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**Institutional impediments to growth
in the mining sector in South Africa**

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**A research project submitted to the Gordon Institute of Business Science,
University of Pretoria, in partial fulfilment of the requirements for the degree of
Master of Business Administration**

10 November 2014

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Abstract

The South African mining sector, once the bedrock of the economy, has been in decline this century while other countries have experienced growth in this sector. The mining sector in South Africa makes a significant contribution to the South African economy through direct and indirect jobs, taxes, royalties, skills development and foreign exchange revenue. The decline of this sector is concerning given its potential for employment, taxes and foreign exchange in a South Africa in great need of all three.

Gold, PGMs¹, coal and iron-ore account for about 81% of South Africa's mining output. The price, demand and production of these four commodities in the 21st century will be established as a benchmark and South Africa's production will be tested against this. Mixed method research using secondary quantitative data and a qualitative survey will be utilised to test the hypotheses. Quantitative secondary data is used to establish price and production trends. A qualitative survey conducted with key stakeholders in the mining sector identifies opinions and reasons for the South African mining trends.

This study confirms the important role of institutions in creating certainty and encouraging investment.

Key words

New Institutional Economics ♦ mining ♦ economic growth ♦ South Africa

¹ Platinum Group Metals (PGMs) consist of six silver-white metals: platinum, palladium, rhodium, ruthenium, iridium, and osmium. They occur together in nature and are produced from the same ore (International Platinum Association, 2014)

Declaration

I declare that this research project is my own work. It is submitted in partial fulfilment of the requirements for the degree of Master of Business Administration at the Gordon Institute of Business Science, University of Pretoria. It has not been submitted before for any degree or examination in any other University. I further declare that I have obtained the necessary authorisation and consent to carry out this research.

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Acknowledgements

This dissertation would not have been possible without the help of a number of people:

To my parents, thank you for your unwavering support and encouragement.

Mike Holland, my supervisor, I am grateful for the guidance, time, patience and knowledge you afforded me over the months it took to write this.

To my long-standing friend and colleague, Kevin Morgan, thank you for giving so generously of your time and insights.

To those people who answered the survey, I don't know who you are, but thank you for giving up your time in a busy day to complete the questionnaire.

Thank you to GIBS, for providing a wonderful opportunity for my learning and growth and a really inspiring campus to do it on.

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1. Introduction to the research problem

1.1 Research Title

Institutional impediments to growth in the South African mining sector.

1.2 Research Problem

Since the discovery of diamonds in 1871 and subsequently gold in 1884, mining has played a significant role in the development of South Africa's economy (Sorensen, 2011). In 2012, mining related exports accounted for 50% of South African exports. Mining is directly responsible for 8% of South Africa's Gross Domestic Product (GDP) and this rises to 17% when supporting industries are included. In a country with high unemployment, mining in South Africa plays a significant role in providing work opportunities directly and indirectly, accounting for just over 1.3 million jobs in South Africa in 2012. Mining also has a significant part to play in absorbing unskilled labour. Four commodities are of particular importance to the South African economy, representing 81% of mineral sales in 2012. These are gold, PGMs², coal and iron-ore (Chamber of Mines, 2013a, 2013b).

Asia's economic growth in the 21st century, dominated by China but including India, created an increased demand for iron-ore and coking coal, key ingredients to steel making and thermal coal for electricity. A growing middle class in China and India, with a large appetite for gold (jewellery), spurred on demand for this precious metal, while central banks around the world continued to purchase gold in the form of bars and coins. Half the platinum produced in the world is used in catalytic converters, with the remainder shared between jewellery, investments and a wide range of other uses.

Commodities such as gold, PGMs, coal and iron-ore are all traded on global exchanges. Their prices change constantly to reflect supply and demand; hence these commodity providers are

² Platinum Group Metals (PGMs) consist of six silver-white metals: platinum, palladium, rhodium, ruthenium, iridium, and osmium. They occur together in nature and are produced from the same ore (International Platinum Association, 2014). In this paper, where the term PGMs is used, it refers to the general activity of mining. Where the term platinum is used, it refers specifically to the price of platinum or the amount of platinum produced.

deemed price takers. In a market economy, growth in production implies growth in demand and an increase in price. The World Gold Council (WGC) reported an increase in gold demand from 2004-2014 from 3,046 tonnes to 3,756 tonnes. The corresponding price increase from 2004-2014 was US\$40.1bn up to US\$170.4bn (World Gold Council, 2014b). Platinum showed a price increase from US\$443 in January 2000, peaking above US\$2,000 in 2008 and settling back to US\$ 1,359 by December 2013. This price followed the increased demand from 7,230 tonnes in 2004 rising to 8,420 in 2013 (Johnson Matthey, 2014).

Coal prices were volatile between 2000-2012 rising from US\$ 39 in 2001 to a high of US\$ 147 in 2008, falling back to US\$ 92 by 2012. Despite the volatility there was a general upward price trend, matched by growing global production increasing from 4,477 million tonnes in 2000 to 7,605 million tonnes in 2012 (British Petroleum, 2013). Iron-ore prices were similarly unpredictable, rising from US\$12 in 2000, peaking in 2011 at US\$177 and global production growing from 1,060 metric tonnes in 2000 to 2,930 by the end of 2012 (United States Geological Survey, 2014).

Commodity providers, as price takers are especially sensitive to input costs, as they are not able to pass these on to consumers if the market clearing price is below their cost of production. Of particular importance to miners in South Africa were the costs of labour and electricity, both making significant contributions to the operational cost of a mine. Gold and PGM mining, both highly energy intensive saw electricity price increases of 143% and 258% respectively as a proportion of overall operating costs since 2007 (Wilburn & Stanley, 2013).

Increased labour costs (South African Reserve Bank, 2008, 2013) and declining quality of precious metal ore in the 21st century in South Africa have also had an impact on the cost of production for mines, making it more expensive to produce less.

The lifecycle of a mine can be as long as 150 years, moving from initial discovery, proven reserves, mining and finally depletion and closing of the mine. Due to the long lead times and length of investment in a mine, investors require stability and certainty in the environment in which they operate. Ore can only be mined where it is found. The context within which mining occurs is therefore a key determinant of investment decisions.

Institutions (both formal and informal) play a significant role in convincing or detaching investors, once ore is found in a particular jurisdiction. New Institutional Economics (NIE) provides a comprehensive and credible framework, explaining how this happens. This model

of economics proposes that good institutions and secure property rights lower risk and the cost of doing business, thereby encouraging trade and ultimately economic growth (D Acemoglu, Johnson, & Robinson, 2005).

In the context of Institutional Economics, “institutions are man-made rules and their accompanying sanctions that are intended to make interactions less risky and more predictable” (Groenewegen, Spithoven, & Van den Berg, 2010). Institutions facilitate predictability, through inclusion and exclusion – i.e. what you may do and what you may not (Groenewegen et al., 2010). Rules of inclusion in mining set out what the rights of the licence holder or potential licence holder are, and provide a framework for financial and operational management. These rules allow investors to manage and contain risk. Mining houses are equally assisted by rules of exclusion, ensuring that mining companies do not waste time or money on unnecessary issues but rather focus on what is required and essential. The rules eliminate guesswork and therefore reduce risk through predictability. Predictability in the form of inclusion and exclusion encourages exchange. Mining, a capital intensive long term investment, is particularly sensitive to the need for predictability. Investors must have a level of comfort around the ability to manage risks and yield economic benefits in the long term, for at least the lifetime of the mine.

How institutions facilitate or hinder behaviour as well as co-ordinate these transactions is a central question of Institutional Economics (Groenewegen et al., 2010). This is an important factor to be considered in the context of mining in South Africa – how have South Africa’s institutions enabled or constrained behaviour to hinder or encourage growth and sustainability in this sector?

The government of South Africa recognises the importance of institutions to provide stability and predictability in the macro-economy generally, and the mining sector specifically to encourage investment in mining. From the Green and White Papers on Mineral Resources in South Africa in 1998 to the National Development Plan of 2013, the government of South Africa has consistently expressed its desire to provide predictable and stable ‘rules of the game’ to ensure continued investment and growth in this important sector in the South African economy (Dept. of Minerals & Energy, 1998; National Planning Commission, 2012). Although mining is recognised by the state as a key sector in the economy, and the state has signalled its goodwill and intention to provide an institutional framework conducive to these

long term mining investments, some of the proposed policies and legislation that have been introduced in the last decade appear to be having a different effect on the sector.

Global trends between 2000 and 2013 in the four commodities (gold, PGMs, coal and iron-ore) showed an increase in demand, price and production and are anticipated to continue to rise until at least 2017. Global gold production between 2000-2017 is estimated to rise by 28%, but South African output is expected to decline by 48% in this period. As South Africa is the largest platinum supplier in the world, global output is largely a reflection of South African output, where we see overall increase in global demand of 41% and South African output of 66% (Menzie et al., 2013). This figure however hides the significant overproduction of platinum in the early part of the century and subsequent massive decline in production (Yager, Soto-Viruet, & Barry, 2013). The demand and supply figures for platinum show a clear deficit in production from 2004-2013 (Johnson Matthey, 2014), and some of this can be accounted for through the recycling of platinum. Coal and iron-ore are set to experience particularly large increases in global production (2000-2017), namely 102% and 188% respectively while South Africa is anticipated to increase its output for these by only 47% and 130% (Menzie et al., 2013).

1.3 Research Aim

From the above, it would appear that over the last 13 years there was an increase in demand for commodities, a corresponding overall increase in prices, and following these market signals, a global increase in production. However, South Africa did not seem to follow this trend, nor does it look set to follow this development. In so doing, South Africa has not managed to benefit from the gains increased mining production would bring South Africa, such as more jobs, foreign exchange and economic growth.

A range of reasons could explain South Africa's recent disappointing performance in this sector. Geological reasons pertaining to the sizes and quality of ore bodies in South Africa may offer some explanation. Linked to the quality of the ore bodies, mining productivity may be another factor to consider. Infrastructure bottlenecks such as inadequate rail transport, port facilities or insufficient energy may have contributed to this overall decline in mining output in South Africa. Other factors, such as institutional reasons may also account for South Africa's seeming inability to reap benefits from a global commodity boom in the last decade.

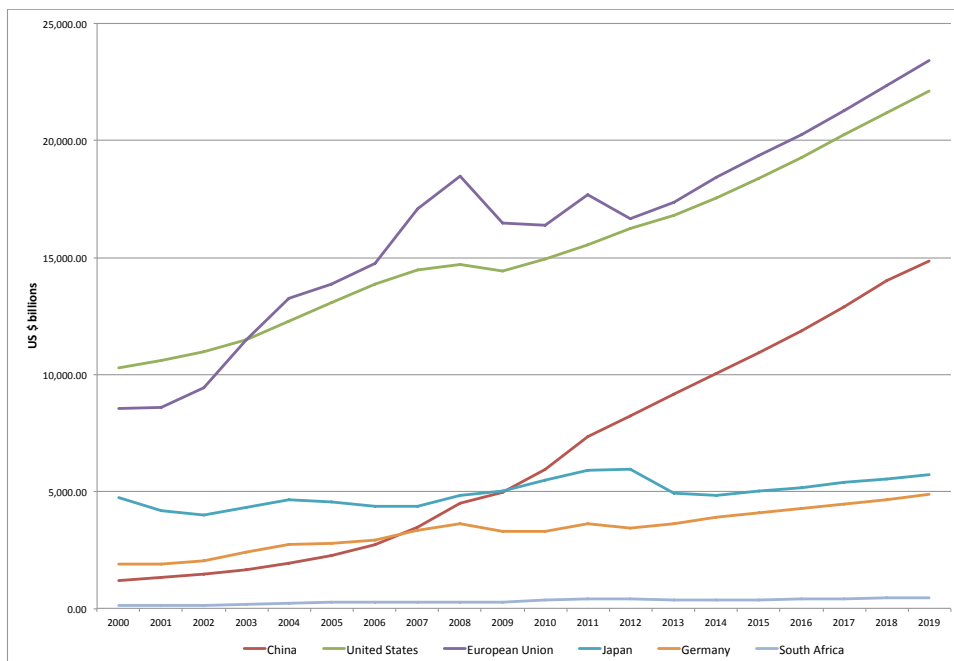
This paper sets out to first confirm that there was a rise in prices, demand and global production in the four key commodities. Further, it will demonstrate that South Africa's mining sector did not expand or grow in line with global demand and production trends. Reasons for South Africa's inability to capitalise on this mining growth opportunity in the last decade will be explored. A variety of reasons will be considered, with particular attention being paid to institutional issues in the South African environment. Finally, suggestions will be made regarding areas for improvement should the country intend to make further investments or grow this sector of the economy as global demand for these commodities grows.

2. Relevant Theory Base

2.1 Global context and importance of mining

Since the onset of the Industrial Revolution in the 18th century in England the lives of billions of people have been improved by access to electricity, sanitation, better living conditions and different modes of transport. Many of these improvements are attributable to coal- America's rise as an economic power in the 19th century, the rise of Germany as a manufacturing powerhouse and then Japan in the latter part of the 20th century. The rise of China in the 21st century is similarly enabled by coal. This constant drive to industrialise and urbanise across the globe has increased the demand for raw materials such as coal for electricity and iron-ore for steel. As far back as 2,600 B.C. gold has been recognised as a precious metal and used in jewellery. Today, jewellery accounts for about 50% of the global gold demand, coming mainly from China and India. Similarly, platinum has long been recognised for its unique qualities and has been found in jewellery dating back to the 7th century. Platinum also has a range of practical uses most notably as an input to catalytic converters, where 50% of today's platinum is used (Clemente, 2012; International Platinum Association, 2014; World Gold Council & Council, 2012).

Figure 1 Top 5 and South African GDP 2000-2019, US\$ billion



(International Monetary Fund, 2014)

While only 2% of the world’s population lived in cities in 1800, this figure is expected to exceed 60% by 2030. With this increased urbanisation comes a correlated increase in the demand for electricity and steel. Electricity consumption has driven coal-based electricity to increase 300% in the last 40 years and in 2005, 40% of the world electricity was made possible with coal. Steel consumption will increase through urbanisation, which will largely be driven by China and India. In China, high density, high-rise buildings are enabling rapid urbanisation and steel is an important component in the composition of high-rise buildings. Infrastructure development and growth in demand for consumer durables are further driving the demand for coal (Clark, Jorgenson, & Auerbach, 2012; Clemente, 2012; International Energy Agency, 2012).

Demand for commodities such as gold, platinum, coal and iron-ore are derived from economic growth. As shown in Figure 1, it is evident that the global economy, despite its set back in recent years, will continue to grow.

In 2013, gold in the form of jewellery made up about 60% of its demand, and the remaining 20% to investment with the remainder shared between central bank purchases and technology applications. This trend is similar in previous years (Thomson Reuters GFMS & World Gold Council, 2014). China is described by the World Gold Council as having a ‘pro-gold’ culture and expects China’s growing middle class together with urbanisation to increase the demand for gold by as much as 20% over the next 3 years (Williams, 2014).

2.2 The role of mining in South Africa: then, now and in the future

Since the discovery of diamonds in 1871, and subsequently gold in 1884, mining has played a significant role in the growth and development of South Africa (Sorensen, 2011). This sector continues to be a major contributor of the South African economy, as illustrated below:

Table 1 Mining contribution to South Africa’s GDP in 2012

2012 Mining Sector Contribution to gross domestic product		
Direct contribution to GDP	Indirect multiplier on contribution to GDP	Nominal mining GDP
8.3%	17%	R262.7 billion

(Chamber of Mines, 2013a)

Gold, PGMs, coal and iron-ore account for 81% (R297bn out of a total of R361bn) of South Africa’s mineral output and are the minerals that will be considered in this paper. The table below highlights the importance of gold, PGMs, coal and iron-ore in the South African economy. Of 525,632 direct jobs provided by mining in South Africa, these four minerals offer employment to 446,668 people (Chamber of Mines, 2013a, 2013d).

Table 2 Key 2012 facts for gold, PGMs, coal and iron-ore

	Gold	PGMs	Coal	Iron-ore
Sales	R76,824,504	R69,204,174	R96,148,181	R56,642,808
Exported	R71,961,757	R60,918,939	R52,226,904	R48,193,830
% exported sales	94%	88%	54%	92%
Number of employees	142,201	197,847	83,240	23,380

(Chamber of Mines, 2013a; Menzie et al., 2013)

A publication “Facts about South African Mining” by the Chamber of Mines, released in August 2013, draws information from Statistics South Africa, Investment Development Corporation and their own research illustrates the key role mining plays in South Africa. A summary of the evidence is presented below, representing 2012 data:

- 72% of South Africa’s energy requirements in the form of coal to produce electricity is sourced domestically
- 1,365,892 jobs are provided in this sector through 524,632 jobs and a further 841,260 indirect jobs
- South African economy is the recipient of most of the mining sectors’ expenditure. A total of R488 billion is spent locally out of an overall income of R497 billion
- R269 billion export revenue accounted for 38% of South Africa’s total exports
- R94 billion in minerals sold locally
- Mining is directly responsible for 12% of investment in the whole South African economy. If compared to private sector investment only, this rises to 19%

(Chamber of Mines, 2013d). See Appendix A for linkages of mining to the general economy.

The mining sector's fixed real investment showed strong growth in 2007 and 2008 (31% and 27% respectively). However, the financial crisis and "domestic constraints including regulatory uncertainty" (Chamber of Mines, 2013a) led to a decrease in investment such that investments plummeted dramatically, yielding only a 4.3% investment in fixed investments in 2012. That said, it is clear from expenditure on exploration globally, that the outlook for mining in the long term remains positive.

Table 3 Global exploration expenditure 2010-2012

Global exploration expenditure increases		
2010	2011	2012
+ 44%	+ 50%	+ 19%
US\$ 11.4 billion	US\$ 17.3 billion	US\$ 20.5 billion (new record)

(Metals Economics Group quoted in "Facts and Figures" 2013b, p. 4)

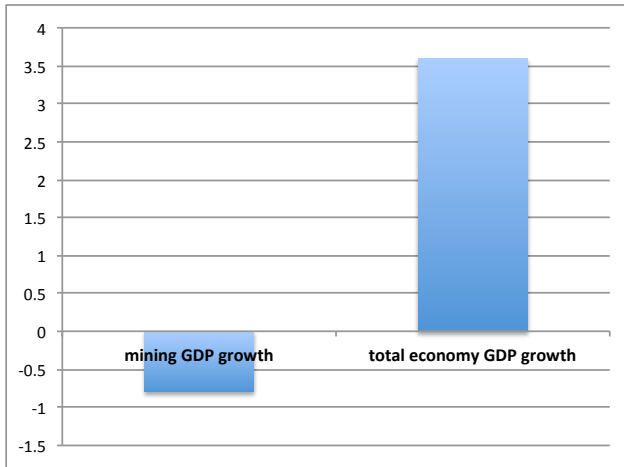
2.3 Economic Growth and Mining in South Africa

2.3.1 National Development Plan (NDP)

Adopted by the Parliament of South Africa and published in 2012, the National Development Plan (NDP) was written, after wide consultation, by the National Planning Commission, a division within the Presidency of South Africa. Economic growth and its associated benefits are the key outcomes the NDP aims to achieve. In pursuit of achieving this vision, a key and specific goal of the NDP is to deliver 5 million jobs between 2010 and 2020 and 11 million jobs by 2030, this equates to reducing unemployment to 14% by 2020 and 6% by 2030 ("National Development Plan Executive Summary", 2012, p. 54). Another goal of the NDP is to achieve an economic growth rate of above 5% a year (National Planning Commission, 2012).

The NDP (National Planning Commission, 2012) recognises that South Africa has not participated in nor benefitted from the mining boom of the last decade. In South Africa, the mining industry declined by 1% a year since 2002, and disappointingly, South Africa's mining sector is smaller now than it was in 1994. In its presentation to the Portfolio Committee on Mineral Resources in September 2013, the Chamber of Mines highlighted this trend, showing that mining GDP has fallen in South Africa by 0.8% between 2004-2012, whereas the South African economy had in fact grown by 3.6% (Chamber of Mines, 2013b).

Table 4 Mining growth rate -v- RSA economy GDP growth 2002-2014



(Chamber of Mines Presentation to Portfolio Committee on Mineral Resources, Sept 2013)

In a separate presentation, the Chamber of Mines stated that between 2001-2008 South African mining GDP declined by 1% per annum, compared to the top mining economies in the world that experienced 5% growth per annum (Baxter, 2013). In the last ten years, Australia’s mining sector has grown from a mere 2% of GDP to 8% of GDP (Swanepoel, 2014). Despite this negative trend in South Africa, the NDP expresses hope that there may still be an opportunity in this sector that can be captured, and it is estimated that an additional 100,000 jobs could be created through 3-4% annual growth in this sector until 2020 (National Planning Commission, 2012). While there are a variety of factors hampering growth in this sector, such as water permits (Ryan, 2011) and labour unrest (PRS Group Inc., 2013), the National Development Plan (2012) recognises that one of the central constraints to investment and growth in this sector is “uncertainty in the regulatory framework and property rights” (National Planning Commission, 2012, p. 146). (See Appendix B for a summary of proposals to grow investment in the minerals cluster. It should be noted that the first bullet point lists (a) certainty in property rights and (b) passing amendments to the Minerals and Petroleum Resource Development Act (MPDRA) (2002) to provide for a stable and predictable regulatory framework.

The NDP recognises and explicitly states that mining is important to the economy and that central to this are property rights and a stable and predictable regulatory framework. Further, it cites the passing of the MPRDA Amendment Bill as one of the mechanisms to secure this. The National Assembly and then the National Council of Provinces passed the MPRDA Amendment Bill in March 2014. All that remains before this Bill becomes an Act of Parliament, ready for implementation, is the President’s signature (Kolver, 2014). This Amendment Bill, once passed into law, will make wide-ranging changes to the way minerals (and petroleum

resources) are regulated. Some of the changes the MPDRA Amendment Bill will make include giving the Minister of Energy discretionary powers on a range of issues such as ownership, free equity for the state, and price determination for the state to participate in a mining venture and mining rights. Therefore, once passed, the MPDRA Amendment Bill is likely to threaten regulatory certainty and property rights, which are keenly advanced by the NDP. The uncertainty introduced by this proposed Act and its effect on investment in the mining sector in South Africa will be explored in Chapter 5 and 6.

2.4 Factors affecting investment decisions in mining

2.4.1 Proven Reserves

As South Africa has been mining gold for over 100 years and other minerals for decades, it may be that South Africa's ore bodies are depleted and therefore no further investment in the sector is warranted. Proven reserves of the four commodities are examined below.

2.4.1.1 Gold world rank 2

South Africa has the second largest proven gold reserve of 6,000 tonnes after Australia with 7,400 tonnes.

Table 5 Proven Reserves, gold

Rank	Country	Proven Reserve (tonnes)
1	Australia	7,400
2	South Africa	6,000
3	Russia	5,000
4	Chile	3,900
5	USA	3,000
6	Brazil	2,600
7	Peru	2,200
8	China	1,900
9	Uzbekistan	1,700

(Halley, 2013)

2.4.1.2 PGMs world rank 1

Ranked first in the world by volume of reserves, sitting at 70,000 tonnes and also first in the world by quality of reserve, with the best platinum/palladium ratio of 1:87. The next closest country to South Africa in terms of reserves is Russia and the second closest to South Africa in terms of the quality of the platinum/palladium ratio is Zimbabwe with a ratio of 1.26 (Chamber of Mines, 2013a; Yager et al., 2013).

Table 6 Proven Reserves, PGMs

Rank	Country	Reserve (‘000 tonnes)	Base
1	South Africa	70,000	
2	Russia	6,600	
3	USA	890	
4	Canada	390	
5	Rest of world	850	

(Hillard, 2001, p. 123)

2.4.1.3 Coal world rank 6

Only those reserves considered economically viable (using current technology and taking current costs into account) are considered, when calculating coal reserves (World Coal Association, 2012). While South Africa represents only 3.5% of global coal reserves, it remains in the top ten countries in the world by size of reserves (British Petroleum, 2013) and has 30,156 million tonnes of coal reserves (anthracite and bituminous) (World Energy Council, 2013).

Table 7 Proven Reserves, coal

Rank	Country	Proven Reserve (million tonne -bituminous)
1	USA	108,501
2	China	62,200
3	India	56,100
4	Russia	49,088
5	Australia	37,100
6	South Africa	30,156
7	Kazakhstan	21,500
8	Ukraine	15,351
9	Colombia	6,366
10	Poland	4,338

(World Energy Council, 2013)

2.4.1.4 Iron-ore world rank 13

According to the Chamber of Mines there is a global iron ore content of 80 billion tonnes of which South Africa has 650 mega tonnes (MT). Ranked 13th in the world in terms of reserves, South Africa was the 5th largest exporter of iron-ore in 2012 (*Facts and Figures 2012, 2013*).

Table 8 Proven Reserves, iron-ore

Rank	Country	Million metric tons	
		Crude ore	Iron content
1	Australia	17,000	35,000
2	Brazil	16,000	31,000
3	Russia	14,000	25,000
4	China	7,200	25,000
5	India	5,200	8,100
6	Venezuela	2,400	4,000
7	Canada	2,300	6,300
8	Ukraine	2,300	6,500
9	Sweden	2,200	3,500
10	United States	2,100	6,900
11	Iran	1,400	2,500
12	Kazakhstan	900	2,500
13	South Africa	650	1,000

(Statistics South Africa, 2013)

Based on the above, it is clear that South Africa has significant proven ore bodies in the four key commodities of gold, PGMs, coal and iron-ore.

2.4.2 Quality of ore bodies and minerals

Whilst it seems undeniable that South Africa has adequate proven reserves of ore deposits, the quality of this ore may differ from those found in other countries. This may be another reason for the country's seeming under-investment in this sector over the last 12 years.

2.4.2.1 Gold

Gold production is calculated by grams of gold extracted per tonne of ore milled. The Chamber of mines 2012 Facts and Figures (Chamber of Mines, 2013b, p. 26) indicates that in 2012 the grade, was 2.91 compared to 4.56 in 2003. A good quality mine may contain as much as 8-10g/t and mines with 4-6g/t are generally considered marginal ("World Class Gold Deposits," 2014; "Gold demand trends. Full year 2013," 2014). The yield of grams of gold per

tonne of ore milled in South Africa has been deteriorating over the last decade, as illustrated below.

Table 9 Declining gold ore-grade 2003-2012

Year	Ore milled metric tonnes 1,000	Production kg	Grade g/m tonne
2003	68,215	311,257	4.56
2004	59,702	282,030	4.72
2005	49,609	255,290	5.15
2006	50,349	235,042	4.67
2007	53,257	219,223	4.12
2008	50,999	182,489	3.58
2009	65,545	170,298	3.29
2010	73,803	160,646	3.04
2011	75,569	149,708	2.81
2012	66,119	124,252	2.91

(Chamber of Mines, 2013a)

Given that the quality of the ore has become more challenging over the last decade, productivity and the cost of labour take on added significance in this context.

2.4.2.2 PGMs

PGMs comprise of six elements namely platinum, palladium, iridium, osmium, ruthenium and rhodium. The ratio in which these are present in ore bodies is significant, particularly the platinum/palladium ratio. As mentioned, South Africa has the best platinum-palladium ratio in the world of 1.87 which makes South African platinum especially attractive to mine (Anglo American Platinum, 2013; Yager et al., 2013).

2.4.2.3 Coal

South African coal competes globally in the anthracitic coal market and is in the top 10 producers of bituminous coal in the world. While the country has a proven reserve of 30,156 million tonnes, a characteristic of South African coal is that it has a high ash content and low sulphur content. South African coal is not considered suitable for export due to its low calorific value³. Therefore, for export purposes, this coal must be beneficiated to improve its characteristics (World Energy Council, 2013). Conversely, the low calorific value/high ash

³ RSA coal ±19 gigajoules per ton, international export quality requires at least 23-26 GJ/t.

content coal of South Africa is ideally and uniquely suited as feedstock for South Africa's coal fired power stations which were designed specifically to take this low grade coal. As a result, 65% of South Africa's coal remains in the country for this purpose (International Energy Agency, 2012).

2.4.2.4 Iron-ore

Iron-ore is graded by its percentage iron (Fe) and for the top global producers. This ranges from 30% (Guinea) to 72% (Mauritania). South African iron-ore ranges from 62%-65% making it a good quality ore (Menzie et al., 2013).

Gold ore bodies in South Africa, while abundant, are of low quality. This makes South African gold particularly expensive to mine. South African platinum has an excellent palladium ratio making it desirable to mine in South Africa. Coal quality is ideal for South African power stations but requires beneficiation for export purposes. South Africa's new power stations require this coal as feedstock once they come online and therefore, coal mining should be ramping up production in South Africa. South African iron-ore has an excellent rating of 62-65% Fe making it a desirable input to steel making.

2.4.3 Mining Exploration

The life-cycle of a mine is depicted below and can continue for as long as 150 years.

Figure 2 Lifecycle of a mine



Africa was the second most popular mining exploration destination in 2012 capturing 17% (US\$3.5 billion) of this global spend, with Democratic Republic of Congo (DRC) and West Africa receiving most of this attention. Exploration spend in South Africa for the same period was virtually non-existent (Chamber of Mines, 2013a). However the Department of Mineral Resources (DMR) claim that South Africa attracted a large portion of African exploration spend (Dept. of Minerals & Energy, 2014) along with Democratic Republic of Congo (DRC), Burkina Faso, Ghana and Zambia. The United States Geological Survey reported that about 50% of US\$ 312 million spent on exploration went towards PGM exploration in South Africa in 2012. Wilburn and Stanley cite a variety of reasons for the decline in exploration spending in South Africa over the last few years. These include “lack of detailed and updated geological maps, limited access to local risk capital, and uncertainty of legislation and mineral policies” (Wilburn & Stanley, 2013, p. 35). In 2013, the Chamber of Mines of South Africa reported to Parliament that although South Africa has the largest *in situ* value of mineral resources in the world, this country only accounted for 3% of greenfield projects (Baxter, 2013).

Given the long lead cycles in mining, to sustain the sector, there is a requirement for a constant pipeline of projects from exploration through operations to depletion (Price Waterhouse Coopers, 2013).

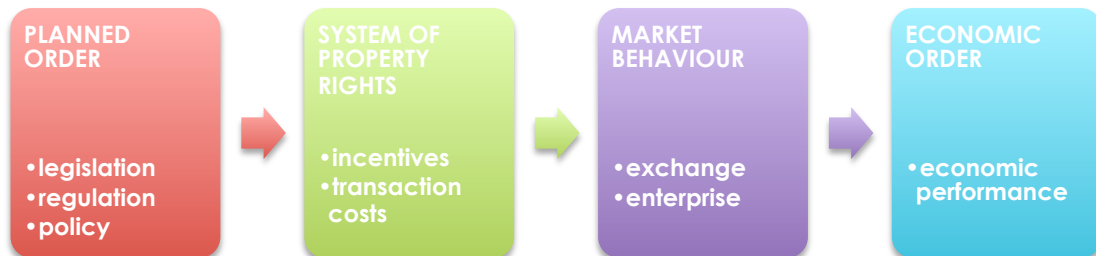
A review of the availability of proven reserves and quality of ore bodies showed that while in some cases (gold) the quality of ore is diminishing; South Africa still has enormous potential given its large proven reserves. Mining finds itself located in a particular context in South Africa, and the institutional arrangements within the country are likely to have an effect on this sector. The theory pertaining to institutional economics is reviewed below.

2.5 Introduction to institutions

2.5.1 Institutional Framework

Within institutional economics, property rights are framed within a set of policies, regulations and legislation (explicit institutions). These ‘rules of the game’ influence property rights and therefore market behaviour.

Figure 3 Institutional Framework



(Adapted from Musole, 2009)

Adam Smith described how and why the division of labour came about and its importance in modern society in his work “An inquiry into the nature and causes of the wealth of nations”, first published in 1776. Paul Seabright (Seabright, 2010), expanded on this theme demonstrating that this division creates a need for co-operation for commerce and exchange to take place. Institutions create an environment where co-operation is possible and risks can be measured and mitigated, giving investors security and peace of mind. Within this framework, institutions are essential to the creation of companies and their corresponding investment, resulting in economic growth and stability.

2.5.2 New Institutional Economics (NIE)

Ronald Coase’s work on transaction costs began in the 1930s and was later developed by Oliver Williamson from the 1970s onwards. More recently, Douglass North (North, 1991), and then Daron Acemoglu (D Acemoglu et al., 2005; Daron Acemoglu, 2012) advanced these theories. This model of economics proposes that good institutions and secure property rights lower risk and the cost of doing business, thereby encouraging trade and ultimately economic growth.

How institutions facilitate or hinder behaviour as well as co-ordination of these transactions is a central question of Institutional Economics (Groenewegen et al., 2010).

2.5.3 Transaction Costs

There are multiple definitions and interpretations of transaction costs (Musole, 2009). Starting with Williamson (Riordan & Williamson, 1985), transaction costs can be viewed as the *ex ante* costs of negotiating a contract and the *ex poste* costs of managing and enforcing a contract. For North (North, 1991), transaction costs are those costs associated with valuing the good(s) to be exchanged and the costs of monitoring and enforcing agreements. A transaction cost is not a production cost, it is the cost of exchange (i.e. buying and selling), and exchange is not cost-neutral. Transaction costs exist to mitigate issues like bounded rationality and opportunism (Crook, Combs, Ketchen Jr., & Aguinis, 2012; Musole, 2009).

Coined by Simon Herbert in the 20th century, “bounded rationality” could be considered “the limits of man’s abilities to comprehend and compute in the face of complexity and uncertainty” (Simon, 1979, p. 10). Humans do not have infinite capabilities or resources to factor in every possible outcome of a situation and adapt their behaviour accordingly. Bounded rationality can lead to opportunism, i.e. one party to the exchange may be aware that the other party is not fully aware or has not taken full account of all the possible outcomes and therefore may try to take advantage of this situation by exploiting the other party. This is particularly significant in transaction theory, where asset specificity, frequency and uncertainty are factors to be considered in the transaction costs (Weber & Mayer, 2014).

Asset specificity refers to an investment made to support a particular exchange. Specificity is particular to the exact nature of the business, and makes the investment difficult if not impossible to switch or liquidate, since the investment is made for one particular purpose (Crook et al., 2012; Riordan & Williamson, 1985). Asset specificity is the most important factor to determine transaction costs (Riordan & Williamson, 1985; Shelanski & Klein, 2005). Langlois summarises this relationship “The possibility of opportunism in the face of highly specific assets certainly does introduce a source of costs other than production costs” (Langlois, 2006, p. 1390). The other two issues, frequency (how often a transaction occurs) and uncertainty (volume, technological and/or behavioural) also contribute to opportunism (Crook et al., 2012).

Asset specificity, frequency and uncertainty create exchange hazards creating a gap for opportunistic behaviour. Of the 3, asset specificity is deemed the most important (Riordan & Williamson, 1985). Lohtia (Lohtia, Brooks, & Krapfel, 1985) defines a Transaction-Specific Asset as an asset “that has little value outside of a particular relationship (p. 261). Weber and

Mayer (2014) go further, and emphasise a firm's exposure to opportunistic behaviour where that firm has specific investments. This opportunistic behaviour can manifest as a "hold up" (Eggertsson, 1990). The potential for hold ups can reduce trust between parties, lead to under-investment, and also create additional costs to safeguard the interests of the investor (Weber & Mayer, 2014).

2.5.4 Institutions

Institutions are important because they try to mitigate issues like asset specificity and the hold up problem. "Institutions" by Douglass North (North, 1991) states "institutions are the humanly devised constraints that structure political, economic and social interaction... to create order and reduce uncertainty... and therefore determine transaction and production costs and hence the profitability and feasibility of engaging in economic activity" (North, 1991). Klein (2000) categorises institutions into institutional environments and institutional arrangements. The former is typically described as 'the rules of the game' and can be explicit or implicit, whereas institutional arrangements are specific guidelines, such as contracts or regulations. North (North, 1999) describes 'institutional structures' as three things: formal rules of the game, informal rules of the game and the effectiveness of enforcement.

In the context of Institutional Economics, "institutions are man-made rules and their accompanying sanctions that are intended to make interactions less risky and more predictable" (Groenewegen et al., 2010, p. 24). Institutions facilitate predictability, through inclusion and exclusion – i.e. what you may do and what you may not. These rules allow investors to manage and contain risk. Rules eliminate guesswork and therefore reduce risk through predictability. Predictability in the form of inclusion and exclusion encourages exchange (Groenewegen et al., 2010).

Geography and culture are considered by Acemoglu (D Acemoglu et al., 2005; Robinson & Acemoglu, 2012) as explanations for growth. However, his empirical research provides a strong positive correlation that it is in fact economic institutions that are the biggest determinant of growth. Supporting the view that it is in fact institutions and not geography nor trade that drives growth, (Rodrik, Subramanian, & Trebbi, 2004) undertook a detailed regression analysis over three different studies containing 64 countries, 79 countries and 137 countries. Their findings consistently demonstrated that the quality of institutions "trumps everything else" (Rodrik et al., 2004, p. 131)

Concerning economic growth and development, Auzan and Satarov (2013) cite Shirley and Keefers research (1984-1992), which conclusively demonstrated that institutional indicators (quality and observance to the rules of the game) are twice as influential as political indicators (quality of economic policy) and concluded “institutions are important” (Auzan & Satarov, 2013). Rodrik believes that it is no longer debatable whether institutions matter or not or their relative importance, but rather the questions to be asked are “which institutions matter and how does one acquire them” (Rodrik, 2007, p. 154).

Maucourant accuses North’s framework of NIE of being “reductive and inadequate” (Maucourant, 2012, p.193). He criticises North for ignoring the reality of the consequences of separating the ownership and control of the means of production from the actual producers. Amartya Sen provides an alternative view, whose model focuses on strategies for development, human liberties and strategies for growth. Public debate and participation in governance lie at the heart of this model (Castellano & García-Quero, 2012), instead of the analysis of institutions and property rights. This theoretical framework is strongly founded in social philosophy and human sciences and is not considered a useful theoretical model for the purpose of this study.

2.5.5 Property Rights

Having established the important role of institutions for economic growth, Acemoglu goes on to make the point that good economic institutions provide secure property rights (D Acemoglu et al., 2005). Broadly, property rights are formal laws and regulations (including enforcement as well as social norms and informal, tacit rules) (Eggertsson, 1990).

There are different types of properties (e.g. public or private) and similarly different types of property rights. Different types of property rights affect transaction costs and ultimately hinder or support economic growth (Eggertsson, 1990). The establishment of property rights raises two issues namely who or what has the power to design and allocate property rights and how these property rights are enforced (Groenewegen et al., 2010).

Groenewegen et al. (2010) propose that three conditions are necessary for a property right to exist, known as a “bundle of property rights”. These are: the right to make use of the good; the right to earn an income from the good; and the right to manage, sell or transfer the good. North (1999) suggests that an institutional structure must be present for property rights to exist.

According to Acemoglu (D Acemoglu et al., 2005) property rights are synonymous and a pre-requisite for economic growth. He offers compelling explanations about the economic growth experienced by, for example England and Netherlands, which specifically relates to property rights which were secured through constitutional rule (D Acemoglu et al., 2005). Conversely, Eggertsson (1990) cites De Soto (1989) and other Peruvian researchers who have demonstrated that behaviour is altered and resources wasted when property rights are insecure. Justesen and Kurrild-Klitgaard (Justesen & Kurrild-Klitgaard, 2013) argue that property rights alone are insufficient to ensure economic growth, but that citizens must be reassured based on past behaviour of the institutions and have a future expectation that property rights will be respected. Their research adds new depth to the debate around property rights and extends the idea that other conditions should be present for property rights to propel economic growth.

South Africa is ranked 56th in the Global Competitiveness Report (Schwab, 2014, p.340) whereas DRC is one of the few countries not ranked at all. It would seem that if the DRC and West Africa are on the receiving end of exploration money (Chamber of Mines, 2013a), there is appetite and will to invest in countries with riskier profiles than South Africa. The property rights model provides interesting insight into this.

Barzel (1997) explains that legal rights are neither necessary nor sufficient to extract economic benefits. Control of an asset may be more important than ownership, Rodrik illustrates this citing the success of the Chinese Village Township Enterprises model (Rodrik, 2008). Another example of this phenomenon can be found when comparing Russia with China. Russia has private property rights whereas China does not. However, China has seen massive entrepreneurial investments over the last two decades whereas in Russia private investment remains low (Rodrik et al., 2004, p.157).

While DRC remains a high risk country for investment (World Bank, 2010), it would seem that where economic value can be extracted in the face of uncertain or non-existent legal rights, investment and development will occur. The legal rights are indeed insignificant if they do not assist or enhance the miner's ability to capture economic benefit.

In the NIE view, the effects of institutions and property rights on transaction costs are inseparable. Acquisition, transfer and ownership of property rights create the requirement for enforcement and this is a costly exercise, creating transaction costs. Transaction costs are

according to North (1999) one of two things, namely the cost of measurement and cost of enforcement. He goes on to stipulate that technology and institutional structure determine transaction costs. Ideally, businesses and country economies should strive to have the lowest possible transaction costs, to maximise benefits to the parties. High transaction costs serve as a dis-incentive to investors, as this is perceived as detracting from the profitability of an enterprise (if this cost cannot be passed to the consumer or makes the product uncompetitive). In his 1993 Prize Lecture, Nobel Laureate Douglass North said “when it is costly to transact then institutions matter. And it is costly to transact” (North, 1993).

2.6 Institutional issues in mining in South Africa

Having established the importance of institutions and the requirement for the rules of the game to be clear, stable and predictable; policies, regulations and legislation pertaining to mining will now be reviewed. Legislation and regulations are tangible institutions that play a crucial role signalling to the market the ‘rules of the game’. Below is a brief history of most of the policy and legislative developments over the last 20 years.

The Mineral Policy Process Steering Committee was formed in 1995, and was made up of representatives from government, organised labour and industry. Extensive discussions, workshops and consultations culminated in the formation of the Green Paper and then the White Paper in 1998. These consultation papers sought to identify and address issues that may have been hampering investment and growth in the mining sector. The White Paper sets out the South African government’s commitment to encourage investment in this sector through the creation of a stable macro-economic environment:

“Government will create a stable macro-environment that supports economic development at national, provincial and local level and in which business, subject to appropriate regulation, can operate profitably, be internationally competitive and satisfy their shareholders’ and employees’ expectations. In this way Government will encourage investment in mining as in other industries.”

(Dept. of Minerals & Energy, 1998)

The Mining Bill of 2001 followed the White Paper and later, in 2002 the Mineral and Petroleum Resources Development Act was passed. The 2002 Mineral and Petroleum Resources Development Act (MPRDA) was a significant milestone in mining policy in South Africa. This Act fundamentally changed mining rights in South Africa. Prior to this Act, the

ownership model was one of public-private partnership. The 2002 Act expropriated mining rights from mining companies, and placed the mining rights under state custodianship. This was done in collaboration and co-operation between the state and the industry, recognising that this is global practice and not unique to South Africa. The industry set about converting their “old order” rights to “new order” rights over the coming years.

The Precious Metals Act was passed in 2006 followed by the introduction of the Mineral and Petroleum Resources Development Amendment Bill in 2008.

2009 saw the introduction of the Royalty Act, which was passed in 2010. In the same year, the African National Congress Youth League (ANCYL) published the controversial discussion paper “Towards the transfer of mineral wealth to the ownership of the people as a whole: A Perspective on Nationalisation of Mines”. This paper introduced the idea that the state might nationalise mines and that this “nationalisation may involve expropriation with or without compensation” (ANCYL, 2012, para. 12). Two years later, in 2012, the African National Congress (ANC) responded with its paper “State intervention in the mining sector [SIMS]”. On the one hand, the SIMS paper put the issue of nationalisation to rest, on the other, it furthered the idea of the State’s participation in mining as an equity partner and strengthened its case for beneficiation in-country and the possibility of determining certain minerals to be “strategic” and therefore under state control (pricing and export) (ANC, 2012).

The first of four drafts of the Mineral and Petroleum Resources Development Amendment Bill was published in 2012. Key issues raised in this Bill were “state free carried interest” for oil and petroleum projects and the possibility to designate certain minerals strategic.

Following the tragic events at Marikana in 2012, the industry signed the Framework for Peace and Stability in the Mining Sector in 2013. The Department of Trade and Industry published its Industrial Policy Action Plan (IPAP) in 2013, this plan included a chapter on “Downstream Mineral Beneficiation”, further developing ideas proposed in the ANC’s SIMS paper. The possibility of “licence extraction” and “local pricing conditions” are introduced in this paper (DTI, 2013, p. 125).

The Davis Tax Commission was established in 2013 to assess how South Africa’s taxation system contributes towards growth and development in South Africa. Mining was identified as a key industry in the taxation system and a Mining Tax Sub-Committee was established. The industry, through its association, Chamber of Mines, has participated in this process.

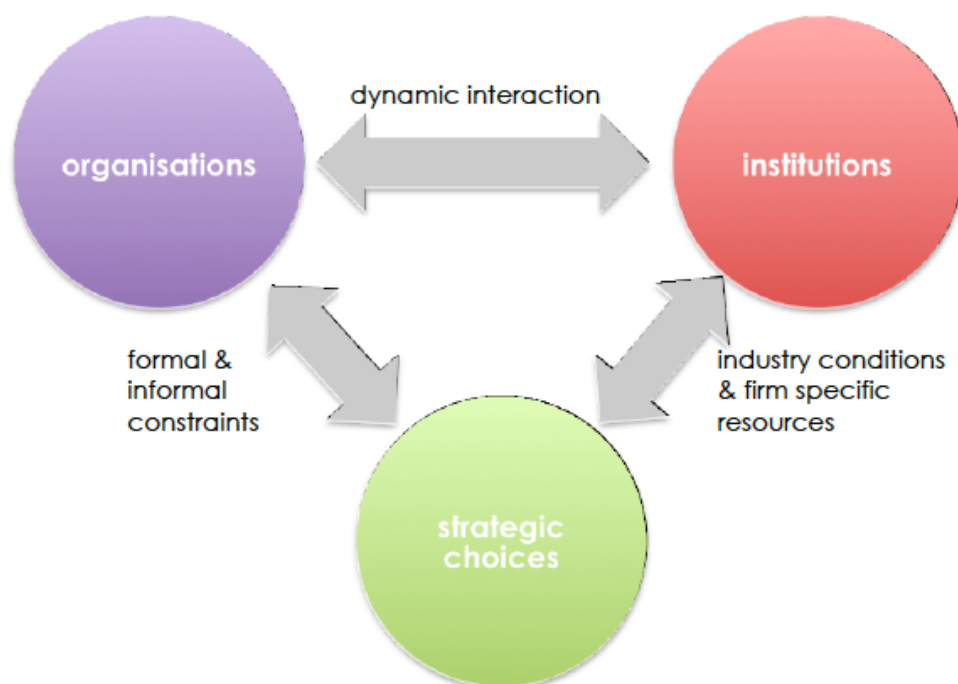
March 2014 saw the approval of the MPDRA Amendment Bill by the Portfolio Committee on Mineral Resources, the National Council of Provinces (NCOP) and Parliament. All that is required is for the President to sign the Bill, for it to become an Act of Parliament. Once signed, a date for implementation of the MPDRA will be set and published in the government gazette.

2.7 Conclusion of Literature Review

South Africa contains the world's highest in situ value of resources in the world (Chamber of Mines, 2013a; Hopwood, Ives, & Beier, 2013). Information about proven ore reserves suggests that South Africa is uniquely positioned to supply global demand in key commodities.

New Institutional Economics provides a framework to review market behaviour and investment decisions. By way of summary, Peng (2002, p. 253) offers an institutional model of strategic choices, showing the dynamic interaction between organisations and institutions. In this model, institutions provide formal and informal constraints, while the organisation assesses its position in relation to other market players and conditions. This dynamic relationship leads to strategic choices for a firm.

Figure 4 Institutional model of strategic choices



2.8 Restatement of Research Problem

In 2012, four commodities, namely gold, PGMs, coal, iron-ore accounted for 81% of South Africa's mining output. The mining sector's contribution to the South African economy was 8% directly and 17% indirectly. This sector provided 1.3m jobs in South Africa and 51% of the country's export income (Chamber of Mines, 2013a). Endowed with vast mineral reserves, coupled with a global appetite for these commodities, South Africa was and remains well positioned to take advantage of this. However, in the last decade, every other country with mineral resources has increased its employment and production. South Africa has not. In fact, South Africa's production and employment has declined in this period (Renwick, 2014). Given that South Africa did not grow its mining sector in tandem with world growth, it is questionable whether the country is capable of growing this sector in the future.

Property rights and transaction costs are key determinants of investment decisions, especially where the investments require large amounts of capital, long lead times and have the risk of asset-specificity. Mining in general suffers from geographic inflexibility (you can only mine a mineral where you find it), asset-specificity, is risky as well as having long lead times (it may take up to ten years of exploration to prove or dis-prove an ore body). For these reasons, this industry is particularly sensitive to 'the rules of the game', and requires that these are known at the outset, and do not change once a course of action (i.e. investment) is chosen.

The last 15 years in South Africa has seen many new ideas, policies, regulations and legislation introduced into the mining sector. What, if any effect, this may have had on investment in the sector will be explored through a stakeholder survey (Chapter 5) and results discussed in the context of institutional economics in Chapter 6.

3. Research Hypotheses

3.1 Research Hypothesis 1

H₀: There was a global increase in price, demand and production in four key commodities gold, platinum, coal and iron-ore between 2000-2013.

H₁: There was no global increase in price, demand and production in four key commodities gold, platinum, coal and iron-ore between 2000-2013.

3.2 Research Hypothesis 2

H₀: South African mining production in four key commodities gold, platinum, coal and iron-ore output followed global trends between 2000-2013.

H₁: South African mining production in four key commodities gold, platinum, coal and iron-ore declined in relation to growth in global output 2000-2013.

3.3 Research Hypothesis 3

H₀: Institutional factors played a role in the decline in production of the South African mining sector in four key commodities gold, PGMs, coal and iron-ore between 2000-2013 and continue to influence current and future investment decisions

H₁: Institutional factors did not play a role in the decline in production of the South African mining sector in four key commodities gold, PGMs, coal and iron-ore between 2000-2013 and do not influence current and future investment decisions.

4. Research Methodology

4.1 Research design

Recognising that qualitative and quantitative research each come with their own limitations, a mixed-methodology, using both qualitative and quantitative research is now not uncommon (Creswell, 2014). This study used a mixed methodology to gain depth of understanding of what has happened in the mining sector in South Africa over the last 12 years. Using qualitative and quantitative approaches verified and cross-referenced data collected from both studies.

This study used quantitative data to first establish that there was a global commodity boom this century, with particular reference to gold, platinum, coal and iron-ore. The study then looked specifically at South Africa's output of these 4 commodities this century to confirm whether or not this country followed the global trend? Finally a qualitative study, in the form of a survey was administered to stakeholders in the mining sector, to gather data to test the third hypothesis. The research design was mixed-method, i.e. a combination of quantitative and qualitative.

The quantitative research is post-positivistic, and used empirical observations and measurements to validate theory. This type of research is not intended to prove a hypothesis, but rather fails to reject the hypothesis (Creswell, 2014). The qualitative research adopted an interpretivist approach, as the study is examined the way in which different players in society, (people or institutions), have influenced each other to create specific outcomes (Saunders & Lewis, 2012).

The research undertook descriptive and explanatory studies pertaining to the mining sector in South Africa. The type of study for H1 and H2 was descriptive. The third Hypothesis was explanatory, where reasons for investment or lack thereof were examined with reference to particular variables (institutional factors) (Creswell, 2014; Saunders & Lewis, 2012).

A philosophy of pragmatism guided the research design.

Table 10 Research Design

H1: There was a global increase in price, demand and production in four key commodities gold, PGMs, coal and iron-ore between 2000-2013	H3: Institutional factors played a role in the decline in production of the South African mining sector in four key commodities gold, PGMs, coal and iron-ore between 2000-2013
H2: South African mining production in four key commodities gold, PGMs, coal and iron-ore output followed global trends between 2000-2013	
Approach	
Inductive	Deductive
Strategy	
Archival research	Survey
Methodology	
Quantitative	Qualitative
Time horizon	
Longitudinal	Cross-sectional

(Saunders & Lewis, 2012)

4.2 Ethics, confidentiality and anonymity

Whereas the evidence in support of Hypothesis 1 and Hypothesis 2 were constructed from publicly available data and Hypothesis 3 was based on people's opinions, there was a reverse requirement for anonymity and confidentiality. Therefore the data sources used in H1 and H2 are fully exposed, initially by their own doing, and now further by this research. H3 on the other hand required a guarantee of privacy through confidentiality and anonymity (Orton-Johnson, 2010, p. 312).

4.3. Hypothesis 1: There was a global increase in price, demand and production in four key commodities gold, platinum, coal and iron-ore between 2000-2013.

Hypothesis 2: South African mining production in four key commodities gold, platinum, coal and iron-ore output followed global trends between 2000-2013.

Archival research was used to gather data to validate these hypotheses. This research provided data on a range of metrics for mining globally, and in South Africa. Mining activities were restricted to the four key minerals gold, platinum, coal and iron-ore.

The research was longitudinal and gathered data and statistics for pertaining to this century, in the four key minerals mentioned.

4.3.1 Universe

Global and South African mining activities in this century.

4.3.2 Population of relevance

Production, demand and price of gold, PGMs (specifically platinum), coal and iron-ore this century.

4.3.3 Sampling

Data sets from publicly available sources were used. A number of different sources were used to ensure the overall reliability of the numbers. Saunders & Lewis (2012) make the point that publicly available data is generally reliable because of the scrutiny it faces. Another reason several sources of information were used to gather the data was that the secondary data used was originally gathered for a different purpose and was not in a format nor did it contain all the data required to test these hypotheses. Data was gathered from the following sources in the table below.

Table 11 Hypothesis 1 and 2 secondary data sources

Variable		Commodity			
		Gold	PGMs / Platinum	Coal	Iron-ore
Hypothesis 1	Price	World Gold Council	Johnson Matthey	British Petroleum. Statistical Review of World Energy.	IndexMundi.com
	Global production	U.S. Geological Survey, Mineral Commodity Summaries	Johnson Matthey	British Petroleum. Statistical Review of World Energy.	IndexMundi.com
Hypothesis 2	Global production top 5, 2009	IndexMundi.com	Johnson Matthey	IndexMundi.com	IndexMundi.com
	South African production	Department of Minerals Resources (South Africa). Statistical Tables	Johnson Matthey	Department of Minerals Resources (South Africa). Statistical Tables	Department of Minerals Resources (South Africa). Statistical Tables

4.3.4 Unit of analysis

The unit of analysis was commodity prices and mining output for the four chosen commodities from 2000-2013.

4.3.5 Measurement

Global output, demand and prices for the four key commodities, gold, platinum, coal and iron-ore from 2000-2013 was established.

South Africa's output for the four key commodities, gold, PGMs (platinum), coal and iron-ore from 2000-2013 was compared to this benchmark.

4.3.6 Data collection

A range of internet based searches realised the databases and information required.

4.3.7 Limitations

Some data sets were incomplete and were there for not fit for purpose for analysis, comparisons and conclusions. Not all data sets were comparable with one another, for example some data spanned multiple years or contained other data that could not be separated which could have potentially influenced the results. It was therefore incumbent on

the author to reformat some of the information and consolidate all information gathered into a matrix that could be utilised for analysis and comparative purposes.

This study was retrospective for the last 12 years, and therefore ignored previous losses or gains prior to 2000. Mining has a long history and the “snapshot” of just over decade may be too short a period to fully explain changes in the sector.

4.3.8 Reliability and Validity

Standards of reliability and validity are especially important in quantitative research (Creswell, 2014). Therefore, the collection of secondary data and the analysis thereof was done mindfully and prudently to safeguard the reliability and validity of the results.

4.3.8.1 Reliability

The data collected for the first two hypotheses were based on published figures by reputable agencies. Also, as many different sources were used to gather the data, this served as a reliability check on the data itself, ensuring consistency in the approach. Finally, as mentioned, since this data was collected from publicly available sources, it had already undergone a process of scrutiny. Publicly available data is likely to be more reliable than privately or secretly held data, as the latter is not exposed to challenges. The reliability of the data was therefore deemed high.

4.3.8.2 Validity

Given the publicly available status of the data from which these two hypotheses were interpreted, it is anticipated that the validity of the data is safeguarded. Publicly available data from reputable institutions and organisations are generally highly regarded as the data is likely to have undergone rigorous scrutiny (Saunders & Lewis, 2012, pp. 92-93).

4.4 Hypothesis 3: Institutional factors played a role in the decline in production of the South African mining sector in four key commodities gold, PGMs, coal and iron-ore between 2000-2013 and continue to influence current and future investment decisions.

The approach for testing Hypothesis 3 is deductive (compared to inductive for Hypothesis 1 and 2). The strategy used to test this hypothesis was a survey, using closed questions, with an option to comment if the respondent wished to. Toepoel (Toepoel, Vis, Das, & van Soest, 2009, p. 145) believes that closed questions are more likely to be answered in a survey than open ended questions. Open-ended questions are more difficult to answer because they require the respondent to recall information, whereas closed questions simply require recognition on the part of the respondent.

4.4.1 Universe

Stakeholders in the South African mining sector.

4.4.2 Sampling

Non-probability sampling in the form of purposive sampling was used for the questionnaire. Key institutions and individuals were identified and approached to survey. This was a cross-sectional study using a structured questionnaire for data collection, with the intention to generalise from the sample to the population (Creswell, 2013a, p. 14).

Table 12 The sampling frame

Field	Organisation	Field	Organisation
political parties	African National Congress Democratic Alliance Economic Freedom Fighters Freedom Front Plus COPE	trade unions	National Union of Mineworkers Association of Mineworkers and Construction Union Congress of South African Trade Unions Policy Unit
equipment suppliers	Joy Global BarlowWorld Tenova	mining publications	Mining weekly Mining prospectus Mining journal miningMX Bloomberg
industry organisations	Chamber of Mines of South Africa World Gold Council World Coal Association International Platinum Association Nedlac Business Unity South Africa	mining companies	Diversified mining companies Gold mining companies Coal mining companies Platinum mining companies Iron ore mining companies Rand refinery
legal services	Webber Wentzel Bowman Gilfillan Hogan Lovells	consultancies	Price Waterhouse Coopers SRK Consulting Moore Stephens BDO Russel & Associate's SRK Consulting
financial services	FNB ABSA Investec Standard Bank Barclays Industrial Development Corporation Liberum Capital Renaissance Capital BNP Paribas Noah Capital Cadiz Nomura Barnard Jacobs Mellet Securities Thebe Investment Corporation Johannesburg Stock Exchange	consulting engineers	Aurecon SMEC South Africa Bosch Stemele Pty Ltd Worley Parsons RSA UWP Consulting Bvi Consulting Engineers Mott Macdonald Bigen Africa AECOM SA GMH / Tswelelo Consulting SiVEST SA Samar Consulting Engineers SA Delta Built Environment Dr Hendrik Kirsten Consulting Engineer SADC Project Consulting
academia	Wits School of Mining University of Manchester School of Oriental and African Studies		

4.4.3 Unit of analysis

Reasons (opinion) for investment, or the lack thereof in the mining sector (gold, PGMs [platinum], coal and iron-ore) this century.

4.4.4 Pre-test

The questionnaire was developed and piloted on 3 industry participants for ease of use, accuracy, grammar and relevance.

4.4.5 Measurement

Citations (by number and percentage) of particular reasons for investment, or the lack thereof in the mining sector (gold, PGMs [platinum], coal and iron-ore) this century. As most of the answers in the survey are categorical, the central tendency will be used to describe the responses (Saunders & Lewis, 2012, p. 177).

The Fraser Institute in Canada conducts an annual global mining survey (Wilson, McMahon, & Cervantes, 2013). The survey examines 16 factors that may encourage or hinder investment in mining in a number of countries, and was deemed appropriate to replicate in this survey. In addition to using the Fraser Institute's 16 institutional variables, this survey elaborated on the detail of some of the variables to gain deeper understanding and granularity of the responses.

4.4.6 Data collection

The questionnaire was transcribed into Google forms. Questions could be answered by ticking a box and every question was compulsory (i.e. the respondent could not continue to the next question without answering the previous question). Respondents were also given an opportunity to write additional comments for each question. There were no identifiers or markers in the questionnaire, ensuring complete anonymity of the respondents. The questionnaire was available for response until September 24th 2014.

Targeted emails were sent to individuals and groups in the first 2 weeks of August 2014. 110 questionnaires were sent out as individual emails addressed directly to the respondent. . Follow up emails were sent a month later, in September 2014.

4.4.7 Limitations

Mistrust that the survey was truly anonymous and not traceable back to the individual, as well as concerns about transmitting information over the internet contributed towards a low

response rate using this survey method (Hudson, Seah, Hite, & Haab, 2004; Vicente & Reis, 2010).

Responses were limited by the options provided, unlike an open-ended survey where respondents are free to provide their own reasons which are often considered to be of higher quality or more informative (Fricker & Schonlau, 2002). Therefore there may have been reasons for investment or lack thereof, other than the ones offered as an explanation in the survey, which were not captured.

This sampling methodology, purposive, is not necessarily representative (Babbie & Mouton, 2003, p. 170). Understanding that there was a risk that the purposive sampling method used in this study may yield non-representative results, to mitigate the sampling technique, a broad range of stakeholders with a wide range of interests was approached for the survey, attempting to gather as broad a spectrum of views as possible.

Low response rates are common in electronic surveys (Hudson et al., 2004). The lack of an adequate number of responses was mitigated by sending an initial email requesting completion and then two follow up emails spaced 3 weeks apart, as suggested by Babbie and Mouton (2003, p. 260).

4.4.8 Privacy and Confidentiality

The consent statement of the questionnaire informed the respondents that the researcher is committed to ensuring adequate precautions are in place to maintain anonymity of the data captured by this survey by using aggregated data. Further, respondents were informed that no distinguishing characteristics that may reveal the respondent's identity would be disclosed.

There were no markers or tags in the coding of the online survey; therefore it would not be possible to identify who responds to the survey.

4.4.9 “Sharing the Perquisites of Privilege”

At the end of the survey, there is an option for the respondent to request a copy of the report once it is complete. This was in acknowledgement of the effort taken by the respondent and a way of sharing the output with them; an output that relied heavily on their contribution (Lincoln, 1995; Vicente & Reis, 2010). If the respondent wished to receive this, they were required to either email the author separately or insert their email address in the questionnaire. Where respondents disclosed their email address voluntarily, the researcher

would then know who they are. However, their privacy is guaranteed, as their email address is not linked to the questionnaire in anyway. This means that the respondent identified himself or herself as such, but it is impossible to know what their answers in the questionnaire were.

4.4.10 Reliability and Validity

Due to the manner of sampling, i.e. purposive rather than random representative and the possibly small number of interviewees, the reliability of the results may be compromised. The number and range of questions across a set of variables helps establish any relationships that may exist between investment behaviour and institutional factors and lends itself to the reliability of the results of the survey.

If the sample group had sufficient trust in the anonymity of the process and answered the questions truthfully, the results are valid for that particular group.

5. Results

5.1 Research Hypothesis 1

H₀: There was a global increase in price and production in four key commodities gold, platinum, coal and iron-ore between 2000-2013.

H₁: There was no global increase in price and production in four key commodities gold, platinum, coal and iron-ore between 2000-2013.

5.1.1 Sample description

Data sets from publicly available sources were used. Data was gathered from the following sources listed below.

Table 13 **Data sources**

Variable	Commodity			
	Gold	Platinum	Coal	Iron-ore
Price	World Gold Council	Johnson Matthey	British Petroleum. Statistical Review of World Energy.	IndexMundi.com
Global production	U.S. Geological Survey, Mineral Commodity Summaries	Johnson Matthey	British Petroleum. Statistical Review of World Energy.	IndexMundi.com
Global production top 5, 2009	IndexMundi.com	Johnson Matthey	IndexMundi.com	IndexMundi.com

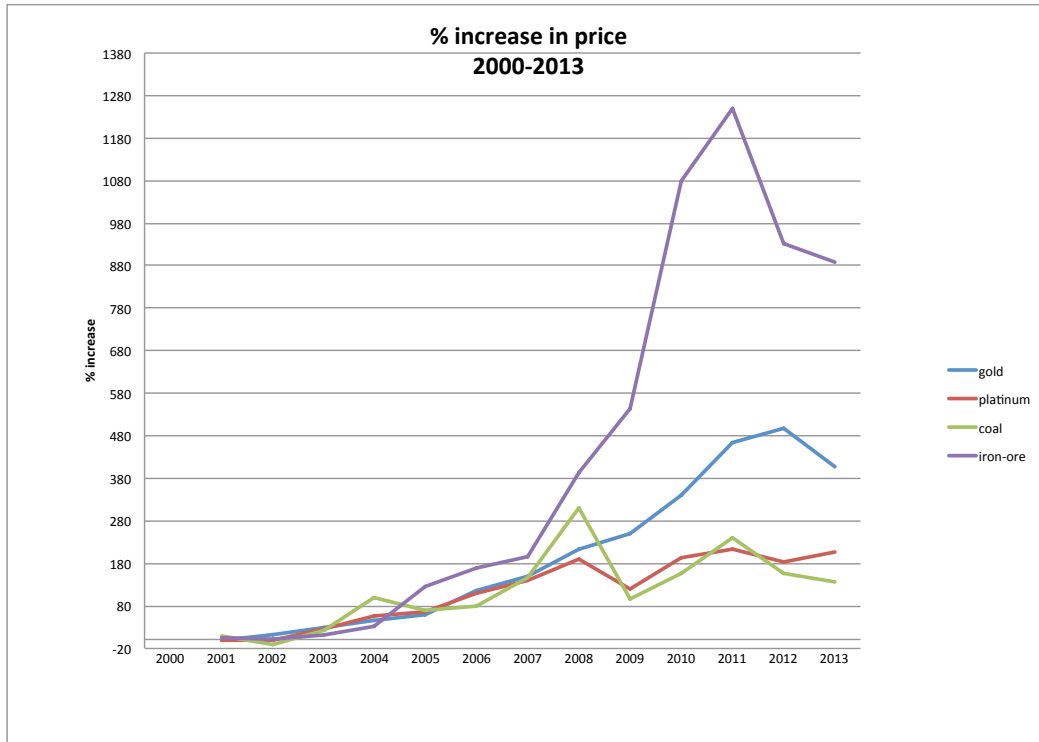
5.1.2 Price Data

Table 14 Price data 2000-2013: gold, platinum, coal, iron-ore

	gold	platinum	coal ⁴	Iron-ore
	US \$ per oz	US \$ per oz	US \$ per tonne	US \$ per dry metric tonne
	end of period	annual average	average of weekly prices	annual average
2000	279	549	32	12
2001	271	533	37	13
2002	310	542	30	13
2003	363	695	37	14
2004	409	849	72	16
2005	444	902	62	28
2006	604	1,144	56	33
2007	695	1,308	85	37
2008	872	1,583	148	62
2009	972	1,210	79	80
2010	1,225	1,615	105	147
2011	1,572	1,723	126	168
2012	1,669	1,555	106	129
2013	1,411	1,677	91	135

⁴ Asian marker price used for coal as 75% of South Africa coal is exported to this continent.

Figure 5 Percentage price increases for gold, platinum, coal and iron-ore 2000-2013

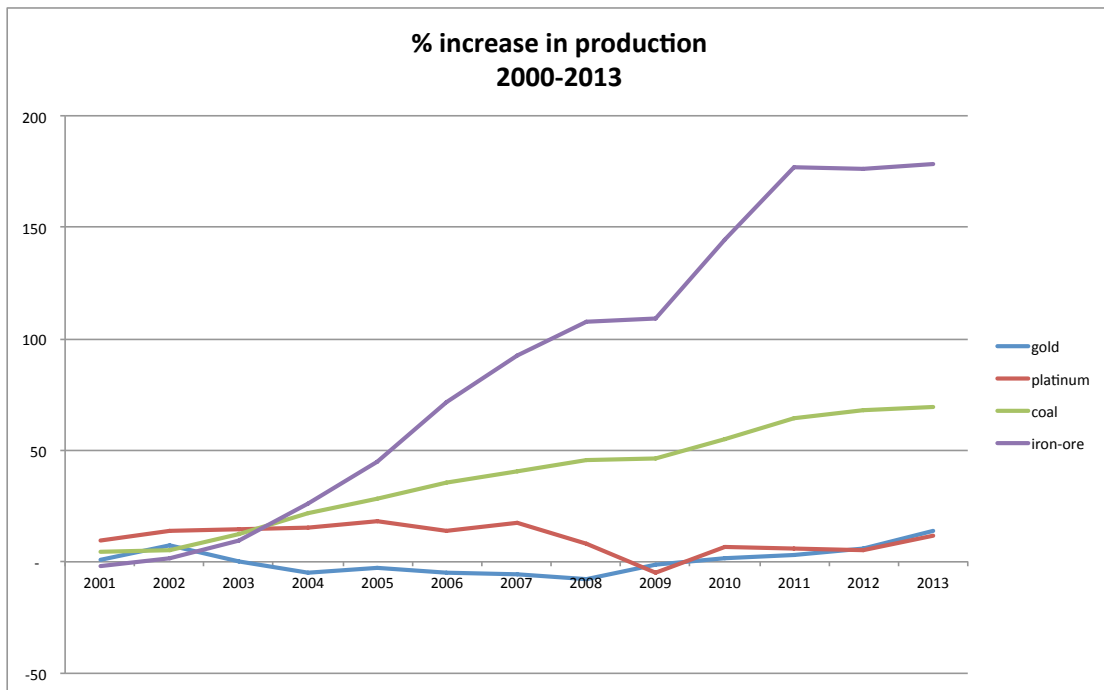


5.1.3 Production Data

Table 15 Production data 2000-2013: gold, platinum, coal, iron-ore

	gold	platinum	coal	iron ore
	tonnes	tonnes	million tonnes oil equivalent	1,000 metric tonnes
2000	2,618	5,680	2,287	1,060,000
2001	2,645	6,230	2,390	1,040,000
2002	2,818	6,470	2,402	1,080,000
2003	2,621	6,530	2,573	1,160,000
2004	2,493	6,540	2,781	1,340,000
2005	2,548	6,695	2,942	1,540,000
2006	2,486	6,475	3,101	1,820,000
2007	2,476	6,680	3,212	2,040,000
2008	2,409	6,160	3,326	2,200,000
2009	2,584	5,390	3,356	2,220,000
2010	2,659	6,075	3,548	2,590,000
2011	2,690	6,035	3,768	2,940,000
2012	2,770	5,990	3,862	2,930,000
2013	2,982	6,345	3,881	2,950,000

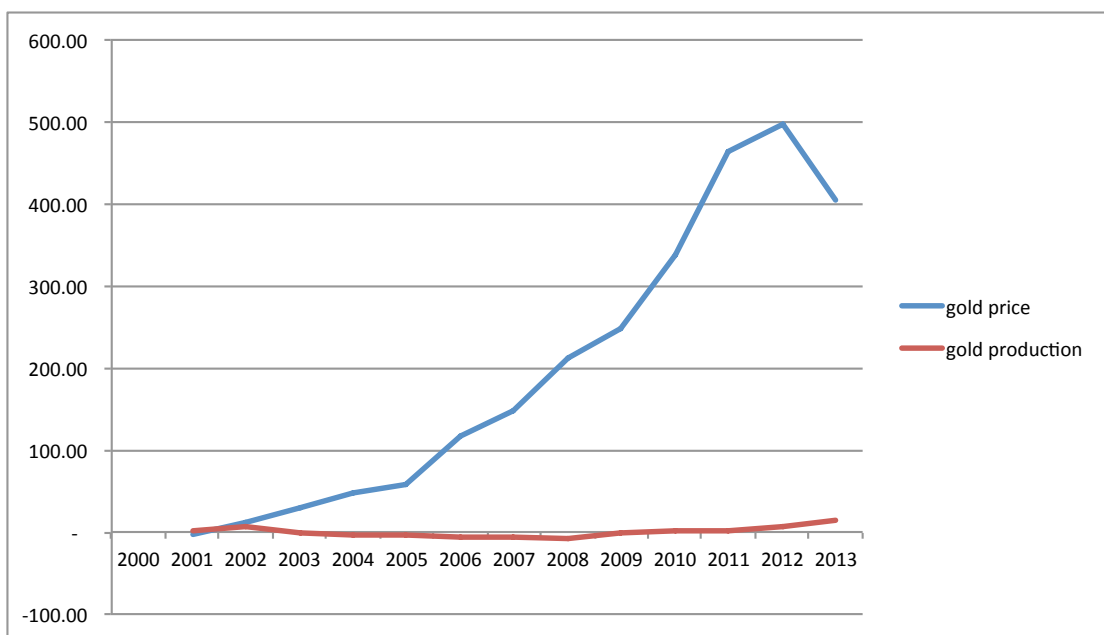
Figure 6 Percentage production increases for gold, platinum, coal and iron-ore 2000-2013



5.1.4 Price and Production data by commodity 2000-2013

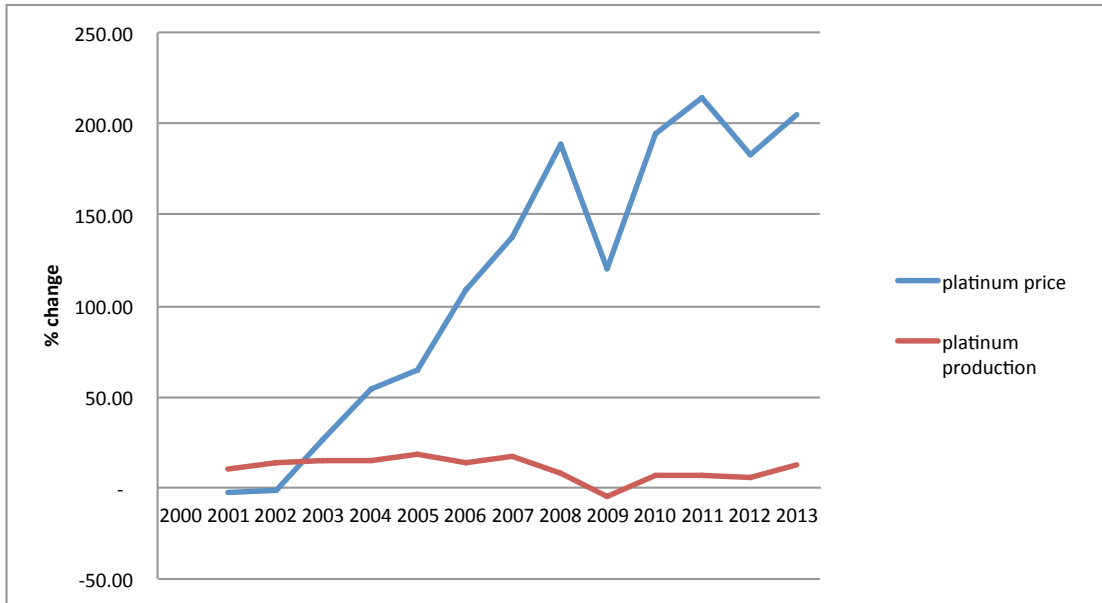
5.1.4.1 Gold

Figure 7 Gold price and production data, 2000-2013



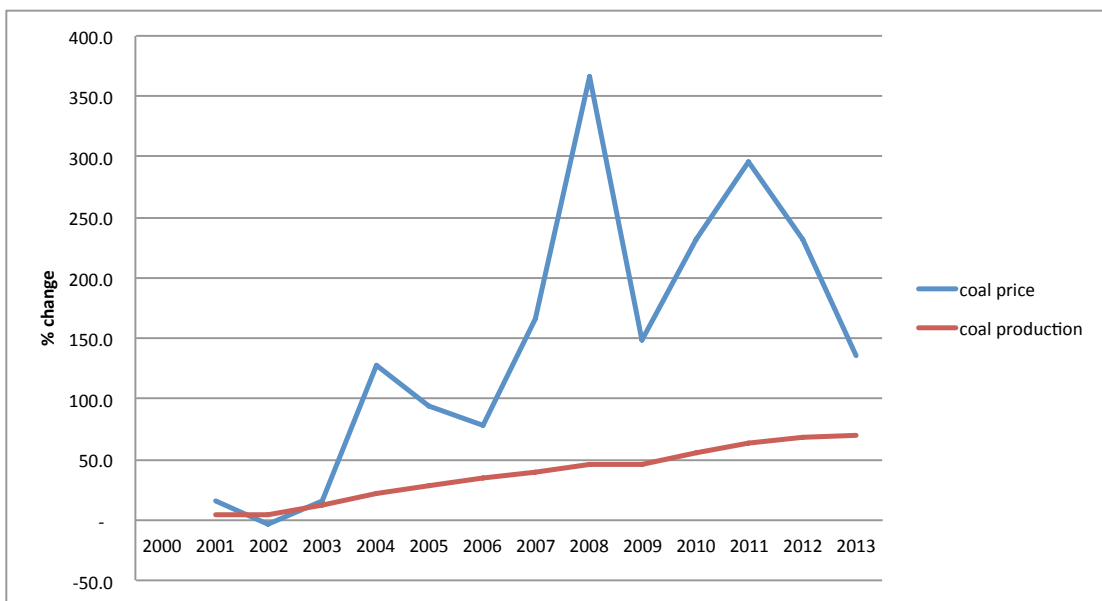
5.1.4.2 Platinum

Figure 8 Platinum price and production data, 2000-2013



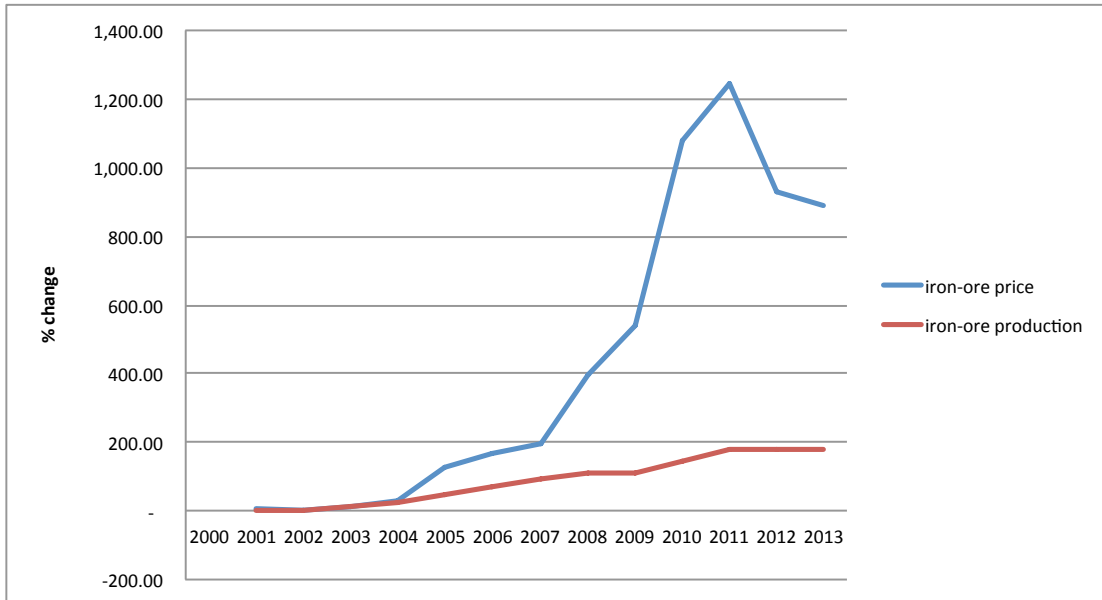
5.1.4.3 Coal

Figure 9 Coal price and production data, 2000-2013



5.1.4.4 Iron-ore

Figure 10 Iron-ore price and production data, 2000-2013



5.2 Research Hypothesis 2

H₀: South African mining production in four key commodities gold, platinum, coal and iron-ore output followed global trends between 2000-2013.

H₁: South African mining production in four key commodities gold, platinum, coal and iron-ore declined in relation to growth in global output 2000-2013.

5.2.1 Sample description

Data sets from publicly available sources were used. Data was gathered from the following sources listed below.

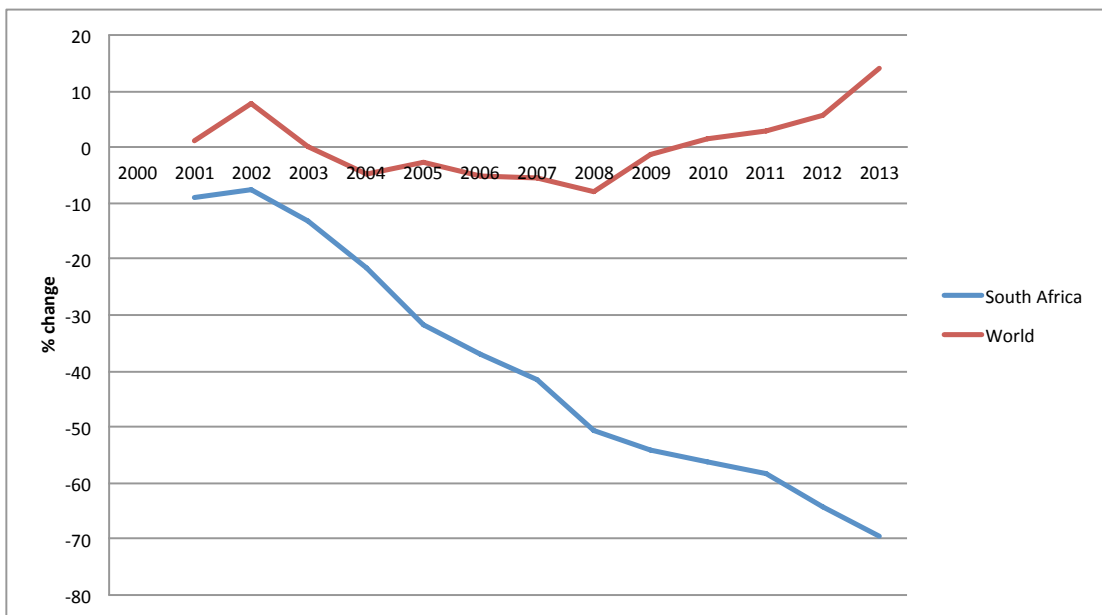
Table 16 Data sources

Variable	Commodity			
	Gold	Platinum	Coal	Iron-ore
Global production	U.S. Geological Survey, Mineral Commodity Summaries	Johnson Matthey	British Petroleum. Statistical Review of World Energy.	IndexMundi.com
Global production top 5, 2009	IndexMundi.com	Johnson Matthey	IndexMundi.com	IndexMundi.com
South African production	Department of Minerals Resources (South Africa). Statistical Tables	Johnson Matthey	Department of Minerals Resources (South Africa). Statistical Tables	Department of Minerals Resources (South Africa). Statistical Tables

5.2.2 Production data by commodity

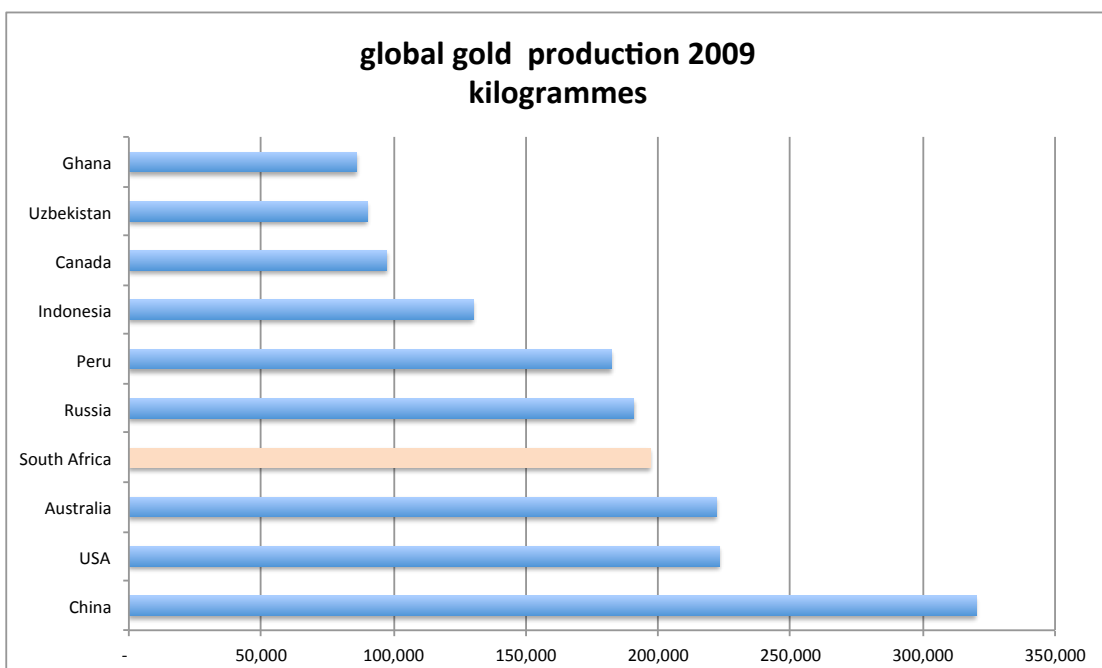
5.2.2.1 Gold

Figure 11 South Africa -v- global gold production, 2000-2013



5.2.2.2 Gold production in perspective

Figure 12 Top 10 gold producing nations 2009



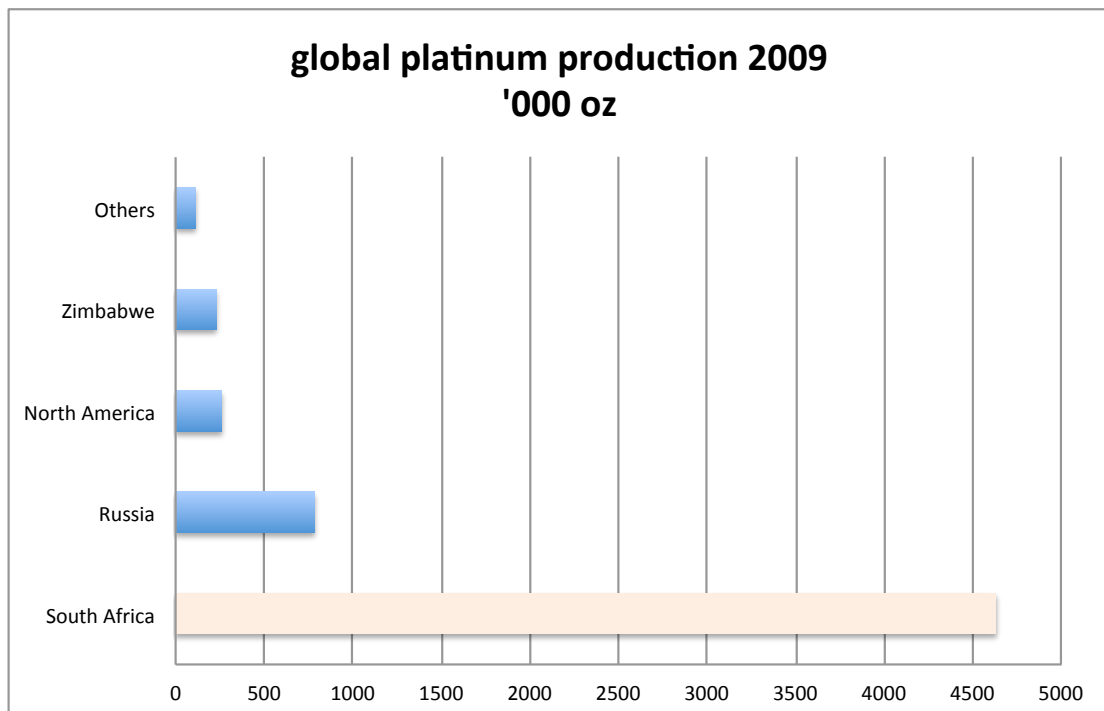
5.2.2.3 Platinum

Figure 13 South Africa -v- global platinum production, 2000-2013



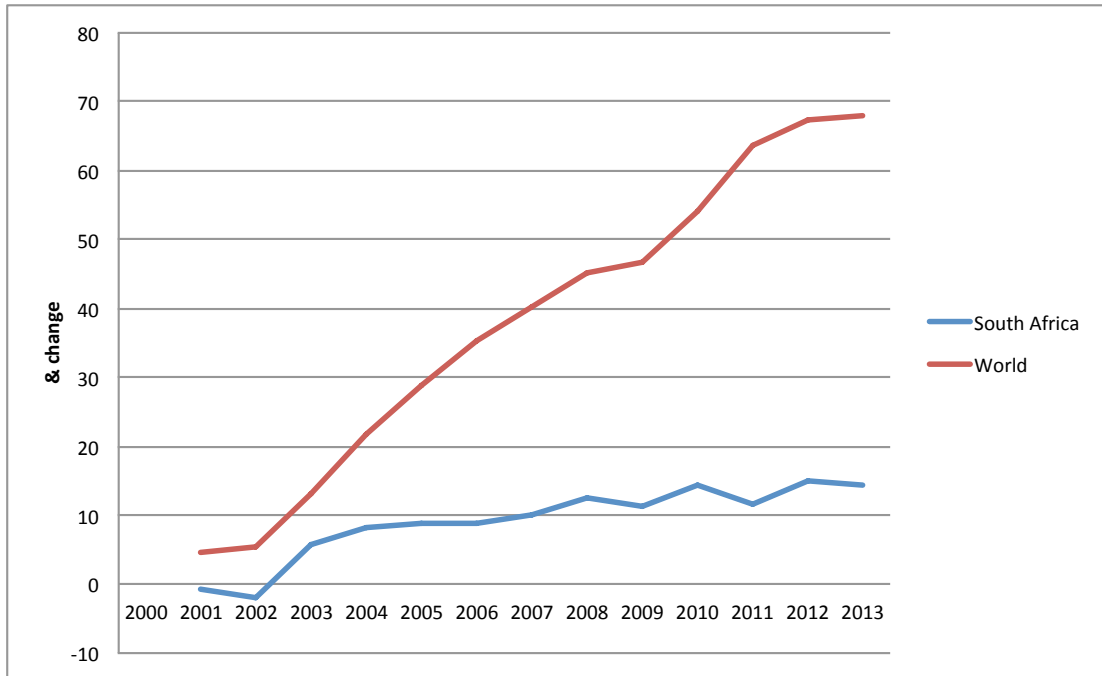
5.2.2.4 Platinum production in perspective

Figure 14 Top 5 platinum producing nations 2009



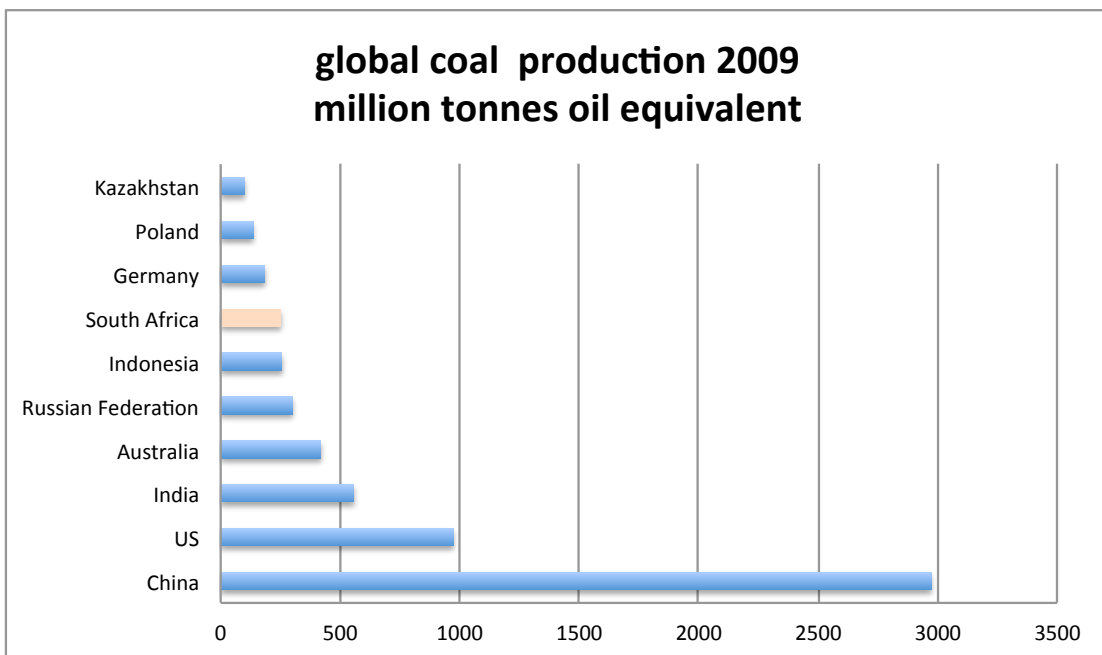
5.2.2.5 Coal

Figure 15 South Africa -v- global coal production, 2000-2013



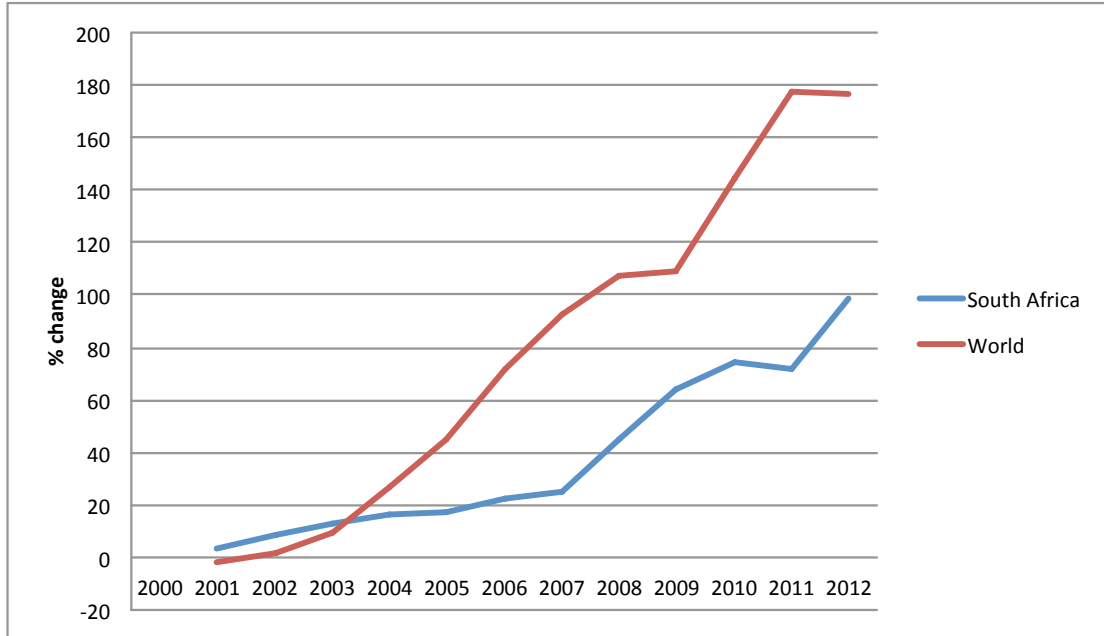
5.2.2.6 Coal production in perspective

Figure 16 Top 10 coal producing nations 2009



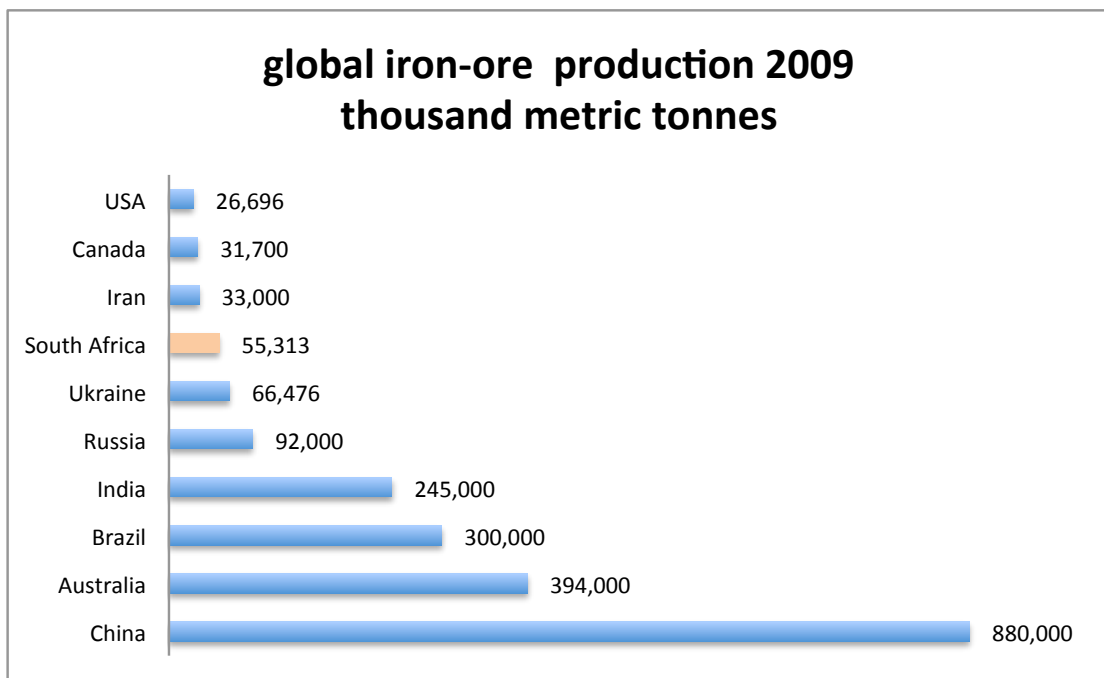
5.2.2.7 Iron-ore

Figure 17 South Africa -v- global iron-ore production, 2000-2012



5.2.2.8 Iron-ore production in perspective

Figure 18 Top 10 iron-ore producing nations 2009



5.3 Research Hypothesis 3

H₀: Institutional factors played a role in the decline in production of the South African mining sector in four key commodities gold, PGMs, coal and iron-ore between 2000-2013 and continue to influence current and future investment decisions.

H₁: Institutional factors did not play a role in the decline in production of the South African mining sector in four key commodities gold, PGMs, coal and iron-ore between 2000-2013 and do not influence current and future investment decisions.

5.3.1 Sample description

Non-probability sampling in the form of purposive sampling was used for the questionnaire. Key institutions and individuals were identified and approached to survey. Senior executives and experienced consultants, financial services executives, academics and journalists in the mining sector were approached to complete the survey.

5.3.2 Profile of participants

A total of 22 completed questionnaires were submitted online and received by the end of September 2014.

Table 17 Participants' profile

Participants	%	No. years experience	%
mining company - diversified	9%	1-5	9%
mining - gold	9%	6-10	41%
mining - coal	14%	11-15	27%
mining - iron ore	9%	16-20	9%
trade union	5%	21-25	9%
political party	5%	26 or more	5%
community leader	5%		
industry group (Nedlac / Busa / CoM)	5%		
equipment / services supplier to industry	9%		
mining engineer	5%		
consulting engineer	5%		
journalist	5%		
financial services	18%		

Hypothesis three will be analysed in two sections. First it will review questions and answers based on issues that faced mining in the past 13 years. Next, opinions on factors affecting investment in the mining sector in the present and future are addressed.

5.3.3 Factors influencing investment decisions in the mining sector in South Africa 2000-2013

5.3.3.1 Legal System

In this century, the legal processes in South African pertaining to mining were fair, transparent, timely, efficiently administered and not corrupt.

Encouraged investment in the mining sector	Was not a deterrent to investment in the mining sector	Was a mild deterrent to investment in the mining sector	Was a strong deterrent to investment in the mining sector	Did not pursue investment in the mining sector at all, due to this factor
23%	18%	32%	27%	0%

5.3.3.2 Administration

In this century, uncertainty concerning the administration, interpretation, or enforcement of existing and future regulations.

Encouraged investment in the mining sector	Was not a deterrent to investment in the mining sector	Was a mild deterrent to investment in the mining sector	Was a strong deterrent to investment in the mining sector	Did not pursue investment in the mining sector at all, due to this factor
0%	23%	23%	50%	5%

5.3.3.3 Policy

In your opinion, in the 21st century, growing or lessening uncertainty in mining policy and implementation in South Africa:

Encouraged investment in the mining sector	Was not a deterrent to investment in the mining sector	Was a mild deterrent to investment in the mining sector	Was a strong deterrent to investment in the mining sector	Did not pursue investment in the mining sector at all, due to this factor
14%	0%	41%	45%	0%

Select Quotes

“South Africa has missed the previous mining boom, and the statics points to lack of certainty on mineral policy going forward”.

“Policy certainty would definitely encourage investment in the South African mining sector”.

Theme: *Uncertainty*

Certainty and its impact on investor confidence and willingness to invest are highlighted here.

5.3.3.4 Nationalisation

	Encouraged investment in the mining sector	Was not a deterrent to investment in the mining sector	Was a mild deterrent to investment in the mining sector	Was a strong deterrent to investment in the mining sector	Did not pursue investment in the mining sector at all, due to this factor
ANC Youth League In 2010, the ANC Youth League published a paper “Towards the transfer of Mineral wealth to the ownership of the people as a whole: a perspective on the nationalisation of mines”	0%	27%	5%	55%	14%
ANC - SIMS In 2012, the ANC published a paper “State intervention in the minerals sector (SIMS)”	0%	18%	36%	41%	5%

Select Quotes

ANC SIMS

“Investors are unsure of what is going to happen next, hence they rather invest elsewhere”.

Theme: *Uncertainty*

Uncertainty as a key detractor from investment is raised here.

5.3.3.5 Duplication

Regulatory duplication and inconsistencies include national/ provincial/ municipal, interdepartmental, government ministries and agencies overlap.

None	1	2	3	4	A lot
0%	14%	41%	27%	18%	5%

5.3.3.6 Environment

	Encouraged investment in the mining sector	Was not a deterrent to investment in the mining sector	Was a mild deterrent to investment in the mining sector	Was a strong deterrent to investment in the mining sector	Did not pursue investment in the mining sector at all, due to this factor
In this century, do you think the complications surrounding complying with environmental and other legislation in South Africa	5%	32%	55%	9%	0%
Do you think the expenses associated with complying with environmental and other legislation in South Africa this century	0%	45%	45%	9%	0%

Select Quotes

“Complying with environmental legislation is a fair request. The cost is very high, but the main concern is that you have to produce it before you get your mining right so sit with the investment risk before the full right is issued”.

“Dealing with different departments causes a major delay in the application and issuing of mining rights, however, environmental compliance expenses in SA are not a deterrent to investments in SA”.

Theme: *Uncertainty*

5.3.3.7 Taxation

Since 2000, personal, corporate, payroll, capital, research, and other taxes as well as complexity of tax compliance in South Africa:

Encouraged investment in the mining sector	Was not a deterrent to investment in the mining sector	Was a mild deterrent to investment in the mining sector	Was a strong deterrent to investment in the mining sector	Did not pursue investment in the mining sector at all, due to this factor
5%	50%	36%	9%	0%

	Do you think the taxation system in South Africa is stable and predictable	Do you think the taxation system in South Africa for mining is stable and predictable	Do you think the royalty system in South Africa for mining is stable and predictable	Do you think the royalty system in the mining sector in South Africa appropriately shares risk and reward
Yes	95%	82%	64%	18%
No	5%	18%	36%	77%

5.3.3.8 Trade Barriers

In South Africa this century, tariff and nontariff barriers, restrictions on profit repatriation, currency restrictions.

Encouraged investment in the mining sector	Was not a deterrent to investment in the mining sector	Was a mild deterrent to investment in the mining sector	Was a strong deterrent to investment in the mining sector	Did not pursue investment in the mining sector at all, due to this factor
0%	32%	50%	14%	5%

5.3.3.9 Land Protection

Looking back over this century, uncertainty concerning environmental regulations, including issues such as stability of regulations, consistency and timeliness of regulatory process, and/or regulations not based on science or best practice.

Encouraged investment in the mining sector	Was not a deterrent to investment in the mining sector	Was a mild deterrent to investment in the mining sector	Was a strong deterrent to investment in the mining sector	Did not pursue investment in the mining sector at all, due to this factor
5%	36%	27%	23%	9%

5.3.3.10 Land

Since 2000 in South Africa, uncertainty concerning disputed land claims.

Encouraged investment in the mining sector	Was not a deterrent to investment in the mining sector	Was a mild deterrent to investment in the mining sector	Was a strong deterrent to investment in the mining sector	Did not pursue investment in the mining sector at all, due to this factor
0%	27%	45%	23%	5%

5.3.3.11 Infrastructure

This century, access to roads, power availability, rail networks and rolling stock, i.e. general infrastructure.

Encouraged investment in the mining sector	Was not a deterrent to investment in the mining sector	Was a mild deterrent to investment in the mining sector	Was a strong deterrent to investment in the mining sector	Did not pursue investment in the mining sector at all, due to this factor
9%	14%	23%	41%	14%

When asked about specific types of infrastructure, opinions were as follows:

	Encouraged investment in the mining sector	Was not a deterrent to investment in the mining sector	Was a mild deterrent to investment in the mining sector	Was a strong deterrent to investment in the mining sector	Did not pursue investment in the mining sector at all, due to this factor
power / electricity supply, reliability, consistency and price	5%	9%	18%	50%	18%
road infrastructure to support the mining sector in South Africa	14%	32%	41%	14%	0%
rail infrastructure to support the mining sector in South Africa	18%	9%	27%	45%	0%
port infrastructure to support the mining sector in South Africa	23%	27%	32%	18%	0%

Select Quotes

“Eskom (Power supply) and Transnet Freight Rail (railway line for export) were the biggest contributors to lack of mining investments, e.g. how many power cuts did we have in the past 10 years on rail, RBCT port has a capacity to export 91Mtpa of coal, but Transnet can only manage between 65 and 70Mtpa!”

Theme: *inadequate infrastructure*

5.3.3.12 Environment

Looking back over this century, uncertainty concerning environmental regulations, including issues such as stability of regulations, consistency and timeliness of regulatory process, and/or regulations not based on science or best practice.

Encouraged investment in the mining sector	Was not a deterrent to investment in the mining sector	Was a mild deterrent to investment in the mining sector	Was a strong deterrent to investment in the mining sector	Did not pursue investment in the mining sector at all, due to this factor
0%	27%	36%	32%	5%

5.3.3.13 Communities

This century, socioeconomic agreements/community development conditions (includes local purchasing or processing requirements, or supplying social infrastructure such as schools or hospitals, etc.):

Encouraged investment in the mining sector	Was not a deterrent to investment in the mining sector	Was a mild deterrent to investment in the mining sector	Was a strong deterrent to investment in the mining sector	Did not pursue investment in the mining sector at all, due to this factor
9%	36%	45%	9%	0%

5.3.3.14 Political Stability

In the 21st century, political stability in South Africa:

Encouraged investment in the mining sector	Was not a deterrent to investment in the mining sector	Was a mild deterrent to investment in the mining sector	Was a strong deterrent to investment in the mining sector	Did not pursue investment in the mining sector at all, due to this factor
23%	18%	27%	32%	0%

5.3.3.15 Corruption

Perceived levels of honesty or corruption in South Africa since 2000:

Encouraged investment in the mining sector	Was not a deterrent to investment in the mining sector	Was a mild deterrent to investment in the mining sector	Was a strong deterrent to investment in the mining sector	Did not pursue investment in the mining sector at all, due to this factor
9%	14%	32%	36%	9%

5.3.3.16 Labour

	Encouraged investment in the mining sector	Was not a deterrent to investment in the mining sector	Was a mild deterrent to investment in the mining sector	Was a strong deterrent to investment in the mining sector	Did not pursue investment in the mining sector at all, due to this factor
This century, regulations and employment agreements, labour militancy and work disruptions	0%	14%	9%	64%	14%
Trade Unions in South Africa play an important role in negotiating between workers and employers. With respect to mining in South Africa – In this century, what was the effect of the perceived relative strength of trade unions	0%	23%	9%	59%	9%
In the last few years, new trade union unions have emerged, with a significant voice. There is tension between some trade unions	5%	18%	5%	64%	9%

5.3.3.17 Skills

The availability of skilled labour in the South African mining sector this century:

Encouraged investment in the mining sector	Was not a deterrent to investment in the mining sector	Was a mild deterrent to investment in the mining sector	Was a strong deterrent to investment in the mining sector	Did not pursue investment in the mining sector at all, due to this factor
14%	32%	41%	14%	0%

5.3.3.18 Geology

The quality of the geological database, including quality and scale of maps, ease of access to information:

Encouraged investment in the mining sector	Was not a deterrent to investment in the mining sector	Was a mild deterrent to investment in the mining sector	Was a strong deterrent to investment in the mining sector	Did not pursue investment in the mining sector at all, due to this factor
32%	50%	14%	5%	0%

5.3.3.19 Security

Since 2000, the level of security including physical security, criminals and terrorists:

Encouraged investment in the mining sector	Was not a deterrent to investment in the mining sector	Was a mild deterrent to investment in the mining sector	Was a strong deterrent to investment in the mining sector	Did not pursue investment in the mining sector at all, due to this factor
0%	41%	45%	14%	0%

5.3.4 Investment Patterns

Over the last few years, mining companies have experienced and continue to experience difficulty raising funds, do you think this is this because:

1. investors believe commodity prices will be weak for sometime	2. investors are worried about the state of the world economy	3. investors are risk averse and see mining as risky	4. investors are worried that costs in mining are rising	5. investors are concerned about the impact of resource nationalism	6. other
27%	9%	23%	18%	9%	5%

5.3.5 Summary of top scores, factors that deterred investment this century

Figure 19 Summary of top scores, factors that deterred investment this century

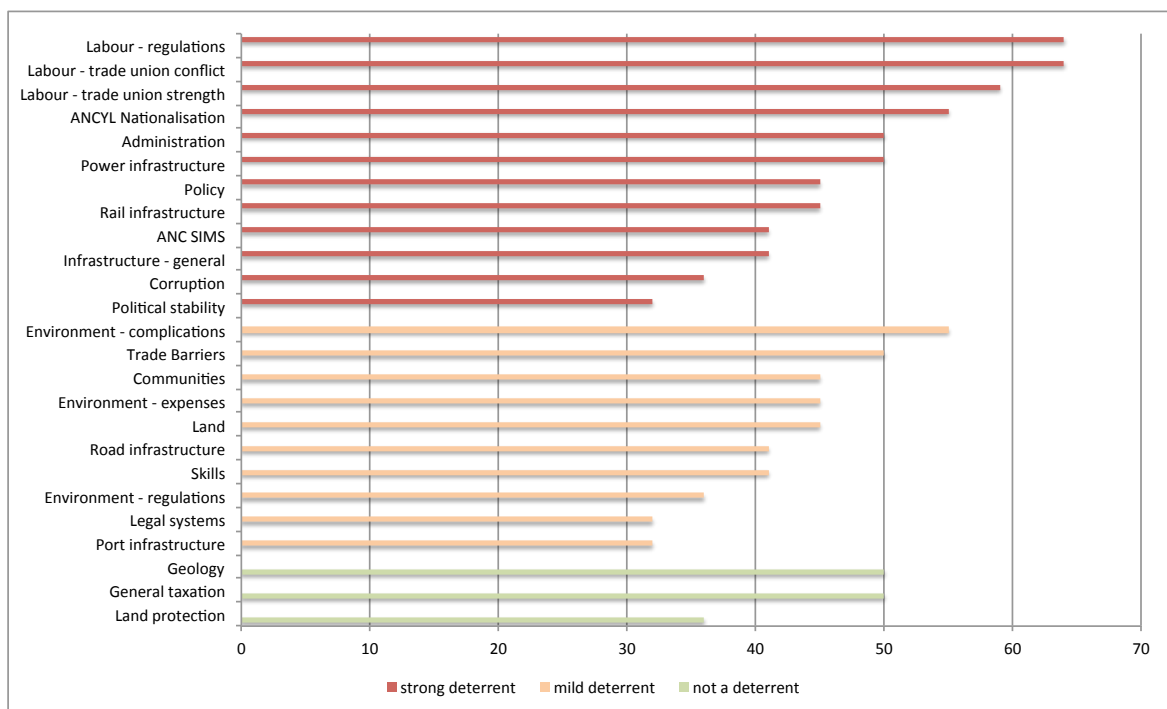


Table 18 Strong deterrents by theme: Uncertainty, Infrastructure and Labour

Strong Deterrants to investment in the 21 st century to date		
Uncertainty	Infrastructure	Labour
Political stability	Infrastructure - general	Labour - trade union strength
Corruption	Rail infrastructure	Labour - trade union conflict
Policy	Power infrastructure	Labour - regulations
Administration		
ANCYL nationalisation		
ANC SIMS		

5.3.6 The Present and Future

This section examines opinions about factors that may be playing a role currently or in the future, influencing investment decisions in mining in South Africa. As mentioned in Chapter 4, the first of 4 drafts of the Mineral and Petroleum Resources Development Act Amendment Bill was tabled in 2012. This Amendment Bill proposes changes to many aspects of mining, from the initial prospecting licencing, through to ownership and transfers of ownership to the end point of beneficiation.

To begin, respondents were asked their opinion on the following statement:

The Mineral and Petroleum Resources Development Act Amendment Bill (MPRDA Amendment Bill) proposes significant changes to the way mining rights are issued, administered monitored and enforced.

Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree
18%	55%	18%	0%	9%

Select quotes

“The current amendments on the mining law as they stand do pose a serious deterrent for investment. The powers given to the minister and also the identification of certain minerals as strategic mineral creates uncertainty.”

“Uncertainty in the granting of permits lengthens the time till the mine can produce and therefore the cost.”

“The amendment bill seeks to take out the first come first serve principle on application of prospecting/mining rights, giving more powers to the minister in this regard.”

Theme: Uncertainty

Respondents expressed concern about the Minister’s increasing discretionary powers and the uncertainty this will bring.

5.3.6.1 MPDRA Amendment Bill

	Encourages investment in the mining sector	Not a deterrent to investment in the mining sector	Is a mild deterrent to investment in the mining sector	Is a strong deterrent to investment in the mining sector	Would not pursue investment in the mining sector at all, due to this factor
<p>Prospecting Rights This will give the Minister the power to decline prospecting rights based on number of rights already held</p>	14%	14%	32%	36%	5%
<p>Beneficiation This will give the Minister certain rights regarding designating certain minerals as strategic, suggests a pricing mechanism and will also require Ministerial consent to export these designated minerals</p>	9%	9%	18%	50%	14%
<p>Transfers This section makes a transfer a “new application” and essentially merges transfers into new applications. In the past these have been deemed separate</p>	0%	18%	59%	18%	5%
<p>Applications Section 9 of the Bill reverses the mechanism for applying for a licence from a voluntary application by the interested party to an invitation by the Minister, and will be granted at the discretion of the Minister. The system will move from administrative to discretionary</p>	0%	9%	32%	45%	14%
<p>Transfer of controlling interest Section 11 (1) gives the Minister discretion to approve a transfer of any interest in an unlisted company or a controlling interest in a listed company</p>	5%	18%	27%	41%	9%

Select quotes

Prospecting Rights

“The ability of the minister to act impartially in this regard remain to be questionable”.

Theme: *Impartiality*

Where an application for a prospecting right was previously an administrative process, under new legislation this will be discretionary, raising anxiety and concerns about uncertainty in future.

Select Quotes

Applications

“Granting licences based on the Ministers discretion will significantly hinder investment considering our politicians corruption history and major business interests”.

“The impartiality of the minister will be questionable in this regard”.

Theme: *Impartiality*

Transfers

“The impartiality of the minister will still remain questionable in this regard!”

Theme: *Discretion and impartiality*

A consistent emerging theme is that of Ministerial impartiality, and moving away from a predictable administrative system to a more human discretionary system.

5.3.7 Summary of top scores, factors that currently and in the future, deter investment

Figure 20 Summary of top scores

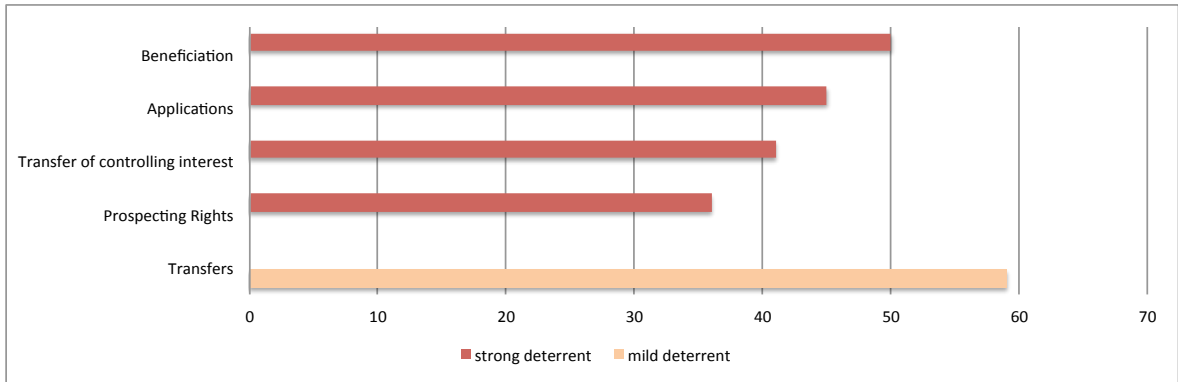


Table 19 Strong and mild deterrents by theme: Uncertainty

Strong Deterrants to investment in the future		
Uncertainty	Infrastructure	Labour
Beneficiation		
Applications		
Transfer of controlling interest		
Prospecting rights		

6. Discussion of Results

6.1 Introduction

This study presented data on global prices and production for the following commodities: gold, platinum, coal and iron-ore in the 21st century. Key stakeholders in the mining sector were surveyed, and opinions were sought on factors that may have encouraged or discouraged investment in the past 13 years. Views were also elicited on current issues that may be encouraging or discouraging investment in the mining sector in South Africa, now and in the future.

6.2 The data

As outlined in the research methodology, secondary data was collected from a range of sources to quantify the magnitude of price and production increases (or decreases) in four key South Africa commodities, namely gold, platinum, coal and iron-ore.

A questionnaire was issued to senior and experienced people who have an interest in mining in South Africa (including politicians, trade unions, academics and the industry). Purposive sampling was used and a total of 22 complete questionnaires were received by the end of September 2014. This sample is not representative, but as discussed in Chapter 4, is used in a deductive manner to explore reasons for lack of investment (and therefore lack of growth) in the mining sector in South Africa this century.

6.3 Research Hypothesis 1

H₀: There was a global increase in price and production in four key commodities gold, platinum, coal and iron-ore between 2000-2013.

H₁: There was no global increase in price and production in four key commodities gold, platinum, coal and iron-ore between 2000-2013.

6.3.1 Gold

The price of gold increased from US\$ 279 per ounce in 2000, to a high of US\$ 1,669 by the end of 2012 and falling back to US\$ 1,411 in 2013. This represents a 406% increase in price over the period. While the price increase of gold from 2000-2013 was significant, the increase in production was much less pronounced. At the beginning of the century, global production was 2,618 tonnes and rose only to 2,982 by 2012, representing a 14% increase.

6.3.2 Platinum

Based on an annual average price, platinum peaked in March 2008 at US\$ 2,280 per ounce, having risen from US\$ 549 in 2000 and closing at US\$ 1,677 by the end of 2013. This represents a 205% increase in price over the period. Similar to gold, production grew modestly by 14% since the turn of the century.

6.3.3 Coal

An average of weekly prices for a tonne of coal rose from US\$ 32 in 2000 to a high of US\$ 148 in 2008, and averaged US\$ 91 by the end of 2013. This represents a 135% increase in price over the period. Coal production grew from 2,287 million tonnes oil equivalent (Mtoe) in 2000 to its peak in 2013 of 3,881 Mtoe, a total of 70% more by the end of 2013.

6.3.4 Iron-ore

Iron-ore prices, while consistently rising since 2000, began to climb steeply since 2008. Prices were upwardly mobile, from an annual average of US\$ 12 per metric tonne in 2000 to US\$ 135 in 2013. This represents an increase of 889% increase over the period. This commodity has nearly tripled in production since 2000, from 1,060,000 thousand metric tonnes to 2,950,000 in 2013, an increase of 178%.

6.3.5 Hypothesis 1 Conclusion

Do not reject H_0 : There was a global increase in price and production in four key commodities gold, platinum, coal and iron-ore between 2000-2013.

6.4 Research Hypothesis 2

H₀: South African mining production in four key commodities gold, platinum, coal and iron-ore output followed global trends between 2000-2013.

H₁: South African mining production in four key commodities gold, platinum, coal and iron-ore declined in relation to growth in global output 2000-2013.

6.4.1 Gold

Figure 11 shows that although somewhat volatile over the period 2000-2013, there was a global increase in gold production of 14%. South African production declined by 70% this century.

As discussed in Chapter 2, and demonstrated in Table 9, the quality of ore has deteriorated over the period from as much as a yield of 5.15 grammes of gold per tonne of ore milled in 2005, to a low of 2.91 by the end of 2012. The amount of ore milled throughout the period remained relatively stable and averaged 61,000 metric tonnes of ore per annum.

Although South Africa's gold production has reduced significantly, the country remains the 4th largest producer (Figure 12) and the 2nd largest reserve in the world (Table 5) and therefore is still considered a major contributor in the global gold sector. However, mining these lower grades of ore requires higher capital investment, as the mines are deeper and the yields smaller. The questions posed to respondents in hypothesis 3, seek to uncover reasons for the lack of willingness to make these investments.

6.4.2 Platinum

As the largest platinum producer in the world (Figure 14), South African platinum represents between 75-80% of global production, depending on the year. Therefore moves in South African production influence the total global output. Out of the four commodities, this is the only one where annual South African growth in production is greater than growth in global production, until 2012 when it equalised. Figure 13 shows how world platinum production mirrors that of South Africa but at a slightly lower rate. 2013 sees an interesting tapering where South African and global production are growing at a similar rate, where global production is 8.5% for the period 2000-2013 and South Africa's 8.4%. It is key to note here that growth in global output is reflection of growth in South African output, as South African production drives the overall global production.

6.4.3 Coal

Global production rose 68% this century compared to South Africa's modest growth of 14% in the same period (Figure 15). Despite this slow growth, South Africa remains the 7th largest coal-producing nation in the world (Figure 16) and has the 6th largest coal reserve (Table 7).

6.4.5 Iron-ore

Interestingly South African production of iron-ore was growing faster than the global growth until 2003. Since then, global growth in production reached 178% by the end of 2013, and South Africa's growth was 99% for the same period, illustrated in Tables 17 and 18.

6.4.6 Hypothesis 2 Conclusion

Note: Platinum has been excluded from this hypothesis since global production is a reflection of South African platinum production.

Reject H₀: South African mining production in gold, coal and iron-ore output followed global trends between 2000-2013.

6.5 Research Hypothesis 3

H₀: Institutional factors played a role in the decline in production of the South African mining sector in four key commodities gold, PGMs, coal and iron-ore between 2000-2013 and continue to influence current and future investment decisions

Opinions were sought from a range of senior stakeholders in the mining sector, about issues that may have encouraged or discouraged investment in the sector this century. Views were also sought to determine the likelihood of future investments in mining in South Africa. The results are presented in Chapter 5 and discussed below.

6.5.1 Factors influencing investment this century

Twenty six percent (26%) of respondents believed the **legal system** in South Africa encouraged investment and 18% stated that the legal system was 'not a deterrent' to investment. However, the remaining 60% believed that these processes posed a mild (32%) or strong (27%) deterrent to investment. Uncertainty concerning the **administration**, interpretation or enforcement of existing and future regulations was found to be a 'strong deterrent to investment' by 50% of respondents and 5% stated they did 'not pursue investment due to this

factor'. 23% stated that this was a mild deterrent and 23% did not find this factor a deterrent at all. When asked about **policy** uncertainty in the 21st century, 45% of respondents stated that this was a 'strong deterrent to investment in the mining sector' and a further 41% said this was a 'mild deterrent'. The remaining 14% believed that policy certainty in South Africa 'encouraged investment in the mining sector'.

The ANC Youth League's discussion document (2010) on **nationalisation** raised anxiety in the sector, and while the ANC SIMS paper (2012) closed down the nationalisation debate, it introduced beneficiation and pricing of 'strategic' minerals as a new theme. 55% of respondents believed that the 2010 ANCYL Nationalisation paper was a 'strong deterrent' for investment. This figure falls to 41% when asked about the ANC-SIMS paper. South Africa is not unique in this regard, and in the last 5 years many resource rich countries have undergone or are discussing some form of resource nationalisation (Menzie et al., 2013. p. 18), these include Australia, China, Guinea and Indonesia. Resource nationalism represented the leading threat to global investment in mining in 2011 but since fallen to 3rd place in 2013 (Ernst & Young, 2014). It would seem that in South Africa and globally, investors have recovered from the shock of the initial mention of nationalisation a few years ago. Also, governments are finding more subtle ways to deal with this, for instance through mandatory beneficiation or higher taxes (Ernst & Young, 2014; Menzie et al., 2013). This 'acceptance' by the industry is revealed in the final question in the survey, where only 9% of respondents hold resource nationalism responsible for mining companies experiencing difficulties raising funds.

A significant comment received on nationalisation was that it was the uncertainty around the proclamations that caused investors to put their money elsewhere. Again, uncertainty is raised as a major concern for the industry. The difference between institutional environments and institutional arrangements (Klein, 2000) was introduced in Chapter 2. The ANCYL Nationalisation Discussion Paper (ANC Youth League, 2012) and the ANC SIMS Paper (ANC, 2012) are examples of institutional environments, that while they are not formal legislation, begin to shape the political and economic landscape of a sector and ultimately influence the institutional arrangements that follow.

While regulatory **duplication** is an annoyance and compliance with **environmental** legislation complicated and expensive, these factors are not a deterrent to investment (32% 'encouraged investment' and 45% 'not a deterrent'). One issue that was raised, is the cost coupled with the uncertainty of licence acquisition. In South Africa it is a pre-requisite to comply with

environmental legislation in order to apply for a licence, however the applicant may not be successful in the application. This makes application both expensive and highly risky. On the whole it would appear that the sector understands the need and associated cost for environmental legislation and compliance. This is not in itself a deterrent to investment in the sector. However, given the requirement to get environmental permits before a licence is granted and the uncertainty around the actual licencing makes this an expensive and possibly fruitless exercise.

The overall South African **taxation** system is not perceived as a hindrance in the mining sector. 50% of respondents said it was not a deterrent and a further 36% said it was a mild deterrent. Coupled with this score, 95% of respondents said that the South African taxation system is stable and predictable. However, this figure falls to 82% when asked about predictability and stability for taxation in mining, and drops further to 64% when asked about the mining royalty system. Only 18% of respondents believe that the royalty system appropriately shares risk and reward.

Trade barriers, land protection, the environment, communities and skills, while of mild concern to the sector are not deemed to be hindrances to investment.

Issues that scored highly for 'strongly discourages investment in mining' include political stability and corruption.

Unsurprisingly, **infrastructure** generally but power and rail specifically, as well as labour issues had 'discouraged investment' as their top ranking scores.

As discussed in Chapter 2, asset specificity, frequency and uncertainty create exchange hazards, which in turn, have the potential to generate opportunistic behaviour, sometimes manifested as a 'hold up'. The potential for hold ups can reduce trust between parties and lead to under-investment (Eggertsson, 1990; Weber & Mayer, 2014). Based on the feedback received in the survey, it certainly seems as if the South African mining sector is experiencing a hold up of sorts. There is no doubt that trust between industry, government and labour has eroded substantially in the last few years and it is undeniable that there has been under-investment in the sector. What is most troubling about this is that it is the very institutions that are supposed to create the certainty and security of property rights that are doing the opposite. The uncertainty generated by the exchange is supposed to be mitigated and contained by the institutional arrangements. However, it is the institutional environment and

institutional arrangements that are creating the uncertainty in the first place. In “Why nationals fail” (Robinson & Acemoglu, 2012) the point is made that mistrust is an outcome of (poor) institutions and not an independent cause.

The recurrent theme in the responses and comments received centre around uncertainty and unpredictability. See table 13 for a summary of the 3 top themes emerging from the ‘strong deterrent’ top scores; these are:

- uncertainty
- infrastructure and
- labour.

The issue of uncertainty relates directly to institutional issues in the mining sector and the South African political economy generally.

Groenewegen (Groenewegen et al., 2010) proposes three conditions to be present, for a property right to exist. These are:

- the right to make use of the good
- the right to earn an income from the good
- the right to manage, sell or transfer the good

When considering the three themes of uncertainty, infrastructure and labour and the three conditions for property rights, it becomes clear that property rights are indeed in jeopardy in the mining sector. In the first instance, the right to make use of the good, immediately brings to mind the proposal to declare certain minerals strategic, determine the price for these and limit exports. Also, in light of the recent strikes, it is clear that the good (i.e. the mine) cannot be made use of when a strike, however protracted, is underway.

The right to earn an income from a good is similarly under threat for the above two reasons, as well as the limitations of infrastructure. With the onset of load shedding in 2008 mines were instructed to reduce their power consumption, and the net result of that was decreased output, i.e. the right to earn an income from the good. Further, in this highly charged labour environment, mines tend to cease operations during strikes as a safety measure for both people and equipment, again making it impossible for them to ‘earn and income from the good’.

Finally, the right to manage, sell or transfer the good is threatened by the MPDRA Amendment Bill, which moves this process from administrative to discretionary and will be discussed below. Acemoglu (D Acemoglu et al., 2005) declared ‘good institutions provide secure property rights’. So too is the opposite true. Poor institutions provide insecure property rights and the consequences of this for investment and growth in an economy are dire.

6.5.2 The present and future

Looking ahead to the future, when asked about the impending changes in mining legislation (i.e. MPDRA Amendment Bill), 73% of respondents agreed (‘strongly agreed’-18% and ‘agreed’-55%) that the changes proposed are significant. Here, respondents expressed their concern at the increasing uncertainty that this new legislation poses for the industry. The uncertainty comes not because the law is unclear, but because the proposed law gives the Minister of Mineral Resources discretionary powers in a range of areas pertaining to mining licensing.

Groenewegen (Groenewegen et al., 2010) informs us that “institutions are man-made rules and their accompanying sanctions that are intended to make interactions less risky and more predictable”. So while institutions are in fact intended to reduce uncertainty and risk, in the case of the MPDRA Amendment Bill, stakeholders in the mining sector actually believe that risk and uncertainty is being increased. This is again highlighted in the next section of questions.

The MPDRA Amendment Bill gives the Minister discretion regarding awarding prospecting rights and the power to declare certain minerals “strategic” to the economy. 36% of respondents said the issue of prospecting rights is a ‘strong deterrent to investment’ and a further 5% said they ‘would not invest’ on this basis. As for **beneficiation**, 50% of respondents believe that this is a ‘strong deterrent’ to investment and another 14% said they ‘would not invest’ because of this. The ability of the Minister to act impartially was raised as a concern here, again emphasising the lack of certainty and therefore increased risk.

Respondents were not particularly concerned that a transfer of licences will in future be considered a new application and 59% of respondents said this would be a ‘mild deterrent’. However, when questioned about **application** processing, 45% said this was a ‘strong deterrent’ and a further 14% said they would ‘not invest for this reason’. Similarly with **transfers of controlling interests**, which will give the Minister discretion to approve or reject the application, 41% said this was a ‘strong deterrent’ and another 9% said they ‘would not invest’ for this reason. Comments in this section indicated that impartiality of the Minister is

of concern. Moving away from a predictable administrative system to a human-discretionary system is raising anxiety in the industry about the lack of predictability once this change takes place.

Institutions are intended to facilitate predictability, through inclusion and exclusion – i.e. what you may do and what you may not (Groenewegen et al., 2010). Rules of inclusion in mining set out what the rights of the licence holder or potential licence holder are, and provide a framework for financial and operational management. These rules allow investors to manage and contain risk. Mining houses are equally assisted by rules of exclusion, ensuring that mining companies do not waste time or money on unnecessary issues but rather focus on what is required and essential. The rules eliminate guesswork and therefore reduce risk through predictability. Predictability in the form of inclusion and exclusion encourages exchange. Mining, a capital intensive long term investment, is particularly sensitive to the need for predictability. Investors must have a level of comfort around the ability to manage risks and yield economic benefits in the long term, for at least the lifetime of the mine. High levels of discretionary powers and awards make predictability almost impossible. The introduction of discretionary powers in the MPDRA Amendment Bill makes the rules of inclusion and exclusion opaque, and therefore creates uncertainty. However, certainty is the foundation on which investments are made, especially investments of a long term and geographically specific nature.

The recurrent theme in the opinions received on questions relating to the current and future position regarding investment all hinge around one theme – uncertainty. This uncertainty is brought about not through indecision, but by the fact that in future, it will not be possible to plan and work towards a particular administrative outcome in mining. Rather, irrespective of planning or resources, decisions will be made by a person, using their own discretion and own measures that would be impossible to predict at the beginning of the process.

Table 15 lists the key issues that were most highly rated as a ‘strong deterrent’. All these issues pertain to a lack of certainty. The issue of uncertainty relates directly to institutional issues in the mining sector and the South African political economy generally.

6.5.3 Hypothesis 3 Conclusion

Do not reject H_0 . Institutional factors played a role in the decline in production of the South African mining sector in four key commodities gold, PGMs, coal and iron-ore between 2000-2013 and continue to influence current and future investment decisions.

7. Conclusion

7.1 Introduction

This chapter provides a summary of the research carried out in this dissertation. Key insights are provided and ideas for future research suggested.

7.2 Research background and objectives

While only 2% of the world's population lived in cities in 1800, this figure is expected to exceed 60% by 2030. With this increased urbanisation comes a correlated increase in the demand for electricity and steel. Electricity consumption has driven coal-based electricity to increase 300% in the last 40 years and in 2005, 40% of the world electricity was made possible with coal. Steel consumption will increase through urbanisation, which will largely be driven by China and India. In China, high density, high-rise buildings are enabling rapid urbanisation and steel is an important component in the composition of high-rise buildings. Infrastructure development and growth in demand for consumer durables are further driving the demand for coal (Clark et al., 2012; Clemente, 2012; International Energy Agency, 2012).

Asia's economic growth in the 21st century, dominated by China but including India, created an increased demand for iron-ore and coking coal, key ingredients to steel making and thermal coal for electricity.

The growing middle class in China and India, with a large appetite for gold (jewellery), spurred on demand for this precious metal, while central banks and investors around the world continued to purchase gold in the form of bars and coins. In 2013, gold in the form of jewellery made up about 60% of its demand, and the remaining 20% to investment and the remainder shared between central bank purchases and technology applications. This trend is similar in previous years (Thomson Reuters GFMS & World Gold Council, 2014). China is described by the World Gold Council as having a 'pro-gold' culture, and is now officially the biggest gold market. China's growing middle class together is expected to increase the demand for gold by as much as 20% over the next 3 years (Williams, 2014). As an indication of this appetite for gold, 2013 was declared a bumper year for gold by the World Gold Council, where

consumer demand was 21% higher than 2012, where China's consumer demand increased 32% and India's 19% of the previous year (World Gold Council, 2014a).

Half the platinum produced in the world is used in catalytic converters, with the remainder shared between jewellery, investments and a range of other applications.

South Africa is the most resource rich country in the world (Dept. of Trade and Industry, 2013) and has large deposits of minerals that have global demand. The country is seemingly well positioned to contribute towards global development and at the same time benefit from this demand. Mining in South Africa, contributed to the country's initial growth 130 years ago, and continues to be a significant contributor in the economy as outlined in Chapter 2. Prices and production of key commodities grew in the 21st century. This research set out to establish whether or not South African mining production mirrored this growth or not. The theory of New Institutional Economics was explored in Chapter 2 and later used in Chapter 6 to interpret opinions solicited from mining stakeholders in Chapter 5.

The study used secondary data to establish mining trends (price and production) for gold, platinum, coal and iron-ore. Commodity prices are globally applicable. Global and South African production data was sourced and analysed with price data to establish trends this century. A survey was administered to a wide range of senior stakeholders in the mining sector. The survey sought the views of these stakeholders pertaining to attitudes towards investment in the sector this century. The overall consensus and recurrent theme was that uncertainty makes investment in this sector especially risky because of the long life cycle of a mine (up to 150 years), asset-specificity and the geographic handcuffs that mineral reserves pose.

7.3 Key insights

7.3.1 Global commodity price boom

There was a **global commodity boom** this century, commodity prices increased markedly and production of these minerals increased as well. The four commodities examined in this paper, gold, platinum, coal and iron-ore all experienced large price increases this century. Responding to this price increase, global production also increased but did not surge ahead as dramatically as prices.

Table 20 Summary of commodity prices rise 2000-2013

% increase 2000-2013	Commodity			
	Gold	Platinum	Coal	Iron-ore
Price	406%	205%	135%	889%
Production	14%	8.5%	68%	178%

7.3.2 South Africa's diminished mining output in the 21st century

While global mining production increased significantly, **South Africa's mining output in the 21st century to date, has been disappointing.** Table 4 shows how mining growth shrank in South Africa in comparison to overall GDP growth. South African mining GDP declined by 1% per annum, compared to the top mining economies in the world that experienced 5% growth per annum (Baxter, 2013).

Table 21 Global -v- South African increase in mining production 2000-2013

% increase 2000-2013	Commodity			
	Gold	Platinum	Coal	Iron-ore
Global Production	14%	8.5%	68%	178%
South African Production	-70%	8.4%	14%	99%

South African gold output halved this century owing to a range of factors, including lower ore-grades and electricity shortages. Despite these reasons for reduced output, South Africa remains the 4th largest producer in the world and has the 2nd largest proven gold reserve. Deep mining technologies require further development and investment for this precious metal to remain a significant contributor to South Africa's economy. The appetite for gold will continue to rise with the growth of India and China. Therefore a market does and will continue to exist for this metal.

Platinum supply and demand is somewhat complicated by its recyclability and substitutability. Platinum production in South Africa grew 8.4% this century while the price grew as much as 205% in the same period.

Coal is an essential part of South Africa's economy, accounting for 72% of the country's primary energy consumption in 2012 (Energy Information Administration, 2013) and 90% of South Africa's electricity is generated from coal-fired power stations (Peltier, 2014). About half the coal produced in South Africa is used locally (for power stations and synthetic fuels), the other half exported. As Medupi and Kusile power stations come online in the next few years, local coal output will need to ramp up significantly to meet the requirements of these power stations. At the same time, Richards Bay Coal Terminal remains under utilised due to rail constraints.

The threat of declaring coal a 'strategic mineral' and therefore subject to export and price limitations imposed by government looms ominously over the coal industry.

A seemingly insatiable appetite for iron-ore this century drove prices up nearly 900% and production increased 178%. Emerging markets, especially China and India, with the twins of urbanisation and industrialisation are sure to continue to drive demand for iron-ore in the foreseeable future. Whilst South Africa is ranked 13th in the world in terms of proven ore body, the ferrochrome content of 62-65% makes it desirable to the local and global market.

7.3.3 The importance of property rights

7.3.3.1 Informal institutions

Informal institutions such as attitudes (ANCYL Nationalisation discussion document, ANC SIMS paper) can play as significant a role as formal institutions (such as the MPDRA Amendment Bill, Industrial Participation Action Plan [IPAP] 2013/4-2015/6). Attitudes and behaviours, even if not codified into law are an important factor to create or reduce certainty. Attitudes, norms and culture ultimately culminate in the formal structures of a society and therefore, discussions or suggestions of policy are interpreted as indicative of the direction formal institutions will take in the future. The remark *"Investors are unsure of what is going to happen next, hence they rather invest elsewhere"* was in response to the question of

nationalisation of the mines in South Africa. This comment goes to the heart of North's statement in 1991 that the creation of order and reduction of uncertainty assists decision making about the "feasibility of engaging in economic activity" (North, 1991).

7.3.3.2 Uncertainty

Uncertainty is a significant determinant in investment decisions, and therefore any attempt to increase investment in mining must address the issue of uncertainty. Industry stakeholders were unequivocal in their statements about the need for certainty, and particularly administrative and policy certainty.

Converting old order to new order rights in the first decade of this century followed by introducing the potential threat of nationalisation of mines created huge uncertainty in the industry at the start of the century. Looking ahead, discretionary powers allocated to a person⁵ increases the unpredictability of the industry and therefore the risks. In a usual business scenario, risks can be quantified and mitigated or priced in. However, where miners are price takers and the risk cannot be quantified or mitigated, the uncertainty becomes too much and investment is then deterred. This research confirms that good institutions and secure property rights lower risk and the cost of doing business, thereby encouraging trade and ultimately economic growth (D Acemoglu et al., 2005). This research showed that administrative and policy uncertainty was a strong deterrent to half the respondents. A pertinent comment was "*Policy certainty would definitely encourage investment in the South African mining sector*".

It is the institutions themselves that are supposed to reduce uncertainty. One of the ways institutions do this is through rules of inclusion and exclusion (Groenewegen et al., 2010). However, in the case of South Africa, it is the very institutions that are meant to create certainty that are actually increasing uncertainty and risk.

7.3.3.3 Price mechanism cannot substitute good institutions

In the absence of good institutions, the **price mechanism** is insufficient to drive production. As illustrated in Chapter 2 and summarised above in Table 14 prices for gold, platinum, coal and

⁵ In this context, specifically the Minister of Mineral Resources.

iron-ore increased significantly this century. Other mining economies, not South Africa, responded in the predictable manner, by producing more. The response of South African mining was more muted than that of other global mining economies. While output did increase in South Africa for these 4 commodities, it did not keep pace with the growth in output that the rest of the world experienced. The neo-classical model of price and demand elasticity have been surpassed by the theory of New Institutional Economics, adding depth and complexity to this issue. The price mechanism is insufficient to drive production.

7.4 Conclusion

Institutional factors play a role in investment decisions. In South African mining this is certainly the case, demonstrated by the decline in mining in South Africa this century and confirmed by stakeholder views and comments. Douglass North’s proclamation “institutions matter” is a powerful understatement, whose significance is only recently being faced and understood.

South Africa is geologically blessed and remains a country with significant mining competencies. Although the sector is in decline, it would appear that, if institutional issues are addressed and property rights secured, this sector could shift from decline to growth and once again be a significant contributor in South Africa across a range of metrics such as employment, taxes, foreign exchange and technology IP.

Klein (2000) distinguishes between the institutional environment and institutional arrangements, whereas Peng, Sun, Pinkham & Chen (2009) formulate this in terms of formal and informal institutions. Taken together, they form the following matrix:

Table 22 Proposed Model for Institutional Analysis

Institutional arrangements			Institutional environment	
Formal institutions	Current	Future	Informal institutions	<ul style="list-style-type: none"> • norms • attitudes • culture • ethics
	<ul style="list-style-type: none"> • laws • regulations • rules 	<ul style="list-style-type: none"> • laws • regulations • rules 		

Adapted from Peng, Sun, Pinkham & Chen (2009) and Klein (2000).

This ‘institutional matrix’ provides model for analysis to examine institutional arrangements and the institutional environment in a systematic way to understand the strengths and challenges in a sector.

At the time of writing (October 2014), the Minister of Mineral Resources, Ngoako Ramatlhodi indicated that the MPDRA Amendment Bill may be “referred back to Parliament” (Ramatlhodi in Creamer, 2014, para. 1) to reconsider aspects of the Bill. Specific reference was made only to separating oil and gas legislation from the MPDRA Amendment Bill. There was no mention of other clauses requiring attention. However, this may be the first positive step towards reconsidering much more than only oil and gas in the MPDRA Amendment Bill.

7.5 Future research

7.5.1 Institutional environment and institutional arrangements

Having confirmed the importance of institutions, it could be useful to further explore the specific relevance and influence of institutional environments and institutional arrangements as they pertain to investment in different sectors in South Africa.

7.5.2 Social license to operate

It would appear that mining companies are trying to be socially and environmentally responsible. At the same time, it seems that the communities they operate in and the general public do not recognise this. What are the reasons for this mismatch of action and acknowledgement thereof? Can mines continue to operate without this social license?

7.5.3 The importance of coal in the South African economy

Coal is vital to supply South Africa’s power stations for electricity generally, but also to facilitate growth in the mining sector. It would be useful to quantify this contribution by building a model to predict what the coal requirement is for local power consumption and the synthetic fuel industry, as well as the potential export demand. Once this is established, the multiplier effect on the economy could be determined and the effects on the economy should these targets not be reached also quantified.

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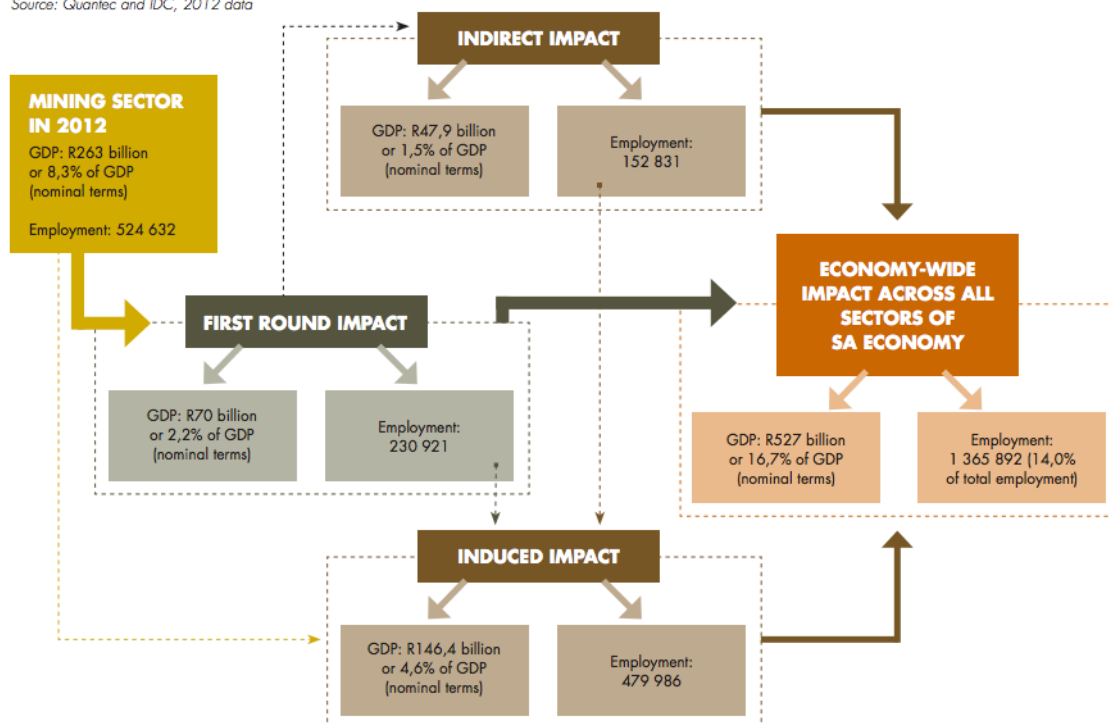
Appendixes

Appendix A

Linkages of mining to the economy

THE LINKAGES OF MINING TO THE ECONOMY

Source: Quantec and IDC, 2012 data



Facts about South African Mining, Chamber of Mines, August 2013, p. 2

Appendix B

National Development Plan– Key drivers of Change – Minerals Cluster

MINERALS CLUSTER

Proposals to grow investment, outputs, exports and employment in the minerals cluster include:

- Address the major constraints impeding accelerated growth and development of the mining sector in South Africa. The main interventions include: ensuring certainty in respect of property rights; passing amendments to the Minerals and Petroleum Resource Development Act (2002) to ensure a predictable, competitive and stable mining regulatory framework; secure reliable electricity supply and/or enable firms to supply their own plant with an estimated potential of 2 500MW by 2015; and secure, reliable rail services, potentially enabling private participation.
- Develop, deepen and enhance linkages with other sections of the economy. This includes: linkages with both manufacturers of inputs (capital goods and consumables) and suppliers of mining-related services; and downstream producers, especially for platinum-group metals and chrome ore. In this regard, an export tax could be considered.
- Provide focused research and development support to enable improved extraction methods that lengthen mine life; better energy efficiency and less water intensity; and alternative uses of South Africa's extracted minerals, especially platinum-group metals, titanium and others that have potential for application in new energy systems and machinery.
- Identify opportunities to increase regional involvement and benefit in the whole minerals cluster. This could include encouraging the establishment and development of alternative providers of partially processed intermediate inputs in other countries in the region.
- Ensure active engagement on, and resolution to, issues raised through the Mining Industry Growth and Development Task Team process.
- Improve alignment of mining charter requirements to ensure effectiveness in local communities.

National Development Plan, 2012, p. 147

Appendix C

Stakeholder Survey

Institutional impediments to growth in the mining sector in South Africa (GIBS MBA)

* Required

Gordon Institute of Business Science

University of Pretoria

Consent Statement

Participants of this survey are part of a research study done by an MBA student of the University of Pretoria's Gordon Institute of Business Science (GIBS). This study is designed to gain a detailed understanding of the issues affecting investment in the mining sector in South Africa in the 21st century and also to gain insight into current and future trends for investment in this sector.

This survey is voluntary and participants may choose to withdraw at any time during the completion of the survey should they wish so. This survey is expected to take about 10 minutes to complete.

The researcher commits to ensuring that adequate precautions are in place to maintain anonymity of the data captured by this survey by using aggregated data. No distinguishing characteristics will be disclosed that may reveal the participant's identity.

1. Please check the box below to confirm your consent. *

Check all that apply.

I agree to participate in this survey with the understanding that this survey is voluntary and that my anonymity is maintained.

2. Legal System *

In this century, the legal processes in South African pertaining to mining were fair, transparent, timely, efficiently administered and not corrupt.

Mark only one oval.

- this encouraged investment in the mining sector
- was not a deterrent to investment in the mining sector
- was a mild deterrent to investment in the mining sector
- was a strong deterrent to investment in the mining sector
- did not pursue investment in the mining sector at all, due to this factor

3. If you would like to add additional comments on this point, please do so below

Mineral and Petroleum Resources Development Act Amendment Bill

4. Regarding legislation in South Africa *

The Mineral and Petroleum Resources Development Act Amendment Bill (MPRDA Amendment Bill) proposes significant changes to the way mining rights are issued and administered, monitored and enforced.

Mark only one oval.

- strongly disagree
- disagree
- neither agree nor disagree
- agree
- strongly agree

5. If you would like to add additional comments on this point, please do so below

6. Prospecting Rights - Section 23(3)(b) of the MPDRA Amendment Bill *

This will give the Minister the power to decline prospecting rights based on number of rights already held.

Mark only one oval.

- encourages investment in the mining sector
- not a deterrent to investment in the mining sector
- is a mild deterrent to investment in the mining sector
- is a strong deterrent to investment in the mining sector
- would not pursue investment in the mining sector at all, due to this factor

7. If you would like to add additional comments on this point, please do so below

8. Beneficiation - Section 26 *

This will give the Minister certain rights regarding designating certain minerals as strategic, suggests a pricing mechanism and will also require Ministerial consent to export these designated minerals

Mark only one oval.

- encourages investment in the mining sector
- not a deterrent to investment in the mining sector
- is a mild deterrent to investment in the mining sector
- is a strong deterrent to investment in the mining sector
- would not pursue investment in the mining sector at all, due to this factor

9. If you would like to add additional comments on this point, please do so below

10. Transfers (of parts) - Section 11(2) *

This section makes a transfer a "new application" and essentially merges transfers into new applications. In the past these have been deemed separate. In your opinion, does this provision

Mark only one oval.

- encourage investment in the mining sector
- is not a deterrent to investment in the mining sector
- is a mild deterrent to investment in the mining sector
- is a strong deterrent to investment in the mining sector
- would not pursue investment in the mining sector at all, due to this factor

11. If you would like to add additional comments on this point, please do so below

Administration

12. Administration *

In this century, uncertainty concerning the administration, interpretation, or enforcement of existing and future regulations

Mark only one oval.

- encouraged investment in the mining sector
- was not a deterrent to investment in the mining sector
- was a mild deterrent to investment in the mining sector
- was a strong deterrent to investment in the mining sector
- did not pursue investment in the mining sector at all, due to this factor

Mineral and Petroleum Resources Development Act Amendment Bill

13. If you would like to add additional comments on this point, please do so below

14. Applications: Section 9 of the MPDRA Amendment Bill *

Section 9 of the Bill reverses the mechanism for applying for a licence from a voluntary application by the interested party to an invitation by the Minister, and will be granted at the discretion of the Minister. The system will move from administrative to discretionary. In your opinion, this provision

Mark only one oval.

- encourages investment in the mining sector
- not a deterrent to investment in the mining sector
- is a mild deterrent to investment in the mining sector
- is a strong deterrent to investment in the mining sector
- would not pursue investment in the mining sector at all, due to this factor

15. If you would like to add additional comments on this point, please do so below

16. Transfer of Controlling Interest *

S11(1) gives the Minister discretion to approve a transfer of any interest in an unlisted company or a controlling interest in a listed company. In your opinion, this provision

Mark only one oval.

- encourages investment in the mining sector
- not a deterrent to investment in the mining sector
- is a mild deterrent to investment in the mining sector
- is a strong deterrent to investment in the mining sector
- would not pursue investment in the mining sector at all, due to this factor

17. If you would like to add additional comments on this point, please do so below

Policy

18. *

In your opinion, in the 21st century, growing or lessening uncertainty in mining policy and implementation in South Africa

Mark only one oval.

- encouraged investment in the mining sector
- was not a deterrent to investment in the mining sector
- was a mild deterrent to investment in the mining sector
- was a strong deterrent to investment in the mining sector
- did not pursue investment in the mining sector at all, due to this factor

19. If you would like to add additional comments on this point, please do so below

20. Nationalisation *

In 2010, the ANC Youth League published a paper "Towards the transfer of Mineral wealth to the ownership of the people as a whole: a perspective on the nationalisation of mines". In your opinion, this paper

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21. If you would like to add additional comments on this point, please do so below

22. Nationalisation *

In 2012, the ANC published a paper "State intervention in the minerals sector (SIMS)". In your opinion, this paper

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23. If you would like to add additional comments on this point, please do so below

Duplication

Regulatory duplication and inconsistencies include national/ provincial/ municipal, inter-departmental, government ministries and agencies overlap

24. *

Do you think there is duplication between National Environmental Management Act (NEMA), MPDRA and National Water Act (NWA)

Mark only one oval.

- | | | | | | | |
|------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-------|
| | 1 | 2 | 3 | 4 | 5 | |
| none | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | a lot |

25. *

In this century, do you think the complications surrounding complying with environmental and other legislation in South Africa

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26. *

Do you think the expenses associated with complying with environmental and other legislation in South Africa this century

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27. If you would like to add additional comments on duplication, please do so below

Taxation regime

28. **General taxation** *

Since 2000, personal, corporate, payroll, capital, research, and other taxes as well as complexity of tax compliance in South Africa

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29. **Do you think the taxation system in South Africa is stable and predictable**

Mark only one oval.

- yes
- no

Thinking about mining specifically-

30. Do you think the taxation system in South Africa for mining is stable and predictable?

Mark only one oval.

- yes
 no

31. Do you think the royalty system in South Africa for mining is stable and predictable?

Mark only one oval.

- yes
 no

32. Do you think the royalty system in the mining sector in South Africa appropriately shares risk and reward?

Mark only one oval.

- yes
 no

33. If you would like to add additional comments on taxation and royalties, please do so below

Trade barriers

34. *

In South Africa this century, tariff and non-tariff barriers, restrictions on profit repatriation, currency restrictions

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Environment

35. Looking back over this century, uncertainty concerning environmental regulations, including issues such as stability of regulations, consistency and timeliness of regulatory process, and/or regulations not based on science or best practice *

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36. If you would like to add additional comments on this point, please do so below

Land Protection

37. Looking back over this century, uncertainty concerning environmental regulations, including issues such as stability of regulations, consistency and timeliness of regulatory process, and/or regulations not based on science or best practice *

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Land

38. Since 2000 in South Africa, uncertainty concerning disputed land claims *

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39. If you would like to add additional comments about land and land issues, please do so below

Infrastructure

40. This century, access to roads, power availability, rail networks and rolling stock, i.e. general infrastructure *

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Specifically, with respect to different types of infrastructure-

41. power / electricity supply, reliability, consistency and price *

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42. road infrastructure to support the mining sector in South Africa *

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43. rail infrastructure to support the mining sector in South Africa *

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45. If you would like to add additional comments about infrastructure, please do so below

Communities

46. This century, socio-economic agreements/community development conditions (includes local purchasing or processing requirements, or supplying social infrastructure such as schools or hospitals, etc.) *

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Political stability

47. *

In the 21st century, political stability in South Africa

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Corruption

48. *

Perceived levels of honesty or corruption in South Africa since 2000

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Labour

49. *

This century, regulations and employment agreements, labour militancy and work disruptions

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Thinking about trade unions and especially in the mining sector-

50. *

Trade Unions in South Africa play an important role in negotiating between workers and employers. With respect to mining in South Africa – In this century, what was the effect of the perceived relative strength of trade unions

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51. *

In the last few years, new trade union unions have emerged, with a significant voice. There is tension between some trade unions. Do you think this tension has

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Skills

52. *

The availability of skilled labour in the South African mining sector this century

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Geology

53. *

The quality of the geological database, including quality and scale of maps, ease of access to information

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Security

54. *

Since 2000, the level of security including physical security, criminals and terrorists

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Investment Patterns

55. Over the last few years, mining companies have experienced and continue to experience difficulty raising funds, do you think this is this because *

Mark only one oval.

- 1. investors believe commodity prices will be weak for sometime
- 2. investors are worried about the state of the world economy
- 3. investors are risk averse and see mining as risky
- 4. investors are worried that costs in mining are rising
- 5. investors are concerned about the impact of resource nationalism
- other

Personal Information

56. In your professional capacity, who do you represent? *

Mark only one oval.

- mining company - diversified
- mining - gold
- mining - PGMs
- mining - coal
- mining - iron-ore
- trade union
- political party
- community / community leader
- industry group (e.g. CoM, Nedlac, etc.)
- equipment / services supplier to industry
- mining engineer
- consulting engineer
- consultant
- journalist
- legal services
- financial services
- academia / research
- government
- regulator
- other

57. How many years have you been involved in the mining sector? *

Mark only one oval.

- 1-5
- 6-10
- 11-15
- 16-20
- 21-25
- 26 or more

Thank you for participating in this survey

58. If you would like to receive a copy of this report once it is complete, please email me directly or supply your email in the box below
