

National Accounts



Environmental Economic Accounts

Mineral Accounts for South Africa: 1980–2009

Discussion document: D0405.2

February 2012

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Statistics South Africa

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Discussion document: **Mineral Accounts for South Africa: 1980–2009**

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List of abbreviations and acronyms

DMR	Department of Mineral Resources
Eskom	Electricity Supply Commission of South Africa
GDP	Gross domestic product
Implats	Impala Platinum
MPRDA	Minerals and Petroleum Resources Development Act
PGM	Platinum group metals
R	South African Rand
R/kg	Rand per kilogram
RRR	Real rate of return
SAMI	South Africa's Mineral Industry (DMR publication)
SARS	South African Revenue Service
SASOL	South African Synthetic Oil Limited
SBI	Sustainable Budget Index
SDR	Social Discount Rate
SEEA	System of Integrated Environmental and Economic Accounts
SNA	System of National Accounts
Stats SA	Statistics South Africa
US\$	United States Dollar
USGS	United States Geological Survey

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Executive summary

South Africa is one of the world's and Africa's most important mining countries in terms of the variety and quantity of minerals produced. South Africa has the world's largest reserves of gold, coal, and platinum group metals (PGM). The country's mineral industry can be broken down into five broad categories – gold, PGM, diamonds, coal and vanadium. Gold, PGM and coal contributed 71% of total mineral sales in 2009, which is R171 876 million and 63% towards minerals gross domestic product (GDP)¹. Mineral industries contributed 9% of the country's GDP¹ for 2009. Coal output sales exceeded those of gold for the first time in 2005 until 2009. PGM output sales exceeded those of gold for the first time in 2000. The Witwatersrand Basin yields 96% of South Africa's gold output. PGM, chrome and vanadium occur in the Bushveld Igneous Complex in Mpumalanga, Limpopo and North West. More than half of the world's chrome and proven PGM reserves are in this deposit. Bituminous coal and anthracite seams occur in the Karoo Basin in Mpumalanga, KwaZulu-Natal, Free State, Limpopo and Eastern Cape.

There has been a noticeable decline in gold production (extraction) and mining contribution to South Africa's GDP. In terms of employment, the mining industry reported an annual decrease of over 6% from December 2008 to December 2009².

South Africa's mineral industry is export-oriented, due to the small domestic market for most commodities. South Africa is a leading world supplier of a range of minerals and mineral products of consistent high quality⁴. South Africa's proven reserves of gold, PGM and coal commodities are regarded globally as the highest. South Africa ranked number five in the world for the production (extraction) of gold, and ranked number one in the world with highest proven gold reserves of 6 000 tons in 2009³. South Africa ranked number one in the production (extraction) of PGM and number one with the highest PGM proven reserves in 2009⁴. With regard to proven coal reserves, South Africa ranked number seven in coal production (extraction) in 2009⁴. Coal is one of the important export commodities because of its vast mineral resource base.

The country's rich endowment of minerals has played a key role in the evolution of the South African economy. For more than a century, South Africa's mineral industry, based mainly on gold, diamonds, coal and, recently, PGM production (extraction), has made an important contribution to the national economy⁴. The focus of this document is therefore on gold, PGM and coal. The country supplies about 80% of the world's PGM. The overall mining production (extraction) has gradually decreased over the years. Total mineral sales in December 2009 amounted to R241 345 million³. In 2009, there were 492 219 employees in the mining and quarrying industry with earnings of R66 096 million³. In 2009, there were 414 880 employees employed within the gold, PGM and coal mining industry with earnings of R55 070 million³. Mining is South Africa's largest industry in the primary economic sector, followed by agriculture⁴.

Gold

South Africa held its position as the world's largest gold producer for more than a century. In 2009 China became the leading number one in gold production (extraction), while gold production (extraction) in South Africa was ranked number five in the world. South African gold production (extraction) has decreased from 675 tons in 1980 to 198 tons in 2009, which represents a 71% decrease over a 29-year period. South Africa's gold production (extraction) year-on-year, showed a negative growth. Gold production (extraction) decreased by 7% from 213 tons in 2008 to 198 tons in 2009. Even though the production (extraction) of South African gold has been decreasing, the output (sales) has shown an increase over the years. The output (sales) revenue of gold was R45 992 million in 2008 and has increased by 6% to R48 696 million in 2009.

Platinum group metals

PGM constitute a family of six chemically similar elements, which include platinum, palladium, rhodium, ruthenium, iridium and osmium. They are divided according to their densities into a heavier category (platinum, iridium and osmium) and a lighter group (palladium, rhodium and ruthenium). South Africa's PGM production (extraction) has increased by 138% from 114 tons in 1980 to 271 tons in 2009. PGM production (extraction) decreased by 2% from 276 tons in 2008 to 271 tons in 2009. PGM export sales for 2008 totalled R77 904 million and decreased by 31% to R53 459 million in 2009. PGM output (sales) for 2009 amounted to R57 782 million.

Coal

In 2009, South African mines produced 251 million tons of coal, which constitutes an increase of 118% from 115 million tons in 1980. In 2008, coal production (extraction) was 253 million tons. Of the 2009 coal production (extraction), 185 million tons were sold domestically at a value of R34 463 million, with export sales totalling 60 million tons at a value of R30 935 million³. South Africa had approximately 30 408 million tons of proven coal reserves, which placed the country as the sixth largest holder of proven coal reserves in the world.

Key findings

Primary mineral exports sales revenue has decreased with 21% from R221 926 million in 2008 to R176 390 million in 2009. In 2009, gold exports increased in value to R46 994 million from R43 994 million but decreased in volume from 190 tons in 2008 to 181 tons in 2009. PGM exports decreased in value from R77 904 million in 2008 to R53 459 million in 2009 but increased in volume from 223 tons in 2008 to 251 tons in 2009. Coal exports decreased in value from R44 706 million in 2008 to R30 935 million in 2009 and decreased in volume from 61 million tons in 2008 to 60 million tons in 2009.

South Africa's mineral industry, based mainly on gold, coal and recently PGM production (extraction), has made an important contribution to the national economy. In 1980, the total gold production (extraction) was 675 tons, declining by 71% to 198 tons in 2009. With the decline in gold production (extraction) there was also a decline in the total volume sold. In 2009, the total volume sold for gold was 187 tons valued at R48 696 million. At this current extraction rate, proven gold reserves are estimated to last 30 years from 2009 due to a decrease in closing stock.

In 1980, production (extraction) of PGM in South Africa was at 114 tons, an increase of 138% to 271 tons for 2009. In 2009, the total sales for PGM were valued at R57 782 million. At the same rate of extraction as in 2009, proven PGM reserves are expected to last for another 258 years.

In 1980 coal production (extraction) was 115 million tons and in 2009, production (extraction) increased by 118% to 251 million tons. The total volume sold showed an increase of 117% from 113 million tons in 1980 to 245 million tons in 2009. In 2009 coal became the largest component of the South African mining industry with total value of sales of R65 398 million. The estimated number of years to depletion for proven coal reserves in 2009 was 121 years.

South African mining companies, like most of their international peers, responded to the global economic crisis by cutting back on supply and closing uneconomic production. The result was a drop in the value of South African mineral sales by 20% from R302 633 million in 2008 to R241 345 million in 2009³. According to the Chamber of Mines, the downward trend in mineral sales was driven by the decline in sales of manganese by 68%, PGM by 37% and coal by 10%. While total primary mineral exports sales fell by 21% from R221 926 million in 2008 to R176 390 million in 2009³.

The output (sales) for gold increased from R10 395 million in 1980 to R48 696 million in 2009. Intermediate consumption increased from R1 454 million in 1980 to R21 944 million in 2009. Gold mineral asset value for closing stock at 3%, 5% and 11,7% for annual values showed a declining trend for the period 1980 to 2009. The asset value for closing stock at the rate of 11,7% was negative for the period 1990 to 2002, and again from 2005 to 2009.

PGM output (sales) increased from R851 million in 1980 to R57 782 million in 2009. From 1999 to 2000 there was an increase in output (sales) from R14 887 million to R27 095 million. From 2005 output (sales) increased from R38 451 million to R65 444 million in 2006. From 2007 to 2008, output (sales) increased from R78 414 to R91 353, but declined in 2009 to R57 782 million. Intermediate consumption for PGM increased from R128 million in 1980 to R39 448 million in 2009. The closing stock for PGM at 3%, 5% and 11,7% at annual values fluctuated from 1980 onwards.

Coal output (sales) increased from R1 497 million in 1980 to R65 398 million in 2009. Intermediate consumption of coal increased from R507 million in 1980 to R25 745 million in 2009. The closing stock for coal for 1980 to 2009 has fluctuated for both annual and 5-year moving averages with negative values in 1999, 2000, and 2002 to 2004 at the discount rate of 11,7% for annual values.

A decrease in the income component leads to less revenue from mining to be invested to maintain a constant stream of income. With a decrease in the capital component, less of the revenue from mining can be consumed as current income. The reverse is true if there is an increase for the income or capital components.

The income component (X) for gold at a real rate of return (RRR) of 11,7% fluctuated over the 29-year period from 1980 to 2009. The income component in 1980 was R6 290 million, decreasing to -R4 070 million in 2009. The capital reinvestment component decreased from R220 million to -R142 million. The capital depreciation factor increased from 3% in 1980 to 10% in 1993 and decreased to 3% in 2009.

The income component (X) for PGM at an RRR of 11,7% fluctuated over the 29-year period from 1980 to 2009. The income component in 1980 was R401 million, decreasing to -R24 845 million in 2009. The capital reinvestment component remained at zero. The capital depreciation factor remained at zero.

The income component (X) for coal at an RRR of 11,7% increased over the 29-year period from 1980 to 2009. The income component in 1980 was R220 million, increasing to R9 816 million in 2009. The capital reinvestment component remained at zero. The capital depreciation factor remained at zero.

1. Introduction

An information system that links the measurement of human activities against the resources provided by the natural environment is required in order to measure sustainability of economic activities and economic growth. South Africa is rich in natural resources, including an abundance of mineral resources. South Africa needs to account for these resources. This mineral accounts discussion document is the sixth edition in the series produced by Statistics South Africa (Stats SA) for the reference period 1980 to 2009. The mineral accounts document present the physical, monetary and resource rent accounts aligned to the principles of the System of National Accounts (SNA). This document also presents the results for the El-Serafy's User-cost method in table format. There are geographical representations of the active mines in South Africa. Stats SA uses the System of Integrated Environmental and Economic Accounts (SEEA) framework as the guideline in the compilation of the mineral accounts.

Section 2 presents the importance of mineral accounts in South Africa. Section 3 presents the updated physical accounts for South Africa where the production (extraction) rate and years to depletion are shown. In section 4 the resource rent accounts are presented along with a summary of the results. In section 5 the monetary accounts are presented with monetary values of South Africa's proven gold, PGM and coal reserves. The monetary accounts are developed with the resource rent accounts as its basis. Section 6 focuses on the concept of sustainability and the approaches on how to measure sustainability with the El-Serafy's User-cost method.

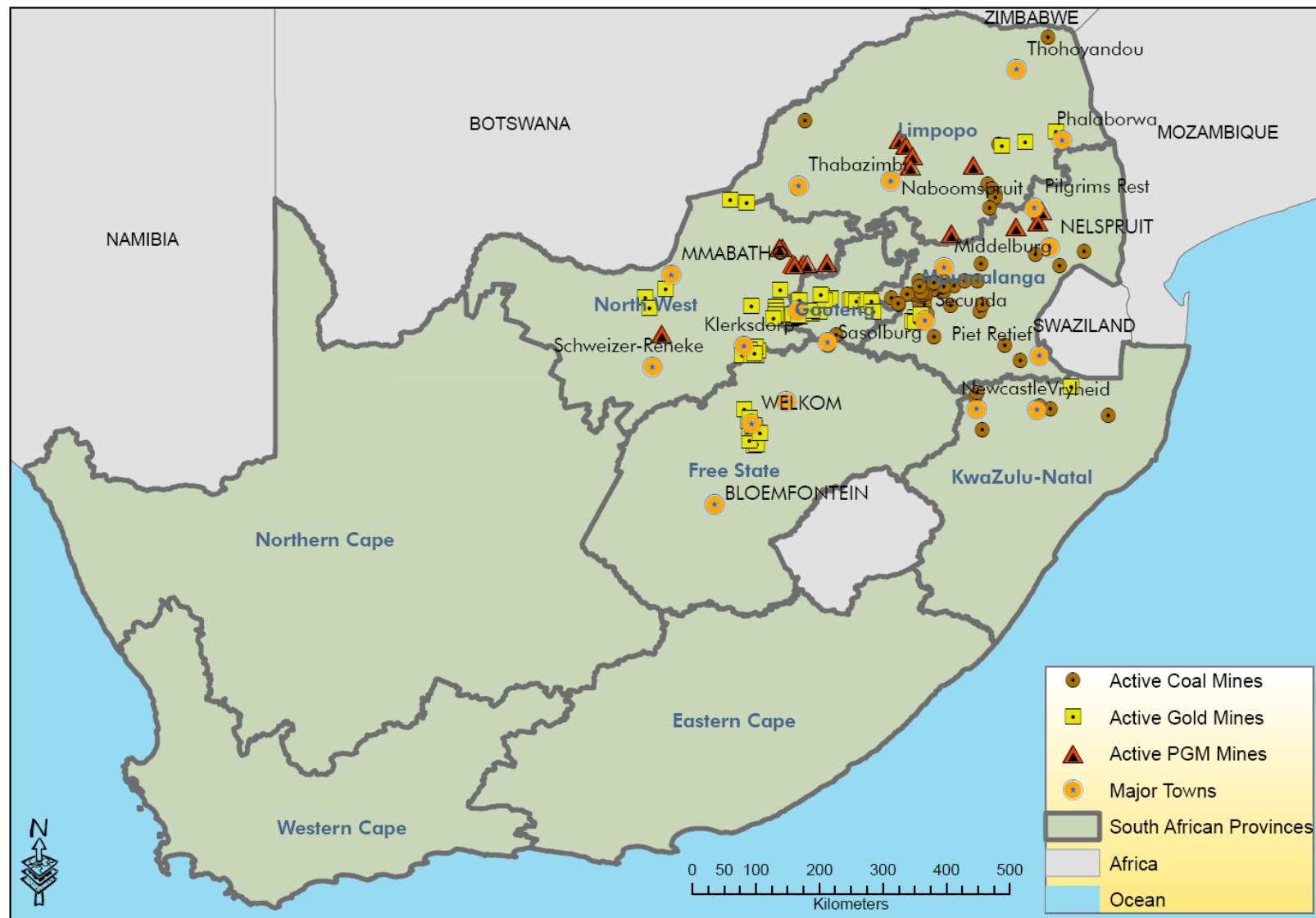
2. The importance of mineral accounts for South Africa

Mining has been the main driving force behind the history and development of South Africa's economy. Mining continues to support and stimulate growth and development in the country. Mining companies contribute extensively to South Africa's tax base. Rail, road and port development is spurred on by the development of new and extended mining operations. New towns are established in mineral rich areas and attract investment into the economy. South Africa holds a major economic and physical presence on the African continent regarding mining⁶. In the past 100 years mining has been the mainstay of the economy and has contributed significantly to the industrial development of the country. In the past 10 years, the development of export-oriented value-added processing aluminium, ferro-alloys, steel, and titanium industries has become an important component of the mineral economy of South Africa. The development of these value-added industries along with an expansion in coal exports and an increase in PGM prices has helped compensate for the declining contribution of gold in the economy. Owing to the high cost of deep gold mining in South Africa and the decline in the world market price for gold, gold export earnings have dropped. Mining contributed 9% directly to the GDP¹ for 2009, and the mining industry reported an annual decrease of 6% or 33 000 employees in December 2009 compared to December 2008². It is estimated by the Chamber of Mines that in 2009, around R200 000 million was added to the local economy through the intermediate and final product industries that use minerals produced by South Africa's mines.

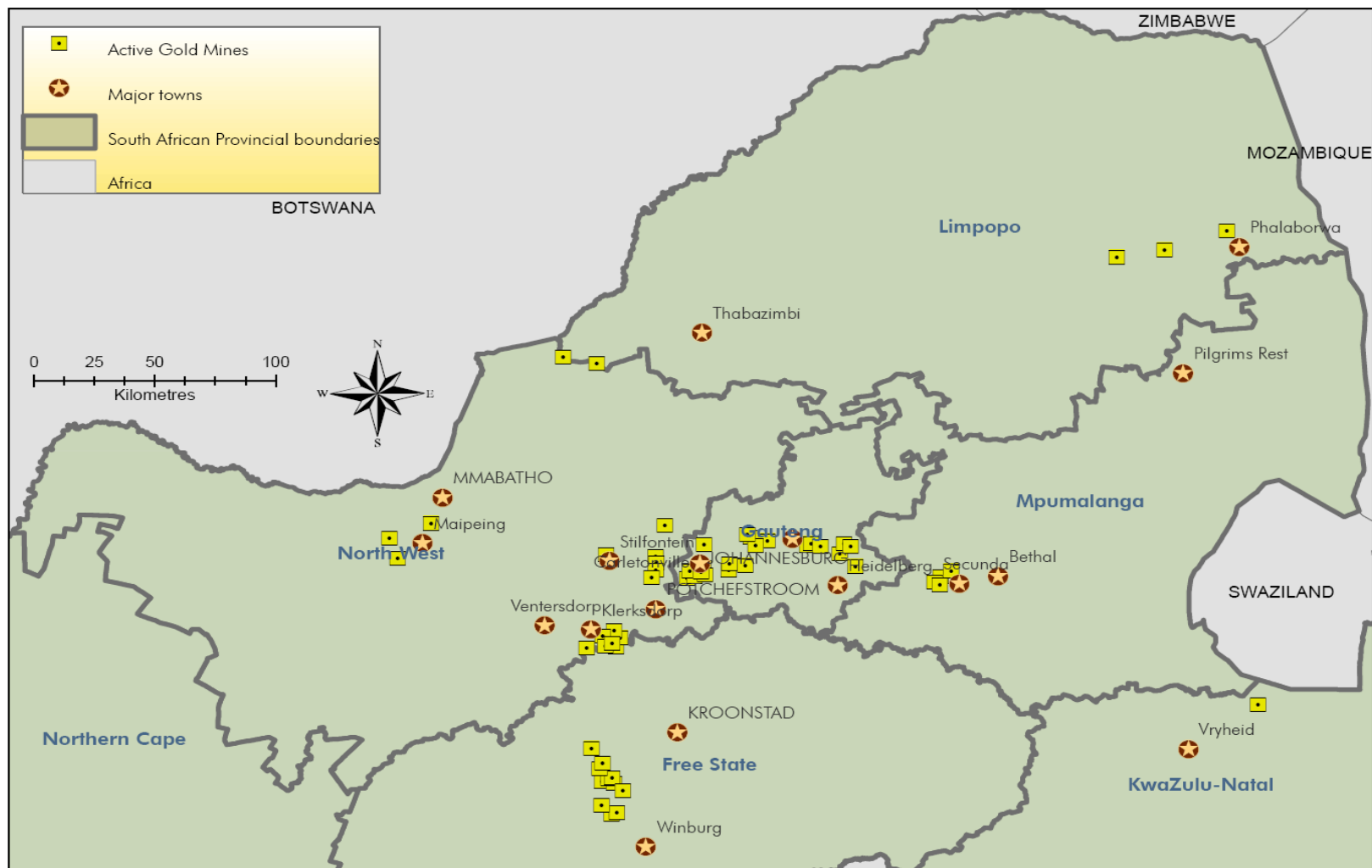
Map 1 illustrates the geographical positions of active gold, PGM and coal mines in South Africa. The majority of mining activities occur in Gauteng, Free State, Mpumalanga, North West and KwaZulu-Natal. Map 2 illustrates the active gold mines in South Africa, of which most are housed in Gauteng. Map 3 illustrates the active PGM mines in South Africa, dominantly in North West and Limpopo. Map 4 illustrates all the active coal mines in South Africa, mostly located in Mpumalanga. From these geographical maps, it is shown which provinces and towns engage in mining activities.

Through mineral accounts it is possible to measure the sustainability of these resources through depletion rates. This information provides a picture to government who has to make strategic plans around economic growth. Some minerals, such as gold, are increasingly difficult to exploit due to the great depths from which the ore needs to be extracted and the associated cost of extraction. If the resources are depleted or are no longer economically viable to extract, the mines could close down, impacting on the economy, society and infrastructure. The calculation of physical volumes of minerals and the years left to depletion is provided by the mineral accounts. Resource rents provided by mining activities, the portion of these rents that should be re-invested to maintain a constant stream of income (capital component), or the residual amount that can be consumed as current income (income component) form part of the calculations in the mineral accounts.

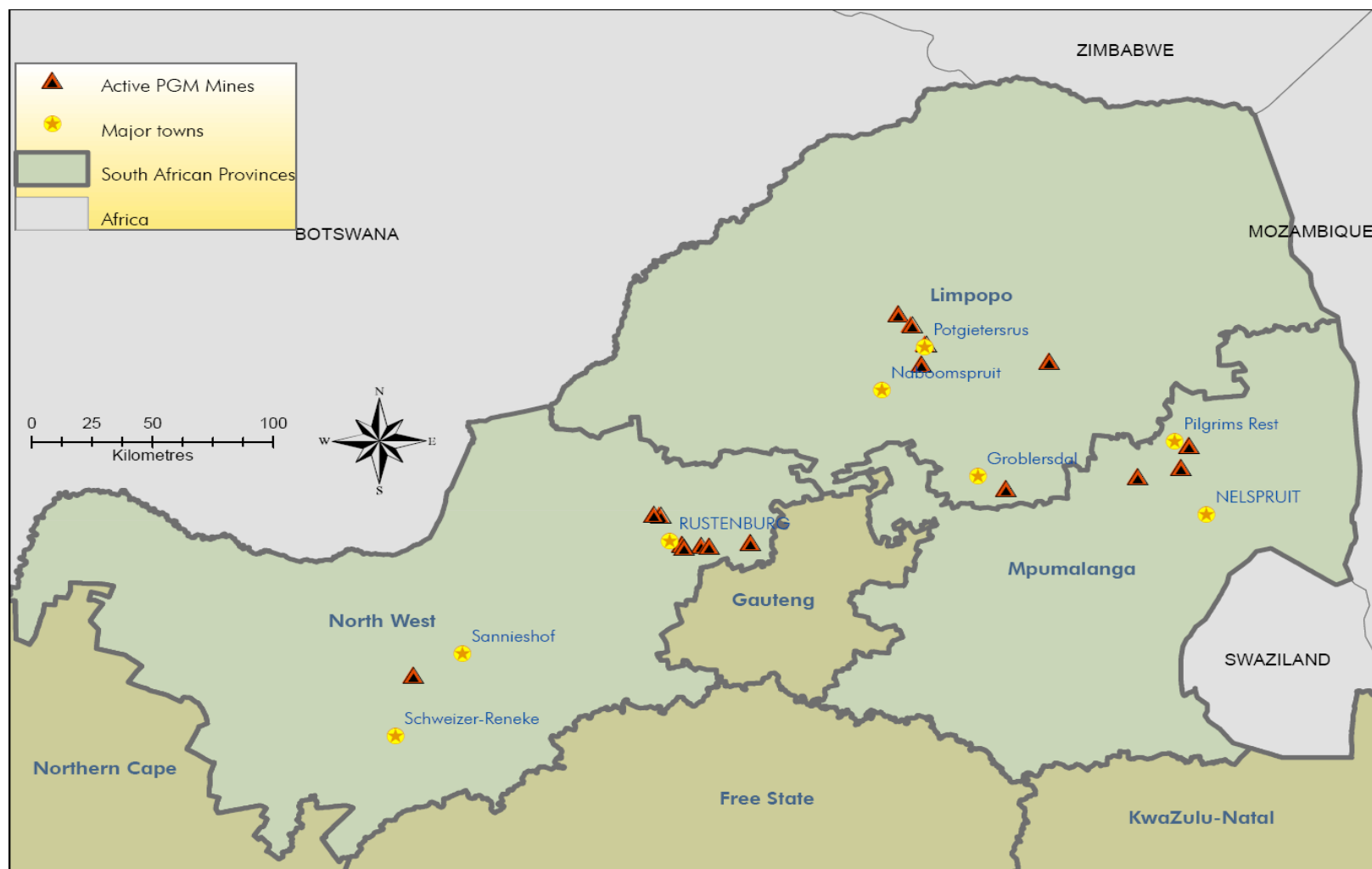
Map 1: Active gold, platinum group metals and coal mines in South Africa⁷



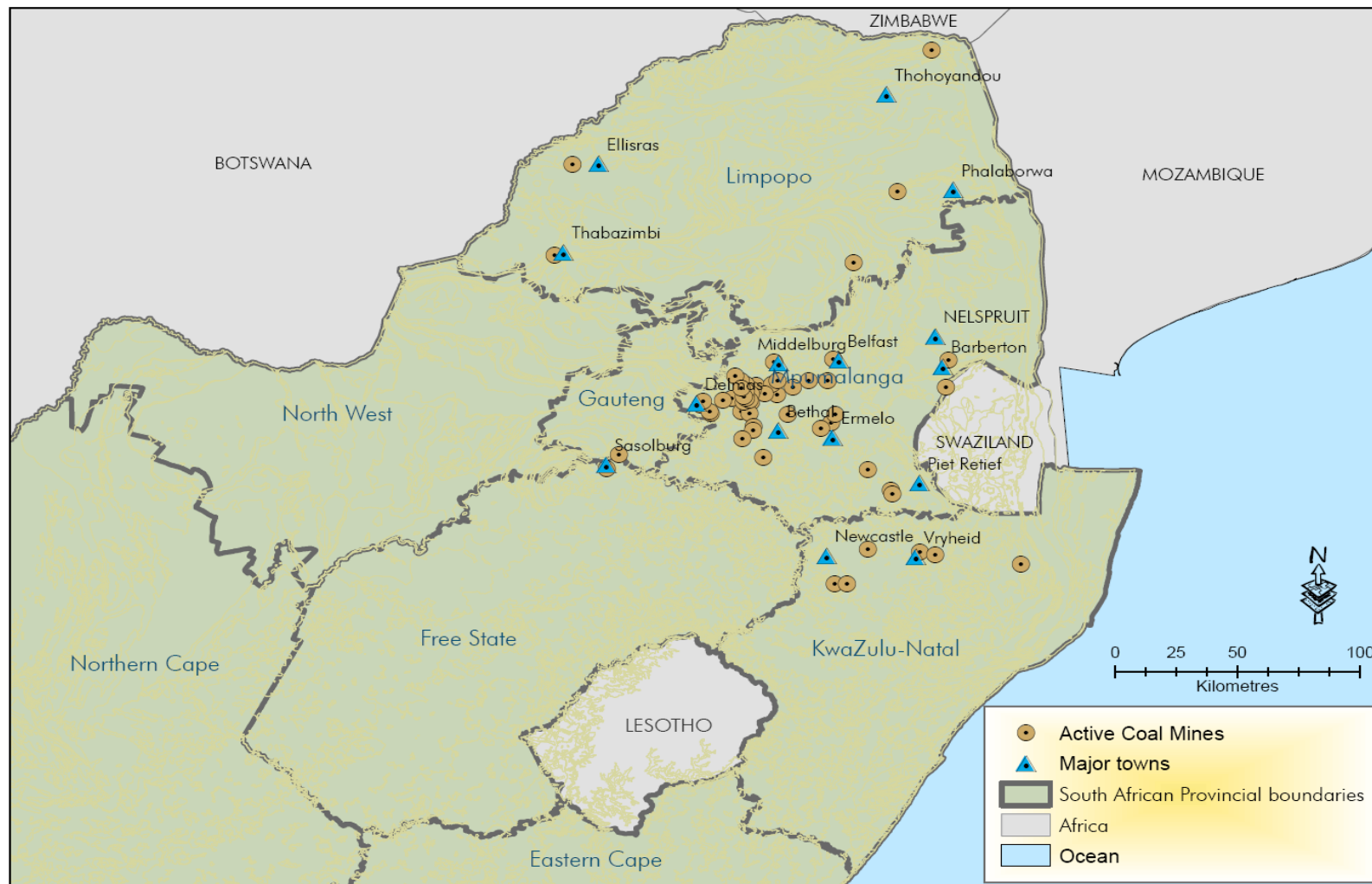
Map 2: Active gold mines in South Africa⁷



Map 3: Active platinum group metals mines in South Africa⁷



Map 4: Active coal mines in South Africa⁷



3. Physical accounts for the South African mining industry

Physical accounts provide information on mineral volume changes. This section presents the updated physical accounts for gold, PGM and coal for the reference period 1980 to 2009. The physical accounts consist of the following components: opening stock; production (extraction); closing stock (sub-soil assets); total volume sold; net change in inventories; closing stock (including inventories); and years to depletion of the particular mineral. These different components enable the monitoring of the physical volumes of mineral resources.

3.1 Gold

South Africa was the world's largest gold producer until 2007 when China became the largest producer of gold. China continued to increase gold production (extraction) and remained the leading gold-producing nation in 2009, followed by Australia. According to the Department of Mineral Resources (DMR)⁴, South Africa produced 198 tons of gold in 2009, which makes it rank number five in world gold production (extraction). This marks the decreasing trend of gold production (extraction) in South Africa. Demand for gold increased in 2009, particularly from India and China. South Africa has an estimated 6 000 tons of proven gold reserves. South African gold proven reserves decreased from 31 000 tons to 6 000 tons in 2009 as estimated by the United States Geological Survey (USGS). The reason for this decrease was due to the fact that the 2009 USGS edition released reserve base figures, which included proven reserves and resources. In the 2010 release, the USGS excluded resources from this figure for all gold resources and reclassified it as reserves for all gold producing countries. This is based on the fact that most of the gold resources occur at a depth of 4 000 metres and more beneath the earth's surface and are therefore currently not viable to mine. The future of the gold industry in South Africa therefore depends on new technologies for deep extraction.

Due to the small domestic market for most commodities, the South African mineral industry is export-oriented. South Africa has approximately 6 000 tons of proven gold reserves, making it the largest holder of proven gold reserves in the world. Australia is ranked number two, followed by Russia, and the number four country as regards to gold reserves in the world is the United States of America⁴. Physical accounts for gold are presented in Table 1. The trend that can be observed from Table 1 is the rate of production (extraction) of gold and how it has declined from 1980 to 2009. In 1980 the total production (extraction) was 675 tons, declining by 71% to 198 tons in 2009. With the decline in production (extraction) there was also a similar decline of 72% in the total volume sold for gold over the same period from 675 tons to 187 tons. Years to depletion is 30 years in 2009 (refer to Figure 1). South Africa's gold production (extraction) decreased by 8% from 213 tons in 2008 to 198 tons in 2009 due to the global economic crisis in 2009, which resulted in a declining demand for commodities. The consequence is the country dropping in production (extraction) ranking from number four in 2008 to number five in 2009. Employment in the gold mining sector declined from 166 424 employees in 2008 to 159 925 employees in 2009³. The mining and quarrying industry provided employment to 485 000 employees from the end of September 2009 to the end of December 2009².

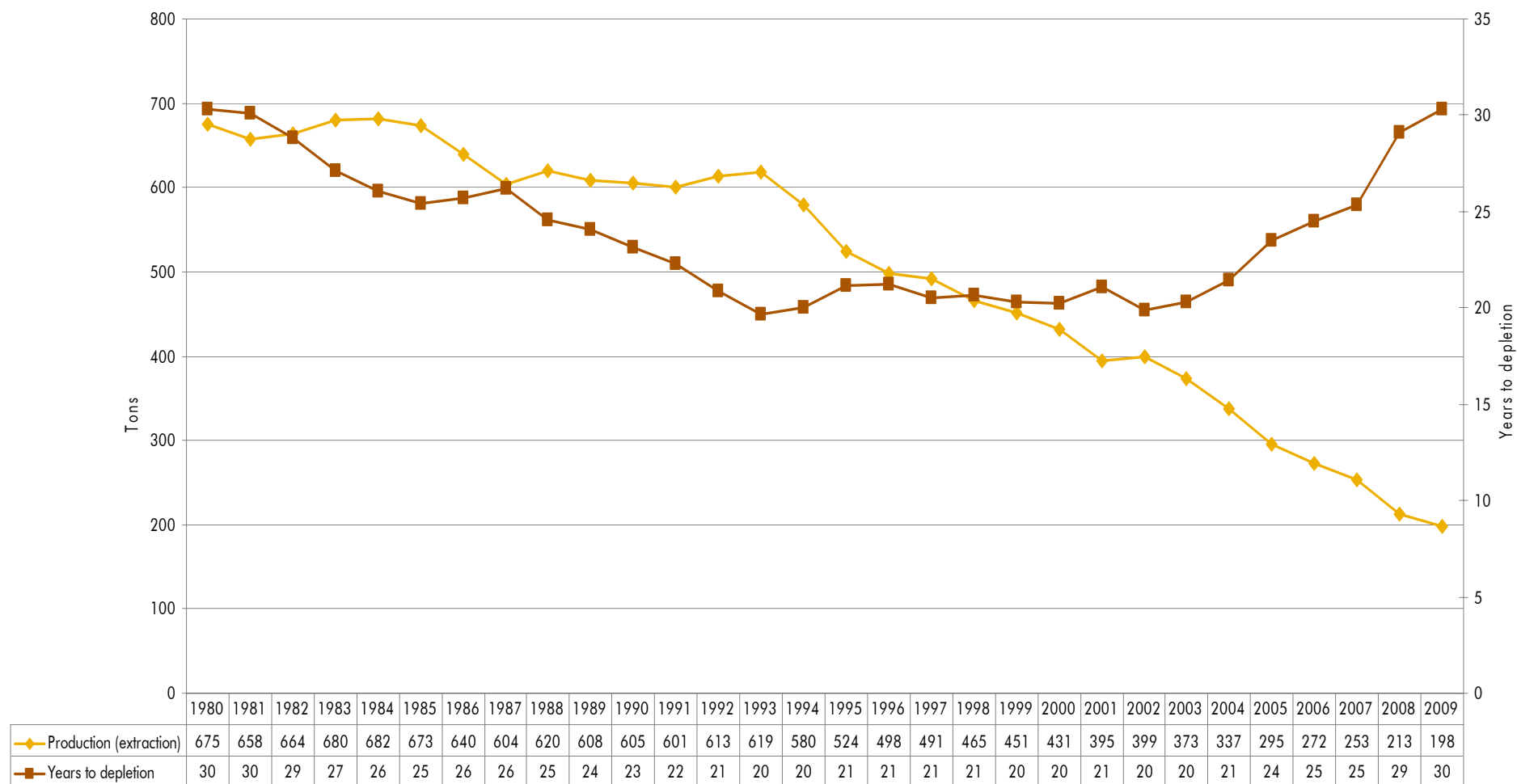
Table 1: Gold: physical accounts for South Africa, 1980–2009^{3, 4}

Year	Opening stock	Production (extraction)	Discoveries	Other volume changes	Closing stock (sub-soil assets)	Total volume sold	Net changes in inventories	Closing stock (including inventories)	Years to depletion
	Tons								
1980	21 117	675	-	-	20 442	675	0	20 442	30
1981	20 442	658	-	-	19 784	661	-3	19 781	30
1982	19 784	664	-	-	19 120	662	2	19 122	29
1983	19 120	680	-	-	18 440	669	11	18 451	27
1984	18 440	682	-	-	17 758	685	-3	17 755	26
1985	17 758	673	-	-	17 085	677	-4	17 081	25
1986	17 085	640	-	-	16 445	642	-2	16 443	26
1987	16 445	604	-	-	15 841	602	2	15 843	26
1988	15 841	620	-	-	15 221	618	2	15 223	25
1989	15 221	608	-	-	14 613	606	2	14 615	24
1990	14 613	605	-	-	14 008	596	9	14 017	23
1991	14 008	601	-	-	13 407	601	0	13 407	22
1992	13 407	613	-	-	12 794	613	0	12 794	21
1993	12 794	619	-	-	12 175	619	0	12 175	20
1994	12 175	580	-	-	11 595	580	0	11 595	20
1995	11 595	524	-	-	11 071	524	0	11 071	21
1996	11 071	498	-	-	10 573	496	2	10 575	21
1997	10 573	491	-	-	10 082	508	-17	10 065	21
1998	10 082	465	-	-	9 617	465	0	9 617	21
1999	9 617	451	-	-	9 166	455	-4	9 162	20
2000	9 166	431	-	-	8 735	406	25	8 760	20
2001	8 735	395	-	-	8 340	387	8	8 348	21
2002	8 340	399	-	-	7 941	396	3	7 944	20
2003	7 941	373	-	-	7 568	376	-3	7 565	20
2004	7 568	337	-	-	7 231	347	-10	7 221	21
2005	7 231	295	-	-	6 936	270	25	6 961	24
2006	6 936	272	-	-	6 664	283	-11	6 653	25
2007	6 664	253	-	-	6 411	243	10	6 421	25
2008	6 411	213	-	-	6 198	199	14	6 212	29
2009	6 198	198	-	-	6 000	187	11	6 011	30

Notes: Non-availability of data is indicated by a dash (-).

Where figures have been rounded, discrepancies may occur with totals.

Figure 1: Gold: production (extraction) and years to depletion, 1980–2009^{3, 4}



Calculations: Statistics South Africa.

3.2 Platinum group metals

PGM constitute a family of six chemically similar elements, which include platinum, palladium, rhodium, ruthenium, iridium and osmium. They are divided according to their densities into a heavier category (platinum, iridium and osmium) and a lighter group (palladium, rhodium and ruthenium). Anglo American Platinum (Anglo Platinum) is the world's largest platinum and palladium producer. Other major producers are Impala Platinum (Implats), Northam Platinum, Aquarius Platinum and Lonmin. South Africa is one of the largest producers of PGM in the world and holds a large percentage of global proven reserves. South African PGM production (extraction) decreased from 309 tons in 2006 to 304 tons in 2007, and to 271 tons in 2009 (refer to Table 2).

In 2009 there was a fall-off in demand, and prices had materially impacted on the sector, with most companies cutting costs and capital expenditure in order to mitigate the impact of lower prices. In 1980, PGM total volume sold in South Africa was 112 tons and increased to 251 tons in 2009 (refer to Table 2). Figure 2 illustrates that increases in production (extraction) have decreased the years to depletion. In 1980, South Africa PGM was standing at 662 years to depletion. In 2009 this figure changed to 258 years to depletion, which is a 61% decrease since 1980 (refer to Table 2 and Figure 2). The decrease in PGM production (extraction) was due to decreased demand from the automotive sectors. The largest fall in automotive demand came from Europe. Vehicle manufacturers currently account for about half of global PGM and palladium consumption. Cuts in PGM output seem inevitable if the global economic crisis persists.

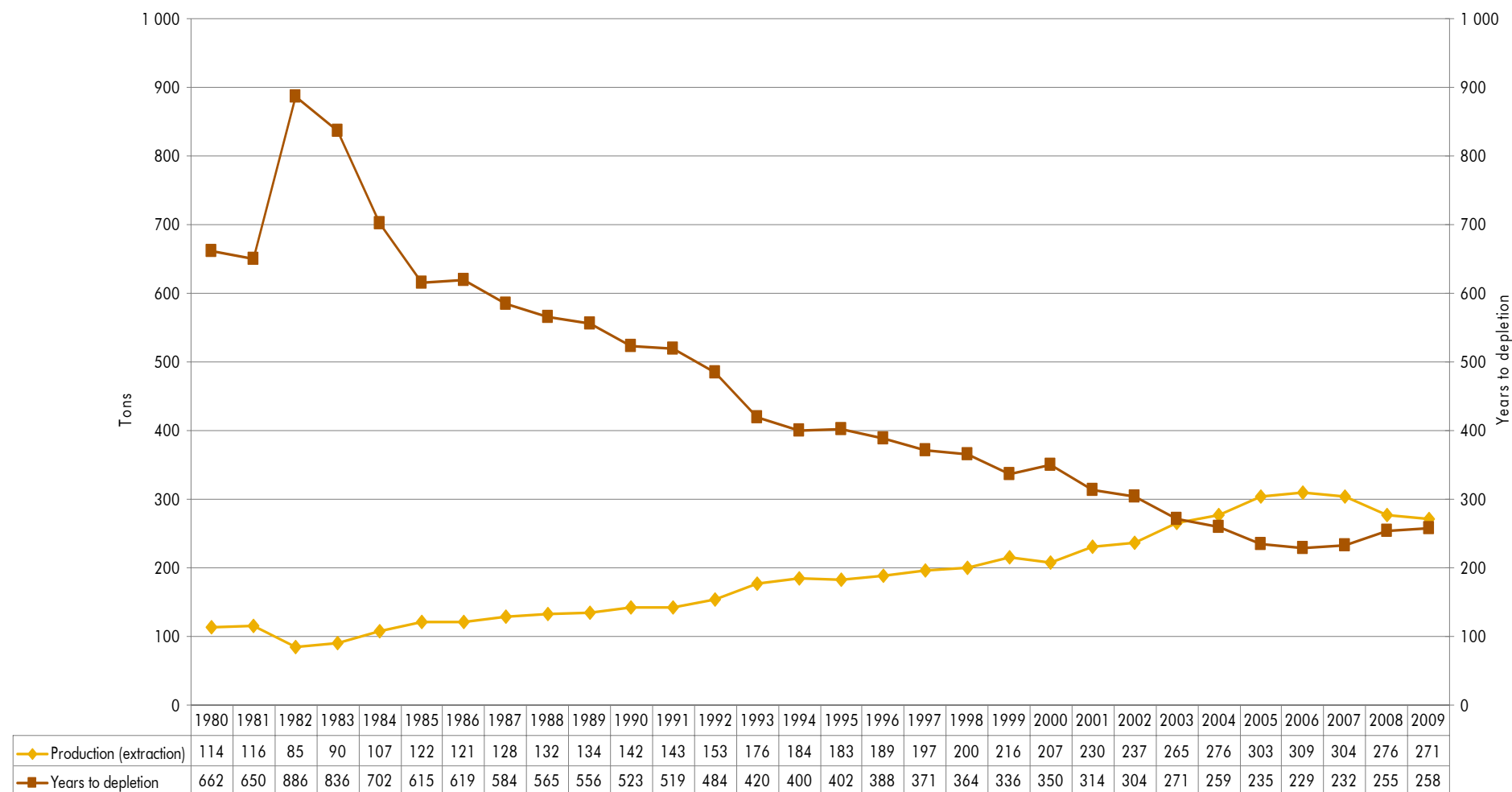
Table 2: Platinum group metals: physical accounts for South Africa, 1980–2009^{3, 4}

Year	Opening stock	Production (extraction)	Discoveries	Other volume changes	Closing stock (sub-soil assets)	Total volume sold	Net changes in inventories	Closing stock (including inventories)	Years to depletion
	Tons								
1980	75 610	114	-	-	75 496	112	2	75 498	662
1981	75 496	116	-	-	75 380	104	12	75 392	650
1982	75 380	85	-	-	75 295	98	-13	75 282	886
1983	75 295	90	-	-	75 205	104	-14	75 191	836
1984	75 205	107	-	-	75 098	113	-6	75 092	702
1985	75 098	122	-	-	74 976	118	4	74 980	615
1986	74 976	121	-	-	74 855	120	1	74 856	619
1987	74 855	128	-	-	74 727	130	-2	74 725	584
1988	74 727	132	-	-	74 595	131	1	74 596	565
1989	74 595	134	-	-	74 461	137	-3	74 458	556
1990	74 461	142	-	-	74 319	136	6	74 325	523
1991	74 319	143	-	-	74 176	141	2	74 178	519
1992	74 176	153	-	-	74 023	137	16	74 039	484
1993	74 023	176	-	-	73 847	154	22	73 869	420
1994	73 847	184	-	-	73 663	162	22	73 685	400
1995	73 663	183	-	-	73 480	175	8	73 488	402
1996	73 480	189	-	-	73 291	184	5	73 296	388
1997	73 291	197	-	-	73 094	187	10	73 104	371
1998	73 094	200	-	-	72 894	194	6	72 900	364
1999	72 894	216	-	-	72 678	199	17	72 695	336
2000	72 678	207	-	-	72 471	199	8	72 479	350
2001	72 471	230	-	-	72 241	193	37	72 278	314
2002	72 241	237	-	-	72 004	208	29	72 033	304
2003	72 004	265	-	-	71 739	241	24	71 763	271
2004	71 739	276	-	-	71 463	260	16	71 479	259
2005	71 463	303	-	-	71 160	259	44	71 204	235
2006	71 160	309	-	-	70 851	266	43	70 894	229
2007	70 851	304	-	-	70 547	258	46	70 593	232
2008	70 547	276	-	-	70 271	223	53	70 324	255
2009	70 271	271	-	-	70 000	251	20	70 020	258

Notes: Non-availability of data is indicated by a dash (-).

Where figures have been rounded, discrepancies may occur with totals.

Figure 2: Platinum group metals: production (extraction) and years to depletion, 1980–2009^{3, 4}



Calculations: Statistics South Africa.

3.3 Coal

Currently, the Witbank coalfields are the most important source of South Africa's mined coal. The future of South Africa's coal industry depends on the development of the Waterberg deposits, which extend into Botswana. Coal has traditionally dominated the energy supply sector in South Africa, from as early as 1880⁸. This is unlikely to change significantly in the next decade, due to the relative lack of suitable alternatives to coal as an energy source. South Africa produced an average of 251 million tons of marketable coal in 2009⁴, making it the seventh largest coal producing country in the world. Some 25% of coal production is exported internationally, making South Africa the fifth largest coal exporting country⁴. The remainder of South Africa's coal production feeds the various local industries, including electricity generation. The key role played by South African proven coal reserves in the economy is illustrated by the fact that Eskom is the 7th largest electricity generator in the world, and South African Synthetic Oil Limited (SASOL) the largest coal-to-chemicals producer⁸. Africa holds less than 5% of the total coal deposits, the remainder of coal resources are located in South Africa⁹.

Coal production (extraction) and exports increased from 1980 until 2008, but dropped in 2009 (refer to Table 3 and Figure 3). The use of coal is expected to increase over the next few years. South Africa has approximately 30 408 million tons of proven coal reserves, making it the sixth largest holder of proven coal reserves in the world⁴.

In 1980, production (extraction) was 115 million tons. In 2009 production (extraction) was 251 million tons, which represents an increase of 118%. An increase in production (extraction) has caused the years to depletion to decrease by 62% over the 29 years of reference. In 1980 there were 315 years to depletion and in 2009, with our present production (extraction) rate, there are almost 121 years of coal supply left.

Domestic sales decreased from 197 million tons in 2008 to 185 million tons in 2009³. South Africa's saleable coal production (extraction) decreased by less than 1% from 253 million tons in 2008 to 251 million tons in 2009 (refer to Table 3).

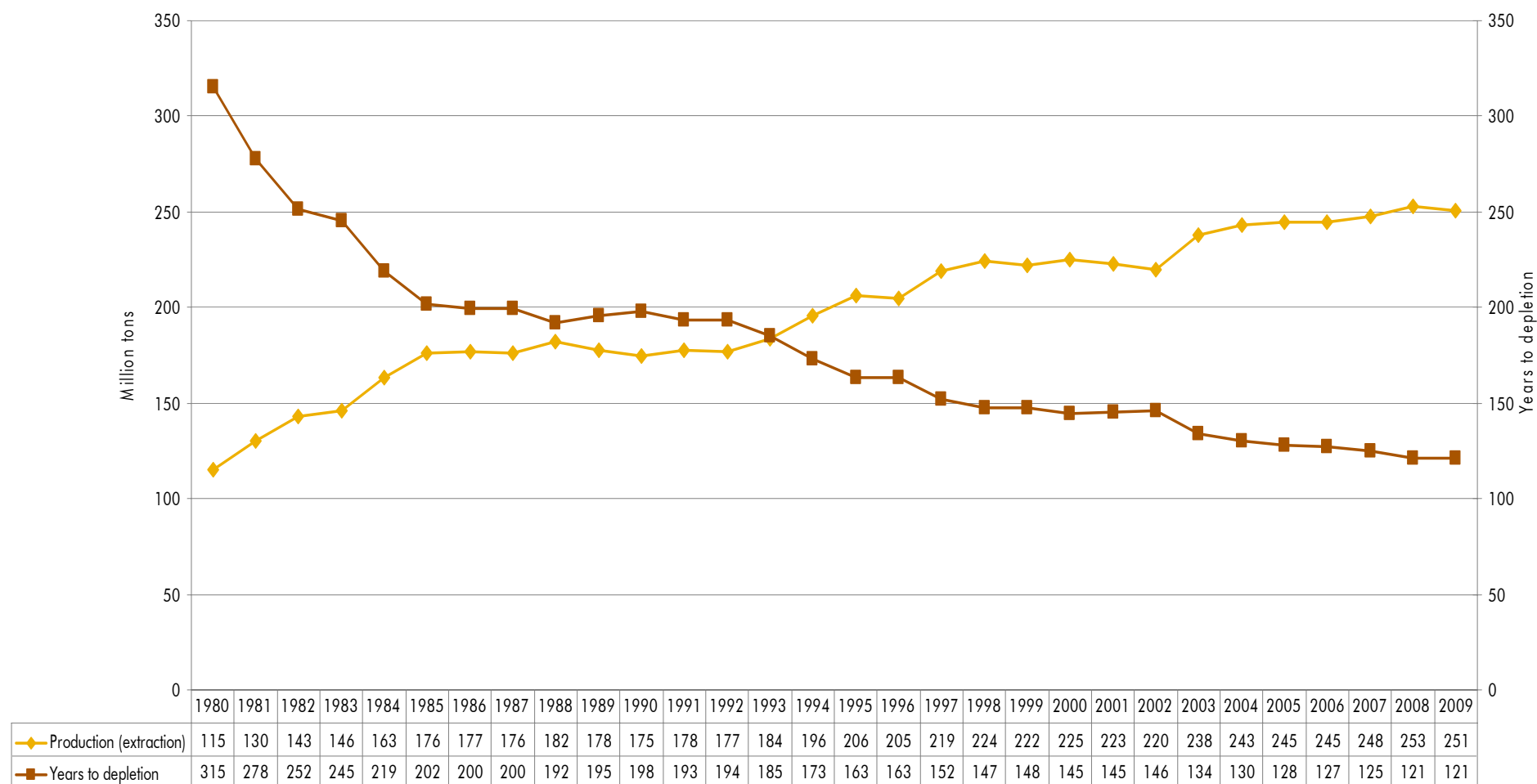
Table 3: Coal: physical accounts for South Africa, 1980–2009^{3, 4}

Year	Opening stock	Production (extraction)	Discoveries	Other volume changes	Closing stock (sub-soil assets)	Total volume sold	Net changes in inventories	Closing stock (including inventories)	Years to depletion
Million tons									
1980	36 371	115	-	-	36 256	113	2	36 258	315
1981	36 256	130	-	-	36 126	130	0	36 126	278
1982	36 126	143	-	-	35 983	140	3	35 986	252
1983	35 983	146	-	-	35 837	145	1	35 838	245
1984	35 837	163	-	-	35 674	161	2	35 676	219
1985	35 674	176	-	-	35 498	172	4	35 502	202
1986	35 498	177	-	-	35 321	174	3	35 324	200
1987	35 321	176	-	-	35 145	173	3	35 148	200
1988	35 145	182	-	-	34 963	184	-2	34 961	192
1989	34 963	178	-	-	34 785	180	-2	34 783	195
1990	34 785	175	-	-	34 610	185	-10	34 600	198
1991	34 610	178	-	-	34 432	182	-4	34 428	193
1992	34 432	177	-	-	34 255	179	-2	34 253	194
1993	34 255	184	-	-	34 071	184	0	34 071	185
1994	34 071	196	-	-	33 875	194	2	33 877	173
1995	33 875	206	-	-	33 669	206	0	33 669	163
1996	33 669	205	-	-	33 464	206	-1	33 463	163
1997	33 464	219	-	-	33 245	217	2	33 247	152
1998	33 245	224	-	-	33 021	224	0	33 021	147
1999	33 021	222	-	-	32 799	222	0	32 799	148
2000	32 799	225	-	-	32 574	225	0	32 574	145
2001	32 574	223	-	-	32 351	221	2	32 353	145
2002	32 351	220	-	-	32 131	227	-7	32 124	146
2003	32 131	238	-	-	31 893	240	-2	31 891	134
2004	31 893	243	-	-	31 650	247	-4	31 646	130
2005	31 650	245	-	-	31 405	245	0	31 405	128
2006	31 405	245	-	-	31 160	246	-1	31 159	127
2007	31 160	248	-	-	30 912	250	-2	30 910	125
2008	30 912	253	-	-	30 659	258	-5	30 654	121
2009	30 659	251	-	-	30 408	245	6	30 414	121

Note: Non-availability of data is indicated by a dash (-).

Where figures have been rounded, discrepancies may occur with totals.

Figure 3: Coal: production (extraction) and years to depletion, 1980–2009^{3, 4}



Calculations: Statistics South Africa.

4. Resource rent accounts for the South African mining industry

Private enterprises are granted leases by government permitting them to extract mineral deposits over a specified period in return for the payment of rents. These payments are often described as royalties, but they are essentially rents that accrue to owners of the assets in return for putting them at the disposal of other institutions for a specified time. This section discusses resource rent calculations for South Africa's gold, PGM and coal industries (Tables 4 to 6), how much rent should be collected by government, and what should the resource rent be used for. The resource rent tables show output (sales), intermediate consumption, compensation of employees, unit rent, resource rent, and other calculations for 1980 to 2009. The Social Discount Rates (SDR) that are used in the resource rent calculation in this discussion document are 3%, 5% and 11,7%.

This section provides a summary of resource rent values in the mining industry in South Africa, specific to each mineral and the relevant year. Negative resource rent values may be an indication that during that specific period it was not economically viable for mines to sustain their production (extraction) rates. The top three minerals (gold, PGM, and coal) output (sales) accounted for R171 876 million in 2009, which is 19% lower than the 2008 (R212 155 million) output (sales).

4.1 Gold

Table 4 presents the resource rent and other calculations for 1980 to 2009 at current prices. Gold output (sales) increased from R10 395 million in 1980 to R48 696 million in 2009. Figure 4 shows how gold output (sales), intermediate consumption and consumption of fixed capital followed a similar trend.

Resource rents at 3%, 5% and 11,7% have increased for the years 1980 to 2009. The negative resource rents are presented at 11,7% SDR from 1990 to 2009 except for 2003 and 2004. A useful indicator is the price of gold to indicate resource rent differences. Gold trading in January 1980 was R557 per ounce. In January 2000, gold was trading at R1 740 per ounce and in January 2009, gold was trading at R8 456 per ounce¹⁰.

Table 4: Gold: resource rent and other calculations for South Africa, 1980–2009^{3, 4, 11, 12, 13}

	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
	Rand millions														
Output (sales)	10 395	8 554	8 778	10 177	11 574	15 291	17 283	17 495	19 701	19 439	18 994	19 296	19 513	23 239	24 953
Intermediate consumption	1 454	1 860	2 379	2 639	3 028	3 822	4 219	4 814	5 372	5 651	6 069	7 511	8 232	9 314	10 870
Compensation of employees															
Total	1 448	1 793	2 098	2 438	2 844	3 311	3 949	4 852	5 521	6 100	6 720	6 849	6 940	7 217	7 612
Male	1 430	1 769	2 068	2 402	2 801	3 256	3 880	4 763	5 417	5 982	6 585	6 701	6 795	7 068	7 462
Female	18	24	30	36	43	56	69	89	103	117	135	148	145	149	150
Consumption of fixed capital	306	385	478	575	658	817	1 074	1 262	1 527	1 776	2 069	2 331	2 567	2 808	3 090
Opportunity cost of capital															
SDR 3%	173	223	279	339	394	495	651	752	902	1 053	1 201	1 318	1 411	1 499	1 595
SDR 5%	289	372	464	565	657	826	1 085	1 254	1 504	1 756	2 002	2 196	2 352	2 498	2 659
SDR 11,7%	676	870	1 086	1 322	1 537	1 932	2 538	2 935	3 520	4 108	4 684	5 139	5 503	5 845	6 221
Rent															
SDR 3%	7 014	4 293	3 544	4 186	4 650	6 845	7 391	5 814	6 378	4 859	2 935	1 288	363	2 401	1 786
SDR 5%	6 898	4 144	3 359	3 960	4 387	6 515	6 957	5 312	5 777	4 157	2 135	409	-578	1 402	723
SDR 11,7%	6 511	3 646	2 737	3 203	3 507	5 408	5 503	3 631	3 761	1 804	-548	-2 534	-3 729	-1 945	-2 840
Unit rent (R/kg)															
SDR 3%	10 390	6 524	5 338	6 156	6 818	10 171	11 548	9 625	10 288	7 992	4 852	2 142	592	3 880	3 080
SDR 5%	10 219	6 298	5 058	5 824	6 433	9 680	10 870	8 794	9 317	6 837	3 528	681	-943	2 265	1 246
SDR 11,7%	9 645	5 541	4 122	4 711	5 143	8 036	8 598	6 012	6 067	2 967	-905	-4 216	-6 083	-3 142	-4 896
Unit rent (R/kg) 5-year moving average															
SDR 3%	10 390	8 457	7 418	7 102	7 045	7 002	8 006	8 864	9 690	9 925	8 861	6 980	5 173	3 891	2 909
SDR 5%	10 219	8 259	7 192	6 850	6 767	6 659	7 573	8 320	9 019	9 100	7 869	5 832	3 884	2 474	1 356
SDR 11,7%	9 645	7 593	6 436	6 005	5 832	5 511	6 122	6 500	6 771	6 336	4 548	1 985	-434	-2 276	-3 848

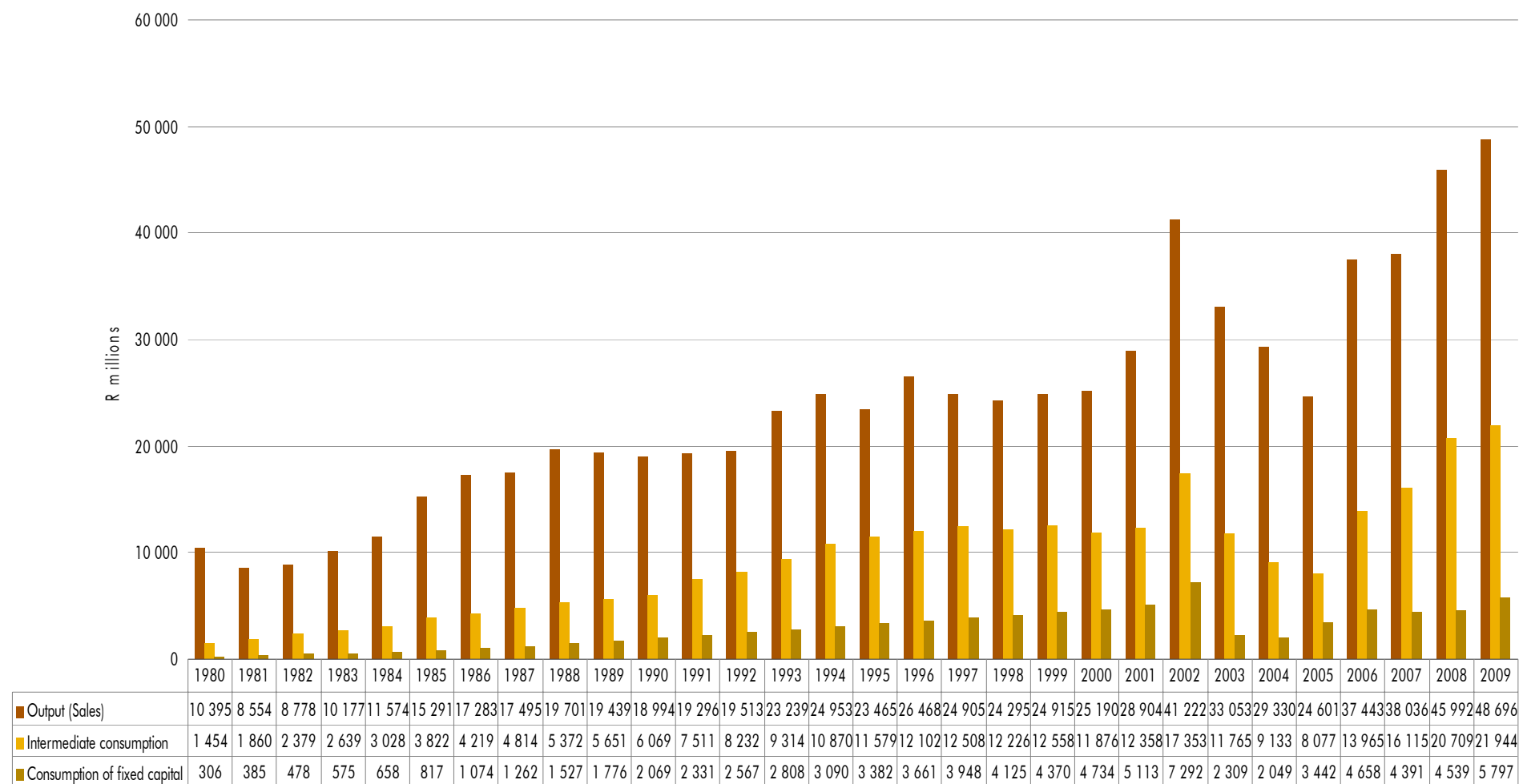
Table 4: Gold: resource rent and other calculations for South Africa, 1980–2009 (concluded)^{3, 4, 11, 12, 13}

	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
	Rand millions														
Output (sales)	23 465	26 468	24 905	24 295	24 915	25 190	28 904	41 222	33 053	29 330	24 601	37 443	38 036	45 992	48 696
Intermediate consumption	11 579	12 102	12 508	12 226	12 558	11 876	12 358	17 353	11 765	9 133	8 077	13 965	16 115	20 709	21 944
Compensation of employees															
Total	8 292	8 807	9 613	9 372	9 100	9 846	10 904	11 324	12 496	12 610	12 153	12 865	14 506	15 960	17 375
Male	8 107	8 602	9 390	9 164	8 902	9 623	10 674	11 081	12 219	12 320	11 787	12 435	13 958	15 248	16 343
Female	185	205	223	208	198	224	230	243	277	289	367	430	549	712	1 032
Consumption of fixed capital	3 382	3 661	3 948	4 125	4 370	4 734	5 113	7 292	2 309	2 049	3 442	4 658	4 391	4 539	5 797
Opportunity cost of capital															
SDR 3%	1 693	1 779	1 862	1 875	1 917	2 002	2 087	2 976	1 019	904	1 232	2 078	1 726	2 345	1 998
SDR 5%	2 822	2 964	3 103	3 125	3 195	3 337	3 478	4 960	1 698	1 507	2 053	3 464	2 877	3 908	3 330
SDR 11,7%	6 604	6 937	7 261	7 313	7 477	7 808	8 959	12 777	3 973	3 526	4 805	8 106	6 731	9 144	7 791
Rent															
SDR 3%	-1 481	119	-3 026	-3 304	-3 030	-3 268	-1 557	2 278	5 464	4 635	-303	3 877	1 298	2 440	1 581
SDR 5%	-2 610	-1 067	-4 267	-4 554	-4 308	-4 603	-2 948	294	4 785	4 032	-1 124	2 491	147	877	249
SDR 11,7%	-6 391	-5 039	-8 425	-8 742	-8 590	-9 074	-8 430	-7 523	2 510	2 013	-3 876	-2 151	-3 707	-4 359	-4 212
Unit rent (R/kg)															
SDR 3%	-2 826	238	-6 162	-7 105	-6 719	-7 583	-3 943	5 708	14 649	13 752	-1 027	14 252	5 129	11 455	7 986
SDR 5%	-4 980	-2 143	-8 690	-9 794	-9 553	-10 680	-7 464	737	12 828	11 964	-3 811	9 158	581	4 117	1 260
SDR 11,7%	-12 197	-10 119	-17 159	-18 800	-19 047	-21 054	-21 341	-18 856	6 728	5 973	-13 138	-7 908	-14 654	-20 465	-21 274
Unit rent (R/kg) 5-year moving average															
SDR 3%	1 374	993	-358	-2 555	-4 515	-5 466	-6 302	-3 928	423	4 517	5 828	9 467	9 351	8 712	7 559
SDR 5%	-346	-911	-2 460	-4 872	-7 032	-8 172	-9 236	-7 351	-2 826	1 477	2 851	6 175	6 144	4 402	2 261
SDR 11,7%	-6 107	-7 287	-9 503	-12 634	-15 464	-17 236	-19 480	-19 820	-14 714	-9 710	-8 127	-5 440	-4 600	-10 039	-15 488

Calculations: Statistics South Africa.

Note: Where figures have been rounded, discrepancies may occur with totals.

Figure 4: Gold: output, intermediate consumption and consumption of fixed capital, 1980–2009^{3, 4, 11, 12, 13}



Calculations: Statistics South Africa.

4.2 Platinum group metals

The resource rent and other calculations for PGM are presented in Table 5 from 1980 to 2009 at current prices. PGM output (sales) increased from R851 million in 1980 to R57 782 million in 2009. From 1999 to 2000 there was an increase in output (sales) from R14 887 million to R27 095 million. From 2005 output (sales) increased from R38 451 million to R65 444 million in 2006. From 2007 to 2008, output (sales) increased from R78 414 to R91 353, but declined in 2009 to R57 782 million. Intermediate consumption for PGM increased from R128 million in 1980 to R39 448 million in 2009.

PGM export sales revenue decreased from R77 904 million in 2008 to R53 459 million in 2009⁴, which led to a significant decline in the overall revenue of the sector. This big decline resulted in the PGM mining sector falling to position number two after coal in terms of total sales value. The PGM mining industry employed the largest number of workers at 184 613 employees and paid R24 879 million in salaries and wages³.

Figure 5 shows how PGM output (sales), intermediate consumption and consumption of fixed capital followed a similar trend. Intermediate consumption increased from R128 million in 1980 to R7 446 million in 1998. From 1998, intermediate consumption began to increase on an annual basis to R39 448 million in 2009. Resource rents at 3%, 5% and 11,7% have all increased from 1980 to 2009. Negative resource rents are observed in 1992 and 2000. The monthly average PGM price for December 1992 was US\$363 per troy ounce¹⁴. Platinum peaked at US\$625 per troy ounce in January 2001 and then increased to US\$1 450 per troy ounce for December 2009¹⁴.

Table 5: Platinum group metals: resource rent and other calculations for South Africa, 1980–2009^{3, 4, 11, 12, 13}

	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
	Rand millions														
Output (sales)	851	937	852	1 118	1 432	1 998	2 964	3 581	3 813	4 611	5 164	5 692	4 678	5 189	5 810
Intermediate consumption	128	206	230	291	372	500	830	967	1 030	1 337	1 652	1 935	1 637	2 243	2 935
Compensation of employees															
Total	224	278	235	254	341	450	570	768	933	1 136	1 505	1 658	1 901	2 111	2 241
Male	221	273	231	250	337	444	564	758	921	1 119	1 472	1 631	1 869	2 079	2 199
Female	3	5	4	4	4	6	7	9	12	16	32	27	33	33	43
Consumption of fixed capital	26	47	43	67	86	100	178	251	305	415	568	683	608	623	697
Opportunity cost of capital															
SDR 3%	17	28	26	34	43	60	119	143	191	231	310	398	327	311	349
SDR 5%	26	37	43	67	86	100	178	251	305	415	568	626	561	571	639
SDR 11,7%	73	106	114	157	188	239	368	520	550	696	917	1 091	990	1 047	1 132
Rent															
SDR 3%	456	378	319	472	590	889	1 268	1 452	1 355	1 493	1 130	1 018	204	-100	-412
SDR 5%	448	369	302	439	547	849	1 208	1 345	1 240	1 309	872	790	-30	-359	-703
SDR 11,7%	401	300	231	349	445	710	1 018	1 075	995	1 028	523	326	-458	-836	-1 195
Unit rent (R/kg)															
SDR 3%	4 004	3 259	3 751	5 249	5 515	7 284	10 476	11 344	10 264	11 142	7 956	7 116	1 332	-568	-2 240
SDR 5%	3 929	3 178	3 551	4 876	5 114	6 956	9 986	10 505	9 397	9 766	6 138	5 524	-197	-2 042	-3 819
SDR 11,7%	3 516	2 583	2 712	3 873	4 156	5 820	8 411	8 400	7 540	7 671	3 682	2 276	-2 997	-4 748	-6 496
Unit rent (R/kg) 5-year moving average															
SDR 3%	4 004	3 631	3 671	4 066	4 356	5 012	6 455	7 974	8 977	10 102	10 236	9 565	7 562	5 396	2 719
SDR 5%	3 929	3 554	3 553	3 884	4 130	4 735	6 096	7 487	8 392	9 322	9 158	8 266	6 126	3 838	1 121
SDR 11,7%	3 516	3 050	2 937	3 171	3 368	3 829	4 995	6 132	6 866	7 569	7 141	5 914	3 635	1 177	-1 656

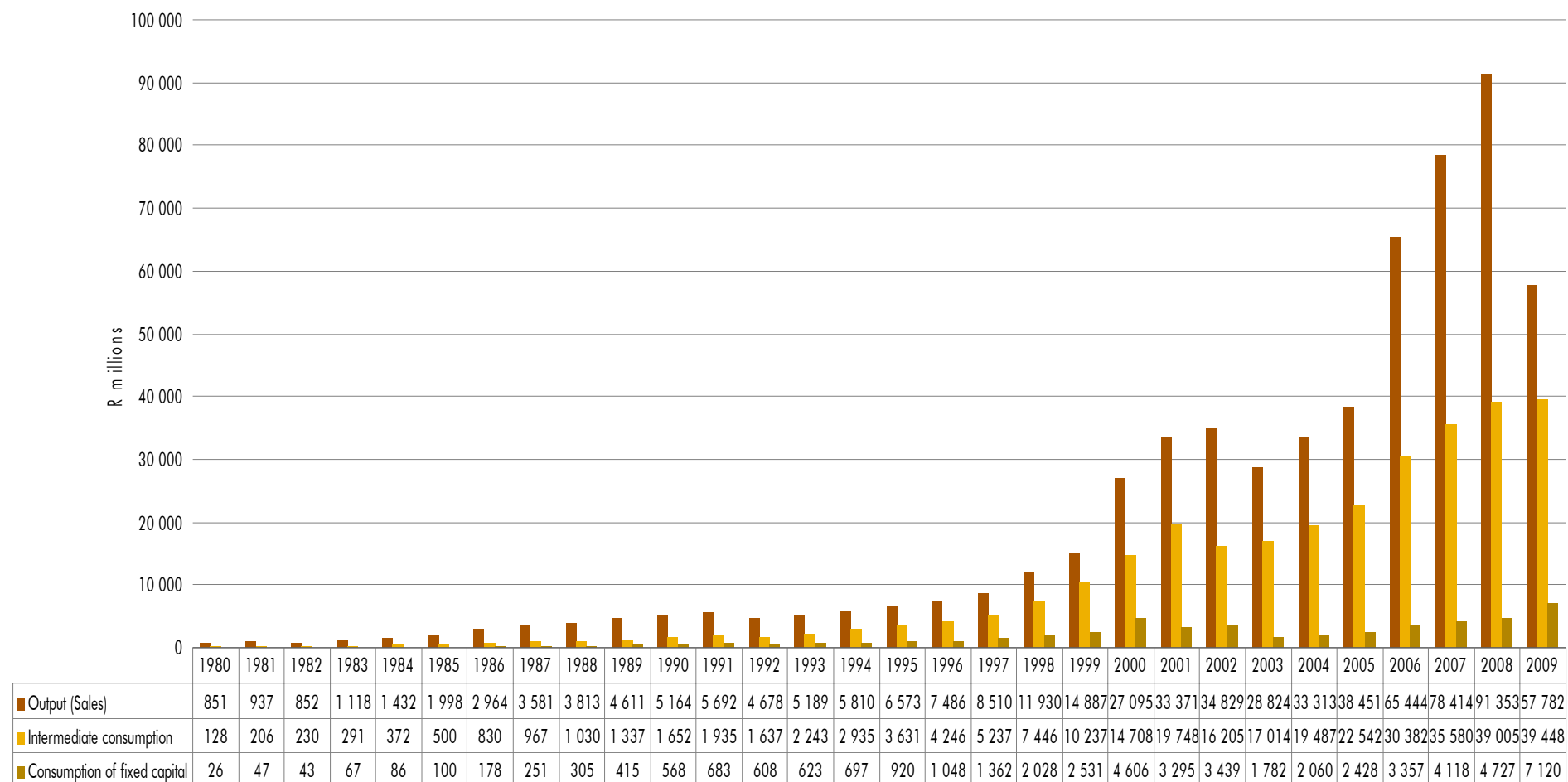
Table 5: Platinum group metals: resource rent and other calculations for South Africa, 1980–2009 (concluded)^{3, 4, 11, 12, 13}

	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
	Rand millions														
Output (sales)	6 573	7 486	8 510	11 930	14 887	27 095	33 371	34 829	28 824	33 313	38 451	65 444	78 414	91 353	57 782
Intermediate consumption	3 631	4 246	5 237	7 446	10 237	14 708	19 748	16 205	17 014	19 487	22 542	30 382	35 580	39 005	39 448
Compensation of employees															
Total	2 522	2 725	2 979	3 444	3 740	4 373	4 915	5 937	7 243	9 064	11 358	12 585	18 341	23 344	24 879
Male	2 471	2 664	2 920	3 364	3 653	4 278	4 806	5 783	7 022	8 743	10 925	11 953	17 376	21 843	23 070
Female	51	61	59	80	88	96	109	154	221	321	432	633	965	1 501	1 810
Consumption of fixed capital	920	1 048	1 362	2 028	2 531	4 606	3 295	3 439	1 782	2 060	2 428	3 357	4 118	4 727	7 120
Opportunity cost of capital															
SDR 3%	460	524	596	954	1 191	2 168	1 212	1 265	839	970	1 090	1 226	1 470	2 132	2 867
SDR 5%	789	823	1 021	1 551	1 935	3 522	2 060	2 150	1 398	1 616	1 816	2 043	2 450	3 553	4 778
SDR 11,7%	1 216	1 255	1 395	1 925	2 385	3 624	4 463	4 658	3 272	3 782	4 249	4 781	5 732	8 314	11 181
Rent															
SDR 3%	-961	-1 057	-1 664	-1 943	-2 812	1 240	4 201	7 983	1 946	1 733	1 033	17 894	18 906	22 144	-16 532
SDR 5%	-1 290	-1 356	-2 089	-2 540	-3 556	-115	3 353	7 098	1 386	1 086	307	17 076	17 926	20 723	-18 443
SDR 11,7%	-1 717	-1 788	-2 463	-2 914	-4 006	-216	950	4 590	-488	-1 080	-2 126	14 338	14 643	15 962	-24 845
Unit rent (R/kg)															
SDR 3%	-5 252	-5 590	-8 446	-9 716	-13 018	5 991	18 265	33 684	7 342	6 277	3 410	57 908	62 190	80 234	-61 002
SDR 5%	-7 048	-7 175	-10 606	-12 698	-16 464	-553	14 578	29 950	5 231	3 935	1 013	55 263	58 967	75 084	-68 055
SDR 11,7%	-9 382	-9 458	-12 502	-14 568	-18 546	-1 043	4 130	19 368	-1 840	-3 912	-7 018	46 402	48 169	57 834	-91 680
Unit rent (R/kg) 5-year moving average															
SDR 3%	78	-2 464	-4 419	-6 249	-8 405	-6 156	-1 385	7 041	10 453	14 312	13 796	21 724	27 425	42 004	28 548
SDR 5%	-1 516	-4 056	-6 138	-8 269	-10 798	-9 499	-5 149	2 962	6 548	10 628	10 941	19 078	24 882	38 852	24 454
SDR 11,7%	-4 269	-6 616	-8 517	-10 481	-12 891	-11 223	-8 506	-2 132	414	3 341	2 146	10 600	16 360	28 295	10 741

Calculations: Statistics South Africa.

Note: Where figures have been rounded, discrepancies may occur with totals.

Figure 5: Platinum group metals: output, intermediate consumption and consumption of fixed capital, 1980–2009^{3, 4, 11, 12, 13}



Calculations: Statistics South Africa.

4.3 Coal

The resource rent and other calculations for coal are presented in Table 6 for 1980 to 2009 at current prices. Coal output (sales) increased from R1 497 million in 1980 to R65 398 million in 2009. Figure 6 shows intermediate consumption increased from R507 million in 1980 to R2 080 million in 1990. From 1991, intermediate consumption increased from R507 million in 2008 to R25 745 million in 2009.

Resource rents at 3%, 5% and 11,7% have increased from 1980 to 2009. Negative resource rents for coal at 11,7% is observed for 1999, 2000, 2002, 2003 and 2004. The local coal price was R187 per ton and export sales were R512 per ton in 2009³. Domestic sales decreased by 6% year-on-year to 185 million tons in 2009³.

In 2009, South Africa's coal proven reserves of 30 408 million tons accounted for 7% of the world total. South Africa has Africa's only significant coal proven reserves. South Africa's coal production (extraction) for 2009 is 251 million tons, which is 4% of the world total. Coal consumption of fixed capital for 1980 was R55 million, and it has increased to R6 820 million in 2009. Most of the country's coal is currently mined in the Highveld, Witbank and Ermelo coalfields located in Mpumalanga. Coal output (sales) decreased from R74 810 million in 2008 to R65 398 million in 2009. Compared to 2008, coal export sales decreased by 31% from R44 706 million in 2008 to R30 935 million in 2009, while domestic sales increased by 14% from R30 104 million in 2008 to R34 463 million in 2009.

Table 6: Coal: resource rent and other calculations for South Africa, 1980–2009^{3, 4, 11, 12, 13}

	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
	Rand millions														
Output (sales)	1 497	2 146	2 653	2 651	3 474	5 102	5 433	4 846	5 952	7 574	8 173	8 785	9 424	9 714	10 353
Intermediate consumption	507	609	732	794	886	1 261	1 449	1 730	1 885	1 963	2 080	3 237	3 816	4 684	5 106
Compensation of employees															
Total	567	738	792	803	903	1 064	1 246	1 383	1 545	1 870	2 130	2 441	2 082	1 884	2 021
Male	554	720	769	777	872	1 028	1 203	1 332	1 487	1 802	2 046	2 344	2 010	1 821	1 949
Female	13	18	23	26	31	37	43	51	58	68	84	97	71	62	72
Consumption of fixed capital	55	73	96	121	143	184	243	286	356	430	534	645	728	814	911
Opportunity cost of capital															
SDR 3%	38	51	68	83	98	124	161	186	228	270	334	401	442	481	526
SDR 5%	63	85	113	139	164	207	269	310	380	450	557	668	736	802	876
SDR 11,7%	148	198	264	325	383	485	629	724	888	1 052	1 303	1 562	1 723	1 876	2 051
Rent															
SDR 3%	330	675	965	850	1 444	2 469	2 333	1 261	1 938	3 041	3 096	2 062	2 356	1 851	1 789
SDR 5%	305	641	920	794	1 378	2 386	2 226	1 137	1 787	2 862	2 873	1 795	2 062	1 531	1 438
SDR 11,7%	220	528	769	608	1 159	2 108	1 866	722	1 278	2 259	2 127	900	1 075	456	264
Unit rent (R/kg)															
SDR 3%	2 869	5 194	6 751	5 819	8 858	14 026	13 182	7 162	10 650	17 087	17 689	11 583	13 313	10 061	9 126
SDR 5%	2 649	4 933	6 436	5 438	8 457	13 554	12 575	6 459	9 816	16 076	16 416	10 083	11 649	8 319	7 338
SDR 11,7%	1 910	4 060	5 380	4 161	7 112	11 975	10 542	4 102	7 021	12 690	12 153	5 057	6 074	2 480	1 347
Unit rent (R/kg) 5-year moving average															
SDR 3%	2 869	4 031	4 938	5 158	5 898	8 129	9 727	9 809	10 776	12 422	13 154	12 834	14 064	13 947	12 355
SDR 5%	2 649	3 791	4 672	4 864	5 582	7 764	9 292	9 297	10 172	11 696	12 269	11 770	12 808	12 509	10 761
SDR 11,7%	1 910	2 985	3 783	3 878	4 525	6 538	7 834	7 579	8 151	9 266	9 302	8 205	8 599	7 691	5 422

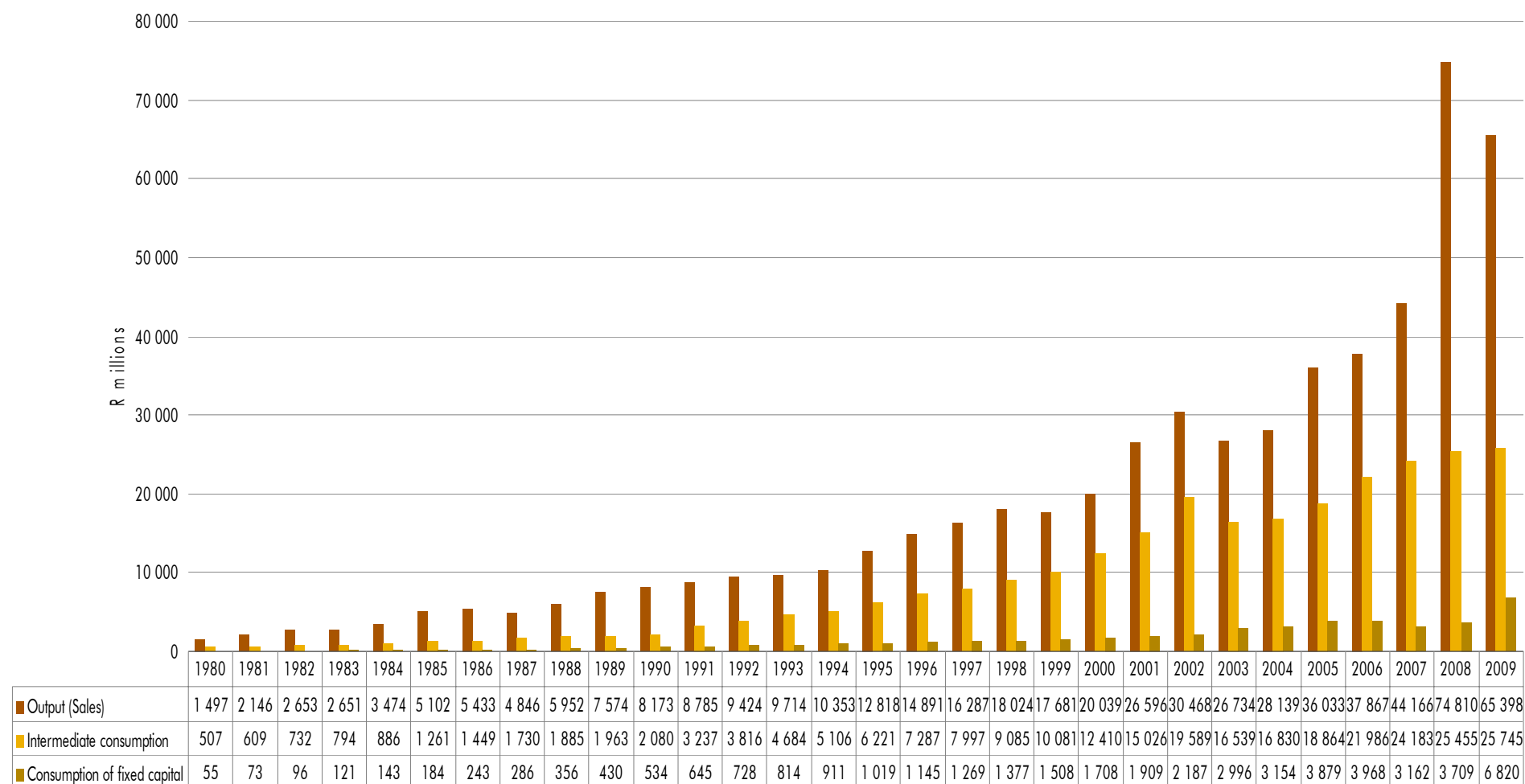
Table 6: Coal: resource rent and other calculations for South Africa, 1980–2009 (concluded)^{3, 4, 11, 12, 13}

	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
	Rand millions														
Output (sales)	12 818	14 891	16 287	18 024	17 681	20 039	26 596	30 468	26 734	28 139	36 033	37 867	44 166	74 810	65 398
Intermediate consumption	6 221	7 287	7 997	9 085	10 081	12 410	15 026	19 589	16 539	16 830	18 864	21 986	24 183	25 455	25 745
Compensation of employees															
Total	2 371	2 782	3 204	3 523	3 831	4 287	4 451	4 468	5 481	5 863	6 482	7 270	8 692	11 021	12 815
Male	2 288	2 687	3 095	3 399	3 698	4 127	4 293	4 289	5 252	5 582	6 156	6 855	8 107	10 194	11 717
Female	83	95	109	124	133	161	158	180	229	281	326	415	585	826	1 098
Consumption of fixed capital	1 019	1 145	1 269	1 377	1 508	1 708	1 909	2 187	2 996	3 154	3 879	3 968	3 162	3 709	6 820
Opportunity cost of capital															
SDR 3%	574	633	686	729	780	873	786	900	644	678	758	726	808	1 375	2 616
SDR 5%	956	1 056	1 144	1 215	1 301	1 455	1 309	1 500	1 074	1 130	1 263	1 211	1 346	2 292	4 360
SDR 11,7%	2 238	2 470	2 676	2 842	3 043	3 404	4 518	5 176	2 513	2 645	2 956	2 833	3 150	5 362	10 201
Rent															
SDR 3%	2 633	3 044	3 132	3 310	1 481	760	4 423	3 324	1 074	1 613	6 051	3 916	7 322	33 251	17 402
SDR 5%	2 251	2 622	2 674	2 825	961	178	3 900	2 725	645	1 161	5 545	3 432	6 783	32 334	15 658
SDR 11,7%	970	1 208	1 142	1 197	-782	-1 771	691	-952	-794	-353	3 852	1 810	4 979	29 263	9 816
Unit rent (R/kg)															
SDR 3%	12 783	14 850	14 299	14 778	6 670	3 379	19 836	15 108	4 513	6 640	24 696	15 986	29 523	131 425	69 330
SDR 5%	10 926	12 790	12 210	12 610	4 327	793	17 491	12 385	2 708	4 779	22 633	14 009	27 352	127 802	62 383
SDR 11,7%	4 707	5 891	5 213	5 344	-3 523	-7 872	3 099	-4 327	-3 337	-1 453	15 724	7 387	20 077	115 665	39 109
Unit rent (R/kg) 5-year moving average															
SDR 3%	11 373	12 027	12 224	13 167	12 676	10 795	11 793	11 954	9 901	9 895	14 159	13 388	16 271	41 654	54 192
SDR 5%	9 663	10 204	10 317	11 175	10 573	8 546	9 486	9 521	7 541	7 631	11 999	11 303	14 296	39 315	50 836
11,7%	3 933	4 100	3 927	4 500	3 526	1 010	452	-1 456	-3 192	-2 778	1 941	2 799	7 680	31 480	39 592

Calculations: Statistics South Africa.

Note: Where figures have been rounded, discrepancies may occur with totals.

Figure 6: Coal: output, intermediate consumption and consumption of fixed capital, 1980–2009^{3, 4, 11, 12, 13}



Calculations: Statistics South Africa.

5. Monetary accounts for the South African mining industry

This section focuses on the monetary accounts for South Africa's gold, PGM and coal mining industries. The results from the resource rent calculations in section 4 were used in the compilation of the monetary accounts. The negative resource rent values are carried through to the monetary accounts. The discussion into the negative resource rent values presented in section 4 are important for the monetary accounts, as it looks at how the fluctuating mineral prices will have an effect on the value of mineral assets represented in the monetary accounts. If there are negative resource rents, this may present negative values for the mineral asset.

Monetary accounts are presented both in current values (the rent calculated for each year) and using a 5-year moving average. The 5-year moving average is used to reflect the fact that mineral prices fluctuate within one year and therefore the current value of mineral assets is not always best represented by the unit rent in any single year¹⁵. In 2009, coal became the largest component of South Africa's mining industry by sales value, with total output (sales) of R65 398 million, followed by PGM group metals at R57 782 million and gold at R48 696 million; the top three minerals accounting for 71% of total mineral sales.

Production (extraction) decreased for most minerals, resulting in the value of South African mineral sales falling by 20% from R302 633 in 2008 to R241 345 million in 2009³. While total primary mineral exports sales fell by 21% from R221 925 million in 2008 to R176 390 million in 2009.

5.1 Gold

Monetary accounts for gold in South Africa are shown in Tables 7 and 8, with opening stock, depletion, revaluation and closing stock in rand values. The values are represented by 3%, 5% and 11,7% SDR values. Table 7 was calculated in annual unit rent figures and Table 8 was calculated with unit rents in 5-year moving averages.

Opening stock in 1981 for annual units was R138 275 million, R106 478 million and R53 696 million at 3%, 5% and 11,7% SDR values respectively. The opening stock has decreased from 1981 to 2009. On an annual basis from 1980 to 2009, the closing stock has shown a decrease of 77% at 3% SDR, and has decreased by 96% and 165% at an SDR of 5% and 11,7% respectively (refer to Table 7 and Figure 7). On a 5-year moving average, closing stock has decreased by 79%, 93%, and 147%, at an SDR of 3%, 5% and 11,7% respectively (refer to Table 8 and Figure 8). The mineral asset value for closing stock at 3%, 5% and 11,7% decreased from 1980 to 1984, increased from 1985 to 1986 and from 1987 decreased until 2009 (refer to Figures 7 and 8). Figure 7 shows that the asset value for closing stock was negative for the period 1990 to 2009 at 11,7%. The closing stock recovered in 2003 but dropped from 2005 until 2009. This observed trend may be due to the fluctuations in the gold price as mentioned in section 4.1 above.

Table 7: Gold: monetary accounts for South Africa, annual 1980–2009^{3, 4, 11, 12, 13}

Year	Opening stock			Depletion			Revaluation			Closing stock		
	Rand millions											
	3%	5%	11,7%	3%	5%	11,7%	3%	5%	11,7%	3%	5%	11,7%
1980	-	-	-	7 014	6 898	6 511	-	-	-	138 275	106 478	53 696
1981	138 275	106 478	53 696	4 293	4 144	3 646	-58 309	-46 854	-27 298	84 260	63 769	30 043
1982	84 260	63 769	30 043	3 544	3 359	2 737	-20 095	-16 436	-10 356	67 709	50 692	22 424
1983	67 709	50 692	22 424	4 186	3 960	3 203	5 042	3 459	-223	76 937	58 111	25 405
1984	76 937	58 111	25 405	4 650	4 387	3 507	1 621	616	-616	83 208	63 114	28 296
1985	83 208	63 114	28 296	6 845	6 515	5 408	30 381	22 910	9 736	120 434	92 539	43 440
1986	120 434	92 539	43 440	7 391	6 957	5 503	3 262	-79	-4 649	131 086	99 417	44 295
1987	131 086	99 417	44 295	5 814	5 312	3 631	-32 372	-28 041	-18 594	104 528	76 688	29 332
1988	104 528	76 688	29 332	6 378	5 777	3 761	-1 196	-1 804	-3 071	109 710	80 661	30 022
1989	109 710	80 661	30 022	4 859	4 157	1 804	-32 199	-27 417	-17 485	82 370	57 400	14 341
1990	82 370	57 400	14 341	2 935	2 135	-548	-36 815	-30 638	-18 113	48 491	28 896	-4 319
1991	48 491	28 896	-4 319	1 288	409	-2 534	-29 057	-23 879	-12 968	20 722	5 426	-19 821
1992	20 722	5 426	-19 821	363	-578	-3 729	-15 516	-12 230	-5 155	5 569	-7 381	-28 705
1993	5 569	-7 381	-28 705	2 401	1 402	-1 945	27 321	23 283	15 913	35 291	17 304	-14 736
1994	35 291	17 304	-14 736	1 786	723	-2 840	-10 509	-9 019	-4 037	26 569	9 007	-21 613
1995	26 569	9 007	-21 613	-1 481	-2 610	-6 391	-48 014	-39 971	-21 346	-22 926	-33 574	-49 351
1996	-22 926	-33 574	-49 351	119	-1 067	-5 039	24 651	20 874	15 430	1 845	-13 767	-38 960
1997	1 845	-13 767	-38 960	-3 026	-4 267	-8 425	-44 707	-35 969	-17 199	-45 889	-54 002	-64 585
1998	-45 889	-54 002	-64 585	-3 304	-4 554	-8 742	-1 179	678	6 186	-50 372	-57 878	-67 141
1999	-50 372	-57 878	-67 141	-3 030	-4 308	-8 590	7 790	7 987	10 059	-45 612	-54 199	-65 672
2000	-45 612	-54 199	-65 672	-3 268	-4 603	-9 074	-216	991	5 425	-49 096	-57 811	-69 321
2001	-49 096	-57 811	-69 321	-1 557	-2 948	-8 430	26 554	22 842	12 669	-24 100	-37 918	-65 081
2002	-24 100	-37 918	-65 081	2 278	294	-7 523	55 587	41 276	15 412	33 765	3 652	-57 192
2003	33 765	3 652	-57 192	5 464	4 785	2 510	42 922	51 699	73 860	82 150	60 136	19 177
2004	82 150	60 136	19 177	4 635	4 032	2 013	-14 230	-11 837	-5 588	72 555	52 331	15 602
2005	72 555	52 331	15 602	-303	-1 124	-3 876	-77 311	-66 552	-42 395	-5 059	-15 346	-30 669
2006	-5 059	-15 346	-30 669	3 877	2 491	-2 151	67 766	47 598	15 658	66 583	34 743	-17 163
2007	66 583	34 743	-17 163	1 298	147	-3 707	-45 079	-32 803	-8 898	22 802	2 086	-29 768
2008	22 802	2 086	-29 768	2 440	877	-4 359	21 676	10 334	-1 641	46 918	13 298	-35 768
2009	46 918	13 298	-35 768	1 581	249	-4 212	-17 312	-9 696	5 238	31 187	3 851	-34 743

Calculations: Statistics South Africa.

Notes: Non-availability of data is indicated by a dash (-).

Where figures have been rounded, discrepancies may occur with totals.

Table 8: Gold: monetary accounts for South Africa, 5-year moving average 1980–2009^{3, 4, 11, 12, 13}

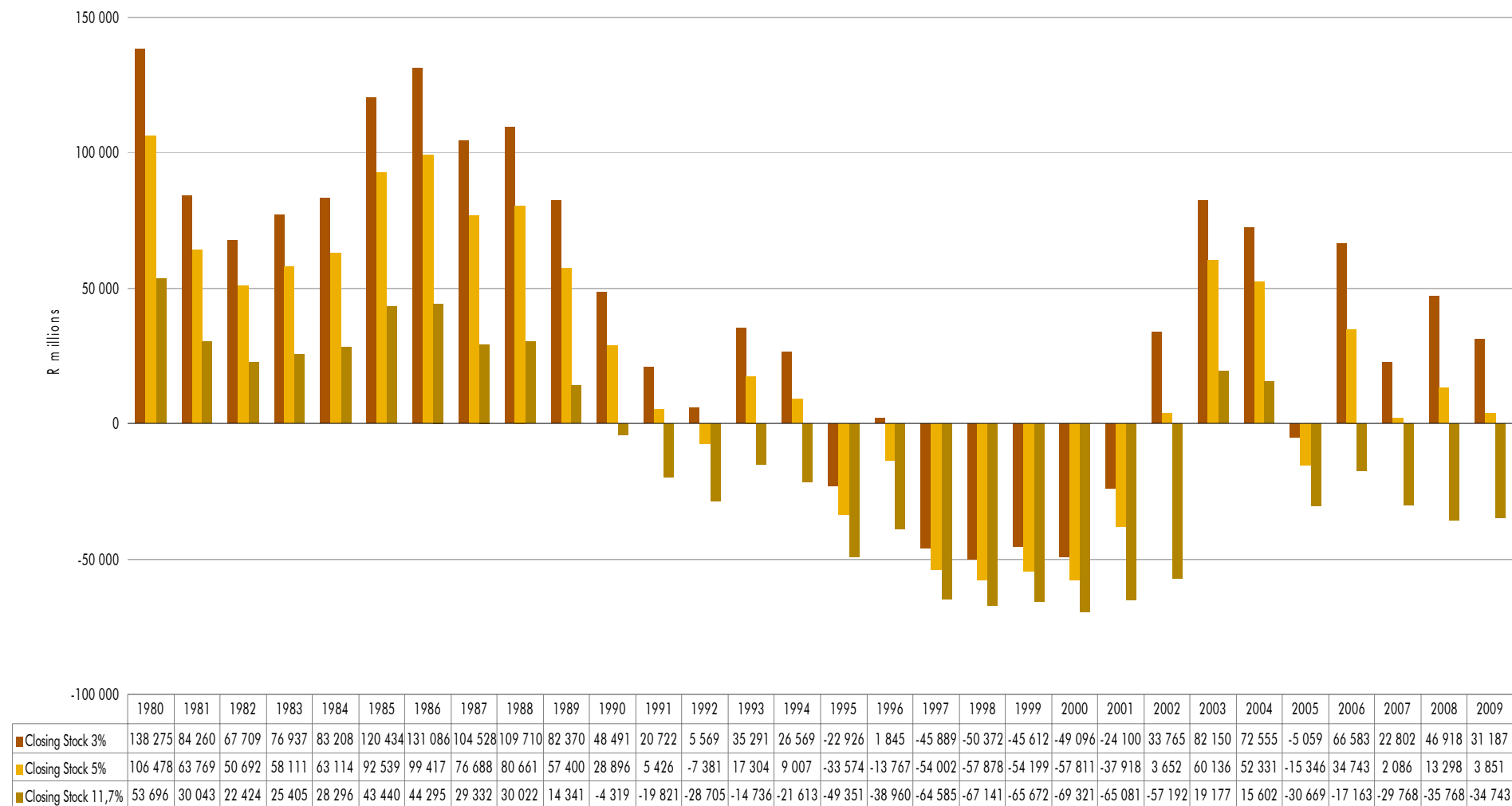
Year	Opening stock			Depletion			Revaluation			Closing stock		
	Rand millions											
	3%	5%	11,7%	3%	5%	11,7%	3%	5%	11,7%	3%	5%	11,7%
1980	-	-	-	7 014	6 898	6 511	-	-	-	138 275	106 478	53 696
1981	138 275	106 478	53 696	5 565	5 434	4 996	-34 615	-28 293	-17 522	109 226	83 619	41 170
1982	109 226	83 619	41 170	4 925	4 775	4 274	-20 066	-16 322	-10 428	94 085	72 072	35 016
1983	94 085	72 072	35 016	4 829	4 658	4 083	-10 153	-8 381	-5 937	88 762	68 349	33 162
1984	88 762	68 349	33 162	4 805	4 615	3 978	-7 586	-6 578	-5 050	85 981	66 386	32 090
1985	85 981	66 386	32 090	4 712	4 481	3 709	-7 790	-7 214	-6 012	82 903	63 654	29 787
1986	82 903	63 654	29 787	5 124	4 847	3 918	2 857	764	-2 168	90 884	69 265	31 537
1987	90 884	69 265	31 537	5 354	5 025	3 926	21	-1 737	-3 750	96 259	72 553	31 713
1988	96 259	72 553	31 713	6 008	5 592	4 198	1 067	-67	-2 402	103 334	78 077	33 509
1989	103 334	78 077	33 509	6 034	5 533	3 852	-7 074	-7 209	-6 740	102 294	76 401	30 622
1990	102 294	76 401	30 622	5 361	4 761	2 751	-19 093	-16 712	-11 671	88 561	64 450	21 702
1991	88 561	64 450	21 702	4 195	3 505	1 193	-25 243	-21 465	-13 563	67 513	46 490	9 333
1992	67 513	46 490	9 333	3 171	2 381	-266	-22 019	-18 452	-11 114	48 666	30 419	-2 048
1993	48 666	30 419	-2 048	2 409	1 531	-1 409	-15 675	-13 056	-7 217	35 399	18 894	-10 674
1994	35 399	18 894	-10 674	1 687	786	-2 232	-11 992	-9 884	-4 083	25 094	9 796	-16 989
1995	25 094	9 796	-16 989	720	-181	-3 200	-14 670	-11 948	-4 520	11 144	-2 333	-24 709
1996	11 144	-2 333	-24 709	494	-454	-3 629	-3 956	-3 065	281	7 682	-5 851	-28 057
1997	7 682	-5 851	-28 057	-176	-1 208	-4 666	-10 172	-8 229	-3 044	-2 666	-15 288	-35 766
1998	-2 666	-15 288	-35 766	-1 188	-2 266	-5 875	-14 259	-11 239	-3 478	-18 113	-28 792	-45 120
1999	-18 113	-28 792	-45 120	-2 036	-3 171	-6 974	-10 501	-7 934	-1 226	-30 651	-39 897	-53 320
2000	-30 651	-39 897	-53 320	-2 356	-3 522	-7 429	-2 385	-817	3 999	-35 392	-44 236	-56 750
2001	-35 392	-44 236	-56 750	-2 489	-3 648	-7 695	-643	964	5 038	-38 524	-46 920	-59 407
2002	-38 524	-46 920	-59 407	-1 567	-2 933	-7 908	16 857	13 408	7 199	-23 234	-36 445	-60 116
2003	-23 234	-36 445	-60 116	158	-1 054	-5 488	25 447	24 250	23 665	2 370	-13 250	-41 939
2004	2 370	-13 250	-41 939	1 522	498	-3 272	19 938	19 212	19 847	23 830	6 460	-25 364
2005	23 830	6 460	-25 364	1 719	841	-2 397	3 157	4 177	8 791	28 707	11 478	-18 971
2006	28 707	11 478	-18 971	2 575	1 680	-1 480	12 946	10 269	8 644	44 228	23 427	-11 807
2007	44 228	23 427	-11 807	2 366	1 554	-1 164	-5 022	-2 923	3 626	41 573	22 059	-9 344
2008	41 573	22 059	-9 344	1 856	938	-2 138	-7 744	-8 779	-6 062	35 684	14 217	-17 545
2009	35 684	14 217	-17 545	1 497	448	-3 067	-7 662	-7 753	-4 682	29 519	6 912	-25 294

Calculations: Statistics South Africa.

Notes: Non-availability of data is indicated by a dash (-).

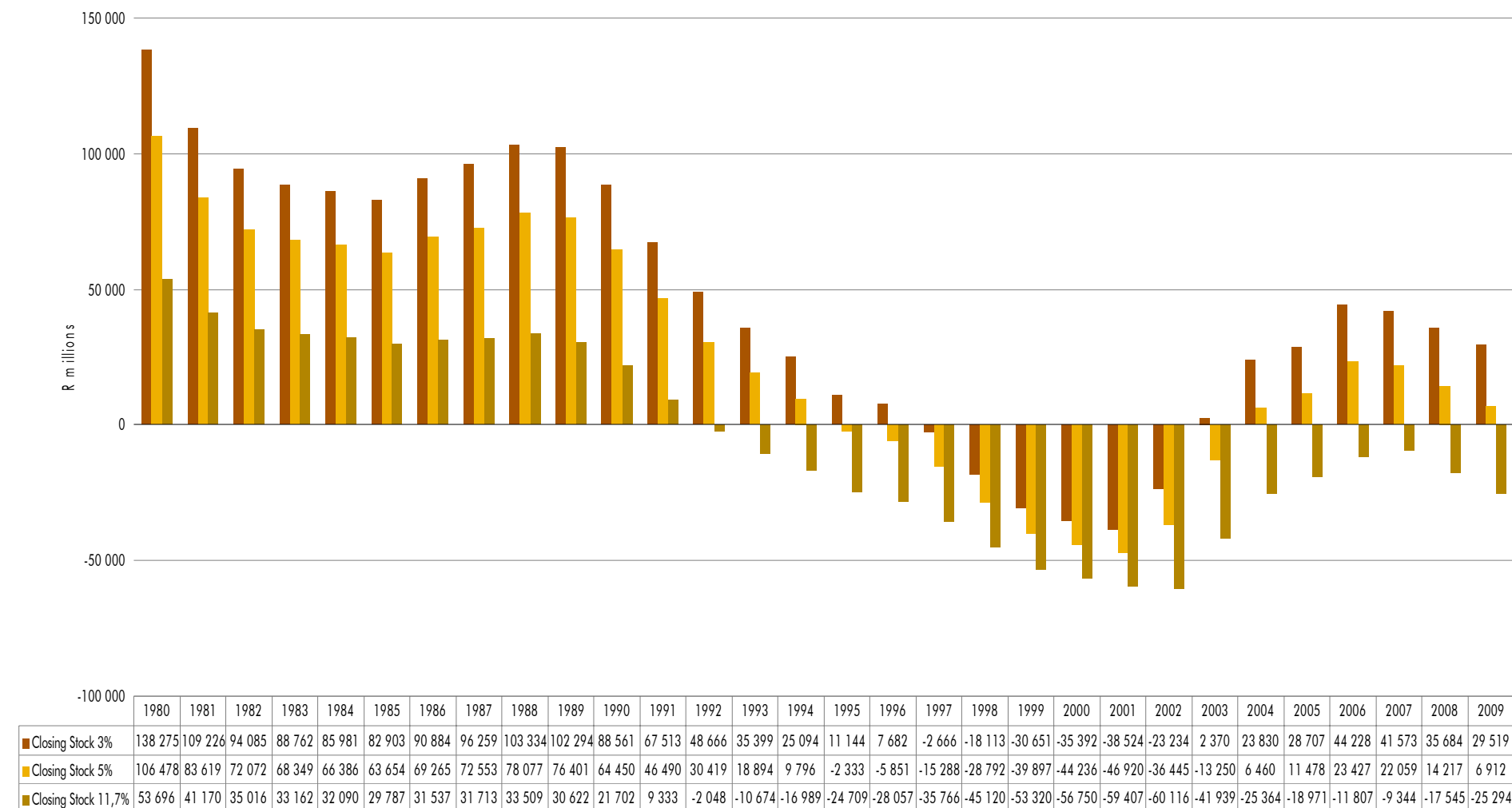
Where figures have been rounded, discrepancies may occur with totals.

Figure 7: Gold: value of annual closing stock, 1980–2009^{3, 4, 11, 12, 13}



Calculations: Statistics South Africa.

Figure 8: Gold: value of 5-year moving average closing stock, 1980–2009^{3, 4, 11, 12, 13}



Calculations: Statistics South Africa.

5.2 Platinum group metals

Tables 9 and 10 present the monetary accounts for PGM in South Africa. The tables show opening stock, depletion, revaluation and closing stock in rand values. The values are represented by 3%, 5% and 11,7% SDR values. Table 9 was calculated in annual unit rent figures and Table 10 was calculated with unit rents in 5-year moving averages.

Opening stock in 1981 was R15 215 million, R8 959 million and R3 426 million at 3%, 5% and 11,7% SDR values respectively (refer to Table 9). Opening stocks have increased from 1981 to 2009 on both an annual basis and on a 5-year moving average.

The closing stock for PGM for the 3%, 5% and 11,7% SDR values increased from 1980. From 1992 to 1999 the annual asset values, closing stock at 3% for PGM declined trend from R6 792 million to -R93 724 million, where negative values are represented from 1993 to 1999. From 2000, the closing stock for PGM recovered up to 2008. There was a decline in 2009 (refer to Figures 9 and 10). This trend could be attributed to the price of PGM as mentioned in section 4.2. The platinum price was US\$1 199 per ounce in 2009.

Table 9: Platinum group metals: monetary accounts for South Africa, annual 1980–2009^{3, 4, 11, 12, 13}

Year	Opening stock			Depletion			Revaluation			Closing stock		
	Rand millions											
	3%	5%	11,7%	3%	5%	11,7%	3%	5%	11,7%	3%	5%	11,7%
1980	-	-	-	456	448	401	-	-	-	15 215	8 959	3 426
1981	15 215	8 959	3 426	378	369	300	-2 992	-1 954	-1 164	12 601	7 373	2 561
1982	12 601	7 373	2 561	319	302	231	-2 292	-1 639	-821	10 628	6 036	1 971
1983	10 628	6 036	1 971	472	439	349	4 646	2 302	660	15 746	8 777	2 979
1984	15 746	8 777	2 979	590	547	445	3 335	1 619	377	19 671	10 943	3 801
1985	19 671	10 943	3 801	889	849	710	9 062	5 181	1 558	29 621	16 973	6 069
1986	29 621	16 973	6 069	1 268	1 208	1 018	11 363	5 984	1 613	42 251	24 165	8 699
1987	42 251	24 165	8 699	1 452	1 345	1 075	4 700	1 384	-584	48 403	26 893	9 190
1988	48 403	26 893	9 190	1 355	1 240	995	-4 596	-3 325	-1 679	45 162	24 809	8 507
1989	45 162	24 809	8 507	1 493	1 309	1 028	3 114	55	-749	49 768	26 172	8 786
1990	49 768	26 172	8 786	1 130	872	523	-13 240	-9 613	-4 840	37 658	17 431	4 469
1991	37 658	17 431	4 469	1 018	790	326	-4 755	-2 422	-2 013	33 920	15 799	2 782
1992	33 920	15 799	2 782	204	-30	-458	-27 332	-16 371	-6 242	6 792	-602	-3 919
1993	6 792	-602	-3 919	-100	-359	-836	-10 023	-6 225	-2 389	-3 330	-7 187	-7 143
1994	-3 330	-7 187	-7 143	-412	-703	-1 195	-9 995	-6 163	-1 877	-13 737	-14 052	-10 215
1995	-13 737	-14 052	-10 215	-961	-1 290	-1 717	-17 341	-10 455	-2 742	-32 040	-25 797	-14 674
1996	-32 040	-25 797	-14 674	-1 057	-1 356	-1 788	-2 122	32	1 183	-35 218	-27 120	-15 278
1997	-35 218	-27 120	-15 278	-1 664	-2 089	-2 463	-18 582	-12 579	-3 308	-55 464	-41 789	-21 050
1998	-55 464	-41 789	-21 050	-1 943	-2 540	-2 914	-7 363	-6 464	-939	-64 770	-50 793	-24 902
1999	-64 770	-50 793	-24 902	-2 812	-3 556	-4 006	-26 142	-16 776	-5 331	-93 724	-71 125	-34 239
2000	-93 724	-71 125	-34 239	1 240	-115	-216	133 823	68 949	32 610	41 339	-2 291	-1 845
2001	41 339	-2 291	-1 845	4 201	3 353	950	94 475	65 995	9 013	140 015	67 057	8 118
2002	140 015	67 057	8 118	7 983	7 098	4 590	118 076	67 809	26 524	266 074	141 963	39 233
2003	266 074	141 963	39 233	1 946	1 386	-488	-203 187	-115 624	-42 912	64 833	27 725	-4 167
2004	64 833	27 725	-4 167	1 733	1 086	-1 080	-8 841	-7 090	-3 981	57 724	21 721	-9 228
2005	57 724	21 721	-9 228	1 033	307	-2 126	-24 350	-15 891	-6 821	34 407	6 137	-18 175
2006	34 407	6 137	-18 175	17 894	17 076	14 338	543 471	318 306	126 386	595 771	341 520	122 549
2007	595 771	341 520	122 549	18 906	17 926	14 643	14 854	-932	-12 036	629 531	358 514	125 156
2008	629 531	358 514	125 156	22 144	20 723	15 962	86 075	35 226	-4 690	737 751	414 463	136 429
2009	737 751	414 463	136 429	-16 532	-18 443	-24 845	-1 272 006	-764 875	-323 937	-550 787	-368 855	-212 354

Calculations: Statistics South Africa.

Notes: Non-availability of data is indicated by a dash (-).

Where figures have been rounded, discrepancies may occur with totals.

Table 10: Platinum group metals: monetary accounts for South Africa, 5-year moving average 1980–2009^{3, 4, 11, 12, 13}

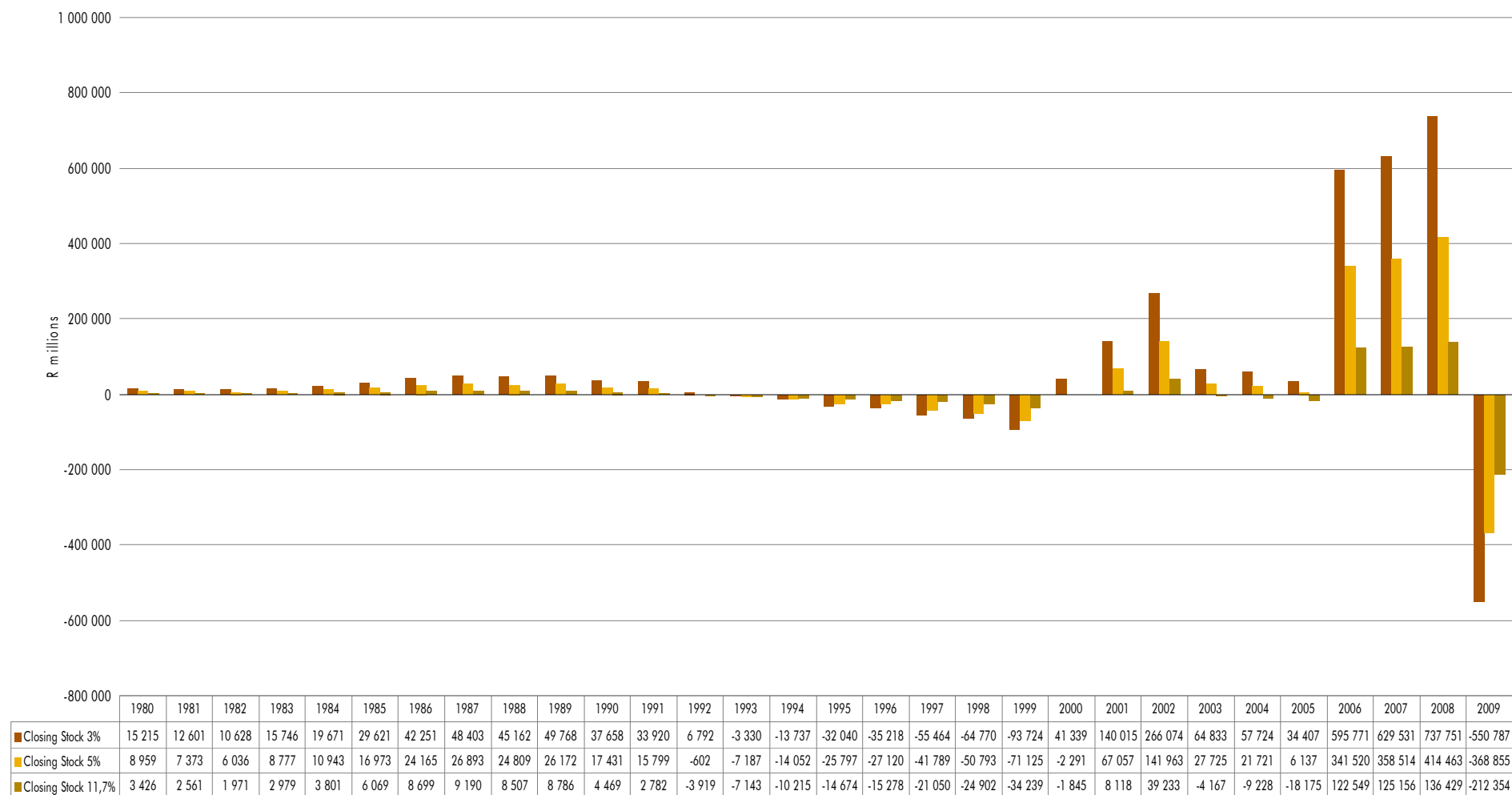
Year	Opening stock			Depletion			Revaluation			Closing stock		
	Rand millions											
	3%	5%	11,7%	3%	5%	11,7%	3%	5%	11,7%	3%	5%	11,7%
1980	-	-	-	456	448	401	-	-	-	15 215	8 959	3 426
1981	15 215	8 959	3 426	421	412	354	-1 595	-1 126	-756	14 042	8 245	3 024
1982	14 042	8 245	3 024	312	302	250	-3 952	-2 507	-1 139	10 402	6 040	2 134
1983	10 402	6 040	2 134	366	350	285	1 429	601	20	12 197	6 990	2 439
1984	12 197	6 990	2 439	466	442	360	2 872	1 405	281	15 535	8 837	3 080
1985	15 535	8 837	3 080	611	578	467	4 234	2 138	445	20 380	11 553	3 993
1986	20 380	11 553	3 993	781	738	604	4 873	2 462	568	26 035	14 753	5 165
1987	26 035	14 753	5 165	1 021	958	785	6 965	3 456	758	34 020	19 168	6 709
1988	34 020	19 168	6 709	1 185	1 108	906	4 292	1 879	131	39 497	22 154	7 746
1989	39 497	22 154	7 746	1 354	1 249	1 014	4 272	1 580	-92	45 122	24 983	8 668
1990	45 122	24 983	8 668	1 454	1 300	1 014	1 876	-274	-1 015	48 452	26 009	8 667
1991	48 452	26 009	8 667	1 368	1 182	846	-4 229	-3 551	-2 284	45 591	23 641	7 228
1992	45 591	23 641	7 228	1 157	937	556	-8 182	-5 834	-3 031	38 566	18 744	4 753
1993	38 566	18 744	4 753	950	675	207	-7 861	-5 911	-3 190	31 655	13 509	1 770
1994	31 655	13 509	1 770	500	206	-305	-15 477	-9 590	-4 071	16 678	4 125	-2 605
1995	16 678	4 125	-2 605	14	-277	-781	-16 219	-9 397	-3 291	473	-5 550	-6 678
1996	473	-5 550	-6 678	-466	-767	-1 250	-15 529	-9 016	-2 760	-15 521	-15 332	-10 688
1997	-15 521	-15 332	-10 688	-871	-1 209	-1 678	-12 628	-7 642	-1 975	-29 020	-24 183	-14 341
1998	-29 020	-24 183	-14 341	-1 250	-1 654	-2 096	-11 389	-7 240	-1 479	-41 659	-33 077	-17 916
1999	-41 659	-33 077	-17 916	-1 815	-2 332	-2 784	-17 036	-11 239	-3 098	-60 510	-46 649	-23 799
2000	-60 510	-46 649	-23 799	-1 274	-1 966	-2 323	19 310	9 288	6 266	-42 474	-39 327	-19 856
2001	-42 474	-39 327	-19 856	-319	-1 184	-1 956	32 176	16 827	5 092	-10 616	-23 685	-16 720
2002	-10 616	-23 685	-16 720	1 669	702	-505	64 567	37 025	12 908	55 619	14 042	-4 318
2003	55 619	14 042	-4 318	2 770	1 735	110	33 913	18 929	5 146	92 303	34 706	937
2004	92 303	34 706	937	3 950	2 933	922	35 354	21 028	6 021	131 607	58 667	7 881
2005	131 607	58 667	7 881	4 180	3 315	650	3 414	4 322	-2 974	139 202	66 304	5 557
2006	139 202	66 304	5 557	6 713	5 895	3 275	77 591	45 704	19 163	223 506	117 903	27 995
2007	223 506	117 903	27 995	8 337	7 564	4 974	45 776	25 812	9 540	277 620	151 279	42 509
2008	277 620	151 279	42 509	11 593	10 723	7 809	97 014	52 462	16 429	386 226	214 464	66 747
2009	386 226	214 464	66 747	7 736	6 627	2 911	-136 205	-88 549	-44 779	257 758	132 542	24 879

Calculations: Statistics South Africa.

Notes: Non-availability of data is indicated by a dash (-).

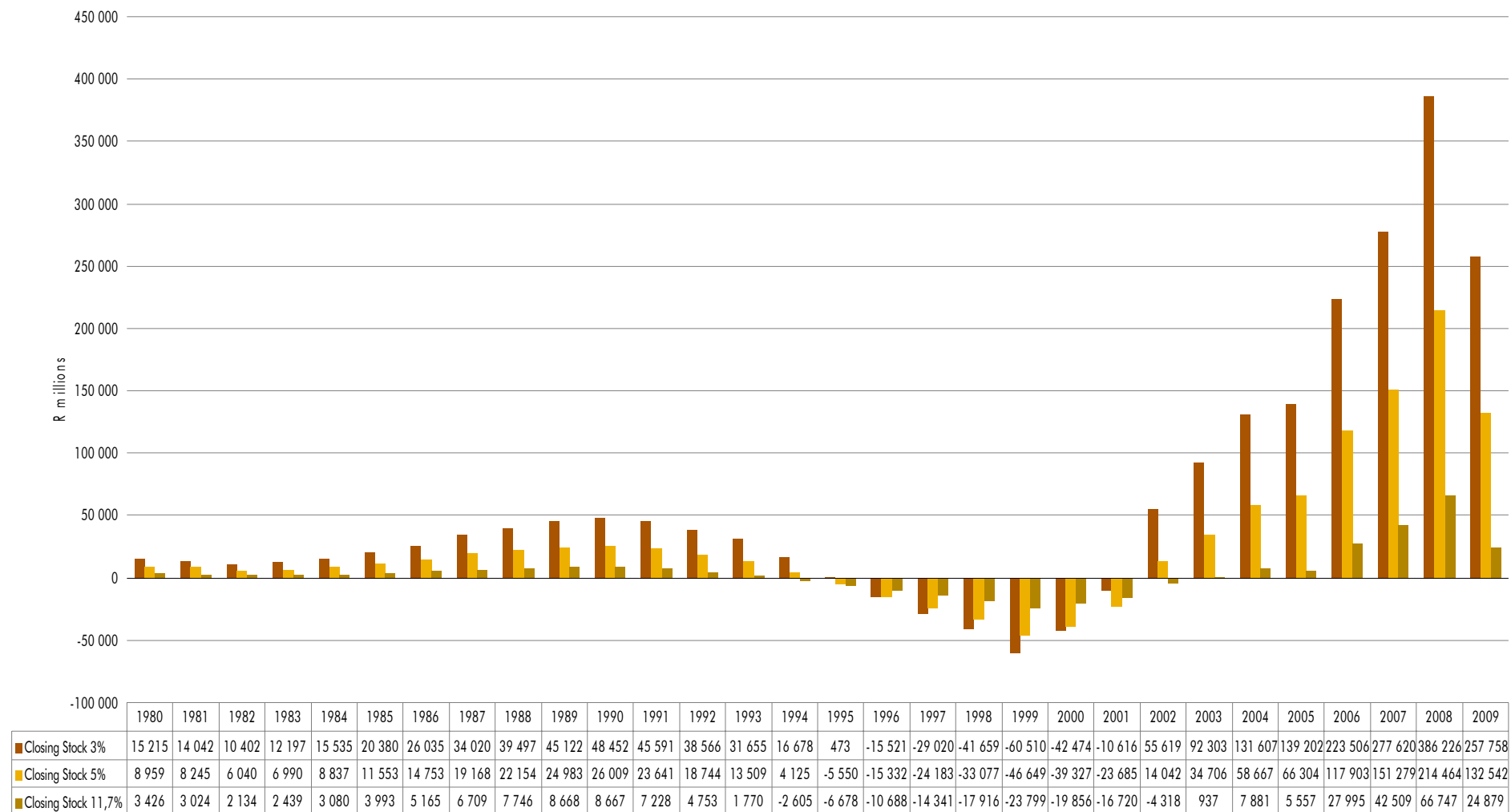
Where figures have been rounded, discrepancies may occur with totals.

Figure 9: Platinum group metals: value of annual closing stock 1980–2009^{3, 4, 11, 12, 13}



Calculations: Statistics South Africa.

Figure 10: Platinum group metals: value of 5-year moving average closing stock, 1980–2009^{3, 4, 11, 12, 13}



Calculations: Statistics South Africa.

5.3 Coal

Tables 11 and 12 present the monetary accounts for coal in South Africa. The tables show opening stock, depletion, revaluation and closing stock in rand values. The values are represented by 3%, 5% and 11,7% SDR values. Table 11 was calculated in annual unit rent figures and Table 12 was calculated with unit rents in 5-year moving averages.

The closing stock and opening stock for coal for 1980 to 2009 has shown a positive trend for both annual and 5-year moving averages (refer to Figures 11 and 12), with negative values for 1999 to 2000 and from 2002 to 2004 at the discount rate of 11,7% for annual values (refer to Figure 11), and at 5-year moving averages there were negative values for 2002 to 2004 at 11,7% (refer to Figure 12).

Table 11: Coal: monetary accounts for South Africa, annual 1980–2009^{3, 4, 11, 12, 13}

Year	Opening stock			Depletion			Revaluation			Closing stock		
	Rand millions											
	3%	5%	11,7%	3%	5%	11,7%	3%	5%	11,7%	3%	5%	11,7%
1980	-	-	-	330	305	220	-	-	-	10 998	6 092	1 877
1981	10 998	6 092	1 877	675	641	528	10 827	6 093	2 106	22 500	12 826	4 511
1982	22 500	12 826	4 511	965	920	769	8 695	4 660	1 295	32 160	18 406	6 575
1983	32 160	18 406	6 575	850	794	608	-4 712	-3 322	-1 990	28 298	15 878	5 192
1984	28 298	15 878	5 192	1 444	1 378	1 159	18 313	10 312	3 557	48 054	27 568	9 908
1985	48 054	27 568	9 908	2 469	2 386	2 108	31 550	17 755	5 998	82 073	47 709	18 014
1986	82 073	47 709	18 014	2 333	2 226	1 866	-6 844	-5 421	-3 932	77 562	44 514	15 948
1987	77 562	44 514	15 948	1 261	1 137	722	-36 919	-22 917	-10 499	41 904	22 734	6 171
1988	41 904	22 734	6 171	1 938	1 787	1 278	20 549	11 207	3 472	64 392	35 727	10 921
1989	64 392	35 727	10 921	3 041	2 862	2 259	33 634	18 638	6 127	101 068	57 227	19 307
1990	101 068	57 227	19 307	3 096	2 873	2 127	-1 277	-2 647	-3 256	102 886	57 453	18 177
1991	102 886	57 453	18 177	2 062	1 795	900	-36 446	-23 355	-11 384	68 502	35 893	7 693
1992	68 502	35 893	7 693	2 356	2 062	1 075	7 430	3 279	421	78 289	41 234	9 189
1993	78 289	41 234	9 189	1 851	1 531	456	-18 689	-12 156	-5 745	61 451	30 609	3 900
1994	61 451	30 609	3 900	1 789	1 438	264	-3 974	-3 288	-1 908	59 266	28 759	2 256
1995	59 266	28 759	2 256	2 633	2 251	970	25 178	13 992	5 061	87 077	45 001	8 287
1996	87 077	45 001	8 287	3 044	2 622	1 208	10 538	4 798	827	100 660	52 422	10 321
1997	100 660	52 422	10 321	3 132	2 674	1 142	-582	-1 647	-1 706	103 209	53 449	9 757
1998	103 209	53 449	9 757	3 310	2 825	1 197	2 413	175	-723	108 932	56 448	10 231
1999	108 932	56 448	10 231	1 481	961	-782	-61 681	-38 212	-16 133	48 732	19 197	-6 685
2000	48 732	19 197	-6 685	760	178	-1 771	-24 500	-15 811	-6 682	24 992	3 564	-15 138
2001	24 992	3 564	-15 138	4 423	3 900	691	116 009	70 479	20 354	145 424	77 943	5 907
2002	145 424	77 943	5 907	3 324	2 725	-952	-39 434	-26 220	-13 091	109 314	54 448	-8 136
2003	109 314	54 448	-8 136	1 074	645	-794	-75 267	-42 220	2 143	35 121	12 873	-6 788
2004	35 121	12 873	-6 788	1 613	1 161	-353	15 902	9 153	4 124	52 636	23 187	-3 017
2005	52 636	23 187	-3 017	6 051	5 545	3 852	138 435	81 958	32 091	197 122	110 691	32 926
2006	197 122	110 691	32 926	3 916	3 432	1 810	-73 530	-45 618	-19 268	127 508	68 505	15 468
2007	127 508	68 505	15 468	7 322	6 783	4 979	103 098	58 428	22 110	237 928	133 716	42 557
2008	237 928	133 716	42 557	33 251	32 334	29 263	806 337	478 878	178 292	1 077 516	644 928	250 112
2009	1 077 516	644 928	250 112	17 402	15 658	9 816	-531 007	-348 272	-176 027	563 911	312 314	83 901

Calculations: Statistics South Africa.

Notes: Non-availability of data is indicated by a dash (-).

Where figures have been rounded, discrepancies may occur with totals.

Table 12: Coal: monetary accounts for South Africa, 5-year moving average 1980–2009^{3, 4, 11, 12, 13}

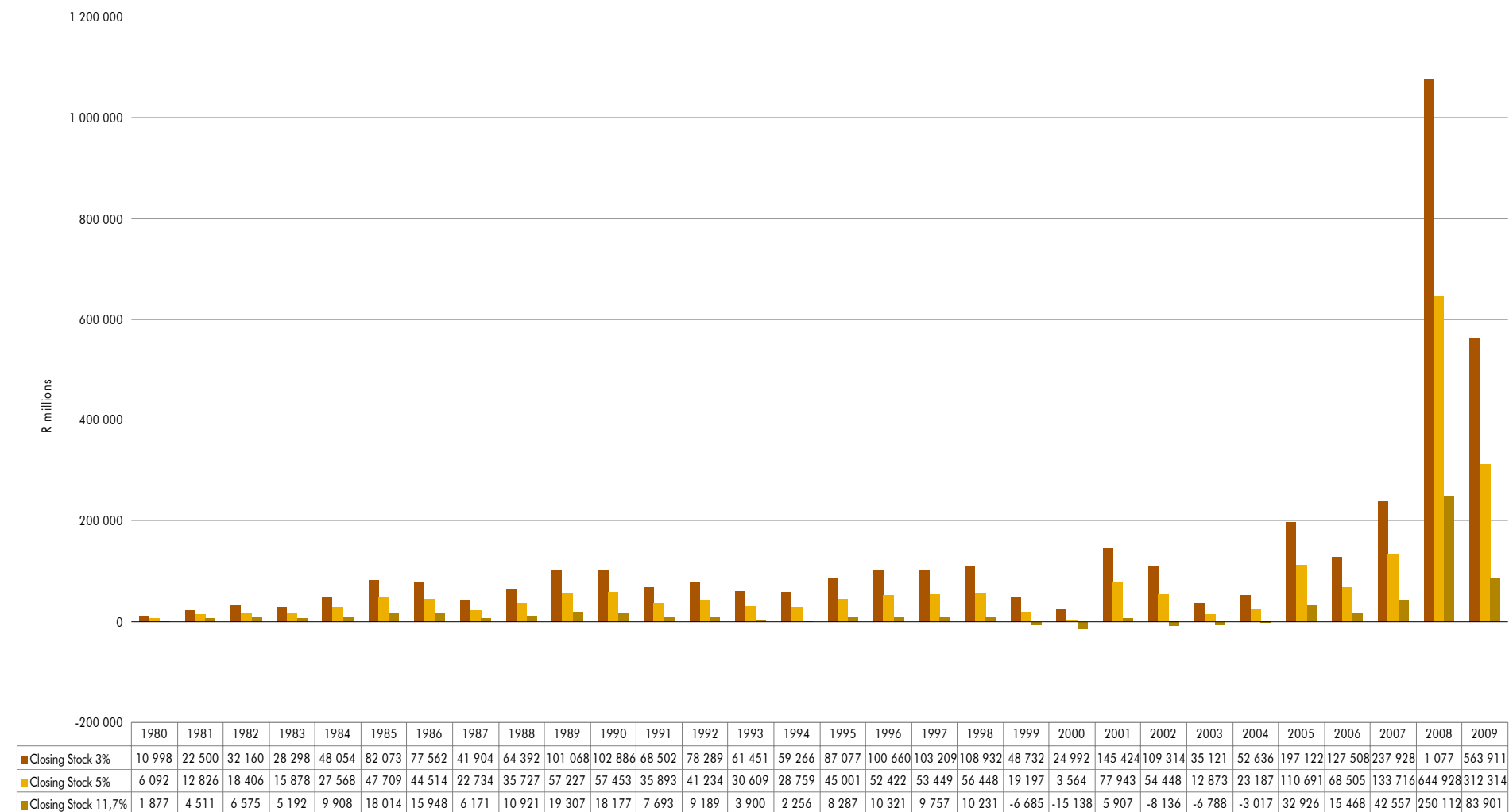
Year	Opening stock			Depletion			Revaluation			Closing stock		
	Rand millions											
	3%	5%	11,7%	3%	5%	11,7%	3%	5%	11,7%	3%	5%	11,7%
1980	-	-	-	330	305	220	-	-	-	10 998	6 092	1 877
1981	10 998	6 092	1 877	524	493	388	5 943	3 271	1 051	17 465	9 856	3 317
1982	17 465	9 856	3 317	706	668	541	5 353	2 839	766	23 524	13 363	4 624
1983	23 524	13 363	4 624	753	710	566	809	129	-351	25 085	14 202	4 839
1984	25 085	14 202	4 839	961	910	738	5 950	3 086	727	31 997	18 198	6 303
1985	31 997	18 198	6 303	1 431	1 366	1 151	14 142	7 762	2 380	47 570	27 326	9 834
1986	47 570	27 326	9 834	1 722	1 645	1 387	7 941	3 921	630	57 233	32 892	11 851
1987	57 233	32 892	11 851	1 726	1 636	1 334	-1 568	-1 806	-1 785	57 392	32 722	11 400
1988	57 392	32 722	11 400	1 961	1 851	1 483	5 797	2 450	-205	65 150	37 024	12 679
1989	65 150	37 024	12 679	2 211	2 082	1 649	6 112	2 529	-231	73 473	41 635	14 097
1990	73 473	41 635	14 097	2 302	2 147	1 628	736	-845	-1 812	76 511	42 937	13 913
1991	76 511	42 937	13 913	2 285	2 095	1 460	-2 895	-3 134	-2 891	75 900	41 898	12 482
1992	75 900	41 898	12 482	2 489	2 267	1 522	4 319	1 172	-996	82 708	45 337	13 009
1993	82 708	45 337	13 009	2 566	2 302	1 415	-94	-1 613	-2 329	85 181	46 026	12 095
1994	85 181	46 026	12 095	2 421	2 109	1 063	-7 373	-5 962	-4 075	80 229	42 174	9 083
1995	80 229	42 174	9 083	2 343	1 991	810	-5 097	-4 366	-2 969	77 475	39 798	6 925
1996	77 475	39 798	6 925	2 465	2 092	840	1 583	-66	-582	81 523	41 824	7 183
1997	81 523	41 824	7 183	2 677	2 259	860	4 031	1 077	-692	88 231	45 160	7 351
1998	88 231	45 160	7 351	2 949	2 503	1 008	5 877	2 363	256	97 057	50 026	8 615
1999	97 057	50 026	8 615	2 814	2 347	783	-7 258	-5 465	-2 708	92 613	46 908	6 690
2000	92 613	46 908	6 690	2 429	1 923	227	-15 199	-10 407	-4 975	79 843	38 424	1 943
2001	79 843	38 424	1 943	2 630	2 115	101	3 981	1 733	-1 182	86 455	42 272	862
2002	86 455	42 272	862	2 630	2 095	-320	-2 589	-2 508	-3 279	86 496	41 858	-2 738
2003	86 496	41 858	-2 738	2 356	1 795	-760	-11 798	-7 811	-2 996	77 054	35 842	-6 493
2004	77 054	35 842	-6 493	2 405	1 854	-675	-1 013	-673	1 399	78 445	37 023	-5 769
2005	78 445	37 023	-5 769	3 469	2 940	476	31 099	18 721	9 359	113 013	58 684	4 065
2006	113 013	58 684	4 065	3 280	2 769	686	-9 501	-6 180	1 110	106 791	55 272	5 861
2007	106 791	55 272	5 861	4 035	3 545	1 905	20 306	11 930	8 513	131 133	70 748	16 278
2008	131 133	70 748	16 278	10 538	9 947	7 964	199 837	117 701	43 829	341 508	198 396	68 072
2009	341 508	198 396	68 072	13 602	12 760	9 938	85 670	43 348	6 928	440 780	254 504	84 937

Calculations: Statistics South Africa.

Notes: Non-availability of data is indicated by a dash (-).

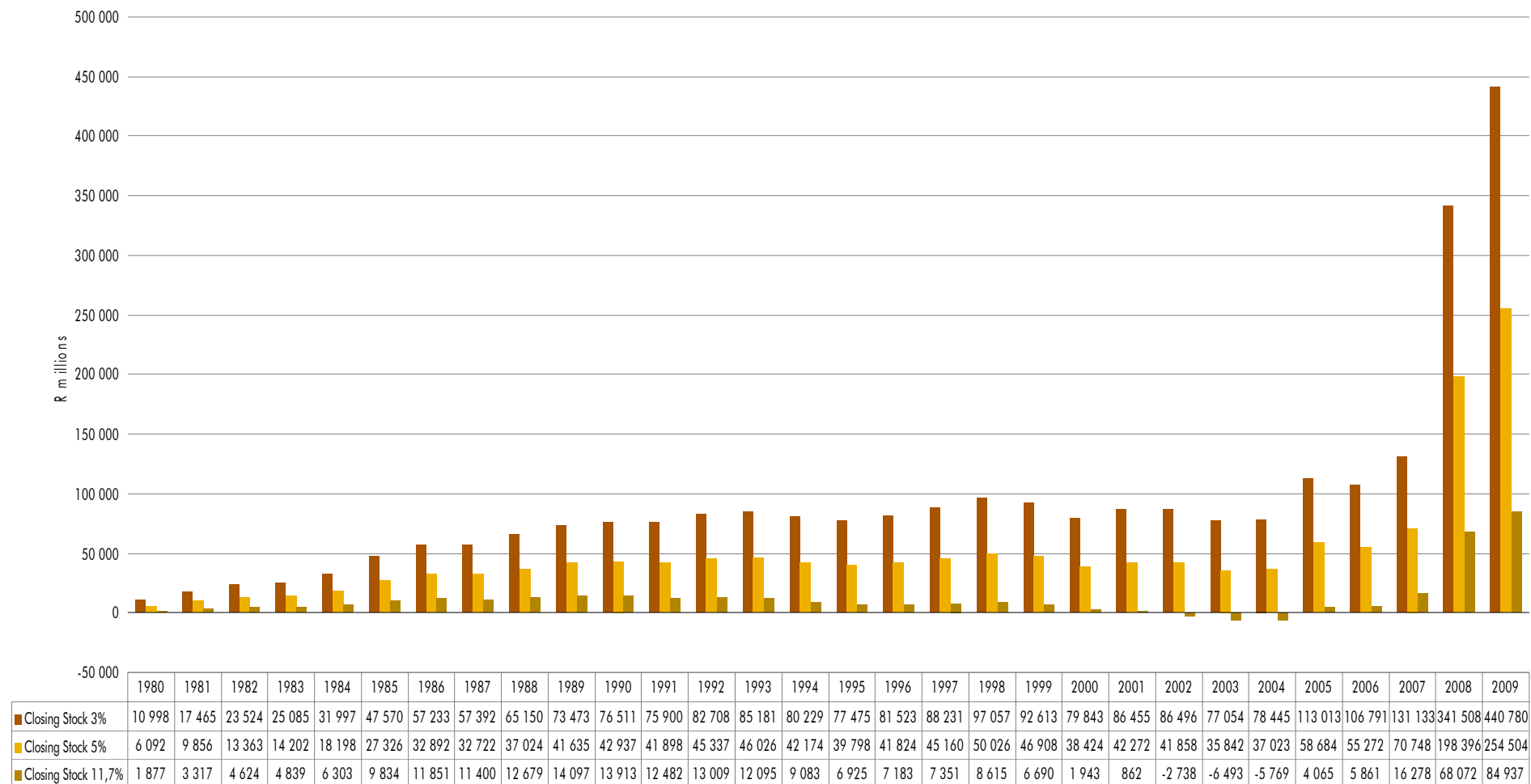
Where figures have been rounded, discrepancies may occur with totals.

Figure 11: Coal: value of annual closing stock 1980–2009^{3, 4, 11, 12, 13}



Calculations: Statistics South Africa.

Figure 12: Coal: value of 5-year moving average closing stock, 1980–2009^{3, 4, 11, 12, 13}



Calculations: Statistics South Africa.

6. Sustainability of minerals in South Africa

This section discusses concepts of sustainability and the implications for approaches to measuring sustainability. Sustainable management of mineral resources requires that resource rent be reinvested in other activities that will generate income after the mineral resources are exhausted. Sustainability in mining refers to the transition from mining to other activities that could replace it, once the mineral resources are depleted. The South African government and mining industry bears a responsibility to ensure the transformation of mineral wealth into other forms of wealth. This transformation requires establishing taxes to recover resource rent and commitment to reinvest the rent.

There are guidelines for reinvesting mineral rent; however, there is no specific rule to determine the amount of rent that must be reinvested. The El Serafy Rule specifies the minimum amount that must be reinvested in order to maintain wealth. There are ways in which natural capital can be transformed into other forms of wealth, such as:

1. Natural resources must be managed to maximise the generation of resource rent;
2. Resource rent must be recovered by an agent capable of reinvesting it; and
3. Resource rent must be used for productive investments.

Sustainability requires non-decreasing levels of capital stock over time, or, at the level of the individual, non-decreasing per capita capital stock. Indicators of sustainability could be based on the value of total assets for every period, or by the change in wealth, i.e. consumption of capital (depreciation) in the conventional national accounts. For a proper measure of sustainability, all assets should be included in such an indicator: manufactured capital, natural capital and human capital. In the past, only manufactured capital was recorded in the SNA, but the recognition of the importance of natural capital has led to the expansion of the asset boundary to include this asset. Human capital has not been included because there is no agreement about how to measure it¹⁶.

To encourage sustainability, fees should be set high enough to recover the rent generated at the most profitable, sustainable level of production (extraction), so that it becomes unprofitable for companies to harvest at levels that deplete the resource stock. The Sustainable Budget Index (SBI) is used to indicate how much of the mineral revenues are used for capital expenditures, including spending for human capital¹⁶. The SBI^a value of one or less is interpreted to mean that current government consumption is sustainable because it is financed entirely out of revenues other than from minerals, and all the revenue derived from mineral resources is used for public investment. A SBI value greater than one means that consumption relies partly on the revenues from mineral resources that are fiscally unsustainable¹⁶.

6.1 Resource rent collection

The collection of rent usually comes about through negotiation between the resource owner and the resource user. Rent can be a fixed sum, or a variety of mechanisms including auctions, royalties and taxes. When designing a rent collection mechanism, it is important to take into account a number of considerations, as follows:

- Avoiding or minimising economic distortions is a key issue for rent recovery that affects the quantity or value of the output so that it is no longer efficient.

^a SBI = Spending/Revenue

- A poorly designed rent collection mechanism can negatively affect innovation. For instance, consider an immature industry that could not pay rent based on competing existing uses. Attempting to collect rent could prevent this immature industry from developing because, at least initially, costs may be very high and only the potential to generate and capture rent would justify development. In this situation, a government might choose to forego rent for a period of time with the prospect of collecting rent in the future. Or a government could use a resource rent tax or accounting profits royalty, effectively sharing the profits and the risk with a developer.
- There may be cases in which rent recovery would be unfair to the resource user. The resource rent is collected for different reasons, e.g. to ensure a return on investment, to avoid inefficient allocation and to achieve ethical objectives.

6.2 Resource rent applications

For resources that are owned by private individuals, there is no constraint on how rental income is spent. However, where the government owns and manages a resource on behalf of the public, in principle there is no reason why rental income should be used only in relation to the resource or activity being charged for. If the government owns minerals resources, which is a public resource, the rent should be used in a way that provides maximum benefit to the public. Rent recovery from non-renewable resources such as minerals could be used for developing renewable alternatives. Resource rent is also collected to enable investment that will enhance the welfare of the future generations. Section 3(1) of the Minerals and Petroleum Resources Development Act (MPRDA), 2002 (Act No. 28 of 2002) states that mineral resources must provide a benefit to all South Africans, and the Minister must ensure the sustainable development of South Africa's mineral and petroleum resources within the framework of the national environmental policy, while promoting economic and social development¹⁶.

6.3 El-Serafy's User-cost method

The User-cost method is a measure of sustainable use of minerals. It divides resource rent into two components, namely:

- Capital component – part of resource rent that needs to be reinvested to maintain a constant stream of income; and
- Income component – residual amount that can be consumed as current income.

The results of the El-Serafy's User-cost formula¹⁷ are presented in Tables 13, 14 and 15 for gold, PGM and coal respectively. The calculations used 3%, 5% and 11,7% SDR/RRR^b.

With a decrease in the income component, less of the revenue from gold mining has to be invested to maintain a constant stream of income. With a decrease in the capital component, less of the revenue from mining can be consumed as current income. The reverse is true if there is an increase for the income or capital components.

The income component (X) for gold at an RRR of 11,7% decreased over the 29-year period from 1980 to 2009. In Table 13, the income component in 1980 was R6 290 million, decreasing to -R4 070 million in 2009. The capital reinvestment component decreased from R220 million to -R142 million. The capital depreciation factor in 2009 was at 3%.

^b SDR is the same as RRR as shown in El-Serafy's User-cost formula.

The income component (X) for PGM at an RRR of 11,7% fluctuated over the 29-year period from 1980 to 2009. In Table 14, the income component in 1980 was R401 million, and this decreased to -R24 845 million in 2009. The capital reinvestment component remained unchanged at zero. The capital depreciation factor remained zero from 1980 to 2009.

The income component (X) for coal at an RRR of 11,7% increased over the 29-year period from 1980 to 2009. In Table 15, the income component in 1980 was R220 million, increasing to R9 816 million in 2009. The capital reinvestment component remained zero from 1980 to 2009. The capital depreciation factor was zero from 1980 to 2009.

Government policy analysis can be informed by El-Serafy's User-cost method to help determine how much of resource rent should be consumed and how much should be reinvested to maintain a constant stream of income.

Table 13: Gold: income and capital component of resource rent 1980–2009

	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
Rand millions															
Income component (X)															
Rent consumed as income (RRR 11,7%)	6 290	3 520	2 628	3 052	3 321	5 101	5 200	3 442	3 528	1 686	-508	-2 336	-3 392	-1 747	-2 559
Rent consumed as income (RRR 5%)	5 616	3 368	2 697	3 127	3 426	5 051	5 412	4 156	4 437	3 174	1 613	306	-424	1 014	525
Rent consumed as income (RRR 3%)	4 979	3 042	2 484	2 890	3 178	4 650	5 035	3 980	4 298	3 258	1 951	849	236	1 540	1 150
Capital component (R-X) Reinvestment															
Remaining rent invested (RRR 11,7%)	220	126	109	152	186	307	303	189	233	118	-39	-198	-337	-198	-280
Remaining rent invested (RRR 5%)	1 282	777	662	833	962	1 464	1 545	1 156	1 339	983	521	103	-153	388	198
Remaining rent invested (RRR 3%)	2 034	1 251	1 060	1 296	1 472	2 196	2 356	1 833	2 080	1 601	984	439	127	861	637
Percentage															
Capital depreciation factor (R-X)/R (%)															
Percentage of reinvestment (RRR 11,7%)	3,39	3,47	3,97	4,74	5,31	5,68	5,50	5,21	6,20	6,54	7,16	7,81	9,04	10,19	9,87
Percentage of reinvestment (RRR 5%)	18,58	18,74	19,70	21,03	21,92	22,47	22,21	21,76	23,19	23,64	24,42	25,19	26,54	27,69	27,38
Percentage of reinvestment (RRR 3%)	29,00	29,14	29,92	30,97	31,66	32,07	31,87	31,53	32,61	32,95	33,53	34,09	35,05	35,86	35,64
	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Rand millions															
Income component (X)															
Rent consumed as income (RRR 11,7%)	-5 828	-4 600	-7 638	-7 937	-7 770	-8 203	-7 686	-6 774	2 269	1 841	-3 608	-2 017	-3 496	-4 192	-4 070
Rent consumed as income (RRR 5%)	-1 923	-788	-3 121	-3 337	-3 142	-3 355	-2 173	213	3 489	2 984	-853	1 912	114	706	203
Rent consumed as income (RRR 3%)	-964	77	-1 958	-2 142	-1 957	-2 109	-1 014	1 464	3 528	3 028	-202	2 611	881	1 714	1 123
Capital component (R-X) Reinvestment															
Remaining rent invested (RRR 11,7%)	-563	-439	-788	-805	-820	-871	-743	-749	240	171	-268	-134	-212	-168	-142
Remaining rent invested (RRR 5%)	-686	-280	-1 146	-1 217	-1 166	-1 248	-776	81	1 296	1 048	-271	579	33	171	46
Remaining rent invested (RRR 3%)	-516	41	-1 067	-1 162	-1 073	-1 159	-543	813	1 936	1 606	-101	1 266	417	725	458
Percentage															
Capital depreciation factor (R-X)/R (%)															
Percentage of reinvestment (RRR 11,7%)	8,80	8,71	9,35	9,21	9,55	9,60	8,82	9,96	9,58	8,52	6,90	6,23	5,71	3,84	3,38
Percentage of reinvestment (RRR 5%)	26,29	26,19	26,86	26,72	27,06	27,11	26,31	27,47	27,09	25,98	24,10	23,23	22,51	19,47	18,57
Percentage of reinvestment (RRR 3%)	34,88	34,81	35,28	35,18	35,42	35,46	34,88	35,70	35,44	34,65	33,29	32,65	32,10	29,73	28,99

Calculations: Statistics South Africa.

Note: Where figures have been rounded, discrepancies may occur with totals.

Table 14: Platinum group metals: income and capital component of resource rent 1980–2009

	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
Rand millions															
Income component (X)															
Rent consumed as income (RRR 11,7%)	401	300	231	349	445	710	1 018	1 075	995	1 028	523	326	-458	-836	-1 195
Rent consumed as income (RRR 5%)	448	369	302	439	547	849	1 208	1 345	1 240	1 309	872	790	-30	-359	-703
Rent consumed as income (RRR 3%)	456	378	319	472	590	889	1 268	1 452	1 355	1 493	1 130	1 018	204	-100	-412
Capital component (R-X) Reinvestment															
Remaining rent invested (RRR 11,7%)	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Remaining rent invested (RRR 5%)	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Remaining rent invested (RRR 3%)	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Percentage															
Capital depreciation factor (R-X)/R (%)															
Percentage of reinvestment (RRR 11,7%)	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Percentage of reinvestment (RRR 5%)	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Percentage of reinvestment (RRR 3%)	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Rand millions															
Income component (X)															
Rent consumed as income (RRR 11,7%)	-1 717	-1 788	-2 463	-2 914	-4 006	-216	950	4 590	-488	-1 080	-2 126	14 338	14 643	15 962	-24 845
Rent consumed as income (RRR 5%)	-1 290	-1 356	-2 089	-2 540	-3 556	-115	3 353	7 098	1 386	1 086	307	17 076	17 926	20 723	-18 443
Rent consumed as income (RRR 3%)	-961	-1 057	-1 664	-1 943	-2 812	1 240	4 200	7 982	1 945	1 732	1 032	17 873	18 886	22 133	-16 524
Capital component (R-X) Reinvestment															
Remaining rent invested (RRR 11,7%)	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Remaining rent invested (RRR 5%)	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,24	0,22	0,08	-0,06
Remaining rent invested (RRR 3%)	-0,01	-0,01	-0,03	-0,04	-0,13	0,04	0,39	1,00	0,65	0,82	1,00	20,36	19,82	11,93	-7,98
Percentage															
Capital depreciation factor (R-X)/R (%)															
Percentage of reinvestment (RRR 11,7%)	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Percentage of reinvestment (RRR 5%)	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Percentage of reinvestment (RRR 3%)	0,00	0,00	0,00	0,00	0,00	0,00	0,01	0,01	0,03	0,05	0,10	0,11	0,10	0,05	0,05

Calculations: Statistics South Africa.

Note: Where figures have been rounded, discrepancies may occur with totals.

Table 15: Coal: income and capital component of resource rent 1980–2009

	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
Rand millions															
Income component (X)															
Rent consumed as income (RRR 11,7%)	220	528	769	608	1 159	2 108	1 866	722	1 278	2 259	2 127	900	1 075	456	264
Rent consumed as income (RRR 5%)	305	641	920	794	1 378	2 385	2 226	1 137	1 786	2 861	2 873	1 795	2 062	1 530	1 438
Rent consumed as income (RRR 3%)	330	675	965	849	1 442	2 462	2 327	1 257	1 932	3 032	3 087	2 055	2 349	1 844	1 778
Capital component (R-X) Reinvestment															
Remaining rent invested (RRR 11,7%)	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Remaining rent invested (RRR 5%)	0,00	0,00	0,00	0,00	0,03	0,13	0,13	0,07	0,15	0,21	0,19	0,14	0,16	0,18	0,31
Remaining rent invested (RRR 3%)	0,03	0,18	0,57	0,60	2,24	6,34	6,38	3,44	6,60	9,40	8,93	6,75	7,70	7,74	10,75
Capital depreciation factor (R-X)/R (%)															
Percentage of reinvestment (RRR 11,7%)	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Percentage of reinvestment (RRR 5%)	0,00	0,00	0,00	0,00	0,00	0,01	0,01	0,01	0,01	0,01	0,01	0,01	0,01	0,01	0,02
Percentage of reinvestment (RRR 3%)	0,01	0,03	0,06	0,07	0,15	0,26	0,27	0,27	0,34	0,31	0,29	0,33	0,33	0,42	0,60
	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Rand millions															
Income component (X)															
Rent consumed as income (RRR 11,7%)	970	1 208	1 142	1 197	-782	-1 771	691	-952	-794	-353	3 852	1 810	4 979	29 263	9 816
Rent consumed as income (RRR 5%)	2 250	2 621	2 672	2 822	960	178	3 897	2 722	644	1 159	5 535	3 425	6 768	32 247	15 616
Rent consumed as income (RRR 3%)	2 612	3 020	3 097	3 269	1 462	750	4 364	3 280	1 054	1 580	5 917	3 827	7 142	32 351	16 930
Capital component (R-X) Reinvestment															
Remaining rent invested (RRR 11,7%)	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,01	0,04	0,01
Remaining rent invested (RRR 5%)	0,77	0,91	1,62	2,12	0,71	0,15	3,29	2,19	0,93	2,02	10,64	6,91	15,46	87,24	42,32
Remaining rent invested (RRR 3%)	20,84	24,24	34,85	41,87	18,55	10,39	59,91	43,75	20,07	33,62	133,83	89,17	179,37	900,00	471,49
Percentage															
Capital depreciation factor (R-X)/R (%)															
Percentage of reinvestment (RRR 11,7%)	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Percentage of reinvestment (RRR 5%)	0,03	0,03	0,06	0,08	0,07	0,09	0,08	0,08	0,14	0,17	0,19	0,20	0,23	0,27	0,27
Percentage of reinvestment (RRR 3%)	0,79	0,80	1,11	1,26	1,25	1,37	1,35	1,32	1,87	2,08	2,21	2,28	2,45	2,71	2,71

Calculations: Statistics South Africa.

Note: Where figures have been rounded, discrepancies may occur with totals.

7. Conclusion

South Africa holds the world's largest natural proven reserves of gold, PGM, chrome ore and manganese ore, and the second-largest proven reserves of zirconium, vanadium and titanium. Minerals are an important natural resource in South Africa and are important in terms of economic development. The decline in gold production (extraction) and volumes sold has masked significant growth in other mining sectors in South Africa. Years to depletion for gold are increasing. Measured in terms of production (extraction), coal and PGM have approximately doubled in size since 1980. PGM are in a growth phase, with South Africa boasting around half or more of world production (extraction) and proven reserves. Years to depletion for both coal and PGM have declined since 1980. The mineral resources measured in these accounts are gold, PGM and coal as they are the major contributors to South Africa's mining industry to the GDP. The value of South African mineral sales fell by 20% due to the impact of the global economic crisis. The top three minerals (gold, PGM and coal) accounted for 71% of South Africa's total mineral sales in 2009.

Mineral resources need to be sustainably extracted in order to prolong their depletion period. The resource rents need to be reinvested to ensure sustainable alternatives to the mining industry. Rent recovery from non-renewable resources could be used for developing renewable alternatives. The South African Revenue Service (SARS) records the mineral resource royalties that have been collected since March 2010 under the MPRDA. This would facilitate analysis and comparison of such data with the resource rent calculations in the near future. The importance of minerals has been highlighted earlier in this document, one aspect which is the positive contribution towards GDP. The minerals account is to be updated periodically, based on data availability from the DMR.

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9. Glossary

Term	Description
Account	An account is a tool which records, for a given aspect of economic life, (a) the uses and resources or (b) the changes in assets and the changes in liabilities and/or (c) the stock of assets and liabilities existing at a certain time; the transactions accounts include a balancing item which is used to equate the two sides of the accounts (e.g. resources and uses) and which is a meaningful measure of economic performance in itself.
Compensation of employees	Compensation of employees is defined as the total remuneration, in cash or in kind, payable by an enterprise to an employee in return for work done by the latter during the accounting period. Compensation of employees does not include any taxes payable by the employer on the wage and salary bill. Note that in this report, compensation of employees will not be equal with other figures published by Stats SA because such figures are adjusted to benchmarking levels done in 1999, whereas figures in this report are not adjusted.
Constant prices	Constant prices are obtained by directly factoring changes over time in the values of flows or stocks of goods and services into two components reflecting changes in the prices of the goods and services concerned and changes in their volumes, i.e. changes in 'constant price terms'.
Consumption of capital	Consumption of fixed capital is a cost of production. It may be defined in general terms as the decline, during the course of the accounting period, in the current value of the stock of fixed assets owned and used by a producer as a result of physical deterioration, normal obsolescence or normal accidental damage. It excludes the value of fixed assets destroyed by acts of war or exceptional events such as major natural disasters, which occur very infrequently.
Current prices	A fundamental principle underlying the measurement of gross value added, and hence GDP, is that output and intermediate consumption must be valued at the prices current at the time the production takes place.
Depletion	The depletion of natural deposits covers the reduction in the value of deposits of subsoil assets as a result of the physical removal and using up of the asset. The changes recorded here are the negative counterparts of gross additions to the level of exploitable subsoil resources that result from reassessments of exploitability, because of changes in technology or relative prices.
Fixed assets	Fixed assets may have been purchased in the past at times when both relative prices and the general price level were very different from prices in the current period. In order to be consistent with the other entries, consumption of fixed capital must be valued with reference to the same overall set of current prices as that used to value output and intermediate consumption.
Fixed assets or inventories	Subsoil assets are different from the stocks of fixed assets and inventories, the major difference being that the process of production has created them. Although they are neither fixed assets nor inventories, they present characteristics of both. The 1993 SNA assumes that all receipts generated from the use of natural assets can be recorded as income, specifically as part operating surplus. The

Term	Description
	implicit assumption is that assets are not exhaustible and therefore no deductions from the receipts are necessary.
Intermediate consumption	Intermediate consumption consists of the value of the goods and services consumed as inputs by a process of production, excluding fixed assets whose consumption is recorded as consumption of fixed capital. The goods or services may be either transformed or used up by the production process. Some inputs re-emerge after having been transformed and incorporated into the outputs. Other inputs are completely consumed or used up. Intermediate consumption includes the rentals paid on the use of fixed assets.
Mineral exploration	Mineral exploration consists of the value of expenditures on exploration for petroleum and natural gas and for non-petroleum deposits; it includes pre-license costs, license and acquisition costs, appraisal costs and the costs of actual test drilling and boring, as well as the costs of aerial and other surveys, transportation costs, etc. incurred to make it possible to carry out the tests.
Monetary accounts	Accounts expressed in monetary terms, using only currency as the unit of measure. Monetary is to be taken as synonymous with 'economic value' as understood in economic theory.
National accounts	National accounts are a coherent, consistent and integrated set of macro-economic accounts; balance sheets and tables based on a set of internationally agreed concepts, definitions, classifications and accounting rules. National accounts provide a comprehensive accounting framework within which economic data can be compiled and presented in a format that is designed for purposes of economic analysis, decision-taking and policy-making.
Natural Resource Accounting	Natural Resource Accounting is an accounting system that deals with stocks and stock changes of natural assets, comprising biota (produced or wild), subsoil assets (proved reserves), water and land with their aquatic and terrestrial ecosystems. It is frequently used in the sense of physical accounting as distinguished from monetary (environmental) accounting.
Natural resources	Natural assets (raw materials) occurring in nature that can be used for economic production or consumption. The naturally occurring assets that provide use benefits through the provision of raw materials and energy used in economic activity (or that may provide such benefits in future) and that are subject primarily to quantitative depletion through human use are subdivided into four categories: mineral and energy resources, soil resources, water resources and biological resources.
Non-renewable natural resources	Exhaustible natural resources such as mineral resources that cannot be regenerated after exploitation.
Nominal holding gains	Nominal holding gains depend upon changes in the prices, or more generally, the monetary values, of assets and liabilities over time. Nominal holding gains may accrue on assets held for any length of time during the accounting period and not merely on assets that appear in the opening or closing

Term	Description
	balance sheets. Nominal holding gains are calculated with reference to assets or liabilities that remain qualitatively and quantitatively unchanged during the period over which the holding gain is measured.
Opportunity cost	In the System, the cost of using, or using up, some existing asset or good in one particular process of production is measured by the amount of benefits that could have been secured by using the asset or good in alternative ways. Opportunity cost is calculated with reference to the opportunities foregone at the time the asset or resource is used, as distinct from the costs incurred at some time in the past to acquire the asset.
Proved reserves	Such estimated quantities of mineral deposits, at a specific date, as analysis of geological engineering data demonstrates with reasonable certainty to be recoverable in the future under the same economic and operational conditions.
Physical accounting	Natural resource and environmental accounting of stocks and changes in stocks in physical (non-monetary) units, for example, weight, area or number. Qualitative measures, expressed in terms of quality classes, types of uses or ecosystem characteristics, may supplement quantitative measures. The combined changes in asset quality and quantity are called volume changes.
Rent/royalties	The owners of assets, whether private or government units, may grant leases to other institutional units permitting them to extract such deposits over a specified period of time in return for the payment of rents. These payments are often described as royalties, but they are essentially rents that accrue to owners of the assets in return for putting them at the disposal of other institutional units for specified periods of time and are treated as such in the System. The rents may take the form of periodic payments of fixed amounts, irrespective of the rate of extraction or, more likely, they may be a function of the quantity or volume of the asset extracted.
Revaluation	Revaluation is the positive or negative holding gain accrued during the accounting period to the owners of financial or non-financial assets and liabilities.
Satellite accounts	Satellite accounts provide a framework linked to the central accounts and which enables attention to be focused on a certain field or aspect of economic and social life in the context of national accounts: common examples are satellite accounts for the environment, tourism or unpaid household work.
Stocks	Stocks are a position in, or holdings of, assets and liabilities at a point in time and the SNA records stocks in accounts, usually referred to as balance sheets, and tables at the beginning and end of the accounting period. Stocks result from the accumulation of prior transactions and other flows, and they are changed by transactions and other flows in the period (note that stocks of goods are referred to as 'inventories' in the SNA).
Subsoil assets	Subsoil assets are defined in the 1993 SNA as proven resources of mineral deposits located on or below the earth's surface that are economically exploitable, given current technology and relative

Term	Description
	<p>prices. Subsoil assets consist of coal, oil and natural gas reserves, metallic mineral reserves and non-metallic mineral reserves. The SEEA adopts the same definition as the SNA.</p> <p>Subsoil assets are classified according to:</p> <ul style="list-style-type: none"> -The degree of geological certainty; and -The degree of economic feasibility of the reserves. <p>The boundary between discovered and undiscovered reserves fluctuates as a result of exploration and development, differing geological conditions and technological improvements. The degree of economic feasibility on the other hand categorises the resource as economic, marginally economic and sub-economic; according to the relationship between prices and extraction costs and technological exploitability.</p>
System of Integrated Environmental and Economic Accounting	Satellite system of the System of National Accounts (SNA) proposed by the United Nations for the incorporation of environment concerns (environmental costs, benefits and assets) into national accounts.
Taxes	Taxes are compulsory, unrequited payments, in cash or in kind, made by institutional units to government units. They are transfers because the government provides nothing in return to the individual unit making the payment, although government may use the funds raised in taxes to provide goods and services to other units, either individually or collectively, or to the community as a whole.
System of National Accounts	The revised system adopted worldwide for conventional economic (national) accounting (Commission of the European Communities and others, 1993).