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Evaluation of financial performance of South African gold, platinum, coal and iron ore mining companies for the period 2012 – 2016.

Tapiwa Makamba

A research report submitted to the Faculty of Engineering and the Built Environment, University of the Witwatersrand, in partial fulfilment of the requirements for the Degree of Master of Science in Engineering.

Johannesburg, 2018

DECLARATION

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ABSTRACT

South Africa hosts vast mineral resources that it has a great global comparative advantage in terms of mineral resources endowment. The mining industry continues to be a key contributor to the country's economy. However, since the end of the 2008 global economic crisis, the industry has faced multiple global and local economic and operational challenges that together threaten the survival and sustainability of the industry.

This study investigated the effects these challenges had on the financial performance and health of the South African mining industry for the period 2012 to 2016. The research focussed on the performance of platinum, gold, coal and iron ore mining companies listed on the Johannesburg Stock Exchange. To determine the companies' financial performance, financial ratios were used to measure the profitability, liquidity, solvency, activity and market performance of the companies. Validation of the findings of ratio analysis was done using the Altman Z"-score analysis model that also classified the companies' financial health over the period. As commodity price is a key driver of mining companies' value, a Pearson coefficient correlation analysis was done to determine the influence commodity price had on the performance of the mining companies during the period.

The study found that the overall financial performance and health of mining companies was declining over the course of the analysis period. Profitability was low for all commodity sectors except iron ore, liquidity was good for the platinum and iron ore sectors but poor for the gold and coal sectors. All commodity sectors had good activity ratios but, had poor solvency and market ratios except the iron ore sector. Only the iron ore mining sector performed well in all the ratio categories. Declining commodity prices for most commodities, increasing operating costs, declining productivity were found to be the main factors that affected the performance of mining companies. In addition, the impact on the mining sector of government and policy uncertainty such as the Mining charter, resulted in wholesale decline in the value of mining stocks as investor confidence waned. The Altman Z"-score analysis showed that most analysed companies were in a safe zone, but a few were in a distress zone during the analysis period. Because mining

companies are price takers, it is important that they improve on their efficiencies to remain viable and sustainable against a constrained economic and operational challenges.

To my wife Annah, my beautiful angels Kudakwashe, Taropafadzwa and Anotidaishe and my parents Peter and Hilda Makamba.

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1 INTRODUCTION

1.1 Chapter overview

This chapter introduces and justifies the research study by giving a background of the South African mining industry in both the global and the national context. A discussion is done of the challenges in the mining industry and their impact on the financial performance of mining companies. In addition, the research motivation, scope and the justification of the selected commodity sectors is given. Finally, the structure of the research report is briefly described.

1.2 Research background

The South African mining industry has a long-associated history with the country's economy and remains one of the principal pillars of economic growth and social development in the country. The industry is a key contributor to the economy and to the socioeconomic welfare of citizens and communities in the country and has been at the forefront of transforming the country into the most industrialized nation in Africa (Government Communications, 2015). The mining industry contributes significantly in areas such as job creation, export earnings, foreign direct investment, support of mining-associated downstream industries, tax remittances, community and environmental support and infrastructure development. The value of a sustainable mining sector is immeasurable to all stakeholders, which includes; government, investors, employees, communities and associated industries, both nationally and globally.

1.2.1 The South African mining industry and its global role in mineral reserves and production

South Africa's mineral resources are found in various geological formations and locations across the country, most significantly the Witwatersrand Basin, the Bushveld Complex, the Transvaal Supergroup, the Karoo Basin, the Phalaborwa Igneous Complex, and the Northern Cape kimberlite pipes and heavy mineral sands (Department of Mineral Resources, 2015). These geological formations host a variety of minerals including gold, uranium, platinum group minerals (PGMs), coal, diamonds, iron ore, chrome and numerous other minerals of economic value. South Africa is recognised globally as one of the major hosts of large diverse and abundant

natural resources. For over 100 years, the diverse natural resources in the country have been the pillar of economic and social growth and transformation. This resulted in the formation of the Johannesburg Stock Exchange (JSE), development of excellent financial, legal, energy, communications and transport systems that have bolstered the country's position as the business gateway into Africa for the rest of the world (Njowa, 2006). Table 1.1 shows some of South Africa's mineral reserves and production in 2014.

Table 1.1: South Africa's mineral reserves, production and global ranking in 2014

(Source: Adapted from Department of Mineral Resources, 2015)

COMMODITY	RESERVES				PRODUCTION			
	Unit	Mass	%	Rank	Unit	Mass	%	Rank
Alumino-silicates	mt	51.0	*	*	*	*	*	*
Antimony	kt	27.0	1.5	5	t	815.0	0.5	6
Chrome ore	mt	6 860.0	73.7	1	kt	14 038.0	43.5	1
Coal	mt	66 700.0	7.0	5	mt	261.4	3.0	7
Cobalt	kt	32.0	0.4	11	kt	1.3	1.2	11
Copper	mt	11.0	1.6	11	kt	79.0	0.4	26
Fluorspar	mt	41.0	17.1	1	kt	164.0	3.4	4
Gold	t	6 000.0	10.9	2	t	151.6	5.5	6
Iron ore	mt	650.0	0.74	12	kt	80 759.0	2.5	7
Lead	kt	0.3	0.3	10	kt	29.0	0.5	18
Manganese ore	mt	150.0	26.3	1	kt	13 549.0	26.1	1
Nickel	mt	3.7	5.0	7	kt	55.0	2.0	11
PGMs	t	63 000.0	95.5	1	t	188.4	50.0	1
Phosphate rock	mt	1 500.0	2.3	5	kt	2 011.0	0.9	12
Titanium minerals	mt	63.0	9.0	4	kt	1 025.6	24.6	1
Uranium	ktu	338.0	6.0	7	ktu	0.7	0.9	11
Vanadium	kt	3 640.0	26.0	3	kt	21.5	27.7	2
Vermiculite	mt	14.0	*	*	kt	143.0	35.8	1
Zinc	mt	15.0	6.5	5	kt	26.0	0.2	31
Zirconium	mt	14.0	18.0	2	kt	398.0	23.0	2

It can be seen in Table 1.1, that in 2014 South Africa held the world's largest reserves of PGMs, manganese ore, chrome ore and fluorspar and significant reserves of gold, zirconium, antimony, coal, nickel, phosphate rock, titanium minerals, uranium and zinc. The country was also the highest producer of PGMs, chrome ore, manganese ore, and vermiculite and a top 10 producer of gold, coal, iron ore, vanadium, zirconium, fluorspar and antimony. Overall, the country's production rankings are consistent with its reserve rankings indicating that the

country is converting its comparative advantage to a competitive advantage. According to World Mining Data (2017), in 2015 South Africa ranked 11th globally in overall mineral production with production dominated by mineral fuels followed by iron and ferro-alloys. In addition to its global competitiveness, the industry is a significant economic contributor to the country. It is because of this significant global contribution that the performance of the industry is being analysed in this study.

1.2.2 Mining contribution to the South African economy

Despite having been the driving force behind economic and social transformation for over 100 years, the South African mining industry remains a significant player in the economy through its contribution to various facets of the economy. The industry's contribution has steadily declined over the years but its influence on the economy remains significant as evidenced by valuable contributions in foreign currency earnings, foreign direct investment (FDI), and employment. Fedderke & Pirouz (2002) observed that, so intertwined are the mining industry and the economy that a decline in the fortunes of the mining sector corresponds with a decline in South Africa's economic growth. Figure 1.1 shows mining value added against GDP.

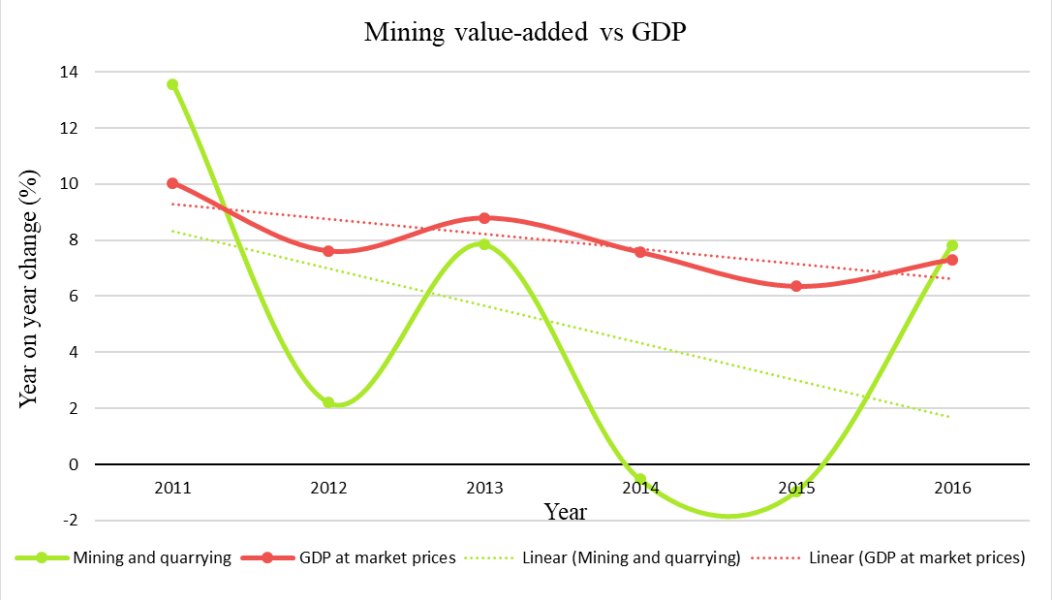


Figure 1.1: Mining-value added versus GDP (2011-2016)

(Source: Adapted from Statistics South Africa, 2017b)

From Figure 1.1 it can be seen that between 2011 and 2016, the year on year change in South Africa's GDP and the mining value-added generally mimic each other. The mining value-added fluctuated more compared to the GDP, but the general trend of the year on year graph curves exhibit resemblance traits. Table 1.2 shows some key mining industry statistics for the period 2007 to 2016.

Table 1.2: Mining industry sales, exports and fixed investment statistics

(Source: Adapted from Chamber of Mines of South Africa, 2016a)

Description	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	Average
Mining's direct contribution to fixed investment (GFCF) (Rm)	40 628	59 084	64 574	63 555	68 420	72 106	79 350	87 030	89 517	93 352	**71 762**
Mining's contribution as % of total investment	9.3	10.6	12	12	11.8	11.5	11	11.1	10.8	11	**11**
Mining industry primary exports (Rm)	160 685	220 077	175 772	224 969	282 297	269 120	279 673	269 264	266 604	294 685	**244 315**
Primary mineral exports as % of total exports	22.8	24.7	23.9	27.4	29.4	26.5	24.2	21.2	20.1	21	**24**
Mining export earnings per unit of GDP created	0.076	0.093	0.07	0.082	0.093	0.083	0.079	0.071	0.066	0.068	**0.078**

From Table 1.2 it can be seen that the mining industry contributed on average 11% to total investment between 2007 and 2016, mineral exports accounted for around 24% of total exports and mining export earnings per unit of GDP created by the mining industry were on average 0.078. Fluctuations in the mining sector's GDP performance are a reflection of the increasingly volatile global and national business environments.

Figure 1.2 shows the mining rand value GDP contribution and percentage trend between 2006 and 2015. For the 10-year period from 2006 to 2015, Figure 1.2 clearly shows the mining industry's consistent decline in GDP contribution to the South African economy. From a high of 9.84% in 2006, it declined by 2.16% to 7.8% in 2015 and according to figures released by the Chamber of Mines of South Africa (2016a), the mining GDP further declined to 7.3% in 2016. Over the longer term, performance data depict a gloomier trend, as in the 1980s the industry's GDP contribution was above 20%, falling to around 15% in 1994 and to around 7% in 2015 (Chamber of Mines of South Africa, 2016c).

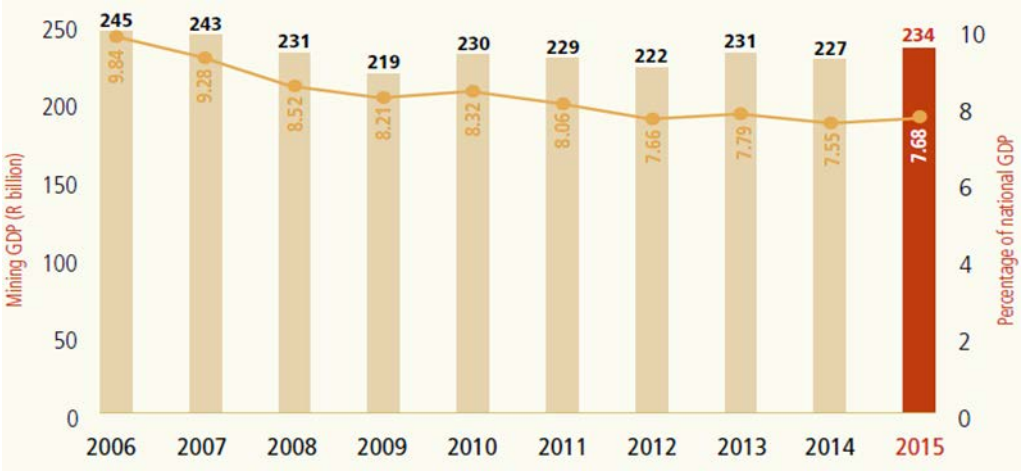


Figure 1.2: Annual mining GDP contribution

(Source: Chamber of Mines of South Africa, 2016b)

The mining industry and the SA government signed a "job pact" in 2015 that showed the commitment of the mining industry to providing socio-economic benefits to the citizens. The pact committed to saving jobs and assisting those taking up voluntary retrenchment packages (Chamber of Mines of South Africa, 2017a). Figure 1.3 shows the industry's employment figures between 2006 and 2015.



Figure 1.3: Total annual mining employment

(Source: Chamber of Mines of South Africa, 2016b)

The influence of operational challenges resulted in fluctuations in employment levels in the industry as shown in Figure 1.3 between 2006 and 2015. Employment

dropped annually by 3.1% between 2012 and 2015, as a reflection of the job cuts to maintain viability. Another significant impact of the mining sector to the economy and society is its sustained practice of upholding and improving the standard of living of its employees. The relatively higher mining industry wages and salaries as compared to the economy-wide average demonstrate a huge commitment to the welfare of the country's citizens. Table 1.3 shows the average monthly employee earnings by industry from 2010 to 2015.

Table 1.3: Average monthly earnings of employees by industry from 2010 to 2015

(Source: Chamber of Mines of South Africa, 2017)

	2010	2011	2012	2013	2014	2015
Agriculture	1 295	1 300	1 495	1 733	2 153	2 231
Mining	5 000	5 800	6 000	6 000	7 000	7 500
Manufacturing	3 250	3 500	3 500	3 672	3 900	3 800
Utilities	6 000	6 000	6 000	8 666	7 000	7 500
Construction	2 437	2 600	2 600	2 800	2 816	3 000
Trade	2 505	2 800	3 000	3 000	3 033	3 100
Transport	3 500	3 600	3 800	3 900	4 000	4 000
Finance	3 501	4 333	4 000	4 000	4 000	4 000
Services	6 000	6 000	6 500	6 000	5 000	5 000
Private households	1 000	1 200	1 200	1 300	1 400	1 500
Total	**2 900**	**3 000**	**3 115**	**3 033**	**3 033**	**3 100**

From Table 1.3 it is can be appreciated that the average mining industry monthly earning has consistently improved against the total average from 2010 to 2015. In 2010 the total industries average was about 58% of the mining industry's average but by 2015, the total industries' average was 41.3% of the mining average, an improvement of 16.7%. Again, it is this significant contribution of the industry to the national economy that the analysis of the industry is being done.

1.2.3 Business environment

The occurrence of global crises expose businesses to numerous operational and economic challenges that overnight can transform a business from profitability to loss-making and in some circumstances to failure and closure. Colff (2012) noted that, failure of companies has far-reaching consequences that destabilise social, political, and economic equilibria within societies and countries. When companies

in developing countries such as South Africa fail particularly in a key sector like mining, the economic and social ripple effect is disastrous. The unpredictability of events increases the importance of the need for clear financial management practices in ensuring businesses operate efficiently and effectively to meet stakeholders' needs at all times. Consequently, the changes in the global socio-economic dynamics because of the 2008 Global Economic Crisis (GEC) ushered in a period of declining commodity prices that potentially affected revenues and profit margins and concurrently company value in the mining industry.

1.2.4 Commodity price

The fungible nature of most mineral commodities means that their prices are determined by global market fundamentals, making mining companies to be price takers. Commodity price is the most significant factor among the group of economic factors that influence company value, and there is significant evidence to suggest that it is the major driver of value in commodity companies. Studies done by different researchers in different fields such as (Mongale & Eita, 2014; MacDiarmid, 2017; Alao & Oloni, 2015; Frankl, *et al.*, 2013) concluded that there is a strong correlation between commodity price and company value. Shifts in market supply and demand determine movements in commodity prices and consequently company value as revenues and profit margins are affected. The effect on profits is significant for mining companies as the mining industry is reliant on returns to offset high capital cost requirements in establishing and maintaining operations.

Figure 1.4 shows prices for coal, gold, iron ore, metals and minerals, platinum and precious metals from 2010 to 2016. The influence on commodity prices post-2008 GEC can be seen from Figure 1.4, as all the major mineral commodities display declining trends. Base metal prices declined more than precious metals' prices with iron ore exhibiting the worst decline. Prior to the 2008 GEC, commodity prices rapidly increased spurring an equally rapid increase in mining productivity, revenues, and profits. With the onset of the GEC, prices plummeted, remaining suppressed until around the middle of 2010 when a resurgence began.

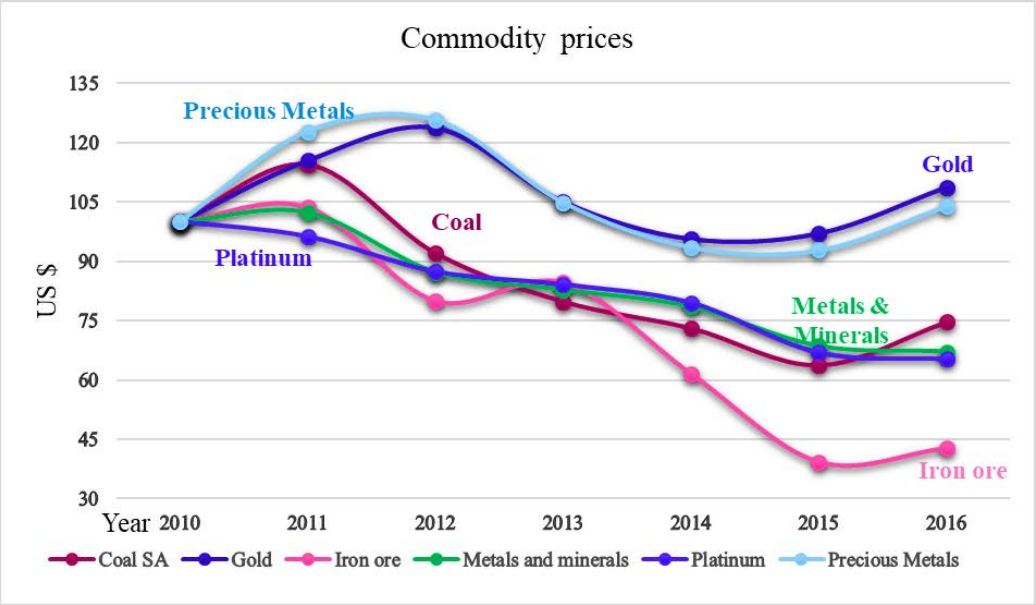


Figure 1.4: Selected commodity prices (2010 – 2016)

(Source: World Bank, 2017)

The resurgence largely influenced by growth in emerging markets and China, in particular, continued until the end of 2011 and on the back of the price resurgence, a revival in the mining sector (Yakovleva, 2015). However, as China's demand for huge quantities of metals and coal waned beyond 2011, commodity prices also slumped. Although price is the key driver of value in commodity companies, other factors and challenges also have a noticeable effect. According to MacDiarmid, *et al.*, (2017), other potential drivers of value in commodity companies may include:

- Production output;
- Revenue;
- Gearing ratio;
- Earnings before interest, tax, depreciation and amortization (EBITDA) multiple;
- EBITDA margin;
- Return on capital employed (ROCE); and
- Net debt to EBITDA ratio.

However, it is worthwhile keeping in mind that the mix of value drivers for each company will consistently change depending on market economics of supply and demand (MacDiarmid, *et al.*, 2017).

1.2.5 Mining industry challenges between 2012 and 2016

Numerous challenges during the period 2012 to 2016 ensured an unanticipated quick end of the predicted period of sustained recovery and strengthening of market fundamentals after the 2008 GEC. These challenges influenced economic fundamentals such as market demand, commodity prices, and operating costs, influencing financial performance of mining companies. Following is a summary of the challenges that were faced by the mining industry between 2012 and 2016 as presented by PricewaterhouseCoopers in their annual periodical analysis of trends in the South African mining industry.

"The growing disconnect", the period was characterised by a general slowdown in economic fundamentals fuelled by a slowdown in the Chinese economy and uncertainty in Europe and the Middle East. Gold price was the only commodity to appreciate. Gold price continued to firm from R8 947 per troy ounce (oz.) in 2010, R11 454/oz. in 2011 and reaching a high of R13 700/oz. in 2012 (World Gold Council, 2017). Labour disputes escalated culminating in the tragic Marikana events, where lives were lost and production interrupted (PricewaterhouseCoopers, 2012).

"A confidence crisis", the after-effects of the Marikana incident and the spread of labour unrests to other mining sectors further negatively affected operations and increased operating costs (PricewaterhouseCoopers, 2013).

"Realigning expectations", the five-month long platinum labour unrest, high operating costs, and low international demand prevailed together with the volatility in commodity markets they made making long term decisions and plans difficult (PricewaterhouseCoopers, 2014).

"The gloves are off", the effects of the new wage structure agreed by industry, government and labour manifested in the form of increased operating costs. Labour costs on most mines in South Africa rose to around 40% of total operating costs. Most commodity prices significantly declined, costs spiralled, and regulatory uncertainty increased and raising capital became more difficult as investor confidence dropped. Limitations within the transport and electricity supply infrastructure worsened the challenges already at play (PricewaterhouseCoopers,

2015).

“Slower, lower, weaker…. But not defeated”, the year was characterised persistence of regulatory uncertainty and spiralling costs (PricewaterhouseCoopers, 2016).

Despite the series topics aptly capturing the general sentiments of the mining industry each year, significant concerns on the implementation of the Mining Charter simmered underneath, silently festering business uncertainty and eroding investor confidence.

The Mining Charter was created to provide a framework for the transformation of the mining and minerals industry by negotiations between government, workers unions, the Chamber of Mines of South Africa (CoM) and the South African Mining Development Association (SAMDA) in 2002 and made public on 1 May 2004. According to ThisisGold (2015a), the Mining Charter enabled legislative empowerment to issues such as; facilitating entry of historically disadvantaged South Africans (HDSAs), guaranteeing equal access to the country’s mineral resources to all South Africans, promoting economic growth and development and providing employment opportunities and promoting the socio-economic welfare of all South Africans. However, because of the industry’s historical association with human rights violations, exploitation and marginalisation of mostly black South Africans, interpretation of the Mining Charter by the different stakeholders transcends its legislative purpose to being political.

Viewed in that perspective the Mining Charter has become highly divisive and concerning especially to investors in the mining industry. Deloitte Touche Tohmatsu Limited (2017) emphasises that despite having already had two revisions to the Mining Charter since proclamation, in 2010 and 2016, ambiguities and shortcomings remain resulting in objections, legislative and otherwise mainly from the CoM. The objections sought to lengthen dialogue and consultations between stakeholders so that the Mining Charter is aligned to broader government and business policies including land and property rights (Deloitte Touche Tohmatsu Limited, 2017). Top on the industry’s concerns was the ‘once empowered, always empowered’ principle which arose from interpretation and recognition of past and

present Black Economic Empowerment (BEE) transactions as part of fulfilment of the Mining Charter's empowerment targets.

The Department of Mineral Resources of South Africa (DMR) believed that all transactions entered before 2004 and those where BEE partners had vacated their shareholding, or the partnerships had failed, fell outside the jurisdiction of the Mining Charter and were not going to be recognised as fulfilling current empowerment requirements (ThisisGold, 2015a). The industry believed all transaction, existing or failed, constituted compliance and should be recognised and companies should only be obligated to fulfil the remainder of the ownership threshold as required by the Mining Charter. According to Peta (2016), the differing interpretations meant that the DMR viewed the empowerment target as a continuous compliance requirement whilst industry viewed it as a once off requirement. Pursuant to the CoM's legislative challenge, the South African high court on 4 April 2018 ruled in favour of the industry' interpretation, meaning that mineral rights holders are not legally required to restore ownership targets once transactions have been disposed or failed (Kotze, 2018). It is hoped the ruling brings clarity and certainty to negotiations and will aid in constructive discussions on the Mining Charter going forward.

Therefore, the uncertainty from the Mining Charter is adversely impacting the mining industry and South African economy as it adds financial strain on businesses and current shareholders. The impact mainly stems from two factors; the uncertainty creates low confidence in the sector resulting in investors shunning the industry and it creates a financial burden on companies and existing shareholders as they must carry the cost of purchasing shareholding offered to BEE partners. These factors cumulatively restrict availability of financial capital that is critical for industry revival and growth.

Against the backdrop of these challenges and uncertainties, determination of how well the mining sector has performed may hold the key to charting a sustainable future.

1.3 Research problem and question

The global mining industry has been operating in a challenging economic and

financial environment since the 2008 Global Economic Crisis (GEC), characterised by declining commodity prices, nationalisation issues, scarce capital, and weak market demand. In addition to global challenges, the South African mining industry faces other operational challenges that are unique to the country such as depth of the mineral deposits, unstable socio-political environment and uncertain government policies, which threaten the sustainability of the industry. With the dominance of these various challenges affecting the South African mining industry, it would follow that there were consequences on the financial performance of individual mining companies. This challenging business environment then raises the research question:

"How has the South African gold, platinum, coal and iron ore mining companies performed economically from 2012 to 2016?"

1.4 Research aim and objectives

The aim of the research is to measure and analyse the performance of South African gold, platinum, coal and iron ore mining companies between 2012 and 2016 in response to local operating challenges, global economic challenges and the lack of a sustained recovery in global economic fundamentals in the five-year period. The objectives of the research are to:

- Conduct a literature review on financial performance and measures of financial performance;
- Analyse the liquidity, activity, solvency, market and profitability ratios of the selected mining companies;
- Analyse the financial performance trends of the selected mining companies;
- Determine overall financial health of the selected companies; and
- Assess the financial health of the selected mining companies based on the Altman Z"-score model and validate findings of ratio analysis.

1.5 Research motivation

The significant contribution and value creation of South Africa's mining industry to both the global minerals industry because of its reserves and production and to the national economic and social constructs depends on the industry's financial

wellbeing. The period 2012 to 2016 was characterised by numerous operational and financial challenges that had influence on the financial wellbeing of the industry. The determination of the financial wellbeing of mining companies provides a representation of the industry's level of financial performance and the strength of its financial health for a sustainable future, hence the importance of evaluating its financial performance.

1.6 Research scope

The focus of this study is analysing the financial performance of South African gold, platinum, coal, and iron ore mining companies, listed on the JSE, during the period 2012 to 2016. This period was selected because it was characterized by the worsening of economic fundamentals such as decreasing market demand, subdued commodity prices, rising operating costs and increasing labour unrests that resulted in increased operating challenges on companies. In general, the period represents a range of economic activities ideal for analysis of mining companies. Analysis of JSE listed mining companies only is because of their direct exposure to both global and national challenges and their financial reports are readily available on the public domain, which are key data sources for the analysis.

The study focuses on four commodities; platinum, gold, coal, and iron ore. They are selected based on their higher contribution to the national economy in areas that include revenue generation, employment provision, export earnings, and employee earnings. Their leading contribution makes them ideal proxies for inferred analysis of the mining industry as discussed in the next section.

1.7 Justification of selected commodities

Although South Africa exploits many mineral commodities, not all are significant contributors to the economy and the social needs of the country and its citizens. The mining industry contributes in many areas of the economy, but some areas have more impact on the socio-economic constructs of a nation than others. The chosen commodities were selected as a proxy to represent the value that the mining industry adds to the national economy. Selection criteria include revenue generation, employment creation, employee earnings, and global production ranking; the key metrics of national economic contribution by an industry. Table 1.4 shows revenue

contribution of commodities to the mining industry between 2012 and 2016.

Table 1.4: Revenue by commodity

(Source: Adapted from Chamber of Mines of South Africa, 2016a; Statistics South Africa, 2017a; Kimberley Process Rough Diamond Statistics, 2016)

Commodity /Year	Gold (Rm)	PGMs (Rm)	Iron Ore (Rm)	Copper (Rm)	Chrome (Rm)	Manganese (Rm)	Diamond (Rm)	Coal (Rm)	Silver (Rm)
2012	74 017	69 204	52 643	5 155	8 277	10 821	8 433	96 148	583
2013	57 479	84 235	63 137	5 818	11 763	14 476	11 425	101 383	453
2014	57 139	77 505	58 686	5 951	13 606	16 376	13 272	103 734	342
2015	58 627	94 138	39 465	5 201	16 216	13 518	17 751	103 243	365
2016	63 491	96 412	43 230	3 745	15 735	19 741	18 372	111 953	413
Average	**62 151**	**84 299**	**51 432**	**5 174**	**13 119**	**14 986**	**13 850**	**103 292**	**431**
Rank	**3**	**2**	**4**	**8**	**7**	**5**	**6**	**1**	**9**

As shown in Table 1.4, the top four revenue contributors are coal, PGMs, gold, and iron ore, hence their selection for analysis in this study. Table 1.5 shows employment contribution of commodity sectors between 2012 and 2016.

Table 1.5: Employment by commodity sector

(Source: Adapted from Chamber of Mines of South Africa, 2016a)

Commodity /Year	Gold	PGMs	Iron Ore	Copper	Chrome	Manganese	Diamonds	Coal	Aggregate and Sand
2012	142 200	197 752	23 380	2 533	19 762	8 685	12 332	83 244	7 719
2013	131 738	191 260	21 127	2 930	18 358	9 842	13 579	88 039	7 510
2014	119 007	186 864	21 794	2 853	18 658	9 971	15 356	86 106	7 421
2015	115 055	187 756	20 760	2 805	18 470	8 657	17 481	77 773	7 525
2016	116 479	172 444	16 490	2 366	15 514	7 240	17 978	77 506	7 602
Average	**124 896**	**187 215**	**20 710**	**2 697**	**18 152**	**8 879**	**15 345**	**82 534**	**7 555**
Rank	**2**	**1**	**4**	**9**	**5**	**7**	**6**	**3**	**8**

It can be seen in Table 1.5 that PGMs employed the most people followed by gold, coal, and iron ore. The four commodities accounted for around 88% of the total direct employees in the mining industry, hence their selection for analysis in this study. Table 1.6 shows employee earnings by commodity sector between 2012 and 2016.

Table 1.6: Employee earnings by commodity sector

(Source: Adapted from Chamber of Mines of South Africa, 2016a)

Commodity /Year	Gold (R')	PGMs (R')	Iron Ore (R')	Chrome (R')	Manganese (R')	Diamond (R')	Coal (R')	Aggregate and Sand	Other mines and
2012	22 238	34 393	4 691	3 434	1 565	2 408	17 446	892	6 563
2013	23 930	37 710	4 848	3 841	1 947	2 871	18 949	940	5 717
2014	23 383	35 652	5 692	4 047	2 302	3 663	20 595	1 038	5 774
2015	24 582	45 015	6 263	4 429	2 201	4 420	19 966	1 120	6 011
2016	28 731	45 876	5 878	4 208	2 118	4 770	21 093	1 190	6 201
Average	**24 573**	**39 730**	**5 474**	**3 992**	**2 027**	**3 626**	**19 610**	**1 036**	**6 053**
Rank	**2**	**1**	**4**	**5**	**7**	**6**	**3**	**8**	

In Table 1.6 employees in the PGMs sector earn more followed by those in the gold, coal, and iron ore sectors. Gold and PGMs maintained consistent year on year improvement on earnings whilst the other showed fluctuating improvements. This is again the reason these four commodities were selected for analysis in this study. Table 1.7 shows the global ranking of the selected commodities based on their production output.

Table 1.7: Selected commodities global production ranking 2008 – 2015

(Source: Adapted from British Geological Survey, 2008-2015)

Ranking	Gold ('000 kg)	Country	Platinum ('000 kg)	Country	Coal (mt)	Country	Iron Ore (mt)	Country
1	3033.9	China	2 105.8	South Africa	28 445.3	China	9 765.0	China
2	2 030.0	Australia	995.7	Russia	7 557.5	USA	4 350.3	Australia
3	1 807.1	USA	193.2	Canada	4 797.4	India	2 967.2	Brazil
4	1 714.9	Russia	162.9	Zimbabwe	3 577.5	Australia	1 381.3	India
5	1 389.3	South Africa	127.7	USA	2 905.0	Indonesia	800.6	Russia
6	1 290.7	Peru	20.3	Botswana	2 704.0	Russia	571.4	Ukraine
7	951.7	Canada	16.8	China	2 041.1	South Africa	513.7	South Africa
8	886.4	Ghana	9.5	Colombia	1 511.7	Germany	389.9	USA
9	745.8	Mexico	6.2	Finland	1 088.3	Poland	386.2	Kazakhstan
10	711.0	Uzbekistan	5.8	Australia	901.6	Kazakhstan	353.7	Iran

It can be seen in Table 1.7 that globally South Africa ranked in the top 10 in the production of gold, platinum, coal and iron ore between 2008 and 2015. The country ranked first in producing platinum, fifth in producing gold and seventh in producing

coal and iron ore. The significant contribution of these four commodity sectors is again the reason they are selected for analysis as a proxy of the South African mining industry.

1.8 Chapter summary and report layout

This chapter has discussed the significant contribution of the mining industry to global reserves and production and in South Africa to creating economic and social equality through broad-based and industry-supported efforts. Although the mining industry's contribution to the national economy has decreased over the years, it remains an important sector to the country. Prevailing global and national challenges have been presented that threaten financial performance and sustainability of the industry. Platinum, gold, coal and iron ore were selected as proxy of the industry based on their contribution to revenue generation, employment creation, export earnings, and employee earnings, the key national economic indicators among others

1.9 Report layout

Chapter 1 Introduced the subject matter through the subtopics such as the background of the South African mining industry, its contribution to the national economy and the challenges faced by the mining industry. The chapter further explained the problem to be research and further provided the research objectives before justifying the need to conduct this study.

Chapter 2 provides a literature review of company performance, with a focus on financial performance, the key financial measurement technique of financial ratios and financial measurement metrics used in company performance analysis. It also provides a review of commodity price as a driver of company value and the Altman Z-score analysis model as a tool to measure financial health of a company.

Chapter 3 describes the methodology used in analysing company performance, data collection, description its presentation and the data analysis process, both financial and statistical. Chapters 4, 5, 6, and 7, present analysis of each commodity selected showing company performance for the five-year period. Financial ratios are presented in graphs and interpreted in the text. A correlation analysis is then done to check the relationship between the financial ratios and the commodity price.

Chapter 9 summarises the analysis results offering a comparison amongst the commodity sectors. This chapter also provides recommendations for each commodity sector identified performance drivers to provide an answer and solution to the research question and problem respectively.

2 LITERATURE REVIEW

2.1 Chapter overview

This chapter reviews the literature on company financial performance, focussing on financial analysis through financial ratios and the Altman Z-score analysis model. The review on metrics focusses on the ratio categories of profitability, liquidity, solvency, activity, and market. Further review of financial ratio analysis discusses financial distress prediction models as tools to measure the financial health of companies and providing validation observations of financial ratio analysis.

2.2 Company performance

Performance is the task of achieving set goals within predetermined periods and meeting acceptable standards (Web Finance, 2017). The level of achievement of the goals defines success or failure of an organisation. It is the basic purpose of every business to meet stakeholder needs by effectively managing financial and non-financial factors to achieve set goals within prescribed time limits. In the mining industry, financial factors include capital, revenues, and costs whilst non-financial factors include safety and health, production rates, and product quality and delivery.

Company performance can be classified as financial or non-financial. Financial performance relates to the use of available resources to generate revenues and profits. Analysis of financial performance is done through numerical analysis of quantifiable financial data such as revenues, capital expenditure, and shareholder returns. Non-financial performance relates to non-monetary factors that aid an organisation in attaining set goals on company policies that include issues on the environment, health and safety standards, and the company's social responsibilities. According to Achim & Borlea (2010), analysis of non-financial performance is based on observations and subjective conclusions that may include understanding how optimisation goals, work responsibilities and safety standards are determined.

Despite both measures being important in determining overall company performance, analysis of non-financial performance is more complex because of the varied nature and influence they have on each operation. Financial measures are determined by set accounting standards that create uniformity and make it easy to

check for conformity. In financial analysis, items on an income statement are formulated the same for all companies irrespective of the structure of each company. On the other hand, non-financial measures are influenced by many factors such as nature of mining, location of the mine and proximity to and level of interaction with communities and natural environments. According to Wharton School (2000), there is no common denominator in the measurement of no-financial data such that analysis their performance becomes complex if some are in time, some in quantities and some in arbitrary ways. The composition of one company's non-financial report will differ from that of the next company based on the pre-prescribed value assigned by each company through its operating policies and strategies. Since publicly listed companies are mandated to publish financial results adhering to specific accounting standards, analysis of financial factors has become the first step in the general measure of company performance. Thus, for the purpose of this research financial performance is used to measure company performance.

2.3 Financial performance measurement

According to Investopedia (2017e), measurement of financial performance of an organisation is an overall determination of how well available assets and resources are being utilised to generate revenues, minimise costs and add value to its stakeholders over a given period. Access and availability of appropriate information on the business' financial position are important if decision-making and business management are to be effective. It is important to keep in mind that factors that influence company performance are specific to each organisation as they are determined by each business' strategic objectives and operating environment. Although financial performance measures are the usual tools in determining a company's progress in achieving strategic goals, it is important that their use acknowledge their limitations especially in interpreting information. According to (McNamara, 2006), the following are some of the benefits and limitations of financial performance measures:

Advantages:

- They provide a summary measure of a company's economic activity;
- The aide in aligning operations to the company's financial objectives; and

- They provide consistency in evaluation, as they are standard for each specific component of the business.

Limitations:

- Financial measures are based on specific metrics that tend to emphasise the repetitive focus on specific functions at the expense of others;
- With business practices evolving to focus more on value creation, financial performance measures represent internally derived value at the expense of the value generated from the people and cultures in improving lives;
- Financial measures review past performance, which has limited relevance in predicting the future; and
- Although the setting of specific goals ensures focused attention, the organisation risks focussing on short-term results and sacrificing long-term value creation.

Despite their limitations, financial measures remain an important analysis tool in building a knowledge base of the business' financial variables and their effect on business growth, innovation and value and wealth creation for stakeholders (Shah, 2013). Analysis of an organisation's financial performance requires a review of relationships between reported items on the company's financial statements using financial ratios. Financial ratio analysis is the most commonly used technique for measuring financial performance.

2.4 Financial ratio analysis

Finch (2017) defines a financial ratio as a decision-making tool that allows comparison of a company's financial statement figures in order to interpret and understand its financial performance. According to Burns, *et al.* (2008, pg. 38), *"Ratios provide a concise and systematic way to organise the enormous quantity of data contained in financial statements into a framework that creates meaningful information"*. Morris (1998) as cited by Rowlings (2016) concluded that although ratio analysis is done through accounting models that have little theoretical foundation, their interpretation should be from a perspective of them being a part of the larger context of financial management. Preferred performance in companies

will depend on sustained improvement of ratios, which depending on the ratio category means increasing or decreasing of the ratio values. For example, profitability ratios are preferable when they are increasing whilst debt ratios are preferable when they are decreasing. It is worthwhile to keep in mind that financial ratios do not usually explain a company's performance but offer guides to the formulation of questions that are relevant to interpreting the company's performance (Brealey, *et al.,* 2001). There are a number of metrics used to measure financial performance that are systematically classified based on the information they provide or the variable they are intended to measure. The metrics selected in this study are classified and discussed in the next section.

2.5 Classification of financial ratios

According to Northwest Farm Credit Services (2017, pg. 3) *"Basic financial ratios are grouped into management categories that help decision makers assess business performance from multiple perspectives"*. Because categorisation is ordinarily subjective due to defined purpose of use, there are potentially many possible categories. For this study, five categories are chosen, that is, profitability, liquidity, solvency, activity and market. The indicated recommended ratios are generic levels and may be different for different industries. The formulas for the selected ratios reviewed in the following sub section are shown in Appendix 10.1.

2.5.1 Profitability ratios

Profitability ratios measure an organisation's ability to generate profits based on sales, equity, costs, and assets over the period under review (Kaplan Financial Limited, 2012). According to Dufera (2010) and Mege (2012), profitability ratios are the most used indicators of overall performance and effectiveness in evaluating company performance. These ratios are popular as measures of financial performance because a profitable company can use profits to pay interest obligations, pay dividends to shareholders or retain them as funds to improve or grow the business. They are also important as they show how the company generates returns by utilising its assets and managing its costs. Typical ratios include gross profit margin, net profit margin, return on equity (ROE), and return on assets (ROA).

Gross profit margin

The gross profit margin ratio shows the relationship between gross profit (gross sales less cost of sales) and sales revenue. The ratio indicates how much the company retains on each unit of sales to service its other costs and obligations. According to Ready Ratios (2017b), the ratio is the proportion by which gross profits exceed production costs. Although acceptable ratio ranges are industry dependent, the general indicator of good performance is continuously improving ratios.

Net profit margin

The net profit margin ratio shows the percentage of each sales unit left over after all expenses have been paid (Ready Ratios, 2017c). It shows the relationship between net realised profits and the generated income. Just like gross profit margin, acceptable ratio ranges are industry dependent although upward trends over time are good indicators of good performance as they show that the company is efficiently converting sales into actual profits.

Return on equity

Investopedia (2017a) states that the return on equity (ROE) ratio measures how much profit the company generates from shareholders' investment. It is the ratio of net income to shareholders' equity. The standard ratio values of between 9% and 12 % are considered desirable but the ratio is influenced by factors such as industry and economic environment (inflation, macroeconomic risks), which means interpretation should be contextualised to be representative and meaningful (Ready Ratios, 2017e).

Return on assets

The return on assets (ROA) ratio shows how much profit a company generates in relation to its total assets. The ratio measures profit per dollar of the company's assets (Ready Ratios, 2017d). It is a ratio of net income after tax to total assets. The ratio indicates the capital intensity of an organisation and is market dependent but just like other profitability ratios, steady or improving ratios are good performance indicators. Capital-intensive industries will have lower ratios when compared to

capital light industries.

2.5.2 Liquidity ratios

In accounting terms, liquidity refers to the ability of an asset to be converted into cash or cash equivalents, quickly and at minimum cost. According to Mege (2012), liquidity ratios are used to measure an organisation's ability to settle short-term financial obligations such as short-term debts and operating costs without affecting normal business operations. In the mining industry, short-term refers to any period up to a year. Normally, steady or successively increasing ratios are preferred as they signify that the company can meet its obligations and can pursue other activities of growth. Declining ratios signify that the company will struggle to meet obligations leading to stifling of growth. Typical ratios include current ratio, quick ratio and working capital.

Current ratio

The current ratio measures the short-term financial health of a company by assessing whether current assets are sufficient to meet current liabilities (Ready Ratios, 2017a). A ratio of 2:1 is considered the standard minimum for safe liquidity. When the current ratio is too high, this may indicate that the company is underutilising its assets, not managing its working capital well, or the company is succeeding in sourcing financing. When the current ratio is too low, this may indicate imminent short-term financial challenges, the company has poor inventory management, or the company is spending cash faster than it is generating it.

Quick ratio

The quick ratio is also referred to as the acid test ratio. The ratio is similar to the current ratio, except assets that are not easily liquidated such as inventories, prepaid expenses and deferred taxes are omitted from current assets. It is considered a more precise measurement of liquidity as it eliminates the effects of the least liquid assets (Team FME, 2013). Although the ratio of 1:1 is considered the standard minimum for safe liquidity, it is industry dependent. A high quick ratio suggests a company is experiencing growth and is able to cover its financial obligations whilst a low ratio suggests the company is struggling to grow or maintain sales or has high leverage.

Working capital

Working capital represents the company's liquidity by looking at the funds available for short-term day-to-day needs of a company. Working capital is the difference between current assets and current liabilities in monetary terms (Northwest Farm Credit Services, 2017). Although working capital is not a ratio, it is normally referred to as one. Ideally, any positive working capital is considered sufficient but exact amounts are company or industry dependant based on planned future activities.

2.5.3 Solvency ratios

Solvency ratios are also referred to as debt or leverage ratios. They measure an organisation's reliance on debt to maintain operations in the long-term. In the mining industry, long-term relates to one year and above. According to Mege (2012), solvency ratios highlight the business' ability to take care of its long-term financial obligations such as interests and scheduled loan payments. Typical ratios include debt to equity ratio, debt to asset ratio and cash flow coverage.

Debt to equity ratio

Debt to equity ratio shows how much of a company's operations are financed by suppliers, lenders, creditors and bond issuers compared to financing by the company's equity (Avdeev, 2017a). A maximum ratio of value 1 is recommended as standard. The debt to equity ratio represents the company's general financial structure. The ratio is industry specific because capital-intensive industries are likely to have higher debt to equity ratios than less capital-intensive industries. Context of the ratio is important for both shareholders and management, for example, when the ratio is too high it may indicate to management that the company will not be able to meet its debt obligation whilst shareholders may feel the company is taking advantage of financial leverage.

Debt to asset ratio

The debt to asset ratio shows how much a company relies on financing from suppliers, lenders, creditors, and obligors compared to funding from assets (Avdeev, 2017c). A ratio of value 0.5 is recommended as standard. However, like

most ratios it is industry dependent as industries have different debt to asset level requirements. A high ratio means greater risk to a company's operations whilst a low ratio means there is room for future borrowings at minimal risk of default on repayment. In some cases when the ratio is too high, attracting supplementary capital may become difficult.

Cash flow coverage ratio

The cash flow coverage ratio shows a company's ability to pay off interest and principal obligations when they become due from generated earnings (Ready Ratios, 2017f). In other words, it is a measure of a company's cash inflows compared to preferred cash outflows. A ratio of 1:1 is the acceptable safe position; anything less signifies impending financial challenges if management of operations does not improve. A very low ratio may suggest a company is not generating enough cash or it has too much debt.

2.5.4 Activity ratios

Activity ratios measure how effectively an organisation utilises its available resources and assets. Activity ratios are also referred to as turnover ratios as they indicate the rate of conversion of assets into sales (Mege, 2012). Some analysts view activity ratios as a reflection of management effectiveness. Typical ratios include asset turnover, fixed asset ratio and inventory turnover.

Asset turnover

The asset turnover ratio assists in measuring the productivity of a company's assets (Investopedia, 2017c). It is a ratio of the value of generated sales to the value of the company's assets. Interpretation is company and industry dependant on factors such as company size, labour size, and pricing strategy, as they significantly influence the ratio value. However, the ratio may even differ within the same industry, for example, in the mining industry, mechanised and conventional operations will have different ratios because of different asset requirements and a mine with older assets versus one with newer assets will have different ratios even if their sales are the same.

Fixed assets turnover

The fixed assets turnover ratio measures the ability of a company to generate sales from fixed assets; namely property, plant and equipment and net of depreciation (Investopedia, 2017b). The ratio is important in measuring productivity because usually fixed assets constitute the biggest component of total assets of a company particularly in mining. Desirable ratios are company and industry dependent. Interpretation of the ratio is based on comparing successive periods to determine whether there is improvement or deterioration in the efficient utilisation of fixed assets.

Inventory turnover

According to Investopedia (2017d), inventory turnover measures how quickly inventories are turned into cash and restocked over a specific period. It is the rate of movement of inventory on and off the shelves. There is no generic recommended ratio but generally, positively improving turnover is preferred as it implies effective turnover management. Inventory turnover is also industry dependent.

2.5.5 Market ratios

Market ratios measure a company's current economic value as determined by market sentiments (Peavler, 2017). They are used by a company's current and potential investors to determine if the company is overvalued, undervalued or fair priced. Because they reflect the market's perception of a company, most managers do not keep an eye on them as they focus on operational indicators. Typical market ratios include share price, earnings per share (EPS), price to earnings (P/E), and book value per share.

Share price

According to Investopedia (2017g), the share price is the value of a unit of a company's ownership. Share prices are driven by mostly by expectation, for example, if the market is expecting good results from a company, the sentiment will cause the share price up but when the results come out and they are not as good, the share price will probably go down because the reality is not exciting (The Guardian, 2001).

Earnings per share ratio

According to Peavler (2017), earnings per share indicate a company's profitability to investors by comparing its earnings to its outstanding shares. By analysing the trend of this ratio, investors are able to derive a value of the company's shares.

Price to earnings ratio

The price to earnings ratio measures the amount investors will pay for a unit of current earnings (Lane, 2017). It is a ratio of the current market price per share to current earnings per share of a company. although, according to Investopedia (2017f), the recommended ratio range is 20 – 25, the ratio is dependent on industries and market conditions.

Book value per share ratio

The book value per share ratio indicates whether a company's market value per share is undervalued or overvalued (Bragg, 2017). It is a comparison of the shareholders' equity to the number of outstanding shares. The ratio is most useful in deciding to buy or sell shares in a specific company as it reflects the amount each share represents of the company's assets.

Although the application of financial ratios is a straightforward process, exercising due caution when interpreting results ensures correct and contextual explanations. It is also important to acknowledge the advantages and limitations that are associated with the use of financial ratios to avoid mistakes in application.

2.5.6 Advantages and limitations of financial ratios

Although very useful in financial performance analysis, caution should be exercised in interpretation and utilisation of financial ratios, as there are advantages and limitations to their use. According to Mege (2012), the following are some of the benefits of using financial ratios:

- Facilitates intracompany comparisons of performance trends over specific periods;
- Facilitates intercompany comparisons of companies of different sizes in the same industry;

- Summarises the data in financial statements using few ratios so that a company's performance is easy to understand; and
- Ratios provide guidance in decision-making.

According to WJEC Business Studies (2012), the following are some of the limitations of using financial ratios:

- The use of different accounting conventions in companies distorts intercompany comparisons;
- Window dressing in the preparation of financial statements results in misleading ratios;
- Although interpretation of multi-ratios offers better insights into performance as compared to interpretation of single ratios, the use of multi-ratios or models without the adequate analysis expertise increases the risk of misinterpretation;
- As they are based on past data there is no certainty in the derived forecasts;
- Changes in business factors can affect the validity of ratios calculated for different periods;
- As financial statements are summarised accounting information, used ratios do not reflect some important information not in the statements;
- The effect of inflation on revenues and profits over time may result in misleading interpretation of results when comparing different periods; and
- There is no standardisation on the use of ratios for specific measures thereby complicating selection and interpretation.

The use of financial ratios and their appropriate interpretation provide an effective tool to manage the performance of specific business areas which when combined characterise the overall performance of a company. As alluded to earlier, ratios also make it possible to compare a company's performance with that of its peers especially those in the same industry.

The change in business dynamics drove the evolution of the use of financial ratios

over the years from the use of individual ratios to combinations that are more complex. The progression to combination analysis was based on observations that a business is a sum of parts that have complementary effects on each other. Since the beginning of the 20th century, the use of financial ratios in firm evaluation has grown to be integral in financial analysis and is underpinned by its principal use in corporate failure prediction models (Balcaena & Ooghe, 2006; Andekina & Rakhmetova, 2013).

2.6 Predicting company failure using financial ratios

Over the years, academics, researchers and economists have done a number of research studies across the globe on various aspects of businesses to analyse financial performance. Following are some of the key empirical studies on different aspects of financial performance.

Beaver (1966) pioneered the use of financial ratio analysis with his study of cash flow generation and leverage, using Univariate Discriminant Analysis (UDA). He developed a mathematical model whose aim was to study the predictive ability of financial ratios to classify bankrupt and non-bankrupt companies. The model has various ratios with different failure prediction accuracies. It can predict failure of a company one year before the company fails. The research determined that net income to total debt ratio has a predictive ability accuracy of 92% one year before failure, net income to sales ratio has a 91% accuracy and net income to net worth, cash flow to total assets and cash flow to total debt ratios each has a 90% accuracy. In conclusion, he hinted at the possibility of using multiple ratios in financial ratio analysis.

Edward Altman followed up Beaver's research by pioneering the use of Multiple Discriminant Analysis (MDA), which has become the most accepted standard and baseline method for comparative studies in financial analysis (Altman & Narayanan, 1997). Altman (1968) developed a five-factor mathematical model for determining the suitability of using ratios as an analytic technique in bankruptcy prediction for manufacturing firms, termed the Altman Z-score model. The model is selected in this research study to provide validation of ratio analysis findings and classify companies' financial health. The developed factors are working capital to

total assets, retained earnings to total assets, earnings before interest and taxes to total assets, market value of equity to book value of total liabilities and sales to total assets. By using a sample of 33 pairs of failed and non-failed manufacturing companies and weighted ratios, the discriminant ratio model achieved prediction and classification accuracy levels of around 94% of all firms. The model had prediction accuracy of 95% within one year of failure but its predictive ability dropped the further away prediction is moved from year of failure.

Daya (1977) analysed 31 pairs of failed and non-failed companies in South Africa from 1966 to 1976. The model was built out of an analysis of seventeen ratios. It determined that cash flow to average total current liabilities ratio had the best prediction accuracy one year before failure and net income to total assets ratio had the best prediction accuracy five years before failure.

Strebel & Andrews (1977) analysed 16 failed and 13 non-failed South African companies from 1971 to 1976 using the cash flow to total debt ratio, to predict corporate failure. The model had prediction ability of one year and five years before failure. Its classification accuracy before failure for five years and one year were 69% and 90%, respectively.

After the MDA dominated period, research focussed on other statistical techniques that included conditional probability models of logit analysis (LA), probit analysis (PA) and linear probability modelling (LPM) (Altman & Saunders, 1998; Andekina & Rakhmetova, 2013). Ohlson (1980) developed an LPM based mathematical model called the Ohlson's O-score model whose aim was to provide better predictive capabilities than the preceding models. The model identified four factors that it deemed most statistically significant in predicting company failure. These factors are; company size (market capitalisation), leverage (total liabilities to total assets ratio), performance (net income to total assets and fixed assets to total liabilities ratios) and current liquidity (working capital to total assets and current assets to current liabilities ratios). Ohlson (1980) concluded that the model's predictive power depends on the time from availability of financial reports and suggested that the other available models had the flaw of overstating their predictive capabilities.

De la Rey (1981) analysed 26 pairs of failed and non-failed companies in South Africa from 1972 to 1979, analysing 25 ratios to develop an MDA model. The model identified six factors; total outside financing to total assets ratios, (earnings or income before interest and tax) to average total assets ratio, total current assets and listed investments to total current liabilities ratio, earnings or income after tax to average total assets ratio, net cash flow to average total assets ratio and stock to inflation adjusted total assets ratio. It had a classification accuracy of 96% one year before failure. The model is used for financial analysis services at the University of Pretoria as part of the BFA-Net database.

Zmijewski (1984) developed a mathematical probit analysis model called the Zmijewski score whose aim was to predict bankruptcy within two years by using ratios determined by probit analysis. He criticised other models for bias towards failed companies and companies with complete data. The probit analysis identified return on assets, leverage, and liquidity ratios as the variables to be applied in the model and was based on the study of 40 bankrupt and 800 non-bankrupt firms. The scoring process entailed calculating a bankruptcy position (X) for the company, beyond which probability of failure is higher.

Clarke, *et al.* (1991) analysed 29 South African companies that failed or distressed and 43 healthy companies from 1985 to 1990, using thirteen ratios to develop a stepwise discrimination model with five ratios. The model had predictive accuracy of between 77% and 78% for four years and one year before failure, respectively.

Court, *et al.* (1999) analysed 21 failed and 19 non-failed South African companies from 1974 to 1985, using macro-economic variables to determine Business Failure Rates (BFR). They developed two models; the first used one ratio from an initial fourteen ration and the second used six ratios from an initial twenty ratios. The rates were coefficients between 0.01 and 0.1 and were used in conjunction with financial ratios to calculate prediction scores. The models predicted failure within one year and two years before failure with 100% and 78% classification accuracy, respectively.

Lukhwareni (2005) analysed 40 companies on the JSE from 1992 to 2002 to develop a wealth creation matrix that classified companies into “Winning clusters”

and “Losing clusters” to determine positions in wealth creation and sustainable growth. The classification was based on the companies’ performance against the sector average. According to Colff (2012), one of the major criticism of the study was that by using absolute values for the variables it biased the study towards specific companies for specific variables thereby influencing classification of the companies resulting in a skewed model.

As research into prediction of financial failure progressed away from statistical models to artificial intelligence methods that were more complex and required use of non-accounting data, investors and managers continued to rely on the earlier statistical models like the Altman Z-score. The reliance on these models by operations managers and investors was not only based on sentiments and familiarity but on valid operational concerns. Operational concerns that included the speed of getting results, the relative ease in use because of uncomplicated calculations and relatively understandable variables. Lawrence, *et al.* (2015) stated that variance in outcomes of models is mainly due to differences in choice of ratios, the number of ratios used, the type of data (financial / non-financial, industry/country) applied, and interpretation. In a review of some of the models Gissel, *et al.* (2007) concluded that although there are significant differences in formulation and constitution of models, empirical tests suggest that most of the models are very good indicators of the financial health of a company.

The perspective that earlier models remained relevant was impressed upon in the study by (Aziz and Dar, 2006), where they concluded that besides MDA and logit statistical models being the most widely used in predicting financial failure, empirical studies have shown they provide the most consistent and reliable methods of failure prediction. For this study, the Altman Z-score model was selected to provide validation of ratio analysis findings and predict the financial health of companies. The model was selected based on literature evidence of its relevance and reliability in previous studies such as (Altman and Heine, 2000; Zlatanović, *et al.*, 2016; Saden and Prihatiningtias, 2015; Chouhan, *et al.*, 2014; Onyiri, 2014), that applied the model in different fields including the mining industry to satisfactory success. The Altman Z-score including the author’s observations relating to selection of the model are discussed in the following sub-section.

2.6.1 Altman Z-score model

The Altman Z-score model is an MDA based bankruptcy analysis model developed by Edward I. Altman in 1968. The model is made up of five weighted financial ratios, determined through the statistical method of discriminant analysis on a sample population of sixty-six bankrupt and nonbankrupt companies (Altman, 1968). The model analysed ratios of financial health, profitability, cash flow generation and utilisation, to determine the ratios that had the most impact on predicting bankruptcy. According to Altman (1968), Equation 2.1 represents the original Z-score:

$$\mathbf{Z = 1.2X_1 + 1.4X_2 + 3.3X_3 + 0.6X_4 + 1.0X_5} \qquad \mathbf{2.1}$$

Where:

X_1 = *working capital to total assets, it measures the net liquid asset of a company relative to the total assets; a firm in trouble will usually experience shrinking liquidity*

X_2 = *retained earnings to total assets, it measures the financial leverage or the cumulative profitability of the firm, as shrinking profitability is a warning sign.*

X_3 = *earnings before interest and taxes to total assets, it measures the productivity of a company's total assets; how productive a company is in generating earnings, relative to its size.*

X_4 = *market value of equity to book value of total liabilities, it offers a quick test of how far the company's assets can decline before the firm becomes technically insolvent (i.e. its liabilities exceed its assets).*

X_5 = sales to total assets, it *measures how effectively the firm uses its assets to generate sales.*

To guide interpretation of the scores, Altman (1968) developed the following index to explain the scores. He said if:

- Z is greater than or equal to 3.0, the firm is most likely to be financially healthy.

- Z is 2.7 to 2.9, the company is probably financially healthy, but this is in the grey area and caution should be taken.
- Z is 1.9 to 2.6, the company is likely to have financial challenges in the immediate future, that is within 2 years.
- Z is less than or equal to 1.8, the company is highly likely to be already in financial challenges.

The original model was developed for manufacturing companies. To cater for the private non-manufacturing industry, a re-estimation of the variables was done, substituting the book value of equity for the market value in X_4. The modified model was termed the Z'-score model (Altman, *et al.,* 2014). According to Altman (1983) as cited by Altman, *et al.* (2014) the Z'-score model is represented Equation 2.2:

$$\mathbf{Z' = 0.717X_1 + 0.847X_2 + 3.107X_3 + 0.420X_4 + 0.998X_5} \qquad \mathbf{2.2}$$

where:

X_1, X_2, X_3, X_4 and X_5 are the same as those for the Z-score model.

According to Altman (1983) as cited by Altman, *et al*. (2014):

- Z' < 1.23 is a Distress Zone (High Risk of Bankrupt), which means the company is likely to be already in financial challenges;
- 1.23 < Z'< 2.9 is a Grey Zone (Uncertain Results), which means the company is probably financially healthy, but caution should be taken; and
- Z' > 2.9 is a Safe Zone (Low-Risk Area (Healthy), which means the company is most likely to be financially healthy.

Further research led to more revisions and refinements of the original model to cater for other industries that included public non-manufacturing and emerging market companies. According to Altman (1983) as cited by Altman, *et al.* (2014) the new model was termed the Z"-score model and is represented by Equation 2.3:

$$\mathbf{Z'' = 6.56X_1 + 3.26X_2 + 6.72X_3 + 1.05X_4} \qquad \mathbf{2.3}$$

Where:

X_1, X_2 and X_3 are the same as those for the Z-score and Z'-score models.

X_4 *still offers a quick test of how far the company's assets can decline before the firm becomes technically insolvent (i.e. its liabilities exceed its assets), but instead of using market value for the variable, book value is used.*

According to Altman (1983) as cited by Altman, *et al.* (2014) if:

- Z" < 1.1 is a Distress Zone, which means the company is likely to be already in financial challenges;
- 1.1 < Z" < 2.6 is a Grey Zone, which means the company is probably financially healthy, but caution should be taken; and
- Z" > 2.6 is a Safe Zone, which means the company is most likely to be financially healthy.

The overall constitution of the formula largely remained the same with changes in the weightings and exclusion of the X_5 (sales / total sales), which was deemed to have potential effects on industries with intensive asset turnover. Interpreting the Z-scores as early warning signs is about assessing the quality of the company's financial standing more than effectively predicting the future.

The Altman model was selected as a validation tool of ratio analysis in this study because of the following reasons according to the author's observations:

- After many years of use the model remains one of the most acceptable financial analysis tools used by accountants, analysts, and banks;
- The model has also gained widespread use in many countries, different industries and in many different contexts;
- The Altman model has a very high prediction accuracy in the short term, which supports the intention of this study to determine the immediate financial health of the mining industry; and
- The required data is readily available from company financial reports on the public domain.

2.7 Chapter summary

This chapter has discussed company performance by highlighting its determinants, which are financial and non-financial. The financial performance was selected and its metrics of measure, financial ratios, classified under profitability, liquidity, solvency, activity and market were selected to represent company performance because of their suitability to analyse the available data in financial statements. Further discussion on financial ratio analysis revealed the use of ratios in the prediction of financial failure and a review of some of the key studies on the field was done. The review reinforced the view that earlier financial prediction models such as the Altman Z-score model are still relevant and reliable in the analysis of financial performance of companies. The Altman Z-score model was selected to both validate the findings of ratio analysis and to predict companies' financial health for the period under review.

3 METHODOLOGY

3.1 Chapter overview

This chapter describes the approach and technique used to collect and analyse the financial data. The data used to measure financial performance was obtained from the selected companies' annual reports on the public domain. The financial performance is measured using financial ratio classified under profitability, liquidity, solvency, activity and market ratios.

3.2 Data collected and its sources

All financial data used to calculate ratios was collected from published companies' financial statements and reports available on the public domain. Commodity prices data was collected from two online sources, World Bank (2017) and Mining Bulletin (2017). The collected price data is in the following format:

- Platinum - $US / troy ounce;
- Gold - $US / troy ounce;
- Iron ore - $US / dry metric tonne unit (dmtu); and
- Coal – $US / metric tonne.

3.3 Data analysis

This study analyses a total of sixteen financial ratios under the categories of liquidity, solvency, profitability, activity and market ratios and uses descriptive statistics (mean, and correlation) and the Altman Z"-score to measure the sector's performance. Some companies were excluded from this analysis for reasons that include, not operating for the full five-year period, unavailability of data and global diversity of company.

3.3.1 Financial ratios

As mentioned in Chapter 2, financial ratios are used to measure company financial performance and interpreted using activities reported in the financial reports. The ratios are calculated using the formulae in Appendix 10.1.

3.3.2 Altman Z"-scores

In this study, the third variation of the Altman Z-score, the Z"-score, was selected

to determine the financial status of the analysed mining companies. It was selected on the basis that the mining industry is a non-manufacturing industry and South Africa is an emerging country. The scores are interpreted using the Z”-score index as shown in Table 3.1.

Table 3.1: Z”-score index

Z"-score	Zone
Z” < 1.1	Distress
1.1 < Z” < 2.6	Grey
Z” > 2.6	Safe

As mentioned before, this study interprets the Z”-scores as warning indicators of the companies’ financial standing.

3.3.3 Descriptive statistics

According to Trochim (2006), the purpose of applying descriptive statistics is to define and express data in simple manageable forms that aid in the easy visualisation of trends and patterns in the data set. Two statistical measures were used in this analysis; mean and correlation, calculated using the data analysis tools in Microsoft Excel.

Mean

Mean is the average of a data set of values and can be said to be the representative of the group as it contains a measure of the group’s characteristics. Mean is calculated by the formula:

$$\boldsymbol{Mean = \frac{Sum\ of\ observations}{Number\ of\ observations}\ or\ \ \mu = \frac{\sum xi}{n}}$$

Correlation analysis

(Venkatachaalam, 2014) defines correlation analysis as a study of the relationship between independent and dependent variables to determine which variables have a significant linear relationship. According to Maths Bit (2017), the linear correlation coefficient is also referred to as the Pearson product moment correlation coefficient (r), the most widely used measure of correlation between two variables. The Pearson coefficient is such that, -1 < r < +1. The coefficients are such that, if r > 0,

the correlation is positive, if r < 0 the correlation is negative whilst if r = 1 or r = -1 the correlation is perfectly linear and if r = 0 there is no correlation (Statistics Laerd, 2013). Table 3.2 shows Pearson's coefficient guidelines.

Table 3.2: Pearson's coefficient guidelines

(Source: Adapted from Statistics Laerd, 2013)

Coefficient, r		
Strength	**Positive**	**Negative**
Low	0.1 to 0.3	-0.1 to -0.3
Medium	0.3 to 0.5	-0.3 to -0.5
High	0.5 to 1.0	-0.5 to -1.0

Financial ratios are tested for correlation with commodity price to measure the sensitivity of specific business areas to commodity price volatility.

3.4 Data presentation

The calculated ratios and statistical indicators are presented using tables and graphs accompanied by interpretations. Figure 3.1 shows a hypothetical presentation of companies' current ratios.

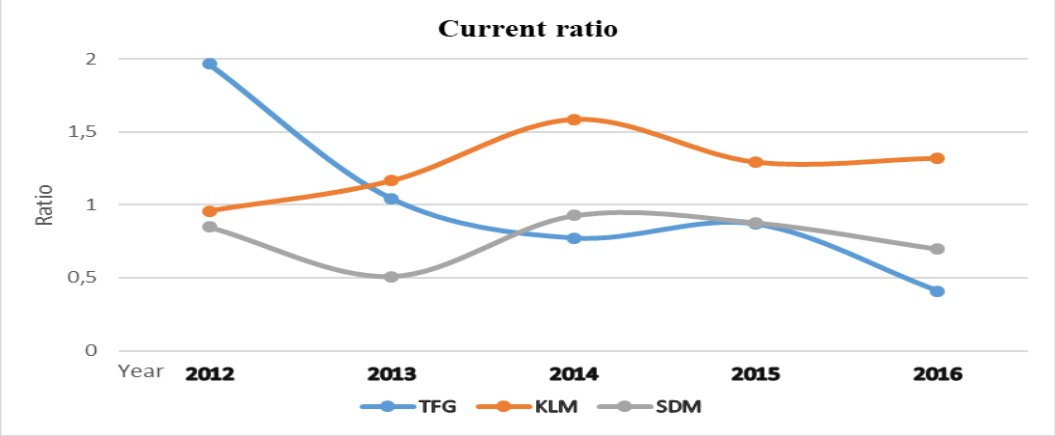


Figure 3.1: Hypothetical current ratios

From Figure 3.1 company trends can be analysed, interpreted, and compared to other companies' trends for the period. A verification of findings from financial ratios analysis is done using the Altman Z"-scores and presented as shown in Table 3.3.

Table 3.3: Hypothetical companies' Z"-scores

Company/Year	2012	2013	2014	2015	2016	Mean
TFG	2.3	0.1	-5.5	-12.2	-9.5	-5.0
KLM	4.3	5.2	4.4	4.2	4.0	4.4
SDM	2.0	1.2	1.7	1.0	-1.6	0.9

Interpretation of the Z"-scores is done based on the guidelines of the score index mentioned earlier to define a particular company's financial status and used to support observations of the calculated financial ratios. Once the companies' financial performance is measured using ratios and verified by the Altman Z"-score, a correlation test is done of each company's ratios with commodity price as shown in Table 3.4.

Table 3.4: Hypothetical correlation coefficients of liquidity ratios to price

Company/Ratio	Current	Quick	Working capital
TFG	-0.6	-0.6	-0.5
KLM	-0.4	-0.3	-0.2
SDM	0.4	-0.3	-0.3
Sample mean	-0.5	0.4	-0.3

3.5 Chapter summary

This chapter has explained the data collected and the methodology used to analyse company financial performance and financial status. The ratios used were categorised into five ratio groups of liquidity, profitability, solvency, activity and market. Commodity price data was collected from online databases and financial data was collected from each company's published financial statements and reports. The Pearson correlation coefficient is used to determine the relationships between the financial ratios and the commodity price. Analysis and presentation of data for each company and commodity sector is done in the following chapters.

4 PLATINUM MINING SECTOR PERFORMANCE ANALYSIS

4.1 Chapter overview

This chapter analyses and discusses the financial performance of selected platinum mining companies over the period 2012 to 2016. Financial performance is analysed through financial ratios and presented for comparison between companies, including determination of trends and correlation to platinum price. Lastly, a determination of the companies' financial standing is carried out using the Altman Z"-score model to verify the observations from ratios analysis. Performance analysis is done to specific companies displaying anomalies and a general performance conclusion is given for the overall industry. All ratios presented in this chapter are shown in Appendix 10.2 to Appendix 10.6.

4.2 JSE listed platinum mining companies

There are fourteen platinum mining companies listed on the JSE according to AM Investor Services SPRL (2017) and Profile Data (2017). Table 4.1 shows the listed platinum mining companies.

Table 4.1: JSE listed platinum mining companies

INCLUDED IN ANALYSIS	EXCLUDED IN ANALYSIS
Andulela Investment Holdings Limited (AND)	African Rainbow Minerals Limited (ARM)
Anglo American Platinum Limited (AMS)	Bauba Platinum Limited (BAU)
Atlatsa Resources Corporation (ATL)	Eastern Platinum Limited (EPS)
Impala Platinum Holdings Limited (IMP)	Jubilee Platinum PLC (JBL)
Lonmin PLC (LON)	Sibanye-Stillwater (SGL)
Northam Platinum Limited (NHM)	Wesizwe Platinum Limited (WEZ)
Royal Bafokeng Platinum Limited (RBP)	
Tharisa PLC (THA)	

Table 4.1 splits the platinum mining companies into two groups, one for the companies selected for analysis and the other for those excluded from analysis based on the criteria stated in Section 3.3 and the following additional explanations:

- African Rainbow Minerals Limited was excluded because of its diversity. Its involvement in platinum mining is through joint ventures and its earnings from the commodity accounts for only fifteen percent of total group earnings;

- Although Bauba Platinum Limited focusses on being a platinum producer, it is currently mining chrome to fund development of its Bauba Platinum Project hence its exclusion from analysis (Bauba Platinum Limited, 2017);
- Eastern Platinum Limited was excluded because it has not had any production since August 2013 when the company suspended operations at its Crocodile River Mine because of a negative global economic environment outlook (Eastern Platinum Limited, 2017);
- Jubilee Platinum PLC was excluded because throughout the period under review it has realised its revenue from its subsidiaries in Power Alt Pvt Ltd (Power Alt) and RST Special metals Pty Ltd (RST), electricity generation and smelting operations respectively (Jubilee Platinum Plc, 2016). The company's flagship platinum operation, Tjate Platinum project, is still in project phase only being awarded its mining license in March 2017 (Jubilee Platinum Plc, 2017);
- Sibanye-Stillwater was excluded as it only acquired its first platinum operation in 2016 (Sibanye Gold Limited, 2016);
- Tharisa PLC produces both PGMs and chrome concentrates from the same resource resulting in shared costs between the commodities. Tharisa has partial financial figures for 2013 and no available financial figures for the years before 2013 as it was listed on the JSE in April 2014 (Tharisa PLC, 2017). Analysis for the company is done of the data available for the period 2013 to 2016; and
- Wesizwe Platinum Limited was excluded because its flagship Bakubung Platinum Mine (BPM) is still at a project phase, with full production forecast for 2021 (Wesizwe Platinum Limited, 2017).

4.3 Profitability ratios

4.3.1 Gross profit margin ratio

Figure 4.1 shows the comparison of the analysed companies' gross profit margins for the period 2012 to 2016. It is clear from Figure 4.1 that companies' gross profit margins varied throughout the period and exhibited declining trends.

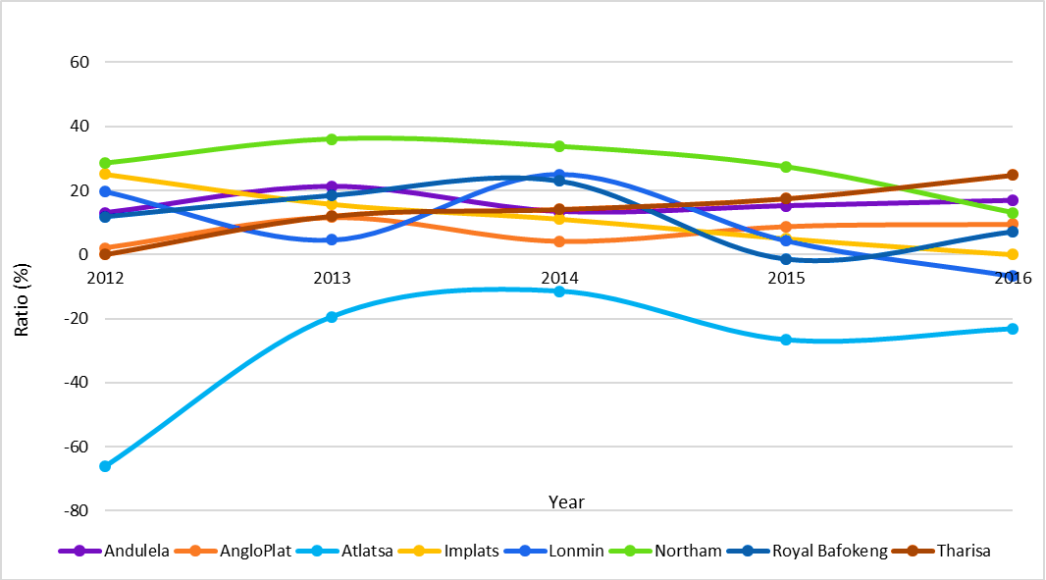


Figure 4.1: Gross profit margin ratios for platinum companies

Comparison among the analysed companies shows that Northam had the best performances and Atlatsa had the least performance whilst the performance of the rest of the analysed companies had alternating positive and negative fluctuations during the period. The two companies are analysed below.

Northam

Northam's strong performance was driven by sustained revenue increases at the back of consistent improvements in metal sales volumes from 320 861oz. in 2012 to 452 393oz. in 2016 and the weakening rand over the period. The company's revenues grew in the five years by 174% from R3 684m in 2012 to R6 405m in 2016 whilst gross profit grew by 172% from R1 051m in 2012 to R1 803m in 2014 before a decreasing to R839m in 2016. The decline in the gross profit and hence the gross profit margin is attributed to escalation of operating costs associated with increase in production volumes, labour and utilities, that increased by 190% from R2 633m in 2012 to R5 007m in 2016 (Northam Platinum Limited, 2012-2016).

Atlatsa

Atlatsa's determined performance was not enough to overcome the numerous challenges the company faced throughout the five-year period. The year 2012 was supposed to be a year of restructuring and consolidation of assets especially Bokoni

mine. However, the illegal strike at the mine, the resultant loss of production and a weaker basket price caused the company to slide further into financial distress in the ensuing years as it assumed more financial liabilities to sustain operations and fund potential expansion projects (Atlatsa Resources Corporation, 2012). The commissioning of the Merensky open cast operations, the disposal of the Boikgantsho and Eastern Ga-Phasha project, (Atlatsa Resources Corporation, 2013), offered some respite as revenues and working capital improved. Lower production, lower grades and higher operating costs from the older UM2 and Vertical Merensky shaft operations caused earnings to remain depressed (Atlatsa Resources Corporation, 2015). Further, cessation of mining at Klipfontein Merensky open cast in 2016 due to community disruptions and other operational challenges only worsened the pressure on the company's financial position and sustainability (Atlatsa Resources Corporation, 2016). All these factors combined caused the company's gross profit margin to be negative for the period under review.

In the absence of a benchmark of gross profit margin, the companies' performance is rated based on being positive and by comparison of successive years. Tharisa had the best year on year improvement in margin but over the period, Northam had the best average whilst Atlatsa had the least gross profit margin. Overall, company performance showed signs of poor performance, although yearly average margins increased marginally from 4.9% in 2012 to 5.2% in 2016.

4.3.2 Net profit margin ratio

Figure 4.2 shows the comparison of the analysed companies' net profit margins for the period 2012 to 2016. As shown in Figure 4.2, the analysed companies exhibited four separate net profit margin performance trends amongst themselves over the five-year period. Compared to gross profit margins, net profit margins decreased significantly because of increases in impairment and interest costs as companies sought external funding to sustain stay-in-business and expansion requirements. The year 2015 was the worst for the platinum sector as seen from the significant drop in margins for most companies. The combined effect of an 11% drop in platinum price in rand terms, questionable government decisions to appoint a new finance minister which shook business confidence, above inflation increase in

wages and utilities costs and the investment rating downgrade of the country can be attributed to this industry-wide descend into negative income.

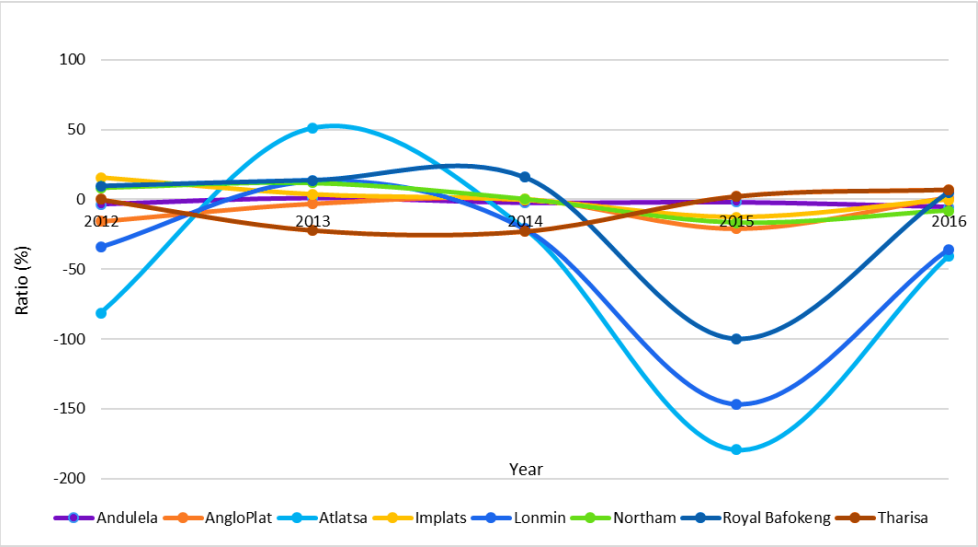


Figure 4.2: Net profit margin ratios of platinum companies

Atlatsa, Lonmin and Royal Bafokeng showed a similar trend of fluctuating margins from 2011 to 2014 then a significant decline in 2015 and an equally significant recovery in 2016. By comparison of averages, Implats had the best performance over the period but Royal Bafokeng had better performance year by year except for 2015 when its margin significantly decreased. Andulela had low negative net profit margins throughout the period except in 2013 when it net margin was positive. These three companies are analysed below.

Implats

Despite having an average gross profit margin that was comparatively just above average, the declining trend over the years pointed to a failure to contain the increases in finance costs and net foreign exchange transaction losses as revenue steadily increased, hence the poor net profit margin. Its comparative better performance is based on minor fluctuations in its net profit margin, for example whilst its maximum and minimum fluctuations were 15.6% and -12.7% respectively, Royal Bafokeng had maximum and minimum fluctuations of 15.9% and -100% respectively. Its 2015 performance was underpinned by its operational resilience driven by early adoption of initiatives to support its balance sheet and

long-term value that included a strategic capital raising exercise and proactive interest expenses reductions. The company's steady increase in revenues year by year, sustained focus on cash preservation and profitability ensured limited impact of spiking operating costs whilst maintaining investments in key capital projects and keeping margins in check.

Royal Bafokeng

Movements in Royal Bafokeng's net profit margin mimicked its gross profit margin year-by-year, the difference being the magnitude of change especially in 2015. Whilst the decline in gross profit margin was 23.0% in 2014 to -1.3% in 2015, net profit margin declined from 15.9% in 2014 to -100% in 2015. The significant change in net profit margin is attributable to the impairment cost of its BRPM operations Styldrift I and Styldrift II amounting to R2 886m (Royal Bafokeng Platinum Limited, 2016).

Andulela

Andulela exhibited consistently low net profit margins compared to its gross profit margins mainly due to underperformance of its Pro Roof Steel Merchants Private Limited (PRSM) operation and low production levels at its Kilken platinum entity despite steady improvements in revenues after a dip in 2013. The company experienced further cost pressures on net profit margin in 2012 and 2015 because of impairment losses against plant and equipment weakening the margins into losses (Andulela Investment Holdings Limited, 2012, 2015).

The eight companies had mixed but declining net profit margins, influenced by massive asset impairments as cash flows decreased due to thinning net margins. The companies did not show signs of consistent improvements over the period under review.

4.3.3 Return on equity ratio

Figure 4.3 shows the comparison of the return on equity of the analysed companies from 2012 to 2016. The right axis is labelled in red and the company related to it is Atlatsa only because of its too high ratios that are not comparable to the other companies.

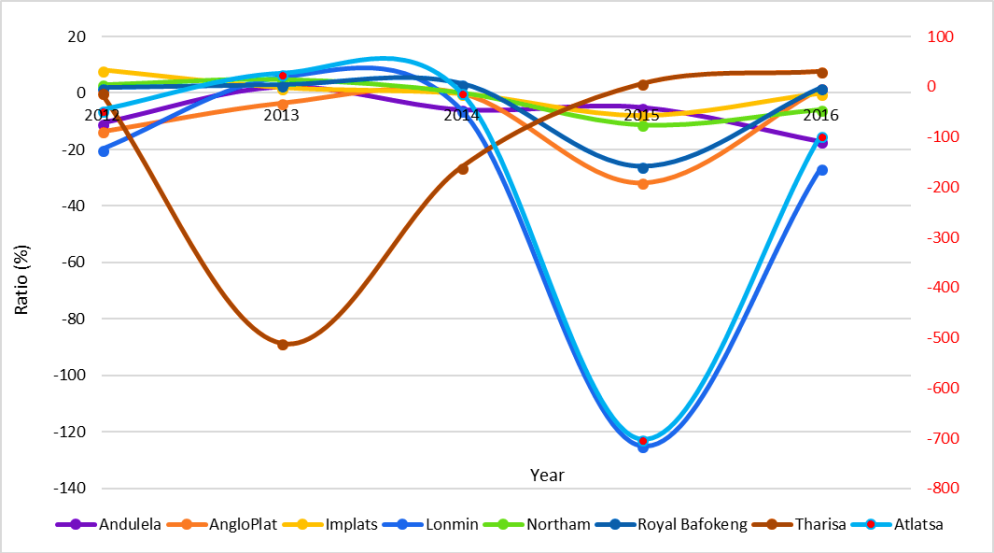


Figure 4.3: Return on equity ratios for platinum companies

As shown in Figure 4.3, the analysed companies had alternating low positive and negative values of return on equity for most of the five years because of the prevailing depressed net incomes, hence similar trends to net profit margin. Just as for net profit margins, the massive movement in 2015 skewed the companies' average ratios into negative returns. None of the companies reached the generic standard of between 9% and 12%, except for Atlatsa, with a ratio of 26.3% in 2013. Lonmin had negative ratios in four of the five years except in 2013, with a ratio of 5.5%. Tharisa had improving year-by-year ratios from a -88.4% in 2013 to 7.8% in 2016. These three companies are analysed below.

Atlatsa

Atlatsa exhibited the lowest returns on equity on average with a significant drop in 2014 because of the combined effect of declining shareholders equity from R1 685m in 2012 to R763m in 2016 and negative net income of R-785m in 2012 to R-736m in 2016 (Atlatsa Resources Corporation, 2016). Its shareholders' equity decreased at the back of increasing accumulated losses. The company's ROE declined by 48% and the shareholders' equity declined by 45% over the period under review. The company struggled to keep operating costs down because of high cost operations and mining challenges, hence its assumption of more debt through a term-loan facility agreement ("Term Loan") with Anglo Platinum, (Atlatsa Resources Corporation, 2015), to maintain operations resulting in a high debt

leveraged balance sheet that hurt returns on equity. This general poor performance supports the findings on its gross profit margin performance.

Lonmin

Lonmin exhibited inconsistent ROE ratios throughout the period under review as the company struggled with maintaining positive trajectory in net earnings. The combined effect of strikes, impairment losses, and increase in debt, (Lonmin Plc, 2015), drove net incomes and equity values down as the company battled to meet capital needs. Increase in retained losses due to increase in negative net income and the decrease in total assets due to impairment losses influenced the lower shareholders' equity. The company's poor ROE performance supports its declining gross profit margin performance.

Tharisa

Tharisa showed improving ROE ratios driven by increase in net income and equity value. High debt facilities during construction and subsequent ramping up of operations in 2013 and 2014 burdened performance resulting in negative net incomes. Increases in revenues and reduction of costs in 2015 and 2016 resulted in an improvement of margins and the company recorded positive net incomes, boosting ROE ratios. This general poor performance supports the findings on its gross profit margin performance.

4.3.4 Return on assets ratio

Figure 4.4 shows the comparison of the return on assets of the analysed companies between 2012 and 2016. The right axis is labelled in red and the company related to it is Atlatsa only because of its too high ratios that are not comparable to the other companies. The ROA values shown in Figure 4.4 highlight that returns mostly declined over the course of the period under review. The ROA trends resemble the net profit margin trends over the five years mainly due to the effect of net income, as total assets were stable. Most of the companies recorded returns between -0.3% and -7.0%, with Implats recording the highest average of 0.3% and Lonmin and Atlatsa recording the two lowest averages of -22.1% and -27.3% respectively.

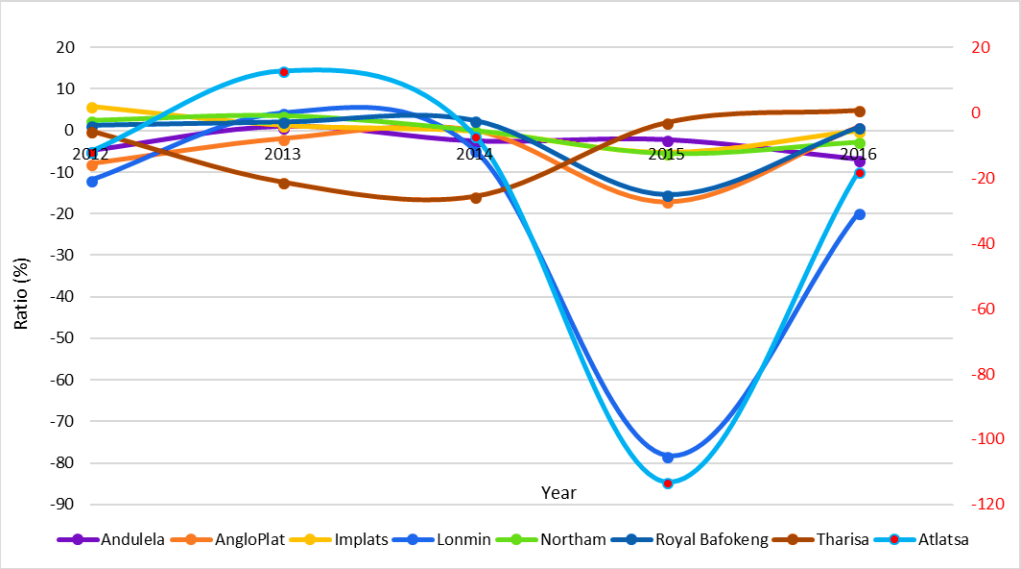


Figure 4.4: Return on assets ratios for platinum companies

Although Royal Bafokeng has an average return lower than that of Implats year-by-year comparisons show that it performed better as it had negative return on assets in only one out of the five years. The three companies, Royal Bafokeng, Atlatsa and Lonmin, are analysed below.

Royal Bafokeng

A steady total asset base over the period ensured Royal Bafokeng's good performance as the impact of escalating operating costs were offset by the impact of a weakening rand that propped up revenues and as a result, net incomes. However, the commodity price slump in 2015 resulted in a decrease in the company's ROE to -15.4%. The overall performance of the company supports the findings on its net profit margin performance.

Atlatsa

Atlatsa's relative good performance in 2013 of 12.9% was undone by a combined effect of poor net incomes of R-486m in 2014 to R-736m in 2016 and a decline in total assets over the same period of R7 078m in 2014 to R4 097m in 2016 (Atlatsa Resources Corporation, 2012-2016). Its net income deteriorated mostly from underperformance of mining operations, the debt leveraging of its balance sheet due to further debt take up and overall decrease in the asset base as the company placed its older shafts on care and maintenance to maintain sustainability. This poor

performance supports the findings on its net profit margin performance.

Lonmin

Lonmin's ROA ratio significantly deteriorated between 2014 and 2016, slumping from -4.7% in 2014 to -78.2% in 2015 and recovering to -19.8% in 2016. Despite the occasional high performances like attaining a six-year production record in 2013, commissioning and optimisation of furnaces and concentrator in 2012 and 2013, low performances that included failure to contain operating costs, frequent disruptions in the production cycle from strikes in 2012 and 2014, frequent safety stoppages by Section 54s and asset impairments caused consistently weakening returns. This general poor performance supports the findings on its net profit margin performance

4.3.5 Summary of platinum companies' profitability performance

The volatile and negative trends of the ratios used to analyse the companies' profitability are indicative of the influence of the numerous challenges on operations resulting in most companies drifting into loss-making positions as earnings and profits were eroded. Gross profit margins were mostly positive as companies benefited from stronger rand commodity prices whilst net profit margins were poor, dampened by above inflation escalations in costs resulting in mostly negative values. ROE and ROA ratios largely resembled net profit margins because of the influence of net income. Overall, the industry's profitability performance was poor over the period under review. This mean that the companies were not profitable over the period under review. The influence of platinum price on platinum companies' profitability performance is tested using the Pearson correlation coefficient below.

4.3.6 Correlation analysis of profitability ratios against platinum price

Table 4.2 shows the Pearson correlation coefficients of the analysed companies' profitability ratios against platinum prices over the period 2012 to 2016. The analysed companies' profitability ratios showed overall low positive correlation to platinum prices as shown in Table 4.2. The positive correlation of platinum price to profitability ratios is expected.

Table 4.2: Pearson correlation coefficients for profitability ratios against platinum prices

Company/Ratio	Gross profit margin	Net profit margin	Return on equity	Return on assets
Andulela	-0.5	-0.2	-0.2	-0.3
AngloPlat	-0.7	-0.5	-0.2	-0.2
Atlatsa	-1.0	-0.2	0.2	0.2
Implats	0.8	0.8	0.8	0.8
Lonmin	0.5	0.1	0.2	0.2
Northam	0.1	0.5	0.4	0.5
Royal Bafokeng	0.0	0.2	0.2	0.2
Tharisa	-0.9	0.2	0.3	0.2
Sample mean	**-0.1**	**0.1**	**0.2**	**0.2**

However, the low correlation of the profitability ratios shows that there was some influence of the platinum price on the financial performance of platinum mining companies but not strong enough for it to be the main driver of the sector's profitability during the period under review. This suggests there were other drivers that had more influence on the companies' financial performance.

4.4 Liquidity ratios

4.4.1 Current ratio

Figure 4.5 shows the comparisons of current ratios for the analysed companies between 2012 and 2016.

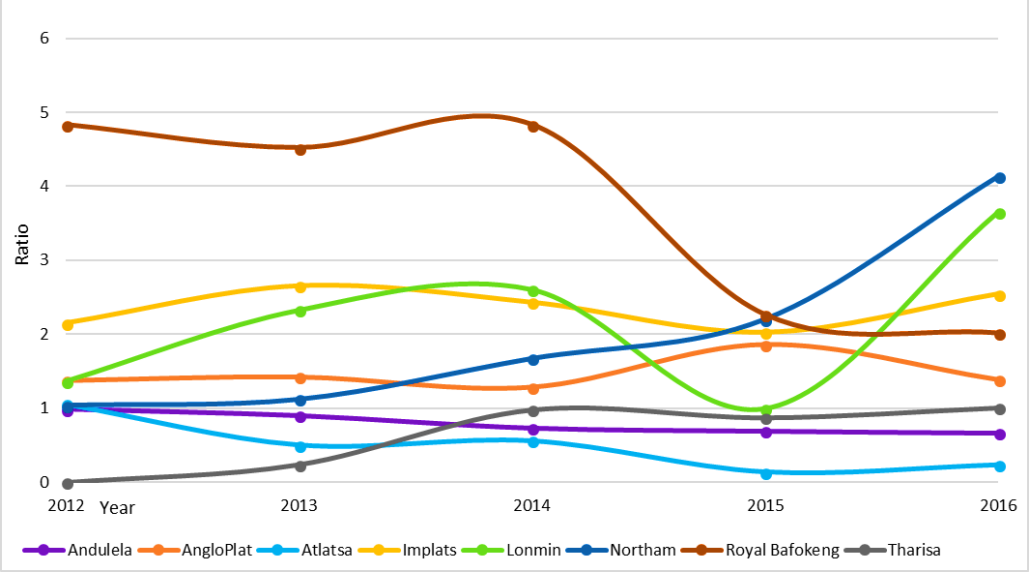


Figure 4.5: Current ratios for platinum companies

Most of the companies exhibited ratios consistently above or near the generic standard value of two as shown in Figure 4.5, indicating the companies maintained satisfactory capability to cover their short-term financial obligations. Over the period under review, Implats, Lonmin, Northam and Royal Bafokeng had current ratio averages above two whilst Andulela, AngloPlat, Atlatsa and Tharisa had current ratio averages below two. Atlatsa was the least current ratio performer whilst Royal Bafokeng was the best current ratio performer. These two companies are analysed below.

Atlatsa

Over the analysed period, Atlatsa had the lowest average current ratio of 0.5 as its current liabilities continuously increased whilst its current assets decreased. Its current assets mainly decrease in inventories and trade receivables whilst its current liabilities increased at the back of increases in short-term loans and borrowings. Commitment of most of the company's generated cash to fulfilling ballooning financial obligations as debt leveraging increased resulted in the company retaining less earnings.

Royal Bafokeng

Although Royal Bafokeng had the highest average current ratio of 3.7 over the period under review underpinned by strong ratios between 2012 and 2014, its ratios significantly weakened in 2015 and 2016. The earlier strong performance resulted from the company maintaining significantly higher current assets compared to current liabilities as net incomes and retained earnings outpaced the escalating operating costs and capital commitments. Initiatives were implemented to improve mining flexibility, reduce costs and operate capital projects within budget and funded from book builds and rights offers (Royal Bafokeng Platinum Limited, 2014). The continued funding of capital expenditure such as the Styldrift 1 main shaft from generated cash ensured successive decreases in retained funds on hand and the decline in the current ratio values in 2015 and 2016.

4.4.2 Quick ratio

Figure 4.6 shows the comparison of the quick ratios of the analysed companies between 2012 and 2016.

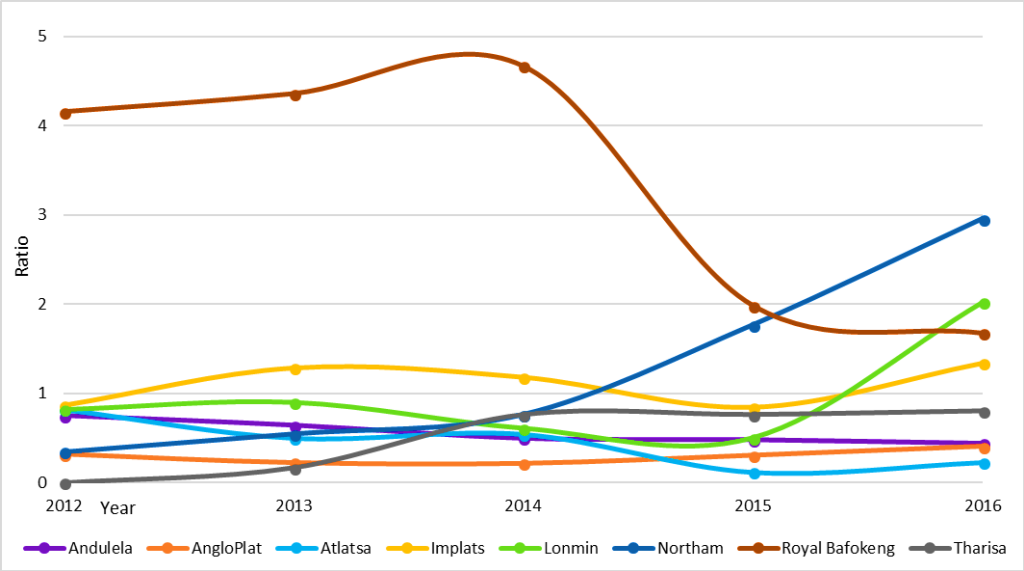


Figure 4.6: Quick ratios for platinum companies

Quick ratios of the analysed companies exhibited similar trends to those shown by the current ratios, like in the current ratio analysis, Royal Bafokeng had the highest quick ratio. Half of the companies had average ratio values above or just below the value of 1 and the other half had ratios closer to 0.5 over the five years. Implats, Northam and Royal Bafokeng had ratios above the value of 1 and Lonmin had a ratio just below at 0.97. Andulela, AngloPlat, Atlatsa and Tharisa all had ratios below the value 1. Despite the combined average quick ratio of 1.09, year-by-year ratios were mostly below the value 1 as shown in Figure 4.6. The average was boosted by an overall upturn of ratios at the end of the period. Volatility in prices and continued increases in operating costs combined to erode cash flows and consequently available funds to counter increasing short-term obligations as companies sought to sustain operations in the immediate term. Northam had a progressively increasing quick ratio that steeply increased from 2014 to 2016, the company is further analysed below.

Northam

Northam showed consistency in improving its quick ratios over the period from 0.35 in 2012 to 2.96 in 2016 driven by higher generated cash, increases in cash and cash equivalents and steady current liabilities, despite declining net incomes at the end of the period. The higher ratio in 2016 was because whilst cash and cash

equivalents declined in that year by 25% from R4 138m in 2015 to R3 105m in 2016, current liabilities declined by a bigger margin of 55% from R2 624m in 2015 to R1 178m in 2016 (Northam Platinum Limited, 2016). Cash and cash equivalents decreased owing to significant decline in short term deposits and current liabilities declined owing to the company having paid off its domestic medium-term debt notes. The company's quick ratio performance supports the findings on its current ratio performance.

4.4.3 Working capital

As mentioned in Section 2.5.2, working capital is not a ratio but an associated measure of liquidity. Figure 4.7 shows the comparison of the working capital of the analysed companies between 2012 and 2016.

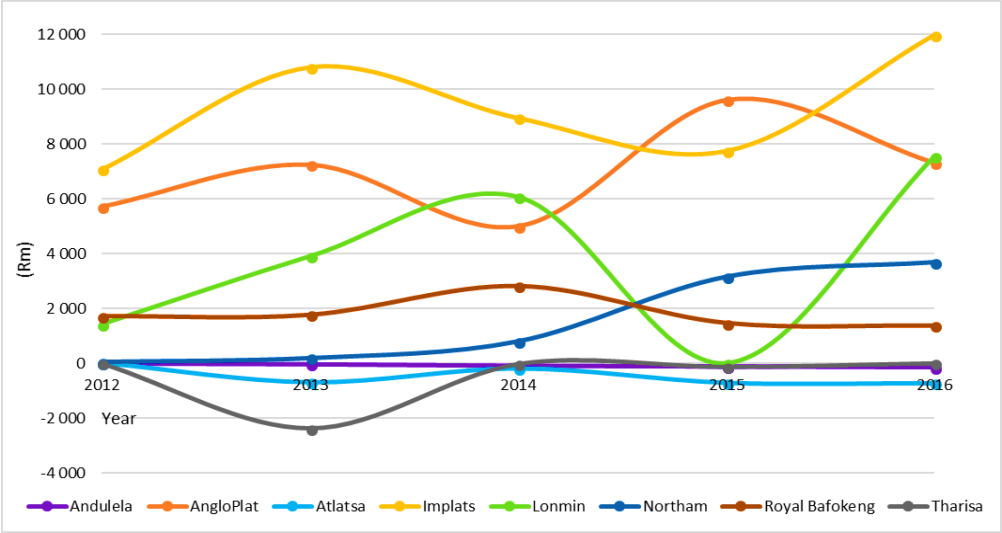


Figure 4.7: Working capital for platinum companies

From the analysed companies, five had positive average working capital and three had negative average working capital throughout the five-year period as shown in Figure 4.7. The difference in the availability of working funds between the companies reflects not just the companies' liquidity but also their profitability. Both positions rely on the companies' ability to generate enough funds to meet financial obligations in the immediate term and retain adequate portions to fund shareholder returns and company growth. AngloPlat, Implats, Lonmin, Northam and Royal Bafokeng maintained positive working capital throughout the period under review whilst Andulela, Atlatsa and Tharisa had negative working capital. Overall, the

average negative working capital of the three companies supports the findings on their average negative net profit margin performance.

Implats maintained significant working capital based on its cash conservation initiatives that included improving cost reductions, production efficiencies and raising equity to secure the completion of key capital projects (Impala Platinum Holdings Limited, 2015). Atlatsa had lower working capital because of its reliance on debt leveraging to sustain some of its operations for example its UM2 and Vertical Merensky shafts, whose high costs resulted in spiralling capital and financial expenditure.

4.4.4 Summary of platinum companies' liquidity performance

Most of the analysed companies showed either satisfactory liquidity or indications of improvement towards satisfactory liquidity. Despite the strain on earnings shown in the profitability ratios, the companies maintained enough current assets to be able to meet their short-term financial obligations. In general, the platinum sector has satisfactory liquidity and is able to meet its short-term financial obligations. The influence of platinum price on platinum companies' liquidity performance is tested using the Pearson correlation coefficient below.

4.4.5 Correlation analysis of liquidity ratios against platinum price

Table 4.3 shows the Pearson correlation coefficients of the analysed companies' liquidity ratios against platinum prices over the period 2012 to 2016.

Table 4.3: Pearson correlation coefficients of liquidity ratios against platinum prices

Company/Ratio	Current	Quick	Working capital
Andulela	0.9	0.9	0.9
AngloPlat	-0.7	-0.6	-0.7
Atlatsa	0.8	0.9	0.7
Implats	-0.3	-0.1	-0.4
Lonmin	-0.5	-0.5	-0.2
Northam	-1.0	-0.9	-1.0
Royal Bafokeng	0.7	0.9	0.5
Tharisa	-0.7	-0.8	-0.4
Sample mean	**-0.0**	**-0.0**	**-0.1**

The companies showed high correlation coefficients against platinum price as shown in Table 4.3. The high correlation coefficients of the ratios, positive or negative, indicate that price was a driver of liquidity during the period under review.

4.5 Solvency ratios

4.5.1 Debt to equity ratio

Figure 4.8 shows the analysed companies' comparison of debt to equity ratios for the period 2012 to 2016.

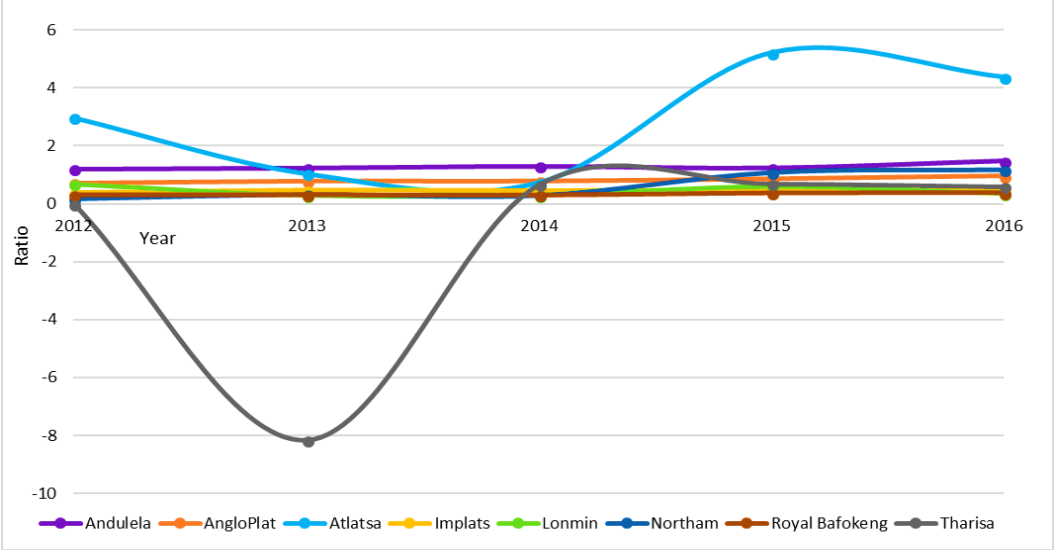


Figure 4.8: Debt to equity ratios for platinum companies

It is clear from Figure 4.8 that the debt to equity ratios were relatively low and consistent for each company over the period under review. Ideally, the debt to equity ratio should be less than the value of one. Five companies had average ratios less than one; AngloPlat had 0.82, Implats had 0.45, Lonmin had 0.4, Northam had 0.61 and Royal Bafokeng had 0.33. Andulela and Atlatsa had average ratios above one with 1.29 and 2.87 respectively. Tharisa had a negative average ratio of -1.56 over the period because of negative equity in 2013. Tharisa's negative equity was due to high debt commitments as the company was still ramping up its operations and constructing its Voyager plant (Tharisa Plc, 2013). Its performance supports the findings of on its quick ratio performance. The consistency in lower ratios can be attributed to the sustained focus on tight management of capital expenditure and preferential focus on equity funding at the expense of loan obligations as companies

sought to preserve cash and sustain operations. The progressively increasing ratios highlight the transition from equity leveraging to higher debt leveraging of balance sheets as prices remained depressed and costs escalated. Atlatsa's high debt to equity ratios are a reflection of the company's highly debt leveraged financial structure as debt uptake outpaced cash generation initiatives and most likely a sign of its investors' loss of confidence in its future viability and so are reluctant to commit more of their capital.

4.5.2 Debt to asset ratio

Figure 4.9 shows the comparison of debt to asset ratios for the analysed companies during the period 2012 to 2016.

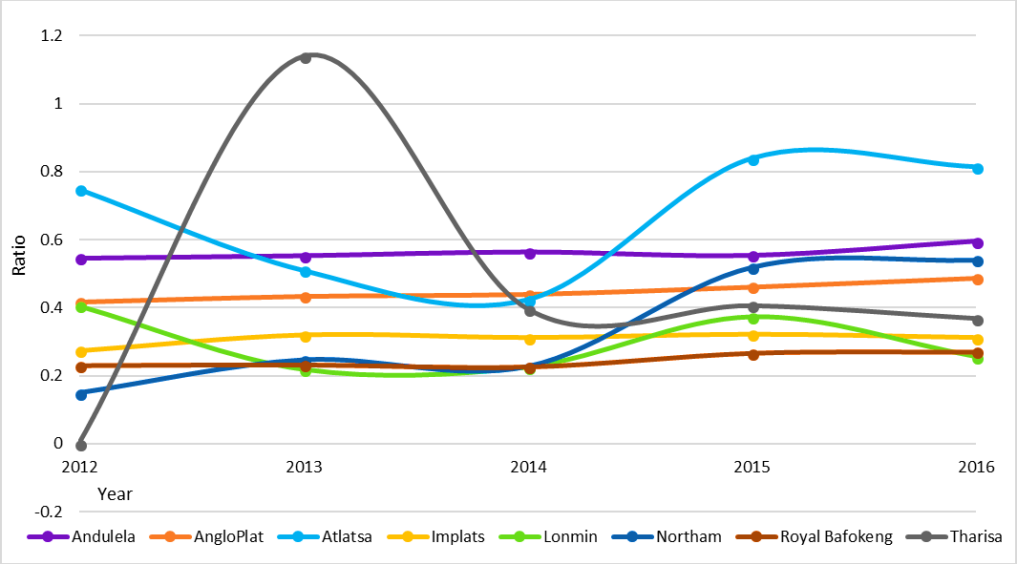


Figure 4.9: Debt to asset ratios for platinum companies

Just like debt to equity ratios, it is clear from Figure 4.9 that most of the companies maintained low and consistent debt to asset ratios underpinned by generally opposite synchronous movements in total assets and total liabilities. The trends further reflect the prevailing focus during the analysis period of keeping financial obligations contained but at the same time looking out for potential growth opportunities. Again, Atlatsa exhibited increasing ratios because of its increasing debt and decreasing total assets and amortisation losses emanating from placing its UM2 and Vertical Merensky shafts on care and maintenance in 2015. Tharisa's significantly high debt to asset ratio is a reflection of the high debt burden the

company had in 2013 because of construction obligations.

4.5.3 Cash flow coverage ratio

Figure 4.10 shows the comparison of cash flow coverage of the analysed companies between 2012 and 2016. Based on the generic safe coverage value of one, all the analysed companies showed poor average cash coverage ratio values throughout the period with significant negative trends as shown in Figure 4.10. The low ratios were a reflection of the strained operating cash flows as companies struggled to generate sufficient cash levels to fund operations without debt support due to cost and production pressures. AngloPlat had progressively improving ratios resulting in the highest average ratio and it is analysed further below.

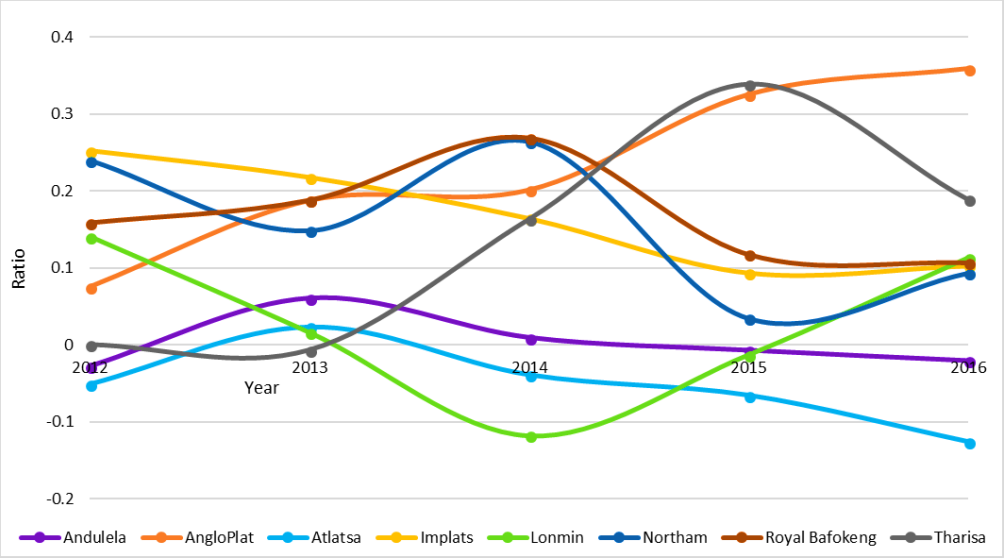


Figure 4.10: Cash flow coverage ratios for platinum companies

AngloPlat

AngloPlat owed its better performance to sustained improving cash inflows compared to cash outflows and reduction in liabilities. The company's performance was underpinned by early adoption of initiatives focussed on consolidation of operations and disposal of assets that had low assessed sustainable estimates in order to reduce cost pressure from unprofitable assets. This was achieved by stopping operations at Thembelani 2 and Tumela 4 shafts and other smaller projects, (Anglo American Platinum Limited, 2012), followed by consolidation of its Rustenburg operations from five to three mines and Union mines from two to one

(Anglo American Platinum Limited, 2013). Further cost reduction initiatives resulted in the closure of two shafts at Bokoni mine, (Anglo American Platinum Limited, 2015) and the complete disposal of the Rustenburg mine to Sibanye-Stillwater (Anglo American Platinum Limited, 2016).

In a broad sense, the sector struggled to generate enough earnings to cover cash outflows resulting in their progressive decline into loss-making positions over the period, reflected in the decreasing and negative operating cash flows. The overall increase in liabilities probably as companies borrowed more capital funds to maintain operations also caused the decline in cash flow coverage ratios. The low group average of 0.08 highlights the severity of the challenge as it confirms the high risk of default on principal financial obligations.

4.5.4 Summary of platinum companies' solvency performance

The analysed companies showed good solvency in debt to equity and debt to asset ratios as seen in their ratios that were mostly lower than the values of one and 0.5 respectively. The performance indicates that the companies' equity and assets can cover their long-term obligations when they are due. However, cashflow coverage was poor as all ratios were under the value of one indicating the companies were not generating enough cash to meet their long-term obligations another reflection of poor profitability. The influence of platinum price on platinum companies' solvency performance is tested using the Pearson correlation coefficient below.

4.5.5 Correlation analysis of solvency ratios against platinum price

Table 4.4 shows the Pearson correlation coefficients of the analysed companies' solvency ratios against platinum prices over the period 2012 to 2016. The companies' solvency ratios showed high inverse correlation to platinum prices as shown in Table 4.4. However, whilst debt to equity and debt to asset ratios showed high negative correlation the cash flow coverage ratio showed high positive correlation. The correlation coefficients are as expected which mean platinum price was a driver of solvency performance during the period under review.

Table 4.4: Pearson correlation coefficients of solvency ratios against platinum prices

Company/Ratio	Debt to equity	Debt to asset	Cash flow coverage
Andulela	-0.9	-0.9	0.4
AngloPlat	-0.9	-0.9	-0.8
Atlatsa	-0.6	-0.5	0.9
Implats	-0.3	-0.3	0.8
Lonmin	0.2	0.2	-0.3
Northam	-0.9	-0.8	0.6
Royal Bafokeng	-0.8	-0.8	0.6
Tharisa	-0.4	0.2	-0.5
Sample mean	**-0.6**	**-0.5**	**0.2**

4.6 Activity ratios

4.6.1 Asset turnover ratio

Figure 4.11 shows the comparison of asset turnover ratios of the analysed companies between 2012 and 2016.

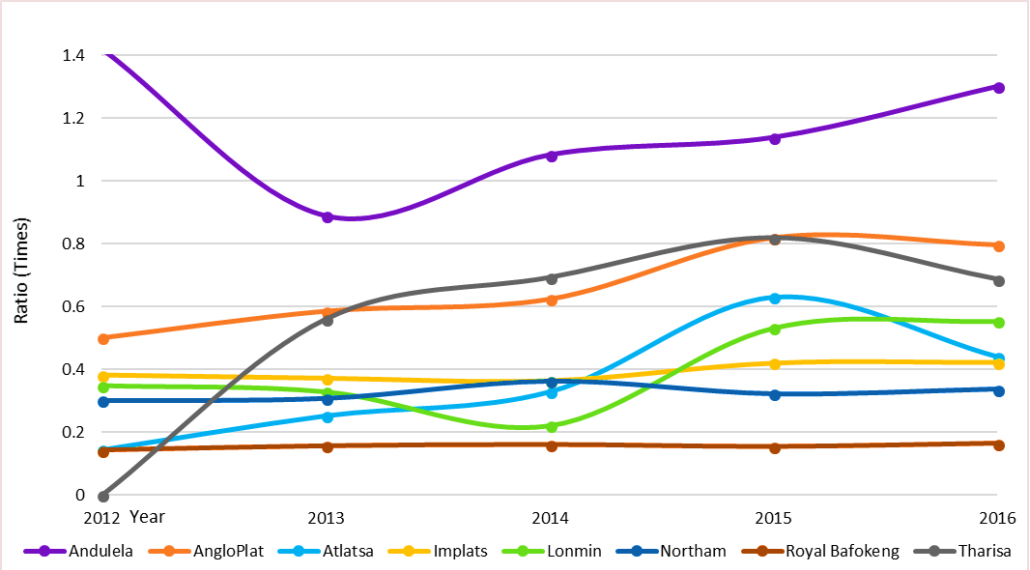


Figure 4.11: Asset turnover ratios for platinum companies

Since there is no recommended minimum ratio value, an indication of good asset turnover performance should be positive and showing an increasing trend. From Figure 4.11 the companies exhibited mixed positive trends that highlighted the volatility in revenues due to the effects of platinum prices and sales volumes

throughout the five-year period. Implats, Northam and Royal Bafokeng had consistent ratios with minor fluctuations as their revenues remained steady influenced by consistent production rates and steady asset bases. Andulela had the highest asset turnover ratios over the five-year period. The company is further analysed below.

Andulela

Andulela had by comparison the best asset turnover ratio performance that showed improving consistency despite a significant dip in 2013. Andulela maintained increasing revenues despite a declining asset base, a reflection of the company improving efficiencies in using its Kilken platinum and PRSM assets. The company's high asset turnover in 2012 was because revenues sharply increased due to consolidation of full financial results of PRSM after its acquisition. The sharp increase in revenues coupled with a decrease in total assets after decommissioning and scrapping of some of PRSM's plant and equipment, Andulela Investment Holdings Limited (2012), influenced the increase.

4.6.2 Fixed asset turnover ratio

Figure 4.12 shows fixed turnover ratios for the analysed platinum companies for the period 2012 to 2016.

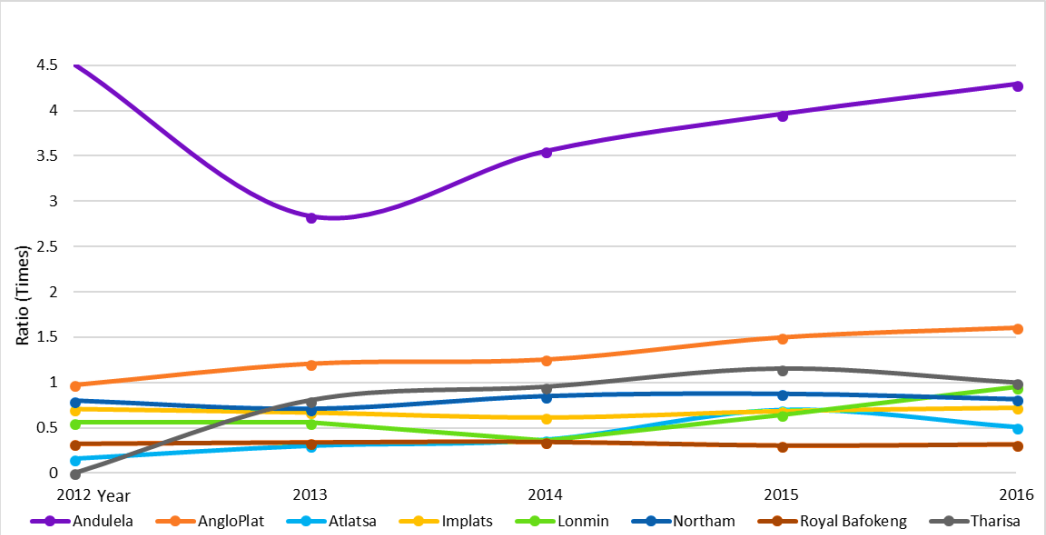


Figure 4.12: Fixed asset turnover ratios for platinum companies

As shown in Figure 4.12 the fixed asset turnover ratios exhibited similar trends to

the asset turnover ratios, where companies maintained consistent ratios over the five-year period. Most companies' values remained around the 2012 levels with minor fluctuations. Andulela had the highest ratios over the five-year period, Atlatsa had the second lowest ratios and Royal Bafokeng had the lowest ratios characterised by a static trend. These three companies are further analysed below.

Andulela

Andulela had the highest turnover ratios over the period driven by steadily increasing revenues and declining fixed assets. The sustained high fixed asset turnover ratios are a reflection of the company's low asset base as it leases premises for its tailings reprocessing operations (Andulela Investment Holdings Limited, 2016). The company's good performance is in contrast to findings on its ROA performance because of its negative net income.

Atlatsa

Atlatsa exhibited by comparison the highest rate of sustained improvement as its turnover ratio improved from 0.16 in 2012 to 0.51 in 2016, an increase of 219% driven by an 87% (R965m to R1 806m) increase in revenues and a -38% (R6 684m to R4 097m) decrease in the asset base (Atlatsa Resources Corporation, 2012-2016). The steady increase in fixed asset turnover of the company seems to be in contrast with its poor ROA ratios; however, the good turnover ratios indicate efficient utilisation of the company's fixed assets. The company exhibited poor ROA ratios due to decreasing total assets and declining net incomes as revenue were strained by increasing costs.

Royal Bafokeng

Royal Bafokeng maintained the lowest fixed asset turnover ratio amongst the analysed companies, averaging 0.32 for the period. The company's performance was driven by sustaining revenue increases through improvement in production levels and production efficiencies as well as continued funding of capital assets for growth like its Styldrift 1 project, resulting in an increase in revenues of 17% (R2 865m – R3 342m) and an increase in assets of 1% (R20 101m – R20 318m) between 2012 and 2015 (Royal Bafokeng Platinum Limited, 2012-2015). The company's

low fixed asset ratio performance supports findings on it ROA performance except for the dip in performance in 2015.

4.6.3 Inventory turnover ratio

Since mining is a capital-intensive industry, the value of inventories is normally high, as it is necessary to keep large stocks of consumables and high-cost equipment at hand. However, the amount of inventory depends on each company's policies and operating structure and may vary significantly even between companies in the same industry. Figure 4.13 shows the comparison of inventory turnover ratios of the analysed companies over the period 2012 to 2016.

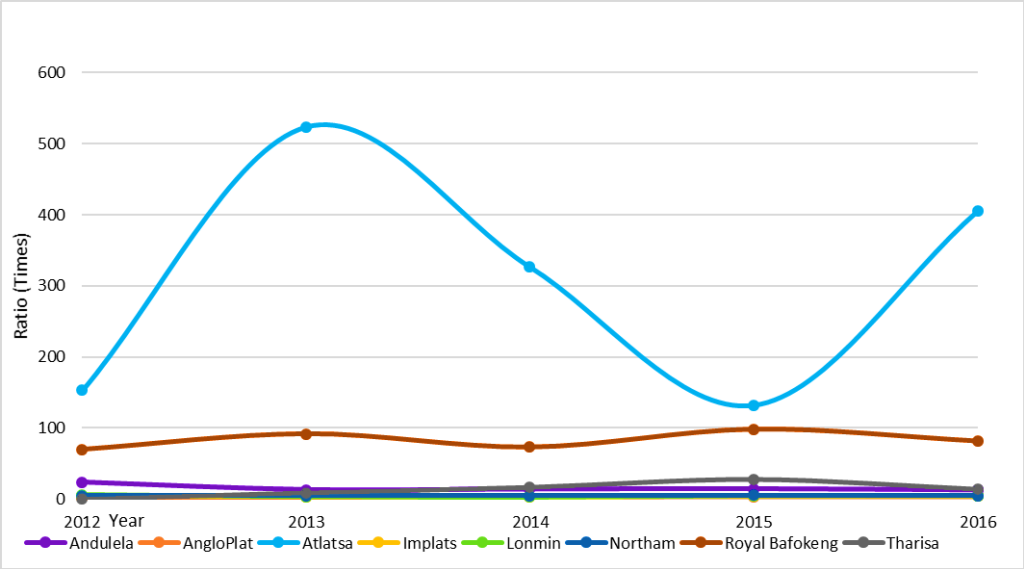


Figure 4.13: Inventory turnover ratios for platinum companies

The observed difference in turnover ratio levels of the companies as seen in Figure 4.13 seems to support the earlier stated assumption that the ratio is dependent on each company's policies and operating structure. Atlatsa's higher inventory turnover ratios were due to the company's 87% increase in revenues and a -29% decreases in its inventory value between 2012 and 2016, a reflection of its restructuring and consolidation initiatives that included placing older shafts on care and maintenance in 2015 resulting in lower production output. Royal Bafokeng had the second highest turnover ratios driven by fluctuations in both inventories and revenues ensuring the ratios were consistent throughout the period.

4.6.4 Summary of platinum companies' activity performance

The analysed companies showed good and encouraging activity ratios. The ratios exhibited increasing trends an indication of the companies improving efficiencies in the utilisation of their assets. Overall, the industry's activity performance was good over the period under review. This mean the companies efficiently utilised their assets to generate revenues. The influence of platinum price on platinum companies' activity performance is tested using the Pearson correlation coefficient below.

4.6.5 Correlation analysis of activity ratios against platinum price

Table 4.5 shows the Pearson correlation coefficients of the analysed companies' activity ratios against platinum prices over the period 2012 to 2016.

Table 4.5: Pearson correlation coefficients of activity ratios against platinum prices

Company/Ratio	Asset Turnover	Fixed Assets Turnover	Inventory Turnover
Andulela	0.7	0.5	1.0
AngloPlat	-0.7	-0.8	-0.6
Atlatsa	-0.7	-0.7	0.5
Implats	-0.2	0.4	0.0
Lonmin	-0.2	-0.2	0.8
Northam	-0.6	-0.1	-0.7
Royal Bafokeng	-0.9	-0.1	-0.6
Tharisa	-1.0	-1.0	-0.7
Sample mean	**-0.4**	**-0.2**	**-0.2**

The companies' activity ratios showed high negative correlation to platinum prices as shown in Table 4.5. The negative correlation of activity ratios to platinum price is as expected. This mean platinum price was a driver of activity performance in platinum companies during the period under review.

4.7 Market ratios

4.7.1 Share price

Figure 4.14 shows the comparison of share prices for the analysed companies between 2012 and 2016. The analysed companies showed differing and fluctuating share prices over the five-year period as seen in Figure 4.14. Most of the companies low fluctuating share prices.

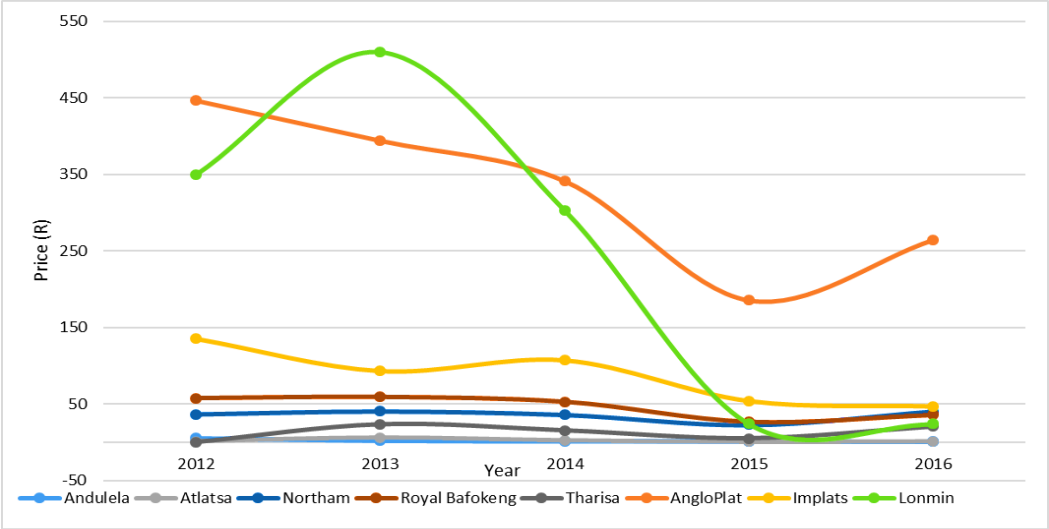


Figure 4.14 Share prices of platinum companies

AngloPlat maintained the highest share prices despite poor profitability. Implats also maintained good share prices but the price had significant fluctuations. Lonmin had high share prices between 2012 and 2014 which decreased by 92% from R303 in 2014 to R24 in 2015. Its share price performance is almost similar to its net profit margin.

4.7.2 Earnings per share ratio

Figure 4.15 shows the comparison of earnings per share ratios for the analysed companies between 2012 and 2016. The right axis is labelled in red and the company related to it is Lonmin only because of its too high ratios that are not comparable to the other companies. It is clear from Figure 4.15 that there was overall poor earnings generation per share in the platinum sector as reflected by the consistent negative ratios over the five-year period. The companies' EPS ratio performance supports the companies' net profit margin performance. Beside the EPS values being low, they fluctuated for each company year by year because of fluctuations in net incomes. The sector mean of R-16,25 shows the general poor performance of the companies. Implats, Northam and Royal Bafokeng had positive EPS ratios for most of the period but the significant drop in platinum price severely influenced their earnings as the companies slid into loss making which ultimately weighed down their averages.

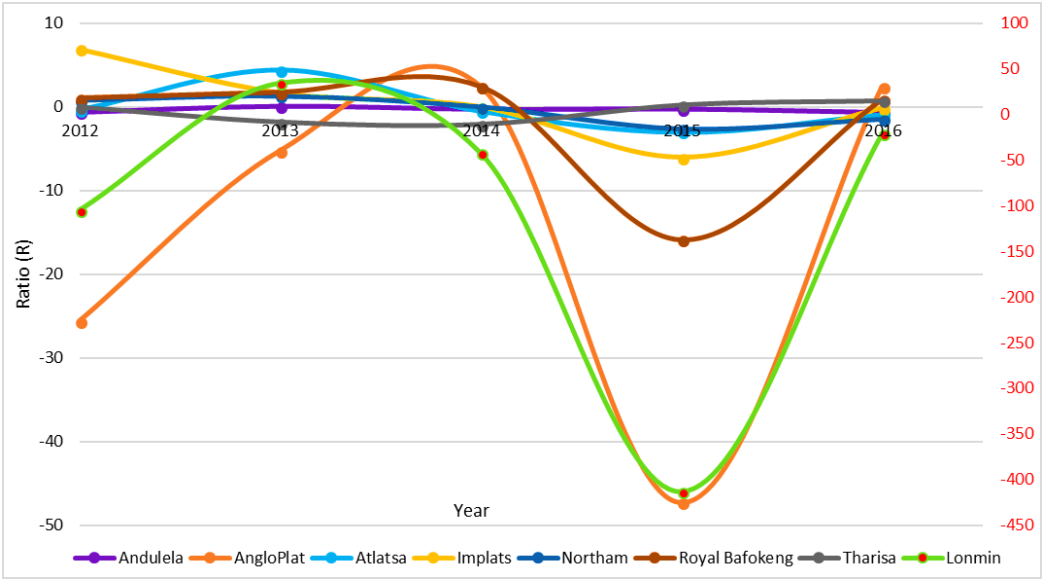


Figure 4.15: Earnings per share ratios for platinum companies

The increase in the number of share offers was further proof of the increasing pressure on earnings as companies resorted to rights issues to raise funds to augment the declining earnings for example Royal Bafokeng in 2014, Implats in 2015, Lonmin in 2015 and Northam in 2015. It is also clear that the aggregate effect of the generally low platinum prices and escalating operating costs including rising wage costs, rising utility costs (electricity, diesel and support services) poses the greatest threat to the future of all sector players, no matter the size or structure of the company. Lonmin had the most volatility in its EPS ratios with a maximum ratio of R35 and a minimum ratio of R-413. The company is further analysed below.

Lonmin

Lonmin's EPS fluctuated the most among the analysed companies and on average; the company had the least ratio over the five years. This was driven by a combination of low and negative net incomes and a decreasing shareholding especially during the years 2014 and 2015. The effects of the five-month industrial strike severely strained net incomes as operating costs increased and the company recorded losses. In 2015, the company experienced massive impairment costs due to reassessment and closure of some of its high costs assets, which reduced net income into further negative returns. The rights issue to raise US$407m as the company sought to strengthen its financial position significantly influenced the

company's shareholding structure. The combined effect of the negative net income and reduced number of shares caused the huge negative drop in EPS in 2015.

4.7.3 Price to earnings ratio

Figure 4.16 shows the comparison of price to earnings per share (P/E) ratios of the analysed companies between 2012 and 2016. The right axis is labelled in red and the companies related to it are AngloPlat, Implats and Northam only because of their too high ratios that are not comparable to the other companies.

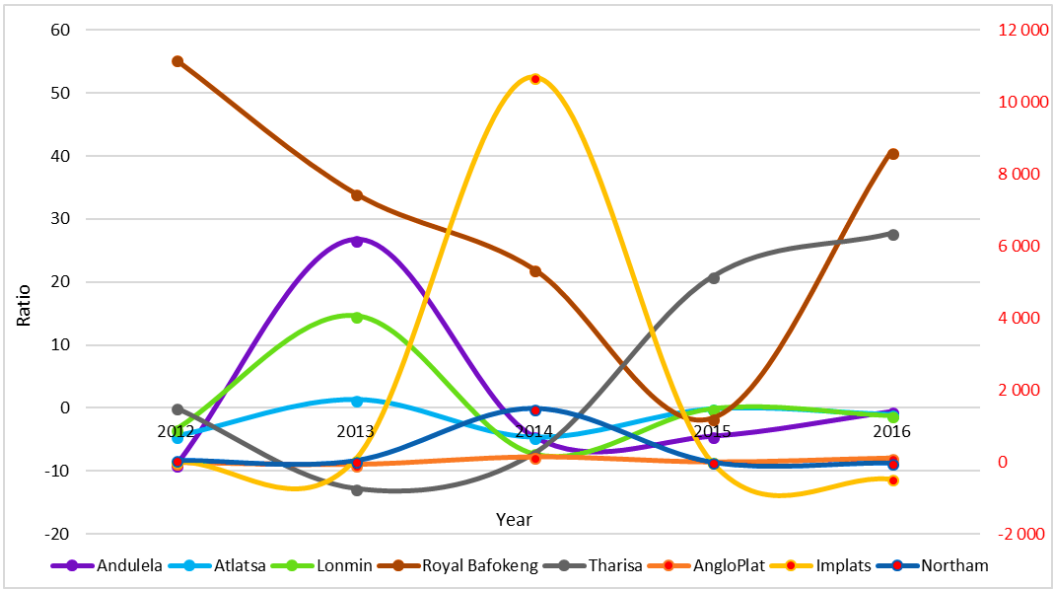


Figure 4.16: Price to earnings ratios for platinum companies

The companies exhibited mixed P/E ratios over the period as shown in Figure 4.16, the effect of a combination of the low EPS and fluctuating market perceptions of the companies and the sector that are reflected in the share prices. Since share prices declined across the sector, it is fair to assume that the exhibited P/E ratios were largely influenced by the companies' earnings generating capability. Implats, Northam and Royal Bafokeng had the better P/E ratios for most of the period, a reflection of their stronger net income earnings resulting in better EPS values. Andulela, Atlatsa and Lonmin all exhibited weaker ratios because of their poor net earnings as reflected in the loss-making positions on their financial statements. Implats exhibited high fluctuations in is P/E ratios because of its fluctuating share price against declining earnings per share ratios. In 2014, the company's share price rose from R93 to R107 whilst its EPS decreased from R1,67 to R0,01 hence the

high P/E ratio.

4.7.4 Book value per share ratio

Figure 4.17 shows the comparison of book value per share (BV) ratios of the analysed companies between 2012 and 2016.

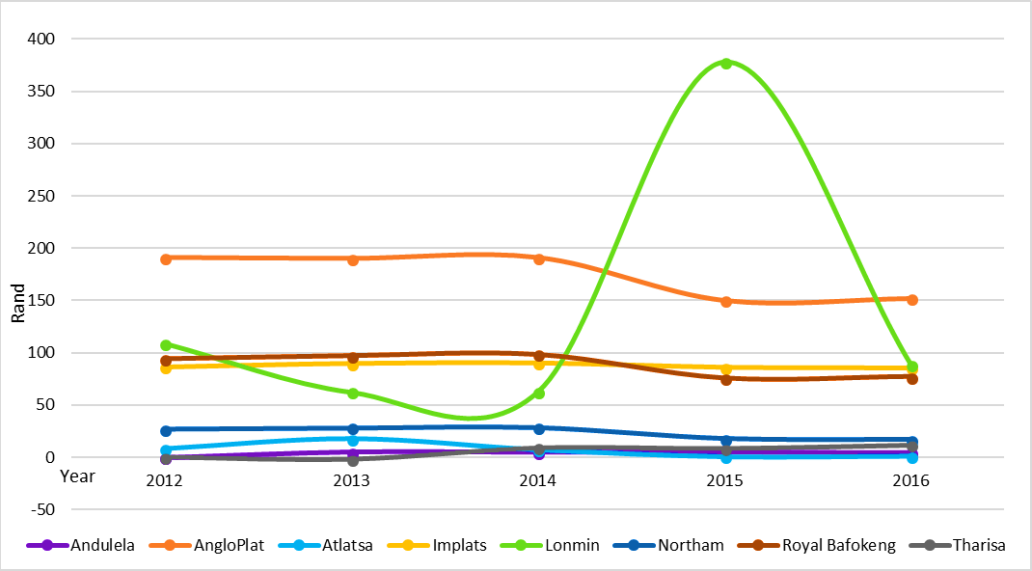


Figure 4.17: Book value per share ratios for platinum companies

Volatility of the BV ratios in most companies was steady notwithstanding the general declining trends from 2014 to 2016 as shown in Figure 4.17. The BV ratio is a reflection of the companies' value as influenced by financial structure due to leveraging and share consolidation. AngloPlat, Implats, Northam and Royal Bafokeng all exhibited good steady BV ratios because they maintained strong equity value and a consolidated shareholding due to sustained focus on retaining earnings to fund capital and growth needs. Lonmin had decreasing BV ratios from 2012 to 2014 before a sharp recovery in 2015 and another decrease in 2016. The sharp jump in 2015 can be attributed to the decline in the company's equity value and issued shares due to the rights issue to strengthen the company's financial position.

4.7.5 Summary of platinum companies' market performance

The analysed companies showed overall poor market performance as indicated by their low ratios for the period under review. This means the platinum mining companies did not deliver value to their shareholders. EPS ratios were low with

companies returning negative values in most years. P/E ratios were mixed and negative resulting in low averages over the five-year period. BV ratios were lower than share prices an indication that there still was market confidence in the mining companies. The influence of platinum price on platinum companies' market performance is tested using the Pearson correlation coefficient below.

4.7.6 Correlation analysis of market ratios against platinum price

Table 4.6 shows the Pearson correlation coefficients of the analysed companies' market ratios against platinum prices over the period 2012 to 2016.

Table 4.6: Pearson correlation coefficients of market ratios against platinum prices

Company/Ratio	Earnings per share	Price to earnings per share	Book value per share	Share price
Andulela	-0.5	-0.4	-1.0	1.0
AngloPlat	-0.3	-0.3	0.4	0.7
Atlatsa	-0.0	-0.6	0.1	-0.2
Implats	0.8	-0.2	-0.3	0.7
Lonmin	0.0	-0.2	-0.1	0.3
Northam	0.4	-0.2	0.4	0.1
Royal Bafokeng	0.2	0.6	0.3	0.5
Tharisa	0.2	-0.2	-0.5	-0.7
Sample mean	**0.1**	**-0.2**	**-0.1**	**0.3**

The companies' market ratios showed mixed correlation to platinum prices as shown in Table 4.6. This mean there was insignificant influence of platinum price on market ratios.

4.8 Comparison of platinum price in USD against Rand

Figure 4.18 shows the comparison of the platinum price in USD/oz against the price in Rand/oz between 2012 and 2016.

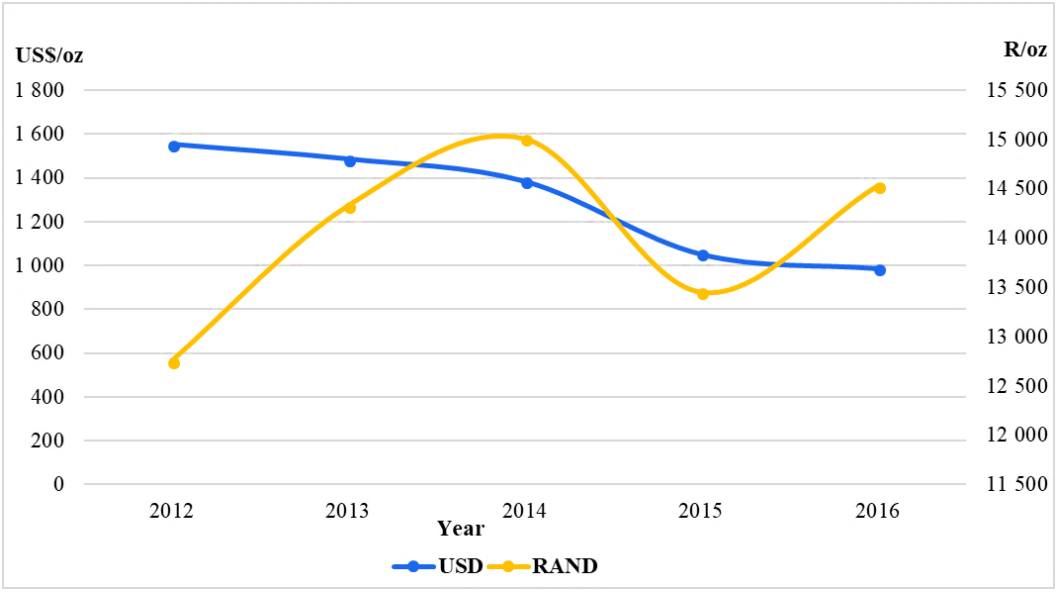


Figure 4.18: Platinum price: USD against Rand

Figure 4.18 shows that the price in USD consistently declined over the five-year period from around 1 553 USD/oz in 2012 to around 989 USD/oz in 2016 whilst the price in Rand increased over the same period mostly driven by a weakening rand value, except for a decline in 2015 in response to a major slump in the USD price. The USD price decline was fuelled by reduced global demand because of fall in demand for diesel engines, emergence of electric cars, increase in the use of recycled platinum and high above ground stocks (Njini & Walt, 2018). Weakening supply because of lowering production levels, lower investments in growth projects and markets and political challenges in key producing countries also acted adversely in dampening sentiments in the industry. Overall, the poor performance of the sector may reflect a significant influence of the consistently declining USD platinum prices as compared to that of the increasing exchange rate over the period.

4.9 Failure prediction analysis of the platinum mining companies

The purposes of using the Altman Z”-score analysis model in this study are to confirm the findings in ratio analysis and to predict failure and possible implications as explained in Section 2.6. Table 4.7 shows the Altman Z”-scores of the analysed companies between 2012 and 2016.

Table 4.7: Platinum companies z”-scores

Company/Year	2012	2013	2014	2015	2016	Mean	Zone
Andulela	-0.6	-0.7	-1.6	-1.8	-2.6	**-1.5**	**Distress**
AngloPlat	2.5	3.0	2.7	2.1	2.7	**2.6**	**Safe**
Atlatsa	0.1	0.7	0.5	-12.4	-4.3	**-3.1**	**Distress**
Implats	5.5	4.7	4.5	3.8	4.4	**4.6**	**Safe**
Lonmin	1.6	5.5	5.0	-4.5	2.3	**2.0**	**Grey**
Northam	6.7	4.1	4.4	2.0	2.5	**3.9**	**Safe**
Royal Bafokeng	4.8	4.8	5.2	3.5	3.6	**4.4**	**Safe**
Tharisa	0.0	-6.0	-0.3	-0.5	0.5	**-1.3**	**Distress**

The Z”-scores as shown in Table 4.7, fluctuated over the five-year period both between companies and within each company’s trend, with company trends mostly fluctuating within single zones. That is, the companies that were in the distress zone in 2012 mostly stayed within that zone showing either minor improvements or further decline. The financial health of each company is interpreted in the following Sub-sections.

4.9.1 Andulela

The classification of Andulela’s financial health as in distress supports the findings of its ratios analysis despite having the highest activity ratios. Its profitability ratios were negative and decreasing except gross profit margin, liquidity ratios followed the same trend with increasing negative working capital. The company had no cash flow coverage and its debt ratios were biased towards increase in liabilities. Activity ratios were marginally better, but they were consistently low. Its market performance was low and declining a sign of the market’s low perception of the company and its decreasing share price (Figure 4.14). The outlook for the company is not good, as indicators suggest further worsening performance. The company potentially faces imminent financial failure unless measures are taken to reduce its debt burden and stimulate cash generation and containment of costs.

4.9.2 AngloPlat

Although AngloPlat’s financial health classification is in the safe zone, it is marginally safe and of concern as shown in its year-by-year classifications and its ratios. The marginal safe zone financial health position supports the findings of its ratios analysis. The company’s profitability ratios were low and mostly negative

whilst exhibiting encouraging levels of liquidity. Debt ratios were good as they were close to the recommended value of one, but cash flow coverage was poor, being far below the recommended standard. Turnover ratios were low but consistently improved over the period. Despite poor market performance, the company enjoyed good market sentiment, reflected in its high share price (Figure 4.14). Overall, the company should intensify its value driven strategies, as its benefits are evident in the progressive improvement in the company's performance.

4.9.3 Atlatsa

Atlatsa's distress classification of its financial health supports the observations from its ratio analysis as the ratios progressively declined throughout the period. Profitability was poor with all ratios having negative values, liquidity progressively weakened as debts increased. The company had negative working capital resulting in no cash flow coverage. Despite high inventory turnover the company's other turnover ratios were low. Its market performance was poor as earnings were low and as reflected in its fluctuating share price (Figure 4.14), market sentiment was low. The company's sustained debt leveraging without tangible improvements in productivity and generated cash flows is concerning and if the company's course is not altered it faces imminent financial default.

4.9.4 Implats

The classification of Implats' financial health as safe supports the findings of its ratios analysis. Despite low profitability and losses from 2014 to 2016, the company maintained high liquidity and low debts. The contradiction between high working capital and low cash flow coverage is a reflection of the company's policy to sustain operations' capital expenditure from its generated cash. Turnover was consistent over the period. Market performance was strong at the beginning of the period but gradually declined as earnings were eroded and the company drifted into loss making. Market sentiments diminished as the company's performance weakened and its share price decreased (Figure 4.14). Although its financial position is strong enough to sustain operations for the near future, the company needs to address cash generation to return earnings to profitability.

4.9.5 Lonmin

Lonmin's financial health classification of grey supports the concern about its profitability as reflected in its low profitability ratios. The major concern with Lonmin's performance has to be its lack of consistency that may suggest a lack of full comprehension of the operational dynamics within the company. Because of the inconsistencies, its ratios fluctuated from good to poor positions and vice versa without indicating a trend direction. Market confidences diminished significantly as reflected by the drop in its share price from R303 in 2014 to R24 in 2015 and 2016 (Figure 4.14). The company requires a strategy that focusses on containing ancillary costs to improve cash flows and measure to ensure consistency.

4.9.6 Northam

The classification of Northam's financial health as safe supports the observations of the analysis of its ratios. Although its profitability decreased from 2014 to 2016, its liquidity increased most likely from debt equity transactions as reflected in the increase in its debt to equity ratios for those years. Cash flow coverage was low and reduced further towards the end of the five-year period and turnover ratios were consistent. Its market performance progressively declined as the company drifted into loss making. However, market confidence remained strong as reflected in the recovery of the share price after the drop in 2015 (Figure 4.14). The recovery of performance after the slump of 2015 suggests the company is positioned to continue with its upward performance prior to 2015.

4.9.7 Royal Bafokeng

The safe classification of Royal Bafokeng supports the observations of its ratios analysis. The company had strong performance in almost all the ratio categories year by year except in 2015 when the platinum price slump adversely affected cash flows. Its market performance was strong throughout the period and market sentiments supported that with the company's share price consistent before 2015 (Figure 4.14) and rebounding in 2016. The outlook is of strong future performance as its status suggests the company has solid operational fundamentals.

4.9.8 Tharisa

The distress classification of Tharisa's financial health supports the observations

from analysis of its ratios, as they were low and mostly negative throughout the period. Despite the low ratios, the company showed sustained improvements and increases of its performance year by year, performing even better than most of the companies over the slump period. Its market performance firmed each year and the market confidence remained strong. The solid performances of the company over the period suggest the company will sustain its performance growth in the future.

4.9.9 Summary of failure prediction analysis of platinum companies

It is clear from the exhibited trends shown in Table 4.7 that despite different financial positions, the companies' individual financial health generally weakened over the five-year period as the impact of escalating operating costs driven by dollar-based costs and lower productivity in operations continually eroded earnings. The Altman Z"-score model supported findings of each company's ratio analysis and classified the companies' financial health.

4.10 Chapter summary

This chapter presented results of financial performance of the analysed platinum companies, analysed using financial ratios. The analysed companies showed indications of weakening profitability and market performance as net earnings dwindled. The companies showed good liquidity and solvency ratio performances, as they were able to satisfy short and long term financial and debt obligations. Activity performance was good as companies effectively utilised assets to generate revenues. Market performance was poor owing to the weak profitability performances. Despite the uncertainties within the local economy from factors such as the Mining Charter, steady results of indicators like share prices and book value ratios, highlight that market confidence remained satisfactorily upbeat about the sector. A test of the ratios' correlation to the platinum price was done and presented. Profitability ratios showed low positive correlation an indication that there may have been other factors that influenced company performance; market ratios had low mixed correlation and liquidity, solvency and activity ratios showed high negative correlation to platinum prices. The failure prediction model classified the companies' financial health and confirmed the findings of their ratios' analysis. Four companies were classified under the safe zone, one under the grey zone and three under the distress zone.

5 GOLD MINING SECTOR PERFORMANCE ANALYSIS

5.1 Chapter overview

This chapter presents an analysis of the results of financial performance and health of selected gold mining companies over the period 2012 to 2016. The financial performance is analysed by use of financial ratios and presented for comparison between companies, including determination of trends and correlation to gold price. Determination and discussion are also done of the financial health of the companies over the five-year period using the Altman Z"-score model. Performance analysis is done to specific companies displaying anomalies and a general performance conclusion is given for the overall industry. All ratios presented in this chapter are shown in Appendix 10.7 to Appendix 10.11.

5.2 JSE listed gold mining companies

There are nine gold-mining companies listed on the JSE According to AM Investor Services SPRL (2017) and Profile Data (2017). Table 5.1 shows the listed gold companies.

Table 5.1: JSE listed gold companies

INCLUDED IN ANALYSIS	EXCLUDED IN ANALYSIS
AngloGold Ashanti Limited (ANG)	African Rainbow Minerals Limited (ARM)
Central Rand Gold Limited (CRD)	Randgold & Exploration Company Limited (RNG)
DRD Gold Limited (DRD)	
Gold Fields Limited (GFI)	
Harmony Gold Mining Company Limited (HAR)	
Pan African Resources PLC (PAN)	
Sibanye Gold Limited (SGL)	

Table 5.1 groups the companies into two categories; one for the companies selected for analysis and the other for those excluded from analysis based on the criteria explained in Section 3.3 and the following additional explanations:

- African Rainbow Minerals Limited was excluded from analysis because its involvement in gold sector is through its 14.7% stake in Harmony Gold whose performance is analysed under Harmony Gold;
- Randgold & Exploration Company Limited was excluded because it is primarily involved in prospecting and exploration for resources; and

- Analysis for Sibanye-Stillwater starts in 2013 as it is the year the company was established and listed on the JSE (Sibanye Gold Limited, 2016).

5.3 Profitability ratios

5.3.1 Gross profit margin ratio

Figure 5.1 shows the comparison of gross profit margins of analysed companies for the period 2012 to 2016.

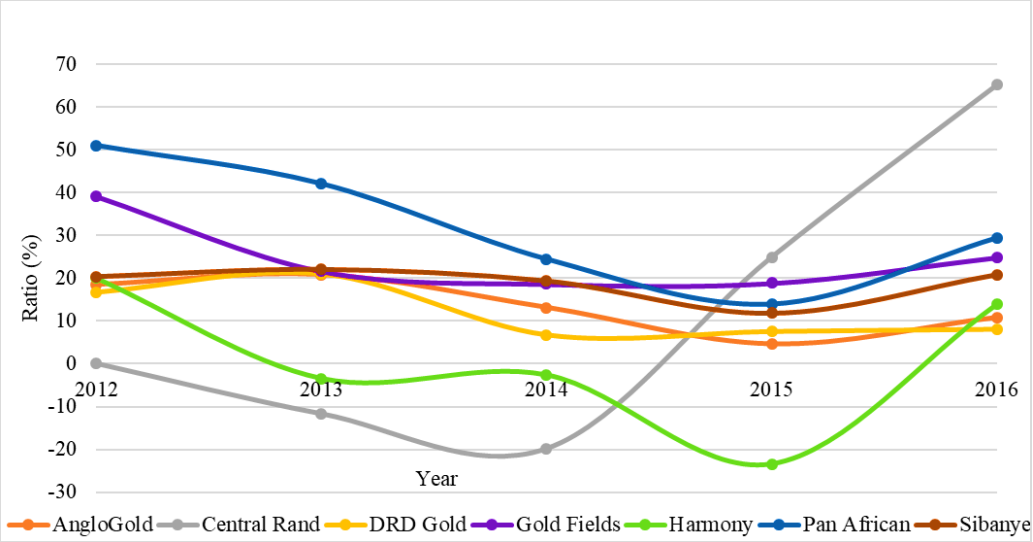


Figure 5.1: Gross profit margin ratios for gold companies

As shown in Figure 5.1 the overriding trend exhibited by the sector over the five-year period shows a general decrease in gross profit margins from 2012 to 2015 and a recovery in 2016. The continuous increase in operating costs coupled with production challenges affected returns as production rates decreased and revenues declined. Harmony Gold had the lowest average gross profit margin characterised by three years between 2013 and 2015 of negative gross profit margins. Pan African Resources had the highest average gross profit margin and Central Rand Gold had the second lowest gross profit margin. These three companies are further analysed below.

Harmony Gold

Over the five-year period Harmony Gold had by comparison the worst gross profit margins especially between 2013 and 2015 as production disruptions resulted in lower gold output and increased operating costs offset by the strengthening of the

rand gold prices. The company experienced production disruptions in 2013 at its Kusasalethu mine because of an industrial strike, producing 2 893kg less gold than in 2012. The safety stoppages in 2014 at Doornkop and Joel mines resulted in gold loss of 1 028kg and 893kg respectively and in 2015 due to further safety stoppages at Hidden Valley and Target 1 mines resulted in gold loss of 686kg and 437kg respectively (Harmony Gold Mining Company Limited, 2013-2015). The company's costs increased by 57% between 2013 and 2015 from R12 137m to R19 053m. The disruptions despite influencing production rates also increased operating costs because of the associated fixed costs and hence the lower gross profit margins.

Pan African Resources

Pan African Resources benefited from its focus on ensuring production output outweighed the escalating operating expenses. This was achieved by maintaining value-adding investments such as the acquisition of Evander mines, investment in the Barberton Tailings Retreatment Plant (BTRP) and Evander Tailings Retreatment Plant (ETRP) to optimise production and broaden income generation (Pan African Resources Plc, 2013-2014). The benefit of the strategy is reflected by the company's sustained revenue and gross profit improvements. Revenues grew from R1 240m to R3 633m and gross profits increased from R632m to R1 066m from 2012 to 2016, respectively.

Central Rand Gold

Central Rand Gold started reporting its revenues and gross profit in 2013 once its gold sales met the criteria set in its accounting policy for recognised revenue (Central Rand Gold Limited, 2013). The company's 2013 and 2014 gross profit margins were significantly low owing to decreasing underground production at its Consolidated Main Reef (CMR) mine due to low productivity from new stoping areas and rising water levels coupled with cost increases from major plant upgrades (Central Rand Gold Limited, 2014). Increased sales volumes in 2015 at the back of higher rand prices and improved plant availability supported by a decrease in costs from cost cutting and labour reductions boosted revenues and gross profit margin from R-17.7m in 2014 to R25.7m in 2015. Despite significant decline in production as mining operations at CMR and open pit Slots 5 and 7 of the Bird reef package

and Slot 6 of the Kimberly reef package were put on care and maintenance in 2016, the company recorded an increase in gross profit margin. The gross profit margin increased to R46m as production costs decreased sharply from R78m in 2015 to R25m in 2016 (Central Rand Gold Limited, 2016).

5.3.2 Net profit margin ratio

Figure 5.2 shows the comparison of the analysed companies' net profit margins for the period 2012 to 2016. The right axis is labelled in red and the company related to it is Central Rand Gold only because of its too high ratios that are not comparable to the other companies. The net profit margin ratios do not show any noticeable resemblance to gross profit margin ratios other than the ratios being lower.

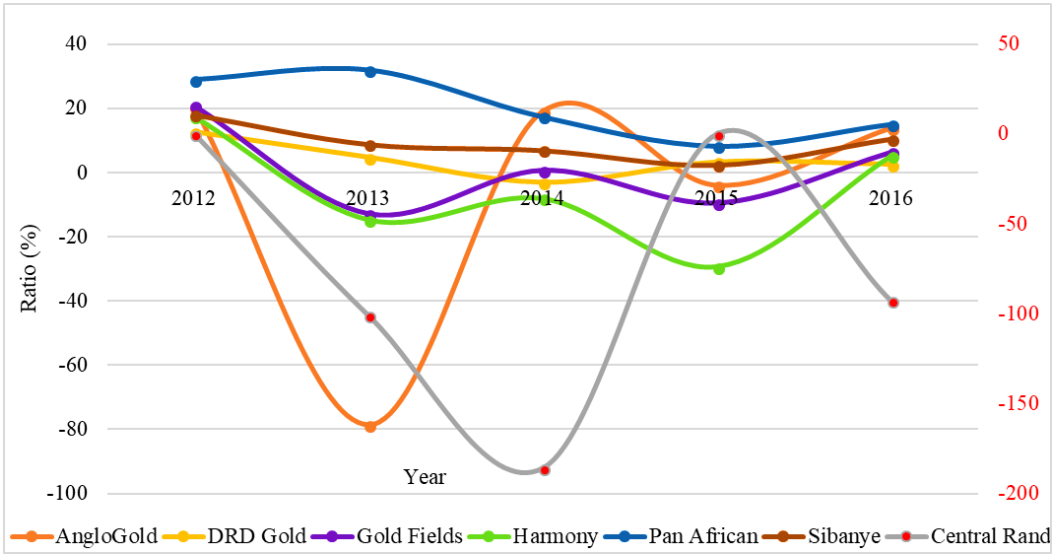


Figure 5.2: Net profit margin ratios for gold companies

The net profit margins shown in Figure 5.2 indicate an overall sector decline in net profit margin ratios coupled with year-by-year fluctuations throughout the five-year period. Unpredictable cost movements of various utilities and inputs and the effects of initiatives by companies to contain finance costs and improve efficiencies most likely influenced the significant fluctuations in the company ratios. Despite firming of rand prices, the sector in general struggled to contain production challenges that included production disruptions, hence the failure to sustain strong net profit margins throughout the period. Pan African Resources and Sibanye-Stillwater were the only companies that returned positive margins throughout the period owing to the higher rand gold prices and adoption of operating strategies that focussed on

increasing the quality of production output, volumes and reduction of costs. Central Rand Gold had the lowest average net profit margin and AngloGold Ashanti had the second lowest average net profit margin over the period under review. The two companies are analysed below.

Central Rand Gold

By comparison, the worst performer of the analysed companies was Central Rand Gold as it reported almost no net income in 2015 of R25 520 and negative net incomes on each of the other four years of the five-year period. Its poor performance was influenced by failure to stabilise and maintain production on operations owing to a variety of challenges that also resulted in higher operating costs because of incurred costs despite low productivity. The challenges included plant unavailability leading to complete loss of gold production, major plant upgrades and lower production and subsequent suspension of underground mining at CMR due to rising water levels and open pit-mining disruption at Slots 5, 6 and 7 due to high rainfalls (Central Rand Gold Limited, 2012-2016). Compounding the increases in costs the company's revenues decreased by 50% from R140m in 2013 to R71m in 2016. The company's net profit margins were noticeable lower than its gross profit margins.

AngloGold Ashanti

AngloGold Ashanti's net profit margin fluctuated year-by-year alternating between positive and negative ratios underpinned by fluctuations in both its revenues and net earnings. The company's net profit margins were lower compared to its gross profit margin. The significant drop in net margin in 2013 was caused by a combination of higher production costs mainly at its Mponeng mine in South Africa and Obuasi mine in Ghana and decline in gold price that resulted in lower revenue and net income (AngloGold Ashanti Limited, 2013). The fluctuating net profit margin ratios continued through the period as the company struggled to maintain consistent production levels and contain costs.

5.3.3 Return on equity ratio

Figure 5.3 shows the comparison of the analysed companies' return on equity ratios between 2012 and 2016. The right axis is labelled in red and the company related

to it is Central Rand Gold only because of its too high ratios that are not comparable to the other companies.

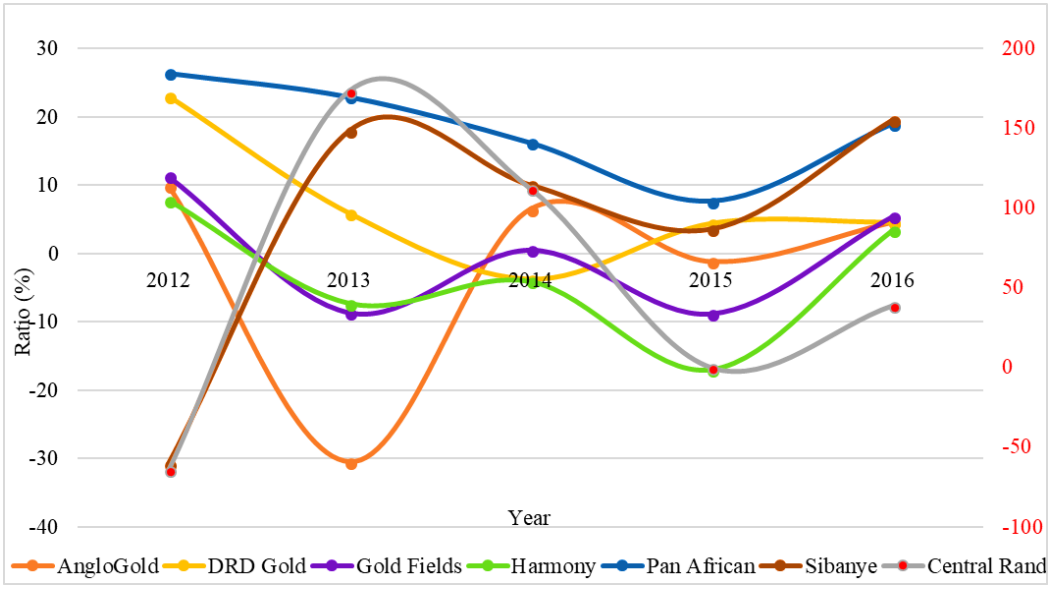


Figure 5.3: Return on equity ratios for gold companies

The ROE trends of the companies were similar to those of net profit margin for the five-year period as seen in Figure 5.3 and were characterised by alternating positive and negative movements year by year. Despite the fluctuations, the ratios in general declined between 2012 and 2015 before significantly recovering in 2016, which improved the average ratios for the period under review. Only Pan African Resources with 18% had an average ROE ratio above the recommended minimum ratio range of 9% to 12%. The declining trend indicates the companies were struggling to provide a return on shareholders' investment as costs eroded net incomes and shareholders' equity weakened. Pan African Resources and Sibanye-Stillwater were the only companies to have ratios meeting the recommended standard of 9% - 12% at some point in the five years. Pan African Resources achieved the standard in 2012, 2013, 2014 and 2016 whilst Sibanye-Stillwater achieved it in 2013, 2014 and 2016. Central Rand Gold had the lowest average ROE ratio and is analysed below.

Central Rand Gold

Central Rand Gold had by comparison the worst ROE ratios as its net income and equity decreased. Its high ratios in 2013, 2014 and 2016 were a reflection of

negative net income and negative shareholders' equity on its balance sheet. Because of the complete debt leverage the company offered no return on its shareholders' investment. The low net incomes between 2012 and 2014 and in 2016 due to production challenges and increasing costs resulted in the company taking up debt funding to sustain operations. The company raised funding through a convertible loan offer of US$7.25m, then through an open offer raised a further US$2.2m and finally undertook bridge funding through convertible securities and warrant issuance (Central Rand Gold Limited, 2012-2015). Without significant increases in revenues and net earnings, the company raised more funding to sustain operations and replace equipment through another share issue in 2016. Central Rand's poor performance supports the findings on its net profit margin performance.

5.3.4 Return on assets ratio

Figure 5.4 shows the comparison of return on assets of the analysed companies over the period, 2012 to 2016. The right axis is labelled in red and the company related to it is Central Rand Gold only because of its too high ratios that are not comparable to the other companies.

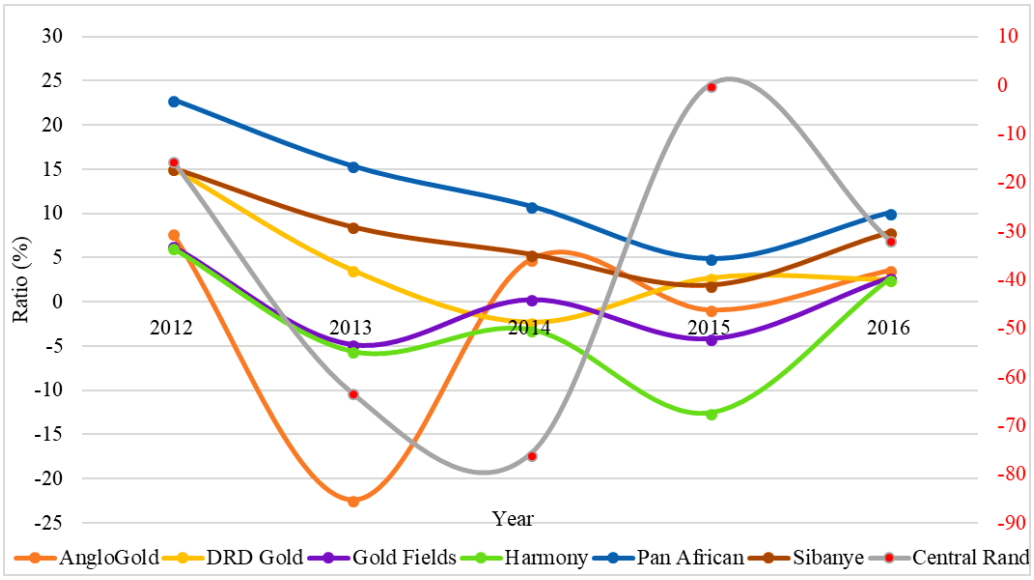


Figure 5.4: Return on asset ratios for gold companies

Despite all companies having steady asset balances over the analysis period, they had fluctuating return on asset ratios as shown in Figure 5.4 with the years 2013, 2014 and 2015 being the most challenging as the companies recorded their lowest

ratios. The companies' poor ROA ratio performances supports findings on their ROE and net profit margin ratios performances. The overriding trend shows ROA ratios gradually declining from 2012 to 2015 before recovering in 2016. The industrial gold sector strikes in 2013 and 2014 and their residual impact, the effect of new wage structures in 2015 and the overall above inflation cost increases of utilities and services, adversely affected all companies' net incomes resulting in lower ROA ratios. Pan African Resources and Sibanye-Stillwater showed resilience throughout the period as they maintained positive ratios whilst Central Rand Gold's negative ratios showed impending financial failure.

5.3.5 Summary of gold companies' profitability performance

The profitability ratios showed similar trends over the course of the five years as revenues and net earnings decreased. Most of the companies exhibited weakening profitability over the first four years before an upturn in 2016 that may indicate recovery of earnings or may be just another fluctuation. Overall, the industry's profitability performance decreased over the period under review. This mean the companies struggled to generate enough revenues to sustain profitability. The influence of gold price on gold companies' profitability performance is tested using the Pearson correlation coefficient below.

5.3.6 Correlation analysis of profitability ratios against gold price

Table 5.2 shows the Pearson correlation coefficients of the analysed companies' profitability ratios against gold prices over the period 2012 to 2016. The companies' profitability ratios showed high positive correlation to gold prices as shown in Table 5.2. This shows that gold price was a driver of profitability for the gold mining companies during the period under review.

Table 5.2: Pearson correlation coefficients of profitability ratios against gold prices

Company/Ratio	Gross Profit Margin	Net Profit Margin	Return on Equity	Return on Assets
AngloGold	0.8	-0.0	0.0	0.1
Central Rand	-0.4	0.3	-0.3	0.0
DRD Gold	0.7	0.8	0.9	0.9
Gold Fields	0.9	0.6	0.6	0.6
Harmony	0.7	0.7	0.7	0.7
Pan African	0.9	0.8	0.9	1.0
Sibanye	0.5	0.9	-0.7	1.0
Sample mean	**0.6**	**0.6**	**0.3**	**0.6**

5.4 Liquidity ratios

5.4.1 Current ratio

Figure 5.5 shows comparisons of current ratios of the analysed companies between 2012 and 2016.

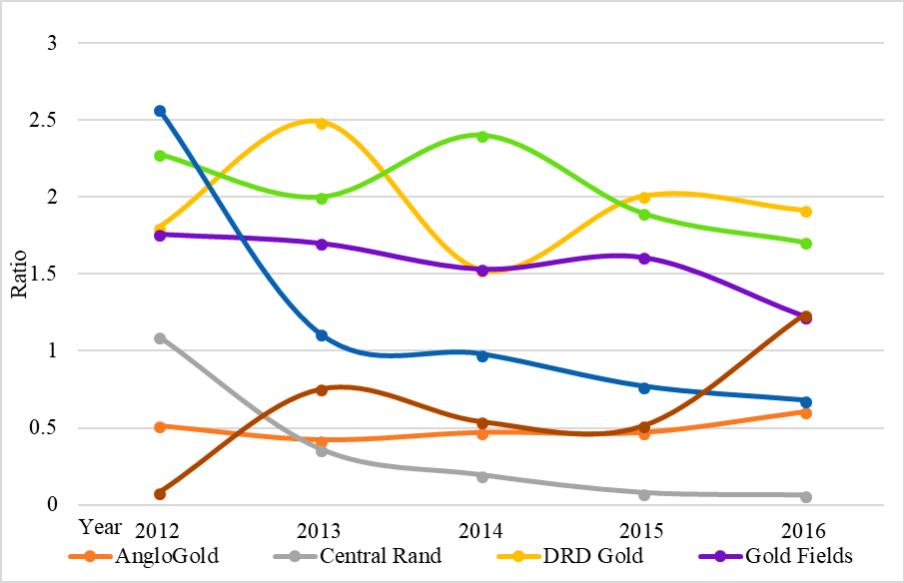


Figure 5.5: Current ratios for gold companies

The companies exhibited differing current ratio levels that were characterised by varying degrees of fluctuations over the five-year period as shown in Figure 5.5. Although the overall trend was negative, the ratios' volatility offered no clear indication of future direction. The weakening retained earnings and increase in current liabilities seems to suggest a debt bias of the balance sheet. Two companies

exhibited ratios above or near the generic standard value of two, which are DRD Gold and Harmony Gold an indication of their satisfactory capability to meet short-term financial obligations. Pan African Resources had progressive decline in current ratios, Central Rand Gold by comparison had the lowest current ratio and Gold Fields had relatively consistent current ratios over the five-year period. The three companies are further analysed below.

Pan African Resources

Pan African Resources' current ratios were strong in 2012 when current assets were more than double current liabilities but progressively weakened as increase in current liabilities outpaced current assets between 2014 and 2016 with current assets increasing by 3% and current liabilities increasing by 48%, respectively. The increase in current liabilities was mainly due to working capital funding associated with commissioning and construction of its BTRP and ETRP operations (Pan African Resources Plc, 2014; 2015; 2016).

Central Rand Gold

Central Rand Gold's current ratios significantly declined over the period with current assets declining by 24% from R55m to R13m mostly from movements in consumables and ore stockpiles. The current liabilities increased by 422% from R51m to R215m mainly due to loan repayments and derivative liability from the US$7.25m convertible loan note from Redstone Capital Limited (Redstone). As a result, retained earnings declined by 207% from R-1 892m to R-3 915m as net income drifted further into losses (Central Rand Gold Limited, 2012; 2013; 2014; 2015; 2016). Its declining ratios were caused by overall decrease in generated cash, which increased reliance on borrowed funding.

Gold Fields

Gold Fields maintained relative consistency in its current ratios reflected by progressively increasing retained earnings. The significant decrease in current assets in 2013 was due to the unbundling process of forming Sibanye as Kloof Driefontein Complex (KDC) and Beatrix mines. The transaction was recorded on the books as assets held for sale or distribution and upon transfer the company

showed a decrease in current assets of R22 238m from R33 213m in 2012 to R10 975m in 2013 (Gold Fields Limited, 2013).

5.4.2 Quick ratio

Figure 5.6 shows the comparison of the analysed companies' quick ratios between 2012 and 2016.

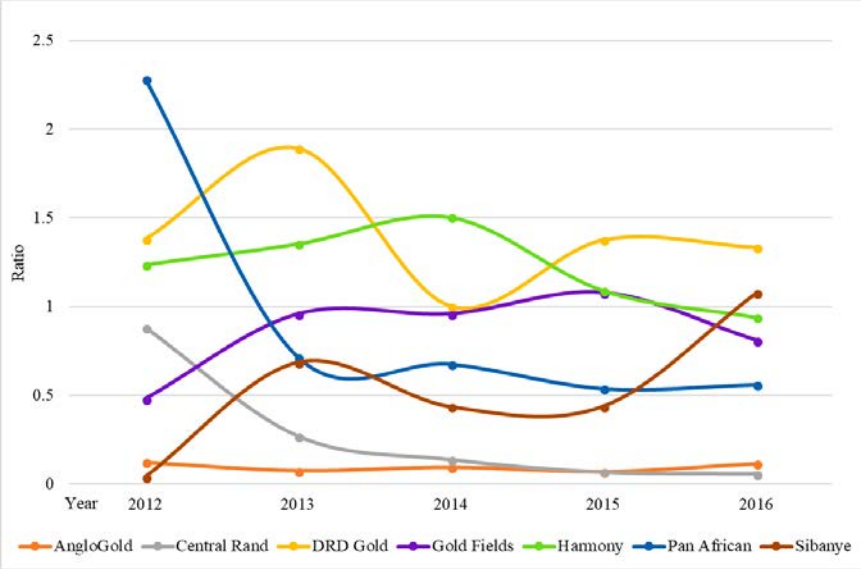


Figure 5.6: Quick ratios for gold companies

As can be seen in Figure 5.6, the companies' quick ratios displayed similar trends by their current ratios (Figure 5.5) over the period. The decreasing quick ratios indicate the declining cash balances within most of the companies' balance sheets observable in liquid asset trends. The companies that had increasing retained earnings showed better ratios compared to those that had weakening retained earnings. DRD Gold, Harmony Gold and Pan African Resources had average quick ratios near or above the standard value of one an indication that they have satisfactory liquid assets to meet short-term financial obligations. The two companies, DRD Gold and Harmony Gold that had current ratios above two also had quick ratios above one. AngloGold Ashanti had the lowest average quick ratio of 0.10 and is further analysed below.

AngloGold Ashanti

AngloGold Ashanti displayed low ratios over the period which is a reflection of its decreasing retained earnings and cash and cash equivalents whilst its current

liabilities remained relatively constant. Its retained earnings decreased by -74% from R10 828m to R-136m and cash and cash equivalents declined from R831m to R607m in 2012 and 2016 respectively (Anglo American Platinum Limited, 2012-2016). Its low quick ratio performance supports the findings on its current ratio performance.

5.4.3 Working capital

Figure 5.7 shows the analysed companies' working capital comparisons for the period 2012 to 2016.

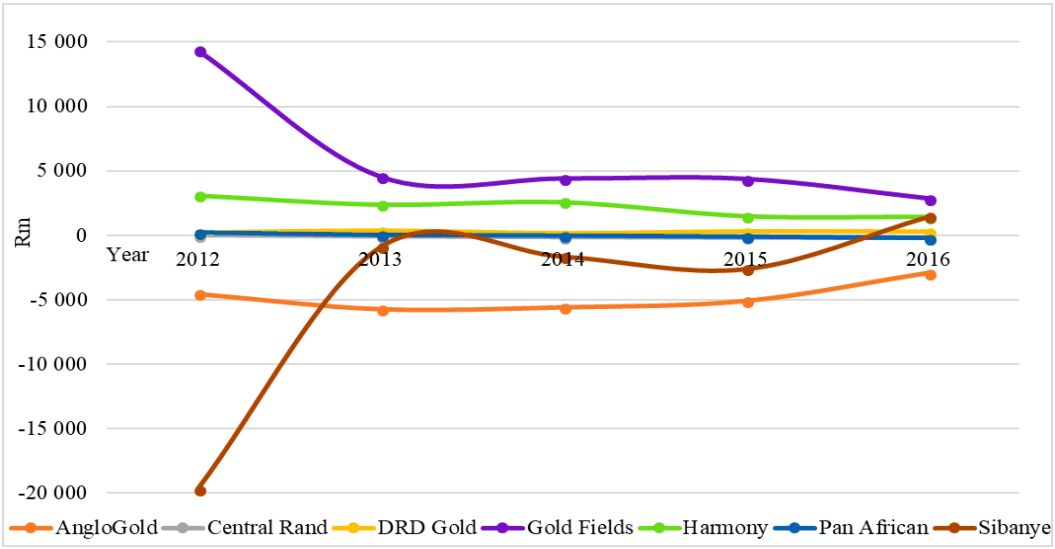


Figure 5.7: Working capital for gold companies

The effect of escalating costs and lower production rates in the gold sector resulted in lower net incomes and consequently less free cash to fund day to day operational activities. The tight cash flows were reflected by low available working capital as shown in Figure 5.7. Because working capital is not a ratio but an absolute, comparisons of averages and yearly figures can be misguiding. DRD Gold, Gold Fields, and Harmony Gold maintained positive working capitals throughout the five years whilst the rest, for the most part, maintained negative working capital balances. Gold Fields had the highest working capital average and Sibanye had the second lowest working capital average over the five-year period. The two companies are analysed below.

Gold Fields

After the tragic fire at Ya Rona shaft, strikes in 2012 and challenges at Damang and South Deep in 2013 had caused significant decrease in production whilst raising costs, Gold fields changed its strategy to focus on high margin mines and enhance cost efficiencies resulting in higher revenues and consistent working capital. The positive working capital performance supports findings on its good gross profit margin performance.

Sibanye-Stillwater

Sibanye-Stillwater had negative working capital for four of the five years owing to the high debt burden it inherited from the unbundling process. Sustained revenue increases and positive margins ensured the company progressively increased its cash balance, reducing the negative retained earnings balance and reducing current liabilities by 71% from R21 428m in 2012 to R6 236m in 2016 (Sibanye Gold Limited, 2012; 2016). The company's performance supports findings on its solid ROE ratio performance.

5.4.4 Summary of gold companies' liquidity performance

The analysed companies exhibited mixed liquidity in the different ratios over the period under review. Two companies had current ratios higher than two, three companies had quick ratios higher than one and three companies had positive working capital. Working capital was strained a reflection of the companies' tight earnings margins as companies struggled with escalating costs. The declining trend in liquidity suggests the companies' capability to cover short term obligations maybe short lived unless cash generation is improved. Overall, the industry's liquidity performance was poor with indications of further decline over the period under review. This mean the companies did not maintain enough financial assets to fulfil short-term financial obligations. The influence of gold price on gold companies' liquidity performance is tested using the Pearson correlation coefficient below.

5.4.5 Correlation analysis of liquidity ratios against gold price

Table 5.3 shows the Pearson correlation coefficients of the analysed companies' liquidity ratios against gold prices over the period 2012 to 2016.

Table 5.3: Pearson correlation coefficients of liquidity ratios against gold prices

Company/Ratio	Current ratio	Quick ratio	Working capital
AngloGold	-0.0	0.6	-0.1
Central Rand	1.0	1.0	0.9
DRD Gold	0.1	0.3	-0.2
Gold Fields	0.6	-0.9	0.9
Harmony	0.5	0.2	0.8
Pan African	0.9	0.9	0.9
Sibanye	-0.6	-0.6	-0.9
Sample mean	**0.3**	**0.2**	**0.4**

The companies' liquidity ratios showed high positive correlation to gold prices as shown in Table 5.3. This shows that gold price was a driver of liquidity performance in gold mining companies during the period under review.

5.5 Solvency ratios

5.5.1 Debt to equity ratio

Figure 5.8 shows the comparison of debt to equity ratios of the analysed companies between 2012 and 2016.

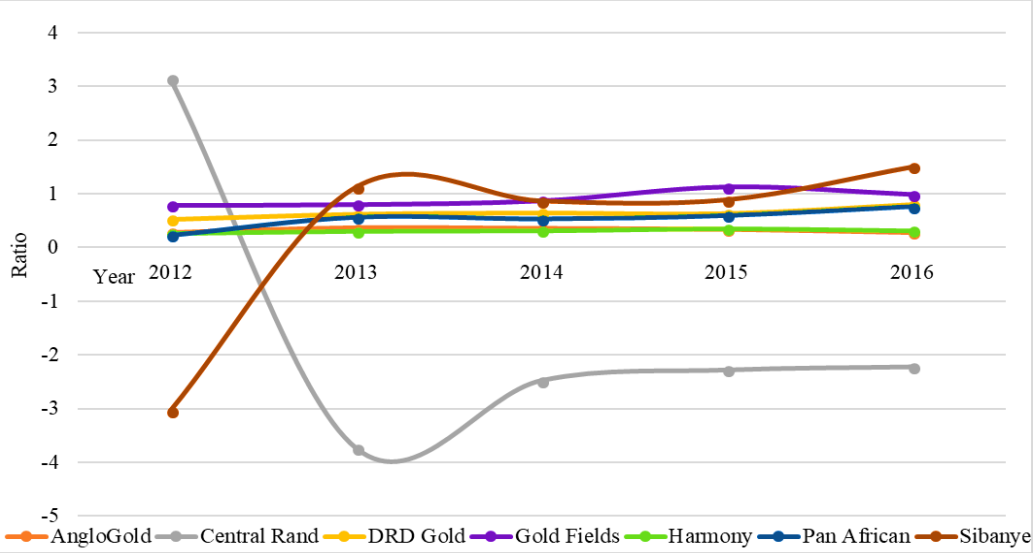


Figure 5.8: Debt to equity ratios for gold companies

In general, more companies had consistent ratios for most of the period under review as shown in Figure 5.8. Based on the generic safe level of debt to equity

ratio value of one or less than one, all the companies had safe debt to equity ratios except for Central Rand Gold which had a negative ratio. The companies' ratios low debt to equity ratios indicate they have low debt leverage and have satisfactory capability to fulfil debt obligations using equity. Gold Fields had the highest average debt to equity ratio of 0.91 and Central Rand Gold had the lowest average debt to equity ratio of -1.52. The two companies are analysed below.

Central Rand Gold

Central Rand Gold's negative ratios were caused by the high debt leveraging of its balance sheet shown in its negative shareholders' equity and increasing liabilities. The company continually borrowed against its equity to sustain operations whilst revenues and net earnings drifted further into losses. This poor performance supports the findings on its ROE performance.

Gold Fields

Gold Fields sustained relativity in shareholders' equity and total liabilities. This it achieved by containing debt and prioritising its use and supporting shareholders' equity value by maintaining retained earnings.

5.5.2 Debt to asset ratio

Figure 5.9 shows the comparison of debt to asset ratios of the analysed companies between 2012 and 2016.

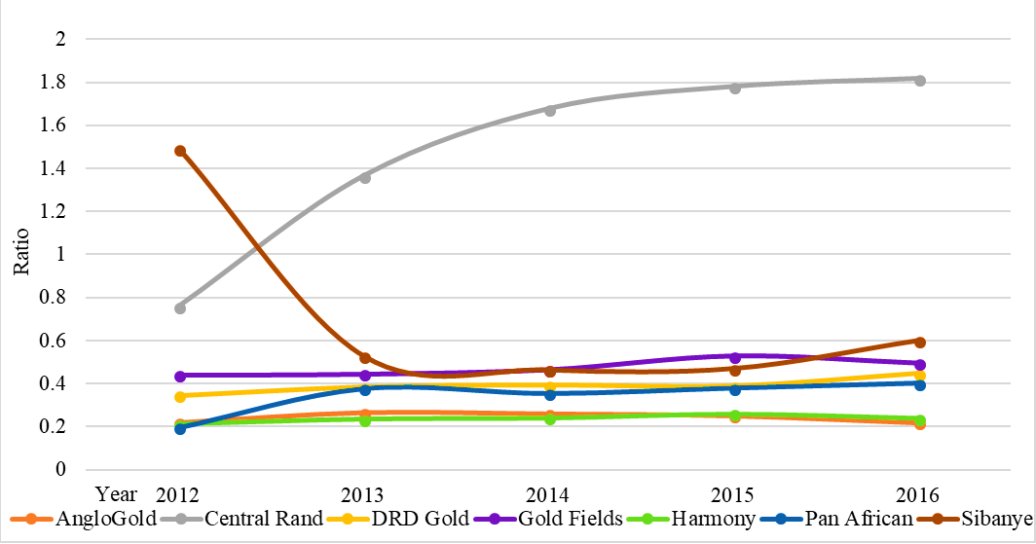


Figure 5.9: Debt to asset ratios for gold companies

The relatively consistent debt to asset ratios exhibited by most of the companies shown in Figure 5.9 reflects the overall industry focus of maintaining debt commitments at levels that are proportionate to specific levels of asset balances. Debt to asset ratios of 0.5 or lower signify good solvency as the companies are maintaining assets that can cover debts when they are due. Two companies had average debt to asset ratios higher than the standard, Central Rand Gold with an average ratio of 1.48 and Sibanye-Stillwater with an average ratio of 0.71. Sibanye-Stillwater's 2012 debt to asset ratio was discordant because of the inherited high debt levels of its mature operations and the associated acquisition costs of unbundling from Gold Fields (Sibanye Gold Limited, 2013). The fact that Central Rand Gold's debt to asset ratios progressively increased whilst its assets remained steady throughout the five-year period is a sure indication of the company's over reliance on debt coverage to sustain operations at the expense of improving production efficiencies. Its poor debt to asset ratios are again due to the influence of its high debt. The company's poor performance supports findings on its ROA ratio performance.

5.5.3 Cash flow coverage ratio

Figure 5.10 shows the comparison of the analysed companies' cash flow coverage ratios for the period 2012 to 2016.

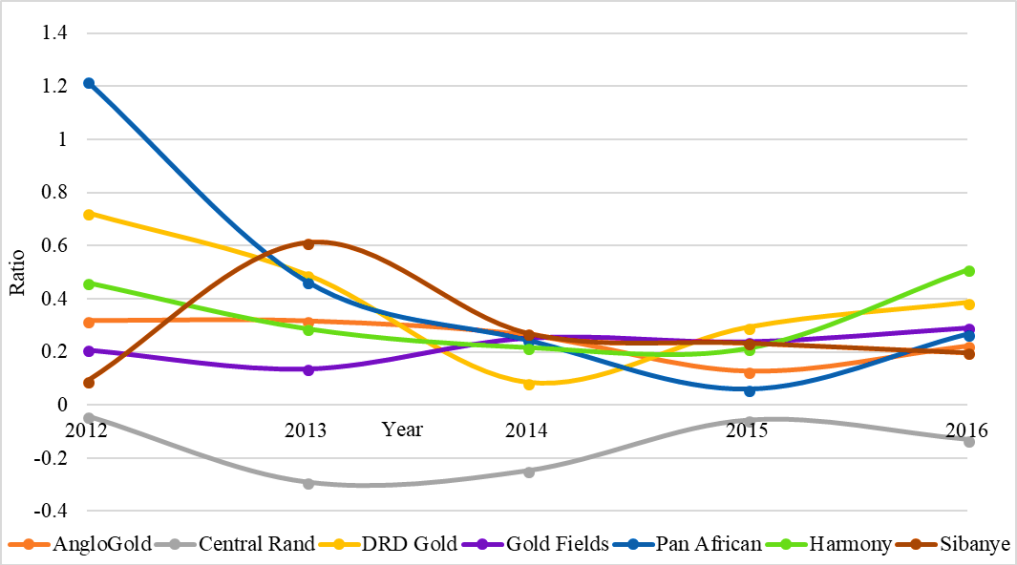


Figure 5.10: Cash flow coverage ratios for gold companies

As shown in Figure 5.10, the overriding cash flow coverage ratios trend over the five years was of a significant decline between 2012 and 2013, then a steady decrease from 2013 to 2015 before a recovery in 2016. An examination of financial statements of most of the companies indicates that the aggregate influence of both movements in operating cash flows and total liabilities caused the trend in the cash flow coverage ratios. Despite consistency in each company's exhibited ratios, their lower values against the standard value of one suggests the companies do not have enough cash flow coverage on debts. Sibanye-Stillwater showed strong performance in recovering from its 2012 ratio of 0.09 to 0.61 in 2013 but it failed to maintain that level for the rest of the period. Central Rand Gold had the lowest cashflow coverage ratios resulting in an average of -0.15 over the period. The two companies are further analysed below.

Sibanye-Stillwater

Sibanye-Stillwater had a low ratio in 2012 due to the weak cash generating positions of the mature assets it inherited and the sector strikes but turned things around in 2013 by adopting new strategies focussed on improving the quality of production volumes and increasing milling rates, resulting in higher gold output, decline in costs and higher generated cash. By the end of the period, the company had increased its operating cash flow from R2 621m to R4 932m in 2012 and 2016, respectively.

Central Rand Gold

The sustained negative ratios shown by Central Rand Gold is readily explained in terms of high debt leveraging but it can also be explained as a symptom of the company's low cash flow generating ability. Analysis of its financial statements suggests a stronger influence of cashflow generation over debt leverage, reflected in higher magnitude of volatility in net incomes compared to that in total liabilities.

5.5.4 Summary of gold companies' solvency performance

The analysed companies exhibited satisfactory levels of solvency as shown by their low debt ratios. However, cash flow coverage was low, which is an indication of the combined effect of the companies' low generated cash and increasing liabilities. Overall, the industry's solvency performance was satisfactory over the period under

review. This mean that the companies are capable of meeting their long-term debt obligations when they are due using their equities and assets. The influence of gold price on gold companies' solvency performance is tested using the Pearson correlation coefficient below.

5.5.5 Correlation analysis of solvency ratios against gold price

Table 5.4 shows the Pearson correlation coefficients of the analysed companies' solvency ratios against gold prices over the period 2012 to 2016.

Table 5.4: Pearson correlation coefficients of solvency ratios against gold prices

Company/Ratio	Debt to Equity	Debt to Asset	Cash Flow Coverage
AngloGold	-0.4	-0.4	0.8
Central Rand	0.8	-1.0	0.2
DRD Gold	-0.7	-0.7	0.8
Gold Fields	-0.8	-0.8	-0.5
Harmony	-0.9	-1.0	0.5
Pan African	-0.8	-0.9	1.0
Sibanye	-0.9	0.9	-0.1
Sample mean	**-0.5**	**-0.5**	**0.4**

The companies' debt to equity and debt to asset ratios showed high negative correlation to gold prices and cash flow coverage ratios showed high positive correlation to gold price as shown in Table 5.4. This mean that gold price was a driver of solvency performance in gold mining companies over the period under review.

5.6 Activity ratios

5.6.1 Asset turnover ratio

Figure 5.11 shows the comparison of the analysed companies' asset turnover ratios for the period 2012 to 2016. Assets were largely steady over the period and the relative fluctuations in the asset turnover ratios shown in Figure 5.11 can be attributed to more pronounced movements in the companies' revenues due to fluctuations in prices and sales volumes. The absence of sustained similarity in the company trends indicates the differing influences of sales volumes and asset bases

on each company.

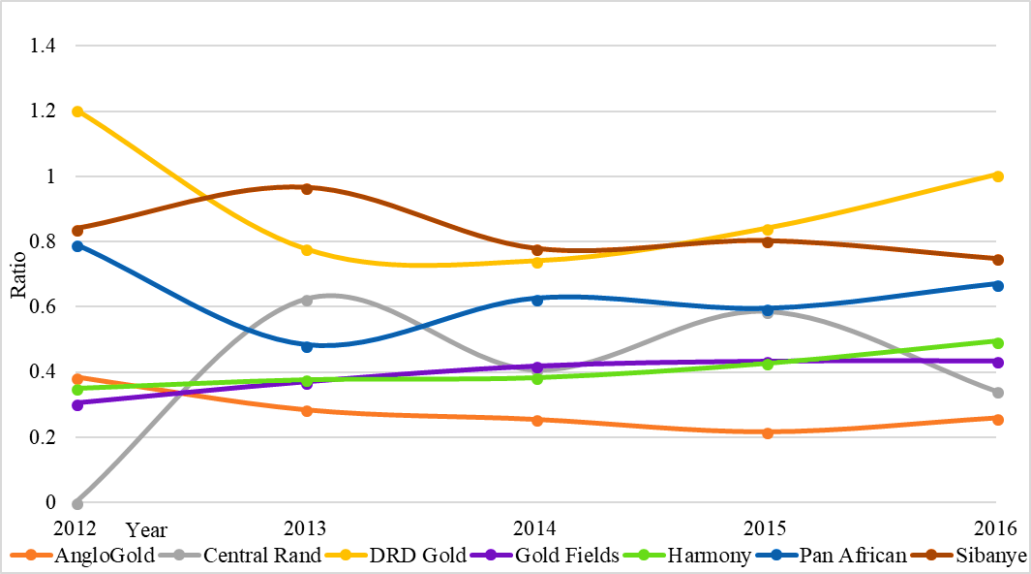


Figure 5.11: Asset turnover ratios for gold companies

Pan African Resources had consistent fluctuations as both revenues and total assets moved year by year. Major capital investments had mismatched influence on balance sheets, for example, the acquisition of Evander mines in 2013 immediately increased operating and capital costs from deepening of its shaft whilst the resultant revenue benefit was only realised the following year. Despite DRD Gold having corresponding movements in revenues and total assets, revenues on aggregate moved in the positive direction whilst total assets moved in the negative direction resulting in the increase in asset turnover between 2014 and 2016.

5.6.2 Fixed asset turnover ratio

Figure 5.12 shows the comparison of the analysed companies' fixed turnover ratios between 2012 and 2016. As shown in Figure 5.12 the companies had differing fixed asset turnover ratios that had minimal fluctuations over the five years. Just like the companies' total assets, the fixed assets were relatively steady compared to revenue movements especially after 2013. Fixed asset turnover ratios were relatively higher compared to asset turnover ratios, an indication that the companies were deriving more value from their fixed assets than from their total assets. Central Rand Gold's fluctuating high turnover ratios indicate the combined influence of its inconsistent revenues because of challenges in maintaining consistent production and its

continually decreasing fixed assets.

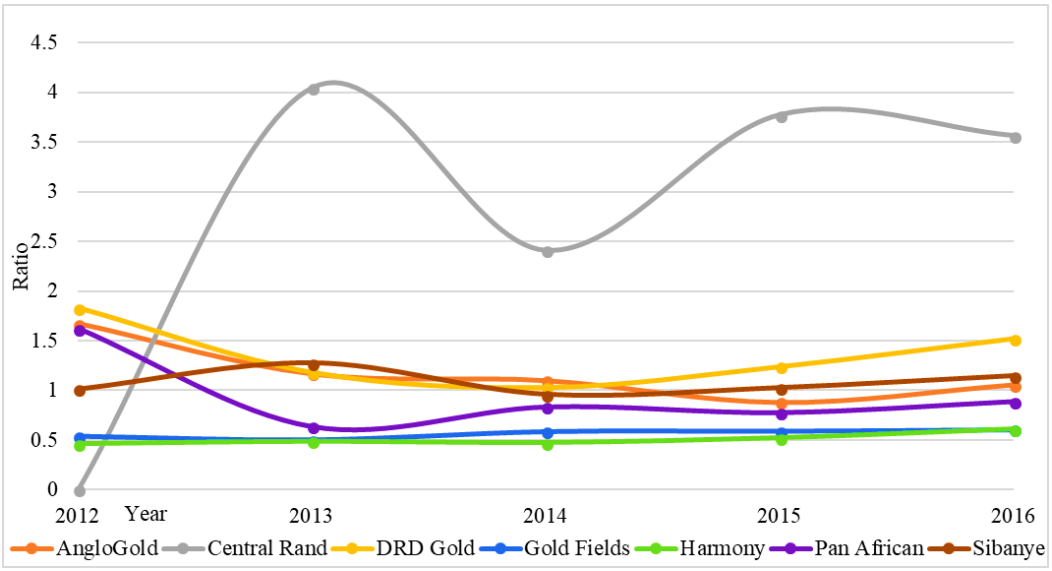


Figure 5.12: Fixed asset turnover ratios for gold companies

Although both Gold Fields and Harmony Gold's flat turnover trends reflect consistency in fixed asset efficiencies due to the influence of corresponding movements in revenues and fixed assets, they also highlight the companies' struggles with cost management and production efficiencies.

5.6.3 Inventory turnover ratio

Figure 5.13 shows the inventory turnover ratio comparison of the analysed companies for the period 2012 to 2016.

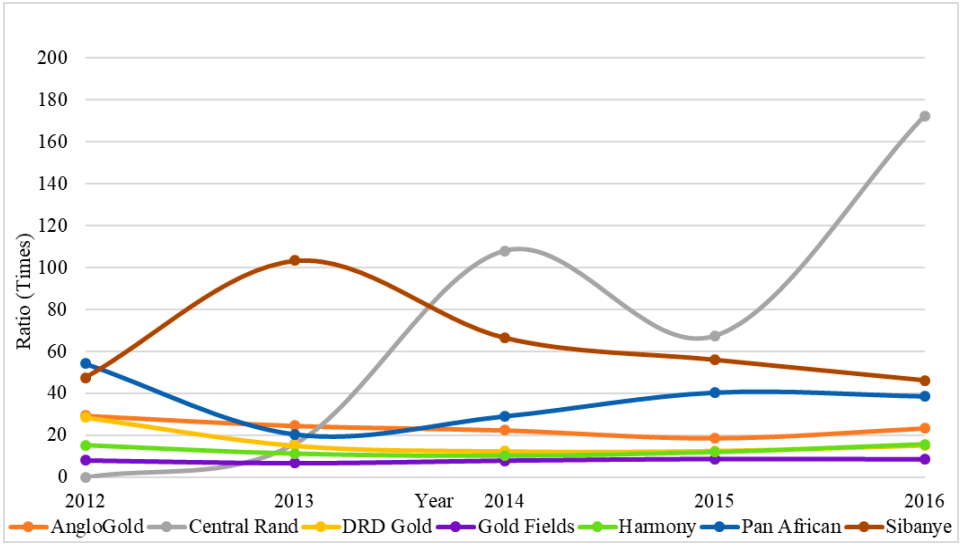


Figure 5.13: Inventory turnover ratios for gold companies

Just like the other turnover ratios, the companies' inventory turnover ratios differed per company as shown in Figure 5.13 but were relatively steady throughout the period. Good inventory turnover ratios are driven by improving revenues and not decreasing inventories. Central Rand Gold had high turnover ratios, a reflection of its poor cash generation capability as they were driven by decreasing inventories and not increasing revenues. Pan African Resources had strong inventory turnover ratios for the period, driven by increases in revenues. Although it has low inventory levels, without a standard reference or understanding of the company's inventory management strategy, it is difficult to determine if it is of concern.

5.6.4 Summary of gold companies' activity performance

The analysed companies exhibited differing levels of turnover in all the ratios with asset and fixed turnover ratios showing more consistency per company than inventory turnover ratios. Inventory ratios also showed wider differences in operating levels attributable to the different inventory management strategies the companies use. Overall, the industry's activity performance was satisfactory over the period under review. The industry activity performance indicates the companies are efficiently utilising their assets to generate earnings. The influence of gold price on gold companies' activity performance is tested using the Pearson correlation coefficient below.

5.6.5 Correlation analysis of activity ratios against gold price

Table 5.5 shows the Pearson correlation coefficients of the analysed companies' activity ratios against gold prices over the period 2012 to 2016.

Table 5.5: Pearson correlation coefficients of activity ratios against gold prices

Company/Ratio	Asset Turnover	Fixed Assets Turnover	Inventory Turnover
AngloGold	1.0	1.0	1.0
Central Rand	-0.7	-0.8	-0.7
DRD Gold	0.7	0.7	0.9
Gold Fields	-1.0	-0.7	-0.4
Harmony	-0.7	-0.5	0.4
Pan African	0.5	0.8	0.4
Sibanye	0.4	0.0	0.0
Sample mean	**0.0**	**0.1**	**0.2**

The analysed companies' activity ratios showed both high negative and positive correlation to gold price as shown in Table 5.5. This mean that gold price was a driver of activity performance in gold mining companies during the period under review.

5.7 Market ratios

5.7.1 Share price

Figure 5.14 shows the comparison of share prices for the analysed companies between 2012 and 2016. The right axis is labelled in red and the companies related to it are is AngloGold, Gold Fields and Harmony Gold only because of their too high ratios that are not comparable to the other companies.

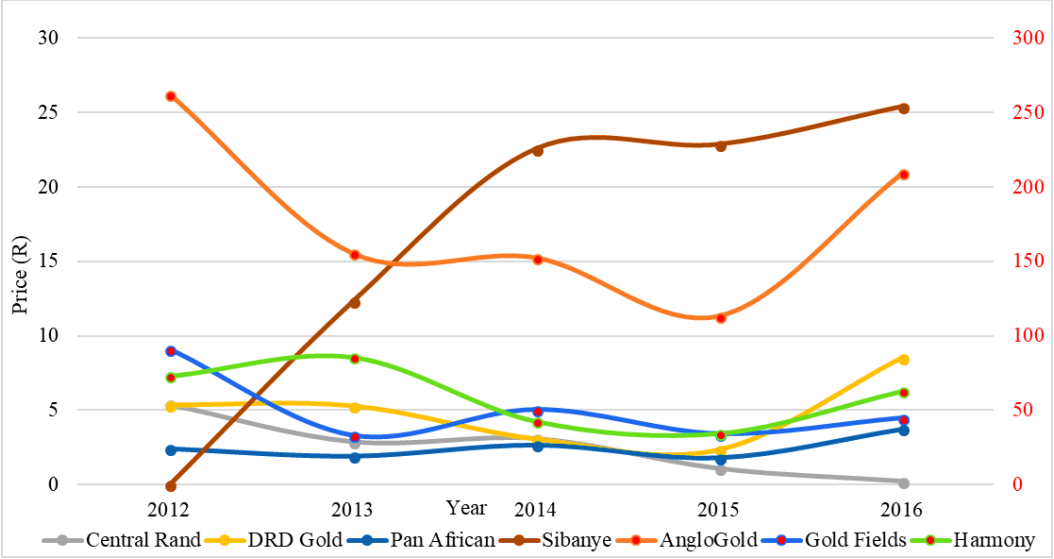


Figure 5.14: Share prices of gold companies

The analysed companies displayed differing share price levels as shown in Figure 5.14. AngloGold Ashanti had the highest share price overall and year-by-year with an average share price of R178.43. Pan African Resources had the lowest average share price of R2.51 over the period. Movements in net incomes influenced share price movements.

5.7.2 Earnings per share ratio

Figure 5.15 shows the comparison of the analysed companies' earnings per share ratios between 2012 and 2016.

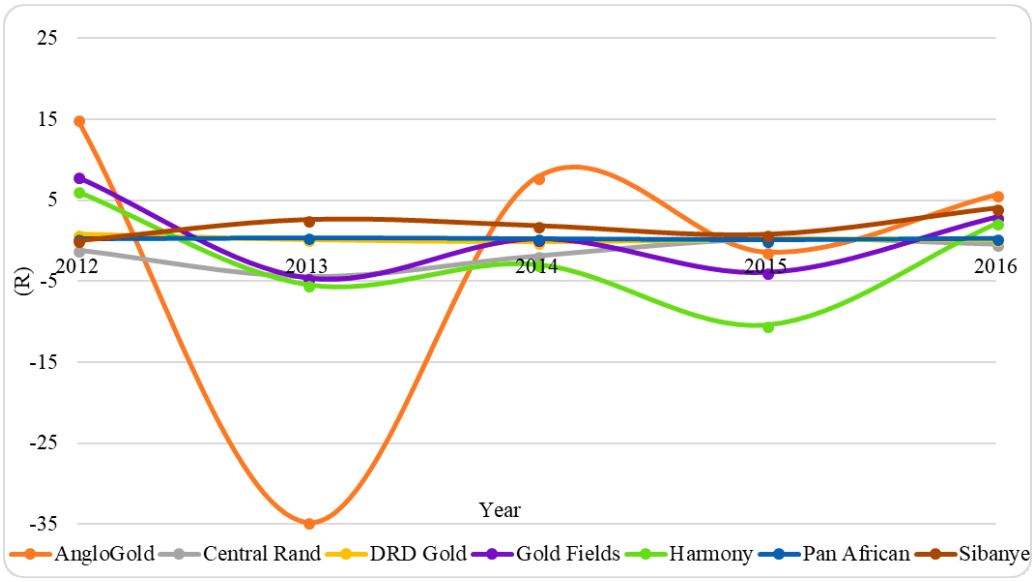


Figure 5.15: Earnings per share ratios for gold companies

Most of the companies returned negative EPS ratios at least once over the five-year period as shown in Figure 5.15. This is an indication the difficulties companies had in maintaining profitability. With overall consistent share levels, changes in EPS ratios were dependent on the companies' net earnings. DRD Gold, Gold Fields, Pan African Resources and Sibanye-Stillwater returned on average positive EPS ratios over the period, but only Pan African Resources and Sibanye-Stillwater returned positive EPS ratios each year. Pan African Resources and Sibanye-Stillwater's earnings performance can be attributed to better management of their asset portfolios in terms of costs containment and production efficiencies. Harmony Gold had the lowest average EPS ratio of R-2.10 and AngloGold Ashanti had the second worst average EPS ratio of R-1.54. These companies are analysed below.

Harmony Gold

Harmony Gold's poor performance was driven by operational challenges that caused increases in production costs despite steady increase in revenues. Sustained decreases in earnings between 2013 and 2015 resulted in the company drifting into loss making as multiple operations experienced disruption from strikes and increasing safety stoppages. The company recovered in 2016 at the back of increased production and gold output and rand gold price offset by increases in operating costs.

AngloGold Ashanti

AngloGold Ashanti had alternating years of negative and positive EPS ratios as it struggled to maintain steady production and hence revenues. The sharp drop in EPS in 2013 was due to a combination of lower gold price, higher production and increase in operating costs due to huge impairment losses resulting in a sharp decrease into negative net earnings.

5.7.3 Price to earnings ratio

Figure 5.16 shows the comparison of price to earnings ratios of the analysed companies between 2012 and 2016.

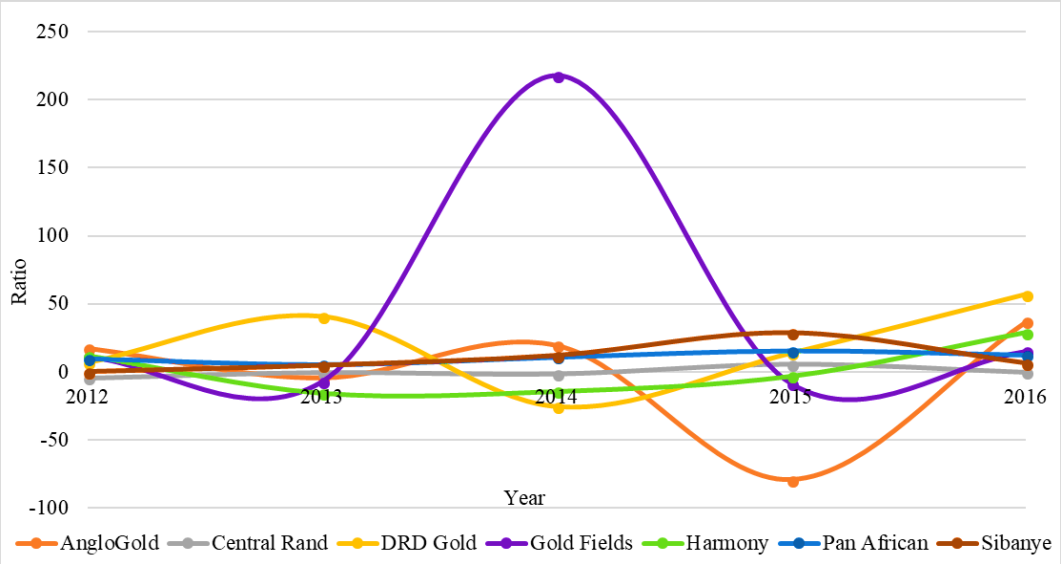


Figure 5.16: Price to earnings per share ratios for gold companies

As shown in Figure 5.16, the price to earnings ratios differed over the period influenced by inconsistent earnings. The inconsistent performance adversely influenced market sentiments resulting in an overall decline in share prices. Harmony Gold's 2014 spike in P/E ratio was a result of a spike in its share price and low earnings most likely because of market over confidence as the company recovered from its poor performance of 2013.

5.7.4 Book value per share ratio

Figure 5.17 show comparison of the analysed companies' book value per share ratios between 2012 and 2016.

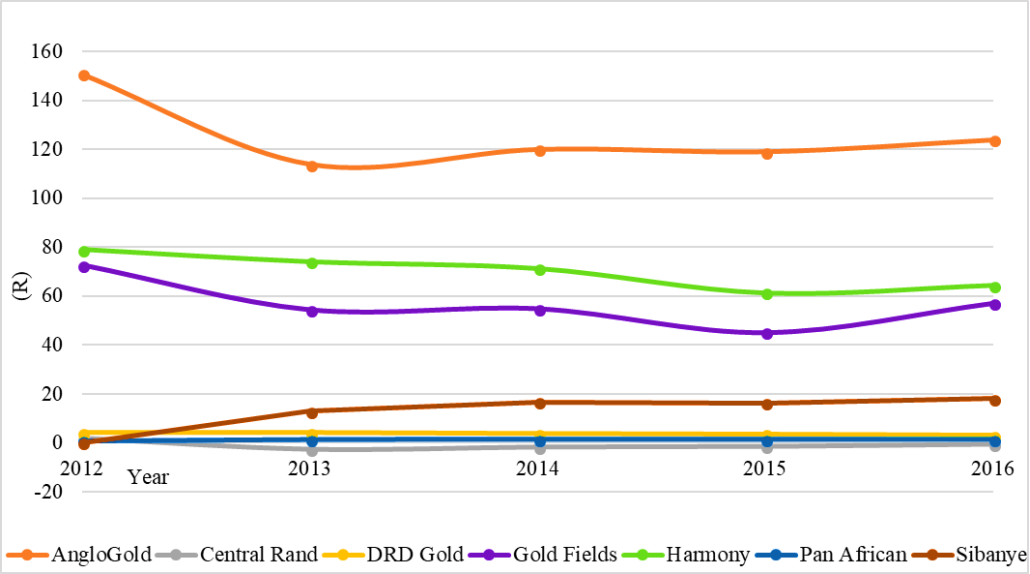


Figure 5.17: Book value per share ratios for gold companies

The companies had differing BV ratios as shown in Figure 5.17, characterised by relative stability from 2013 to 2015 and hints of increase in 2016. AngloGold Ashanti had the highest BV ratios owing to its strong shareholder equity value a reflection of its strong asset base. Central Rand Gold had the weakest BV ratio, negative from 2013 to 2016 due to its negative equity shareholding as its liabilities exceeded its assets. Weak BV ratios indicate low value to shareholders in the event of company failure.

5.7.5 Summary of gold companies' market performance

Market performance of the analysed companies was mixed and followed the companies' overall profitability trends of weakening and fluctuating ratios. Market sentiments largely responded to company performances except for AngloGold where the market confidence remained strong despite the company's varying performances. Overall, the industry's market performance was poor over the period under review. The influence of gold price on gold companies' market performance is tested using the Pearson correlation coefficient below.

5.7.6 Correlation analysis of market ratios against gold price

Table 5.6 shows the Pearson correlation coefficients of the analysed companies' market ratios against gold prices over the period 2012 to 2016.

Table 5.6: Pearson correlation coefficients of market ratios against gold prices

Company/Ratio	Earnings per share	Price to earnings	Book value per share	Share price
AngloGold	0.1	0.4	0.8	0.8
Central Rand	-0.3	-0.8	0.7	0.9
DRD Gold	0.8	-0.1	0.7	0.2
Gold Fields	0.6	-0.2	0.9	0.8
Harmony	0.7	0.1	0.9	0.7
Pan African	0.4	-0.6	-0.9	-0.1
Sibanye	-0.5	-0.8	-1.0	-1.0
Sample mean	**0.3**	**-0.3**	**0.3**	**0.3**

The market ratios of the analysed companies showed high positive correlation to gold prices except for P/E ratios that showed high negative correlation to gold prices. This mean that gold price was a driver of market performance of gold mining companies during the period under review.

5.8 Comparison of gold price in USD against Rand

Figure 5.18 shows the comparison of the gold price in USD/oz against the price in Rand/oz between 2012 and 2016.

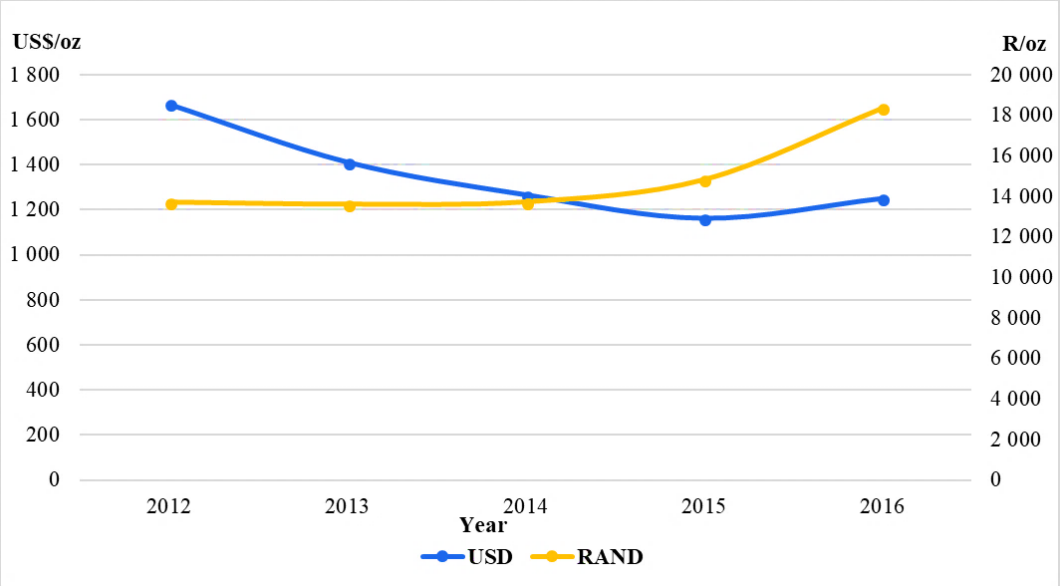


Figure 5.18: Gold price: USD against Rand

As shown in Figure 5.18, the USD price steadily decreased between 2012 and 2015

before recovering in 2016 whilst the Rand price consistently increased over the period, albeit marginal between 2012 and 2014. The USD price waned in response to decline in both supply and demand as the global economy slowed down. Rising costs, labour demands in some producer countries like South Africa, Chinese economic slowdown, lower investments in exploration and new mines as finance tightening was implemented and the increasing depth of economically viable ore significantly contributed to the weakening supply (ThisisGold, 2015b). The recovery at the end of the period was significantly driven by improved investment in the metal as a safe-haven considering global economic and political uncertainties and at times the weakening of the USD. The progressive decline in performance of the sector despite the strengthening exchange rate increase may indicate its limited influence as compared to other factors.

5.9 Failure prediction analysis of the gold mining companies

The Altman Z"-score analysis is done to confirm the findings in ratio analysis and to predict financial failure of the companies and its possible implications. Table 5.7 shows the Z"-scores of the analysed companies between 2012 and 2016.

Table 5.7: Gold companies Z"-scores

Company/Year	2012	2013	2014	2015	2016	Mean	Zone
AngloGold	4.0	2.1	2.7	2.5	3.6	3.0	**Safe**
Central Rand	-26.8	-40.8	-51.3	-66.8	-69.9	-51.1	**Distress**
DRD Gold	-0.1	-0.5	-1.9	-0.9	-1.6	-1.0	**Distress**
Gold Fields	3.4	2.4	2.8	2.6	2.7	2.8	**Safe**
Harmony	5.0	3.5	3.4	1.8	3.5	3.4	**Safe**
Pan African	9.0	4.3	4.3	3.6	3.9	5.0	**Safe**
Sibanye	-7.8	-0.1	0.4	-0.2	1.2	-1.3	**Distress**

The results in Table 5.7 show that companies maintained consistent health statuses throughout the period. The Z"-scores were either in the safe zone or in the distress zone. The financial health of each company is interpreted in the following Sub-sections.

5.9.1 AngloGold Ashanti

AngloGold Ashanti's safe health classification supports findings of its ratio analysis in the company's overall good ratios, despite drifting into loss making in 2013 and

2015. The year by year Z"-scores correspond to the company's profitability movements. Of some concern is the company's liquidity performance, as its ratios were poor and working capital negative. The poor liquidity is also seen in the low cash and retained earnings balances on its balance sheet. In the years it was profitable the company delivered decent earnings to its shareholders and its market performance benefited from solid market confidence.

5.9.2 Central Rand Gold

Central Rand Gold's poor ratios are also confirmed by its Z"-score category of in the distress zone. The company had poor performances in almost all its financial ratios. Sustained negative earnings, increasing liabilities, negative equity are all indications of the critical state of the company financially. Without drastic intervention to increase revenues and generate earnings, the company faces imminent failure.

5.9.3 DRD Gold

On the surface, the distress classification of DRD Gold's financial health does not seem to support findings of its ratio analysis, but in the context of its five-year performance, the score is a warning of potential financial problems if the current operating model was maintained. Its ratio analysis shows satisfactory profitability, strong liquidity, serviceable debt, strong turnover and strong market sentiments but little indicators in its performance points to a different outcome. Indicators such as negative retained earnings, narrow margins, marginal increases in liabilities, marginal decreases in assets and flat revenues, cumulatively suggest the company only focusses on the short-term success with no plans for future growth or survival in the event of further downturn of the business environment.

5.9.4 Gold Fields

Gold Fields' financial health is classified as safe, a confirmation of the ratio analysis findings. The company exhibited acceptable performances in all measured indicators underpinned by sustained revenue increase, reduction in operating costs and wider earnings margins.

5.9.5 Harmony Gold

The safe health classification of Harmony Gold supports the findings in its ratio

analysis. The immediate recovery in earnings after the challenges of 2013 to 2015 indicate strong operational fundamentals within the company that bodes well for its future. Despite the poor years, the company maintained good performances in liquidity, debt coverage and turnover. Share prices confidence wobbled because of the poor performances but recovered well, an indicator that the market still had confidence in the business.

5.9.6 Pan African Resource

The safe financial health classification supports the findings in its ratio analysis. The company had solid performances in all indicators with the exception of working capital that was negative from 2014 to 2016 owing to increasing current liabilities.

5.9.7 Sibanye-Stillwater

The distress classification of Sibanye-Stillwater's financial ratio contradicts the findings in its ratio analysis because of the unique circumstance of Sibanye due to the unbundling of Gold Fields' assets into Sibanye-Stillwater. The classification is more a reflection of the restructuring and consolidation process during and after the unbundling from Gold Fields that left the company with an inheritance of high liabilities, negative returned earnings and low cash reserves. The solid performances of the company are observed in its ratios and are supported by the progressive improvements in the Z"-scores over the period under review.

5.9.8 Summary of failure prediction analysis of gold companies

The analysed companies exhibited sustained stable financial health with indications of possible improvement in performance. Of the companies in the distress zone, DRD Gold and Sibanye-Stillwater have potential to strengthen without major changes whilst Central Rand Gold may require complete restructuring. The Altman Z-score model correctly classified and supported the findings of the companies' ratio analysis.

5.10 Chapter summary

This chapter has presented results of the analysis of financial performance of gold mining companies using financial ratios. The analysed companies showed weakening profitability ratios as increasing costs and production challenges

pressurised earnings. Consequently, liquidity was poor as cash flow was restricted. Solvency performance was generally good except cash flow coverage ratio was low owing to lower revenue generation. Activity was solid as companies effectively utilised their assets in revenue generation. The companies' market performance was poor as earnings dwindled and the market lost confidence, depressing share prices.

A correlation was done to test the relationship between ratios and gold price. Profitability and liquidity ratios showed high positive correlation to gold price. While debt to equity and debt to asset ratios had high negative correlation cash flow coverage ratios had high positive correlation to gold price. Market ratios were mixed as share price, EPS and BV ratios showed high positive correlation and P/E ratios showed high negative correlation to gold price. Gold price was a driver of financial performance in gold mining companies during the period under review.

Failure prediction analysis was also done on the companies and it supported the findings of the companies' ratios' analysis and classified their financial health. Four companies were classified under the safe zone and three companies were classified under the distress zone.

6 COAL MINING SECTOR PERFORMANCE ANALYSIS

6.1 Chapter overview

This chapter analyses and discusses the financial performance and health of selected coal mining companies over the period 2012 to 2016. Financial performance is analysed through financial ratios and presented for comparison between companies, including determination of trends and correlation to platinum price. Lastly determination of the companies' financial health is carried out using the Altman Z"-score model to verify the observations from ratio analysis. Performance analysis is done to specific companies displaying anomalies and a general performance conclusion is given for the overall industry. All ratios presented in this chapter are shown in Appendix 10.12 to Appendix 10.16.

6.2 JSE listed coal mining companies

There are fifteen coal-mining companies listed on the JSE according to AM Investor Services SPRL (2017) and Profile Data (2017). Table 6.1 shows the listed coal companies.

Table 6.1: JSE listed coal companies

INCLUDED IN ANALYSIS	EXCLUDED IN ANALYSIS
Buffalo Coal Corporation (BUC)	African Rainbow Minerals Limited (ARM)
Exxaro Resources Limited (EXX)	Anglo American PLC (AGL)
Keaton Energy Holdings Limited (KEH)	Firestone Energy Limited (FSE)
Petmin Limited (PET)	Glencore PLC (GLN)
Wescoal Holdings Limited (WSL)	Hwange Colliery Company Limited (HWA)
	Miranda Mineral Holdings Limited (MMH)
	Resource Generation Limited (RSG)
	Sasol Limited (SOL)
	South32 Limited (S32)
	Waterberg Coal Company Limited (WCC)

Table 6.1 splits coal mining companies into two groups; one for the companies selected for analysis and the other for those excluded from analysis based on the criteria stated in Section 3.3 and the following additional explanations:

- African Rainbow Minerals Limited is a diversified commodities group involved in coal mining through its joint venture with Glencore but was

excluded for analysis due to unavailability of full segment financial data for its coal operations;

- Anglo American PLC and Glencore PLC were excluded because of their global diversity and size that distort their representation of the South African coal-mining environment;
- Firestone Energy Limited, a dually listed company on the Australian Stock Exchange (ASX) and the JSE was excluded because it was engaged in value engineering and optimisation studies for its Waterberg Project (Firestone Energy Limited, 2015). The company is also currently suspended from trading on the JSE;
- Hwange Colliery Company Limited is listed on the JSE but was excluded because its operations are in Zimbabwe;
- Miranda Mineral Holdings Limited was excluded because it is a mineral exploration and investment holding company that is engaged in the development of coalfields of KwaZulu-Natal and other interests in gold, diamonds, base and industrial minerals (Miranda Mineral Holdings Limited, 2013). The company is also currently suspended from trading on the JSE;
- Petmin Limited delisted from the JSE in June 2017 but was included because it was listed and in operation throughout the period of analysis;
- Resource Generation Limited is an emerging coal producer dually listed on the ASX and JSE. It was excluded because it is currently developing its Boikarabelo Coal Mine in the Waterberg region (Resource Generation Limited, 2016);
- Sasol Limited was excluded form analysis because of the minor contribution to the Sasol group and the lack of full segmental financial information for its mining unit;
- South32 Limited was excluded because of the minority contribution to the group of its South African coal unit; and
- Waterberg Coal Company Limited is listed on both the ASX and the JSE. It

was excluded because its core business is the exploration for coal, gold, copper, and uranium. The company is currently suspended on the JSE (Profile Data, 2017).

6.3 Profitability ratios

6.3.1 Gross profit margin ratio

Figure 6.1 shows the comparison of gross profit margin ratios of the analysed companies between 2012 and 2016.

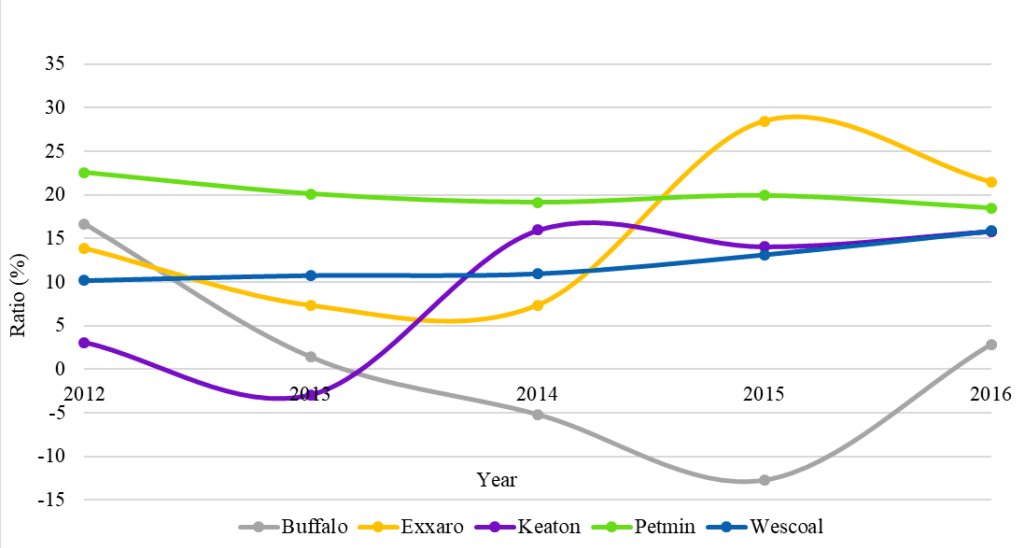


Figure 6.1: Gross profit margin ratios for coal companies

The companies showed differing gross profit margin ratios throughout the five-year period as shown in Figure 6.1, highlighting the varying impact of operational challenges on each company. Petmin and Wescoal had stable ratios driven by sustained increases in generated revenue due to increasing production and sales volumes and firm focus on cost reduction initiatives. Keaton Energy and Buffalo had at least a year of negative gross profit margin ratios in the five years, reporting average gross profit margin ratios of 9.2% and 0.6%, respectively. These companies are further analysed below.

Keaton Energy

After recovering from lower performances in the beginning of the period, Keaton Energy had equally good margins for the rest of the period. Although the company consecutively increased production in 2012 and 2013, the combined effect of lower

coal prices and increasing production costs adversely affected its revenues. The company's operating costs were influenced by the costs arising from increased production and low mining and production efficiencies. Production costs increased in 2012 because of increases in production at Vaalkrantz Colliery of 99% and at Vanggatfontein Colliery of 569%. Further increases in cost were in 2013 as Vanggatfontein Colliery increased production by 58% and the poor roof conditions encountered in the West Alfred section at Vaalkrantz that resulted in higher rock support costs and lower production (Keaton Energy Holdings Limited, 2012; 2013). After implementing initiatives focussed on managing costs and improving efficiencies, the company returned good profit margin ratios in 2014, 2015 and 2016 (Keaton Energy Holdings Limited, 2014-2016).

Buffalo

Buffalo had comparatively the worst performance over the period, dictated by escalating operating costs and increasing mining challenges. A combination of above inflation increases in wages and utilities and operational challenges such as a six-week strike at Forbes Coal Dundee Properties in 2013, flooding and geological challenges at Magdalena in 2014 and 2015, caused gross profit margin ratios to remain depressed (Forbes & Manhattan Coal Corporation, 2012; Buffalo Coal Corporation, 2014).

6.3.2 Net profit margin ratio

Figure 6.2 shows net profit margin ratios of the analysed companies between 2012 and 2016.

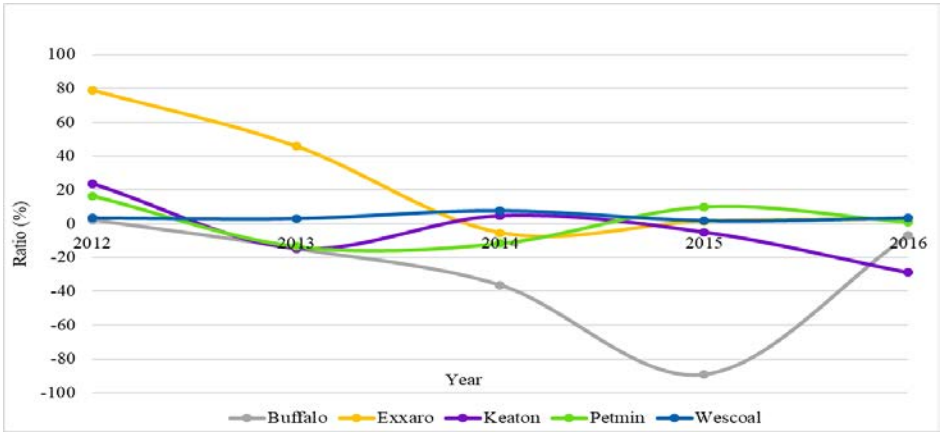


Figure 6.2: Net profit margin ratios for coal companies

The overall trend of the companies' net profit margin ratios was negative over the five-year period as shown in Figure 6.2. Despite success with implementation of various initiatives focussed on improving production and processing efficiencies, overhead and finance costs remained too high and adversely influencing net incomes. Wescoal was the only company to maintain positive net margins over the period, benefiting from the revenue contribution of its coal supply business, Wescoal Trading. Buffalo had the lowest average net profit margin ratio and Exxaro had the highest net profit margin ratio over the five-year period. These companies are further analysed below.

Buffalo

Buffalo's fluctuating revenue, spiralling costs and its reliance on debt funding resulted in negative net earnings. Successive challenges at its flagship Magdalena operations between 2013 and 2015 led to working capital deficits as the company could no longer generate enough cash from its operations. To mitigate against the working capital deficiency the company took up convertible loan funding from Resource Capital Fund V L.P. (RCF) to sustain operations (Buffalo Coal Corporation, 2014).

Exxaro

Exxaro had an excellent performance in 2012 at the back of high earnings margins supported by productivity and enhancement initiatives despite lower sales volumes and increase in US dollar-based costs. The year 2014 was set to be even better for the company underpinned by higher revenues and strong cash flow generation but a massive impairment loss on its Mayoko project eroded earnings resulting in a net loss of R-884m. Subsequent years 2015 and 2016 became years of restructuring and consolidation as the company focussed on optimisation and cost reduction initiatives that included disposal of loss making assets, prioritising capital allocation and reduction of debts to boost net earnings (Exxaro Resources Limited, 2014-2016).

6.3.3 Return on equity ratio

Figure 6.3 shows return on equity ratios of the analysed companies for the period 2012 to 2016. The right axis is labelled in red and the company related to it is

Buffalo only because of its too high ratios that are not comparable to the other companies.

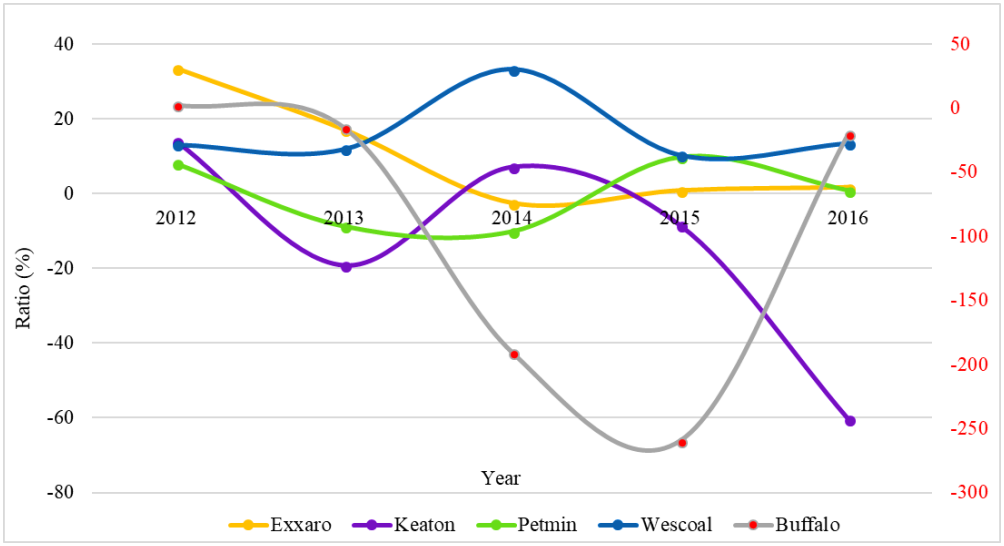


Figure 6.3: Return on equity ratios for coal companies

The return on equity ratios followed similar trends to net profit margins as shown in Figure 6.3. Although the ROE ratios had more fluctuations, they exhibited overall declining trends over the five years, driven by increasing reliance on debt funding to keep operations running because poor cash generation. Buffalo had the lowest average ROE ratio and Keaton Energy had the second least average ROE ratio over the period. The two companies are analysed below.

Buffalo

The declining ROE ratios between 2013 and 2015 shown by Buffalo were a reflection of its negative net earnings and gradual decrease in shareholders' equity as operational challenges drove costs up resulting in lower revenues and earnings supported by increase in debt. The sharp improvement in 2016 because of restructuring and cost reduction initiatives and increase in revenues, markedly improved earnings but increase in negative equity may suggest the company was still under heavy strain of both operational underperformance and debt reliance (Buffalo Coal Corporation, 2016).

Keaton Energy

The weakening ROE ratios of Keaton Energy were a reflection of the sustained

mining challenges the company faced especially at its Vaalkrantz operations from 2014 until it was placed on care and maintenance in 2016, driving net incomes lower. Increasing impairment losses put more strain on its earnings resulting in more debt up take to sustain operations reflected in declining equity (Keaton Energy Holdings Limited, 2014-2016).

6.3.4 Return on assets ratio

Figure 6.4 shows the comparison of the analysed companies' return on asset ratios for the period 2012 to 2016. Figure 6.3 shows return on equity ratios of the analysed companies for the period 2012 to 2016. The right axis is labelled in red and the company related to it is Buffalo only because of its too high ratios that are not comparable to the other companies.

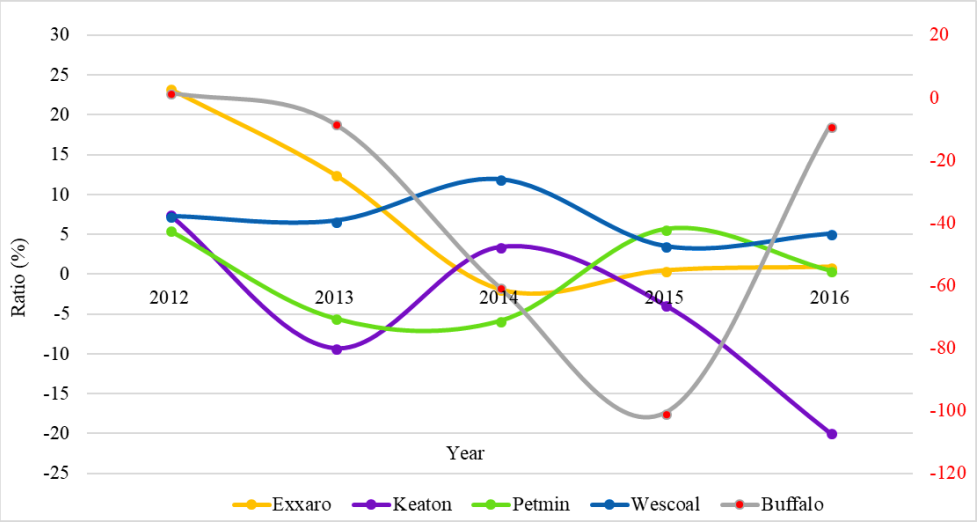


Figure 6.4: Return on assets ratios for coal companies

The ROA ratio trends were near identical to ROE trends as shown in Figure 6.4, a reflection of the influence of net income, as assets remained steady over the period. Fluctuations in Buffalo were consistent with movements in net income until 2015 when the company initiated a new restructuring process to turn around the company's performance and financial position. The restructuring exercise resulted in a decrease in its total assets as the company closed its Canadian head office and its Magdalena open cast as it reached its end of life to reduce costs.

6.3.5 Summary of coal companies' profitability performance

The analysed companies showed weakening profitability over the period, due to

effects of increasing operating costs and challenges despite some respite from increasing rand commodity prices. The industry's profitability performance indicates that the companies were not generating enough earnings. The influence of coal price on coal companies' profitability performance is tested using the Pearson correlation coefficient below.

6.3.6 Correlation analysis of profitability ratios against coal price

Table 6.2 shows the Pearson correlation coefficients of the analysed companies' profitability ratios against coal prices over the period 2012 to 2016.

Table 6.2: Pearson correlation coefficients of profitability ratios against coal prices

Company/Ratio	Gross Profit Margin	Net Profit Margin	Return on Equity	Return on Assets
Buffalo	0.9	0.7	0.7	0.7
Exxaro	-0.7	0.9	0.9	0.9
Keaton	-0.7	0.6	0.5	0.5
Petmin	0.8	0.1	-0.1	-0.1
Wescoal	-0.7	0.1	0.0	0.4
Sample mean	-0.1	0.5	0.4	0.5

The profitability ratios of the analysed companies showed high positive correlation to coal price as shown in Table 6.2. This shows that coal price was a driver of profitability performance of the coal mining companies' financial performance.

6.4 Liquidity ratios

6.4.1 Current ratio

Figure 6.5 shows the comparison of current ratios of the analysed companies between 2012 and 2016. The current ratios shown in Figure 6.5 show that each company maintained a relatively consistent ratio level throughout the period, except Buffalo whose ratios continually decreased. Between 2012 and 2014, the companies maintained relative consistency in the levels of current assets and current liabilities but as cost pressures increased and free cash dwindled in 2015, the companies increased liabilities to sustain short-term financial obligations as reflected in the weakening current ratios.

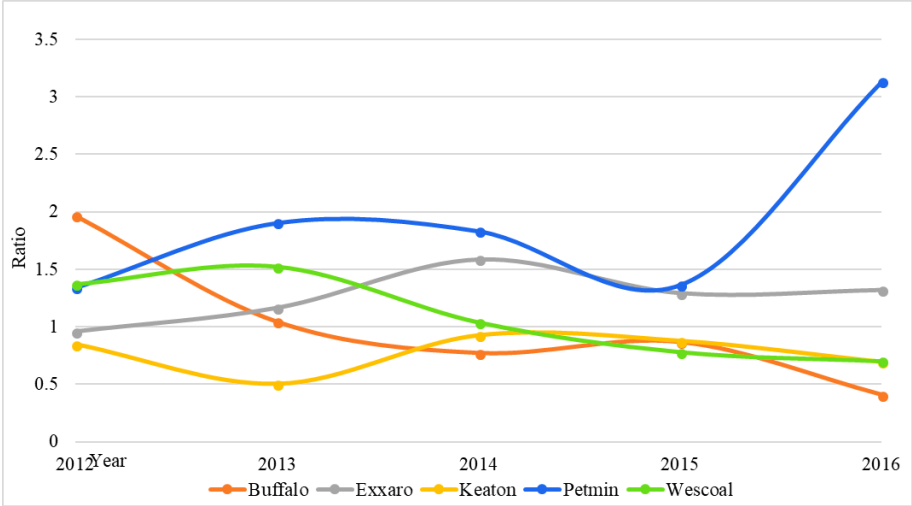


Figure 6.5: Current ratios for coal companies

The increases in the liabilities mostly emanated from restructuring and refinancing of existing loan facilities and the associated finance costs. Petmin was the only company to reach the standard minimum current ratio of two. The company had an average current ratio of 1.92 over the period, indicating it was the only company capable of satisfactorily satisfying its current liabilities using its current assets.

6.4.2 Quick ratio

Figure 6.6 shows the comparison of quick ratios of the analysed companies between 2012 and 2016.

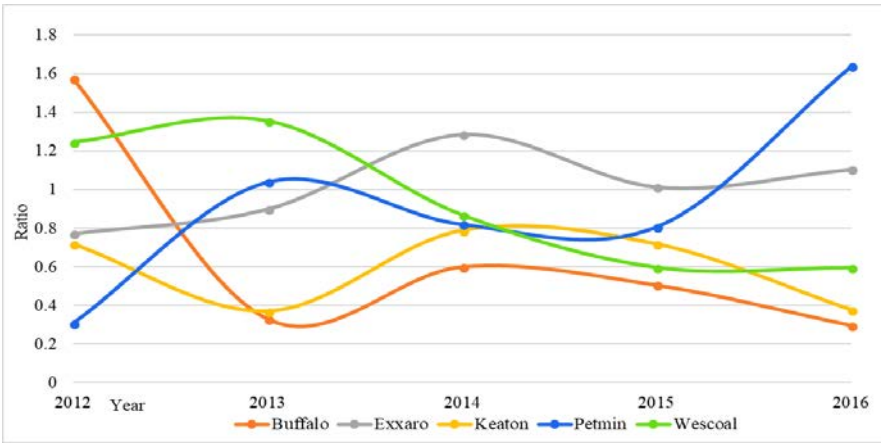


Figure 6.6: Quick ratios for coal companies

The companies displayed similar trends in quick ratios and current ratios as shown in Figure 6.6 and Figure 6.5, respectively. The general corresponding movements in current assets and current liabilities were responsible for the relative consistence

in fluctuations of the ratios. Three of the analysed companies. Exxaro, Petmin and Wescoal had average quick ratios around the standard value of one for the period, indicating that the companies had enough asset cover of short-term obligations. Buffalo and Keaton Energy's low ratios were driven by increases in current liabilities whilst current assets decreased. The fluctuations and absence of strong improvement in trends suggest the companies' cash flows were tight.

6.4.3 Working capital

Figure 6.7 shows the comparison of working capital of the analysed companies for the years 2012 to 2016.

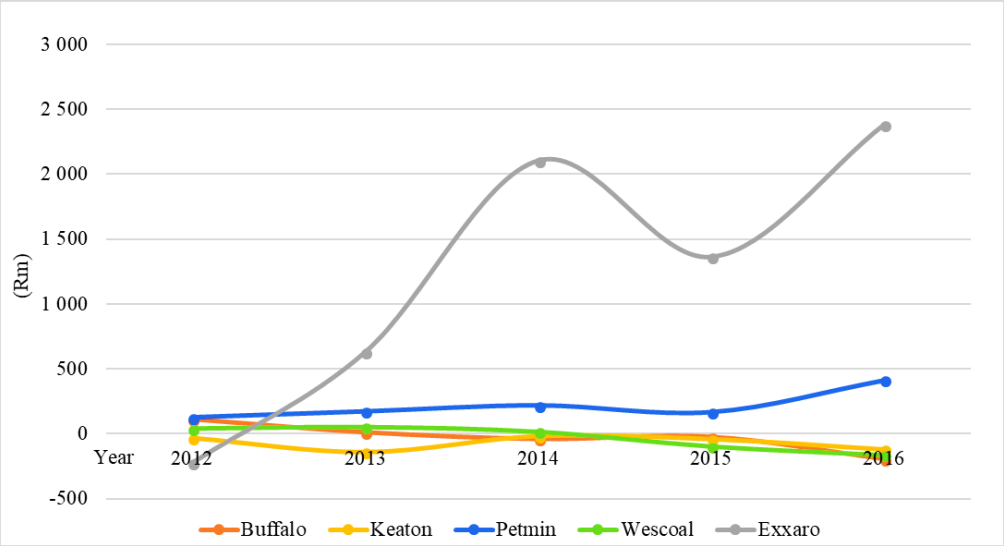


Figure 6.7: Working capital for coal companies

The working capital trends shown in Figure 6.7 highlight the difficulty companies had in generating required cash to sustain short-term operations. Available working capital is an indication of the cash generating capacity of a company and from the performance of the analysed companies, it is clear that their cash generating ability was severely strained during the period under review. Petmin was the only company with positive working capital for each of the five years, which supports the findings of its current ratio performance. Exxaro had negative working capital in 2012 and significantly, higher positive working capital in the following years. The company's poor performance in 2012 was due to higher trade and other payables of R4 099m compared to trade and other receivables of R2 642m (Exxaro Resources Limited, 2012). By comparison, Keaton Energy had the lowest average working capital of

R-71.68m. The company had negative working capital in each of the five years driven by progressively increasing borrowings from R49.18m to R201.68m and tax payments from R0.61m to R2.73m in 2012 and 2016 respectively (Keaton Energy Holdings Limited, 2012 - 2016).

6.4.4 Summary of coal companies' liquidity performance

The companies displayed overall poor liquidity over the period. One company; Petmin had an acceptable current ratio, three companies; Exxaro, Petmin and Wescoal had acceptable quick ratios and two companies; Exxaro and Petmin had positive working capital. The companies' poor liquidity indicates that they are struggling to generate enough free cash for day-to-day operations and are increasingly relying on short-term borrowings. The influence of coal price on coal companies' liquidity performance is tested using the Pearson correlation coefficient below.

6.4.5 Correlation analysis of liquidity ratios against coal price

Table 6.3 shows the Pearson correlation coefficients of the analysed companies' liquidity ratios against coal prices over the period 2012 to 2016.

Table 6.3: Pearson correlation coefficients of liquidity ratios against coal prices

Company/Ratio	Current ratio	Quick ratio	Working capital
Buffalo	0.8	0.7	0.7
Exxaro	-0.6	-0.6	-0.8
Keaton	-0.2	0.1	0.1
Petmin	-0.3	-0.6	-0.5
Wescoal	0.9	0.9	0.8
Sample mean	0.1	0.1	0.1

The analysed companies' liquidity ratios showed mixed correlation as shown in Table 6.3. The generally high correlation shows that coal price was a driver of liquidity performance in coal-mining companies' financial performance.

6.5 Solvency ratios

6.5.1 Debt to equity ratio

Figure 6.8 shows the comparison of the analysed companies' debt to equity ratios

between 2012 and 2016.

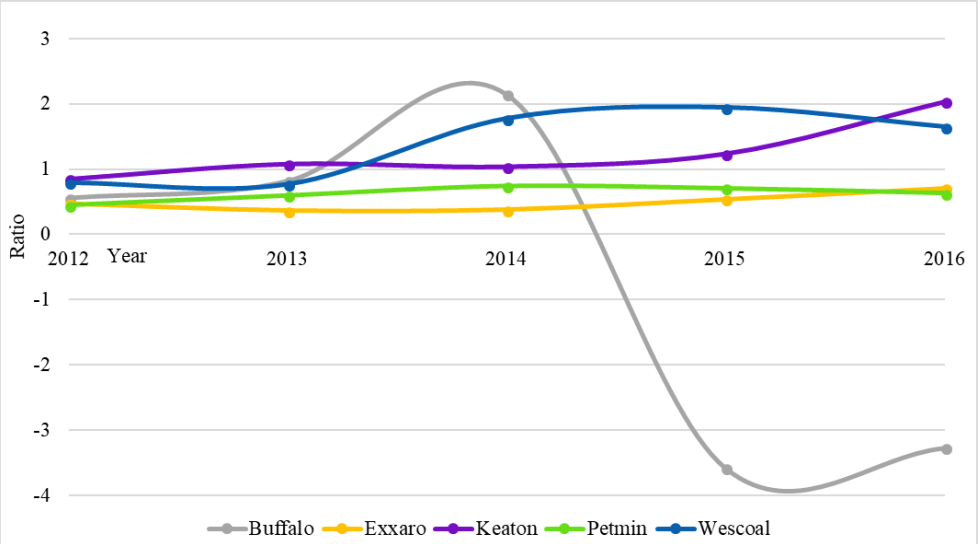


Figure 6.8: Debt to equity ratios for coal companies

As shown in Figure 6.8 Exxaro and Petmin had relatively steady debt to equity ratio trends whilst Keaton Energy and Wescoal had fluctuating and increasing ratio trends. Two companies; Keaton Energy and Wescoal had average debt to equity ratios higher than the standard limit of one, indicating they have insufficient debt cover from their equity. Exxaro and Petmin had average debt to equity ratios lower than the standard limit, indicating they have acceptable cover of equity on their debts.

Keaton Energy's ratios were driven by continuous increases in liabilities whilst shareholders' equity weakened especially after 2014 as the company relied more on external funding to cover stripping costs (Keaton Energy Holdings Limited, 2014). Despite Wescoal maintaining growth in shareholders' equity, total liabilities growth outpaced it, resulting in the increase in the ratio as the company externally funded restructuring costs and operationalisation of Elandspruit colliery (Wescoal Holdings Limited, 2016). Debt to equity ratios of Buffalo worsened each successive year from 0.56 in 2012 to -3.58 in 2015 and marginally improved to -3.27 in 2016, due to the company's negative shareholders equity because of its continued borrowing to stay in business.

6.5.2 Debt to asset ratio

Figure 6.9 shows the comparison of debt to asset ratios of the analysed companies between 2012 and 2016.

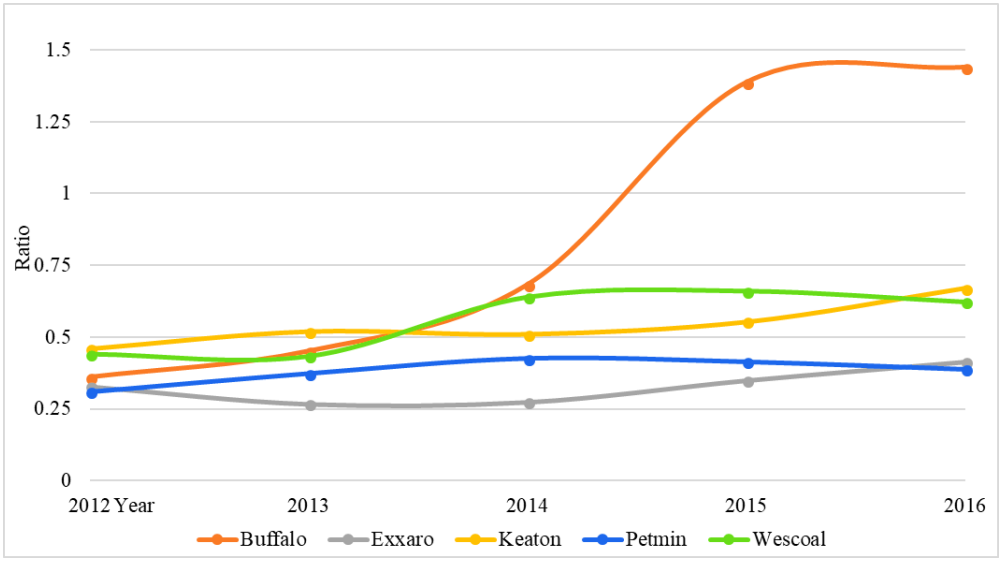


Figure 6.9: Debt to asset ratios for coal companies

The debt to asset ratios shown in Figure 6.9 exhibit trends of continued increases over the five-year period. Buffalo, Keaton Energy and Wescoal had average debt to asset ratios higher than the standard limit of 0.5, indicating their ratios are unacceptable. Exxaro and Petmin had average debt to asset ratios lower than the standard limit indicating they had sufficient asset cover on their long-term debt obligations. The debt to asset ratio trends for Exxaro, Keaton, Petmin and Wescoal are similar to those of their debt to equity ratios owing to the greater influence of total liabilities compared to total assets. The overall increasing trend directions are indicative of impending risk of balance sheets being debt leveraged. The effect of Buffalo's restructuring exercise that included closure of its Canadian offices and Magdalena open cast is clearly shown in Figure 6.9 when the debt to asset ratio sharply increased in 2015 due to the resultant significant reduction in total assets (Buffalo Coal Corporation, 2015).

6.5.3 Cash flow coverage ratio

Figure 6.10 shows the comparison of the analysed companies' cash flow coverage ratios for the period 2012 to 2016. The low values of cash flow coverage ratios shown in Figure 6.10 confirms the adverse effects operational challenges had on

the companies' cash generating capacity throughout the period.

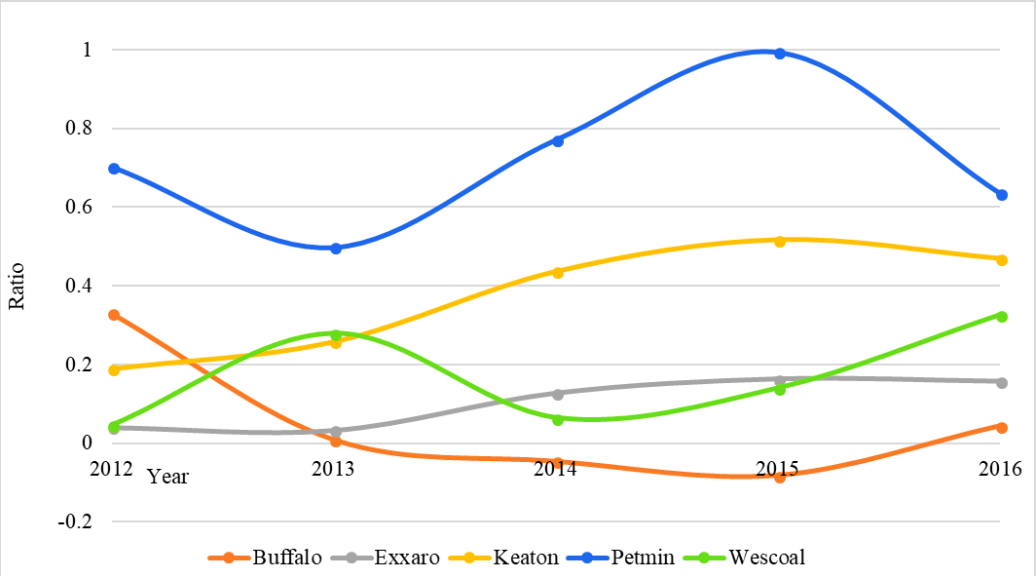


Figure 6.10: Cash flow coverage ratios for coal companies

The sub 1-ratio values are a clear indication that the companies were not generating enough earnings to cover accrued long-term obligations over the period mainly because liabilities growth outpaced earnings growth. Buffalo's debt burden was so high that it negated any earnings the company generated hence the near zero ratios. It is clear that the status quo cannot be maintained without running the operations to closure and so it is important that companies address the challenges and get operations back to generating earnings.

6.5.4 Summary of coal companies' solvency performance

The overall solvency performance of the analysed companies was poor for all the ratios. Two companies, Exxaro and Petmin had acceptable average debt to equity and average debt to asset ratios, whilst all the companies had unacceptable average cashflow coverage ratios. These observations suggest the companies did not maintain sufficient equity and asset balances to cover their long-term debt obligations. The influence of coal price on coal companies' solvency performance is tested using the Pearson correlation coefficient below.

6.5.5 Correlation analysis of solvency ratios against coal price

Table 6.4 shows the Pearson correlation coefficients of the analysed companies' solvency ratios against coal prices over the period 2012 to 2016.

Table 6.4: Pearson correlation coefficients of solvency ratios against coal prices

Company/Ratio	Debt to Equity	Debt to Asset	Cash Flow Coverage
Buffalo	0.7	-0.9	0.8
Exxaro	-0.5	-0.4	-0.9
Keaton	-0.6	-0.7	-1.0
Petmin	-0.8	-0.8	-0.5
Wescoal	-0.9	-0.9	-0.4
Sample mean	-0.4	-0.8	-0.4

The analysed companies' solvency ratios showed high negative correlation to coal price as shown in Table 6.4. This shows that coal price was a driver of solvency performance of coal-mining companies' financial performance.

6.6 Activity ratios

6.6.1 Asset turnover ratio

Figure 6.11 shows the comparison of the analysed companies' asset turnover ratios for the period 2012 to 2016.

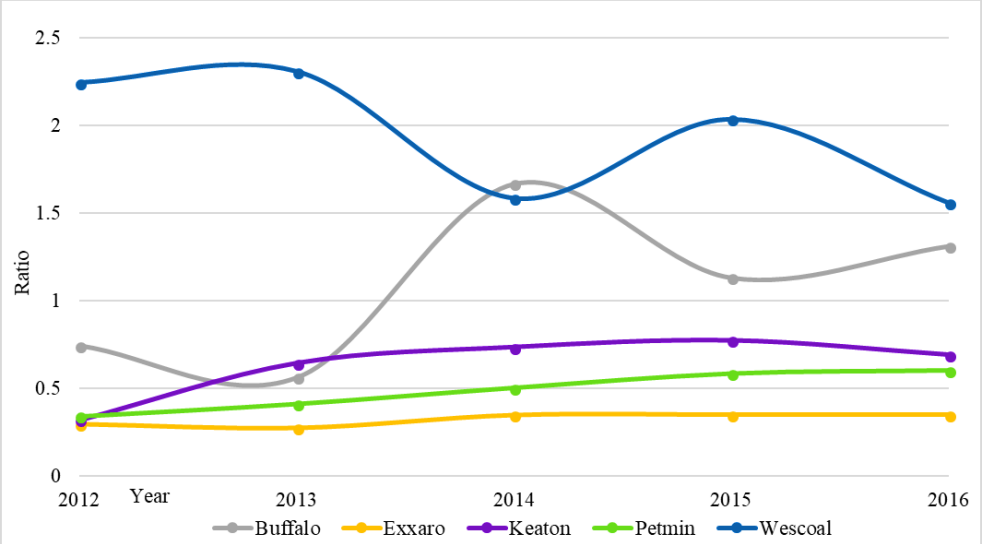


Figure 6.11: Asset turnover ratios for coal companies

Simultaneous increases in revenues and total assets possibly caused the gradual changes in the asset turnover ratios of Exxaro, Keaton and Petmin as shown in Figure 6.11. The lower ratios exhibited by the three companies indicate that they were possibly underutilising their assets and with improved efficiencies they would

achieve better sales volumes. The high ratio values exhibited by Wescoal and Buffalo indicate that the two companies were more efficiently utilising their assets to generate sales volumes. Wescoal' strategy of continually looking for expansion potential and improving production efficiencies drove the company's high asset turnover (Wescoal Holdings Limited, 2015). Increases in total asset from acquisitions were matched by increases in production levels. In the first part of the period revenues mainly drove Buffalo's ratios as total assets were relatively stable, but with restructuring initiatives in the second part of the period, leading to less assets, the increases in the ratios were driven by the decline in total assets (Buffalo Coal Corporation, 2012-2016).

6.6.2 Fixed asset turnover ratio

Figure 6.12 shows the comparison of the analysed companies' fixed asset turnover ratios between the years 2012 to 2016.

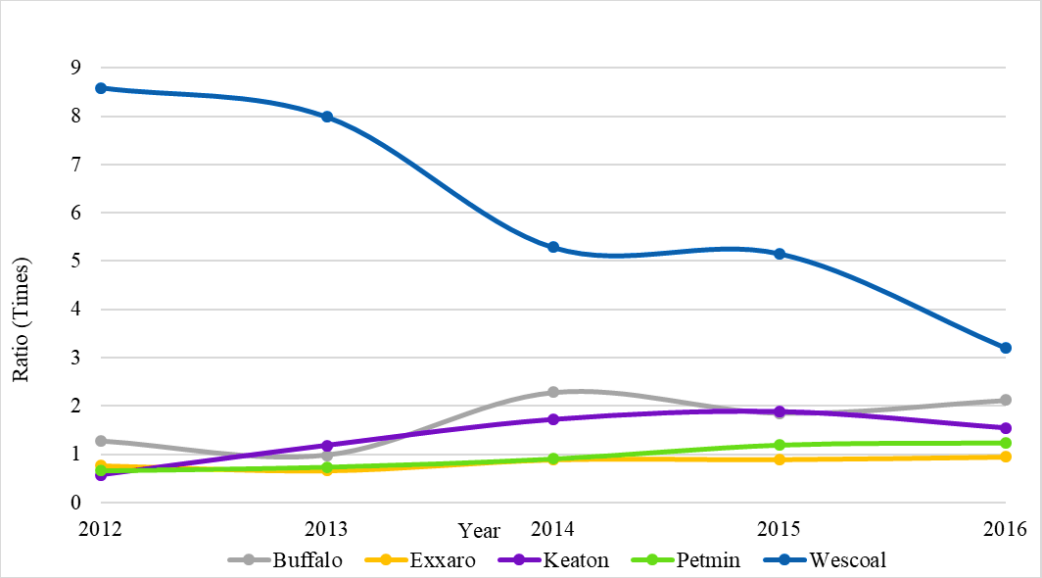


Figure 6.12: Fixed asset turnover ratios for coal companies

It can be seen from Figure 6.12 that the fixed asset turnover trends are similar to the asset turnover trends for four of the companies; Buffalo, Exxaro, Keaton and Petmin. The aggregate corresponding movements in revenue and fixed assets had the defining influence on Exxaro, Keaton and Petmin's ratios. The movements in revenues more than the changes in fixed assets influenced Buffalo's ratios more. Wescoal comparably had the highest turnover ratios owing to consistent increases

in revenue and fixed assets. The company's comparably higher ratios are due to its operating structure where its revenue generation was dominated by its supply division, accounting for 53% in 2012 rising to 61% in 2016. The other contributing factor to the decline in the ratio from 2014 was the commissioning of two other operations; Intibane Colliery in 2014 and Elandspruit in 2015, which increased the company's fixed assets (Wescoal Holdings Limited, 2014-2016).

6.6.3 Inventory turnover ratio

Figure 6.13 shows the inventory turnover ratios comparison of the analysed companies between 2012 and 2016.

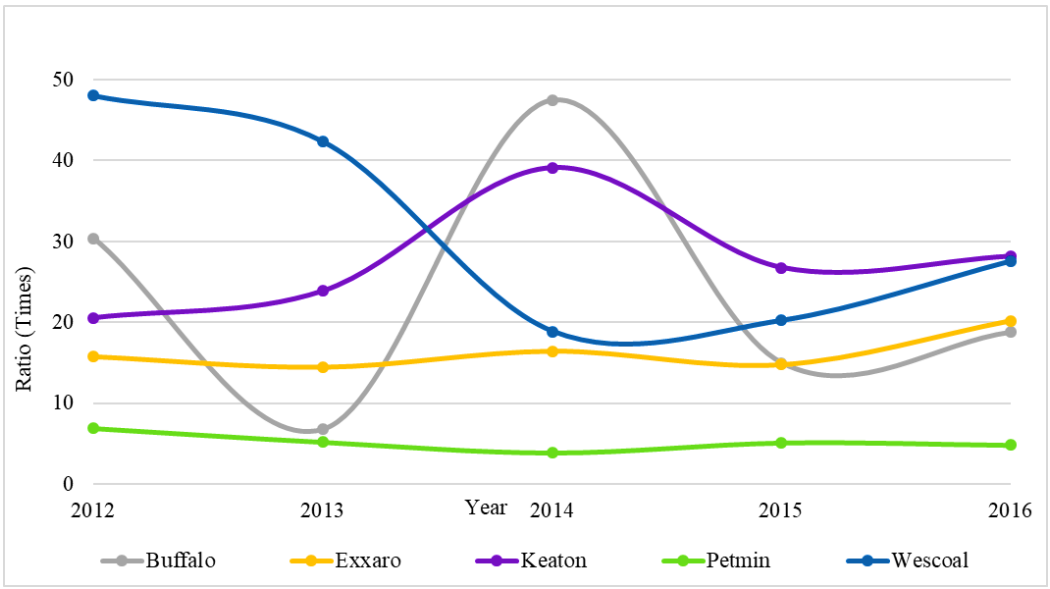


Figure 6.13: Inventory turnover ratios for coal companies

The analysed companies exhibited varying inventory turnover ratio levels as shown in Figure 6.13, a reflection of the different inventory management strategies implemented by each company. Exxaro and Petmin maintained relatively steady inventory turnover ratios over the period, Buffalo and Keaton had fluctuating inventory turnover ratios whilst Wescoal's ratio trend characterised a trough. Exxaro and Petmin's ratios were driven by sustained increases in both revenues and inventories, indicating the companies literally turned over their inventory the same number of times each year. The alternate high and low turnover ratios exhibited by Buffalo and Keaton suggest the lack of consistency in either revenue generation or management of inventory levels. Wescoal had declining turnover from 2012 to

2014 and increasing turnover from 2015 to 2016. The decrease between 2012 and 2014 was driven by low inventory levels and the increase between 2015 and 2016 was driven by declining revenue.

6.6.4 Summary of activity performance

The coal mining companies' activity performance was solid for the period under review; which mean the companies were generally efficient in the use of their assets to generate revenues and profits. The influence of coal price on coal companies' activity performance is tested using the Pearson correlation coefficient below.

6.6.5 Correlation analysis of activity ratios against coal price

Table 6.5 shows the Pearson correlation coefficients of the analysed companies' activity ratios against coal prices over the period 2012 to 2016.

Table 6.5: Pearson correlation coefficients of activity ratios against coal prices

Company/Ratio	Asset Turnover	Fixed Assets Turnover	Inventory Turnover
Buffalo	-0.6	-0.6	0.2
Exxaro	-0.8	-0.6	-0.3
Keaton	-0.9	-0.9	-0.4
Petmin	-1.0	-0.9	0.6
Wescoal	0.5	0.8	0.9
Sample mean	-0.5	-0.5	0.2

The companies' activity ratios showed high negative correlation to coal price as shown in Table 6.5; an indication that coal price was a drive of activity performance of coal-mining companies' financial performance.

6.7 Market ratios

6.7.1 Share price

Figure 6.14 shows the comparison of share prices for the analysed companies between 2012 and 2016. The right axis is labelled in red and the company related to it is Exxaro only because of its too high ratios that are not comparable to the other companies.

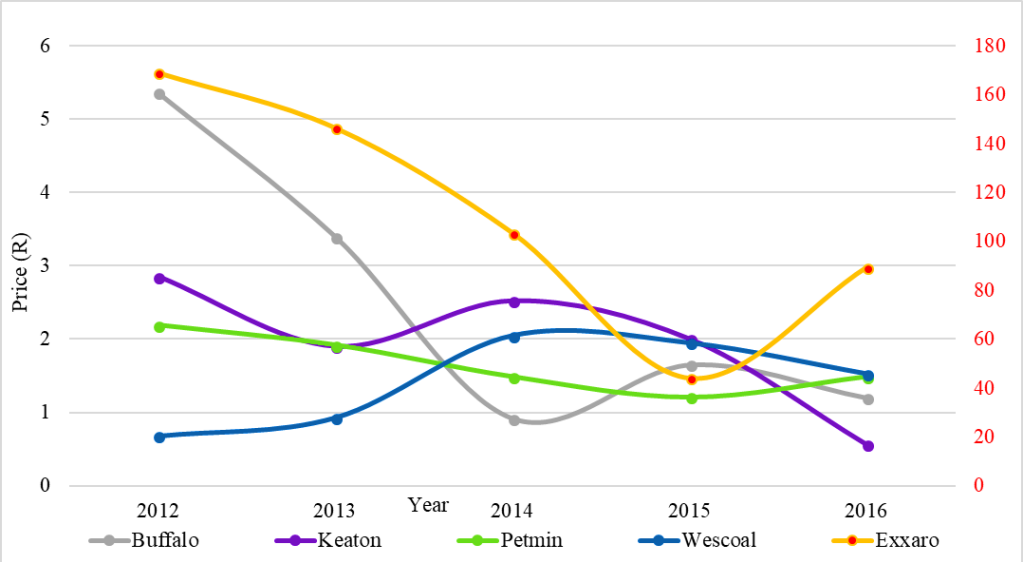


Figure 6.14: Share prices of coal companies

Overall, the analysed companies displayed decreasing share prices as shown in Figure 6.14. The share price trends display some resemblance to net profit margin ratio trends an indication of the influence of net earnings on market sentiments. Share price movements mirrored movements in net earnings.

6.7.2 Earnings per share ratio

Figure 6.15 shows the earnings per share ratio comparison of the analysed companies between 2012 and 2016. The right axis is labelled in red and the company related to it is Exxaro only because of its too high ratios that are not comparable to the other companies. The earnings per share ratios significantly varied for the companies as shown in Figure 6.15, a clear reflection of the volatile earnings margins during the five years. Wescoal had positive ratios on each of the five years indicating sustained profitability, availability of funds to distribute to shareholders and investor attractiveness reflected in its steady share price. The positive returns were driven by improving net income each year, offset by increasing equity value.

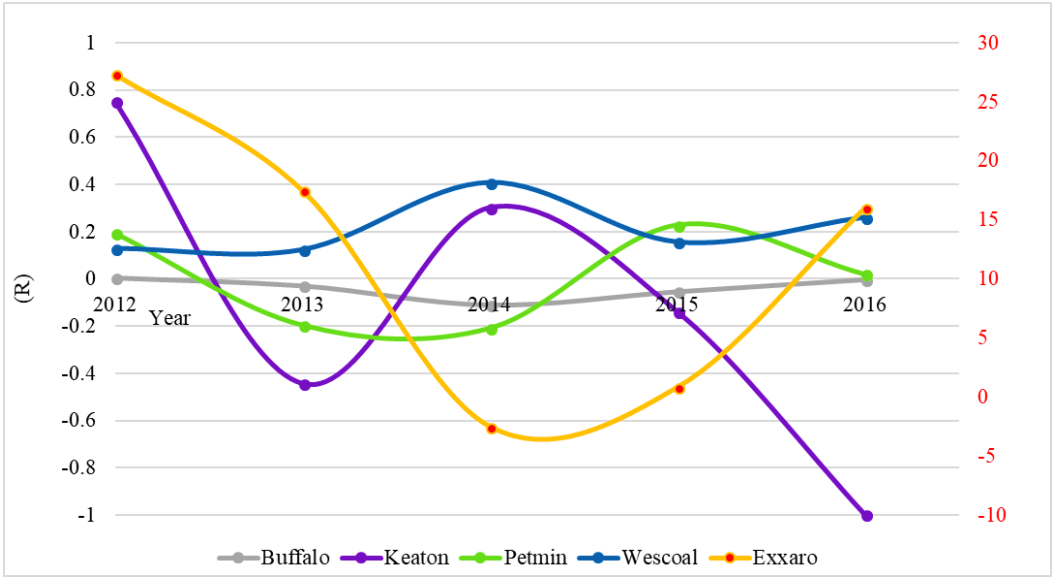


Figure 6.15: Earnings per share ratios for coal companies

Buffalo's struggles to sustain earnings margins was reflected in its negative earnings per share ratios. The poor ratios were driven by its increasing negative net income offset by increasing debt equity effectively meaning its lenders hold the company.

6.7.3 Price to earnings ratio

Figure 6.16 shows the comparison of price to earnings ratios of the analysed companies between 2012 and 2016. The right axis is labelled in red and the company related to it is Buffalo only because of its too high ratios that are not comparable to the other companies. The companies had differing and fluctuating price to earnings ratios over the five-year period as shown in Figure 6.16. The fluctuations are a reflection of the financial performance of the companies as seen in the earnings and the ratio acts as an indicator to the nature of a company's performance. By comparison, Buffalo had the lowest average P/E ratio of -17.03 a reflection of its negative net earnings and declining share price over the period.

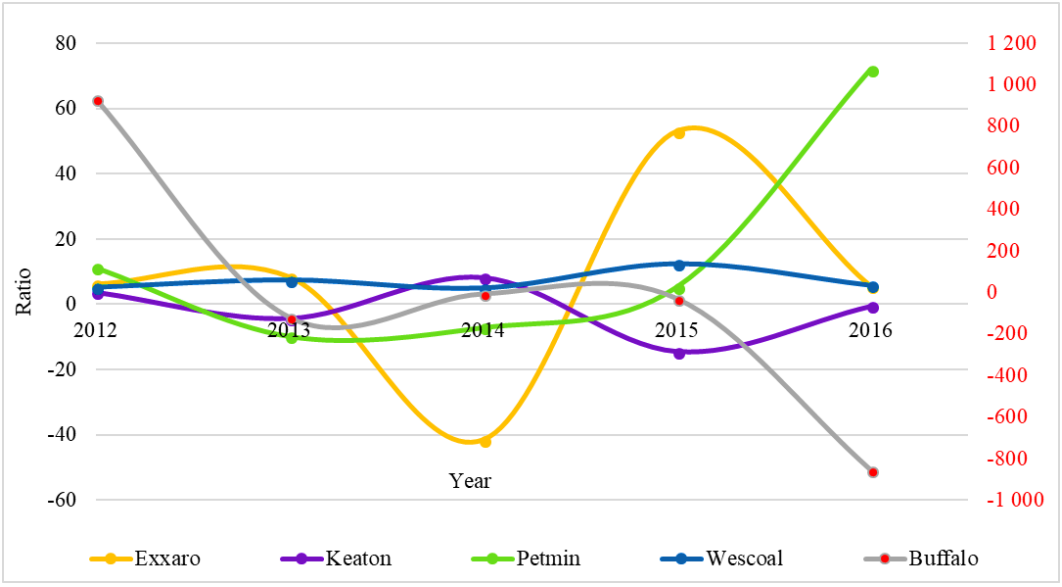


Figure 6.16: Price to earnings ratios for coal companies

Petmin had the highest average P/E ratio of 14.27, owing to a drop in earnings and an increase in its share price in 2016, which boosted the P/E ratio average for the period. Wescoal's performance however suggests it performed better than the rest as the company maintained strong share prices and increased earnings successively over the period.

6.7.4 Book value per share ratio

Figure 6.17 shows the comparison of book value per share ratios of the analysed companies between 2012 and 2016. The right axis is labelled in red and the company related to it is Exxaro only because of its too high ratios that are not comparable to the other companies. As can be seen in Figure 6.17, Keaton, Petmin and Wescoal maintained relatively steady book value per share ratios over the five years. Because of the influence of shareholders' value and issued shares, those companies that carry high debts on their balance sheets are most likely to have poor BV ratios. Buffalo's BV ratio trend supports the findings of its debt to equity performance.

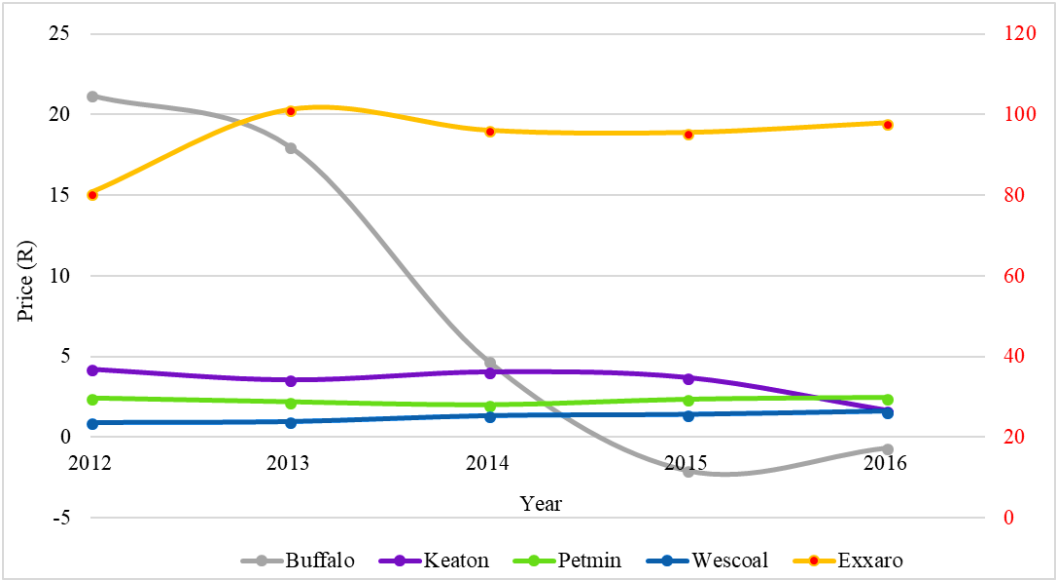


Figure 6.17: Book value per share ratios for coal companies

By comparison, Exxaro had the highest ratio due to its sustained increase in shareholders' equity through an asset growth rate higher than the liabilities growth rate whilst its number of shareholders remained constant. Buffalo and Keaton Energy reflect the increase in debt on their balance sheets as shareholders' equity decreased and number of shareholder increased possibly from share-based loan financing.

6.7.5 Summary of coal companies' market performance

Overall market performance of the analysed companies was poor over the period under review, owing to the influence of poor net earnings. The BV ratios were steadier as equity was largely consistent over the period. The influence of coal price on coal companies' market performance is tested using the Pearson correlation coefficient below.

6.7.6 Correlation analysis of market ratios against coal price

Table 6.6 shows the Pearson correlation coefficients of the analysed companies' market ratios against coal prices over the period 2012 to 2016.

Table 6.6: Pearson correlation coefficients of market ratios against coal prices

Company/Ratio	Earnings per share	Price to earnings	Book value per share	Share price
Buffalo	0.3	0.7	1.0	0.9
Exxaro	0.7	-0.4	-0.6	1.0
Keaton	0.6	0.6	0.5	0.6
Petmin	-0.1	-0.3	-0.0	1.0
Wescoal	-0.3	-0.6	-0.9	-0.8
Sample mean	0.3	-0.0	-0.0	0.5

The market ratios of the analysed companies showed mixed correlation as shown in Table 6.6. Despite the mixed correlation, the high positive and negative correlation coefficients for most ratios show that coal price influenced market ratios.

6.8 Comparison of coal price in USD against Rand

Figure 6.18 shows the comparison of the coal price in USD/t against the price in Rand/t between 2012 and 2016.

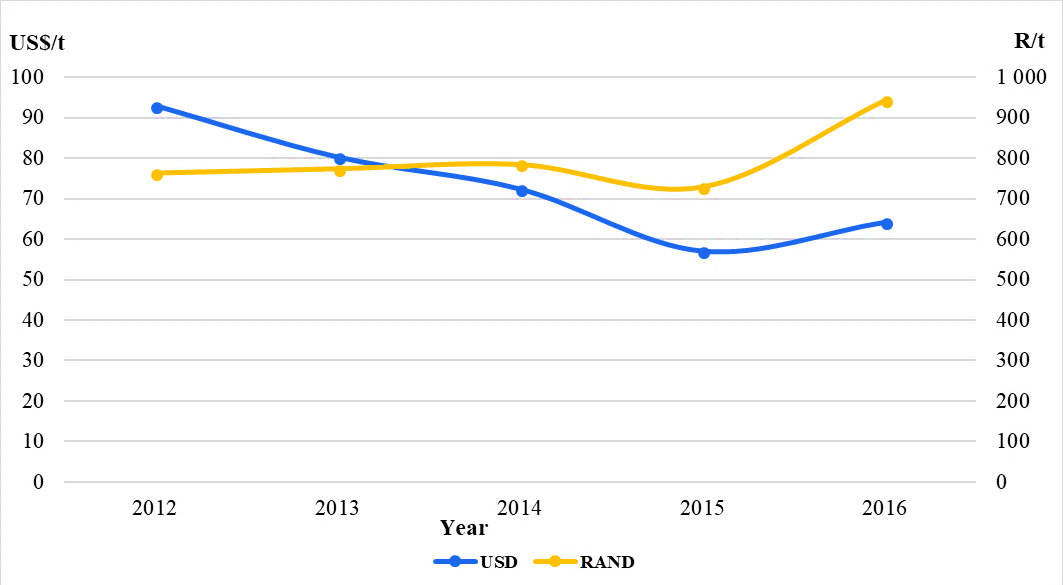


Figure 6.18: Coal price: USD against Rand

From Figure 6.18, whilst the USD price trend was mostly negative, the Rand price had an upward trend over the period supported by the weakening Rand value. Over

the five years, the negative USD price trend only showed an upturn in 2016 whilst the Rand trend was initially marginally upward between 2012 and 2014 before a depression in 2015 because of a sharp drop in USD price and a recovery in 2016 as the USD price also firmed. The overriding pressure on coal prices over the five-year period was the reduction in global primary energy consumption because of the slowing global economic growth especially in advanced economies. Coupled with lower consumption in advanced economies was the impact of emerging markets diversifying their energy and power generation into more environmentally friendly sources (Department of Mineral Resources, 2016). The sector's performance does not reflect sustained influence of a single factor although the exchange rate did have a significant impact in dampening the effect of consistently low and declining USD prices over the period.

6.9 Coal production and sales

Figure 6.20 shows the South African coal production and sales figures between 2012 and 2016.

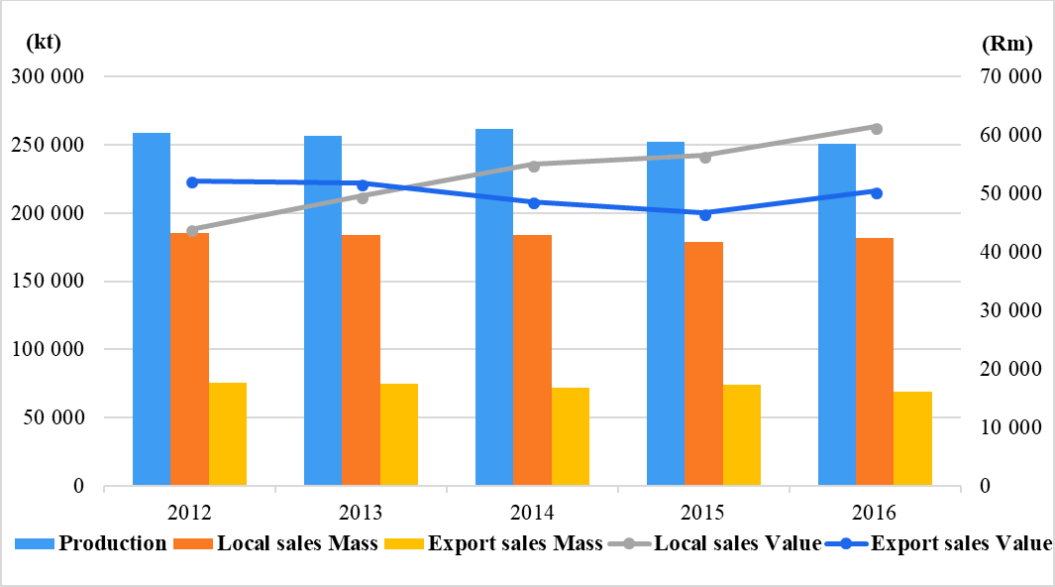


Figure 6.19: South African coal production and sales

(Source: Adapted from Chamber of Mines of South Africa, 2016a)

As seen in Figure 6.20, overall the industry recorded a declining production trend as the industry grappled with the reality of ageing mines, challenging geological conditions, lower quality ore bodies and difficulties in accessing capital to fund

expansion projects (Chamber of Mines of South Africa, 2015). However, there was consistency in the splits of local and export sales volumes and values. On average, in volumetric terms, local sales accounted for 72% and export sales accounted for 28% of total sales whilst in value terms, local sales accounted for 52% and export sales accounted for 48% of total sales over the period (Chamber of Mines of South Africa, 2016a). Sustained growth in local sales value was driven by firm consumption of electricity and liquid fuels as coal generated on average 70% of the energy produced by Eskom. Although export earnings were weak because of depressed global demand and prices, the country benefitted from a weakening Rand and firm consumption by the country's largest coal importer, India.

6.10 Failure prediction analysis of the coal mining companies

Application of the Altman Z"-score analysis is to validate the findings in ratio analysis and to predict financial failure of the companies and its possible implications. Table 6.7 shows the comparative Z"-scores of selected coal companies for the period 2012 to 2016.

Table 6.7: Z"-scores of coal companies

Company/Year	2012	2013	2014	2015	2016	Mean	Zone
Buffalo	2.3	0.1	-5.5	-12.2	-9.5	-5.0	**Distress**
Exxaro	4.3	5.2	4.4	4.2	4.0	4.4	**Safe**
Keaton	2.0	1.2	1.7	1.0	-1.6	0.9	**Distress**
Petmin	4.7	4.0	3.7	3.9	4.9	4.2	**Safe**
Wescoal	3.2	3.6	2.3	0.2	0.6	2.0	**Grey**

As shown in Table 6.7, the companies had differing financial health for the period under review. The financial health of each company is interpreted in the following Sub-sections.

6.10.1 Buffalo

The distress classification of Buffalo's financial health supports its poor financial performance as observed in ratio analysis. From 2013, the company's performance progressively decreased as it borrowed more. Its performance recovered in 2016, reporting positive gross and operating incomes but its net income remained negative. Despite marginal improvement in revenues, the company still has to work

on reducing its debt levels, increase assets, cash and retained earnings before it can return to financial health.

6.10.2 Exxaro

Exxaro's safe classification of its financial health supports its solid performance and financial standings observed in ratio analysis. The company's solid financial balances of cash and cash equivalents, current assets and retained earnings provide enough cover against adverse operational and market conditions if need be.

6.10.3 Keaton Energy

Keaton Energy's financial health is classified as in distress, a confirmation of its deteriorating performance as found in its ratios' analysis. Declining revenues, declining earnings and increasing liabilities are all indicators of the company's drift into financial difficulty. If operating fundamentals are not restored in the short term, the company may be heading on a path of financial failure.

6.10.4 Petmin

The safe classification of Petmin's financial health supports the observation made in its ratios analysis. Despite stable cash, assets and retained earnings balances, the company's decreasing income earnings are indications of imminent problems within the company business environment that need to be resolved before they escalate.

6.10.5 Wescoal

Wescoal's financial health classification of grey zone, confirms the company's volatile and declining performance as found in its ratios analysis. Revenues and earnings showed signs of declining whilst liabilities steadily increased. A review and reinforcement of initiative may be required to improve efficiencies so that the company's financial health does not decline further.

6.10.6 Summary of failure prediction analysis of coal companies

The Altman Z"-scores correctly classified the analysed companies' financial health and confirmed findings in ratio analysis. Overall, the companies' financial health was mixed as two companies had safe financial health, another two companies had distress financial health and one company had grey financial health.

6.11 Chapter summary

This chapter presented the analysed results of financial performance of coal mining companies using financial ratios. The analysed companies displayed poor and weakening profitability performance reflected by decreasing net earnings, poor liquidity and solvency performance reflected by low generated cash and unsatisfactory equity and asset cover of short-term financial liabilities and long-term debt obligations. The companies also displayed good activity performance reflected by efficient utilisation of assets, but their market performance was poor owing to poor net earnings. A test of correlation of the ratios against coal price was done. Profitability ratios showed high positive correlation to coal price and solvency and activity ratios showed high negative correlation to price. Liquidity and market ratios showed mixed high correlation to coal price. Finally, a failure prediction analysis of the coal mining companies was done, and it supported findings of their ratios' analysis. The analysis classified the financial health of two companies as safe, one company as grey and the other two companies as in distress.

7 IRON ORE MINING SECTOR PERFORMANCE ANALYSIS

7.1 Chapter overview

This chapter analyses and discusses the financial performance of selected iron ore companies over the period 2012 to 2016. Financial performance is analysed by use of financial ratios and presented for comparison between companies, including determination of trends and correlation to iron ore price. A determination and discussion are also done of the financial health of the companies over the five-year period using the Altman Z"-score model. Performance analysis is done to specific companies displaying anomalies and a general performance conclusion is given for the overall industry. All ratios presented in this chapter are shown in Appendix 10.17 to Appendix 10.21.

7.2 JSE listed iron ore mining companies

According to AM Investor Services SPRL (2017); Profile Data (2017), there are three mining companies involved in iron ore mining that are listed on the JSE. Table 7.1 shows the listed iron ore mining companies.

Table 7.1: JSE listed iron ore companies

INCLUDED IN ANALYSIS	EXCLUDED IN ANALYSIS
Assore Limited (ASR)	African Rainbow Minerals Limited (ARM)
Kumba Iron Ore Limited (KIO)	

Table 7.1 splits the iron ore companies into two groups, one for the companies selected for analysis and one for the company excluded from analysis based on the explanations given below. Numerous privately owned small and junior mining companies undertake iron ore mining in South Africa but are not listed on the JSE. Of the three listed companies, only Kumba Iron Ore is a single commodity producer. The other two are diversified mining companies with Assore Limited mining iron ore as well as chrome and manganese whilst African Rainbow Minerals Limited mines ferrous metals (iron ore, chrome, and manganese), platinum, copper, and gold. Below are additional explanations on the inclusion and exclusion of some of the companies:

- African Rainbow Minerals Limited was excluded as its involvement in iron ore mining is through its 50% stake in Assore. Assore Limited is a joint

venture company that is involved in the mining of base minerals and metals including chrome, iron ore, and manganese. However, because by revenue contribution to the group, iron ore contributes 60%, Assore Limited (2016), the company is classified as an iron ore mining company for the purpose of this analysis.

7.3 Profitability ratios

7.3.1 Gross profit margin ratio

Figure 7.1 shows the comparison of gross profit margins of the selected iron ore companies between 2012 and 2016.

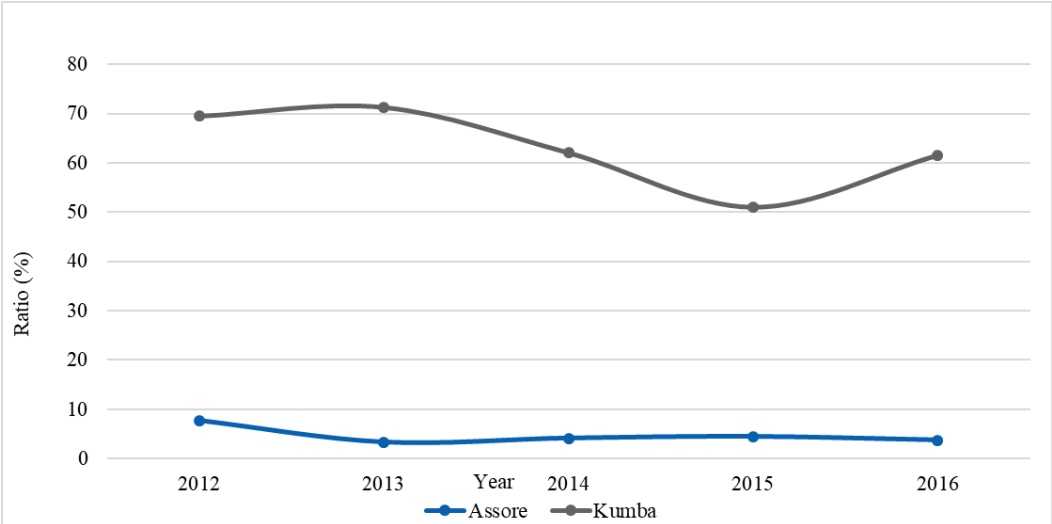


Figure 7.1: Gross profit margin ratios for iron ore companies

As can be seen in Figure 7.1, the companies' gross profit margins consistently declined over the five-year period. Progressively increasing revenues supported by stronger rand prices despite increasing production costs underpinned Assore's performance after the gross profit margin ratio drop in 2013. High electricity costs and interrupted supply affected productivity at its furnaces (Assore Limited, 2013). Kumba experienced progressive decrease in revenues and margins as operating costs increased. Cost cutting measures by the company reduced labour count and the reconfiguration of its Sishen pit were some of the initiatives implemented to resuscitate production resulting in improved gross margins in 2016 (Kumba Iron Ore Limited, 2012-2016).

7.3.2 Net profit margin ratio

Figure 7.2 shows the comparison of the selected iron ore companies' net profit margins for the period 2012 to 2016.

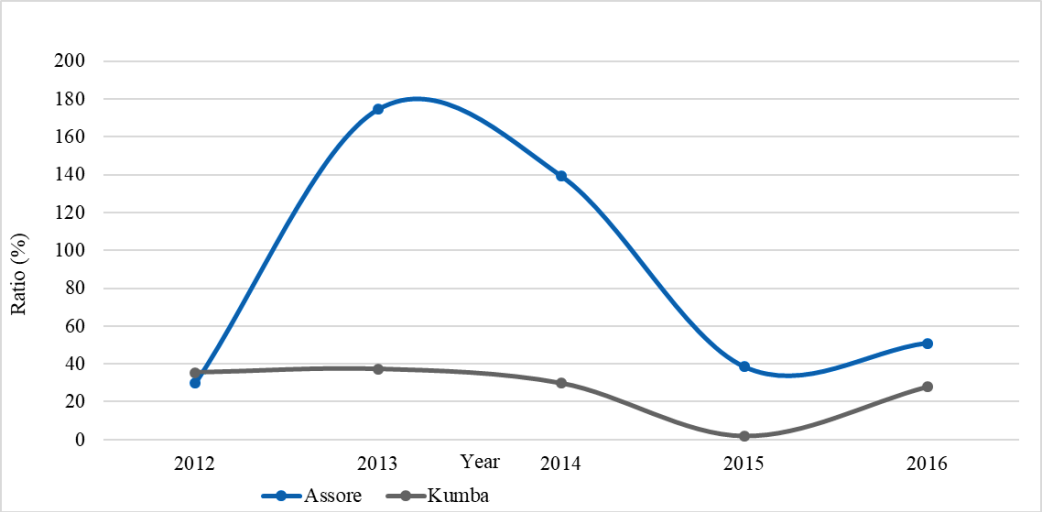


Figure 7.2: Net profit margin ratios for iron ore companies

The companies had solid net profit margin ratios for the period as shown in Figure 7.2. Kumba's net profit margin ratio spiked in 2013 because of increased revenues as production volumes declined and supported by increasing rand prices. The increase in revenue was despite cost increases mostly from increased waste mining at Sishen and Kolomela operations. The higher net profit margins of Assore in 2013 and 2014 were because of the company adopting a new accounting method that resulted in adjustment of some financial figures from the proportionate consolidation method, to the equity accounting method in relation to its joint venture operations (Assore Limited, 2013-2014). Sustained increases in capital expenditure for expansion, weaker rand prices, and increasing costs strained Assore's cash flow resulting in decline in net earnings.

7.3.3 Return on equity ratio

Figure 7.3 shows the comparison of the selected iron ore companies' return on equity between 2012 and 2016. It is clear from Figure 7.3 that the companies' ROE ratios gradually decreased throughout the period. On average, the companies' ROE ratios were considerably above the recommended standard range of 9% to 12%. Kumba's high ROE ratios in 2012 and 2013 were driven by high net income and

low equity in 2012 and both higher net income and higher equity in 2013.

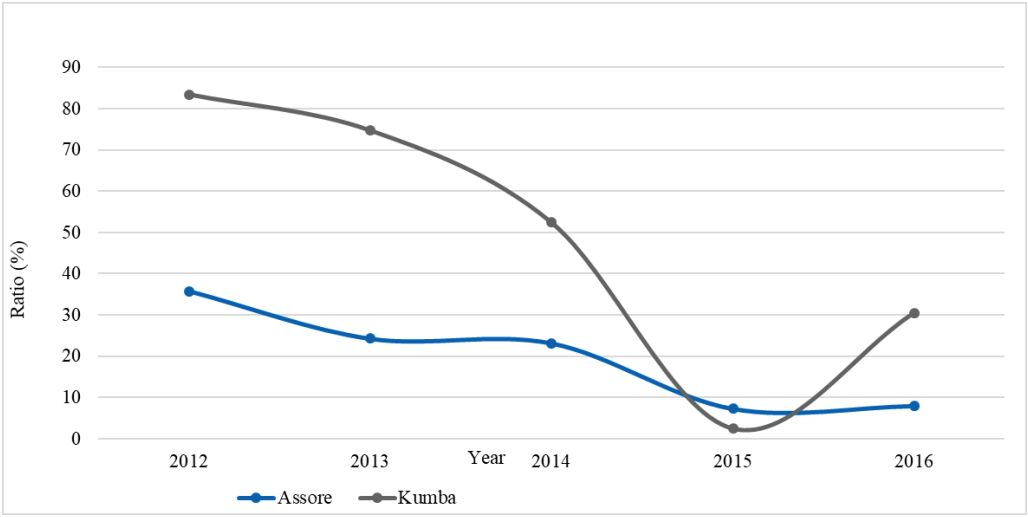


Figure 7.3: Return on equity ratios for iron ore companies

Subsequent decreases in the ROE ratio were due to declining net income as costs increased and iron ore prices weakened. Assore had the same trend as Kumba for the period. Its ROE ratios were driven by gradual decrease in net income whilst shareholders' equity continually increased resulting in lower ROE ratios.

7.3.4 Return on assets ratio

Figure 7.4 shows the comparison of return on assets of the selected iron ore companies during the period 2012 to 2016. ROA ratio trends were similar to ROE trends because of the declining net incomes.

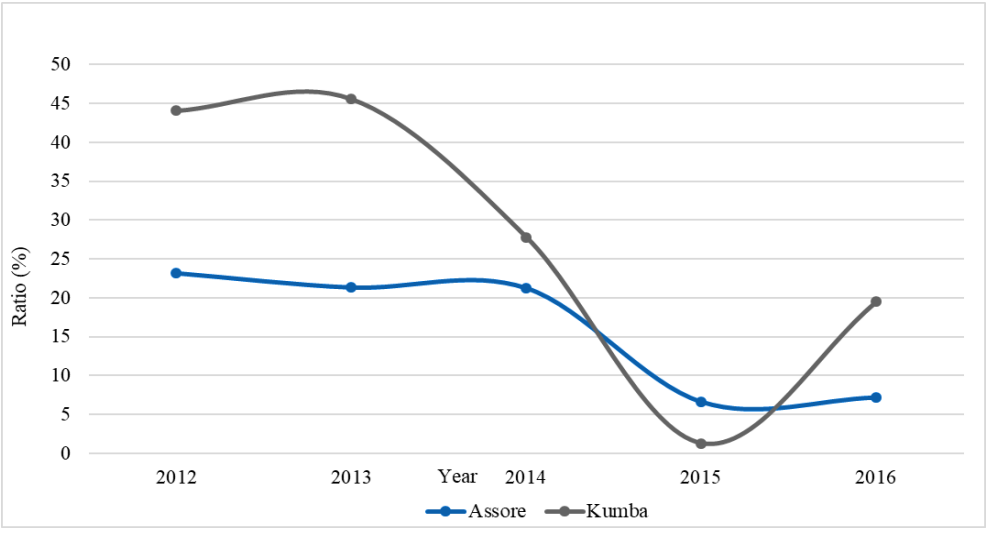


Figure 7.4: Return on assets ratios for iron ore companies

The weakening ROA ratios shown in Figure 7.4 were a reflection of the companies' declining net incomes and increasing total assets. The companies also showed signs of marginal recovery in 2016 as net incomes improved as initiatives on cost reduction and improving operational efficiencies were bearing fruit.

7.3.5 Summary of iron ore companies' profitability performance

Despite weakening trends for most of the period, the companies' profitability ratios remained solid. Upturn signs in 2016 were encouraging as they show that the companies' cost containment processes were effective. Overall, the iron ore mining companies were profitable as they were able to generate enough revenues to retain positive net earnings. The influence of iron ore price on iron ore companies' profitability performance is tested using the Pearson correlation coefficient below.

7.3.6 Correlation analysis of profitability ratios against iron ore price

Table 7.2 shows the Pearson correlation coefficients of the analysed companies' profitability ratios against iron ore prices over the period 2012 to 2016.

Table 7.2: Pearson correlation coefficients of profitability ratios against iron ore prices

Company/Ratio	Gross Profit Margin	Net Profit Margin	Return on Equity	Return on Assets
Assore	0.3	0.5	0.9	0.9
Kumba	0.9	0.8	0.9	0.9
Sample mean	**0.6**	**0.6**	**0.9**	**0.9**

The companies' profitability ratios showed high positive correlation to iron ore price as shown in Table 7.2. this shows iron ore price was a driver of profitability performance of iron ore mining companies' financial performance.

7.4 Liquidity ratios

7.4.1 Current ratio

Figure 7.5 shows the comparisons of current ratios of the selected iron ore companies for the period 2012 to 2016.

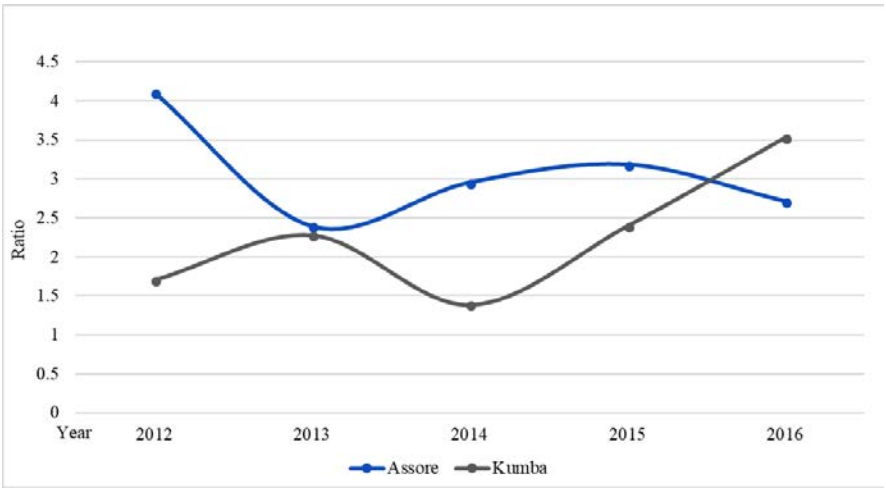


Figure 7.5: Current ratios for iron ore companies

The companies' exhibited solid current ratios as shown in Figure 7.5, significantly higher than the recommended standard of value two. Despite a decline in current ratio in 2014, Kumba' ratios had an increasing trend. Its performance was sustained by general increases in its trade and other receivables and cash and cash equivalents balances over the period under review (Kumba Iron Ore Limited, 2012 - 2016). Assore's fluctuating performances had a general declining trend because of decreases in inventories, trade and other receivables and increases in overdrafts (Assore Limited, 2012 - 2016).

7.4.2 Quick ratio

Figure 7.6 shows the comparative quick ratios of the selected iron ore companies between 2012 and 2016.

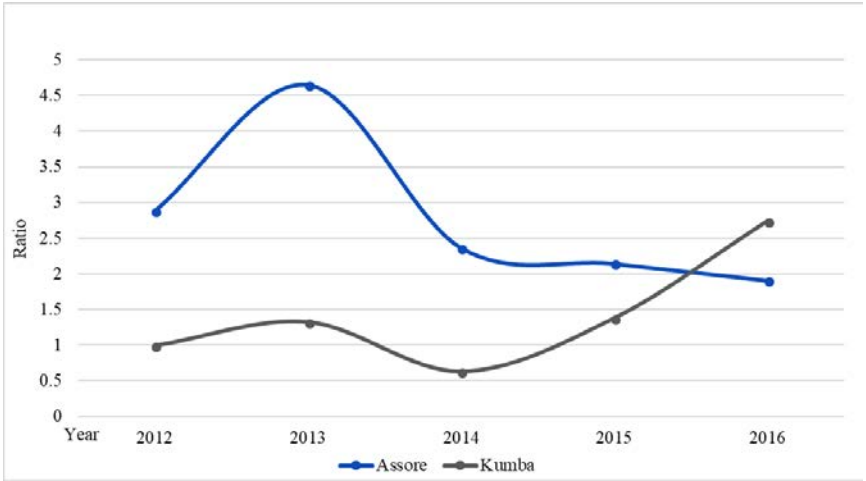


Figure 7.6: Quick ratios for iron ore companies

The companies' quick ratios were consistently above the standard value of one, a good indicator of their strong performance despite fluctuations over the period as shown in Figure 7.6. Assore's quick ratios were caused by general decreases in cash resources and trade and other receivables and consistent current liabilities. Kumba's strengthening quick ratios were supported by increasing cash and trade receivables, as current liabilities were steady.

7.4.3 Working capital

Figure 7.7 shows the comparisons of working capital of the selected iron ore companies between 2012 and 2016.

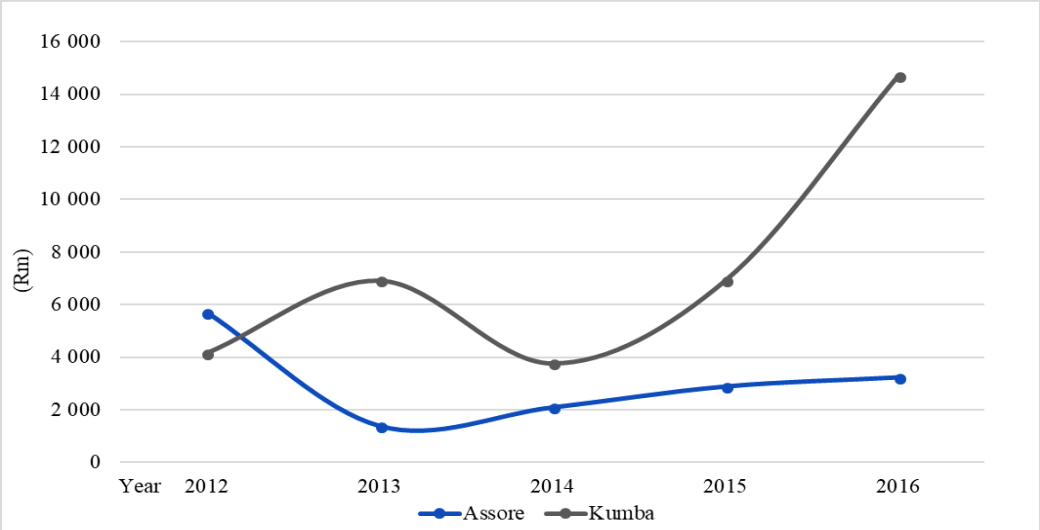


Figure 7.7: Working capital for iron ore companies

As can be seen in Figure 7.7, Assore and Kumba maintained significant working capital over the five years; which meant that both companies had a high capability to meet their day-to-day financial obligations.

7.4.4 Summary of liquidity performance

The companies had excellent liquidity throughout the period, reflected in the high current and quick ratios and working capital. This means that the companies had capability to meet their short-term financial obligations sufficiently, indicating there was no risk of short-term default. The influence of iron ore price on iron ore companies' liquidity performance is tested using the Pearson correlation coefficient below.

7.4.5 Correlation analysis of liquidity ratios against iron ore price

Table 7.3 shows the Pearson correlation coefficients of the analysed companies' liquidity ratios against iron ore prices over the period 2012 to 2016.

Table 7.3: Pearson correlation coefficients of liquidity ratios against iron ore prices

Company/Ratio	Current ratio	Quick ratio	Working capital
Assore	0.2	0.8	0.1
Kumba	-0.6	-0.6	-0.6
Sample mean	**-0.2**	**0.1**	**-0.3**

As shown in table 7.3, the companies had differing correlation coefficients of their liquidity ratios. Assore's current ratio and working capital had low positive correlation to iron ore price whilst its quick ratios had high positive correlation to iron ore price. Kumba' liquidity ratios all showed high negative correlation to iron ore price.

7.5 Solvency ratios

7.5.1 Debt to equity ratio

Figure 7.8 shows the selected iron ore companies' comparative debt to equity ratios for the period 2012 to 2016.

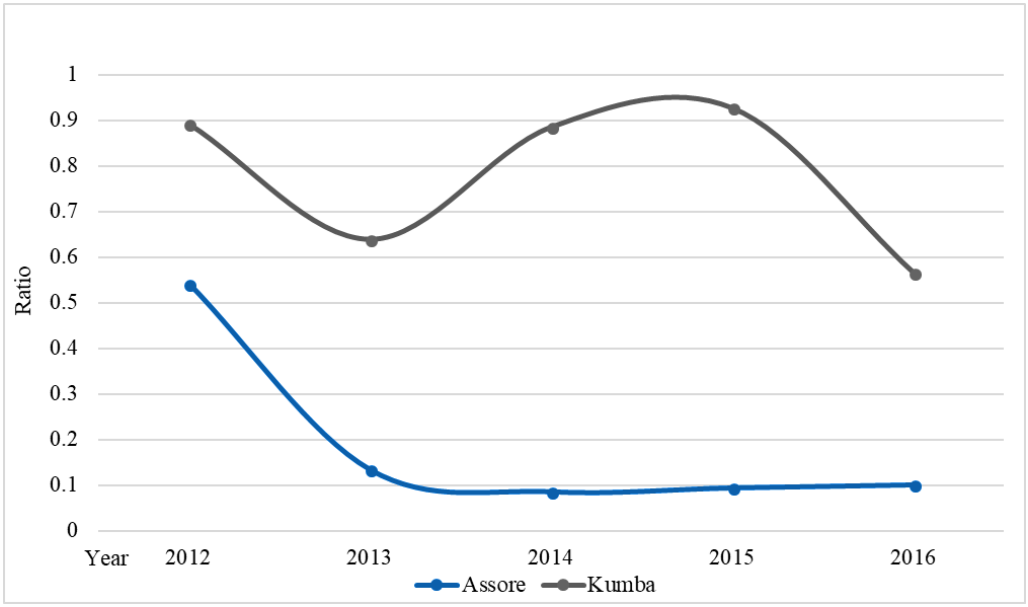


Figure 7.8: Debt to equity ratios for iron ore companies

Both companies maintained debt to equity ratios below the recommended limit of value one as shown in Figure 7.8. This mean the companies were able to finance their debt using equity in case of liquidation. Assore's low debt to equity ratios were driven by increasing equity value whilst liabilities decreased, over the course of the period. Its equity increased from R13 317m in 2012 to R18 912m in 2016 due to increasing retained earnings whilst its total liabilities decreased from R6 134m in 2012 to R1 917m in 2016 due to repayment of its long-term debt (Assore Limited, 2012-2016). Kumba's debt to equity ratio was driven by an increase in equity of R17 227m from 2012 to 2016 due also to increasing retained earnings despite an increase in total liabilities of R3 449m over the same period because of increasing interest bearing short and long-term borrowings (Kumba Iron Ore Limited, 2012-2016).

7.5.2 Debt to asset ratio

Figure 7.9 shows the comparison of debt to asset ratios of the selected iron ore companies during the period 2012 to 2016.

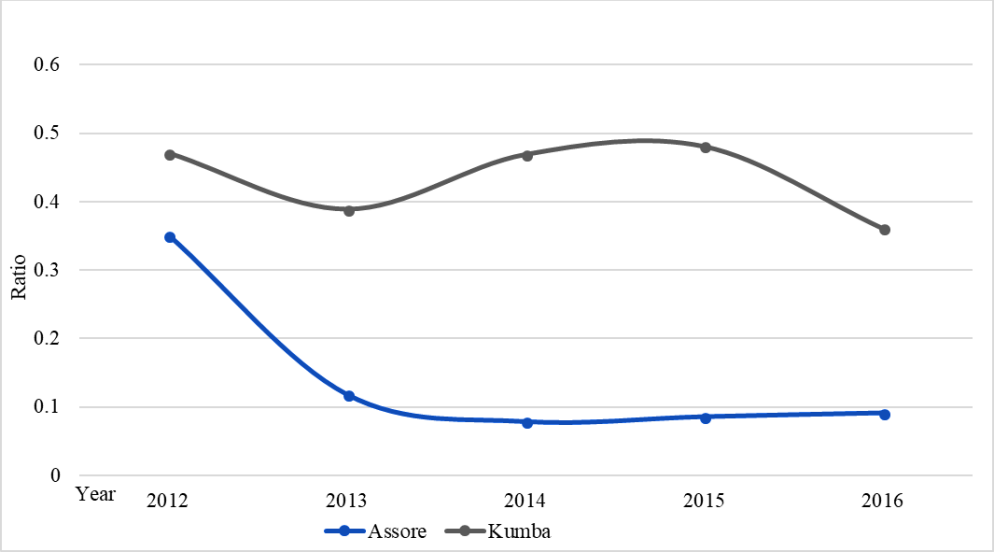


Figure 7.9: Debt to asset ratios for iron ore companies

As seen in Figure 7.9, the companies maintained low debt to asset ratios below the recommended standard of 0.5, underpinned by increasing total assets. Assore' debt to asset ratios decreased from 0.35 in 2012 to 0.09 in 2016, a reflection of its very low debt. This mean the companies were able to finance their debt using assets in case of liquidation.

7.5.3 Cash flow coverage ratio

Figure 7.10 shows the comparison of the selected iron ore companies' cash flow coverage ratios between 2012 and 2016.

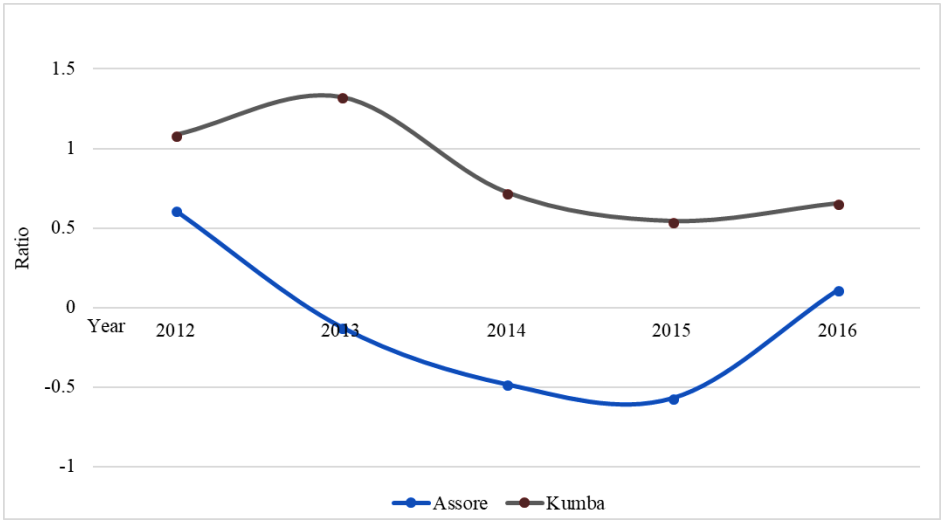


Figure 7.10: Cash flow coverage ratios for iron ore companies

The companies had differing cash flow coverage ratios over the period as shown in Figure 7.10. The companies' average cash flow coverage ratios were below the minimum standard of one; which means the companies were bot capable to finance their long-term financial obligations using generated cash flows. Assore's trend over the period was defined by three years of negative ratios because of negative operating cash flow. The change in accounting methods resulted in readjustment of the operating cash flow to the negative values on the company's cash flow statement hence the negative cash flow coverage ratio. Before the readjustment, the 2013 operating cash flow had increased from R3 757m in 2012 to R3 856m in 2013 that was readjusted to R-230m (Assore Limited, 2012-2013). Kumba's declining performance in 2014 and 2015 was attributed to decreasing generated cash and increasing financial costs as production and revenues decreased (Kumba Iron Ore Limited, 2015).

7.5.4 Summary of iron ore companies' solvency performance

The analysed companies displayed solid debt to equity and debt to asset ratios but poor cash flow coverage ratios. This means the iron ore companies were capable of meeting long-term debt obligations using their equities and assets but were unable

to do the same with generated cash flows. The influence of iron ore price on iron ore companies' solvency performance is tested using the Pearson correlation coefficient below.

7.5.5 Correlation analysis of solvency ratios against iron ore price

Table 7.4 shows the Pearson correlation coefficients of the analysed companies' solvency ratios against iron ore prices over the period 2012 to 2016.

Table 7.4: Pearson correlation coefficients of solvency ratios against iron ore prices

Company/Ratio	Debt to Equity	Debt to Asset	Cash Flow Coverage
Assore	0.5	0.6	0.5
Kumba	0.9	0.0	0.9
Sample mean	**0.7**	**0.3**	**0.7**

The companies' solvency ratios showed high positive correlation to iron ore price as shown in Table 7.4. the high positive correlation shows that iron ore price was a driver of solvency performance of iron ore mining companies' financial performance.

7.6 Activity ratios

7.6.1 Asset turnover ratio

Figure 7.11 shows the comparison of asset turnover ratios of the selected iron ore companies between 2012 and 2016.

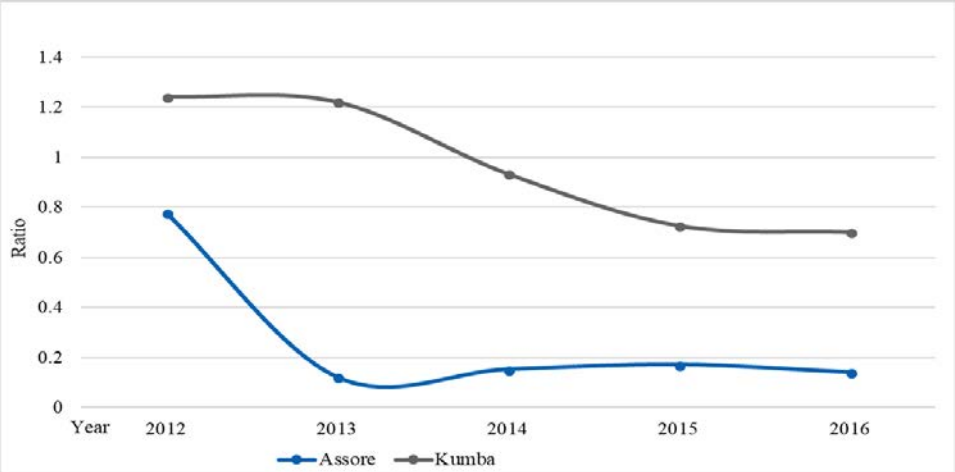


Figure 7.11: Asset turnover ratios for iron ore companies

The companies' asset turnover ratios differed over the period as shown in Figure 7.11, with Kumba showing higher turnover ratios compared to Assore. Kumba's turnover ratios progressively decreased year by year as revenues decreased and total assets increased. Its revenues were affected mostly by decreases in iron ore price; 28% drop in export iron ore price in 2014 and a 42% drop in average iron ore price in 2015. The company's increase in total assets was mainly driven by the housing expansion at its Kolomela mine and stay in business capital expenditure for construction work at its Sishen mine (Kumba Iron Ore Limited, 2014; 2015). Assore's turnover ratios fluctuated from the influence of revenues as total assets increased. The declining revenues are a concern as this may indicate decreases in efficiencies within the organisations.

7.6.2 Fixed asset turnover ratio

Figure 7.12 shows fixed turnover ratios of the selected iron ore companies for the period 2012 to 2016.

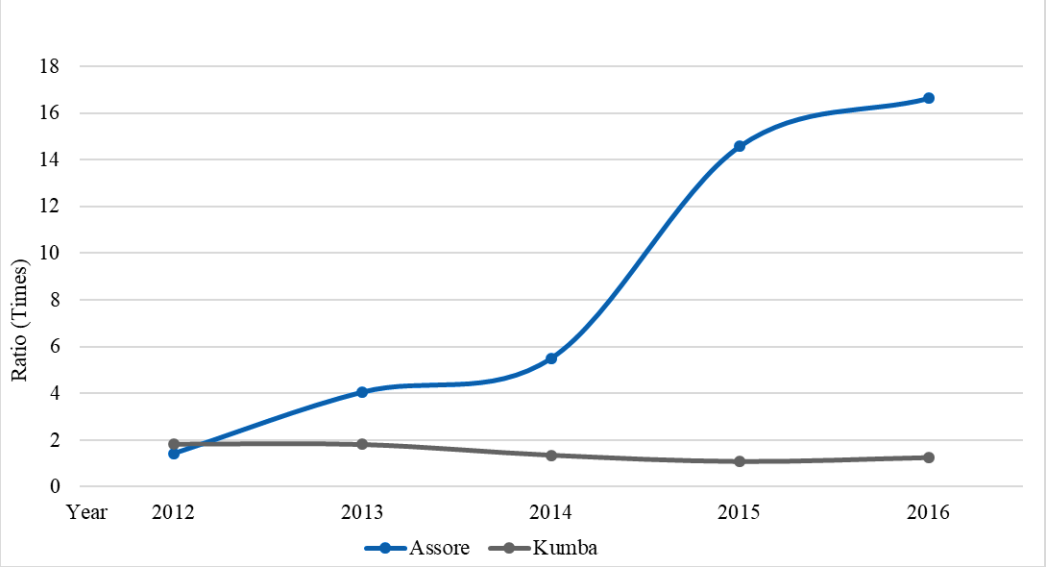


Figure 7.12: Fixed asset turnover ratios for iron ore companies

The fixed asset turnover ratios shown in Figure 7.12 shows a reversal of asset turnover positions. Assore had higher fixed asset turnover ratios compared to Kumba. Whilst Assore's ratios progressively increased, Kumba's ratios fluctuated. Lower fixed assets and increasing revenues drove Assore's higher turnover ratios in 2015 and 2016 (Assore Limited, 2016). Higher fixed assets and decreasing

revenues drove Kumba's lower turnover ratios in 2015 and 2016 (Kumba Iron Ore Limited, 2016).

7.6.3 Inventory turnover ratio

Figure 7.13 shows the comparative inventory turnover ratios of the selected iron ore companies over the period 2012 to 2016.

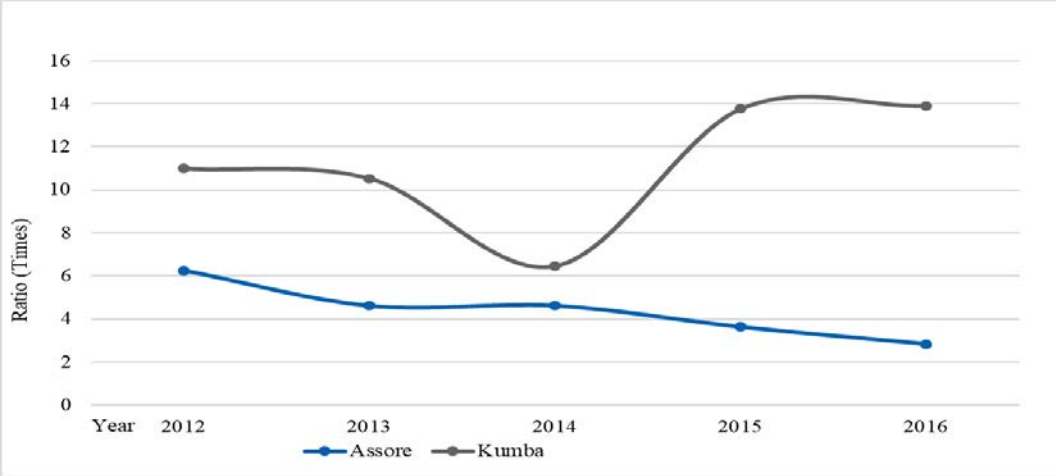


Figure 7.13: Inventory turnover ratios for iron ore companies

The companies had satisfactory inventory turnover ratios as shown in Figure 7.13, with Kumba's ratios steadily increasing whilst Assore's ratios declined. Despite accounting readjustments of Assore's inventories between 2013 and 2015 resulting in lower accounting figure, the company's turnover ratios remained solid, improving progressively. Kumba's turnover ratios for the period were characterised by three cycles, 2012 to 2013 they were driven by both increases in revenues and inventories, 2014 the ratio was driven by lower revenue and higher inventories and 2015 to 2016 they were driven by both lower revenues and lower inventories. Its revenues were mostly driven by fluctuations in the iron ore prices whilst movements in inventory were mostly because of ore stockpile management as the company sought to maximise plant capacity utilisation including processing low grade material (Kumba Iron Ore Limited, 2012 - 2016).

7.6.4 Summary of activity performance

The companies displayed mixed activity performance with low asset turnover ratios and solid fixed asset and inventory turnover ratios. Despite the mixed performance, the companies effectively utilised their fixed assets to generate revenues. The

influence of iron ore price on iron ore companies' activity performance is tested using the Pearson correlation coefficient below.

7.6.5 Correlation analysis of activity ratios against iron ore price

Table 7.5 shows the Pearson correlation coefficients of the analysed companies' activity ratios against iron ore prices over the period 2012 to 2016.

Table 7.5: Pearson correlation coefficients of activity ratios against iron ore prices

Company/Ratio	Asset Turnover	Fixed Assets Turnover	Inventory Turnover
Assore	0.5	-0.9	0.8
Kumba	1.0	1.0	-0.5
Sample mean	**0.7**	**0.0**	**0.1**

The companies' activity ratios showed high positive correlation to iron ore price as shown in Table 7.5. The high correlation shows that iron ore price was a driver of activity performance of iron ore mining companies' financial performance.

7.7 Market ratios

7.7.1 Share price

Figure 7.14 shows the comparison of share prices for the analysed companies between 2012 and 2016.

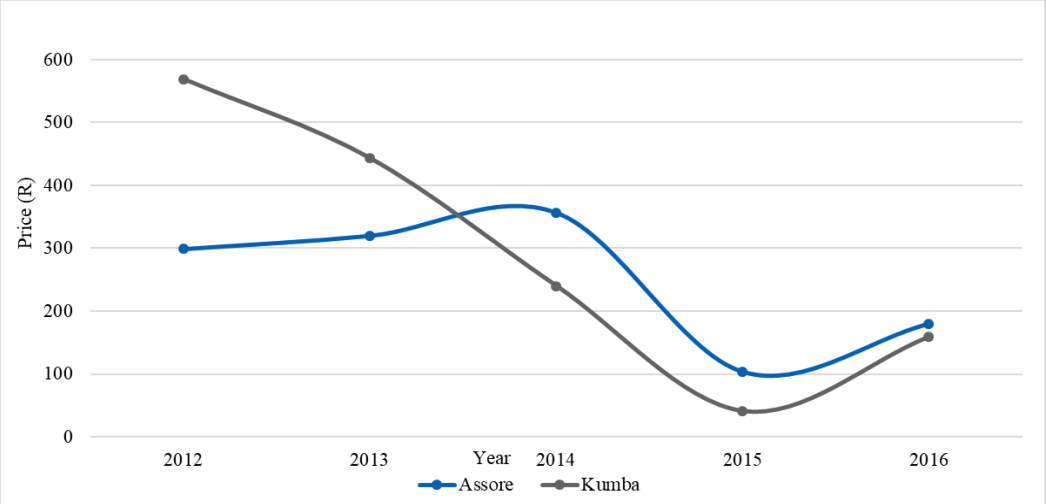


Figure 7.14: Share prices of iron ore mining companies

The companies displayed differing trends between 2012 and 2014 and between

2014 and 2016 as shown in Figure 7.14. The companies' share price trends loosely resemble the net profit margin ratio trends possibly, as the market reacted to earnings announcements. Kumba's share price was in free fall between 2012 and 2015 before recovering in 2016. Assore's share price marginally increased from 2012 to 2014 then it slumped in 2015 before recovering in 2016.

7.7.2 Earnings per share ratio

Figure 7.15 shows the comparative earnings per share ratios of the selected iron ore companies over the period 2012 to 2016.

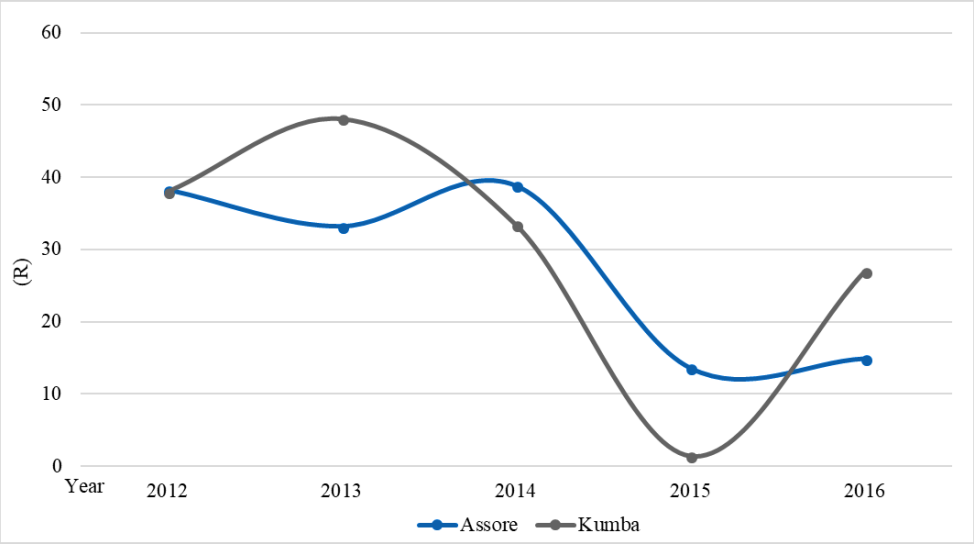


Figure 7.15: Earnings per share ratios for iron ore companies

The companies had very solid EPS ratios over the period as shown in Figure 7.15 with a noticeable decline in 2015 as iron ore prices decreased. On average over the period, the companies delivered to shareholders almost equal amounts; Assore R28 per share and Kumba R30 per share. Earnings drove the companies' EPS ratios, as shares remained flat throughout the period. The earnings per share ratio trends is almost similar to the share price trends as shown in Figure 7.14.

7.7.3 Price to earnings ratio

Figure 7.16 shows the comparative price to earnings ratios of the selected iron ore companies over the period 2012 to 2016.

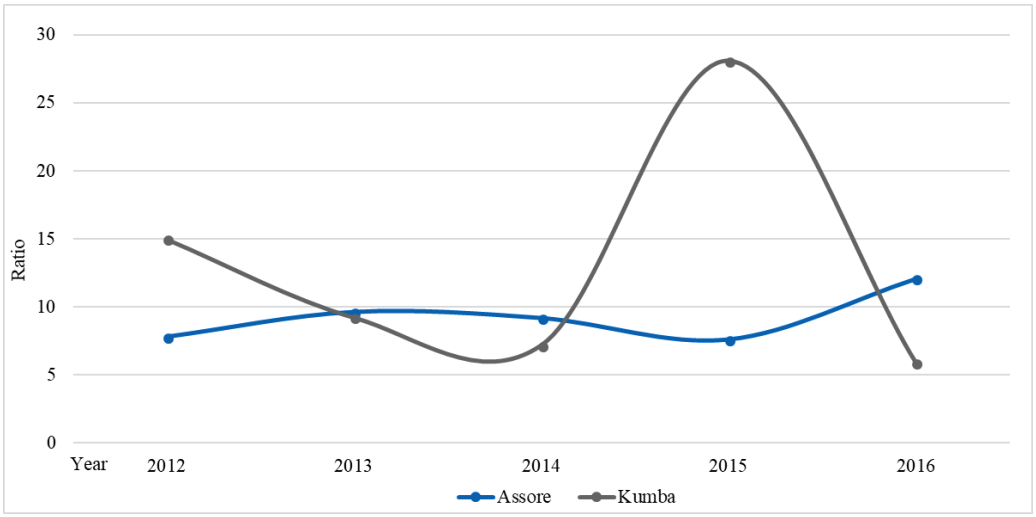


Figure 7.16: Price to earnings ratios for iron ore companies

The companies' price to equity ratios were equally solid throughout the period as shown in Figure 7.16, with Kumba having better P/E ratios compare To Assore. Movements in share prices (Figure 7.14), and EPS mostly corresponded for both companies over the period.

7.7.4 Book value per share ratio

Figure 7.17 shows the comparative book value per share ratios of the selected iron ore companies over the period 2012 to 2016.

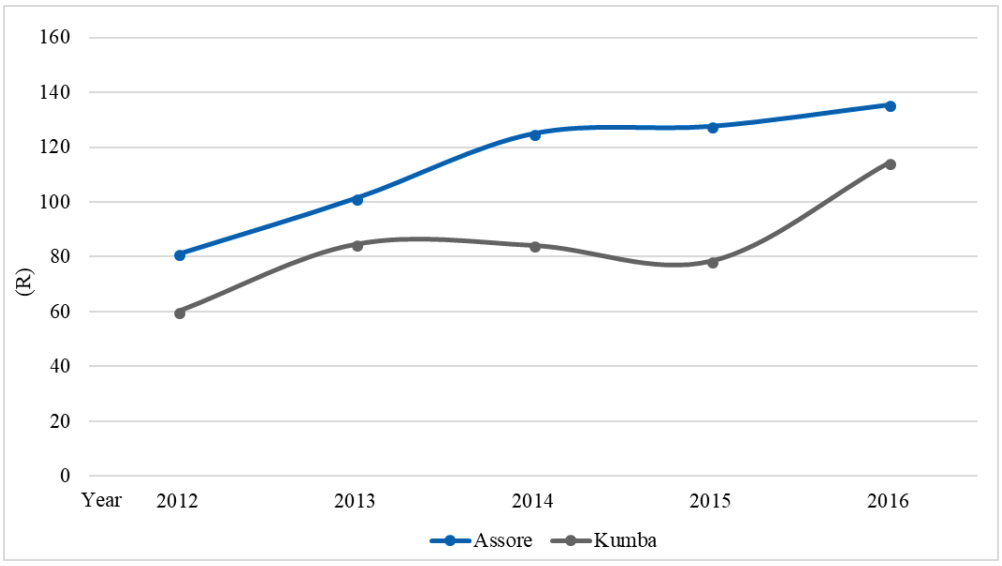


Figure 7.17: Book value per share ratios for iron ore companies

The companies' book value per share ratios were satisfactory showing increasing

trends as shown in Figure 7.17. Assore had higher BV ratios compared to Kumba. Both companies' BV ratios were driven by progressive increases in equity values supported by profitability and retained earnings.

7.7.5 Summary of iron ore companies' market performance

The companies' market performance was very satisfactory. This means the companies consistently delivered value to their shareholders through share earnings and maintaining market confidence as reflected in their solid share prices (Figure 7.14). The influence of iron ore price on iron ore companies' market performance is tested using the Pearson correlation coefficient below.

7.7.6 Correlation analysis of market ratios against iron ore price

Table 7.6 shows the Pearson correlation coefficients of the analysed companies' market ratios against iron ore prices over the period 2012 to 2016.

Table 7.6: Pearson correlation coefficients of market ratios against iron ore prices

Company/Ratio	Earnings per share	Price to earnings	Book price per share	Share price
Assore	0.9	-0.3	-0.9	0.8
Kumba	0.9	-0.3	-0.6	0.9
Sample mean	**0.9**	**-0.3**	**-0.7**	**0.9**

The companies' market ratios showed high positive correlation to iron ore price as shown in Table 7.6. The high correlation shows that iron ore price was a driver of market performance of iron ore mining companies' financial performance.

7.8 Comparison of iron ore price in USD against Rand

Figure 7.18 shows the comparison of the iron ore price in USD/t against the price in Rand/t between 2012 and 2016.

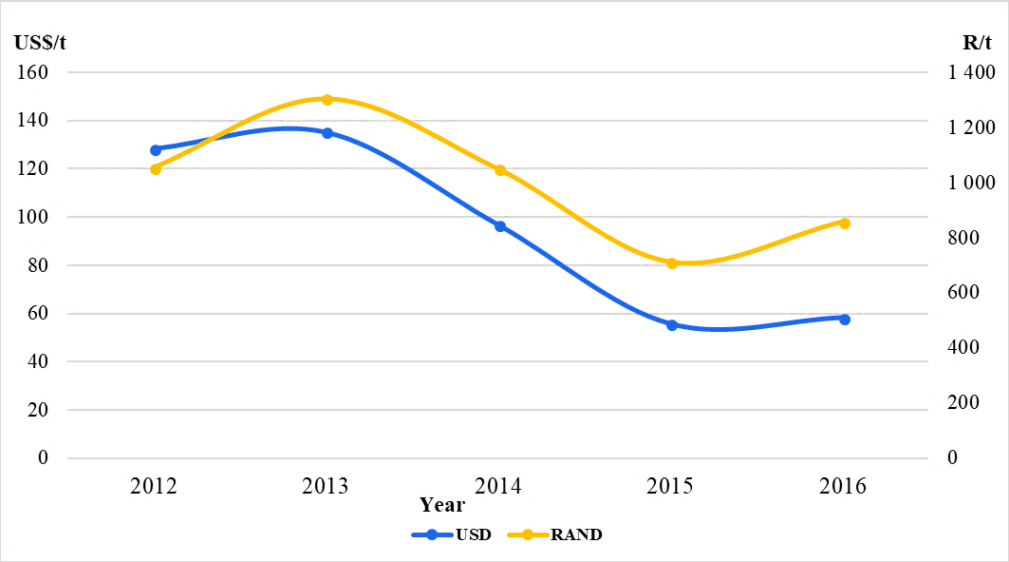


Figure 7.18: Iron ore price: USD against Rand

As can be seen in Figure 7.18, the USD and Rand prices strongly resembled each other over the five-year period as they both decreased except for a recovery in 2016. Despite the weakening rand value, the rand price could not mount a positive trend mostly because of the high volatility in the USD price. With iron ore prices largely driven by demand in the steel industry, the slowdown in the Chinese and emerging markets significantly depressed demand and subsequently prices (Department of Mineral Resources, 2016). Ernst & Young Global Limited (2015) noted that the existence in the sector of state owned producers in the sector also drove price volatility and suppression as these producers are often subsidised allowing them to continue operating during loss making cycles. Although the exchange rate did have significant impact on performance margins of the sector, the high fluctuations in the USD price of the commodity dampened its overall influence over the period.

7.9 Failure prediction analysis of the iron ore mining companies

The Altman Z”-score analysis is used to confirm the findings in ratio analysis and to predict financial failure of the companies and its possible implications. Table 7.7 shows the comparative Z”-scores of the selected iron ore companies for the period 2012 to 2016.

Table 7.7: Z”-scores of iron ore companies

Company/Year	2012	2013	2014	2015	2016	Mean	Zone
Assore	10.0	12.6	17.1	16.2	15.4	14.2	**Safe**
Kumba	7.4	8.3	5.4	3.2	6.8	6.3	**Safe**

As can be seen in Table 7.7 the companies had healthy financial positions throughout the five-year period. The financial health of each company is interpreted in the following Sub-sections.

7.9.1 Assore

The classification of Assore’s financial health as safe supports the findings its ratios’ analysis as the company had solid performances in all analysed ratio categories. Despite the decline in values after 2014, the company still had satisfactory performance.

7.9.2 Kumba

Kumba’s financial health is classified as safe, a confirmation of the observations of its ratios’ analysis. The company consistently delivered solid financial performances and financial value to its shareholders throughout the period whilst maintaining strong flexible financial status.

7.9.3 Summary of failure prediction analysis of iron ore companies

The Altman Z”-score model supported the findings of the companies’ ratios’ analysis. The analysed companies had solid financial health.

7.10 Chapter summary

This chapter has presented the results of the analysis of iron ore companies’ financial performance. The companies displayed solid profitability performance; which means the companies were profitable. They also had high liquidity ratios; meaning they were satisfactorily liquid and were able to fulfil short-term financial obligations. Their solvency performance was mixed, showing solid debt to equity and debt to asset ratios and poor cash flow coverage ratios; meaning they were capable of fulfilling long-term debt obligations using their equities and assets but were unable to do so with generated cash flows. Activity performance was mixed as well with solid fixed asset and inventory turnover ratios and low asset turnover

ratios; meaning the companies effectively utilised fixed assets and effectively turned inventory to generate revenues. The companies displayed good market performance as they delivered value to their shareholders through share earnings and solid share prices. A correlation test of ratios to iron ore price was also done. Profitability, solvency, activity and market ratios showed high positive correlation to iron ore price and liquidity ratios showed mixed correlations to iron or price. The failure prediction analysis supported the observations of the companies' ratios' analysis and classified the companies' financial health as safe.

8 CONCLUSION AND RECOMMENDATIONS

8.1 Chapter overview

This chapter presents a summary of the findings of this research study. The presentation reviews the financial performance of the analysed commodity sector mining companies and their financial health positions including any identified trends and challenges within the sectors. The chapter ends by providing recommendations on improving performance and suggestions on future work based on this research study.

8.2 Findings

The analysis of platinum, gold, coal and iron ore mining companies observed a number of findings on the influence of global and local economic and operating challenges on the mining industry's financial performance and health between 2012 and 2016. The findings are discussed in the following sub-sections.

8.2.1 Platinum mining companies

The analysed platinum mining companies showed overall low and weakening profitability, reflected by decreasing and at times negative earnings margins as financial and operational challenges affected the companies' financial performance. Despite declining earnings, the companies maintained relatively satisfactory liquidity and were capable of meeting their short-term financial obligations. Their solvency ratios were mixed with debt to equity and debt to asset ratios being acceptable and indication of the companies' ability to meet their long-term debt obligations using their equities and assets. Cash flow coverage ratios were poor; indicating the companies were not capable of meeting their long-term debt obligations using generated cash. Activity ratios were solid with indications of strengthening; this meant the companies were efficiently utilising their assets to generate revenues and profits. The companies' market ratios were poor owing to the poor realised net earnings; this meant the companies did not deliver value to its shareholders. The correlation test showed that profitability ratios had low positive correlation to platinum price; liquidity ratios showed both positive and negative high correlation to platinum price, solvency and activity ratios showed high negative correlation to platinum price and market ratios showed mixed low

correlations to platinum price. The overall high correlations to platinum price indicate platinum price influenced the companies' financial performance over the period under review, supporting the companies' ratios' analysis. Failure prediction analysis support the companies' ratios' analysis and observed that four companies had safe financial health, one had grey financial health and three companies had their financial health in distress.

8.2.2 Gold mining companies

The combination of declining revenues, declining earnings and increasing operating and financial costs depressed financial performance of the gold mining companies over the period under review. For most companies increases in finance costs were driven by the increases in lending and investment premiums as investors and financiers sought to cushion themselves from the impacts of uncertainties created by government policies and decisions including the application and interpretation of the Mining Charter. The analysis of their financial performance showed that their profitability over the period was poor and declining. This meant the companies were struggling to generate enough revenues and retain sufficient net earnings. The companies displayed differing performances in their liquidity ratios, but overall combined liquidity was poor and declining which meant the companies did not have enough current assets to cover short-term financial obligations. Debt ratios were satisfactory, but cash flow coverage ratios were poor indicating the companies were capable of meeting their long-term debt obligations using their equities and assets but not their generated cash. Despite differing turnover levels, the companies had good activity ratios indicating they were efficiently utilising their assets to generate revenues and profits. The companies' market ratios were poor and largely fluctuated in response to profitability performance. The correlation test showed that profitability, liquidity and market ratios had high positive correlation to gold price, solvency ratios had high negative correlation to gold price and activity ratios had mixed positive and negative correlations to gold price. This supported the findings of the companies' ratios' analysis. Failure prediction analysis supported the findings of the companies' ratios' analysis as well and observed that four companies had safe financial health and three had their financial health in distress.

8.2.3 Coal mining companies

Despite increased productivity boosting revenues, declining coal prices and increasing operating and financial costs eroded income margins. The analysed coal mining companies' profitability progressively weakened over the period reflected by poor profitability ratios that indicated the companies were not retaining enough earnings. Liquidity and solvency ratios were poor, an indication that the companies did not have the capability to fulfil their short and long term financial and debt obligations using their equities and assets. Activity ratios were solid which meant the companies were efficiently utilising their assets to generate revenues and profits. The companies' market ratios were poor underpinned by poor net earnings. The correlation test showed that profitability ratios had high positive correlation to coal price, liquidity and market ratios showed mixed high correlations to coal price and solvency and activity ratios showed high negative correlation to coal price. The correlation coefficients supported findings of the companies' ratios analysis, but the mixed correlations indicate the influence of other factors besides coal price. Failure prediction analysis supported the findings of the companies' ratios' analysis and observed that two companies had safe financial health, one company had its financial health in the grey zone and two companies had financial health in distress. The production profile of the coal industry although negatively declining, fluctuated in a narrow range. Local and export sales volumes and values also maintained historical ratios although there was a marginal increase in local sales values over the five-year period.

8.2.4 Iron ore mining companies

The high business uncertainty in the sector for much of the period under review owing to numerous economic challenges that included low market demand, iron ore price volatility, increased labour costs resulted in declining earnings. The analysed companies showed solid but declining profitability with a hint of recovery in 2016. Overall, the companies generated enough revenues and retained sufficient positive earnings. Liquidity and solvency ratios were good which meant the companies were capable of settling their short and long term financial and debt obligations without affecting the viability of operations. Despite mixed performance in their activity ratios, the companies retained solid ratio levels, which meant the companies were

effectively utilising their assets to generate revenues and profits. The companies' market ratios were good owing to good earnings, which meant the companies returned value to their shareholders. The correlation test showed that profitability, solvency, activity and market ratios had high positive correlation to iron ore price and liquidity ratios had high negative correlation to iron ore price. This supported the findings of the companies' ratios' analysis. The failure prediction analysis supported the findings of the companies' ratios' analysis and observed that both analysed companies had safe financial health.

8.3 Research limitations

Unavailability of full segmental financial data on financial reports of diversified companies that would have allowed for wider analysis of all operations involved in the commodity sectors under review. Because of the limited number of companies analysed the information may have less relevance as a measure of the commodity sectors besides providing guiding indications. The different accounting methods used by different companies introduced inconsistencies in some of the data in financial reports.

8.4 Recommendations for improving company performance

From this study, mining executives should consider the following when analysing their companies' financial performance and health:

- They must understand the value of frequent use of financial ratios in monitoring performance as an aid to good management and decision-making practices;
- They must have a good understanding of the relevance of each utilised ratio to their specific organisation based on factors that include commodity sector, company size, and company structure. By so doing they may be able to correlate specific ratios to specific challenges in their business cycle;
- Because of the volatile and dynamic nature of challenges and variables in the business environment, it is vital that companies adopt and maintain a balanced combination of response plans. For example, the principle of economies of scale works to counter a lot of operational challenges but

utilising a combination of factors such as containing costs and increasing asset turnover can be more effective in dealing with specific challenges; and

- It is clear from the study that companies with strong policies on earnings retention have a good chance of weathering challenges by maintaining liquidity.

8.5 Suggestions for future research work

Every research has a limited scope but in the process of doing it, other areas of potential study are discovered. For this study they are:

- Subject to availability of relevant data a broader study of more companies per commodity sector will better represent the industry; and
- Research over longer periods to compare behaviour of the different ratios during various cycles and determine the ones that are reflective of specific cycles.
- Study comparing the findings of the Altman Z”-score analysis model to other failure prediction models to validate its findings as well as determine if there are significant differences in analysing the South African mining industry.

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10 APPENDICES

Appendix 10.1: Financial ratio categories and formulas

Category	Formula	Category purpose
Profitability ratios		Measure the ability of the company to generate profits
Gross profit margin (%)	(Gross income * 100) / Revenue	
Net profit margin (%)	(Net income * 100) / Revenue	
Return on equity (%)	(Net income * 100) / Equity	
Return on assets (%)	(Net income * 100) / Total assets	
Liquidity ratios		Measure the company's ability to cover its short-term financial obligations
Current ratio	Current assets / Current liabilities	
Quick ratio or Acid test	Liquid assets / Current liabilities	
Working capital (Rm)	Current assets - Current liabilities	
Solvency ratios		Measure the company's ability to meet its long-term financial obligations
Debt to equity	Total liabilities / Total equity	
Debt to asset	Total liabilities / Total assets	
Cash flow coverage	Operating cash flow / Total liabilities	
Activity ratios		Measure the company's ability to efficiently utilise its available resources or assets to generate revenue and profit
Asset turnover	Revenue / Total assets	
Fixed asset turnover	Revenue / Fixed assets	
Inventory turnover	Revenue / Inventories	
Market ratios		Measure a company’s current economic value as determined by market sentiments
Earnings per share (R')	Net income / Common shares	
Price to earnings	Share price / Earnings per share	
Book value per share (R')	Equity / Common shares	

Appendix 10.2: Profitability ratios of platinum mining companies

(Sources: Andulela Investment Holdings Limited, 2012-2016; Anglo American Platinum Limited, 2012-2016; Atlatsa Resources Corporation, 2012-2016; Impala Platinum Holdings Limited, 2012-2016; Jubilee Platinum Plc, 2012-2016; Lonmin Plc, 2012-2016; Northam Platinum Limited, 2012-2016; Royal Bafokeng Platinum Limited, 2012-2016; Tharisa Plc, 2013-2016)

Gross Profit Margin

Company/Year	2012	2013	2014	2015	2016	Mean
Andulela	13.0%	21.2%	13.4%	15.2%	16.8%	**15.9%**
AngloPlat	2.0%	11.6%	4.1%	8.7%	9.5%	**7.2%**
Atlatsa	-66.2%	-19.5%	-11.5%	-26.7%	-23.2%	**-29.4%**
Implats	25.2%	15.8%	11.2%	5.0%	0.0%	**11.4%**
Lonmin	19.6%	4.5%	25.0%	4.3%	-6.7%	**9.4%**
Northam	28.5%	36.1%	33.8%	27.4%	13.1%	**27.8%**
Royal Bafokeng	11.9%	18.5%	23.0%	-1.3%	7.2%	**11.8%**
Tharisa	0.0%	12.0%	14.1%	17.5%	24.8%	**17.1%**
Sample mean	**4.9%**	**12.5%**	**14.1%**	**6.3%**	**5.2%**	**8.6%**

Net Profit Margin

Company/Year	2012	2013	2014	2015	2016	Mean
Andulela	-3.4%	1.1%	-2.4%	-2.0%	-5.3%	**-2.4%**
AngloPlat	-15.8%	-3.3%	0.1%	-20.8%	1.1%	**-7.7%**
Atlatsa	-81.3%	51.1%	-20.9%	-179.4%	-40.7%	**-54.2%**
Implats	15.6%	3.6%	-0.4%	-12.7%	-0.1%	**1.2%**
Lonmin	-34.1%	13.0%	-21.0%	-146.9%	-35.8%	**-44.9%**
Northam	8.4%	11.9%	0.4%	-16.7%	-7.9%	**-0.8%**
Royal Bafokeng	9.6%	13.8%	15.9%	-100.0%	5.0%	**-11.1%**
Tharisa	0.0%	-22.0%	-22.8%	2.4%	7.2%	**-8.8%**
Sample mean	**-14.4%**	**8.6%**	**-6.4%**	**-59.5%**	**-9.6%**	**-16.2%**

Return on Equity

Company/Year	2012	2013	2014	2015	2016	Mean
Andulela	-10.6%	2.2%	-5.9%	-5.0%	-17.1%	**-7.3%**
AngloPlat	-13.6%	-3.5%	0.1%	-31.7%	1.7%	**-9.4%**
Atlatsa	-46.6%	26.3%	-11.9%	-702.1%	-96.5%	**-166.2%**
Implats	8.2%	2.0%	-0.2%	-7.9%	-0.1%	**0.4%**
Lonmin	-20.0%	5.5%	-6.0%	-124.9%	-26.6%	**-34.4%**
Northam	3.0%	4.9%	0.2%	-11.2%	-5.8%	**-1.8%**
Royal Bafokeng	1.8%	2.8%	3.3%	-26.0%	1.8%	**-3.3%**
Tharisa	0.0%	-88.4%	-26.1%	3.4%	7.8%	**-25.9%**
Sample mean	**-11.1%**	**-6.0%**	**-5.8%**	**-113.2%**	**-16.8%**	**-30.6%**

Return on Assets

Company/Year	2012	2013	2014	2015	2016	Mean
Andulela	-4.8%	1.0%	-2.6%	-2.2%	-6.9%	**-3.1%**
AngloPlat	-7.9%	-1.9%	0.0%	-17.1%	0.9%	**-5.2%**
Atlatsa	-11.7%	12.9%	-6.9%	-113.1%	-18.0%	**-27.3%**
Implats	6.0%	1.3%	-0.2%	-5.4%	-0.1%	**0.3%**
Lonmin	-11.9%	4.3%	-4.7%	-78.2%	-19.8%	**-22.1%**
Northam	2.5%	3.7%	0.1%	-5.4%	-2.7%	**-0.3%**
Royal Bafokeng	1.4%	2.2%	2.5%	-15.4%	0.8%	**-1.7%**
Tharisa	0.0%	-12.3%	-15.8%	2.0%	4.9%	**-5.3%**
Sample mean	**-3.8%**	**1.4%**	**-3.4%**	**-29.3%**	**-5.1%**	**-8.1%**

Appendix 10.3: Liquidity ratios of platinum mining companies

Current ratio

	Company/Year	2012	2013	2014	2015	2016	Mean
AND	Andulela	0.99	0.90	0.73	0.69	0.67	**0.80**
AMS	AngloPlat	1.38	1.42	1.29	1.86	1.39	**1.47**
ATL	Atlatsa	1.06	0.51	0.56	0.14	0.23	**0.50**
IMP	Implats	2.16	2.66	2.44	2.03	2.55	**2.37**
LON	Lonmin	1.37	2.33	2.61	1.00	3.65	**2.19**
NHM	Northam	1.04	1.12	1.67	2.20	4.13	**2.04**
RBP	Royal Bafokeng	4.83	4.52	4.84	2.27	2.02	**3.70**
THA	Tharisa	0.00	0.24	0.98	0.87	1.01	**0.77**
	Sample mean	**1.83**	**1.71**	**1.89**	**1.38**	**1.96**	**1.75**

Quick ratio

Company/Year	2012	2013	2014	2015	2016	Mean
Andulela	0.75	0.65	0.50	0.48	0.44	**0.56**
AngloPlat	0.32	0.23	0.22	0.31	0.41	**0.30**
Atlatsa	0.82	0.50	0.54	0.12	0.23	**0.44**
Implats	0.87	1.29	1.18	0.85	1.34	**1.11**
Lonmin	0.82	0.90	0.61	0.50	2.02	**0.97**
Northam	0.35	0.55	0.76	1.77	2.96	**1.28**
Royal Bafokeng	4.16	4.36	4.67	1.99	1.67	**3.37**
Tharisa	0.00	0.17	0.76	0.76	0.80	**0.62**
Sample mean	**1.15**	**1.08**	**1.16**	**0.85**	**1.23**	**1.09**

Working capital (Rm)

	Company/Year	2012	2013	2014	2015	2016	Mean
AND	Andulela	-3	-28	-94	-121	-157	**-81**
AMS	AngloPlat	5 712	7 239	4 997	9 603	7 307	**6 972**
ATL	Atlatsa	11	-688	-193	-708	-723	**-460**
IMP	Implats	7 072	10 797	8 943	7 746	11 982	**9 308**
LON	Lonmin	1 425	3 899	6 056	0	7 547	**3 785**
NHM	Northam	50	190	804	3 160	3 690	**1 579**
RBP	Royal Bafokeng	1 709	1 760	2 811	1 461	1 365	**1 821**
THA	Tharisa	0	-2 381	-16	-124	7	**-628**
	Sample mean	**2 282**	**2 599**	**2 913**	**2 627**	**3 877**	**2 860**

Appendix 10.4: Solvency ratios of platinum mining companies

Debt to Equity Ratio

Company/Year	2012	2013	2014	2015	2016	Mean
Andulela	1.20	1.24	1.29	1.24	1.47	**1.29**
AngloPlat	0.72	0.78	0.79	0.86	0.95	**0.82**
Atlatsa	2.97	1.04	0.74	5.21	4.37	**2.87**
Implats	0.38	0.47	0.45	0.47	0.45	**0.45**
Lonmin	0.68	0.28	0.29	0.60	0.34	**0.44**
Northam	0.18	0.33	0.29	1.08	1.17	**0.61**
Royal Bafokeng	0.30	0.30	0.29	0.36	0.37	**0.33**
Tharisa	0.00	-8.16	0.65	0.68	0.58	**-1.56**
Sample mean	**0.92**	**-0.47**	**0.60**	**1.31**	**1.22**	**0.72**

Debt to Asset Ratio

Company/Year	2012	2013	2014	2015	2016	Mean
Andulela	0.55	0.55	0.56	0.55	0.60	**0.56**
AngloPlat	0.42	0.43	0.44	0.46	0.49	**0.45**
Atlatsa	0.75	0.51	0.42	0.84	0.81	**0.67**
Implats	0.27	0.32	0.31	0.32	0.31	**0.31**
Lonmin	0.41	0.22	0.23	0.37	0.26	**0.30**
Northam	0.15	0.25	0.23	0.52	0.54	**0.34**
Royal Bafokeng	0.23	0.23	0.23	0.27	0.27	**0.25**
Tharisa	0.00	1.14	0.40	0.41	0.37	**0.58**
Sample mean	**0.40**	**0.46**	**0.35**	**0.47**	**0.46**	**0.43**

Cash Flow Coverage Ratio

Company/Year	2012	2013	2014	2015	2016	Mean
Andulela	-0.03	0.06	0.01	-0.01	-0.02	**0.00**
AngloPlat	0.08	0.19	0.20	0.32	0.36	**0.23**
Atlatsa	-0.05	0.02	-0.04	-0.07	-0.13	**-0.05**
Implats	0.25	0.22	0.16	0.09	0.10	**0.17**
Lonmin	0.14	0.02	-0.12	-0.01	0.11	**0.03**
Northam	0.24	0.15	0.26	0.03	0.09	**0.16**
Royal Bafokeng	0.16	0.19	0.27	0.12	0.11	**0.17**
Tharisa	0.00	-0.01	0.16	0.34	0.19	**0.17**
Sample mean	**0.11**	**0.10**	**0.11**	**0.10**	**0.10**	**0.11**

Appendix 10.5: Activity ratios of platinum mining companies

Asset Turnover

Company/Year	2012	2013	2014	2015	2016	Mean
Andulela	1.42	0.89	1.08	1.14	1.30	**1.17**
AngloPlat	0.50	0.59	0.62	0.82	0.80	**0.67**
Atlatsa	0.14	0.25	0.33	0.63	0.44	**0.36**
Implats	0.38	0.37	0.36	0.42	0.42	**0.39**
Lonmin	0.35	0.33	0.22	0.53	0.55	**0.40**
Northam	0.30	0.31	0.36	0.32	0.34	**0.33**
Royal Bafokeng	0.14	0.16	0.16	0.15	0.16	**0.16**
Tharisa	0.00	0.56	0.69	0.82	0.69	**0.69**
Sample mean	**0.46**	**0.43**	**0.48**	**0.60**	**0.59**	**0.51**

Fixed Assets Turnover

Company/Year	2012	2013	2014	2015	2016	Mean
Andulela	4.51	2.84	3.55	3.96	4.29	**3.83**
AngloPlat	0.97	1.21	1.26	1.50	1.61	**1.31**
Atlatsa	0.16	0.30	0.37	0.70	0.51	**0.41**
Implats	0.71	0.67	0.62	0.69	0.72	**0.68**
Lonmin	0.56	0.56	0.36	0.65	0.95	**0.61**
Northam	0.80	0.71	0.85	0.87	0.82	**0.81**
Royal Bafokeng	0.32	0.34	0.35	0.30	0.32	**0.32**
Tharisa	0.00	0.80	0.95	1.15	1.00	**0.97**
Sample mean	**1.15**	**0.93**	**1.04**	**1.23**	**1.28**	**1.12**

Inventory Turnover

Company/Year	2012	2013	2014	2015	2016	Mean
Andulela	23.38	12.95	13.77	14.21	12.48	**15.36**
AngloPlat	2.69	2.66	3.25	3.67	3.79	**3.21**
Atlatsa	152.78	523.47	326.83	132.37	404.96	**308.08**
Implats	4.04	3.53	4.02	4.00	4.38	**3.99**
Lonmin	6.21	3.39	2.59	4.60	4.56	**4.27**
Northam	4.54	5.03	4.96	5.48	4.81	**4.97**
Royal Bafokeng	69.72	91.58	72.87	97.90	81.32	**82.68**
Tharisa	0.00	8.96	16.53	27.57	13.93	**16.75**
Sample mean	**37.62**	**81.45**	**55.60**	**36.22**	**66.28**	**55.44**

Appendix 10.6: Market ratios of platinum mining companies

Earnings per share

Company/Year	2012	2013	2014	2015	2016	Mean
Andulela	-0.61	0.07	-0.27	-0.24	-0.63	**-0.34**
AngloPlat	-25.58	-5.25	2.39	-47.28	2.41	**-14.66**
Atlatsa	-0.33	4.40	-0.49	-2.99	-0.89	**-0.06**
Implats	6.90	1.67	0.01	-6.03	-0.10	**0.49**
Lonmin	-104.59	34.78	-42.00	-412.86	-20.23	**-108.98**
Northam	0.81	1.32	0.02	-2.64	-1.45	**-0.39**
Royal Bafokeng	1.04	1.73	2.39	-15.89	0.88	**-1.97**
Tharisa	0.00	-1.84	-2.12	0.24	0.74	**-0.75**
Sample mean	**-17.48**	**4.61**	**-5.01**	**-60.96**	**-2.41**	**-16.25**

Price to earnings per share

Company/Year	2012	2013	2014	2015	2016	Mean
Andulela	-9.05	26.74	-4.53	-4.49	-0.59	**1.62**
AngloPlat	-17.45	-75.03	142.73	-3.92	109.71	**31.21**
Atlatsa	-4.42	1.36	-4.58	-0.13	-1.01	**-1.76**
Implats	19.57	55.69	10 700.00	-8.96	-470.00	**2 059.26**
Lonmin	-3.35	14.65	-7.21	-0.06	-1.18	**0.57**
Northam	44.79	30.39	1 485.83	-8.55	-27.56	**304.98**
Royal Bafokeng	55.29	34.10	22.05	-1.68	40.65	**30.08**
Tharisa	0.00	-12.77	-7.26	20.83	27.70	**7.13**
Sample mean	**12.20**	**9.39**	**1 540.88**	**-0.87**	**-40.28**	**304.26**

Book value per share

Company/Year	2012	2013	2014	2015	2016	Mean
Andulela	0.11	5.18	5.03	5.06	4.53	**3.98**
AngloPlat	190.86	189.93	190.80	149.96	151.84	**174.68**
Atlatsa	8.35	17.57	7.36	0.94	1.38	**7.12**
Implats	86.51	89.99	90.47	86.25	85.69	**87.78**
Lonmin	109.03	62.44	62.64	377.80	88.86	**140.15**
Northam	27.22	28.27	28.65	18.08	17.12	**23.87**
Royal Bafokeng	94.31	97.29	98.47	75.60	77.10	**88.55**
Tharisa	0.00	-2.04	8.97	8.42	11.66	**6.75**
Sample mean	**73.77**	**61.08**	**61.55**	**90.27**	**54.77**	**68.29**

Share price

Company/Year	2012	2013	2014	2015	2016	Mean
Andulela	5.50	2.00	1.22	1.09	0.37	**2.04**
AngloPlat	446.33	393.91	341.12	185.34	264.41	**326.22**
Atlatsa	1.45	5.96	2.25	0.39	0.90	**2.19**
Implats	135.00	93.00	107.00	54.00	47.00	**87.20**
Lonmin	349.89	509.68	302.65	23.99	23.88	**242.02**
Northam	36.37	40.12	35.66	22.61	40.05	**34.96**
Royal Bafokeng	57.50	59.00	52.71	26.65	35.61	**46.29**
Tharisa	0.00	23.50	15.40	5.00	20.50	**16.10**
Sample mean	**147.43**	**140.90**	**107.25**	**39.88**	**54.09**	**97.91**

Appendix 10.7: Profitability ratios of gold mining companies

(Sources: AngloGold Ashanti Limited, 2012-2016; Central Rand Gold Limited, 2012-2016; DRD Gold Limited, 2012-2016; Gold Fields Limited, 2012-2016; Harmony Gold Mining Company Limited, 2012-2016; Pan African Resources Plc, 2012-2016; Sibanye Gold Limited, 2013-2016)

Gross Profit Margin Ratio

Company/Year	2012	2013	2014	2015	2016	Mean
AngloGold	18.5%	20.8%	13.1%	4.6%	10.8%	**13.6%**
Central Rand	0.0%	-11.7%	-19.9%	24.9%	65.1%	**11.7%**
DRD Gold	16.7%	21.1%	6.8%	7.6%	8.1%	**12.0%**
Gold Fields	39.1%	21.6%	18.6%	18.8%	24.8%	**24.6%**
Harmony	20.0%	-3.4%	-2.6%	-23.4%	13.9%	**0.9%**
Pan African	51.0%	42.0%	24.4%	13.9%	29.4%	**32.1%**
Sibanye	20.3%	22.0%	19.3%	11.9%	20.8%	**18.9%**
Sample Mean	23.7%	16.0%	8.5%	8.3%	24.7%	**16.3%**

Net Profit Margin Ratio

Company/Year	2012	2013	2014	2015	2016	Mean
AngloGold	20.2%	-78.7%	18.8%	-4.1%	13.7%	**-6.0%**
Central Rand	0.0%	-101.1%	-185.9%	0.0%	-92.8%	**-76.0%**
DRD Gold	12.5%	4.7%	-3.0%	3.2%	2.5%	**4.0%**
Gold Fields	20.8%	-12.9%	0.7%	-9.5%	6.3%	**1.1%**
Harmony	17.4%	-14.8%	-8.1%	-29.4%	5.2%	**-5.9%**
Pan African	28.9%	31.9%	17.3%	8.3%	15.1%	**20.3%**
Sibanye	18.0%	8.8%	6.9%	2.4%	10.5%	**9.3%**
Sample Mean	16.8%	-23.2%	-21.9%	-4.2%	-5.6%	**-7.6%**

Return on Equity

Company/Year	2012	2013	2014	2015	2016	Mean
AngloGold	10.0%	-30.5%	6.5%	-1.2%	4.6%	**-2.1%**
Central Rand	-64.4%	173.3%	112.0%	0.0%	38.8%	**51.9%**
DRD Gold	23.1%	5.9%	-3.7%	4.5%	4.6%	**6.9%**
Gold Fields	11.3%	-8.6%	0.6%	-8.8%	5.4%	**0.0%**
Harmony	7.8%	-7.3%	-4.1%	-17.0%	3.4%	**-3.4%**
Pan African	26.4%	22.9%	16.2%	7.7%	19.0%	**18.5%**
Sibanye	-30.8%	18.0%	10.1%	3.6%	19.6%	**4.1%**
Sample Mean	-2.4%	24.8%	19.7%	-1.6%	13.6%	**10.8%**

Return on Assets

Company/Year	2012	2013	2014	2015	2016	Mean
AngloGold	7.8%	-22.4%	4.8%	-0.9%	3.6%	**-1.4%**
Central Rand	-15.6%	-63.2%	-75.8%	0.0%	-31.7%	**-37.3%**
DRD Gold	15.1%	3.7%	-2.2%	2.7%	2.6%	**4.4%**
Gold Fields	6.3%	-4.8%	0.3%	-4.1%	2.7%	**0.1%**
Harmony	6.1%	-5.6%	-3.1%	-12.6%	2.6%	**-2.5%**
Pan African	22.9%	15.4%	10.8%	4.9%	10.1%	**12.8%**
Sibanye	15.1%	8.5%	5.4%	1.9%	7.8%	**7.8%**
Sample Mean	8.3%	-9.8%	-8.5%	-1.1%	-0.3%	**-2.3%**

Appendix 10.8: Liquidity ratios of gold mining companies

Current ratio

Company/Year	2012	2013	2014	2015	2016	Mean
AngloGold	0.52	0.42	0.47	0.47	0.61	**0.50**
Central Rand	1.10	0.36	0.19	0.08	0.06	**0.36**
DRD Gold	1.80	2.49	1.53	2.01	1.92	**1.95**
Gold Fields	1.76	1.70	1.53	1.61	1.22	**1.57**
Harmony	2.28	2.00	2.40	1.90	1.71	**2.06**
Pan African	2.57	1.11	0.98	0.77	0.68	**1.22**
Sibanye	0.08	0.75	0.54	0.51	1.24	**0.63**
Sample mean	**1.44**	**1.26**	**1.09**	**1.05**	**1.06**	**1.18**

Quick ratio

Company/Year	2012	2013	2014	2015	2016	Mean
AngloGold	0.12	0.08	0.10	0.07	0.12	**0.10**
Central Rand	0.88	0.27	0.14	0.07	0.06	**0.28**
DRD Gold	1.38	1.89	1.00	1.38	1.33	**1.40**
Gold Fields	0.48	0.96	0.96	1.08	0.81	**0.86**
Harmony	1.24	1.36	1.50	1.09	0.94	**1.23**
Pan African	2.28	0.72	0.68	0.54	0.56	**0.95**
Sibanye	0.04	0.69	0.44	0.44	1.08	**0.54**
Sample mean	**0.92**	**0.85**	**0.69**	**0.67**	**0.70**	**0.76**

Working capital (Rm)

Company/Year	2012	2013	2014	2015	2016	Mean
AngloGold	-4 532	-5 701	-5 555	-5 068	-2 908	**-4 753**
Central Rand	5	-76	-136	-173	-202	**-117**
DRD Gold	210	362	163	305	287	**265**
Gold Fields	14 355	4 529	4 389	4 362	2 842	**6 095**
Harmony	3 118	2 401	2 591	1 490	1 438	**2 208**
Pan African	225	40	-9	-99	-205	**-10**
Sibanye	-19 681	-887	-1 630	-2 597	1 467	**-4 666**
Sample mean	**-900**	**95**	**-27**	**-254**	**388**	**-139**

Appendix 10.9: Solvency ratios of gold mining companies

Debt to Equity Ratio

Company/Year	2012	2013	2014	2015	2016	Mean
AngloGold	0.28	0.36	0.35	0.34	0.28	**0.32**
Central Rand	3.14	-3.74	-2.48	-2.28	-2.22	**-1.52**
DRD Gold	0.53	0.62	0.65	0.64	0.81	**0.65**
Gold Fields	0.79	0.80	0.87	1.12	0.99	**0.91**
Harmony	0.27	0.31	0.32	0.35	0.31	**0.31**
Pan African	0.23	0.56	0.53	0.59	0.76	**0.53**
Sibanye	-3.04	1.12	0.86	0.89	1.50	**0.27**
Sample mean	0.31	0.01	0.16	0.23	0.35	**0.21**

Debt to Asset Ratio

Company/Year	2012	2013	2014	2015	2016	Mean
AngloGold	0.22	0.27	0.26	0.25	0.22	**0.24**
Central Rand	0.76	1.36	1.68	1.78	1.82	**1.48**
DRD Gold	0.34	0.38	0.39	0.39	0.45	**0.39**
Gold Fields	0.44	0.45	0.47	0.53	0.50	**0.48**
Harmony	0.21	0.24	0.24	0.26	0.24	**0.24**
Pan African	0.20	0.38	0.35	0.38	0.40	**0.34**
Sibanye	1.49	0.53	0.46	0.47	0.60	**0.71**
Sample mean	0.52	0.51	0.55	0.58	0.60	**0.55**

Cash Flow Coverage Ratio

Company/Year	2012	2013	2014	2015	2016	Mean
AngloGold	0.32	0.32	0.26	0.13	0.22	**0.25**
Central Rand	-0.04	-0.29	-0.25	-0.06	-0.13	**-0.15**
DRD Gold	0.72	0.49	0.08	0.29	0.39	**0.39**
Gold Fields	0.21	0.14	0.25	0.24	0.29	**0.23**
Harmony	0.46	0.29	0.22	0.21	0.51	**0.34**
Pan African	1.22	0.46	0.24	0.06	0.27	**0.45**
Sibanye	0.09	0.61	0.27	0.23	0.20	**0.28**
Sample mean	0.43	0.29	0.15	0.16	0.25	**0.26**

Appendix 10.10: Activity ratios of gold mining companies

Asset Turnover

Company/Year	2012	2013	2014	2015	2016	Mean
AngloGold	0.38	0.28	0.26	0.22	0.26	**0.28**
Central Rand	0.00	0.63	0.41	0.59	0.34	**0.39**
DRD Gold	1.21	0.78	0.74	0.84	1.01	**0.91**
Gold Fields	0.30	0.37	0.42	0.43	0.43	**0.39**
Harmony	0.35	0.38	0.38	0.43	0.50	**0.41**
Pan African	0.79	0.48	0.63	0.59	0.67	**0.63**
Sibanye	0.84	0.97	0.78	0.80	0.75	**0.83**
Sample Mean	0.55	0.56	0.52	0.56	0.57	**0.55**

Fixed Assets Turnover

Company/Year	2012	2013	2014	2015	2016	Mean
AngloGold	1.67	1.17	1.10	0.88	1.06	**1.18**
Central Rand	0.00	4.04	2.41	3.77	3.56	**2.76**
DRD Gold	1.83	1.18	1.03	1.24	1.52	**1.36**
Gold Fields	0.54	0.50	0.59	0.59	0.60	**0.56**
Harmony	0.46	0.49	0.47	0.52	0.61	**0.51**
Pan African	1.62	0.64	0.83	0.78	0.89	**0.95**
Sibanye	1.01	1.28	0.96	1.03	1.15	**1.08**
Sample Mean	1.02	1.33	1.06	1.26	1.34	**1.20**

Inventory Turnover

Company/Year	2012	2013	2014	2015	2016	Mean
AngloGold	29.42	24.50	22.32	18.54	23.30	**23.62**
Central Rand	0.00	16.07	108.05	67.44	172.32	**72.78**
DRD Gold	28.38	14.96	12.29	12.48	15.14	**16.65**
Gold Fields	7.89	6.67	7.79	8.54	8.35	**7.85**
Harmony	15.23	11.22	10.22	11.95	15.71	**13.59**
Pan African	54.09	20.25	28.94	40.28	38.50	**36.41**
Sibanye	47.44	103.32	66.46	55.97	46.16	**63.87**
Sample Mean	26.07	28.14	36.58	30.74	45.64	**33.43**

Appendix 10.11: Market ratios of gold mining companies

Earnings per share

Company/Year	2012	2013	2014	2015	2016	Mean
AngloGold	15.02	-34.76	7.81	-1.42	5.66	**-1.54**
Central Rand	-1.15	-4.44	-1.90	0.20	-0.45	**-1.55**
DRD Gold	0.80	0.13	-0.12	0.17	0.15	**0.23**
Gold Fields	7.89	-4.62	0.23	-3.93	2.94	**0.50**
Harmony	6.14	-5.43	-2.93	-10.44	2.18	**-2.10**
Pan African	0.25	0.36	0.25	0.12	0.30	**0.26**
Sibanye	0.00	2.60	1.86	0.79	4.02	**1.85**
Sample Mean	4.13	-6.59	0.74	-2.07	2.12	**-0.33**

Price to earnings

Company/Year	2012	2013	2014	2015	2016	Mean
AngloGold	17.47	-4.47	19.50	-79.44	36.93	**-2.00**
Central Rand	-4.68	-0.65	-1.63	5.31	-0.47	**-0.42**
DRD Gold	6.69	40.62	-25.42	13.76	56.87	**18.50**
Gold Fields	11.53	-7.12	217.50	-8.65	15.20	**45.69**
Harmony	11.86	-15.78	-14.49	-3.29	28.85	**1.43**
Pan African	9.76	5.25	10.76	15.63	12.40	**10.76**
Sibanye	0.00	4.73	12.12	28.92	6.32	**10.42**
Sample Mean	7.52	3.23	31.19	-3.96	22.30	**12.05**

Book value per share

Company/Year	2012	2013	2014	2015	2016	Mean
AngloGold	150.88	113.85	119.96	118.99	123.86	**125.51**
Central Rand	1.79	-2.56	-1.70	-1.44	-0.57	**-0.89**
DRD Gold	4.24	4.27	3.84	3.55	3.10	**3.80**
Gold Fields	72.73	54.52	54.90	45.20	57.14	**56.90**
Harmony	78.97	74.01	71.23	61.33	64.44	**70.15**
Pan African	0.94	1.41	1.52	1.50	1.48	**1.37**
Sibanye	0.00	12.82	16.67	16.36	17.97	**12.76**
Sample Mean	44.22	36.90	38.06	35.07	38.20	**38.49**

Share price

Company/Year	2012	2013	2014	2015	2016	Mean
AngloGold	262.34	155.22	152.27	113.12	209.18	**178.43**
Central Rand	5.39	2.88	3.10	1.07	0.21	**2.53**
DRD Gold	5.35	5.28	3.05	2.34	8.53	**4.91**
Gold Fields	90.95	32.89	50.29	33.98	44.69	**50.56**
Harmony	72.84	85.71	42.47	34.31	62.89	**59.64**
Pan African	2.42	1.91	2.67	1.80	3.75	**2.51**
Sibanye	0.00	12.30	22.55	22.85	25.39	**16.62**
Sample Mean	62.76	42.31	39.49	29.92	50.66	**45.03**

Appendix 10.12: Profitability ratios of coal mining companies

(Sources: Forbes & Manhattan Coal Corporation, 2012-2014; (Buffalo Coal Corporation, 2014-2016); Exxaro Resources Limited, 2012-2016; (Keaton Energy Holdings Limited, 2012-2016; Petmin Limited, 2012-2016; Wescoal Holdings Limited, 2012-2016)

Gross Profit Margin Ratio

Company/Year	2012	2013	2014	2015	2016	Mean
Buffalo	16.7%	1.4%	-5.2%	-12.7%	2.8%	**0.6%**
Exxaro	13.9%	7.3%	7.3%	28.4%	21.5%	**15.7%**
Keaton	3.1%	-3.0%	15.9%	14.1%	15.8%	**9.2%**
Petmin	22.5%	20.1%	19.1%	19.9%	18.5%	**20.0%**
Wescoal	10.2%	10.7%	10.9%	13.1%	15.8%	**12.2%**
Sample mean	13.3%	7.3%	9.6%	12.6%	14.9%	**11.5%**

Net Profit Margin Ratio

Company/Year	2012	2013	2014	2015	2016	Mean
Buffalo	2.2%	-14.8%	-36.4%	-89.0%	-6.9%	**-29.0%**
Exxaro	78.9%	45.7%	-5.4%	1.5%	2.7%	**24.7%**
Keaton	23.6%	-14.4%	4.7%	-5.0%	-28.8%	**-4.0%**
Petmin	16.3%	-13.4%	-11.7%	9.8%	0.9%	**0.4%**
Wescoal	3.3%	2.9%	7.6%	1.7%	3.3%	**3.7%**
Sample mean	24.9%	1.2%	-8.2%	-16.2%	-5.8%	**-0.8%**

Return on Equity

Company/Year	2012	2013	2014	2015	2016	Mean
Buffalo	2.5%	-15.1%	-190.6%	-259.7%	-20.5%	**-96.7%**
Exxaro	33.5%	17.1%	-2.6%	0.8%	1.6%	**10.1%**
Keaton	14.0%	-19.3%	7.0%	-8.6%	-60.3%	**-13.4%**
Petmin	8.0%	-8.8%	-10.2%	9.7%	0.8%	**-0.1%**
Wescoal	13.1%	11.9%	33.2%	10.3%	13.4%	**16.4%**
Sample mean	14.2%	-2.8%	-32.6%	-49.5%	-13.0%	**-16.7%**

Return on Assets

Company/Year	2012	2013	2014	2015	2016	Mean
Buffalo	1.6%	-8.3%	-60.5%	-100.6%	-9.0%	**-35.4%**
Exxaro	23.3%	12.5%	-1.9%	0.5%	0.9%	**7.1%**
Keaton	7.5%	-9.3%	3.4%	-3.8%	-19.9%	**-4.4%**
Petmin	5.5%	-5.5%	-5.9%	5.7%	0.5%	**0.1%**
Wescoal	7.3%	6.7%	12.0%	3.5%	5.1%	**6.9%**
Sample mean	9.1%	-0.8%	-10.6%	-18.9%	-4.5%	**-5.1%**

Appendix 10.13: Liquidity ratios of coal mining companies

Current Ratio

Company/Year	2012	2013	2014	2015	2016	Mean
Buffalo	1.97	1.04	0.77	0.87	0.41	**1.01**
Exxaro	0.96	1.16	1.59	1.29	1.32	**1.26**
Keaton	0.85	0.51	0.93	0.88	0.69	**0.77**
Petmin	1.34	1.91	1.83	1.37	3.13	**1.92**
Wescoal	1.37	1.52	1.04	0.78	0.70	**1.08**
Sample mean	1.30	1.23	1.23	1.04	1.25	**1.21**

Quick Ratio

Company/Year	2012	2013	2014	2015	2016	Mean
Buffalo	1.58	0.33	0.60	0.51	0.30	**0.66**
Exxaro	0.77	0.90	1.29	1.01	1.11	**1.02**
Keaton	0.72	0.37	0.79	0.72	0.38	**0.59**
Petmin	0.31	1.04	0.82	0.81	1.64	**0.92**
Wescoal	1.24	1.36	0.87	0.60	0.59	**0.93**
Sample mean	0.92	0.80	0.87	0.73	0.80	**0.83**

Working Capital (Rm)

Company/Year	2012	2013	2014	2015	2016	Mean
Buffalo	112.60	11.29	-40.62	-24.86	-195.41	**-27.40**
Exxaro	-222.00	631.00	2 103.00	1 361.00	2 381.00	**1 250.80**
Keaton	-34.88	-139.61	-20.67	-42.93	-120.31	**-71.68**
Petmin	126.15	172.55	219.51	166.75	414.28	**219.85**
Wescoal	39.59	50.51	13.94	-97.72	-163.53	**-31.44**
Sample mean	4.29	145.15	455.03	272.45	463.20	**268.03**

Appendix 10.14: Solvency ratios of coal mining companies

Debt to Equity Ratio

Company/Year	2012	2013	2014	2015	2016	Mean
Buffalo	0.56	0.82	2.15	-3.58	-3.27	**-0.67**
Exxaro	0.47	0.36	0.38	0.54	0.71	**0.49**
Keaton	0.85	1.08	1.04	1.24	2.03	**1.25**
Petmin	0.45	0.60	0.74	0.71	0.63	**0.62**
Wescoal	0.79	0.77	1.77	1.94	1.65	**1.39**
Sample mean	0.63	0.73	1.22	0.17	0.35	**0.62**

Debt to Asset Ratio

Company/Year	2012	2013	2014	2015	2016	Mean
Buffalo	0.36	0.45	0.68	1.39	1.44	**0.86**
Exxaro	0.33	0.27	0.27	0.35	0.41	**0.33**
Keaton	0.46	0.52	0.51	0.55	0.67	**0.54**
Petmin	0.31	0.37	0.43	0.41	0.39	**0.38**
Wescoal	0.44	0.43	0.64	0.66	0.62	**0.56**
Sample mean	0.38	0.41	0.51	0.67	0.71	**0.54**

Cash Flow Coverage Ratio

Company/Year	2012	2013	2014	2015	2016	Mean
Buffalo	0.33	0.01	-0.05	-0.08	0.04	**0.05**
Exxaro	0.04	0.03	0.13	0.16	0.16	**0.10**
Keaton	0.19	0.26	0.44	0.52	0.47	**0.37**
Petmin	0.70	0.50	0.77	0.99	0.64	**0.72**
Wescoal	0.04	0.28	0.06	0.14	0.33	**0.17**
Sample mean	0.26	0.22	0.27	0.35	0.33	**0.28**

Appendix 10.15: Activity ratios of coal mining companies

Asset Turnover

Company/Year	2012	2013	2014	2015	2016	Mean
Buffalo	0.74	0.56	1.67	1.13	1.31	**1.08**
Exxaro	0.30	0.27	0.35	0.35	0.35	**0.32**
Keaton	0.32	0.64	0.73	0.77	0.69	**0.63**
Petmin	0.34	0.41	0.50	0.58	0.60	**0.49**
Wescoal	2.24	2.31	1.58	2.03	1.56	**1.95**
Sample Mean	0.79	0.84	0.97	0.97	0.90	**0.89**

Fixed Assets Turnover

Company/Year	2012	2013	2014	2015	2016	Mean
Buffalo	1.28	0.98	2.28	1.85	2.12	**1.70**
Exxaro	0.77	0.67	0.89	0.90	0.95	**0.84**
Keaton	0.57	1.18	1.72	1.88	1.54	**1.38**
Petmin	0.66	0.74	0.91	1.20	1.24	**0.95**
Wescoal	8.59	7.98	5.28	5.16	3.20	**6.04**
Sample Mean	2.37	2.31	2.22	2.20	1.81	**2.18**

Inventory Turnover

Company/Year	2012	2013	2014	2015	2016	Mean
Buffalo	30.34	6.75	47.43	14.94	18.75	**23.64**
Exxaro	15.76	14.46	16.43	14.78	20.17	**16.32**
Keaton	20.52	23.87	39.13	26.75	28.16	**27.69**
Petmin	6.89	5.18	3.86	5.09	4.80	**5.16**
Wescoal	48.02	42.34	18.86	20.21	27.57	**31.40**
Sample Mean	24.31	18.52	25.14	16.36	19.89	**20.84**

Appendix 10.16: Market ratios of coal mining companies

Earnings per share

Company/Year	2012	2013	2014	2015	2016	Mean
Buffalo	0.01	-0.03	-0.11	-0.05	-0.00	**-0.04**
Exxaro	27.34	17.51	-2.49	0.83	16.00	**11.84**
Keaton	0.75	-0.44	0.30	-0.14	-1.00	**-0.10**
Petmin	0.20	-0.19	-0.21	0.23	0.02	**0.01**
Wescoal	0.13	0.12	0.41	0.16	0.26	**0.22**
Sample Mean	5.68	3.39	-0.42	0.21	3.06	**2.38**

Price to earnings

Company/Year	2012	2013	2014	2015	2016	Mean
Buffalo	932.60	-121.15	-8.36	-31.07	-857.14	**-17.03**
Exxaro	6.18	8.36	-41.57	53.06	5.59	**6.33**
Keaton	3.79	-4.30	8.32	-14.49	-0.56	**-1.45**
Petmin	11.21	-9.89	-7.20	5.27	71.98	**14.27**
Wescoal	5.23	7.46	5.00	12.39	5.83	**7.18**
Sample Mean	191.80	-23.90	-8.76	5.03	-154.86	**1.86**

Book value per share

Company/Year	2012	2013	2014	2015	2016	Mean
Buffalo	21.20	18.04	4.76	-2.04	-0.66	**8.26**
Exxaro	80.51	101.29	96.13	95.57	97.98	**94.29**
Keaton	4.25	3.58	4.08	3.74	1.69	**3.47**
Petmin	2.44	2.22	2.04	2.36	2.47	**2.31**
Wescoal	0.94	1.00	1.35	1.43	1.62	**1.27**
Sample Mean	21.87	25.22	21.67	20.21	20.62	**21.92**

Share Price

Company/Year	2012	2013	2014	2015	2016	Mean
Buffalo	5.36	3.40	0.92	1.65	1.20	**2.51**
Exxaro	169.00	146.46	103.50	44.04	89.50	**110.50**
Keaton	2.85	1.90	2.52	2.00	0.56	**1.97**
Petmin	2.19	1.92	1.49	1.21	1.49	**1.66**
Wescoal	0.68	0.93	2.05	1.95	1.53	**1.43**
Sample Mean	36.02	30.92	22.10	10.17	18.86	**23.61**

Appendix 10.17: Profitability ratios of iron ore mining companies

(Source: Assore Limited, 2012-2016; Kumba Iron Ore Limited, 2012-2016)

Gross Profit Margin Ratio

Company/Year	2012	2013	2014	2015	2016	Mean
Assore	7.7%	3.3%	4.1%	4.4%	3.7%	**4.7%**
Kumba	69.4%	71.2%	62.0%	51.0%	61.5%	**63.0%**
Sample mean	**38.6%**	**37.3%**	**33.1%**	**27.7%**	**32.6%**	**33.9%**

Net Profit Margin Ratio

Company/Year	2012	2013	2014	2015	2016	Mean
Assore	29.7%	174.6%	139.2%	38.4%	50.9%	**86.6%**
Kumba	35.4%	37.3%	29.7%	1.8%	27.8%	**26.4%**
Sample mean	**32.6%**	**105.9%**	**84.5%**	**20.1%**	**39.3%**	**56.5%**

Return on Equity

Company/Year	2012	2013	2014	2015	2016	Mean
Assore	35.8%	24.2%	23.1%	7.2%	7.9%	**19.6%**
Kumba	83.4%	74.7%	52.4%	2.5%	30.5%	**48.7%**
Sample mean	**59.6%**	**49.4%**	**37.7%**	**4.9%**	**19.2%**	**34.2%**

Return on Assets

Company/Year	2012	2013	2014	2015	2016	Mean
Assore	23.2%	21.3%	21.3%	6.6%	7.2%	**15.9%**
Kumba	44.1%	45.6%	27.8%	1.3%	19.5%	**27.6%**
Sample mean	**33.6%**	**33.5%**	**24.5%**	**4.0%**	**13.3%**	**21.8%**

Appendix 10.18: Liquidity ratios of iron ore mining companies

Current Ratio

Company/Year	2012	2013	2014	2015	2016	Mean
Assore	4.11	2.39	2.95	3.18	2.71	**3.07**
Kumba	1.70	2.28	1.39	2.40	3.53	**2.26**
Sample mean	**2.91**	**2.33**	**2.17**	**2.79**	**3.12**	**2.66**

Quick Ratio

Company/Year	2012	2013	2014	2015	2016	Mean
Assore	2.88	4.65	2.37	2.14	1.91	**2.79**
Kumba	0.99	1.32	0.63	1.38	2.74	**1.41**
Sample mean	**1.94**	**2.98**	**1.50**	**1.76**	**2.32**	**2.10**

Working Capital (Rm)

Company/Year	2012	2013	2014	2015	2016	Mean
Assore	5 712.88	1 385.39	2 087.59	2 885.12	3 232.01	**3 060.60**
Kumba	4 161.00	6 925.00	3 773.00	6 922.00	14 711.00	**7 298.40**
Sample mean	**4 936.94**	**4 155.20**	**2 930.29**	**4 903.56**	**8 971.51**	**5 179.50**

Appendix 10.19: Solvency ratios of iron ore mining companies

Debt to Equity Ratio

Company/Year	2012	2013	2014	2015	2016	Mean
Assore	0.54	0.13	0.09	0.09	0.10	**0.19**
Kumba	0.89	0.64	0.89	0.93	0.57	**0.78**
Sample mean	**0.72**	**0.39**	**0.49**	**0.51**	**0.33**	**0.49**

Debt to Asset Ratio

Company/Year	2012	2013	2014	2015	2016	Mean
Assore	0.35	0.12	0.08	0.09	0.09	**0.15**
Kumba	0.47	0.39	0.47	0.48	0.36	**0.43**
Sample mean	**0.41**	**0.25**	**0.27**	**0.28**	**0.23**	**0.29**

Cash Flow Coverage Ratio

Company/Year	2012	2013	2014	2015	2016	Mean
Assore	0.61	-0.12	-0.48	-0.57	0.11	**-0.09**
Kumba	1.09	1.33	0.72	0.54	0.65	**0.87**
Sample mean	**0.85**	**0.60**	**0.12**	**-0.01**	**0.38**	**0.39**

Appendix 10.20: Activity ratios of iron ore mining companies

Asset Turnover

Company/Year	2012	2013	2014	2015	2016	Mean
Assore	0.78	0.12	0.15	0.17	0.14	**0.27**
Kumba	1.24	1.22	0.94	0.73	0.70	**0.97**
Sample mean	**1.01**	**0.67**	**0.54**	**0.45**	**0.42**	**0.62**

Fixed Assets Turnover

Company/Year	2012	2013	2014	2015	2016	Mean
Assore	1.43	4.06	5.50	14.58	16.62	**8.44**
Kumba	1.84	1.82	1.35	1.08	1.25	**1.47**
Sample mean	**1.63**	**2.94**	**3.43**	**7.83**	**8.94**	**4.95**

Inventory Turnover

Company/Year	2012	2013	2014	2015	2016	Mean
Assore	6.25	4.61	4.62	3.63	2.83	**4.39**
Kumba	10.99	10.53	6.46	13.77	13.90	**11.13**
Sample mean	**8.62**	**7.57**	**5.54**	**8.70**	**8.37**	**7.76**

Appendix 10.21: Market ratios of iron ore mining companies

Earnings per share

Company/Year	2012	2013	2014	2015	2016	Mean
Assore	38.27	33.20	38.81	13.60	14.91	**27.76**
Kumba	38.02	48.10	33.44	1.46	26.98	**29.60**
Sample mean	**38.15**	**40.65**	**36.13**	**7.53**	**20.95**	**28.68**

Price to earnings

Company/Year	2012	2013	2014	2015	2016	Mean
Assore	7.81	9.64	9.19	7.61	12.07	**9.26**
Kumba	14.96	9.21	7.18	28.08	5.89	**13.07**
Sample mean	**11.39**	**9.42**	**8.18**	**17.85**	**8.98**	**11.16**

Book price per share

Company/Year	2012	2013	2014	2015	2016	Mean
Assore	81.06	101.43	125.01	127.68	135.46	**114.13**
Kumba	60.11	84.64	84.20	78.45	114.35	**84.35**
Sample mean	**70.59**	**93.03**	**104.61**	**103.06**	**124.90**	**99.24**

Share price

Company/Year	2012	2013	2014	2015	2016	Mean
Assore	298.90	320.00	356.66	103.50	180.01	**251.81**
Kumba	568.88	443.00	240.00	41.00	159.00	**290.38**
Sample mean	**433.89**	**381.50**	**298.33**	**72.25**	**169.51**	**271.10**