban areas. For example, the growth of Musina in the Limpopo province as a town was a result of copper mining in the area. The development of Rustenburg was a direct result of platinum mining in the North West province.

2.6 LINKAGES BETWEEN THE GOLD MINING INDUSTRY AND THE DIFFERENT ECONOMIC SECTORS

2.6.1 Introduction

Hirschman (1958) formulated the theory of linkages between different economic sectors. Industries are linked to other industries in one way or another. Industries with backward linkages make use of inputs from other industries. The gold mining industry uses products of the explosive industry, which in turn makes use of large quantities of chemicals used in preparing explosive devices like dynamite. The opening of a gold

mine will therefore create a demand for explosives and chemicals. Initially this demand may be satisfied by imports. But with time local business people will realise that there is a market for these products and will set up local plants to meet this demand.

Forward linkages occur in industries that produce goods that are used as inputs into other industries. Gold is used as an input in the manufacturing of jewellery. Seeing that there is a domestic supply of gold, manufacturers can set up their own factories that would make use of the available gold. Similarly, the opening up of successful gold mines may lead to the setting up of local refineries, rather than shipping the gold to other countries for refining. This happened in South Africa with the opening of the Rand Refinery in 1920. Harmony Gold has also opened a refinery to refine its own gold. Both forward and backward linkages generate pressure that leads to the creation of new industries (Gillis, Perkins, Roemer & Snodgrass 1996:64).

To determine the linkages effects of the gold mining industry in South Africa, a useful tool is the supply and use tables compiled by Statistics South Africa (2003). Supply and use table have both statistical and analytical functions. As a statistical tool they serve as co-ordinating framework for economic statistics. As an analytical tool, the tables serve as a basis for calculating the economic data contained in national accounts and for detecting weaknesses in the economic data. Moreover, they are conveniently integrated into macroeconomic models in order to analyse the link between final demand and industrial output levels. The supply and use tables are also useful in the analysis of inter-relationships between industries in an economy with respect to the production and uses of its products and the products imported from abroad (Statistics South Africa 2003:1).

The structure of supply and use tables is explained by means of an aggregate set of tables. In order to simplify references to these supply and use tables, the columns of the supply table have been numbered SC and the rows have been numbered SR. The columns of the use table have been numbered UC and the rows have been numbered UR. The intersection of a row and a column is denoted by a colon separating the two applicable numbers for instance SC1:SR1. The economy is divided into three industries, namely, primary, secondary and tertiary. The supply table shows the origin of the resources of goods and services, depicting products in rows (SR) and industries in columns (SC). In the rows, various types of products are presented according to a product classification. An additional row is added for the adjustment of direct purchases by South African residents abroad. The columns depict information on the output of each industry according to an industrial classification, imports, taxes less subsidies on products and trade and transport margins. Furthermore, in the supply table, goods and services produced in the economy are measured at basic prices. The basic price is the

amount receivable by the producer from the purchase of a unit of a good or service produced as output minus any tax payable plus any subsidy receivable on that unit as a consequence of its production or sale. Basic prices exclude any transport charges invoiced separately by the producer (Statistics South Africa 2003:16).

The use table shows the uses of goods and services and supplies information on the cost structure of the various industries. In the rows, the various types of products are presented according to a product classification. Additional rows are added for the adjustment of direct purchases by South African residents abroad and direct purchases in the domestic market by non-South African residents. The table is divided into three different sections, each with its own characteristics. The first section shows the goods and services used as intermediate consumption at purchasers' prices by industry and by product. The total row shows intermediate consumption by industries at purchasers' prices. The second section shows the components of final demand namely, exports, households' consumption expenditure, general government consumption expenditure, fixed capital formation, changes in inventories and the residual item at purchasers' prices. The third section elaborates on the production cost of producers other than intermediate consumption expenditure namely, compensation of employees, taxes less subsidies on production and imports, consumption of fixed capital and net operating surplus/mixed income. The purchaser's price is the amount paid by the purchaser, excluding any deductible VAT or similar deductible tax, in order to take delivery of a unit of a good or service at the time and place required by the purchaser. The purchaser's price of a good includes any transport charges paid separately by the purchaser to take delivery at the required time and place (Statistics South Africa 2003:16-17).

2.6.2 Gross value added by sector

Table 2.8 Percentage contribution of components of gross value added to total gross value added at basic prices according to industry: 1993, 1998, 1999 and 2000

Sector	Year	Compensation of employees	Gross operating surplus/Mixed income	Taxes less subsidies on production	Total gross value added
Agriculture, hunting, forestry and fishing	1993	31.1	74.4	-5.5	100.0
	1998	32.4	69.0	-1.4	100.0
	1999	33.5	67.4	-0.9	100.0
	2000	34.2	66.6	-0.8	100.0
Mining and quarrying	1993	52.7	46.4	0.9	100.0
	1998	52.1	46.3	1.6	100.0

Sector	Year	Compensation of employees	Gross operating surplus/Mixed income	Taxes less subsidies on production	Total gross value added
	1999	49.3	49.0	1.7	100.0
	2000	46.8	51.4	1.8	100.0
Gold and uranium	1993	57.2	41.8	1.0	100.0
	1998	68.8	28.8	2.4	100.0
	1999	73.3	24.5	2.2	100.0
	2000	69.2	28.7	2.1	100.0
Manufacturing	1993	55.8	44.6	-0.4	100.0
	1998	54.8	45.0	0.2	100.0
	1999	54.8	44.3	0.9	100.0
	2000	52.3	46.7	1.0	100.0
Electricity, gas and water supply	1993	28.0	70.7	1.3	100.0
	1998	33.0	66.0	1.0	100.0
	1999	36.4	62.9	0.7	100.0
	2000	34.3	64.9	0.8	100.0
Construction	1993	77.7	21.2	1.1	100.0
	1998	63.2	35.9	0.9	100.0
	1999	61.7	37.1	1.2	100.0
	2000	59.1	39.5	1.4	100.0
Wholesale, retail and motor trade, hotels and restaurants	1993	51.7	45.8	2.5	100.0
	1998	50.6	46.9	2.5	100.0
	1999	51.1	45.5	3.4	100.0
	2000	48.0	48.5	3.5	100.0
Transport, storage and communication	1993	52.4	46.8	0.8	100.0
	1998	48.3	51.3	0.4	100.0
	1999	44.9	54.2	0.9	100.0
	2000	42.2	56.7	1.1	100.0
Finance, real estate and business services	1993	33.5	61.1	5.4	100.0
	1998	34.0	61.0	5.0	100.0
	1999	33.1	60.8	6.1	100.0
	2000	33.1	60.6	6.3	100.0
Community, social and personal services	1993	84.6	14.2	1.2	100.0
	1998	85.4	13.8	0.8	100.0
	1999	83.9	15.0	1.1	100.0
	2000	83.3	15.3	1.4	100.0

Source: Statistics South Africa (1999, 2000, 2002, 2003).

Gross value added at basic prices is defined as output valued at basic prices less intermediate consumption valued at purchasers' prices. Table 2.6 shows the components of gross value added at basic prices by industry for 1993, 1998, 1999 and 2000. An analysis of the percentage contribution of the components of gross value added to total gross value added at basic prices for different industries shows that in certain sectors the compensation of employees is the largest contributor to the total gross value added by the specific sector. In other industries the operating surplus is the largest contributor to the total gross value added by the specific sector (Statistics South Africa 2003:2). The percentage contribution of taxes less subsidies on production is negligible in all cases. The agriculture, hunting, forestry and fishing sector is the only sector where subsidies on production exceed taxes on production (Statistics South Africa 2003:3).

In the gold mining industry the compensation of employees is the largest contributor to total gross value added by the industry. The percentage contribution of taxes less subsidies on production is also negligible in the gold mining industry. The contribution of gross operating surplus to total gross value added of the gold and uranium industry is relatively low in comparison to sectoral averages.

2.6.3 Supply of products at basic prices

In table 2.9 we show that the gold mining industry is important not to the mining sector only but to other sectors as well. Put differently, the table shows what the gold mining industry produces. In table 2.9, it is shown that the gold mining industry supplied goods and services to the value of R25 million to the real estate services sector in 1993 which was 0.07 percent of the total supply. The figure was R30 million in 2000 which was 0.04 percent of the total supply. In percentage terms, the contribution of the gold mining industry to total supply was high in 1993 as compared to 2000 for all the industries given in table 2.9.

In the bigger picture we see that the gold mining industry as a whole contributed about 2.9 percent to total supply of goods and services in the economy in 1993. The contribution went down to 1.6 percent in 2000. It is also shown that the gold mining industry is not the only producer of gold. The gold mining industry produced 94.3 percent of gold in both 1993 and 2000 and the remaining 5.7 percent was produced by other sectors such as the silver mining industry. We also find that the gold mining industry supplied some construction material to the value of R1 021 million or 5.8 percent of the total supply in 1993. The figure changed to R1 234 million or 3.7 percent of total supply in 2000.

The gold mining industry did not concentrate on mining gold only but it also mined non-ferrous metals to the value of R77 million for the year 1993. Production of non-ferrous metals increased to R93 million in 2000.

Table 2.9 Supply of products at basic prices 1993 and 2000

Supply of products	Total supply at basic prices R Million		Gold R Million		Gold as % of total supply	
	1993	2000	1993	2000	1993	2000
Gold and uranium ore products	24 763	29 913	23 344	28 198	94.3	94.3
Other mining products	22 247	78 618	261	315	1.2	0.4
Non-ferrous metals	8 008	24 278	77	93	1	0.4
Other constructions	17 638	33 094	1 021	1 234	5.8	3.7
Real estate services	34 433	82 565	25	30	0.07	0.04
Other business services	34 248	53 051	3	3	0.0	0.01
Total supply at basic prices	859 565	1 846 446	24 763	29 913	2.9	1.6

Source: Statistics South Africa (1999, 2003).

2.6.4 Use of products at purchasers` prices

In table 2.10 we use selected figures from the use table to determine the use of products by the mining industry. In the case of gold mining the use of products concepts refers to what products the gold mining industry buys from other industries.

Table 2.10 Use of selected products at purchasers` prices 1993 and 2000

Use of products	Total supply at purchasers` prices R Million		Gold industry use R Million		Use coefficient per R1 output	
	1993	2000	1993	2000	1993	2000
Pumps	2 255	5 530	214	642	0.0002	0.0003
Mining machinery	2 528	8 095	591	622	0.0007	0.0003
Electricity	17 739	31 193	1 856	2 128	0.0021	0.0011
Wood products	6 131	11 568	693	894	0.0008	0.0005
Other chemical products	6 089	11 721	435	1 103	0.0005	0.0006
Total uses at purchaser Prices	894 856	1 926 262	9 321	12 620	1,0000	1,0000

Note: Products were selected if use exceeded R600 million in 2000.

Source: Statistics South Africa (1999, 2003).

From table 2.10 it can be shown that the gold and uranium mining industry was an important user of mining machinery, electricity and wood products in 1993, demanding in excess 10 percent of the product supply. This changed somewhat by 2000, with only pumps exceeding the 10 percent level. Its use of other chemical products increased from 7.1 percent in 1993 to 9.4 percent in 2000. Overall, a diminishing demand for products by the gold industry is again observed. Total use decreased from 1.0 percent in 1993 to just under 0.7 percent in 2000. The gold mining industry use of mining machinery decreased from 23.4 percent in 1993 to less than 8 percent in 2000 and is indicative of how significant the impact of a declining gold industry is on related industries.

Considering that the gold and uranium industry is exceptionally dependent on the international pricing of gold and its products and are mostly exported, a change in the dollar price eventually impacts on production and the use of products. In table 2.10 the technical (use or demand) coefficient for the gold and uranium industry was calculated to show the value of the products purchased or demanded by the gold industry from the market to supply R1 of output. Every column entry of the gold industry use is simply divided by the total uses at purchasers' prices. A number of direct or first-order effects can be derived from these coefficients. For example, to produce R1 of gold output, R0.0003 of mining machinery is demanded and R0.0011 of electricity is required for the year 2000. If the production or supply of gold is to be increased by R2 billion, the gold mining industry would for example use R1 million wood products and R2.2 million worth of electricity. The calculation of the second-round effects would call for more sophisticated techniques which are beyond the scope of this section.

2.7 THE CONTRIBUTION OF GOLD MINING TO TOTAL GOVERNMENT REVENUE

Government revenue is made up mainly of tax revenue. In the fiscal year 2004/2005, tax revenue constituted 98 percent of the budget revenue of government in South Africa (Budget Review 2005:180). The gold mining industry has always been a major source of government revenue. It was the gold mining industry that first put the old Transvaal province onto a sound financial position and ever since the Union in 1910, the South African government has relied heavily upon the gold mining industry as source of revenue. For many years the gold mining industry has been subjected to a special tax which does not apply to other industries.

In 1910 the gold mining industry paid R2,8 million in taxes and the tax paid went up to

R812 million in 1974 (Houghton 1976:111). Yet, today the personal income tax and value added tax make the biggest contributions to total government revenue.

In table 2.11 below we show the contributions to total tax revenue by the different taxes for different years. Note that the secondary tax on companies was introduced in 1993, hence nothing appears on the secondary tax column before 1993. An important aspect that needs to be noted is that the separate contributions of the gold mining companies to total tax revenue is reflected until the fiscal year 1998/99. From 1999 onwards the contribution of the gold mining industry to total tax revenue is grouped together with other companies under the main heading “companies”. Therefore, after the fiscal year 1999/00, tax revenue from gold mines is not reflected separately. VAT was introduced in 1991, hence nothing appears in the VAT column before 1991.

Table 2. 11 Contributions of selected taxes to total tax revenue (actual collections) 1980/81-2003/04

Year	Total tax revenue RMillion	Personal income tax		Tax on companies		Tax on gold mines		Value-added tax		Secondary tax on companies	
		RMillion	%	RMillion	%	RMillion	%	RMillion	%	RMillion	%
1980/81	13 680,6	2 220,6	16.2	2 418,7	17.7	2 794,8	20.4	-	-	-	-
1982/83	17 860,4	4 589,7	25.7	3 681,3	20.6	1 278,2	7.2	-	-	-	-
1984/85	24 120,2	7 850,9	32.5	3 820,1	15.8	1 598,9	6.6	-	-	-	-
1986/87	35 852,7	10 467,7	29.2	5 113,5	14.3	2 523,5	7	-	-	-	-
1988/89	51 462,2	14 910,4	29	8 236	16	1 694,7	3.3	-	-	-	-
1990/91	71 756,2	24 149,6	33.6	11 870,5	16.5	644,4	0.9	-	-	-	-
1992/93	83 863,7	33 833	40.3	12 126	14.5	421,5	0.5	17 506,1	20.9	-	-
1994/95	112 189,2	44 972,8	40.1	11 961,3	10.6	1 172,7	1	29 288,4	26.1	1 303,6	1.2
1996/97	147 332,3	59 519,8	40.4	16 985	11.5	507,7	0.3	35 902,9	24.4	1 337,9	0.9
1998/99	184 843,6	77 733,9	42.1	20 388,0	11.0	188,6	0.1	43 985,4	23.8	1 930,8	1.0
2000/01	220 334,1	86 478,0	39.2	29 491,8	13.4	-	-	54 455,2	24.7	4 031,3	1.8
2001/02	252 298,3	90 389,5	35.8	42 354,5	16.8	-	-	61 056,6	24.2	7 162,7	2.8
2002/03	282 209,7	94 336,7	33.4	55 745,1	19.8	-	-	70 149,9	24.9	6 325,6	2.2
2003/04	302 507,5	98 495,1	32.6	60 880,8	20.1	-	-	80 681,8	26.7	6 132,9	2

Source: Budget Review (1998, 2002, 2004, 2005).

The biggest contribution to total tax revenue came from the personal income tax category. The contribution of the personal income tax to total tax revenue increased from 16.2 percent in the fiscal year 1980/81 to a maximum of 42.1 percent in 1998/99 and then declined to 32.6 in 2003/04. On the other hand, the contribution by companies to total tax revenue changed from 17.7 percent to 20.1 percent during the same period. Note that from 1999 the figure for companies includes gold mining companies. The secondary tax on companies contributed 1.0 percent during the 1998/99 fiscal year and the figure went up to 2 percent during the 2003/04 fiscal year.

The other significant contributor to total tax revenue was the value added tax (VAT). Since its introduction in 1991, the contribution of VAT increased from 20.9 percent in the financial year 1992/93 to 26.7 percent in 2003/04. This is an indication of the revenue potential of VAT, a growing economy and improved tax collection capacity.

The income tax contribution of the gold mining industry to total tax revenue fell drastically from 20.4 percent during the 1980/81 fiscal year to 0.1 percent during the 1998/99 fiscal year. The drastic fall in the contribution of the gold mining industry to total tax revenue is attributed to the fall in the volume of gold mined as well as the decrease in the price of gold (Fedderke & Pirouz 2002:7). The Chamber of Mines (2003) reports that the gold mining industry paid R747.8 million in taxes in the year 2000. The figure increased to R1.2 billion in 2001. The tax paid increased again in 2002 to R3 billion. The higher profit levels resulted in an increase in tax collections from the gold mining industry from 2000 to 2002 (Chamber of Mines 2003). Thus, although gold mining taxes showed a decline to 1998/99, from the data of the Chamber of Mines there appears to be an improvement in 2000, 2001 and 2002.

It must be noted that marginal mines are sensitive to the rand and dollar price changes. When commodity prices increase substantially, the profit of marginal mines will increase. If the price of gold falls, the marginal mines will lose profits at a faster rate than other mines. An increase in the gold price will encourage the mining of low grade ore as it is now profitable to mine them. On the other hand, a decrease in the price of gold will encourage the mining of high grade ores (MBendi Information for Africa 2006).

2.8 CONCLUSION

The history of the gold mining industry in South Africa is one of decline. We saw strong declining trends in the gold mining industry contribution to GDP mainly due to the maturity of the industry. On the other hand, the manufacturing sector contributed significantly to GDP.

In terms of the contribution of the gold mining industry to total employment in the economy we showed that the gold mining industry's contribution to total employment is steadily

shrinking. Since 1980, employment in the gold mining industry has almost halved.

Even though the contribution of the gold mining industry to total employment is declining, the impact of the gold mining industry in terms of capital formation, infrastructure and urbanisation remains important. Of similar importance is the linkage between gold mining and different economic sectors.

The gold mining industry remains important in terms of foreign exchange earnings for the South African economy. Its export earnings have however diminished substantially since the early eighties when high dollar prices for gold impacted favourably on gold export earnings. While the manufacturing sector generates more export sales than the gold mining industry, as a net exporter the gold mining industry and the platinum mining industry remain the most important earners of foreign exchange for the country. The contribution of the gold mining industry to total tax revenue of the government is also declining. Personal income tax and VAT are now the biggest contributors to total tax revenue.

CHAPTER THREE

PRINCIPLES OF TAXATION

3.1 INTRODUCTION

In chapter two it was shown that the gold mining industry is a declining industry. It nevertheless still makes an important contribution to the economy and the fiscus. The primary aim of this dissertation is to investigate gold mining taxation. To enable us to make observations about gold mining taxation, we need to determine if the tax is a good tax. In this respect we must be guided by the principles of taxation.

The key principles of any tax system are equity, efficiency and administrative simplicity (Eckstein 1979:69; Black, Calitz and Steenekamp 2003:122). We can say that no matter how careful the government is in administering its tax system, tax distortions will always exist. Taxes have a tendency to distort economic activity and these distortions must be kept as low as possible. The principles of equity and efficiency often work in different directions. Trying to meet efficiency may violate the equity criterion and trying to satisfy the equity principle may violate the efficiency principle. Therefore the counteracting forces must be kept at a minimum. When tax equity is investigated, we need to consider the principle of tax incidence.

Section 3.2 will focus on the equity principle of taxation. Under the equity principle the main focus will be on the benefit principle and ability-to-pay principle. In our discussion we will pay attention to the concepts of vertical equity and horizontal equity. Both vertical and horizontal equity are subjective concepts which need some value judgements (Hyman 2005:405). The efficiency principle is discussed in section 3.3. In section 3.4 we pay attention to the concept of administrative efficiency and other aspects of taxation. Section 3.5 turns its attention to the incidence of a tax.

3.2 EQUITY PRINCIPLE OF TAXATION

The equity principle is among the four canons of taxation that were put forward by Adam Smith. Smith put the equity principle as follows "The subjects of every state ought to contribute towards the support of the government, as nearly as possible, in proportion to their respective abilities; that is, in proportion to the revenue which they respectively enjoy under the protection of the state" (Smith 1776:371). Two concepts of equity can be identified from this statement: the benefit received principle and the ability-to-pay principle.

3.2.1 The benefits received principle

Taxes levied according to the benefit principle means that the government supplies services to its citizens and charges its citizens for those services. The benefit principle links the expenditure side of the budget to the revenue side, thereby regulating government expenditure (Black et al. 2003:123). The benefit principle implies that there will be a direct link between services provided by the government and taxes levied by the government. This link in turn implies that those who receive more government services must pay more taxes and those who receive less services must in turn pay fewer taxes.

Despite looking reasonable, the benefit principle has some limitations. Firstly it is difficult to measure benefits received. The benefit principle therefore cannot be used effectively in the case of public goods. The nature of public goods is that they are non-rival and non-excludable. Non-excludability means that one cannot prevent a person from consuming public goods regardless of whether they paid for the use of a good. Non-rivalry on the other hand means that the increase in the number of people who use public goods cannot decrease the amount of public goods available to the existing consumers. The characteristics of some public goods and services lead to the free-rider problem. The free-rider problem implies that people who do not pay for the provision of public goods also enjoy the public goods provided by the government. Consequently, the benefit received principle breaks down as an equity norm.

The remedy to the free-rider problem is the imposition of user charges. User charges are voluntary payments for certain government services. User charges are suitable if the good provided by the government is a mixed good. Under the user charge system consumers pay government services the same way as they do when buying private goods in the market. For example, you cannot expect to get access to a public park where user charges are imposed and expect to pay nothing. User charges tend to discriminate against the poor. The poor cannot send their children to government schools where user charges are imposed. User charges are usually justified as a means of making those who use government services pay for the cost involved. However, there is no guarantee that this objective will be achieved in practice. On the other hand, true marginal cost pricing of public goods is seldom achieved. The user charges in most instances bear little or no relation to the actual cost of providing public goods (Black et al. 2003:211).

In instances where benefits can be identified and where rivalry and excludability are possible, the benefit principle can enhance efficiency by equating the marginal benefit and the marginal cost of the user. In the case of congestible public goods such as public roads, swimming pools and parking space in the central business district, user charges such as tolls, entrance fees and parking fees may enhance efficiency and serve as a rationing device (Black et al. 2003).

Failure to use user charges in an economy can lead to what Heyns (Black et al. 2003:210) calls forced carrying. Under forced carrying some people are forced to carry a heavier than proper burden. For instance if a local road was financed out of general tax money then those who do not use the road will see this as an unfair practice and their welfare will decrease.

The question that comes to mind is who should pay more taxes, the poor or the rich, in terms of the benefit principle (see Black et al. 2003:123). Some economists say that the poor should pay more taxes for they are in need of government services more than the rich because they are too poor to provide themselves with services like security. On the other hand, it is argued that the rich are rich and have everything to lose and therefore the rich must pay more taxes. Under the benefit principle of taxation it follows that those who do not use government services need not pay taxes. In the real world it is impossible to imagine that a certain group of people do not have to pay taxes because no government services are received by that group. Almost everyone receives government services. Therefore almost everyone must pay taxes. According to the benefit principle even street beggars must pay taxes because they get government services in the form of street lights and police protection, but this is unacceptable on equity grounds.

Despite the above limitations of the benefit principle, there is still room for the application of the benefit principle in the tax system. For instance the fuel levy is a close approximation of the application of the benefit principle. Motorists pay for the benefit they get from using the road. User charges support the benefit principle.

3.2.2 The ability-to-pay principle

Ability to pay distinguishes between horizontal and vertical equity. According to Rosen (1995:345) and Bailey (2002:208) horizontal equity implies that people on the same level economically must pay the same amount of taxes. On the other hand, vertical equity implies that people who are on different positions on the economic ladder must be taxed differently because their ability-to-pay is also different. Although there is consensus that taxes should treat taxpayers in similar positions equally, there is less said about the necessary degree of unequal treatment of taxpayers in unequal positions.

The tax structure is divided into three categories. The proportional one takes a constant share of all income levels, in this case the marginal and average tax rates are equal. The progressive tax rate takes an increasing share as income increases. The marginal tax rate will be greater than the average tax rate. Under the regressive tax rate a lower share of income is taken as income increases. Under the regressive tax system the marginal tax rate is smaller than the average tax rate (Rosen 1995:276-277).

The rich taxpayers pay more tax in cash or absolute terms than the poor under all of these tax structures. Under the regressive tax rate structure the rich pay more taxes than the poor in cash terms as long as the marginal tax rate is above zero (Bailey 2002:208). Vertical equity is usually taken to mean a progressive tax system. A progressive tax system, however, breaches constitutional liberty by applying a different set of rules to a minority of citizens which are rich. A highly progressive tax system may also lead to excessive public expenditure if it encourages the belief that the rich will pay for spending (Bailey 2002).

It is one thing to agree that people who are on the same level must be taxed equally and people on different levels must be taxed differently. But how do we determine that people are on the same level or on different levels? In other words how do we measure ability to pay? We normally think that income is the best way to measure ability to pay, for it tends to give people total command over resources during a certain period. Income can also add to a person's wealth, hence a general belief that it is a good measure of ability to pay. Eckstein (1979:53) also argues that almost all taxes fall on individual incomes. After all the forward, backward and lateral shifting, the tax is going to be paid by someone and this tax is going to reduce that person's income. In other words, Eckstein is implying that income is the best measure of ability to pay. In practice income is commonly used as a measure of ability to pay (Black et al. 2003:124). It is suggested that income measures the outcome of people's decisions and not their ability to pay. Workers working longer hours but at the same hourly rate would earn higher income and be taxed accordingly. This would tax their additional effort at a higher rate and be counter-productive. It is suggested that the wage rate instead of the total income is the more appropriate measure of ability to pay. If the wage rate were to be used as a measure of ability to pay, then taxpayers would pay the same amount of tax.

Using the wage rate as a measure of ability to pay has its own problems. Firstly, investments in human capital, that is, education, on-the-job training and health care, influence the wage rate. If a person with a degree earns the same wage rate as another with a high-school qualification it won't be fair to treat them the same. Secondly, computation of the wage rate requires the division of total earnings by hours of work. The latter is not easy to measure. It is not easy to count time spent on coffee breaks. For a given income it would be worthwhile for a worker to exaggerate hours of work so that he can report a reduced number of hours worked and hence pay fewer taxes. There is also a chance for employers to collude with their employees in return for a share of tax savings.

Wealth can also be considered as an appropriate measure of ability-to-pay. Taxing wealth and income can be considered as double taxation because wealth generates income which is already taxed. Historically South Africa has been concerned with the excessive concentration of wealth in the hands of the few. South Africa's estate, capital gains tax and gift taxes are a response to this concern.

Consumption can also be used as a measure of ability to pay. Nicolas Kaldor argued that it is consumption that measures the resources that a person actually withdraws from the economy for his personal use (Eckstein 1979:54). The part of a person's income that is not consumed is saved. The savings made can help to finance the capital accumulation of the country. An increase in the country's capital stock can lead to an increase in production. If an individual elects to consume more than what he earns in terms of income by buying on credit or withdrawing from his past savings he should pay a higher tax because that person will be depleting one of the sources of financing the capital stock of the country.

The utility approach can also be used to measure equal positions in either income or the wage rate. The utility definition of horizontal equity states that if two individuals are equally well off, that is, if they have the same utility level in the absence of a tax, they should be equally well off after the imposition of a tax. Furthermore, taxes should not change the utility ordering. If individual K is better off than individual M before the taxation, he or she should be better off after the imposition of a tax (Rosen 1995:345), otherwise the tax will lead to violation of horizontal equity.

It goes without saying that tax rates are determined as much by politics, sociology and psychology as by economics. In spite of all the difficulties of measuring ability to pay there is still some consensus that people who earn more income should pay more taxes. We should, however, note that choosing the right proxy of ability to pay is only a first step in designing an equitable tax structure. As Musgrave and Musgrave (1989:228) point out, the second step is to apply this proxy or index. They conclude that "tax policy, therefore, is an art no less than a science; and equity is to be sought as a matter of degree rather than as an absolute norm".

3.3 EFFICIENCY

According to Eckstein (1979:71) neutrality has long been considered one of the virtues of a good tax. By neutrality is meant that there is no disturbance in private production and consumption decisions. In other words the allocation of resources in the private sector remains unchanged. Eckstein (1979:71) concludes that "a tax system as pervasive as ours cannot be neutral". Eckstein's views are shared by Herber (1983), who notes that the traditional literature of public finance associates the concepts of tax neutrality with that of allocative efficiency.

People consider the impact of taxes in their everyday transactions. A worker may decide not to work overtime because the marginal tax rate will take a quarter of the additional income. An entrepreneur may decide not to invest in a certain business venture because the return after taxes is not worth the risk. A consumer may decide to buy commodity B rather than product

A because product A is subject to an excise tax and product B is not. At times the government sees it necessary to depart from the neutrality requirement, as in the case of alcohol and tobacco taxes. At other times governments ignore the need for neutrality when imposing taxes required to raise revenue. The resultant departures from neutrality need to be considered as distortions in decision making. These distortions are a serious matter in a market economy. We rely on consumers' expression of their preferences in the market to influence businesses in their production decisions. That is, before the entrepreneur can supply any product in the market he or she must first understand the needs of his potential market and for the entrepreneur to make an informed decision the consumers must convey undistorted preferences.

Allocative efficiency can be explained using a general equilibrium approach. The Pareto efficiency condition is useful here. The marginal rate of substitution (MRS) should be equal to the marginal rate of transformation (MRT) for Pareto efficiency to exist (Rosen 1995:308). The Pareto efficiency condition can also be stated as $MRS=MRT=Pa/Pb$. Non-neutral taxes distort relative prices ratios. Sometimes taxes can correct distortions, for instance externalities.

If non-neutral taxes are imposed, the two sides of the market are no longer at equilibrium. According to Eckstein (1979:72), consumers will consider the price plus the tax and producers will consider the price minus the tax. The tax imposed causes price differences to exist. Because of a difference in prices, the private economy is misled into producing the wrong combination of goods, underproducing goods and services that are taxed heavily. Thus the resources are no longer used efficiently. Eckstein (1979:72) notes that "this additional loss, beyond the value of resources withdrawn from private use through the tax, is called the dead-weight loss of taxation because this loss has no offsetting gain to the government. It is simply the loss suffered from the reduction in efficiency of the economy, a cost of an imperfect tax system".

An efficient tax system must cause little distortion. According to Eckstein (1979:75), the dead-weight loss can be minimised by imposing taxes in such a way that decision making is not affected, in other words, the tax cannot be avoided by changing behaviour. An example of a tax that cannot be avoided and thus does not change economic behaviour is a head tax. It can only be avoided by death or if a person leaves the country. A head tax is a lump sum that is imposed on living people. A head tax normally generates little revenue for the government, because the tax rate is normally set at a low level so that low income taxpayers can afford to pay the tax. All other taxes can be avoided. For instance, excise taxes can be avoided by purchasing less of the taxed goods and services. In the case of income taxes, the taxpayer can avoid the tax by working fewer hours and earning less income, and property taxes can be avoided by owning less property. Rosen (1995:308) noted that a lump-sum tax is considered

unfair because everybody pays the same amount of tax regardless of one's economic circumstances.

3.4 ADMINISTRATIVE EFFICIENCY AND OTHER ASPECTS OF TAXATION

When levying taxes, the authorities need to take into consideration the principle of administrative efficiency. A system that is not administered effectively can only bring about poor collection, breeds uncertainty as to the tax outcome of business actions and may become a deterrent to international investment and trade. For taxes to be efficient, administration and compliance costs need to be kept low. The dead-weight loss is not the only cost of taxation. Taxes have to be administered and expenses are incurred in the process (Black et al. 2003:146). The structure of taxation should be such that the costs of collecting taxes and administering the tax system are small relative to the tax yield. This applies equally to the government and taxpayers. These principles may be contradictory. For example, designing a tax system that is easy to administer and simple to understand may result in horizontal inequalities by failing to take account of the different conditions of taxpayers with similar incomes. For example, consider two people with identical incomes, one may have children to look after and the other may have none. Tax allowances in respect of children could be used but these measures may increase administrative costs (Bailey 2002:209). Administrative costs include the salaries and wages of the staff of the tax collecting authorities, the full cost of the accommodation for staff, materials used by staff and the services received but not paid for from other departments (James & Nobes 2000:39).

In addition to administration costs which are incurred by the state, there are some compliance costs which taxpayers must contend with in order to meet their tax obligations. These include the cost of time spent filling in tax returns as well as the cost of employing tax experts (Rosen 1995:348). In designing taxes, an effort must be made to keep compliance and administration costs at bay.

Taxes also need to be flexible and adjust to the business cycle. The economy is characterised by booms and recessions. The tax system needs to adjust as the economy adjusts (Black et al. 2003:148). The adequacy of a tax is also important. Given two taxes equal in all respects, the one that yields bigger revenue is the better one. No matter how equitable and efficient a tax may be, if it fails to derive revenue, it usually has little justification for being levied unless it is meant to correct certain behaviour in the market, for instance discouraging smoking and alcohol drinking. According to Eckstein (1979:51), the tax system must, furthermore, be enforceable and a good tax system does not impose taxes that are impossible to enforce. Even where voluntary compliance is the rule, the possibility of verifying tax payments must exist, and the taxpayers must be certain about the tax system. Investment is risky and if business is uncertain about the amount of taxes to be paid, investment can decrease drastically. Similarly,

individuals should be secure against unpredictable taxes levied on their wages or other incomes. Tax collectors should have little discretion about how much to assess taxpayers for this is a great power and subject to abuse.

3.5 THE INCIDENCE OF A TAX

Tax incidence is the study of who bears the economic burden of a tax. It is the positive analysis of the impact of taxes on the distribution of wealth within a society. It starts with the basic observation that the person who has the legal obligation to make a tax payment may not be the person whose wealth is reduced by the existence of a tax. The incidence of a tax is divided into statutory and economic incidence. The statutory incidence of a tax refers to the distribution of legal tax payments based on the statutory obligation to remit taxes to the government (Fullerton & Metcalf 2003).

Economists focus on the economic incidence, which measures the changes in economic welfare in society arising from a tax. Economic incidence differs from statutory incidence because of changes in behaviour and consequent changes in equilibrium prices. Consumers buy less of the taxed product so firms produce less and buy fewer inputs, which change the net price or return of each input. The fact that there is a decrease in the demand for inputs means that the production of those inputs is going to decrease. If production decreases then the cost of production will increase. The firm can be forced to cut down its production cost by reducing the number of people it employs.

Ultimately, tax incidence is about tax shifting and no one being prepared to bear the burden of a tax. Suppliers will always try to shift the burden to the consumer. Rosen (1995:273) aptly describes it as: "Struggle and contrive as you will, lay your taxes as you please, the traders will shift it off from their own gain".

Taxes can be shifted in three different ways. As noted by Bailey (2002:66), these are forward shifting, backward shifting and lateral shifting. Under forward shifting, the producer will try to avoid the burden of the tax by increasing the price of the products it sells. Backward shifting involves reducing the prices paid for the factors of production like land, capital and labour. Under lateral shifting the firm can reduce the dividends paid to its shareholders.

The time dimension also has an impact on the analysis of the incidence problem. The incidence of a tax depends on price changes. Price change takes time. Under normal conditions, one will expect responses to be bigger in the longer run than in the short run. Thus the short-run and long-run incidence of a tax may differ (Rosen 1995:276). In the long run people are given enough time to decide on certain economic issues and therefore their reaction will be totally different from a decision made within a short period. The incidence of a tax

cannot be known until all the direct and indirect effects have worked their way out. This may take long. Among the indirect effects of a tax are the rate of capital formation, technological progress and the long-run trend of prices and production. The longer the time period, the more difficult it becomes to isolate the economic effects of a tax from other forces in the economy which alter prices and income. The shorter the period that is under consideration, the more definite are the conclusions that can be drawn.

The incidence of a tax depends on the elasticity of supply and demand. In general terms, the more elastic the demand curve, the less the tax borne by consumers, *ceteris paribus*. On the other hand, the more elastic the supply curve, the less tax borne by producers (Rosen 1995:282). Rosen (1995:282) also notes that elasticity provides a rough measure of a taxpayer's ability to escape a tax. The more elastic the demand, the simpler it is for consumers to turn to other products when the price goes up and therefore the bigger the burden of taxation that will be carried by the producer. On the other hand if consumers buy the same amount of goods regardless of the price, then the whole burden can be shifted to them.

3.6 CONCLUSION

The main principles of taxation are equity, efficiency and administrative efficiency. A good tax system needs to take into account the benefit received by the taxpayer as well as the ability to pay of the taxpayer. The ability to pay principle is divided into horizontal and vertical equity. Horizontal equity implies that people on the same level economically must be taxed equally and vertical equity means that people who are on different levels on the economic ladder must be taxed differently. The main measure of ability to pay is income.

The tax system also needs to be efficient, meaning that the tax system must not disturb economic behaviour. The tax system must be neutral. In real life, very few taxes are neutral and therefore a good tax system must cause as little distortion as possible. A lump-sum tax, for example a head tax, is one of the few taxes that are neutral. It is difficult to satisfy the principles of equity and efficiency at the same time. These two principles move in different directions. A tax system that focuses on equity may become inefficient and a tax system that focuses on efficiency may become inequitable.

A good tax system also needs to have low administration and compliance costs and it must be flexible enough and adjust to changes in the business cycle. The incidence of a tax is the study of who bears the burden of a tax. It is divided into statutory and economic incidence. Tax incidence is about tax shifting. Taxes can be shifted in three different ways. These are forward shifting, backward shifting and lateral shifting. The incidence of a tax depends on the elasticity of supply and demand. The more elastic the demand curve, the less the tax borne by consumers and the more elastic the supply curve, the less the tax borne by producers.

CHAPTER FOUR

ECONOMICS OF NATURAL RESOURCES AND TAXATION OF NATURAL RESOURCES

4.1 INTRODUCTION

Natural resources are gifts of nature and include land, forests, oceans and mineral deposits and can be renewable or non-renewable. Almost every country raises revenue from the economic activities associated with the exploitation of natural resources. This can take different forms. It may consist of taxes specific to the resources in question, for example, royalties are levied on most mining activities in countries like Canada, Australia and Botswana. It may involve special measures applicable selectively to the resource industries within more general tax systems, such as company taxation. The process may also involve varying degrees of public ownership of resource property rights, ranging from ownership of the resource being exploited, which is then sold or leased to private sector resource firms, to joint ventures between the public and private sectors and complete public ownership and operation of resource firms by the government.

In this chapter, the focus is on natural resources, one of the four factors of production, others being labour, capital and entrepreneurship. The application of economic principles to the study and analysis of natural resources is called natural resource economics (Field & Field 2002:24).

We start the chapter by discussing the characteristics of renewable and non-renewable resources and the role of government in section 4.2. Section 4.3 covers reasons for taxing natural resources. The methods of generating government revenue from natural resources are discussed in section 4.4, followed by the conclusion in section 4.5.

4.2 RENEWABLE AND NON-RENEWABLE RESOURCES AND THE ROLE OF GOVERNMENT

Renewable resources are those resources that can replace themselves after being used (Field 2001:32). Renewable natural resources are also known as flow resources (Mather & Chapman 1997:14) due to the fact that the use of these resources is not limited to a certain period provided that they are extracted efficiently without over exploitation. Solar energy and water power are good examples of flow resources.

Renewable resources can be stored for future use, thereby smoothing imbalances between supply and demand. For instance, food stockpiles can be used to feed the nation during

drought periods. Excessive food can be kept in a safe place during bumper harvests for future use (Tietenberg 1996:119).

Renewable natural resources generate a continuous flow of output for an indefinite time and include fisheries, forests, hydro-electricity, water supplies, clean air and agricultural land. As the renewable resources are put to economic use they tend to replace themselves by natural or artificial means (Perman, Ma, McGilvray & Common 2003:556). Overexploitation of resources can lead to their extinction. In some cases the exploitation may involve a continuous flow of output, for example fisheries and hydro-electricity, in others it may involve a series of cycles of extraction and replenishment, for example, when clear cutting is used in forests (Boadway & Flatters 1993:2).

Non-renewable resources are those that cannot be replaced (Perman et al. 2003:18). They are irreversible, meaning that the amount of the resource extracted cannot be increased or cannot be replaced after extraction (Perman et al. 2003:18). Non-renewable resources are also known as stock resources, due to the fact that they can only be used for a limited period (Mather & Chapman 1997:14). The quantity available is fixed. Examples include gas and mineral resources.

Non-renewable resources can be stored for future use or to increase the economic life of the resources (Tietenberg 1996:119). The life span of non-renewable resources can also be increased by recycling or reusing the resource. For example, the copper wiring used in a vehicle can be reused once the vehicle enters the scrap yard (Tietenberg 1996:118). However, the recycling cannot continue forever because every time the resource is recycled, its original composition is weakened, that is, the non-renewable resource will lose its original quality (Tietenberg 1996:119). Natural resources can only be recycled up to a certain point. Not all depletable or non-renewable resources can be recycled. Non-renewable resources like coal and oil can be used only once. The current use of a non-renewable natural resource means that it will not be available for use in future.

The greatest similarity between renewable and non-renewable resources is that both are capable of being fully exhausted or fully exploited. Excessive extraction of natural resources can drive the amount of both renewable and non-renewable resources available to extinction. In case of non-renewable resources, the resource can be exhausted by simply using all the available resources. Renewable resources can be fully exhausted if the rate of extraction far outstrips the rate of replenishment (Perman et al. 2003:556).

The risk of over-exploitation of natural resources prompts the government to intervene in the natural resources industry. The government can intervene in the resource industries for other reasons as well. One of the reasons is that some of the natural resources, like water and fresh

air, are non-excludable and non-rival. They are public goods. The problem with public goods is that there is no market for them and the private sector cannot efficiently provide and use public goods (Mather & Chapman 1997:28). Also, natural resource exploitation can lead to environmental pollution and degradation, that is, negative externalities are generated. At the end of the day, people who are not directly involved in the use of natural resources can end up suffering the negative effects of natural resource exploitation. In the case of negative externalities, the government can order resource exploiters to take into consideration the welfare of other citizens when exploiting natural resources and resource firms can also be ordered to reduce the level of pollution or face prosecution by the authorities (Perman et al. 2003:209). On the tax front, Pigouvian taxes can be imposed on those firms that generate negative externalities (Rosen 1995:99).

Another way of reducing resource overexploitation is the use of control and command regulations. For instance, to reduce the overexploitation of fish reserves, the following measures can be implemented: The size of the boats can be restricted to small boats; closed fishing seasons can be introduced; the number of days allowed per boat for fishing purposes can be limited; and the mesh or net size can also be controlled, so that small and unwanted fish can remain in the water where they can reproduce and add to the number of existing fish (Perman et al. 2003:587).

A further reason for government intervention in the natural resource sector is that the majority of natural resources are subjected to open access or are free-for-all resources. In other words, the natural resources are open for use to almost everybody. The fact that natural resources are open for use to almost everybody leads to the overexploitation of natural resources. Common resources are normally subject to the tragedy of commons problem (Mather & Chapman 1997:41). The general feeling that natural resources are not owned by any person can serve as an incentive to overexploit the resources. All the people in the community will feel that they need to gain as much benefit as possible from the exploitation of free natural resources. The result will be a rush for natural resources and the exhaustion of these resources will be unavoidable (Mather & Chapman 1997:42). The allocation of private property rights can help deter the overexploitation of natural resources. The owners of natural resources with well defined property rights can be encouraged to exploit natural resources efficiently and cannot afford to overexploit natural resources. Overexploitation can mean a decrease in income. The decrease in income is viewed as a loss of income by natural resource owners (Tietenberg 1998:37). The mining company that owns land can be encouraged to mine the ore efficiently so that the benefits gained can stretch over a long period.

The extraction of natural resources can be extremely capital-intensive. For example, the mining industry needs machinery, like caterpillars for clearing the land, railway infrastructure and drilling machines, to mention just a few. The fact that a lot of capital is needed when

operating a mining business makes mining a very risky investment. It is risky to the investor in the sense that a large amount needs to be spent on machinery and other inputs before any income can be generated. The gestation lags for most natural resources is also very long. Gestation refers to the period from initial exploration to the time when production income starts flowing into the company (Sarma & Naresh 2001:1). In the mining sector, the first step is exploration, which involves the search for the ore. After exploration, the development stage must follow. This involves the clearing of the site, the installation of machinery and the putting in place of all the necessary amenities needed before the actual mining can take place. Only then will the mining process commence. The mining company will also not necessarily earn income soon after production has started. The capital intensity and long gestation periods for some natural resource exploitation and the associated risk involved require favourable measures or treatment by government to ensure long-run sustainability of resources.

Although a case is made in this section for government to intervene where natural resources are over-exploited, it must be considered that government may also fail in achieving optimal outcomes. Bureaucrats have the tendency to increase their budgets and try to get as much money as possible for their own use. Interest groups can also influence political decisions. Rent-seeking can also cause government failure. Rent-seeking involves the use of resources in lobbying and other activities aimed at influencing the decisions of the politicians (Tietenberg 1996:57). Politicians also try to get as many votes as possible by acceding to the demands of the electorate.

4.3 REASONS FOR TAXING NATURAL RESOURCES

As mentioned in section 4.2, natural resources have characteristics that can lead to over-exploitation and negative externalities. A number of government interventions were noted in section 4.2. We are particularly interested in taxation as an instrument for correcting the adverse effects of natural resource exploitation. In addition, researchers have identified a number of other reasons why natural resources should be taxed. These include: rent collection, capital income earned, the conservation of natural resources, the exercise of monopoly power in international markets, limited life span and capital intensity (Boadway & Flatters 1993:11-12).

4.3.1 Rent collection

Natural resources are mainly taxed to obtain a share of the economic rent for public use (Boadway & Flatters 1993:11). In general, people talk of renting a car, renting a house or renting a flat. However, in economics the word rent has a very different meaning. In this section much of the discussion revolves around land rents. Since many natural resources have similar characteristics to land, it is maintained that the concepts and analysis applicable to

land can be extended to other natural resources such as minerals.

According to Ricardo (1911:33) rent is "that portion of the produce of the earth which is paid to the landlord for the use of the original and indestructible powers of the soil". Put differently, economic rent is the income that the landlord has after deducting the income for all other factors of production and all sorts of expenses incurred of every nature. Rent thus excludes any payment received by the landlord for capital invested in or on his land in the form of buildings, drains, hedges, fences, walls and other improvements. The income generated from other economic activities besides land use is classified as profit. Profit is different from rent because the laws which regulate the progress of rent are different from the laws that regulate the progress of profit and seldom operate in the same direction (Scott 1933:113). Land is limited in quantity and not uniform in quality. If land was available in unlimited quantities, no rent could be paid. The main reason for not paying rent for natural resources like air and water is that they exist in boundless quantities. If all land were unlimited in quantity and uniform in quality, no rent could be paid for its use, unless where it possessed peculiar advantages of situation. Economic rent is the surplus profit that the landowner gets from the use of the land. The difference between economic rent and excess profits earned by a firm is that under conditions of perfect competition excessive profits can be competed away, whereas the economic rent is a permanent condition (Van den Bogaerde 1978:160).

Economic rent can be divided into rent of intensity, rent of quality and rent of location (Van den Bogaerde 1978:157-164). In a society where land is abundant and the population is small in relation to the amount of land, people can move freely from one piece of land to another. Initially, people will make use of the more fertile land and the less fertile land will be ignored. As the population grows, the need for more fertile land will increase. Eventually the fertile soil will be exhausted. The land user will start using less fertile land and rent will accumulate on more fertile land (Ricardo 1911:37).

Fertile land will be overused and the excessive use of land will generate rent which will fall into the hands of the landlord. Before a shortage of land, rent cannot be charged because land users can simply move to an unoccupied piece of land rather than pay rent (Ricardo 1911:34). Rent is therefore linked to the scarcity of land. In cases where land belongs to everybody, that is where land is common property rather than private property, rent cannot be regarded as a cost of production because land is the gift of nature. Being a gift of nature, there is no cost involved in the procurement of land, provided the land under consideration is common property.

Rent of intensity comes into effect when there is an excess demand for land. The supply of land is fixed. As the population grows, there will be a demand for more land. This demand for

more land will eventually lead to a shortage of land. The shortage of land will lead to rent being imposed on the users of land. The land users cannot refuse to pay rent because they cannot relocate to an empty piece of land as no land is available. As the population increases, the rent will rise because the land will become scarce. An increase in population will eventually lead to production taking place beyond maximum average output. Land will be used more intensively and rent which is a surplus will come into the picture. Intensive use of land can be an indication of land shortage and that is why rent of intensity is sometimes called rent of scarcity (Van den Bogaerde 1978:161).

Rent of quality comes into existence due to the fact that land is of different quality. Not all land is equally fertile. Nature's surface is made up of fertile and non-fertile land. Initially, people will go for the most fertile land, neglecting the less fertile land. As the population and cultivation increases on the fertile land, rent will be generated. Rent of quality is about fertile land earning more rent and less fertile land earning less rent (Ricardo 1911:35). With the passage of time, less fertile land will be sought after. As the demand for more land increases, less fertile land will start generating rent. The rent from the less fertile land will be smaller than the rent from the more fertile land.

Some of the land is situated in remote areas which are far away from the market and with little infrastructure. Areas that are situated close to the market yield higher rents than land which is far away from the market and this is what is meant by rent of situation or rent of location. Transport costs need to be added to the cost of production when determining rent for land that is situated away from the market. It is not necessarily true that land situated in remote areas will generate less rent than land situated close to the market. The land situated near to the market can be infertile or of little economic value. If the land that is not close to the market is more fertile than the land that is close to the market, we can expect the rent for the land that is located far from the market to be higher than the one located close to the market (Van den Bogaerde 1978:162).

The economic rent can be decreased in different ways. Firstly a decrease in the population by whatever means can lead to a decrease in the rent generated. We have seen that an increase in the population can put pressure on land, in the sense that it will increase demand for land and as the demand for land increases, the rent will also increase. Population decrease will have the opposite effect on the demand for land, as more land will be available for use. Land users will have the freedom to move from one piece of land to another and rent will eventually decrease due to the abundance of land (Ricardo 1911:35).

An improvement in cultivation technology can also lead to a decrease in rent. Technological improvement enhances the efficient use of land, which means that land users can use the same piece of land for a long time, thereby reducing pressure on the demand for new land which

will eventually decrease in rent (Ricardo 1911:41). Ricardo (1911:110) argues that rent can discourage the cultivation of land because the more land is demanded and cultivated, the more pressure is put on the land which can eventually lead to the shortage of land and this shortage can lead to the generation of more rent. Knowing that they will pay more for more land they demand and use, people will be discouraged from cultivating land.

The Ricardian theory of rent is criticised for being based on unrealistic assumptions. The theory operates under the assumption of perfect competition, perfect mobility of the factors of production within the boundaries of a country and unchanging technology in the agricultural sector. Technology has changed over years in the agricultural sector. Factors of production are not perfectly mobile; they are hindered by a number of laws and regulations. In the real world perfect competition does not exist at all. Ricardo was not aware that the proportionate increase in rents and prices for urban land would far exceed the increases for farm land (Oser 1970:92).

Ricardo overemphasised the role of diminishing returns. The law of diminishing returns is correct only if other factors, including technology, are kept constant. The level of technology in the agricultural sector has improved over the years. Improvements in agriculture have resulted in increasing returns per unit of labour in the most advanced countries. The Ricardian theory is also criticised for assuming that landlords are not interested in increasing productivity in agriculture. Improvements permit poor land to be worked, thereby increasing the surplus available for rent. Only if improvements in agriculture are not accompanied by an increase in demand for farm products does rent fall.

Similar to land, the mining industry generates rent. The mining industry uses machinery and labour to extract minerals from the earth's surface and mineral resources are the gifts of nature. There are a limited number of equally high grade mines and that is why some mines tend to generate rent (Ricardo 1911:46). If there were an excessive number of equally rich mines, no rent would be generated because the value of the produce of the mines would depend on the quantity of labour necessary to extract the mineral and bring it to market. Mines as well as land generally pay rent to their owner.

Every country is endowed with mines of different qualities and these mines produce ores of different quality and value. The value of the ore produced from the poorest mine must be high enough to cover the cost of production and afford a profit for the investor. The return on capital from the poorest mine paying no rent would be used as a benchmark for the payment of rent by the more productive mines. The benchmark mine is supposed to yield normal profits. The mines that get more than the normal profit will pay the extra profit as rent to the owners (Ricardo 1911:46).

Rent of situation is very common in the mining industry. The majority of mines are situated far from the market. Mineral products in South Africa and other developing countries are marketed overseas. It involves a lot of transport cost to ferry the minerals to markets. Rent can also originate through differences in location. If mines of the same grade are situated at different distances from the market, the farthest mines must pay the normal returns to labour and capital. The mines located close to the market will yield extra returns because of smaller transport costs and these returns will constitute rents (Oser 1970:91). Some mineral products are of higher quality than others. For example, diamonds are of high quality as compared to asbestos. Diamonds therefore produce higher rents of quality than coal (Boadway & Flatters 1993:8). Mineral resources that are scarce, like gold and diamonds, produce more rent than ubiquitous minerals like coal and sand.

4.3.2 Capital income

Capital and other factors of production like land and entrepreneurship are important in exploiting natural resources such as mining operations. Capital refers to machinery used in the exploitation of natural resources. Huge amounts of capital are invested in the exploitation of natural resources (Otto 2001:4-5). Profit is the return on capital and it shows the ability to pay taxes for services rendered by government to natural resource enterprises, therefore, profitable mining or natural resource activities should be taxed (Sinn 1987). Profit is the reward for taking risks and is paid to the entrepreneur. Capital is one of the factors of production. Like labour and natural resources, capital generates income in the form of profit (Ricardo 1911:263). Often natural resources are taxed differently because of their unique characteristics, for example, natural resources have long gestation periods and require huge capital investments. See section 4.2.

4.3.3 Conservation of resources

Taxes may be used as a way of inducing resource firms to take into consideration the environment in which they operate in their resource management decisions (Boadway & Flatters 1993:12). According to Grafton, Pendleton and Nelson (2001:54) conservation is "a general term for a mix of preservation, restoration, use and management of natural and human-made resources for the long-term benefit of societies." As noted in section 4.2, the extraction of natural resources causes environmental damage and negative externalities are generated. Free-for-all natural resources can be over-exploited. There is, therefore, a need for government intervention through taxes or through the imposition of rules and regulations (Perman et al 2003:209).

Production taxes can be used to reduce the rate of exploitation of resources. Under production taxes if a company produces more goods, it will also pay more taxes. This can encourage

resource exploiters to reduce the rate of exploitation, thereby conserving resources for future use (Boadway & Flatters 1993:12). Public concern over environmental damage and the fear of losing natural resources has forced governments to levy conservation taxes (Church 1985:73). According to Church (1985:73) conservation taxes or severance taxes reduce the rate of extraction of natural resources. However, according to Church (1985:73), the conservation may prove to be inefficient because the economic growth rate is reduced. Again, if the effect of the tax is to increase the ore cut-off grade, then conservation of the resource is forfeited, because low grade ores will be bypassed and once bypassed the resources may not be economically retrievable (Church 1985:73). Conservation taxes induce the firm to utilise high grade ores and reduce production and increases the incremental cost of extraction since it is levied on output (Church 1985:73). If incremental costs increase more rapidly as extraction takes place, the firm can maximise its profit by slowing the rate of extraction (Church 1985:73). The total industry output will fall because the rate of extraction is slowed down and also due to the fact that marginal firms will become unprofitable and will therefore cease production (Church 1985:73).

4.3.4 Monopoly power in international markets

Natural resource industries are very capital-intensive (Sarma & Naresh 2001:1). The high investment costs result in monopolistic market forms. Some countries may be important suppliers of a resource on the world market, to the extent of influencing the international price of the product in question (Boadway & Flatters 1993:12). Monopolists tend to levy higher prices for their products and produce at lower levels than competitive firms. Entry into the market is normally difficult under monopolistic conditions. The cost of production for resource companies is normally very high. New firms cannot enter into the resource industry through what is called market penetration. Market penetration is whereby new entrants into the industry keep the price of their products below those of the existing firms. Because the cost of production is prohibitive in resource industries, new firms cannot afford to keep their prices down for fear of running huge losses (Perman et al. 2003:519).

Monopolistic profits generated by the monopolist can encourage the government to levy a tax on the extra income generated. Monopolistic profits show the ability of the monopolist to pay taxes. Besides taxation, the government can encourage new participants into the resource industries by, for example, lowering taxes paid by resource industries. If the government manages to attract investors into the resource industries, the existing monopolies can be dismantled by increased competition. Accelerated depreciation can also be used as a way of attracting investment into the resource industries. Higher prices do not necessarily mean that the profit for the firm will increase. Higher prices associated with an increase in the cost of production can leave profits unchanged or can even lead to a decrease in profits (Boadway & Flatters 1993:12).

4.3.5 Limited life-span

Non-renewable resources has a limited life-span because they do not have the capacity to replace themselves (Perman et al. 2003:11) Once non-renewable resources are finished, they are finished. The longevity of both renewable and non-renewable resources can be enhanced by extracting the resources efficiently. In cases where the rate of exploitation is greater than the rate of replenishment, even those resources which are capable of replacing themselves (such as fisheries) can be exhausted (Perman et al. 2003:11). The life-span of renewable resources therefore depends on the rate of exploitation of natural resources. Overexploitation can reduce the life-span of renewable natural resources as well as the flow of income and government tax revenue.

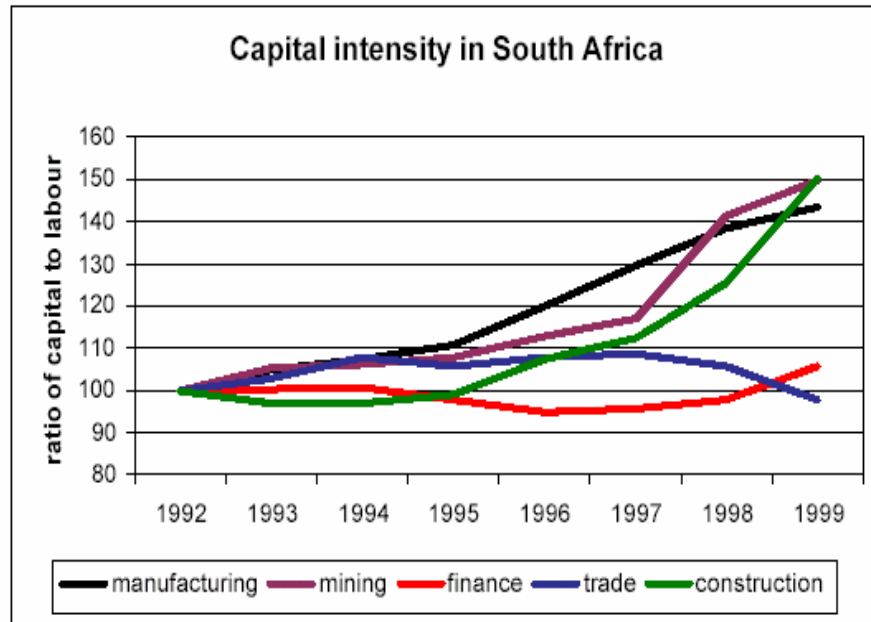
Taxation can be used to discourage the overexploitation of natural resources and in turn prolong the life span of natural resources. The government can levy an additional tax for the overexploitation of natural resources. Resource companies that exploit natural resources at a faster rate than other companies can be made to pay higher taxes than companies that extract resources at an efficient rate (Church 1985:73).

4.3.6 Capital intensity

Natural resource exploitation is capital-intensive (Samson, Mac Quene & Van Niekerk 2001:9). Over the past decade, capital intensity as measured by the value of fixed assets over employment or capital-to-labour ratio has shown a steady increase (Statistics Canada 2004:1). The South African economy has become more capital-intensive, especially the mining industry (United Nations 1998:4). There has been more than a doubling of the use of capital compared to labour throughout the economy since the 1960`s (United Nations 1998:4). In the agricultural sector, capital-intensive production increased by 55 percent from 1960 to 1995. In the mining industry there was an increase of 331 percent in the use of capital from 1960 to 1995. Capital intensity in the manufacturing sector increased by 252 percent during the same period. The services sector increased its use of capital by 83 percent from 1960 to 1995 (United Nations 1998:4). Even though capital-intensive production tends to reduce employment, global trends are towards capital-intensive production because more can be produced at cheaper prices and higher profits can be generated (United Nations 1998:4). The high capital intensity of much of the mining industry encourages mining firms to seek the maximum use of their equipment, calling in turn for more flexible and often more intensive work patterns (International Labour Organisation 2006:1). In an authoritative study on *Capital/Skills-Intensity and Job Creation: An Analysis of Policy Options*, Samson et al (2001) highlight the capital intensity of the mining industry. Figure 1.1 shows that there is

rising capital intensity in mining, manufacturing and construction. Capital-to-labour ratios are stable in the financial services and trade sectors (Samson et al. 2001:9).

Figure 4.1 Capital intensity in South Africa



Source: Samson, Mac Quene & Van Niekerk (2001:9)

The consequence of capital intensity is that investment must be encouraged or facilitated by the government. Capital-intensive projects can deter investors if they do not see the possibility of gaining profit. To encourage investment in such projects, the tax system must allow for deductions for capital expenditure. For example, mining firms can fully subtract expenditure of a capital nature from their taxable income for the year in which the expenditure was incurred (Samson et al. 2001: 6). The government can also encourage investment in the mining sector by providing a mechanism whereby equipment imported for mining purposes is duty free, exempted, zero rated or refundable. The government can also provide some value-added tax relief on equipment purchases if the mine product is destined for export (Otto 2000:3). Mine products are often destined for highly competitive export markets. The government can also impose low or no export duty on minerals and provide a means whereby value-added tax on export tax sales is either not applied or applied in a way that allows for a refund or credit (Otto 2000:3). A tax holiday can also be imposed whereby certain mining industries are exempted from a certain tax for a certain period. The government can also consider the possibility of removing ring-fencing as a way of encouraging investment in the capital-intensive industry like mining. The removal of ring-fencing will allow non-profit-making mining companies to offset their expenses against the income of highly profitable companies (Otto 2000:15). Mine products are prone to price changes, to encourage investment

in the mining industry the government can allow certain types of taxes, usually royalties, to be waived from time to time for projects experiencing short-term financial problems and provide for the carrying forward of losses (Otto 2000:3).

According to Samson et al. (2001:10) job creation depends on the rate of capital investment, productivity growth and the degree of substitutability of capital and labour. An increase in investment will not necessarily increase employment. If an increase in productivity is labour augmenting and labour cannot be substituted for capital, more investment can lead to job losses even though the economy will be growing. As a result, the capital-to-labour ratio will rise (Samson et al. 2001:10).

4.4 METHODS OF GENERATING GOVERNMENT REVENUE FROM NATURAL RESOURCES

In section 4.3 we looked at the reasons for taxing natural resources. In this section we are going to look at the methods used to generate government income from natural resources. Some of the ways used to generate income for government from natural resources are: tax on rents, auction rights, ownership and production sharing, royalties, export taxes, import taxes, and company income taxes.

4.4.1 Tax on rents

The government can use different ways to divert economic rents of the resource industries for public use (Boadway & Flatters 1993). According to Boadway and Flatters (1993:11), a suitable rent tax is a tax on the net cash flow per annum of resource firms. In case of non-renewable resource firms, the base would include all revenues on a cash basis less all current and capital costs, including the cost of acquiring resource properties, exploration expenses, development and any processing expenses incurred by the resource firm (Boadway & Flatters 1993:7). For renewable resources, similar costs can be deducted, including costs of property rights, harvesting costs, any renewal costs such as replanting or restocking as well as processing costs done by the firm.

Resource rents are taxed over and above the levies that are implicit in general income taxes. The move is justified on two grounds. First, resource rent taxes are said to be efficient and non distorting (Boadway & Flatters 1993:11). Second, property rights to resources ought to belong to the public rather than to private individuals since they represent the gifts of nature rather than a reward for economic effort.

Tax on rent is a tax on the company's supra profit. The economic rent tax affects only the economic profit of the company and it does not affect economic behaviour (Boadway &

Flatters 1993:11). According to Nellor (1995:239), the resource rent tax "efficiently captures a share of natural resource rent which is the return over and above the company's cost of capital". Natural resources are normally obtained at no cost. Natural resources should benefit everyone. It would be fair to have those who own natural resources to share the benefits of owning natural resources with others by paying taxes. Resource rent tax is imposed only if the company's accumulated cash flow is positive. Negative cash flow is accumulated at an interest rate until a positive figure is attained, only then can a tax be imposed again. The government may not receive revenue from less profitable projects (Sunley & Baunsgaard 2001:5).

The resource rent tax provides automatic stability in the tax system as revenue is linked to profitability. The disadvantage of the resource rent tax is that it can discourage exploration as investors know that they will be highly taxed for highly successful projects and no compensation will be received for unsuccessful projects. The resource rent tax reduces expected exploration returns and distorts exploration decisions (Sarma & Naresh 2001:7). In cases where capital is tax deductible, the resource rent tax can encourage the excessive use of capital in the production process. The company can also decrease its rate of productivity so that it can pay a reduced amount in rent taxes.

4.4.2 Auction rights

Government can get a share of the resource rents by requiring firms to bid for the rights to exploit resources. In the case of non-renewable natural resources the bidding process will take place before the exploration stage. For renewable resources the bidding process can be done for a known number of resources. For such a system to work properly the property rights obtained must be continuous. If property rights are not continuous, operators would be encouraged to extract the resources inefficiently, that is, should the resource operators feel that they are given a limited period to do their business, they will rush the exploitation of resources and this could result in inefficiency (Boadway & Flatters 1993:45). Under the auction process the right to extract natural resources is put forward for everybody to contest and those with the best bids or those who are prepared to pay the highest price can get the right to extract natural resources.

The auction process can only work for the government if the natural resources in question are in the hands of the government. In cases where the resources are in private hands the auction process can benefit only those who own the resources in question. For the auction process to operate efficiently there should be enough competition. Without enough competition the government will not be able to capture enough resource rents. Competition may be difficult to achieve in some instances because of differences in information about the size and quality of the resource in question (Boadway & Flatters 1993:28). The auction process will not work if the resources are common property and land is abundant. Resource users will simply move

from one piece of land to another instead of paying for the right to use the land.

The advantage of the auction process is that payment is made upfront at the beginning of the extraction process. The auction system may yield little revenue if the investors feel that fiscal rules may be changed once the operations begin (Nellor 1995:238). The auction process can generate substantial amounts of income for the government. The disadvantage of the auction system is that those people from the marginalised societies who cannot afford to buy the right to extract resources will be left out of the process.

4.4.3 Ownership and production sharing

A direct way in which government can appropriate resource rents is to buy equity in the firm. The government may contribute to a share of the costs and claim an equivalent share of the equity. This would be equivalent to a cash-flow tax. The public sector would have to identify both the cash costs and the revenue accruing to the relevant operation of the firm (Nellor 1995:240).

In some countries governments insist on the acquisition of some share in the project without paying a fair price. Equity holding gives the government some ownership and control over natural resources and it also gives the government a sense of participation in the economic development of the country. The problem with government taking ownership is that it exposes itself to risk.

If the government takes equity positions in resource industries, it follows that some funds can be diverted from priority projects towards the funding of resource industries. If the government borrows from abroad to finance its equity acquisitions, there will be a time when the government will be required to pay back the interest even though it did not get any dividends from the project. Government equity can lead to conflict between the roles of the government as a shareholder and a regulator. As a shareholder the government will want to maximise returns from its investment and as a regulator it will want to ensure that the company complies with all government regulations (Nellor 1995:240).

The government can also attempt to tax resource rents through some form of direct participation in resource exploitation. This can be done through production sharing. Production sharing can take place in the form of the government receiving a certain proportion of the output and then selling it. Production sharing can also occur by leasing a resource deposit in return for a portion of the sales revenue (Boadway & Flatters 1993:34). In agriculture, production sharing is called crop sharing when the landowner allows the tenant to farm a piece of land in return for a share of the crop produced. Production sharing schemes are subject to negotiation and therefore the proportion of sharing varies from project to

project. It is inefficient and unfair because resource operators who do not have enough bargaining power can end up having much government interference in their operations (Boadway & Flatters 1993:50). Another type of sharing arrangement is profit sharing (Boadway & Flatters 1993:34). Under the profit sharing arrangement the government will collect income from resource firms in the form of dividends. If the government buys its shares, it will take risks like any other investors. If the firm makes a profit, the government will also gain and if a loss is incurred, the government will also suffer.

4.4.4 Royalties

Government can also use royalties to extract income from resource firms. Royalties are also called severance taxes, when a resource is non-renewable, and a stumpage fee in forestry. The attractive part of a royalty system is that it is simple to administer (Sunley & Baunsgaard 2001:2). These levies have been seen less as a form of tax than a fee charged for removing resources from public lands (Boadway & Flatters 1993:38).

The revenue-based royalty system, which includes severance and stumpage fees, taxes revenue with no account for costs. As such it acts as a disincentive for investment and extraction of resources and generates less income for the public sector than could be generated by a rent tax (Boadway & Flatters 1993:37). Furthermore, since no account is taken of the costs, the royalty system discriminates against high cost revenue sources. This crude royalty system is generally known as high grading of the resources (Boadway & Flatters 1993:38). According to Boadway and Flatters (1993:38), the royalty system tends to over-estimate the economic rent derived from any business and creates a distortion by putting a wedge between the returns of marginal investments of different capital intensities. Capital-intensive projects will be neglected and projects needing little capital investment will be preferred under the revenue-based royalty system as companies get taxed before they can recover their cost of production (Boadway & Flatters 1993: 38).

The profit-based royalty system is viewed as a better measure of taxing resource firms than a revenue-based royalty system because it does not distort investment decisions. However, under a profit-based royalty system the government runs the risk of receiving little revenue or nothing from resource owners if the company runs at a loss (Nellor 1995:239).

4.4.5 Export taxes

Export taxes have been used as a major source of revenue in some primary-product-exporting countries. If the country is a price taker on the international market, an export tax has the effect of making the products of the exporting country uncompetitive. Export taxes will tend to increase the price of exports, thereby making the products unattractive to international

buyers. However, if these products were to be sold locally, then consumers will pay less for these products. Most countries have found that export taxes on resource products are regressive, for instance rubber in Malaysia (Boadway & Flatters 1993:49). The advantage of an export tax is that it gives domestic processors access to raw materials at a price that is lower than that faced by foreign processors.

According to Boadway and Flatters (1993:49), export taxes can be justified if the country has some monopoly power in the international market. The imposition of the export tax means that the exporting country will get more revenue because of the increase in the price. International competition has forced many countries to get rid of export taxes. Countries like Chile, Mexico, Poland, South Africa and Zimbabwe do not levy export duties on minerals (Otto 2000:8).

4.4.6 Import taxes

Countries can also use import taxes as a way of deriving income from foreign natural resources. Import taxes can increase the price of foreign-produced resources and make them unattractive to the domestic consumer. This can boost domestic production and sales for the locally produced natural resources. Import taxes can spark retaliation and everyone can end up being worse off. Resource sector firms rely on imported capital and intermediate inputs for their operational, development and exploration activities. Import duties are an important, timely and relatively stable source of government revenue from the resource sector (Nellor 1995:238).

4.4.7 Company income taxes

Resource taxes are the overall system of taxes that reduces the income of businesses. The tax system includes direct taxes like company taxes and indirect taxes like sales tax and excise taxes. The aim of company income taxes is to tax capital and personal income of residents and where possible of non-residents earning income within the boundaries of the taxing country. In most countries company income tax treats resource industries more favourably than other industries. The intention is to attract investment into the natural resources sector. Resource industries, especially mining, are capital-intensive and many investors are reluctant to take the risk. Therefore government efforts are needed to attract investors into this risky industry. The mining industry has a finite life-span. The finite life-span can be a deterrent to investment and therefore the tax system must be more favourable (Otto 2001:4-6).

The income tax base is profit which requires the matching of expenses with income. A number of countries promote the development of the mining industry by allowing exploration and development costs to be deducted for tax purposes. Different governments also make

provision for accelerated depreciation allowances as a way of promoting the development of the mining industry (Sunley & Baunsgaard 2001:3).

In Canada, for example, there is a 100 percent depreciation allowance for mining equipment. In Argentina there is a depreciation allowance of 60 percent during the first year and 20 percent per annum during the next two years (Sarma & Naresh 2001:5). Huge capital outlays are incurred by mining companies during the exploration and development of mines and to compensate the mines, generous depreciation allowances need to be provided (Sarma & Naresh 2001:5).

The cost of production in the mining industry is prohibitive. To encourage investment in the resource industries, especially mining, the government can also introduce tax holidays for the first few years of production to allow the firms to recover their costs. For example, in Brazil eligible mining companies are given tax holidays of about ten years (Sarma & Naresh 2001:5).

In Canada a resource allowance of 25 percent is given as an additional deduction on the company's profit. Processing allowances can also be imposed. "These are simply additional deductions from the mining profits base" (Sarma & Naresh 2001:6). To enhance the viability of resource firms, the following additional deductions for calculating net taxable income can be made: feasibility study costs, pre-production exploration costs, development costs, operating cost, post-production exploration costs, interest on long-term debt, royalty payments, import duties on equipment, export duties, sales taxes on equipment and services, fees based on land area, payroll taxes and stamp duties (Sarma & Naresh 2001:5).

4.5 CONCLUSION

Natural resources tend to be overexploited because they are subjected to open access or are free-for-all resources. Some form of government intervention is required. We have focussed on taxation as an instrument. Reasons for taxing natural resources have been identified and these include: rent collection, capital income, conservation of resources, and exercise monopoly power in international markets, limited life-span and capital intensity.

Various types of instruments to capture resource rents have been identified, including: tax on rents, auction rights, ownership and production sharing, royalties, export taxes, import taxes and company income taxes. From the above investigation, the following should be considered when resource rents need to be captured. The most efficient way to tax is to levy an economic rents tax because a tax on rents does not disturb economic behaviour. In other words, an economic rents tax is efficient. Despite this, income tax remains the most popular. Royalties are also favoured because of their administrative simplicity.

It is not enough to understand the economics of natural resources and the taxation of natural resources. Since the focus of this dissertation is gold mining taxation, we need to get a more focused view on mining taxation. Therefore, the international experience of mining taxation is the subject of the following chapter.

CHAPTER FIVE

TAXATION OF MINERALS AND INTERNATIONAL EXPERIENCE

5.1 INTRODUCTION

The taxation of industrial minerals varies greatly from country to country. Industrial minerals or minerals refer to geological materials which are mined for their commercial value and exclude mineral fuels (Wikipedia 2005). In each country there exist a number of levies which affect the operation of the mineral sector at the prospecting stage, exploration stage, trade stage or final consumption stage. The mineral sector is a very high-risk and capital-intensive sector. There are long gestation lags involved in prospecting and extraction. The prices of most minerals fluctuate, which makes the operation of a mine a risky endeavour (Sarma & Naresh 2001:2). In countries like Namibia and South Africa, where the gold mining industry is taxed on a formula basis, marginal mines can operate for a long time and start paying taxes only once they become economically viable. Because of the high-cost nature of the mining industry, the South African government introduced what is called ring-fencing in the mining sector. The ring-fencing system prevents mining companies from deducting the costs of one mine against the income of another mine. The logic behind ring-fencing is the subject matter of chapter six.

In some countries mineral resources belong to the state. The state as a resource owner has a valuable asset in the ground. This mineral deposit can only be exploited once. The government can get a share of the resources, for example, by requiring mining concerns to pay taxes for the extraction of these resources (Sunley & Baunsgaard 2001:1). There is some conflict between mining companies and governments over the division of risk and reward for mineral development. Both parties want to maximise reward and shift as much risk as possible to the other party.

The purpose of this chapter is to examine the broad trends in the mineral tax practices around the world. In section 5.2 we will look at the differential treatment of mining. The discussion of the categories of mineral taxation around the world will fall under section 5.3. The conclusion will occupy section 5.4.

5.2 THE DIFFERENTIAL TREATMENT OF MINING

In chapter four, section 4.3, attention was given to the reasons for taxing natural resources. Much of that section and the reasons are applicable to mineral taxation. In short, government taxes mining for two primary reasons (Otto 2000:1), one is to raise revenue and the other is to guide taxpayer behaviour. While some countries treat different sectors the same, many minerals-producing countries treat mining different to other sectors. In an authoritative study entitled *Mining taxation in developing countries*, Otto (2000) provides a number of reasons which justify discrimination between, or the differential treatment of, mining and other sectors. These are (Otto 2000:3-4):

- The mining industry is a high risk sector.
- Significant amounts of capital goods are invested in the mining industry. In other words, the mining industry is highly capital intensive.
- The majority of minerals are non-renewable and therefore have a limited life-span.
- The prospecting and extraction of minerals result in long gestation periods. It takes a long time before the investor can reap rewards for investing in the mining sector.
- The mining industry is also prone to commodity price fluctuations, which make it a highly risky business.
- In countries where mineral ownership resides with the state, the mining industry exploits part of the country's heritage.

Sarma and Naresh (2001:4) also support the idea of treating the mining sector differently to other sectors but with some reservations. They argue that,

The special character of the mineral sector and the dual nature of the role of the government lead to a dilemma, whether taxation of the mining sector should be different from the general system in terms of rate structure and administration. Taxes of general application may not always be suitable for mineral companies involving high capital intensity and long-gestation lags. At the same time, exempting mineral companies from general taxation is administratively inconvenient and also against equity principles. Furthermore, it is difficult to prejudge whether exempting the mineral companies from general taxation and subjecting them to only special taxes would promote or detract from the neutrality of the whole taxation system. The distortions created by the special fiscal treatment of mining may not be equal to the distortions removed by the abolition of general taxes. The case for exemption is strong only when the general taxes are distortionary.

The differential treatment of industries or tax discrimination is a key element of tax policy. Tax discrimination is practised by most countries. In general terms, tax discrimination can be

defined as a situation whereby different tax-paying institutions are taxed differently. For the purpose of this section, we will define tax discrimination as the tax treatment of one class of minerals being different to another class of minerals (Otto 2000:17). Countries like Greenland, for example, do not discriminate between mines, but most other countries do. South Africa is a good example of a country that practices tax discrimination in the mining sector. The gold-mining industry is taxed on a formula basis while other mining entities that are not involved in gold mining are taxed at the company rate (Budget Review 2005:83, Budget Review 2006). In Namibia the gold, gas and oil mining industries are all taxed on a formula basis. However, for diamond mines the tax rate is 55 percent. On top of the 55 percent, diamond mining firms are required to pay an additional 10 percent in royalties to the government (Ministry of Finance (Namibia) 2005).

Tax discrimination can lead to economic inefficiency. As mentioned earlier no, person actual enjoys paying taxes. In order to try and pay as little tax as possible, investors may relocate their resources towards areas where low tax rates are charged. As more companies focus their attention towards less taxed areas, an over-supply and over-exploitation of the less-taxed resource may take place.

Table 5.1 shows the tax provisions that apply to the mining industry internationally and the reasons for them. One notes that the tax provisions are very unique and linked to the characteristics of the mining industry, for example exploration incentives.

Table 5.1 Special tax provisions for the mining industry and their reasons

Tax Provision	Reasons
Exploration incentives	Mining operations are normally preceded by a long and expensive exploration program. Exploration costs are incurred before taxable income is available and the government need to make special provision as to how pre-production exploration expenses are handled for future income tax purposes.
Mine development	The development of a mine is capital intensive and the company will need to import large quantities of different capital equipment from specialised suppliers. Many governments realise the capital intensity of the industry and provide various ways to accelerate the recovery of capital costs once production starts.
Equipment imports	In the case where the mining industry depends on imported equipment, the government can reduce the cost of importing machinery by removing import duty for the importation of capital goods. Some countries provide some sort of relief from

Tax Provision	Reasons
	value-added tax on equipment purchases, mainly if the mineral is destined for export.
Export sales	The majority of mineral products are destined for highly competitive export markets. Many countries impose low or no export duties on minerals and provide a means whereby value-added tax (VAT) on export sales is either not applied or applied in a way that allows for a refund or credit.
Commodity price cycle	Mines produce raw materials that are prone to price changes on a periodic, business-cycle related basis. Thus many governments allow certain type of taxes to be cancelled, usually royalties, by a designated government officer, for projects experiencing short-term financial difficulties and provide for the carrying forward of losses.
Post-production expenses	After mining ceases and there is no income, a mine will incur significant costs relating to the closure and reclamation of the site. The government normally requires the mine to set aside the funds for the closure and reclamation in advance and to provide some deduction for these set-aside funds against current income tax liability.
Stabilisation	Many mining projects will have a long life-span and firms will attempt to minimise their tax risk exposure by stabilising some or all of their relevant taxes for at least part of their life-span. Governments provide tax stability through a number of different legislated and negotiated approaches.
Negotiated agreements	When the level of investment is large, the government can enter into a negotiated agreement, including special tax provisions, with the mine that has the effect of supplanting general laws, including laws that address tax matters.
Ring-fencing	Most countries allow a company to consolidate books from all operations for determining income tax liability. In instances where negotiated agreements are in force, income from an operation governed by an agreement may be ring-fenced even though the general tax law does not impose ring-fence restrictions.

Source: Otto (2000:3-4).

According to Otto (2000:17), tax discrimination can be divided into tax discrimination by type of mineral, the scale of operations and the nationality of the miner.

5.2.1 Tax discrimination by type of mineral

Many developing countries tax different minerals differently. In some countries each and every mineral is taxed differently. For example, different minerals can be charged different royalty rates. In Namibia, for example, diamond mining firms pay royalties of 10 percent, while coal mining companies only pay 4 percent in royalties. In Ivory Coast the gold mining industry is charged a royalty of 3 percent while the copper mining industry pays 2.5 percent in royalties to the government. The South African authorities are proposing a royalty of 3 percent for gold, 4 percent for platinum, 8 percent for diamonds, 2 percent for coal, iron ore and copper (National Treasury 2003:8). The proposed royalty for industrial minerals is 1 percent. Until 1994 different company tax regimes applied to gold, diamonds and other mining companies in South Africa. The different royalty rates amount to tax discrimination. Tax discrimination can also take the form of grouping minerals together and then taxing one group differently from the other group. Typical groupings include: industrial and construction minerals, fertilizer minerals, precious metals, precious stones, base metals and non-petroleum energy minerals (Otto 2000:17).

To some extent, the level of discrimination may depend on whether the mineral is meant for export in highly competitive markets or is destined for a local market. For example, base metals are often taxed at a lower rate than low-value bulk commodities, like sand and gravel, reflecting the fact that the tax system for base metals is highly dependent on foreign investors who have many countries to choose from when making their investment decisions, compared to sand and gravel, where many local investors can play an active role (Otto 2000:18).

Governments may also adjust their tax system with the intention of imposing higher tax rates on mines that are perceived to produce highly profitable minerals (Otto 2000:18). Diamond mines for example pay a higher royalty rate in Russia than coal mines. The royalty rate in Russia is 8 percent for diamonds and 4 percent for coal mines.

5.2.2 Tax discrimination by size of operation

World wide companies, partnerships and sole proprietorships are taxed differently. Different countries use different criteria to identify small and big firms. In South Africa, it is the amount of taxable income that is used as an identifying criterion for small and large business operations. At the time of writing, a company that earned taxable income of less than R300 000 was classified as a small business and paid a rate of 10 percent on taxable income of more than R40 000. Firms that generated taxable income of more than R300 000 were identified as

big businesses and they therefore paid a tax rate of 29 percent (Budget Review 2006:74).

Otto (2000:18) notes that regardless of tax policy and law very few individual operators in developing countries pay taxes in the mining sector. The majority of individual operators in the mining industry are not registered for tax purposes and therefore are not known. Some of these sole operators may be operating illegally and taxing them is extremely difficult. It is also not easy to tax operators who operate in the informal sector. Most governments are struggling to effectively tax artisanal miners directly because of the reasons given above. Instead, attempts to tax the buyers of their products through various gold buyers and precious stones licensing arrangements has worked well in countries like Malaysia (in the case of tin buying), but the system can lead to rampant smuggling and tax evasion. The system has a tendency of pushing the bigger burden of the tax to the consumer.

For mining conglomerates, it has been the practice of many nations to enter into a negotiated agreement with the investor that addresses a lot of issues, including taxation. In some cases the agreement creates a unique tax system for that mine, which takes into account the perceived profit potential of the operation. Mining conglomerates are so influential in the economy that they can probably influence the authorities to act in a certain way when it comes to taxation. Although the question of bigness and smallness of a firm varies from country to country and even though it is not easy to pinpoint a small firm and a big firm, the general practice in different nations is to tax so-called big firms differently from so-called small firms.

5.2.3 Tax system that discriminate by nationality

International mining firms are often treated differently to local mining companies through the provision of special tax terms provided in a foreign investment act or under a specially negotiated agreement. Firms that come from within a regional trading bloc often enjoy lower tariff rates or accelerated customs treatment. The same does not apply to investors outside the bloc. Examples of regional blocs are the Asia-Pacific Economic Forum (APEC), North American Free Trade Agreement (NAFTA), Southern African Development Community (SADC) and the Southern African Customs Union (SACU). Countries that have special relations often negotiate bilateral double taxation agreements, bilateral investment agreements and bilateral agreements that may reduce the level of withholding taxes and tariff rates (Otto 2000:18).

Tax discrimination by nationality in the form of regional blocs can promote regional growth at the expense of those nations that are outside the bloc. Regional blocs tend to reduce competition from the outside world and this can lead to increased consumer prices and inefficiency on the part of producers. Producers can decide to reduce production, thereby increasing the price of the product. Tax reduction for member countries can end up reducing

tax revenue for the individual governments. According to Appleyard and Field (2001:354), regional blocs can result in trade diversion, which refers to a situation whereby there is a shift in product origin from a non-member producer whose resource costs are cheap to a member country producer whose resource costs are higher. This shift represents a movement away from the free-trade allocation of resources and could reduce welfare (Appleyard & Field 2001:354).

5.3 CATEGORIES OF MINERAL TAXATION AROUND THE WORLD

The different categories of mineral taxation (Otto 2000:5-13; Sarma & Naresh 2001:4-9) are: income tax, withholding taxes, resource rent tax, import and export duties, stamp duty and property taxes, fixed fees, royalties, production sharing and equity sharing, auctions and sales taxes. In this section we will briefly discuss the existing mineral levy systems in selected countries with a view to identifying the commonly used fiscal instruments. The discussion will be limited to the following mineral-producing countries: Argentina, Australia, Brazil, Canada, Chile, China, Indonesia, Papua New Guinea, South Africa and the United States of America. These ten countries contribute significantly to the world mineral production and their practices can be regarded as a benchmark (Sarma & Naresh 2001:4). The discussion here is mostly based on the work of James Otto from the Colorado School of Mines and Sarma and Naresh from the National Institute of Public Finance and Policy, India, who extensively researched mining taxation worldwide. In addition, an authoritative study on mining taxation was undertaken for United Nations Conference on Trade and Development (UNCTAD) by Otto, Beraun and Cordes and published under the title *Global Mining Taxation Comparative Study* in 2000.

5.3.1 Income tax

Income tax is the most important type of mining taxation levied by governments. It is levied as part of the government's general power to tax. The income tax system is normally made up of a basic rate structure, provision for deductions of certain items from the tax base and tax incentives (Sarma & Naresh 2001:4).

5.3.1.1 The basic rate structure

The basic rate for mining firms is normally a single rate. However, in some countries multiple rates are used. In Brazil, for instance, small companies, including mining companies, can elect from many alternatives. In Chile, small-scale miners are subject to a single tax which is withheld by buyers of those mining products, based on the percentage of the net price of the mining products. In countries like Canada and the United States of America, where federal systems are in existence, mining companies are normally liable for both federal and provincial

income taxes. The overall corporate income tax rate in several countries ranges from 17 percent in Chile to 35 percent in Argentina. In China, mining firms pay an income tax of 33 percent, 30 percent of which goes to the central government and 3 percent to the provincial government (see table 5.2).

Table 5.2 Income tax rates applied to mining projects in selected jurisdictions for 2005

Country	Corporate income tax rate
Argentina	35%
Australia	30%
Brazil	25%
Canada	22.12%
Chile	17%
China	33%
Indonesia	30%
Papua New Guinea	35%
South Africa	29% (2006)
United States of America	35%

Sources: Budget Review (2006), Department of Finance (Canada) (2005), Heritage Foundation (2006), Otto (2000).

The South African tax formula for gold mines, not exempt from the secondary tax on companies is $Y = 35 - 175/X$, and in the case of gold mining companies opting to be exempt from the secondary tax on companies, the formula is $Y = 45 - 225/X$ with X representing the ratio of profit to revenue. The rate of non-mining income is 37 percent (South African Revenue Services 2005:10). The gold mining tax rate for the year 2006/7 did not change. The figures for the 2005/6 fiscal year still apply for the fiscal year 2006/7 (South African Revenue Services 2006). The South African gold mining formula will be discussed in chapter six.

Supplementary taxes in the form of higher rates of income tax and progressive profits tax can be used to supplement the general income tax on minerals. In some countries, the higher tax rates are applied progressively on a project-by-project basis. More profitable projects are taxed at higher rates than less profitable ones. Profits above a certain stipulated limit are taxed at a higher rate. The limit is determined in terms of capital invested. Whenever the profit-capital ratio rises above a certain threshold level, a higher tax rate is applied on additional profits (Garnaut & Ross 1983:95).

The progressive profit tax is used in countries like Australia, Brazil, Canada, Indonesia, Papua New Guinea, South Africa and the United States of America and it has been applied to the

copper, gold and silver mines of Bougainvillea Copper Limited of Papua New Guinea. In Brazil taxable profits up to BRL 240 000 are taxed at a rate of 15 percent. Profits above that amount are taxed at 25 percent (Sarma & Naresh 2001:7).

The progressive profit tax is clearly linked to the profitability of the firm. This means that there is lower risk to some investors than applying the same higher tax rate to all mining companies. The progressive profit tax has the administrative advantage over some other profit-based taxes, as it can use existing tax legislation without much modification. The biggest advantage of levying higher rates of income tax is that there is no need to design and levy special taxes. The existing income tax can be used (Garnaut & Ross 1983:96). Mining income tax has the advantage of sharing the risk, which the majority of mining firms prefer and is better than a fixed fee or a royalty system (Sarma & Naresh 2001:6). However, income tax administration is more complicated and the determination of the tax rate is complex.

5.3.1.2 Depreciation allowance

The provision of tax depreciation allowances for the wearing-off of machinery and buildings is common in taxation and is very important in the mining sector. Because of the huge capital outlays during the exploration and development phases of mines, there is need for a generous depreciation allowance so as to increase the viability of the mining industry (Sarma & Naresh 2001:5). Several countries allow accelerated depreciation for machinery used in the mining industry. Otto (2000:13) notes that the high capital intensity and large equipment expenditure of the mineral sector affects the profitability of the mine during the early years of investment. Many governments recognise the capital intensity of the mining industry by allowing the taxpayer to claim large depreciation deductions in the early years of investment. In Argentina 60 percent of infrastructure can be claimed in the first year and 20 percent per annum during the next two years. In Canada there is a 100 percent depreciation allowance, also called full-expensing for equipment used in new mines (Sarma & Naresh 2001:5). In South Africa and Zimbabwe, capital equipment can be expensed in the year incurred or the first year of production. Failure to provide depreciation allowances for highly capital-intensive industries like mining can increase the cost of production in the resource industries. The problem with depreciation allowances is that the total amount of government tax revenue is reduced.

5.3.1.3 Tax incentives

Mining companies are given special incentives, such as resource and processing allowances, foreign re-investment allowances and re-investment deposit allowances. Other tax incentives

used are tax holidays and tax credits for research and development. Company losses are allowed to be carried forward or backward for a number of years.

Canada is one of the countries where resource and processing allowances exist. These are just additional deductions from the mining company's profits. Resource allowances are calculated at 25 percent of defined resource profits. The main purpose for granting processing allowance is to ensure that mining tax will fall only on profits from the extraction of the ore and not on profit from associated mineral processing operations (Sarma and Naresh 2001:6).

China has one of the most attractive tax policies for attracting foreign investors to the mining industry. If foreign investors use profits from their company to reinvest in the mineral enterprise or to launch another foreign-funded mining company with a five-year operation period, 40 percent of the income tax paid is returned to the investor (Sarma and Naresh 2001:6). The problem with tax incentives is that government revenue can decrease and the tax base is eroded. Tax incentives of the China type can also lead to an over-concentration of industries in the mining sector and this can lead to an early exhaustion of natural resources (Sarma & Naresh 2001:6).

5.3.2 Withholding taxes

Bishop (2004:277) defines a withholding tax as a “tax that is collected at source, before the taxpayer has seen the income or capital to which the tax applies. In other words, that part of income or capital due in tax is withheld from the taxpayer, who therefore cannot easily avoid paying the tax. Withholding taxes are frequently imposed on interest and dividends”.

Withholding taxes are relevant for tax harmonisation purposes across countries. Many countries tax the world-wide income of companies and allow foreign tax credits on the domestic tax liability. Investors in these countries would like to have the host nation's income tax system harmonised with their system to keep the administration simple. High withholding taxes on expatriated profits severely affect the viability of investment decisions. Double taxation agreements mitigate the burden to some extent (Sarma and Naresh 2001:6).

According to Otto (2000:9), withholding taxes can be divided into withholding taxes on remitted dividends, withholding taxes on foreign loan interest and withholding taxes on foreign services. Many countries impose a dividend withholding tax. Otto (2000:9), argues that dividend withholding taxes can be used to encourage reinvestment. In South Africa, a dividend withholding tax is imposed in the form of secondary tax on companies (STC). The secondary tax on companies is currently 12.5 percent (Budget Review 2006). China imposes no dividend withholding tax. In Indonesia, a dividend withholding tax of twenty percent is imposed. A dividend withholding tax can be detrimental to investment in the sense that

investors may consider investing in countries where a dividend withholding tax does not apply or where a lower dividend withholding tax applies (Sarma and Naresh 2001:6). In other words, the tax distorts investment decisions and is therefore non-neutral (see section 3.3).

Many countries levy a withholding tax on interest payments made by mines to foreign lenders. Withholding taxes on foreign loan interest are normally used to encourage domestic borrowing and strengthen the domestic lending industry. The effect of this tax is weakened somehow by the common practice of allowing interest payments to be deducted for the purpose of determining taxable income. Countries like China, Papua New Guinea and South Africa do not impose withholding taxes on interest payments. On the other hand a withholding tax on interest payments of 20 percent is imposed in Indonesia and 4 percent in Chile (Otto 2000:11).

Withholding taxes on foreign interest payments have the tendency to protect domestic producers at the expense of domestic consumers. In fact, the impact of a foreign-loan-interest tax is the same as an import tax. Foreign-loan-interest withholding tax can lead to an excess demand for loans in the domestic economy. If borrowers have little choice, there will be a rush for domestic loans and the interest rate for domestic loans can increase. Withholding taxes on foreign loan interest can benefit the lender at the expense of the borrower (Otto 2000:10).

In cases where the economy is not big enough to offer credit for the buying of capital goods, a tax on foreign loan interest can lead to a decrease in capital accumulation and investment as the investors will find it expensive to borrow from the outside world (Otto 2000:10). At times the investor can be forced to borrow from expensive domestic sources. Even though foreign-loan-interest withholding taxes are inefficient, they can increase government revenue.

A study by Otto (2000:10) shows that many mining companies use the services of foreign employees to undertake different tasks, like surveying and marketing. The government can decide to impose withholding taxes on services provided by foreign contractors so as to encourage the use of domestic services. China and South Africa are among the countries that do not impose withholding taxes on foreign services. In Chile a withholding tax on foreign services of 20 percent is imposed. Papua New Guinea imposes withholding taxes on foreign services of 15 percent (Otto 2000:11).

Not all countries have all the resources needed for economic development. Developing countries, for example, depend on technology, skilled labour and technical services from the developed world. Withholding taxes on foreign services that are levied by developing countries can reduce the transfer of technology, skilled labour and advanced services from the developed world to the developing world. A withholding tax on foreign services by one nation

can also lead to retaliation by other nations and everyone will end up being worse off. Foreign services withholding taxes are not fair because they discriminate against different countries (Appleyard & Field 2001:354).

5.3.3 Resource rent tax

A resource rent tax can be used to capture mineral rents that are not collected by royalties and help fiscal stability by linking revenue to profitability. The taxation of resource rents is well covered in the previous chapter, section 4.3.1. In this section only a brief discussion will be given.

Economic rent can be defined as a surplus value created during the production of a good or service due to ownership of a fixed factor of production or due to the ownership of a factor of production that is in limited supply (Foldvary 2000:2). In many economic activities it is not possible to generate economic rents. Thus, for example, if the saw-miller could sell sawn wood for far more than the cost of production and thus earn an economic rent from that production, other producers would soon enter the market and drive the product prices down until the surplus disappears. However, if that activity was dependent upon a fixed factor of production, for instance good quality land, then other producers could not enter that particular part of the market and drive down prices, and the economic rent would persist. The classic example of an economic rent is land rent. Land supply is generally fixed and land costs nothing to produce, yet with the addition of other inputs land can be made to produce outputs that are far higher in value than the total cost of the inputs. When economic rent is taxed, the quantity of land available does not change. The economic rent tax levied will not be passed on to the tenant, since the payment of rent does not change the supply or demand for land (Foldvary 2000:2). On very productive land or land in favourable locations, the economic rent is higher while more remote or less productive areas generate less economic rent (Batt 2002:1). Rent is thus referred to as a specific kind of income received by the owners of land and other gifts of nature or natural resources. Natural resources are obtained at no cost and hence the income that they generate is known as economic rent. Owners of natural resources receive rent because of the special qualities of natural resources. Rent is thus a payment received for special advantages of any sort. Natural resources are said to generate rents for their owners and therefore these rents need to be taxed. Economic rent shows the surplus paid to any factor of production over its supply price. Economic rent is the difference between what a factor of production is earning and what it would need to earn to keep it in its current use and is the amount a factor of production is earning over and above what it could be earning in its next best alternative use (Garnaut & Ross 1983:3).

Under the progressive profits tax system, projects with different time sets of cash flows are taxed differently, even if their net present value is the same. This is against the principle of

horizontal equity of taxation and it is therefore unfair. The resource rent tax is imposed once the accumulated cash flow becomes positive. It captures the share of the mineral rent which is the return over and above the company's cost of capital. All the cash inflows and outflows are added together to get a net inflow amount. The net cash flow figures are accumulated each and every year at an interest rate until a net positive figure is obtained. The amount is then taxed at a certain tax rate. As long as the accumulated values are positive, tax is levied. If the net cash inflows turn out to be negative in the following year, then the taxation is halted until the figure becomes positive again (Garnaut & Ross 1983:98).

The resource rent tax takes into consideration the cost of production, including all the opportunity cost, and it therefore does not distort investment. The fact that the resource rent tax is linked to profitability means that it can automatically stabilise government revenue (Garnaut & Ross 1983:3). Despite the fact that the resource rent tax sounds attractive, it can still discourage exploration because investors know that they will be taxed on highly successful projects but they will not be compensated for unsuccessful ones. The resource rent tax can reduce the expected return from exploration and this can in turn distort exploration decisions (Sarma & Naresh 2001:7).

The resource rent tax can encourage companies to make use of excessive capital or to reduce their productivity so that the amount of tax paid can be minimal. The biggest advantage of economic rent taxes is that no excess burden is created. Taxes on income, goods, and transactions do have an excess burden because by raising the price and reducing the quantity of goods, resources do not get allocated to where the people most want them. Taxes on labour and goods raise prices, while rent-based payments do not affect the rent, and they lower the price of land, rather than raise the price of land (Foldvary 2000:2).

The resource rent tax is currently in use in the petroleum, gas and metals industries of Australia, Papua New Guinea and Tanzania (Sarma & Naresh 2001:7). In these countries, a resource rent tax is used as a supplement to the general company taxation (Sunley & Baunsgaard 2001:5). The problem is whether to impose company taxation first or a resource rent tax. If a resource rent tax is levied before corporate income tax, then it can be treated as a deductible cost for the calculation of taxable income. On the other hand, if resource rent tax is levied after the company profit tax, the payment of company profit tax can be treated as a cash-outflow for the purpose of assessing the resource rent tax (Sarma & Naresh 2001:8).

5.3.4 Import and export duties

Mining is capital intensive and utilises specialised equipment that is usually imported. Import duties on equipment can have a negative impact on the feasibility of the project during the early years. Even low levels of equipment import duty can sink marginal mines (Otto 2000:7).

In most countries the importation of equipment is exempted from import taxes and this can be an advantage to the mining sector as the sector depends on imported capital equipment and intermediate inputs for its exploration, development and operational activities (Sunley & Baunsgaard 2001:10). In Argentina, mining companies are exempted from import duties on all capital equipment. In Australia a rate of 5 percent is paid for most imports of capital goods. An exemption can be granted if the importing company can prove that there is no substitute product in Australia. In Canada and Brazil, most mining equipment is exempt from import duties (Pimentel 1999). The authorities in Chile levy an import duty of 10 percent for the importation of all mining equipment. In Indonesia, exemption for equipment is given for the first ten years and thereafter an import duty of 20 percent is imposed on capital equipment and spares (Sarma & Naresh 2001:8).

South Africa does not levy import duty on mining plant and equipment imports. In China mining equipment may be exempted for Sino-foreign joint ventures and Sino-foreign cooperatives. The type of machinery used in the mining industry is very complicated and most developing countries do not have the capacity to manufacture such machinery. If the intention of the government is to raise revenue, then import duties can play a bigger role because of the importance of imported capital goods in resource industries (Nellor 1995:241).

A study by Otto (2000:8) shows that in the past, governments commonly imposed export duties on raw materials. In addition to acting as revenue generating device, export duties were used as a means to encourage value adding to the raw materials. With increased global competition, most countries have eliminated or zero-rated export duties on minerals regardless of the degree of processing. In cases where the supplier is a monopolist on the international market, export taxes can lead to more revenue being generated and an increase in economic growth. Countries like Argentina, Brazil, Canada, Chile, China, South Africa and the United States of America do not impose export duty on mineral products (Otto 2000:8).

5.3.5 Stamp duty and property tax

In the mineral sector, stamp duty is applicable for mining leases or property transfers. The rate of taxation varies from country to country and within countries it also varies from province to province. In countries like Argentina and China a stamp duty of 1.0 percent is normally levied. Brazil, Canada and the United States of America offer an exemption. In Chile there is no stamp duty at all (Sarma & Naresh 2001:8).

Property tax is normally charged by local authorities on land and properties for municipal services rendered. In the United States of America a rate of 1.5 percent is charged for

properties. In Argentina, the property tax of 1.0 percent is levied on all property, including mining property (Sarma & Naresh 2001:8). Different jurisdictions tend to levy different property taxes. Differences in property taxes can lead to people and businesses relocating towards low property tax jurisdictions. Mining property is an immobile tax base which can easily be exploited and even over-exploited by local governments.

5.3.6 Fixed fees

Most developing countries impose fees for the application and issuance of documents relating to exploration and mining. In most cases these fees are low and are designed to generate revenue for administrative purposes. High fees may be imposed to discourage speculators (Otto 2000:9).

A fixed fee is normally charged for the use of the land specifically for mining. A prospecting fee is charged for mineral exploration and a mining fee is levied for the extraction of the mineral. In Australia, prospecting licence fees are applied more to the gold mining industry than other minerals. In Brazil, prospecting licence fees are negotiable and in case of no agreement the court can decide the amount of prospecting fee to be paid by the prospective investors. Canada levies a one-off prospecting fee which is integrated within the mining lease fees. The number of hectares mined determines the amount of prospecting fees to be levied in Chile (Sarma & Naresh 2001:8). Mineral licence fees are levied upon the successful exploration of the mineral. Chile charges an annual fee based on the number of hectares in addition to the legal fee paid on request for concession. Argentina and Brazil levy no mining licence fee (Sarma & Naresh 2001:9).

A fixed fee is suitable when the government has no idea of the value of the mineral to be extracted and if it is hard to pre-assess the value of the mineral in the ground. The advantage of a fixed fee system is that it is easy to administer. High fixed fees can reduce the profitability of the company if revenue inflow declines. A fixed fee can also be seen as an increase in the company's fixed cost of production which can decrease the profit earned by a company (Garnaut & Ross 1983:91).

5.3.7 Royalties

According to Cawood and Macfarlane (2003:214) a royalty is a "payment to the holder of the mineral rights when minerals are extracted from the land and sold on the markets". In countries where the private ownership of mineral rights is not allowed, royalties are payable to the state. Private sector royalties are higher than government royalties because, in the words of Cawood and Macfarlane (2003:214), "government royalties must support the national objective and still compete with the policies of other countries seeking investment."

A study by Cawood and Macfarlane (2003:214) indicates that royalties were popular as a rent collection instrument before Second World War. Since then, different governments have switched their policies towards profit-based tax systems. Revenue-based royalties can have a significant impact on the profitability of the mining company. Royalties are also a good policy instrument. For example, in the United States of America the government promoted the exploration and development of new mining ventures by forfeiting mineral royalty payments. Due to environmental considerations, the government also imposed royalties on state land to discourage further mining activities in those environmentally degraded areas. Revenue-based royalties are good for mineral rights owners because they ensure that even if the mining company runs at a loss, the mineral rights holders will get some compensation for the mineral extracted. Revenue-based royalties can also lead to a stable flow of income as they do not depend on company profitability.

Otto (2000:6) argues that over the past century, there has been a trend to de-emphasise tax systems that are revenue-based and to instead implement taxes that are profit based. Some countries have eliminated royalties entirely, while others have reduced their importance. Chile is one of the countries that does not levy royalties on minerals. While the trend has been to move towards profit-based taxes, countries like Argentina, Australia, Brazil, China, Indonesia, Papua New Guinea and the United States of America still retain revenue-based royalty taxes (National Treasury 2003:7). One of the reasons for using revenue-based royalties is the issue of patrimony. In most countries minerals belong to the state. If the company extracts the state's resources, the state may deem it necessary to demonstrate that it has received something in return for its lost minerals. Mining companies do not always generate taxable profits, and thus there is no guarantee that the state will receive any profit-based taxes for its lost minerals. Many developing nations impose revenue-based royalty systems, thus ensuring that whenever a mine extracts the state's resources, the state receives at least some nominal payment. Royalties are simple and easy to administer (Sarma & Naresh 2001:9).

Ad valorem or specific royalties, levied on the value of the product or on the quantity of the product are also levied on mining activities as a way of deriving revenue for government use. In the case of a specific tax, the tax base is the quantity produced which is easy to check. Royalties deter investments less than does a fixed-fee system. However, royalties tend to increase the cost of production and reduce the rate and pace of extraction of the mineral (Sarma & Naresh 2001:9). Some deposits will be left in the ground although their price exceeds the cost of production. To reduce distortions, a royalty applied on a sliding scale is recommended whereby less productive mines pay fewer taxes in royalties (Sarma & Naresh 2001:9). A sliding-scale royalty system may also be inefficient because it can lead to delays in extraction as a means of tax avoidance. In South Africa there is no royalty system in place at present. The proposed royalty system is still under discussion. In Australia, the royalty rate is

2.5 percent for gold and 7.5 percent for diamonds. The Chinese authorities levy a royalty of 4 percent for gold mining and also 4 percent for diamonds. The Indonesian royalty system taxes diamonds at 10 percent and gold at 1.0 percent (National Treasury 2003:8).

5.3.8 Production sharing and equity sharing

The first type of production sharing is where the investor pays the government with a portion of its products. The government can then sell the product (Garnaut & Ross 1983:101). The other type of production sharing is whereby the government allows the investor to recover exploration, development and operating costs, including depreciation, before they can share any products. A production sharing system is less risky because it does not require the government to buy some equity in the firm (Sarma & Naresh 2001:9).

A high production sharing system is like a duty at a very high rate and it can discourage the extraction of the mineral deposit and can also lead to the extraction of high grade ores at the expense of the low grade ores. If the government buys some equity in the resources firm, then the government exposes itself to risk, for it will have to share in the losses and gains of the firm. The liquidity of the company will be better if, instead of paying taxes, the government is allowed some equity in the company (Garnaut & Ross 1983:103). Government equity can lead to a decrease in the amount of tax revenue collected from private companies (Sarma & Naresh 2001:9). Production sharing and equity sharing is practised in Indonesia, Papua New Guinea, Tanzania and Zambia (Sarma & Naresh 2001:10).

5.3.9 Auctions

Income from mineral resources can also be generated by auctioning the right to exploit resources. The auction process involves the selling of the rights to exploit minerals to investors. Maximum income from the auction process can be generated only if there is high competition among the bidders. The biggest advantage of the auction process is that the government can get income upfront before any production can take place. The government is guaranteed some income even if the investor were to run a loss (Boadway & Flatters 1993:23).

For the government to benefit from the auction process, the mineral resources must be in the hands of the government, otherwise the income generated will fall in the hands of the private resource owners. The disadvantage of the auction process is that it can affect the viability of the project due to the fact that the company pays out money before any income can be generated. The auction system also exposes private resource developers to political risk arising from at times inconsistent behaviour on the part of the government. After collecting some income through the auction process, the government can be tempted at some later stage

to alter the terms of the original lease (Boadway & Flatters 1993:30). Such changes may include the confiscation of previously negotiated exploitation rights. The government can also be tempted to impose windfall profits if it feels that the mining company is making excessive profits.

In order for the government to maximise the proportion of rents it is able to collect from an auction system, it is important that all the terms of the lease be specified as clearly and irrevocably as possible at the beginning. This applies especially to conditions under which the lease might be altered or terminated, the nature of the tax and the way in which future disputes might be settled. Auctions are seldom used as means of taxation in developing nations because of the unwillingness of governments to enter into long-term lease agreements with resource developers (Boadway & Flatters 1993:30).

The auction can yield 100 percent of the expected value of the rents to the bidder, whereas an income tax cannot guarantee 100 percent income (Boadway & Flatters 1993:45). Under the auction system, the firm is forced to bear the risk associated with resource exploitation, whereas with the cash-flow tax the public sector shares the risk. The public sector is better able to pool or spread the risk. The auction system may be inefficient if the bidding process is not competitive. If the auction requires firms to bid not only on a once and for all payment but also on a future royalty payment, the outcome will not be efficient, since the firm will be encouraged to behave inefficiently in the future. Auctions are a theoretical category and they are seldom practised in any country (Boadway & Flatters 1993:30).

5.3.10 Sales tax

Sales tax and similar indirect taxes, like excise tax and royalties, adversely affect the price of the mineral product. In competitive environments, the development of certain ores can be hindered. Sales taxes hinder the development of the mine by adding to the production cost, increasing the risk and discouraging investment (Sarma & Naresh 2001:8). Sales taxes encourage the mining of high-grade ores and the neglecting of low grade ores, which will shorten the life-span of the mine, with a consequent shortened period of revenue flow to the host country.

Most countries abstain from levying sales tax not only on mineral ores but also on the inputs and equipment used in mining. In Argentina, Brazil, Chile, Indonesia and Papua New Guinea local purchases of mineral ores are not taxed (International Bureau of Fiscal Documentation 1993). In Australia, inputs used on the mine site are exempt from sales tax. In Canada, local purchases of equipment used in mines are exempt from sales tax, while sales of ores attract a provincial tax of 7 to 10 percent.

Value-added tax (VAT) is becoming common worldwide, but some nations have chosen not to adopt this taxation tool because of the paperwork required by both the taxpayer and the government (Otto 2000:12). Value-added tax is imposed on most purchases including capital goods and services. Value-added tax is a consumer tax and mineral exports must compete globally. In most value-added tax countries, most exports are zero rated including mineral exports. The imposition of value-added tax on imported capital goods and services can be a heavy burden on the mining industry, which relies on imported capital goods, and this can affect the growth of the mining industry (Otto 2000:12).

5.4 CONCLUSION

Government taxes natural resource sectors for two main reasons, to generate revenue and regulate taxpayer behaviour. The generation of revenue reason is more important than the regulation of behaviour. The majority of mineral-producing countries treat the mining sector differently to other sectors. The mining sector has characteristics that warrant a differential tax treatment. Some of the reasons that necessitate treating the mining sector differently from other sectors are that the mining sector is a high-risk sector, mining is capital intensive, limited life-span, long gestation lags, the proneness to commodity price fluctuations and the view that mineral resources are part of the country's heritage.

To increase the viability of the mining sector, government needs to intervene by making special tax provisions for the mining sector. These provisions include exploration incentives, mine development, equipment imports, export sales, commodity price cycles, post-production expenses, stabilisation, negotiated agreements and ring-fencing. Tax discrimination can be divided into discrimination by type of mineral, size of operation and nationality.

Different countries use different types of tax systems to harness revenue from the exploitation of natural resources. The most important types of mineral taxation include income tax, withholding taxes, resources rent tax, import and export duties, stamp duty and property tax, fixed fees, royalties, production sharing and equity sharing, auctions and sales tax. Resource rent taxes are preferred by economists because of their neutrality. Royalties are simple to administer but they can lead to inefficiency, especially if they are revenue-based royalties. Even though the trend has been to move towards a profit-based royalty system, there are a number of countries that still levy revenue-based royalties. Auctions are a theoretical category and they are practised in few countries, if any.

CHAPTER SIX

GOLD MINING TAXATION IN SOUTH AFRICA

6.1 INTRODUCTION

From 1875 to 2005 the taxation of gold mining in South Africa varied. For the period 1875 to 1935, the gold mining industry was mainly taxed on a flat rate basis and the rates were modified significantly from one period to another. From 1936 the formula system has been used to derive tax revenue from the gold mining industry and the formula has been modified from time to time. The aim of the formula basis of taxation is to encourage the mining of marginal gold ores with the intention of prolonging the life span of gold mines (Van Blerck 1992:C-5). Once marginal gold ores are bypassed, they cannot be recovered. The gold mining sector is an important industry in South Africa in terms of employment, exports and economic growth. The early closure of the gold mining industry could lead to economic hardships for different sectors of the economy that are linked to the gold mining industry in one way or another. The gold mining tax formula encourages the mining of marginal ores because the tax tunnel in the formula makes sure that not much is paid to the government in terms of tax revenue when the dollar price of gold is low.

This chapter starts by looking at the history of gold mining taxation in South Africa. This is will be done in section 6.2. In section 6.3 the gold mining tax formula used today will be discussed. The advantages and disadvantages of the gold mining tax formula in comparison to the flat rate tax will also be discussed.

The amount of tax revenue collected from the gold mining industry depends, among other things, on capital expenditure deductions allowed by the authorities. There is, therefore, a need to discuss the principle of ring-fencing in the gold mining industry and this is the subject matter of section 6.4.

The government intends implementing the royalty system for the gold mining industry in 2009. In the meantime we need to know the implications of the royalty system for the gold mining industry. It is also imperative to discuss the different royalty rates imposed by major gold-producing countries and compare those rates with the rate proposed for the South African gold mining industry. The discussion of the royalty system is in section 6.5, followed by the conclusion in section 6.6.

6.2 GOLD MINING TAXATION: 1875-1936

The first tax on gold mining was levied in 1875 at a rate of three shillings per fine ounce of gold (Van Blerck 1992:C2). A third of the tax went to the owner of the land and the government got two thirds of the tax. In 1885 a form of mining right known as *Mynpachtbrief* was introduced. Under the *Mynpachtbrief*, the gold mining sector was supposed to pay rental to the state for the right to mine in the country. The rental rates were very low and no significant revenue was generated.

In 1898 a direct tax of 5 percent was levied on the net profit of gold mines. The tax rate increased to 30 percent in 1899 but due to the Anglo-Boer war, the tax was never implemented. The tax rate was later reduced to 10 percent in 1902. In 1908, the government introduced a mining lease arrangement whereby the state leased mining rights to the miners in return for a share of the profits. The profit-sharing schedule was based on a sliding scale, based on the percentage ratio of profits to revenue. The government required a minimum share of 2.6 percent when the profit to revenue ratio was between 10 and 12 percent. At a profit to revenue ratio of 60 percent and above, the maximum share required by the government was 50 percent on net profits.

In 1910 the Union of South Africa was established and the Mining Taxation Act of 1910 was promulgated. In terms of the Act, the gold mining industry was taxed at a rate of 10 percent of net profit. The rate was reduced to 5 percent in 1917. The rate applied to all companies, mining and non-mining, to maintain uniformity in the economy. A dividend withholding tax of 10 percent for gold mining dividends was also introduced in the same year (Van Blerck 1992:C3). The aim of the gold mining dividend withholding tax was to encourage the reinvestment of dividends in the gold mining industry, thereby improving the economy.

In 1918 the lease formula was introduced. The formula was as follows:

$$y = a - (ab/x), \text{ where}$$

y represents the lease rate to be determined,

a represents the marginal lease rate,

b represents the portion of the lease-free revenue,

x represents the ratio of profit to revenue.

The formula implied that a tax rate of "a" percent would be payable but only if the profit exceeded "b" percent of revenue. The intention of the formula was to encourage the mining of marginal ores as the break-even point was lowered by the following factor:

$$z = (ab/100) / (1-(a/100)).$$

The above equation implies that, ignoring other taxes and minimum lease charges, a mine could extract ore yielding hundred pounds up to a cost of hundred pounds plus "z" and still break even after the lease, provided it remained in a lease-paying position (Van Blerck 1992:C3). This lease formula was the predecessor of the gold mining tax formula that was introduced in 1936.

In 1925, the gold mining withholding tax on dividends imposed in 1917 was abolished because the tax was a deterrent to new investment projects, which was contrary to what the authorities thought when they initially introduced the withholding tax. Van Blerck (1992:C4) notes that, between 1925 and 1935, the gold mining sector was consistently taxed at a higher rate than ordinary companies. The gold mining tax rate eventually increased to 20 percent. After the abandonment of the gold standard in 1932, gold mining profits increased due to price increases of gold. The excess profits attracted the excess profit duty, which was levied from 1932 to 1935. The situation worsened with the introduction of 10 percent surtax on taxable income before capital redemption in 1935.

In table 6.1 the formula effects were calculated assuming "x" is equal to 100 percent. The lowering of the pay limit is a function of "a" and "b". It is computed as: $(ab/100) / (1-a/100)$. Where the factor computed is for example 10 percent, this means that ore can be mined at an overall accounting loss without the mine suffering an after-tax loss, provided that the accounting loss does not exceed 10 percent and that the mine remains in an overall tax paying position (Van Blerck 1992:C-18).

6.3 TAXING GOLD MINING: 1936-2005

In 1936, following the recommendations of the Corbett Committee of 1935, a two-tier tax system was imposed on gold mining companies (see Van Blerck 1992: C-4 to C-5). The system provided for a basic tax at a rate of 15 percent and a formula tax which was derived from the lease formula discussed above. A "baby formula" for gold mines with taxable income of less than R400 000 was also introduced to help less profitable and new mines to survive. Decades later, the Marais Committee (1988:141) argued that the "baby formula" was insignificant and it was therefore not considered in the committee's investigations. The system

was based on the Namibian diamond tax system and it was regarded as a fair and efficient system, in the sense that it prolonged the lives of marginal mines (Cawood & Macfarlane 2003:216). The structure of the gold mining tax formula was as follows:

$Y = A - (AB/X)$, where

Y represents the tax rate to be determined

A is the marginal tax rate

B represents the portion of tax free revenue (the tax tunnel)

X represents the ratio of taxable income (profit) to total revenue

The tax rate "Y" is used to determine the amount of tax from gold mining income. The "B" factor represents the tax tunnel, in other words it is that amount of income that is tax free. As long as the taxable income ratio (X) is equal to or less than "B" percent of mining revenue, no tax is paid by the gold mining firm (Van Blerck 1992:D2). The factor "A" represents the marginal tax rate which applies on each rand of taxable income that is above the tax tunnel. The "X" factor is the ratio of taxable income to total income expressed as a percentage. As soon as the taxable income exceeds the tax tunnel, the gold mines pay tax at the marginal rate which makes the taxation of gold mines extremely progressive.

The basic tax rate of 15 percent was abolished in 1946 to avoid unnecessary complications when calculating the tax rate. It was also suggested that the abolition of the basic rate would encourage investment in the gold mining industry. The special tax levied during the war time on the gold mining industry was also abolished during the same year and the formula system then became the only way of gathering income from the gold mining industry. In 1946 the formula was: $y = 70 - (420/x)$, with the tax tunnel of 6 percent ($420/70=6\%$). Any amount outside the tax tunnel attracted a marginal tax rate of 70 percent. For gold mining leases granted after 28 February 1946, a 100 percent capital redemption expenditure was granted. All other gold mines were allowed a 20 percent amortisation of new expenditure (Van Blerck 1992:C7). Since 1946 the gold mining formula tax has been amended regularly. Table 6.1 summarises the history of the tax on gold mining.

Table 6. 1 History of gold mining tax formula in South Africa 1936-2005

Year introduced or amended	Basic formula factors $y=a-(ab/x)$			Basic formula effects				Surcharge	Formula/Surcharge Effect (Maximum average tax rates)				Non-mining company tax rate (%)
	a	b	ab	Tax tunnel	Marginal tax rate outside the tax tunnel	Maximum average tax rate	Reduction of ore pay limit		Tax tunnel	Marginal tax rate outside the tax tunnel	Maximum average tax rate	Reduction of ore pay limit	
1936	40	12.5	500	12.5%	40.0%	35%	8.33%	0%	12.5%	40%	35%	8.33%	8.75
1946	70	6	420	6%	70%	65.80%	14%	0%	6%	70%	65.80%	14%	20
1947	63	6	378	6%	63%	59.22%	10.22%	0%	6%	63%	59.22%	10.22%	20
1948	60	6	360	6%	60%	56.40%	9%	0%	6%	60%	56.40%	9%	20
1951	63	6	378	6%	63%	59.22%	10.22%	0%	6%	63%	59.22%	10.22%	22.50
1956	60	6	360	6%	60%	56.40%	9%	0%	6%	60%	56.40%	9%	22
1966	60	6	360	6%	60%	56.40%	9%	5%	6%	63%	59.22%	10.22%	40
1967 (1)	60	6	360	6%	60%	56.40%	9%	5%	6%	63%	59.22%	10.22%	40
1967 (2)	60	8	480	8%	60%	55.20%	12%	5%	8%	63%	57.96%	13.62%	40
1976 (1)	60	6	360	6%	60%	56.40%	9%	10%	6%	66%	62.04%	11.65%	43
1976 (2)	60	8	480	8%	60%	55.20%	12%	10%	8%	66%	60.72%	15.53%	43
1978 (1)	60	6	360	6%	60%	56.40%	9%	7.5%	6%	64.80%	60.91%	11.05%	42
1978 (2)	60	8	480	8%	60%	55.20%	12%	7.5%	8%	64.80%	59.62%	14.73%	42
1979 (1)	60	6	360	6%	60%	56.40%	9%	5%	6%	63%	59.22%	10.22%	42
1979 (2)	60	8	480	8%	60%	55.20%	12%	5%	8%	63%	57.96%	13.62%	42
1982 (1)	60	6	360	6%	60%	56.40%	9%	15%	6%	69%	64.86%	13.35%	46.20

1982 (2)	60	8	480	8%	60%	55.20%	12%	15%	8%	69%	63.48%	17.81%	46.20
1984 (1)	60	6	360	6%	60%	56.40%	9%	20%	6%	72%	67.68%	15.43%	50
1984 (2)	60	8	480	8%	60%	55.20%	12%	20%	8%	72%	66.24%	20.57%	50
1985 (1)	60	6	360	6%	60%	56.40%	9%	25%	6%	75%	70.50%	18%	50
1985 (2)	60	8	480	8%	60%	55.20%	12%	25%	8%	75%	69.00%	24%	50
1989 (1)	73	5.86	428	5.86%	73%	68.72%	15.85%	0%	5.86%	73%	68.72%	5.85%	50
1989 (2)	73	7.64	558	7.64%	73%	67.42%	20.67%	0%	7.64%	73%	67.42%	20.67%	50
1990 (1)	71	5.76	409	5.76%	71%	66.91%	14.10%	0%	5.76%	71%	66.91%	14.10%	50
1990 (2)	71	7.27	516	7.27%	71%	65.84%	17.79%	0%	7.27%	71%	65.84%	7.79%	50
1991	61	5	305	5%	61%	57.95%	7.82%	0%	5%	61%	57.95 %	7.82%	48
1992	58	5	290	5%	58%	55.10%	6.90%	0%	5%	58%	55.10%	6.90%	48
1994 (3)	49	5	245	5%	49%	46.55%	4.80%	0%	5%	49%	46.66%	4.80%	35
1994 (4)	58	5	290	5%	58%	55.1%	6.90%	0%	5%	58%	55.1%	6.90%	48
1995 (3)	43	5	215	5%	43%	40.85%	3.77%	0%	5%	43%	40.85%	3.77%	35
1995 (4)	58	5	290	5%	58%	55.1%	6.90%	0%	5%	58%	55.1%	6.90%	48
1997 (3)	43	5	215	5%	43%	40.85%	3.77%	0%	5%	43%	40.85%	3.77%	35
1997 (4)	51	5	255	5%	51%	48.45%	5.20%	0%	5%	51%	48.45%	5.20%	42.2
2000 (3)	37	5	185	5%	37%	35.15%	5%	0%	5%	37%	35.15%	5%	30
2000 (4)	46	5	230	5%	46%	43.7%	4.26%	0%	5%	46%	43.7%	4.26%	37.8
2005 (3)	35	5	175	5%	35%	33.25%	2.69%	0%	5%	35%	33.25%	2.69%	29
2005 (4)	45	5	225	5%	45%	42.75%	4.09%	0%	5%	45%	42.75%	4.09%	36.89

Sources: Van Blerck (1992); Budget Review (1993, 1994, 1995, 1996, 1997, 2005).

- Notes:
- a. The formula with (1) shows that the formula applies to pre-1966 and 1966.
 - b. The formula with (2) shows that the formula only applies to post-1966 gold mines.
 - c. Gold mining companies that are not exempt from the payment of secondary tax on companies are taxed according to the formula denoted by (3).
 - d. The formula for gold mining companies that are exempt from the payment of secondary tax on companies is denoted by (4).
 - e. Maximum average tax rate calculated assuming $x=100\%$.

In 1947, the amortisation allowance granted to gold mines other than new gold mines was increased to 22.5 percent. To encourage deep-level gold mining, the capital allowance with regard to deep-level gold mining was introduced in 1956. As a way of getting more tax revenue from more profitable mines, the government introduced a surcharge of 5 percent in 1966. The surcharge increased to 25 percent in 1985 and it was eventually abolished in 1988. The government increased the capital allowance for post-1990 mines from 10 percent to 12 percent in 1990. An important modification occurred in 1967. The "b" factor was changed from 6 percent to 8 percent resulting in lower average tax rates for pre-1966 gold mines and a higher rate for post-1966 mines. This duality remained unchanged until 1991 when the "b" factor was phased out and a uniform lower rate recommended by the Marais Committee was introduced. Secondary Tax on Companies (STC) was introduced in 1993 and gold mining companies were allowed to elect not to be subjected to STC. This again resulted in a dual system for gold mines.

A study by Cawood and Macfarlane (2003:217) shows that on 1 January 1994 the right to mine principle was abolished putting an end to the lease consideration. Since then the gold mining industry no longer had an obligation to pay a share of its profits to the state.

In 2005 two gold mining tax formulae were used:

$Y = 35 - 175/x$, in the case of gold mines not exempt from secondary tax on companies (STC)

$Y = 45 - 225/x$, in the case of gold mining companies opting to be exempt from secondary tax on companies (STC)

In the above formulae, the tax tunnel is 5 percent in both cases. It therefore follows that the gold mining sector in South Africa does not pay tax on 5 percent of its total revenue.

The following simple table can be used to determine the tax rate and the profit-to-revenue ratio of two hypothetical mining companies.

Table 6. 2 Income statement of two hypothetical gold mining companies, 2005

	Company A	Company B
Total mining revenue	R500 Million	R500 Million
Total deductions	R200 Million	R400 Million
Net profit	R300 Million	R100 Million
The X factor	$300/500=0.6*100=60\%$	$100/500=0.2*100=20\%$
Average tax rate: $y = 45-225/x$ (STC exempt)	41.25%	33.75%
Average tax rate: $y = 35-175/x$ (STC payable)	32.08%	26.25%

Source: Van Blerck (1992) and own calculations.

From table 6.2, it can be noted that companies that choose not to pay secondary tax on companies end up paying a higher tax rate than companies that are not exempt from secondary tax on companies. It will also be noted that where a company experiences high mining costs, for example marginal mines, that the "x" factor is smaller. This converts to a lower average tax rate.

The following advantages of the formula tax have been identified:

- The formula encourages the mining of marginal ores by lowering the ore pay limit of all gold mines which are making taxable profit in contrast to a flat rate tax, thereby prolonging the life span of marginal gold mines (Gidlow 1988:28). The formula tax also provides assistance to mines which may need to mill unpayable ore while developing access to payable ores. The Corbett Committee of 1935, as quoted in the Marais Committee (1988), rejected the implementation of a flat rate tax. It favoured a formula tax rate because a flat rate tax would discourage the mining of marginal gold ores and would not increase government revenue significantly if the price of gold increased. In other words, a flat rate tax was seen not to be progressive and the government would not share in the profitability of the mine, should profits increase rapidly. The formula tax also implies that marginal ores are mined at the expense of the fiscus and they make no contribution at the margin to the after-tax profits of the company (Margo Commission 1987:252).

- The tax tunnel in the formula lowers the grade of the ore brought to the mill and generally encourages high cost deep-level mining, thereby maximising the extraction of the available ore body (Marais Committee 1988:88).
- The supporters of the formula tax argue that its benefits are more than its costs. Where the formula is used to promote the extraction of low grade ore within a developed section of a mine, the marginal cost is low and the capital already spent in developing the section is a sunk cost. The social return on capital invested in mining is increased by extending the lives of the mines. The foreign exchange generated by maximising gold production has important positive linkages for other sectors of the economy (Marais Committee 1988:88).
- The progressiveness of the formula helps the government to get extra income without having to impose extra taxes in times of high profitability. In times of low profitability the tax rate will fall, thereby giving gold mines some financial relief (Van Blerck 1992:D11). The gold mining formula conforms to the ability-to-pay principle, unlike a flat rate tax (Marais Committee 1988:93). The progressiveness of the formula also supports the patrimony argument, which says that mineral deposits are part of the society's inheritance and that society should be compensated for its exploitation by the withdrawal of a substantial portion of the economic rent by means of the tax system.
- The Margo Commission of 1987 placed more emphasis on the distortion created by a 25 percent surcharge on the gold formula and appeared to use this factor as a means of justifying the total abolition of the formula. The surcharge of 25 percent had the effect of increasing the marginal cost, thus reducing the incentive to reduce costs and effectively lowering the pay limit. Therefore the concern expressed by the Margo Commission (1987) about the formula tax and its effects on the encouragement of the mining of sub-marginal ores and the disincentive to save on working costs and capital expenditure should be blamed to a very large extent on the surcharge and not on the formula system as such (Marais Committee 1988:176).
- The advocates of the formula agree that the surcharge results in an abnormal distortion of the original characteristics of the formula system, but argue that a modification of the formula to reinstate these original characteristics will remove this distortion, while retaining a positive effect on gold mining (Marais Committee 1988:89).

The Marais Committee (1988:89-91) identified the following criticisms of the gold mining tax formula.

- The Margo Commission emphasised the distortion effect inherent in the formula. If the total impact of the tax and an average lease are taken into account, it is possible to spend between R122 and R130 on resources to obtain extra output worth R100.
- The distortion effect is considerably increased by the surcharge. The formula was not designed to operate at a high marginal tax rate and an increase in the marginal tax rate reduces the incentive to be cost effective and lowers the pay limit excessively.
- The concept of the tax tunnel cannot be reconciled with the basic premise of an income tax on companies, which is intended to tax profits irrespective of the rate of return and does not recognise the ability-to-pay concept, which is a feature of income tax on individuals.
- The formula can reduce efficiency and lead to the misallocation of resources and distortions in the economy through wasteful expenditure (Van Blerck 1994:120). The high marginal rates implied that in the 1980s about 79 percent of any increase in costs was borne by the fiscus. Protagonists of the flat rate believe that this characteristic can discourage efficiency and encourage the investment by existing mines in marginal incremental capacity. The inherent subsidy can promote capital projects by existing mines aimed at the exploitation of low-grade ores which would not have been viable without it. A mine can invest in a project yielding negative rates of return and increase its earnings, provided that it is otherwise paying tax. Van Blerck (1992:D19), however, argues that it is not possible for the management of a company to be involved in wasteful expenditure, given the need to pay dividends to the shareholders. If the management were to be involved in unnecessary expenditure, this could reduce the income paid as dividends. If the management continues to be inefficient, the shareholders could opt to replacing the whole management team. Mining firms can focus their capital resources towards the exploitation of low-grade ores, thereby leading to inefficiency (Marais Committee 1988:90).
- It is doubtful that the formula actually promotes the mining of marginal ores. Deep-level mines cannot mine selectively to take advantage of the formula. In practice, the marginal cost of removing ore is the dominant factor in any decision to mine or not to mine a marginal area.

- Although the distortions can be reduced by means of other parameter values, it is inherent in the formula and can only be removed by changing to a flat rate tax.
- The formula does not reduce risk where it is most needed, for new mining ventures, but subsidises marginal operations where the risk profile is lower, at the expense of new mines.
- Because of the formula, the returns on investment to the fiscus and shareholders are unequal.
- Some critics of the formula base their argument on the fact that the cost of extracting gold is rising faster than the general price level in the economy. Ore reserves which are currently payable can become unpayable if their extraction is postponed by subsidising the mining of sub-marginal ores. However, while it is true that the cost of extracting gold has increased more than the inflation rate, this increase has been the result of a number of factors, some of which do not increase the cost of mining of specific blocks of ore. For example, a higher gold price has reduced the pay limit, thereby increasing the cost of producing gold. Also as mines become deeper, the cost of production also increases.

The formula tax is normally compared to the flat rate tax and therefore to get a better picture we also need to look at the major implications of the flat rate tax for the gold mining industry. Table 6.1 shows that the gold mining sector was taxed at a higher average rate than ordinary companies being taxed at a flat rate. The difference in the tax rates may lead to distortions in investment. The fact that the gold mining sector is taxed at a higher average rate than ordinary companies can be a good enough reason to discourage investment in the gold mining sector. We know that if the tax rate forces the taxpayer to change his or her behaviour, then that tax structure is inefficient (see chapter three, section 3.3). We must, however, also consider the average tax rate of different gold mining companies to make a fair comparison. In this regard, table 6.2 shows that hypothetical company B pays only 26.25 percent tax if it opted to pay secondary tax on companies (STC), compared to an ordinary company which could potentially be subjected to a rate of 36.89 percent in 2005. The major implications of the flat rate tax, as identified by the Marais Committee (1988:93), can be summarised as follows:

- The flat rate tax has an advantage of simplicity but it does not conform to the ability-to-pay principle and the patrimony argument.
- The flat rate tax provides for tax neutrality, given similar risks and similar

treatment of capital expenditure. The flat rate tax does not recognise possible inter-industry risk differentials. The fiscus and the shareholders receive the same returns and therefore projects developed by mines which are already taxpayers are more likely to be undertaken on their own merits and not to take advantage of tax benefits.

- The absence of a tax tunnel removes the incentive to mine marginal ores. Any specific incentive to gold mines will have to be given outside the tax system, given a similar treatment of capital expenditure.
- A flat rate tax gives a more stable flow of tax revenue for the government than the formula tax. However, a 50 percent tax rate which applied to non-mining companies until 1990 can lead to a decrease in government tax revenue from a flat rate tax. It must be noted that the formula tax can only lead to an increase in tax revenue if the profit to revenue ratio is increasing. The profit to revenue ratio has been declining, hence a decline in tax revenue collected from the formula tax.
- The formula tax reduces the responsiveness of after-tax profits to the gold price and therefore renders South African gold shares less attractive to foreign investors. A change to the flat rate could enhance the attractiveness of South African gold shares to foreign investors.

The Margo Commission (1987) favoured the replacement of the formula tax system with the flat rate system on profits, but was not prepared to make a firm recommendation in this regard without a detailed investigation; it recommended that such an investigation be carried out. The Margo Commission (1987) also recommended that the "baby formula" for gold mines with taxable income of less than R400 000 should be abolished. The commission also recommended that the formula tax should not be extended to other mines. The other recommendation made by the Margo Commission was the abolition of the 25 percent surcharge on gold mines. All of the above recommendations by the Margo Commission were implemented.

The Marais Committee (1988) recommended that the lease payment should be abolished. This recommendation was implemented and from the first of January 1994 the lease system no longer applied. This means that minerals on state land were free. The Marais Committee (1988:102) also argued that to establish neutrality between the mining sector and other sectors in the economy, there were two choices, either a flat company tax or a standard formula at $61-305/x$. It recommended the latter formula calculated as $y = a-ab/x$, where "b" is a constant of 5 and "a" is 1,22 times the ordinary

company tax rate. The formula was not implemented by the government. The government is thinking of reintroducing the lease system through the royalty system from 2009. The government is of the opinion that minerals resources should belong to everybody and they must benefit everybody because they are a nation's patrimony. As a custodian of natural resources, the government should introduce a lease system in the form of royalties, which can then be used for the benefit of everybody.

In conclusion, the tax tunnel, which is a tax-free portion in the gold mining tax formula, is advantageous to the gold mining sector in the sense that the industry is paying less taxes compared to what the industry would have paid without the tax tunnel. The authorities are trying to compensate for the revenue lost through the provision of the tax tunnel by charging extremely high marginal tax rates on gold mining operations. There is no tax tunnel when it comes to ordinary company taxation and hence a lower tax rate applies compared to the gold mining sector. Different tax rates complicate the whole tax system.

6.4 RING-FENCING

Ring-fencing is practised by a number of countries and it is mostly applied to the mining industry. In the United States of America, a tax law was introduced in 1986 which was aimed at fighting tax sheltering and tax arbitrage. The measures included the limitation of losses especially those arising from passive activities and more stringent at-risk rules and minimum taxes. In the United Kingdom, ring-fencing is applied to prevent an erosion of company tax base. A ring-fence is drawn around North Sea profits, so that losses made onshore cannot be offset against North Sea profits. According to the Marais Committee (1988:75), South Africa needs to pay close attention to the incidence of tax sheltering as this can affect the tax base in the mining sector. Tax sheltering can necessitate the imposition of a higher tax rate than would otherwise be necessary to raise a given amount of tax revenue, thus penalising other taxpayers in the mining sector (Marais Committee 1988:75). The mining sector is a capital-intensive industry and if expenditures from one mine were to be deducted against the income of another mine, then the tax base would be eroded, hence the need for ring-fencing.

The Margo Commission (as quoted in the Marais Committee 1988:37) recommended that once neutrality regarding capital expenditure and the tax rates is accomplished, ring-fencing should be reconsidered since it could lead to the inefficient allocation of resources in the long run. It is also recommended that automatic exemption from ring-fencing should be granted in the case of failing mines. In the meantime, no automatic exemption is granted to failing mines because it is the Minister of Finance that must

grant exemption from ring-fencing.

The amount of tax revenue derived from the gold tax formula will depend on, among other things, the amount of deductions allowed per gold mine. Van Blerck (1992:15-2) defines ring-fencing as "the isolation for tax purposes of certain types of activities, income or losses". In other words, ring-fencing refers to the artificial restrictions created by law with the intention of ensuring that capital expenditure incurred by a particular mine is only deducted against the income generated by that particular mine and the balance is carried forward for deductions in the following year.

6.4.1 Categories of ring-fencing in the South African gold mining industry

In the following subsections we will discuss the different ring-fences applicable to the gold mining industry in South Africa. Some of these ring-fences are applicable to other sectors of the economy as well. This section is based mostly on the comprehensive study on gold mining taxation by Van Blerck (1992).

6.4.1.1 Taxpayer ring-fencing

Taxable income for each taxpayer is determined separately in the gold mining industry. Each employee's income is reconciled against that person's expenditure and taxed accordingly. This type of ring-fencing is also applicable to other sectors of the economy. Natural persons, companies, clubs, and every other tax-paying organisation are demarcated differently and taxed accordingly. Van Blerck (1992:15-2) noted that in South Africa there are no provisions for this type of merged group taxation and the time was not ripe for such provisions.

6.4.1.2 Mining activity ring-fencing

Mining firms also generate non-mining income. Mining income is taxed at a rate that is different from the rate applicable for non-mining income. In the case of gold mining in South Africa, mining income is taxed on a formula basis and non-mining income is taxed according to company taxation (Budget Review 2005:83). This kind of ring-fencing creates a wedge between these different incomes with mining income taxed at a higher rate than non-mining income (Van Blerck 1992:15-3). Van Blerck (1992:15-3) argues that, the mining ring-fence is not a watertight fence because non-mining tax losses can be used to reduce mining income, and mining tax losses caused by working losses may reduce non-mining income.

6.4.1.3 The gold formula ring-fencing

The gold tax formula shows that the taxation applicable to the gold mining industry does not apply to other sectors. The taxable income under the gold formula is determined on a mine-by-mine basis and this can create a lot of difficulties where a company operates more than one gold mine. The situation can be made more complex if these different companies also generate non-mining income. The tax tunnel for each mine must be determined without taking into consideration mining expenses from other mines operated by the same company or non-mining losses (Van Blerck 1992:15-4). Also losses or deductions not attributable to the mining of gold from a particular mine may not be taken into account in the determination of taxable income according to the gold mining formula.

6.4.1.4 Capital expenditure "general" ring-fencing

Before 1984 it was possible for a gold mining company operating more than one mine to deduct capital expenditure from the income of another mine even though the expenditure did not emanate from that mine. It was also possible to make capital expenditure deductions against non-mining income (Van Blerck 1992:15-5). In 1983 a restriction was introduced which prevented gold mining firms from deducting capital expenditure against non-mining income. In other words, the restriction implies that the total capital expenditure deductible from any mine during a particular year shall not exceed the mining taxable income of that mine. Any excess of capital expenditure over mining income shall be carried forward and applies as capital expenditure for the following year (Van Blerck 1994:122).

6.4.1.5 Capital expenditure per mine ring-fencing

Before 1985, it was possible for a mining company which operated more than one mine to make capital deductions incurred in one mine against mining income generated by the other mine. In 1985 a restriction was imposed which prevented the deduction of capital expenditure of one mine against the mining income of the other mine. It means that capital expenditure of a particular mine has to be deducted against the mining income of the particular mine that incurred the expenditure, despite the fact that this mine together with the others may be owned by one company (Van Blerck 1994:122).

Put differently, total capital expenditure of one mine during a particular period or year shall not exceed the total taxable mining income during the same period from that particular mine, unless the Minister of Finance in consultation with the Minister of

Minerals and Energy directs otherwise. Any capital expenditure in excess of the taxable income of that particular mine shall be carried forward to the following year.

The capital expenditure per mine ring-fence decreases the rate of return on new mining projects undertaken by an existing company when that new project is a new mine and not an extension of the existing mine. The ring-fencing also increases the risk of launching new mining ventures because in the event of the venture failing the capital expenditure incurred could never be deducted for tax purposes (Van Blerck 1992:15-6).

Provision was made in 1990 for the ring-fence to be breached by up to 25 percent of taxable income to allow a company to apply a portion of expenditure on one mine against the taxable income of other mines that belong to the same company. The breaching provision was, however, restricted. The restriction was aimed at preventing a situation whereby an existing profitable mining company could be used to incorporate a new mine for income tax purposes, whereas the major earnings are paid to the original mineral rights owners in the form of dividends (Van Blerck 1992:15-7).

6.4.1.6 Prospecting ring-fencing

If a mining company incurs prospecting expenditure, such expenditure is accordingly deducted for tax purposes. The Commissioner has the power to prescribe that such expenditure be deducted in instalments or to restrict the deduction to a particular class of minerals to which the prospecting applies (Van Blerck 1992:15-8).

6.4.2 Advantages and disadvantages of ring-fencing

The advantage of ring-fencing is that it helps to reduce the erosion of the tax base (Van Blerck 1994:122). But the Marais Committee (1988:75) pointed out that ring-fencing might be the result of the lack of inter-sectoral tax neutrality. When ring-fencing was introduced in 1985, the gold mining industry was growing rapidly and there was a fear that new investment projects would wipe away the mining tax base. Since then a lot has changed. The gold mining sector has reached maturity and this does not warrant the existence of ring-fences in the gold mining industry.

Ring-fencing can lead to inefficiency in resource allocation in the long run. If capital expenditure cannot be moved from one mine to another to be set off against the taxable income of another mine, capital expenditure will be moved from its most productive use to where it can be efficient in reducing taxation. This creates capital deepening within the ring-fence rather than the efficient use of capital within the gold mining company and other firms affected by the ring-fence (Marais Committee 1988:36).

Ring-fencing increases the risk of starting new mining ventures. Mining firms will want to use the existing mining operations as a way of diluting the risk by spreading it through existing companies. In the presence of ring-fencing this cannot be done, thereby increasing the risk for new mines. Companies invest heavily in capital leading to reduced direct tax in the initial stages. But once the company gets established it can generate a lot of income in terms of taxation. Therefore, the decrease in direct taxation can be temporary. Nevertheless, gold mining firms contribute a lot towards government revenue through indirect taxes like value-added tax (VAT). Gold mining companies employ a lot of people who end up paying personal income tax to the government (Marais Committee 1988:74).

Ring-fencing can discourage future investment in mining especially in marginal ore bodies which, because of South Africa's geological formation and the exhaustion of rich ore bodies, are necessary to keep the gold mining industry afloat. Ring-fencing can defeat the initial aim of the gold mining formula, which is to encourage the mining of marginal ores. The restrictions also make it difficult for gold mines to attract equity capital from both local and overseas sources (Marais Committee 1988:74).

When making economic decisions, the mining firms look at both mining and non-mining income. Therefore capital deductions should be allowed for both mining and non-mining income to allow the firm to make sound economic and tax decisions. Tax distortions can influence the decisions made.

6.5 THE GOLD MINING ROYALTY SYSTEM

On 1 January 1994 the right to mine principle was abolished, putting an end to the lease system. The lease consideration entitled the government to a share of the profits gained from the extraction of minerals mined by different companies. With the lease system non-existent, minerals on state land were free minerals (Cawood & Macfarlane 2003:217). After realising that minerals on state land were available for free, the government promulgated the Minerals and Petroleum Royalty Bill in 2003 whereby all minerals will belong to the state and those extracting the minerals should compensate the government through paying royalties.

The National Treasury (2003:1) summarises the rationale for the imposition of royalties in South Africa as follows:

The Royalty Bill gives effect to the Minerals and Petroleum Resources Development Act, No 28 of 2002. The proposed royalty regime imposes a

quarterly charge on holders of mineral rights for the extraction and transfer of South African mineral resources. This Bill recognises that the Nation is entitled to a consideration for the extraction of its non-renewable mineral resources. South Africa is not alone in charging a royalty for its mineral resources. Most countries with significant mineral resources impose such a charge. The royalty is levied in addition to income tax but scores as a deduction, as it constitutes a deductible expense in the production of income.

It is important to note that most non-marginal mines generate on extraction so-called resource rents, which are a function of the scarcity value of minerals. These rents can be taxed/shared between government and the operators without impacting negatively on the economic viability of the project. The charging regime contained in the Royalty Bill strikes a balance between the need for adequate compensation and the imperative of maintaining the international competitiveness of the mining sector. The royalty rates fall well within internationally competitive margins that can be sustainable for the foreseeable future.

The state also wants to use the royalty system as a way of generating revenue. The state can also use the royalty system as a way of conserving natural resources. This is indicated by the fact that scarce natural resources like diamonds pay the highest royalty rates compared to abundant minerals like salt and sand. The royalty rates range from 1.0 percent to 8 percent (see table 6.3). Some of the products paying a royalty of 1.0 percent are salt, oil and gas. Coal will pay a royalty of 2 percent. Gold will fall under the 3 percent royalty rate. Platinum group metals will pay a royalty of 4 percent. Mineral products like amethyst and quartz will fall under the 5 percent royalty rate. Diamonds will pay the highest royalty rate of 8 percent. No mineral product falls under the 6 percent and 7 percent royalty rates (National Treasury 2003:33).

Table 6.3 shows the different proposed royalty rates in South Africa.

Table 6.3 Proposed royalty rates for different minerals in South Africa

Group	Substance	Royalty Rates %
1	Salt, sand, stone, sandstone, late, gravel, clay, concrete, motor, plaster, brick, dolorite, limestone, shale, gypsum, perlite and phosphate rock extracted by a mineral extractor outside of the exemption described under section twelve.	1
2	Oil and gas: natural gas and natural gas condensate petroleum crude offshore production where the water depths are deeper than five hundred metres.	1

3	Alumino-silicates (andalusites, sillimanite, kyanite), asbestos, ammonium sulphate, barytes, zirconium oxide, uranium oxide, kaolin, talk, 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 five hundred 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, hydrogrossular, spessartine), lolite, kyanite, sodalite, sugilite (royal lavulite or royal azel), tourmaline, verdite (serpentine) and topaz.	5
10	Unpolished natural diamonds	8

Source: National Treasury (2003).

The royalty is an ad valorem tax in the form of a certain percentage withheld on the gross sales value of the mineral extracted. No deductions are allowed against gross sales income (National Treasury 2003:2). The National Treasury (2003:2) argues that the use of revenue-based royalty system is consistent with international standards. The National Treasury (2003:2) further argues that profit-based royalties could be avoided by artificially inflating costs, thereby reducing royalty collections to marginal levels.

The gross value of any mineral resource will equal its readily tradable "fair" market price to the extent published by the Department of Minerals and Energy or international commodity price lists. This price represents the best approximation of a mineral resource's intrinsic value extracted from South African territory (National Treasury 2003:2). The Bill also provides a mechanism that in the event of the Department of Minerals and Energy not being able to publish a readily available market price, the stated value of a mineral resource for the royalty must at least be equal to the actual gross sales price of the mineral transferred. Thus the Bill provides for upward value adjustments to address under-valuations or avoidance issues. For example, government has the right to increase the value above the gross sales price if that price does not fully reflect the arm's length value of the mineral resource transferred (National Treasury

2003:2).

The Bill provides for certain exemptions. In the case of marginal mines, the Royalty Bill provides the Minister of Finance with the power to exempt marginal mines from paying royalties. According to the National Treasury (2003:3) the purpose of this exemption is to ensure that the royalty does not force the closure of low-grade mines, thereby causing a loss of employment.

The Bill also seeks to enshrine maximum certainty for investors by minimising administrative discretion and maximising clarity of administration. In order to allay uncertainty concerning rates, the Royalty Bill contains rates that are sustainable for the foreseeable future. As an added measure of assurance, the Royalty Bill contains a fiscal stabilisation provision that will act as a contractual guarantee for a stable set of rates if mining rights owners are willing to pay a premium. In terms of this measure, a mineral rights holder is guaranteed to retain the initial applicable royalty rate upon conversion to new order rights if that holder pays a premium equal to the lesser of 2 percent or 50 percent of the initial royalty rate. Hence, a mineral rights holder with a normal royalty of 2 percent must pay an additional 1.0 percent for the guarantee. The fiscal stabilisation provision will remain in effect for the duration of the right, excluding renewals and extensions, that is no more than 30 years (National Treasury 2003:4).

In the next paragraphs the intention is to discuss the various reactions and criticisms of imposing the royalty system. The reactions are varied but can be grouped. The government has made it clear that it intends imposing a revenue-based royalty system instead of a profit-based one (South African Revenue Services 2005:34). The gold mining industry prefers a profit-based royalty system. Some of the objections advanced by the gold mining industry for the levying of a revenue-based royalty system are discussed below.

The delayed introduction causes uncertainty. The state intends implementing the royalty system in 2009 to give resource owners enough time to convert to the new system. The delay causes a lot of uncertainty and new projects can be suspended until the taxes and royalties surrounding the mining sector are known (Chamber of Mines of South Africa 2004:9).

A revenue-based royalty system has a cost-increasing effect. Harmony Chief Executive Officer, Bernard Swanepoel is of the opinion that the royalties increase the cost of doing business and it can lead to job losses in the long run. Durban Roodepoort Deep Chief Executive Officer, Mark Wellesley-Wood argues that a revenue-based royalty is an additional cost and it can sterilise gold reserves (*Mining Weekly May* 2003:39). Bernard

Swanepoel went to the extent of describing the royalty on gold mining as a belated tax on fixed assets that have been owned for a long time. The revenue-based royalty system is a fixed cost which raises the pay limit. This kind of royalty raises the cut-off grade that is, the grade at which reserves would no longer be economically viable, with the result that the ore below the cut-off point is not mined, thereby reducing the life of the mine and bypassing marginal gold ores. It was observed that 65 percent of South Africa's gold resources are still in the ground above the current cut-off grade. The imposition of the revenue-based royalty system will sterilise R1.6 billion worth of gold resources by raising the cut-off grade (Cawood & Macfarlane 2003:228). Revenue-based royalties can increase fixed costs and make the mining of marginal ores uneconomic, resulting in gold mine closures and retrenchments. This can be critical in the South African environment.

The international experience shows that a profit-based royalty system is more acceptable than a revenue-based one (see section 5.3.7). A revenue-based royalty system may mean that some of South Africa's economic gold ore deposits will be bypassed, potentially cutting the recoverable reserve base by 3.7 percent (Mining Weekly 2003). The country's gold reserves may be reduced from 16250 tons to 15650, according to the Chamber Mines (2004). The royalty payments on revenue would increase fixed costs and the industry's cut-off grade, that is, the grade at which reserves would no longer be economically viable would rise from 4g of gold per ton of ore mined to 4,2g.

Gold mining companies Harmony Gold and Durban Roodepoort Deep warned that the proposed royalties will decrease investment in the South African mining industry (Mining Weekly May 2003:39). The proposed Royalty Bill could threaten South Africa's international competitiveness in the mining industry as far as securing investment in exploration is concerned. Extremely high royalties can decrease the wealth of both the mines and the state, in the sense that production and investment can be discouraged by high royalties (Cawood & Macfarlane 2003:215). Marginal mines are major employers and they consume a lot of goods and services in the economy and they are also linked to different suppliers.

The arbitrary categorisation of different mineral products is not acceptable according to the Chamber of Mines (2004:9). This grouping of products implies an illogical application, suggesting that diamond mining is twice as profitable as platinum mining and that gold mining is three times more profitable than the mining of granite.

According to the Chamber of Mines (2004:9) the government's review of international practice had not factored in South Africa's participation in the treatment of people with

HIV and Aids, black economic empowerment provisions and long lead times before an economic return from a project. The Bill would raise the cost of capital and increase project risk, making it more difficult for empowerment companies to raise debt finance. The system encourages high grading and discourages the emergence of new investment projects through increased risk and reduced rewards. When lending money, the bank will charge a risk premium as a result of a royalty. The increased risk is imposed by the possibility of the borrower failing to repay the debt. This will result in higher interest rates, making it difficult for new entrants to raise finance. The risk to the equity holder will also increase (Cawood & Macfarlane 2003:229). All these changes will lead to an increase in the cost of capital. Mining companies will invest in areas where finance is cheaper and where the risk is low. The Bill makes provision for the preservation of existing royalties payable by mines to communities or natural persons in addition to the royalty rate stipulated in the Bill. This move will amount to a double royalty threat (Chamber of Mines 2004:9). The Chamber of Mines of South Africa (2004:9) also argues that the revenue-based royalty system would eat into cash flow before any income was generated and make it difficult for empowerment investors to obtain loans because it will raise the cost of capital and increase project risk.

The revenue-based royalty system could cost South Africa jobs. The introduction of a revenue-based royalty system adds a fixed cost to every mining operation. This has a detrimental effect on less profitable mines. The mines will always try to cut costs and this can be done by cutting the number of employees (Finance Week 2005).

The royalty system may deviate from the ability-to-pay principle of fairness. The royalty system must be implemented according to the ability-to-pay principle (see section 3.2.2). The ability-to-pay principle does not depend on the type of commodity mined. Instead it depends on the relationship between sales revenue and the cost involved in producing that particular mineral (Cawood 2003:24).

The draft Royalty Bill provides that the minister may exempt from royalties partially or wholly certain marginal mines. This provision has its own problems. First, it is very difficult to determine what is meant by marginality. The mine must prove that only low-grade ores remain and that it is not economically viable to continue with the mining operations (Chamber of Mines 2004:9). Second, firms can be encouraged to reduce their production with the intention of avoiding the tax. This is against the efficiency principle of taxation (see section 3.3). The question of determining the marginality of the firm is subjective and this can lead to firms that are economically similar being treated differently for tax purposes, which is against the equity principle of taxation (see section 3.2).

Different industries are treated in a non-neutral manner. As table 6.3 shows different minerals are treated differently. The fact that different minerals are taxed differently can encourage investors to shift their production towards products with a low royalty rate and this is against the efficiency principle of taxation (see section 3.3).

Small-scale mining companies may be disadvantaged. Neal Froneman, Chief Executive Officer of Afrikander Lease (Mining Weekly May 2003:38), argued then that small-scale mining companies, new entrants to the mining industry and companies operating marginal mines could be the hardest hit by a revenue-based royalty system. With the rand gold price declining due to a strong rand, a 3 percent royalty rate on revenue of gold mining could make a number of marginal mines uneconomic. Large mining companies like AngloGold and Gold Fields, have more flexibility, than small mining firms. In the case of a decrease in the price of gold and an increase in the cost of production, large firms would have more flexibility allowing them to stop production and restart only if it is economical to do so. Small miners cannot do that because once they stop production it will be difficult for them to restart due to financial constraints. The royalty system will simply increase the hurdle to new entry into the mining industry (Mining Weekly May 2003:39).

The table 6.4 depicts the different gold mining royalty rates for different countries.

Table 6.4 Gold mining royalties for different countries, 2003

Country	Royalty %	Revenue / Profit Based
Angola	2-5%	Revenue based
Australia	2.5%	Revenue based
Bolivia	1-7%	Revenue based
Botswana	3-10%	Profit based
Burkina Faso	3%	Revenue based
Canada-British Columbia	15% of taxable income	Profit based
Canada-Ontario	18% of taxable income	Profit based
Canada-Quebec	20% of taxable income	Profit based
China	4%	Revenue based
Ghana	3-12%	Revenue based
Indonesia	2%	Revenue based
Ireland	1.5-4.5%	Revenue based
Ivory Coast	3%	Profit based
Lesotho	5-10%	Revenue based
Malawi	5-10%	Revenue based
Mexico	1.5%	Revenue based
Mozambique	3-10%	Revenue based
Papua New Guinea	2%	Revenue based
Philippines	23%	Revenue based

Poland	10%	Revenue based
Russia	6%	Revenue based
South Africa (proposed)	3%	Revenue based
Swaziland	1-2.5%	Profit based
Tanzania	3%	Revenue based
Uzbekistan	4%	Revenue based
Zambia	2-5%	Profit based
Zimbabwe	2-10%	Revenue based

Source: National Treasury (March 2003).

From the table 6.4 it can be seen that the majority of countries levy revenue-based royalties and a few countries, like Botswana, Canada, Ivory Coast, Swaziland and Zambia, levy profit-based royalties (National Treasury 2003:7). The royalty rates given in the table range from 1.0 percent to 23 percent. The Philippines charges the highest royalty of twenty-three percent. The gold mining sector plays a crucial role in the South African economy and therefore the authorities cannot afford to levy very high royalties.

Otto (2000:6) argues that while the trend has been to move towards profit-based taxes, many countries, as shown in table 6.4, still use revenue-based royalties, mostly for patrimony reasons. In most countries minerals belong to the state and the state might find it necessary to be compensated every time its minerals are extracted. Mining companies do not always generate taxable profits and there is no guarantee that the state will be compensated for minerals extracted and hence a need for revenue-based royalties. Under a revenue-based royalty system the government will get tax income even if the firm runs at a loss. Under a profit-based royalty system, the government runs the risk of not getting any income if the firms runs at a loss (Nellor 1995:239).

The revenue-based royalty system could result in huge revenue losses. Eric Lilford (as quoted in the Finance Week 25 February 2005:17), Director of Resources at Investec, calculated that R33 billion will be lost in revenue over the economic life-span of the gold mining industry. Including the current effects of the rand and adding back the benefits of higher prices for gold, the cumulative economic impact to the gold mining industry as a whole may result in a revenue loss of R214 billion. If all precious minerals are taken into consideration, the cumulative loss in revenue is R764 billion.

On the other hand, profit-based royalties do not affect resource allocation in any way. The profit-based royalty system is based on the realised net resource value and the maximum royalty burden is the value of the resource in the ground. This royalty system has a smaller impact on marginal mines. Resource owners generally require a higher

percentage of profits in order to receive the same income over the life of a mine as that from revenue-based royalties. The disadvantage of profit-based royalties is that if the mining firm runs at a loss, the resource owner does not get any compensation (Cawood & Macfarlane 2003:215). If profits rise above the inflation rate, the resource owner will benefit and the resource owner will lose if profits decline.

In response to the above concerns, National Treasury (2003:10) argues that the royalty rates proposed are reasonable compared to other mineral-rich countries. Mining firms prefer a profit-based royalty to a revenue-based one. Martin Grote, Head of Tax Policy at the National Treasury, said with reference to the gold mining royalty "the gold industry rate will definitely be reviewed". He also promised a similar review in other mining sectors (*Finance Week* February 2004:17).

6.6 CONCLUSION

The taxation of the gold mining industry is based on a formula basis and this formula has been in existence since 1936. The intention of the formula system was to encourage the mining of marginal ores. The authorities feared that once such ores had been bypassed it would not be easy to go back to them. The formula system seems to be doing just that. The fact that the gold mining industry is treated differently to other industries shows that there is discrimination in the tax system and this is against the equity principle of taxation. The discrimination is not based on the amount of income generated but on the product produced. The tax tunnel, which assures the gold mining industry of a certain portion of revenue that is tax free, can lead to an over-concentration of resources in the gold mining industry. This can lead to an inefficient allocation of resources and is against the efficiency principle of taxation. Notwithstanding the equity and efficiency arguments, both the Margo Commission and Marais Committee favoured the retention of the formula system and that rates be set so as to approach neutrality between the mining sector and other sectors.

Ring-fencing is divided into, taxpayer ring-fencing, mining activity ring-fencing, gold formula ring-fencing, capital expenditure "general" ring-fencing, capital expenditure per mine ring-fencing and prospecting ring-fencing. Ring-fencing can be a good way of preventing the erosion of the tax base but it can lead to inefficiency whereby capital resources can be concentrated in areas where they can be effective in reducing taxable income. Ring-fencing is practised in the mining sector only in South Africa and it discriminates against firms that are involved in mining. The discrimination is based on the type of activity and not on the amount of income generated, which is against the equity principle of taxation.

The biggest advantage of the revenue-based royalty system is that it is easy and simple to administer. The revenue-based royalty system can also generate revenue for the government even if the mining firm makes a loss. The majority of role players in the gold mining industry appreciate the fact that they must pay royalties, but they prefer profit-based royalties to revenue-based ones. On the basis of the arguments provided here, the disadvantages of the revenue-based royalty system as compared to the profit-based royalty system calls for the government to consider the profit-based royalty system. As indicated in section 6.5, revenue-based royalties are inefficient and unfair (see also sections 3.2, 3.3).

CHAPTER SEVEN

CONCLUSION

The economic significance of the gold mining sector has declined significantly since the 1980s. The decline in the economic importance of the gold mining industry is attributed to the maturity of the industry. Even though the economic importance of the gold mining industry has declined compared to other industries in the economy, the industry remains a force to be reckoned with in the mining sector. A strong South African currency and a lower dollar gold price can, however, dash any hopes of the gold mining industry recovering to its previous peaks.

Despite the decline in the economic significance of the gold mining sector, its legacy is there for everybody to see. One of Africa's biggest cities, Johannesburg, came into being as a result of the gold mining industry. An advanced transport network was developed to service the needs of this ever-growing city of gold. The mining of gold also brought with it the urbanisation of the hinterland of South Africa.

The gold mining industry is linked to a number of industries, as discussed in chapter two. The crumbling of the gold mining industry may severely impact on related industries, either directly or indirectly. One example is the reduction in the gold and uranium industry demand for mining machinery that occurred from 1993 to 2000. Although demand increased at purchasers' prices in relative terms, use in 2000 was less than a third of what it was in 1993. The contribution of the gold mining industry to economic growth and employment has also declined. But this does not mean that the industry is insignificant because it is still one of the biggest earners of foreign currency.

In chapter two (section 2.7) it was shown that the income tax contribution of the gold mining industry to total tax revenue has declined significantly since the eighties. The decline in tax revenue is not surprising given that the industry is nearing its maturity, production volumes are declining and the cost of production is increasing. The nature of the gold mining tax formula also makes it necessary for gold mines to pay fewer taxes in times of low profitability. Compared personal income tax, company taxation, value-added tax and the secondary tax on companies, the gold mining sector makes the lowest contribution to government tax revenue (see table 2.11).

Despite the fact that the gold mining industry is declining, it still has an obligation to contribute to government tax revenue, like any other entity. The taxation of gold mines must not be done on a haphazard basis, but it must be guided by the principles of good

taxation, which are flexibility, administrative simplicity, efficiency and equity. These principles were briefly discussed in chapter three. The taxation of gold mines must observe the ability-to-pay and benefit principles. The principle of equity is further divided into vertical and horizontal equity. The administration of the tax system must be simple and it must not involve unnecessary complications. Compliance costs must also be low. A good tax must not disturb economic behaviour, that is, it should be neutral.

The gold mining sector uses a number of government services, like protection services and public infrastructure, and therefore according to the benefit principle they must pay taxes. The ability-to-pay principle is more complicated. The difficult part is how to measure the ability to pay of a gold mining firm. For example, when determining the ability-to-pay does wealth show the ability-to-pay or is the ability-to-pay indicated by income. Again the definition of income is problematic. Despite all these problems, in the gold mining industry ability-to-pay is determined by revenue generated by the firm.

The gold mining tax formula is progressive and it complies with the ability-to-pay principle. The economic environment is turbulent, which means that a good tax system must be able to adjust to economic changes. This has been the case with the gold mining tax formula where we have seen the authorities adjusting the formula from time to time to give tax relief to gold mining firms in times of economic hardship. The gold mining sector is experiencing economic decline and the tax authorities have responded by regularly lowering the marginal tax rate paid by gold mining firms since 1990 and by removing the tax surcharge in 1989.

No tax system can be totally neutral and therefore the tax authorities must try to keep the disruptions caused by a tax as low as possible. The principles of efficiency and equity are not always compatible. Trying to attain efficiency in taxation can lead to the violation of equity and vice versa. Value judgements are involved when dealing with the principles of equity and efficiency and therefore the principles of taxation are not a watertight way of determining the goodness of a tax. Tax increases in the gold mining industry may have negative effects on the already declining employment opportunities in the gold mining industry (see section 2.3). Tax increases will simply increase the cost of production and given the already declining production in the gold mining industry and the current strong rand, the burden of this tax may be borne by both employees and shareholders of the company. Retrenchments will be unavoidable and profits and dividends declared will be low.

Natural resources are different from other sectors of the economy. In chapter four it was argued that renewable resources can be used over and over again but with non-renewable resources it is a different story, for they can only be used once. Gold mining

involves the extraction of non-renewable resources and it is a capital-intensive operation. The gestation period for most natural resources is very long and gold mining operations are very risky. In chapter four (section 4.3) it was shown that because of the characteristics of non-renewable resources government's role is to intervene. One intervention is taxation.

Like any other entity that is involved in the generation of income, operations exploiting natural resources need to pay tax and contribute towards government revenue. First, the exploitation of natural resources generate economic rent and they must therefore be taxed. Second, capital generates income in the form of profit which also calls for the taxation of natural resources. Other justifications for the taxation of natural resources are: conservation of resources, exercising of monopoly power in international markets, limited life-span and capital intensity. Different methods can be used to derive tax revenue from natural resources and these include: tax on rents, bids for the right to exploit natural resources, government equity and production sharing, royalties, export taxes, import taxes, auction rights and capital income taxes. The tax on economic rent is the most efficient way of taxing natural resources because it does not distort investment decisions.

Different countries levy different taxes on different resources. The international experience is that countries levy taxes on natural resources for two main reasons: to generate revenue and to regulate taxpayer behaviour. In chapter five the study was narrowed further by focussing on how minerals are taxed and what the international experience is. It was suggested that the mining industry needs to be treated differently from other industries for the following reasons: there is a lot of risk involved in mining operations; the mining industry is highly capital intensive; mineral resources are non-renewable; long gestation periods are involved in the prospecting and extraction of minerals; the mining sector is also prone to commodity price fluctuations and the exploitation of minerals involves exploiting part of the nation's heritage.

The differential treatment of the mineral sector can be unfair, can involve administrative complications and can also lead to economic inefficiency. Tax discrimination can be by type of mineral (whereby different minerals are treated differently), by size of operation (whereby big firms are treated differently from small firms for tax purposes) and by nationality (whereby mineral resources from different countries are treated differently in terms of trade tariffs).

The international experience is that different countries levy more than one tax rate on mineral resources, either through direct taxation or indirect taxation. The taxation of resources in different countries includes income tax, which is levied as the government's

general power to tax, export and import taxes, withholding taxes, resources rent taxes, stamp duty and property taxes, fixed fees, royalties, production sharing and equity sharing, auctions and sales taxes.

The gold mining industry in South Africa is treated differently from other sectors. In chapter six the history of gold mining taxation was reviewed. The taxation of gold mining income is based on a formula and the industry is also subjected to ring-fencing. The intention of the gold mining tax formula is to encourage the mining of marginal gold ores, thereby prolonging the life of the gold mining sector which is very important for economic growth. The formula is succeeding in encouraging the mining of marginal ores. The problem with the formula is that it discriminates against other minerals that are also important for economic growth, like the platinum group of metals, diamonds and coal. The gold mining sector employs a lot of workers and removing the formula could lead to the closure of marginal gold mines and cause unemployment.

The formula tax has not been extended to other mines, probably because it can only operate effectively where ore grades are highly variable and relatively large tonnes of marginal ores are available. Platinum grades are not highly variable and diamond grades in turn vary so extremely that the valuation and selection of marginal ores is very uncertain. To protect the tax base, the authorities decided to ring-fence the mining sector. The problem of ring-fencing is that it encourages the inefficient use of resources. Most mineral operations are faced with the problem of ring-fencing of one form or another. Ring-fencing also discourages new mining ventures.

Natural resources are the gifts of nature and they must be used for the benefit of everybody. In South Africa some mineral resources are in the hands of private individuals which means that those resources can only benefit a few individuals and not the whole population. The government decided to impose a royalty on the extraction of mineral resources in the country. The belief is that mineral resources should belong to everybody and the government as the custodian of those minerals should levy a royalty on the extraction of minerals which can then be used for the benefit of everybody (see section 6.5). The mining industry players are not against paying royalties. The problem is that the mining companies prefer a profit-based royalty system to a revenue-based one (see section 6.5).

Even though the majority of countries listed in table 6.4, levy revenue-based royalties, the arguments for and against the revenue-based royalties suggest that the profit-based royalties will be acceptable, as discussed in section 6.5.

We have seen that the gold mining industry is taxed differently to other industries in the

economy. When the gold mining tax formula was first introduced, the gold mining industry was the dominating factor in the economy. The platinum group of metals is now taking centre stage in the mining sector and the manufacturing and service sectors are also playing a big role in economic development. The fact that things have changed from the time when the gold mining tax formula was first introduced does not mean that the formula must be abandoned. The gold mining industry is declining but it is not insignificant.

The removal of the formula system will affect the profitability of the gold mines, which can lead to early closure of mines. The formula must be kept in place for the time being. The gold mining industry is still one of the biggest earners of foreign currency and South Africa needs the foreign currency badly for economic growth. The gold mining industry therefore needs some form of relief to allow its continued existence. The gold mining industry currently employs about two hundred thousand employees. If the gold mining industry were to crumble due to a heavy tax burden, all these employees would add to the already high unemployment rate.

The important lesson to be learnt is that when looking at the economic significance of a tax, a holistic approach must be taken. When comparing the royalty rates of different countries it is not enough to look at the royalty rates and say that we propose lower royalty rates than our direct competitors. We need to look at, among other things, company taxes imposed by those different countries to get a better picture of the whole tax system. For example, the South African tax authorities argue that the proposed royalties are much lower than the rates applied in Botswana, yet in Botswana company taxation is much lower than in South Africa. Ignoring company taxation in the analysis of royalties can lead to misleading conclusions.

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