Analysis of Investment in Mining

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List of acronyms used in this document

ASX	Australian Securities Exchange
COMTRADE	United Nations International Trade Statistics Database
E&MJ	Engineering and Mining Journal
EPC	Engineering, Procurement, Construction
FIRB	Foreign Investment Review Board
GEC	Global Economic Crisis
GFCF	Gross Fixed Capital Formation
GVA	Gross Value Added
ITC	International Trade Centre
JSE	Johannesburg Stock Exchange
LPI	Logistics Performance Index
PGMs	Platinum Group Metals
ROA	Return on Assets
UNCTAD	United Nations Conference on Trade and Development

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1. Introduction

South Africa's mining sector has been through a torrid time since the Global Economic Crisis (GEC) that commenced in 2008. The commodity boom that preceded the crisis has been followed by an extended bear market characterized by volatile and generally declining prices, falling profits, and fractious labour relations. While output has not declined in absolute terms over the whole post GEC-period, there have been periods of negative growth and few indications of a recovery that can be sustained. This is not an environment that would typically be regarded as being conducive to rising levels of investment in the sector.

In its traditional economic sense, the act of investment constitutes an addition to the fixed capital stock of an economy. Since fixed capital - in the form of buildings, machinery and equipment, and transport equipment - is a critical input into most production processes, increases in the quantity and/or quality of capital assets is typically associated with an expansion in production capacity and is a prerequisite for economic growth. As part of the existing fixed capital is consumed during the production process, increases in the fixed capital stock requires that gross new investment flows exceed the value of the fixed capital consumed within the same period. Investment can also reflect financial flows arising from changing ownership of assets that may have very little to do with underlying changes in the quantum of fixed capital. In such cases, the economic value of this investment can arise from the freeing-up of capital for investment in new ventures in the same sector, or investment in others sectors. The new owners may also be more adept at extracting value from the asset than the previous owners.

In order for private investment projects to be undertaken, they should yield returns that exceed the cost of the financial capital employed, and at least match risk-adjusted returns on alternative uses of that capital. For this reason, investment in a particular economy, or sector, is viewed as an expression of confidence in its future. Levels of investment in South Africa's mining sector can therefore be regarded as something of a barometer of the sector's health and relative attractiveness, when compared with investments in other sectors, or in mining activities in other parts of the world.

This study analyses investment trends in mining in South Africa, and contrasts these with similar trends in both other sectors and other economies, so as to provide a perspective of the sector's relative health and future prospects. In the absence of comprehensive, disaggregated official data the analysis has had to try to construct a picture of relevant trends using a variety of data sources. These include aggregated national accounts indicators of investment flows and stocks for mining in South Africa sourced from the South African Reserve Bank; slightly disaggregated data of the same flows and stocks from Quantec's Standardised Industry Database; disaggregated data on the annual financial performance of operations engaged in mining a wide variety of different metals and minerals sourced from Statistics South Africa's Annual Financial Statements analysis; aggregated country data of foreign direct investment inflows and stocks from the ITC's Investment Map using UNCTAD and COMTRADE data; annual surveys of global investment projects in metals mining published by the Engineering and Mining Journal (E&MJ); and data on aggregated investment project values by type of investment published by SNL Metals and Mining. The study has also used country ranking data from the World Bank's *Ease of Doing Business* and *Logistics Performance* indices to assess broader economic, logistic and administrative factors that may impact on the mining sector in South Africa.

None of these sources are without limitations or shortcomings, but it is hoped that together they provide a reasonably comprehensive and accurate reflection of investment trends in mining.

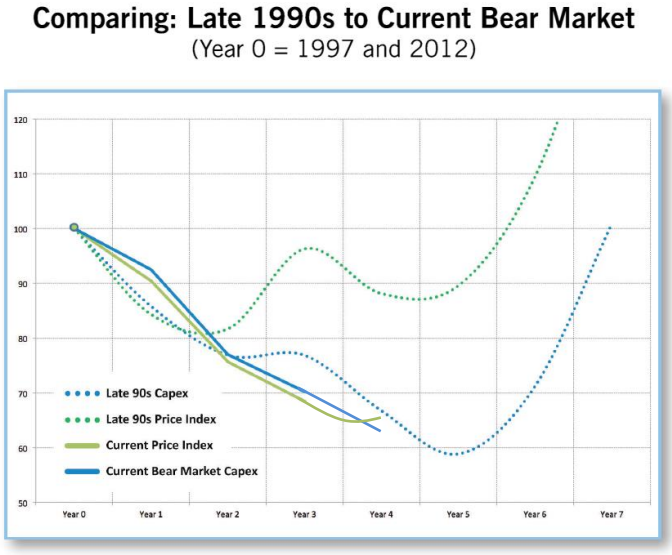
2. The global context for investment in the mining sector

In the wake of the GEC, most mineral commodity prices plummeted, before recovering strongly between late 2009 and early 2011 on the back of strong demand from China. However, a strong bear market then took hold, with the prices of South Africa's main mining commodities decreasing between January 2011 and September 2015 as follows:

Coal	58%
Iron Ore	68%
Gold	17%
Platinum	46%

As Figure 1 indicates, the extent and duration of the most recent decline in prices has been greater than the bear market of the late 1990s, with even tentative signs of a recovery yet to emerge. Importantly, the capital expenditure cycle in mining – which typically lags price trends by up to a year – has followed a similar trend to that of price indices over the past three years. Some analysts and industry experts[1] argue that the underlying cause of the persistent bear market in mining is the result of excess supply, rather than deficient demand, and that this is – in large part – due to global over-investment in the sector. A turnaround will either require a strong recovery in the demand for commodities, widespread shut downs of unprofitable operations, a deliberate cut back in supply from established operations – or some combination of these three factors. However, there is little indication that any of these developments will emerge over the short-to-medium term[2]. As a consequence, the prevailing bearish market conditions seem likely to persist for some time to come – with negative implications for investment in the sector.

Figure 1: Contrasting prices and capital expenditure in mining during two bear markets



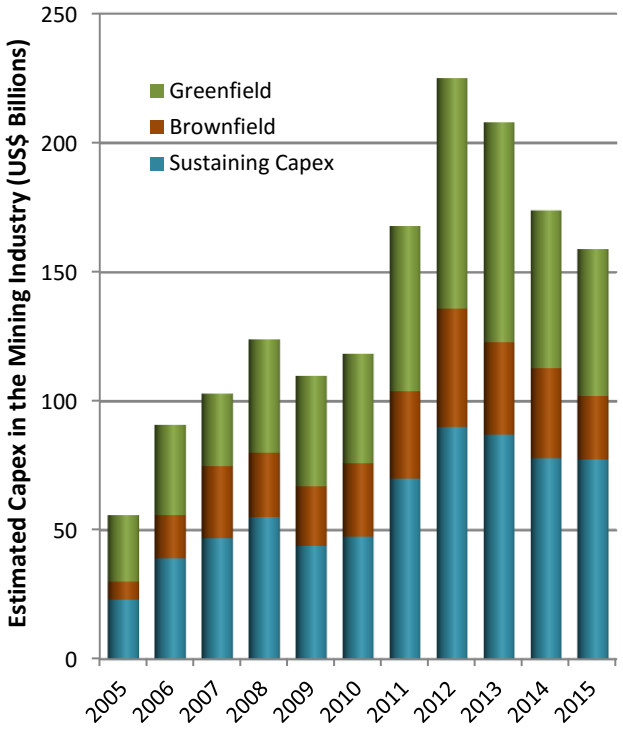
Adapted from work done by SNL Metals and Mining, 2015

[1] Ivan Glasenberg, CEO of Glencore recently criticized other players in the mining sector, stating that "Oversupplying markets regardless of demand is damaging the credibility of the industry."

[2] Responding to critics who have suggested the miners should rein in expansion plans, Andrew Mackenzie, CEO of BHP Billiton, was recently quoted as saying "Any attempt to curtail low-cost supply in open markets only encourages the continuation –- or entry –- of more costly production."

This view seems to be supported by estimates of the value and nature of global investment in mining reflected in Figure 2, which indicates that by the end of 2015 mining capex could be as much as 30% lower than it was at its peak in 2012. This decline is expected to be driven by a 14% decline in expenditure aimed at sustaining existing production facilities, a 47% decline in brownfield investment, and a 36% fall in greenfield investments over the same period. Brownfield investments refer to the acquisition of existing mining operations that may have been "mothballed" or have been operating unprofitably under their previous owners. The dramatic fall in the value of this type of investment suggests that there are perceived to be limited opportunities to turn existing loss-making operations into financially-viable entities given prevailing commodity prices. Similarly, there are substantially fewer unexploited mineral deposits of sufficient quality to justify greenfield investments in the context of current and anticipated commodity prices.

Figure 2: Value and nature of global capital expenditure in mining



Source: SNL Metals and Mining, 2015

Given the transnational character of the global mining industry, levels of foreign direct investment inflows and accumulated stocks of such investment can provide a proxy for the level of investor confidence in particular locations, and for underlying capital formation. Table 1 indicates the reported value of world FDI inflows into the top twenty reporting[3] recipient countries. It indicates that Australia was – by some magnitude – the largest recipient of FDI inflows in 2012, followed by Canada, Malaysia and Chile. Given that South Africa is excluded, some care should be taken in interpreting these figures because there is likely to be some reporting bias. Given that commodity prices started to fall during 2011 – signaling the end of the so-called "Super Cycle" - these figures may reflect some residual investment exuberance. There is also a lag between initial decisions to invest and the related payment flows, so some of the 2012 flows may have related to investment decisions from 2011, or earlier. The construction of new mines (greenfield investments) would also typically require investment over a number of years.

[3] South Africa does not currently report FDI flows at a sector level – so it is not included in this analysis.

Table 1: Reported value of FDI inflows into the mining sector in 2012

Rank	Country	Value of FDI Inflows into Mining and Quarrying in 2012 US$ Million
1	Australia	38,834.6
2	Canada	6,878.4
3	Malaysia	3,117.1
4	Chile	2,837.7
5	Colombia	2,262.7
6	Kazakhstan	1,344.6
7	Dominican Republic	1,167.9
8	Mexico	627.7
9	Denmark	552.6
10	Spain	420.2
11	Romania	344.4
12	France	330.2
13	Italy	317.4
14	Ecuador	224.9
15	Bolivia	218.9
16	Turkey	214.0
17	Viet Nam	167.5
18	Poland	160.6
19	Nicaragua	157.8
20	Czech Republic	134.9

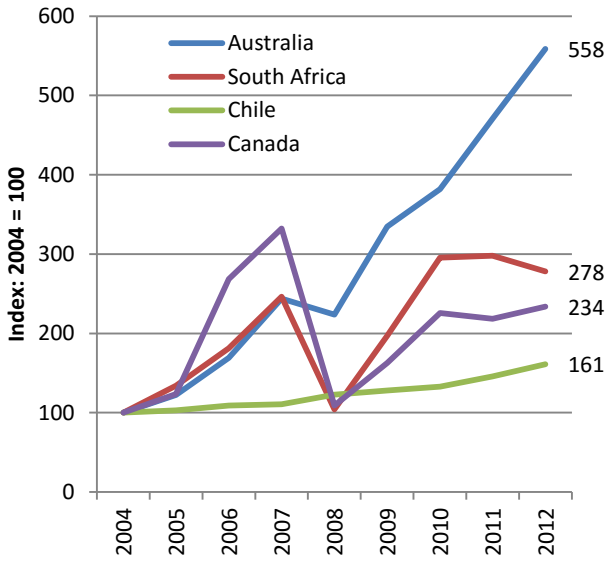
Source: ITC Investment Map, using UNCTAD and COMTRADE data

The available Investment Map figures do not differentiate between the mining of different commodities. However, FDI inflows into some countries – such as Malaysia and Kazakhstan – are likely to be dominated by investment in oil and gas extraction activities.

The stock value of FDI reflects the accumulated impact of prior investment inflows, adjusted for changes in the value of the underlying assets. Annexure 1 reflects the twenty countries with the largest reported stocks of FDI in mining as at the end of 2012. In this case, South Africa had the second largest foreign investment in the sector, with FDI valued at US$55.2 billion (around R453 billion at the exchange rates that prevailed in 2012). This was substantially lower than the US$212.3 billion of FDI inflows that Australia had attracted at that time, but significantly more than Chile (US$30.9 billion) and Canada (US$16.7 billion).

Relative trends in the stock of mining FDI over time for Australia, South Africa, Chile and Canada are shown in Figure 3. It indicates that the stock value of mining FDI in Australia increased by 458% between 2004 and 2012. The corresponding increase in South Africa was only 178%, while in Canada it was 134% and in Chile only 61%. Between 2004 and 2007, during the commodity boom leading up to the 2008 GEC – Australia and South Africa followed similar trends, but Australia was impacted less severely by the GEC and its aftermath, and recovered more strongly and consistently in the years that followed. This seems likely to have been influenced largely by the more extensive supply arrangements between Australia and China. In the company of these other countries, the decline in FDI stock values in 2012 in South Africa seems

Figure 3: Relative trends in the stock value of FDI (US$) in mining and quarrying from 2004 to 2012 – Australia, South Africa, Chile and Canada



Source of basic data: ITC Investment Map, using UNCTAD and COMTRADE data

likely to have been driven by endogenous factors, including Marikana and the disrupted labour relations environment of the time, and electricity supply constraints.

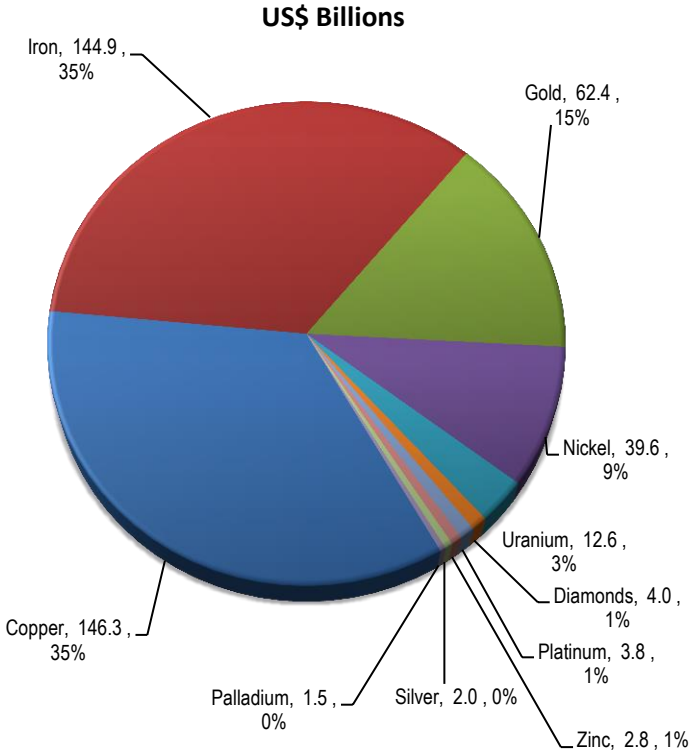
Table 2: South Africa's share of global investment in the metals mining sector

Country	Share of Global Mining Investment (% of Total)			
	2013	2012	2011	2009
Australia	13	14	15	11
Canada	15	14	14	11
Chile	9	9	8	9
Brazil	7	7	7	7
Russia	9	7	7	6
Peru	6	6	6	6
United States	6	5	5	5
South Africa	3	3	4	4
Philippines	2	2	3	3
Guinea			2	2
Mexico	2	2		

Source: E&MJ's Annual Survey of Global Mining Investment – various editions

An analysis of investment in the mining sector using data sourced from Engineering and Mining Journal's *Annual Survey of Global Mining Investment* indicates that South Africa's ranking has slipped from 7th in 2010 to 8th in 2013. The rankings of the 10 largest investing destinations from 2008 to 2013 are shown in Annexure 2. More importantly, the country's share of global investment has declined as indicated in **Error! Reference source not found.** – from 4% in 2009 to around 3% in 2013. Over the same period, Russia's share increased from 6% to 9%, and Brazil and Chile's shares remained stable at 7% and 9% respectively. Canada's share rose from 11% to 15%. Australia's share increased from 11% to 13% but was off its 2011 peak of 15%.

Figure 4: The value and share of global investment in 2013 by type of metal mined



In 2013, investment in the metals mining sectors was dominated by iron and copper – which collectively accounted for about 70% of the value of investment projects surveyed[4]. By comparison, gold, silver, diamonds and platinum group metals (PGMs) collectively only accounted for 18% of total investment. The reason for the relative importance of base metals investment probably arises from their more widespread industrial use and geographical prevalence. However, this has not protected them from significant declines in commodity prices. As was noted above, the price of iron ore declined by almost 70% between January 2011 and September 2015. Over the same period, copper prices fell by 45% and nickel prices by 61%.

Source: E&MJ's Annual Survey of Global Mining Investment – 2014

Table 3: Value of mining investment projects in the metals mining sectors in 2013

Country	Value of Mining Investment Projects (US$ million)
Canada	64,401
Chile	54,397
Russia	50,635
Australia	48,471
Peru	29,504
Brazil	27,287
USA	18,935
Papua New Guinea	13,215
Argentina	10,775
Guinea	10,000
Philippines	9,695
Indonesia	8,335
Sierra Leone	8,000
South Africa	7,895
Cameroon	7,686
Congo (Brazzaville)	7,545
Panama	6,181
Sweden	4,994
Mexico	4,360
Other Countries	27,564
Total	**419,875**

Source: E&MJ's Annual Survey of Global Mining

[4] Many mining projects extract more than one type of metal. These figures reflect the primary metal being mined

Table 3 shows the estimated value of investment projects by country in 2013. It indicates that global metals mining investment was valued at almost US$420 billion in that year. Of this Canada attracted investment of US$ 64.4 billion, followed by Chile (US$54.4 billion), Russia ((US$50.6 billion) and Australia (US$48.5 billion). Investment in the South African metals mining sector is estimated at US$7.9 billion (about R76 billion at prevailing exchange rates). This is similar to Sierra Leone, Cameroon, and Congo Brazzaville.

Investment – 2014[5]

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3. The nature of global investment in the metals mining sectors

At the project level, different types of investment go through various stages – creating a "pipeline" of investment activity that involves different categories of suppliers and service providers. Greenfield investments will usually first go through a conceptual (sometimes referred to as an order of magnitude or scoping study) and pre-feasibility phase. Pre-feasibility studies are more detailed than scoping studies, form part of necessary due diligence, are used to identify areas within the project that require more work, and aim to determine whether to proceed with a detailed feasibility study. The latter will provide the basis for capital appropriation, and budgets for the project. They require significant formal engineering work, should be accurate to within 10-15% and can cost up to 1.5% of the total estimated project cost. If the detailed feasibility study determines that the project is economically viable and meets the necessary standards of anticipated returns, the project will move into the construction phase.

[5] It is important to acknowledge the limitations of this survey of investment project data. Firstly, it is not clear what degree of coverage the sample has. Secondly, it is not clear that a consistent definition of the expenses that can be included in investment was applied to the responses received. Thirdly, the survey only encompasses metals mining activities, so investment of coal, and petroleum oil and gas extraction – which are significant globally – are not included. Nevertheless, the survey provides important project data that is useful in assessing investment trends with respect to the type of metal being mined, the location of the mining, the type of investment involved, and its announced value.

Of the US$420 billion total investment in metals mining globally in 2013 around 76% (US$322 billion) was identified as greenfield investment. Table 4 indicates the number of projects associated with each of the stages described above, as well as the total and average value of greenfield projects. It is notable that there was an increase in the number of projects at the detailed feasibility stage in 2013, but a decline in the number at both the conceptual and pre-feasibility stage and in those at the construction stage. In total, the number of greenfield projects dropped slightly from 151 to 149 between 2012 and 2013. On the basis of these figures, the scale of the required investment for a greenfield mining project to begin delivering metal ores in 2013 was around US$2.2 billion (around R21 billion at the prevailing average exchange rate). This was slightly lower than the US$2.3 billion average project value in 2012.

Table 4: The number of greenfield metals mining investment projects globally by stage and their aggregate and average value in 2012 and 2013

Year	Conceptual and Pre-feasibility	Detailed Feasibility	Construction	Total Number of Projects	Total Value of Projects (US$ Billion)	Average Value per Project (US$ Billion)
2012	67	63	21	151	344.1	2.3
2013	60	72	17	149	321.9	2.2

Source of basic data: E&MJ's Annual Survey of Global Mining Investment

Brownfield and sustaining investments also typically go through a number of stages, ranging from feasibility to plans and construction. In 2013, such investments only accounted for 22% of the total number of metals mining investment projects, and 24% of the total value. The number, value and scale of these projects by stage is shown in Table 5. The number of projects at the construction stage increased in 2013, while those undergoing feasibility assessments dropped slightly. Overall there was an increase in the number of brownfield projects in 2013 – from 44 projects to 48. The average total cost of a brownfield investment in mining was around US$2 billion in 2013, down from US$2.1 billion in 2012.

Table 5: The number of brownfield and sustaining metals mining investment projects globally by stage and their aggregate and average value in 2012 and 2013

Year	Feasibility	Plans	Construction	Total Number of Projects	Total Value of Projects (US$ Billion)	Average Value per Project (US$ Billion)
2012	12	18	14	44	91.5	2.1
2013	10	18	20	48	97.9	2.0

Source of basic data: E&MJ's Annual Survey of Global Mining Investment

4. Investment in the mining and quarrying sector in South Africa

Figure 5: Mineral exports contribution to total

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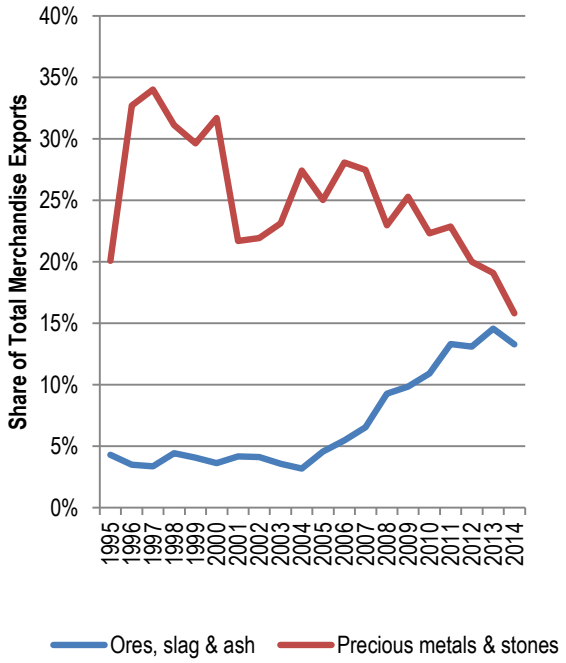


Source: South African Revenue Service, via Quantec

There have been significant structural shifts in South Africa's earnings from mineral exports – particularly over the past decade. Whereas earnings from precious metals and stones have steadily declined in their contribution to total merchandise export earnings, from a peak of 34% in 1997 to under 16% in 2014, the contribution of ores, slag and ash has risen from just over 3% to more than 13% between 2004 and 2014. These trends are illustrated in Figure 5.

In the wake of the Global Economic Crisis, South Africa has lost market share in many categories of metal and mineral products. Annexure 3 indicates the share of total South African metal and mineral exports in 2014, the average annual percentage change in the value of South African exports in US dollar terms, the corresponding average annual growth in world exports of the same commodity, and the resulting net export growth for South African exports.

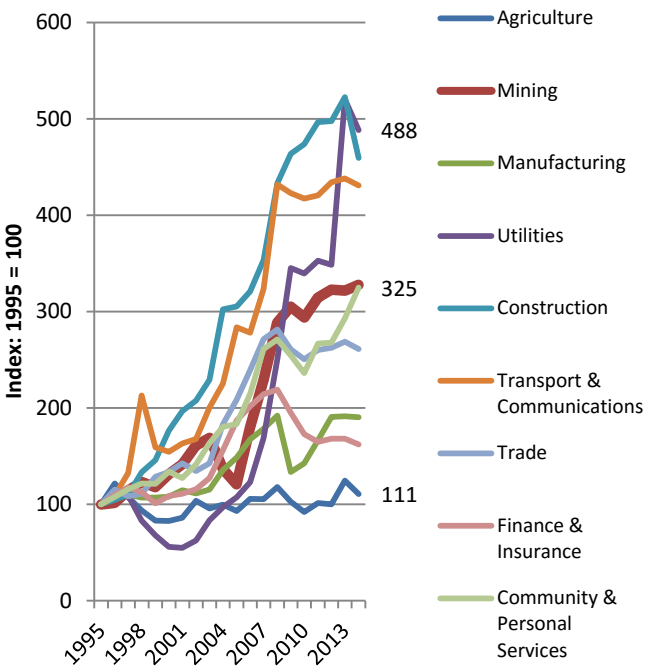
If South African exports of a particular commodity grew at a faster rate than the corresponding rate of growth in world exports, then this is an indicator of competitive advantages in that commodity. Conversely, if South African export growth is lower than corresponding world export growth, this is taken to indicate a competitive disadvantage in that commodity.

The analysis reveals that South Africa gained global market share in 18 mineral product categories which together accounted for 48.5% of the value of total mineral exports in 2014. The most significant of the categories that gained market share were iron ore (25% of mineral exports), coal (16% of mineral exports) and manganese (6% of mineral exports). The country lost global market share in 21 mineral product categories which collectively accounted for 51.5% of mineral exports in 2014. The most significant of these was platinum (24% of mineral exports), gold (22% of mineral exports), and diamonds (9% of mineral exports).

It is not clear what impact levels of gross fixed capital formation in mining had on this export performance. On the one hand, deteriorating competitiveness suggests deteriorating returns and a decline in the willingness to invest in the sector. On the other, insufficient investment would limit the capacity to extract minerals and to grow exports.

Figure 6: Relative trends in real gross fixed capital formation by sector

In the light of this, it is interesting to compare trends in the levels of gross fixed capital formation in the mining and quarrying sector with that of the other major sectors of the South African economy. Figure 6 indicates that while fixed investment in mining has not performed as well as some other sectors (construction, utilities, and transport and communications), it has performed relatively better than others – particularly agriculture, finance and insurance, manufacturing and trade.

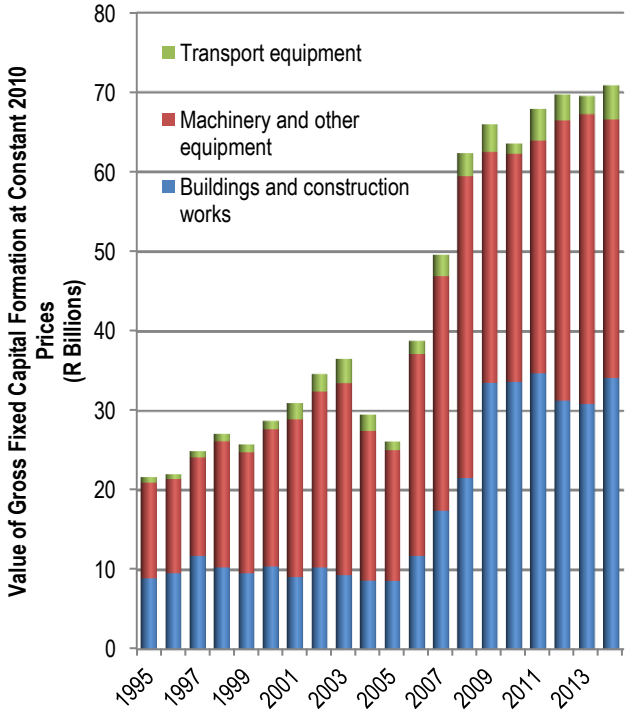


Source: South African Reserve Bank, via Quantec

Between 1995 and 2014, the value of real fixed capital formation in mining rose by 225%, compared with 388% in the case of utilities and 11% in agriculture.

The value of fixed capital formation (GFCF) in mining in constant price terms by asset type is shown in Figure 7. It indicates a drop in investment levels between 2003 and 2005, followed by a dramatic rise that lasted till 2009. After a slight decrease in 2009, levels of investment have been relatively flat in real terms.

Figure 7: The value of gross fixed capital formation in mining by asset type



Source: Quantec Standardised Industry Database

While it remains the smallest component of real GFCF, investment in transport equipment has shown the strongest growth since 1995. By 2014, it had increased by 516%. Over the same period, investment in buildings and construction works increased in real terms by 283%, and capital expenditure on machinery and other equipment rose by 169%. The increased investment in transport equipment may be a response to an inability to access Transnet rail facilities – particularly in the case of newer mining operations located in areas unserved by rail. At the same time, there is relatively little evidence of a dramatic increase in mechanization within the sector.

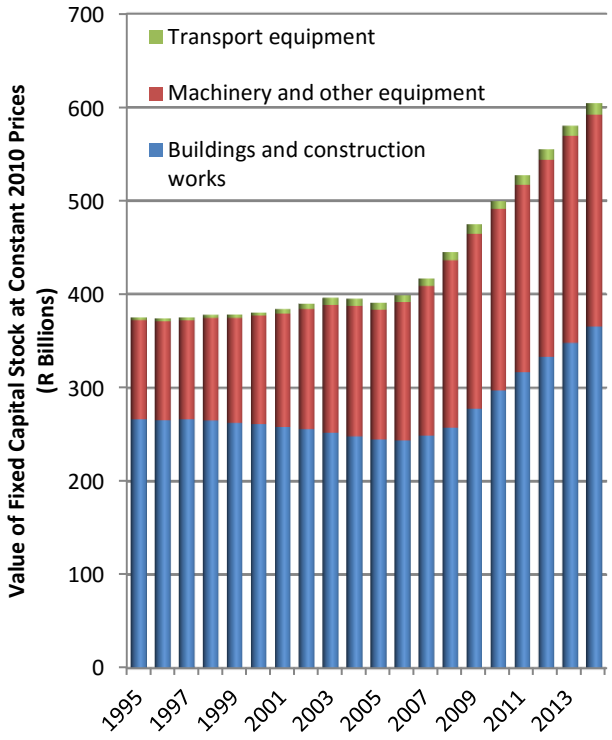
Figure 8: The value and composition of the real fixed capital

After an extended period of stagnation, the real fixed capital stock of the mining sector increased steadily between 2007 and 2014 – rising by more than 50%. This rise is reflected in Figure 8 and indicates that the rate of new investment has consistently exceeded the rate at which the existing capital stock is consumed. This should point towards greater production capacity within the sector.

The average annual rates of consumption of the different asset types in mining are as follows:

Transport equipment	24% p.a.
Machinery & other equipment	12% p.a.
Buildings & construction works	5% p.a.

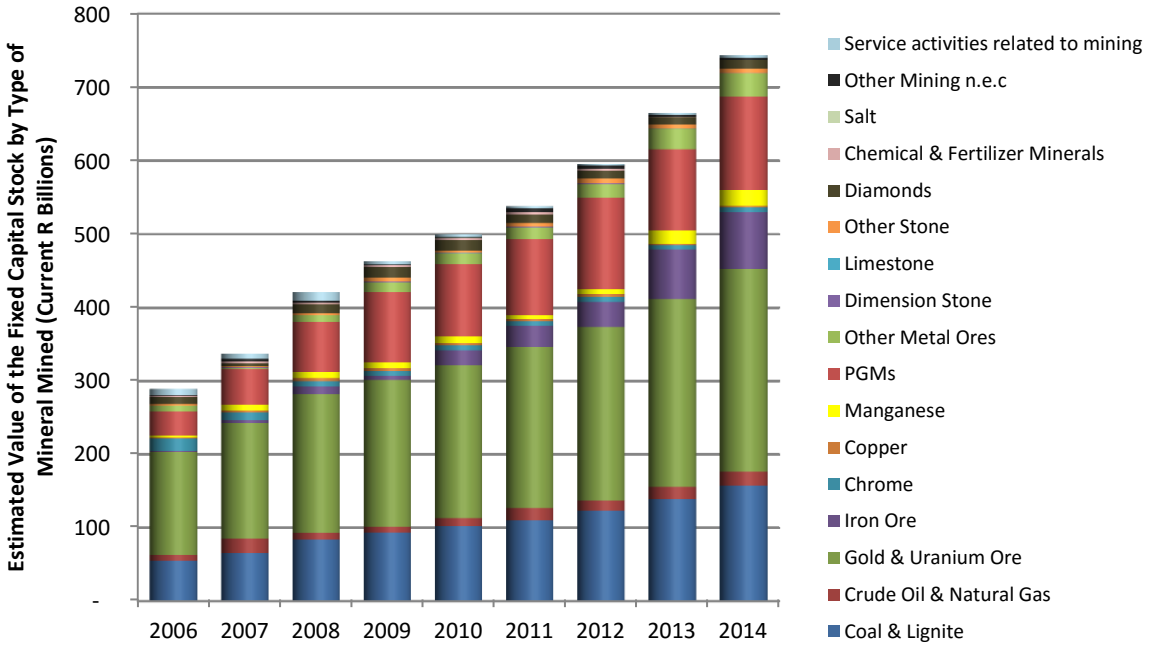
stock in the mining and quarrying sector



Source: South African Reserve Bank, via Quantec

This gives rise to expected average asset lifespans of around 4 years for transport equipment, 8 years for machinery and equipment and 21 years for buildings and construction works.

Figure 9: The value and composition of the fixed capital stock in the mining and quarrying sector by type of mineral mined

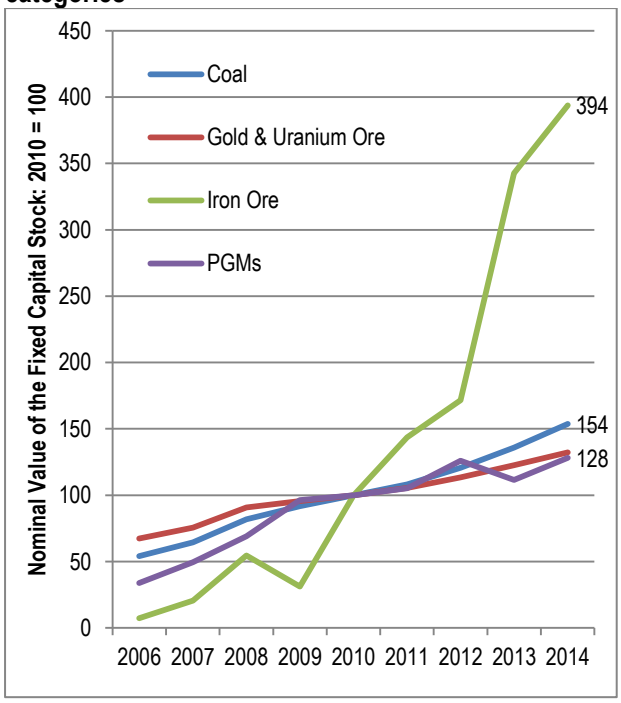


Source of basic data: Quantec Standardised Industry Database, StatsSA Annual Financial Statements – various editions

Available data only provides for limited disaggregation of the fixed capital stock by type of commodity mined. Using Quantec data for coal mining, gold and uranium ore mining, iron ore mining and other mining, and weighting the relevant data using non-current asset data for different types of mining entities obtained from the Statistics South Africa analysis of Annual Financial Statements, it has been possible to estimate the fixed capital stock applicable to each commodity type, and to examine how the share of accumulated fixed investment of each type of mining has changed over time. The results of this estimation are reflected in Figure 9 above, as well as in Annexure 4 – which indicates how the share of each type of mineral mined of the total fixed capital stock has changed over time.

The share of gold and uranium ore decreased from an estimated 48% of the total in 2006 to 37%. Coal's share rose from 19% to 21%, while PGMs increased from around 12% to 17%. Iron ore showed the most significant gain, increasing from 0.5% in 2006 to almost 11% in 2014. The other minerals generally account for relatively small shares of the fixed capital stock. A rising share of the overall capital stock points to rates of investment in respect of particular minerals that are higher than the sector average. Conversely, declining shares – as with gold, diamonds, chrome and (since 2010) PGMs - indicate rates of investment lower than the sector average.

Figure 10: Relative trends in the nominal value of the fixed capital stock for the major mining product categories



Source of basic data: Quantec Standardised Industry Database, StatsSA Annual Financial Statements – various editions

The relative impact of these trends on the nominal value of the fixed capital stock in the major mining product categories (coal, gold, iron and PGMs) is shown in Figure 10. It indicates a dramatic 294% increase in the value of the capital stock associated with iron ore mining between 2010 and 2014. By contrast, the growth in the value of the capital stock for coal, gold and PGMs was more pedestrian over the same period – ranging from 54% in the case of coal, to around 28% in the case of the precious metals.

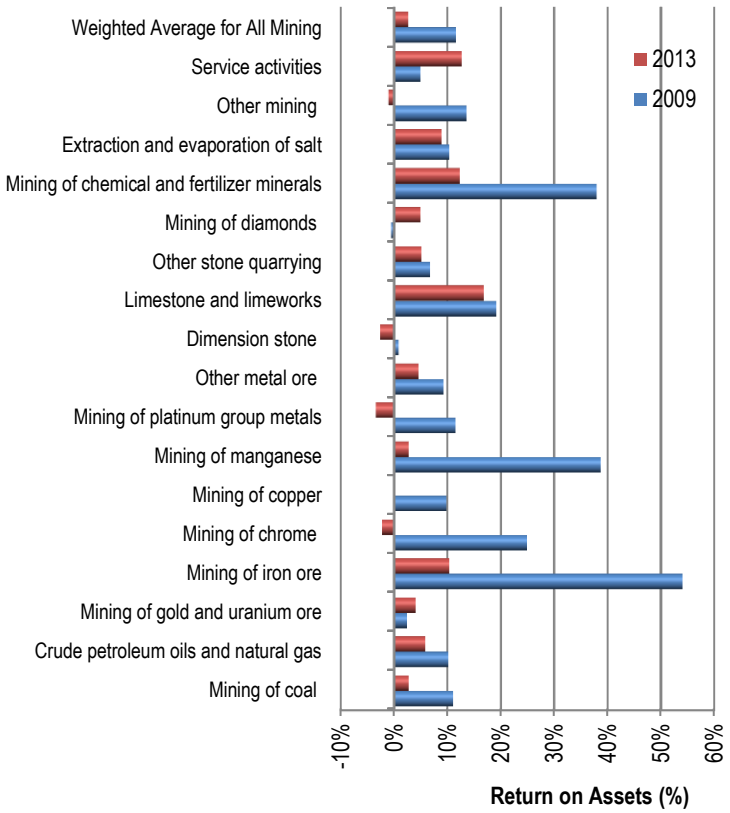
As has already been indicated, private sector investment is generally undertaken with the expectation of a return on that investment that exceeds the cost of the funds and that at least matches the risk-adjusted returns anticipated on alternative uses of those funds. Given the sharp fall in the price of almost all mining commodities over the past few years, it seems likely that the returns being achieved in relation to most mining activities are lower than were anticipated at the time some of the investments in the sector were made.

An analysis of the return on assets in respect of different commodities mined is reflected in Figure 11. A more comprehensive table reflecting ROA by mined commodity from 2006 to 2013 is included as Annexure 5.

Figure 11 indicates that the return on assets has generally decreased significantly since 2009, and was negative in the case of four types of commodities: chrome, PGMs, dimension stone, and other mining. Only two products or activities experienced improved returns between 2009 and 2013: gold and uranium ore mining, and services incidental to mining. The improvement in returns to gold mining was marginal, but overall the average returns across the whole sector declined as reflected below:

2008	14.7%
2009	11.6%
2010	4.8%
2011	9.3%
2012	6.7%
2013	2.7%

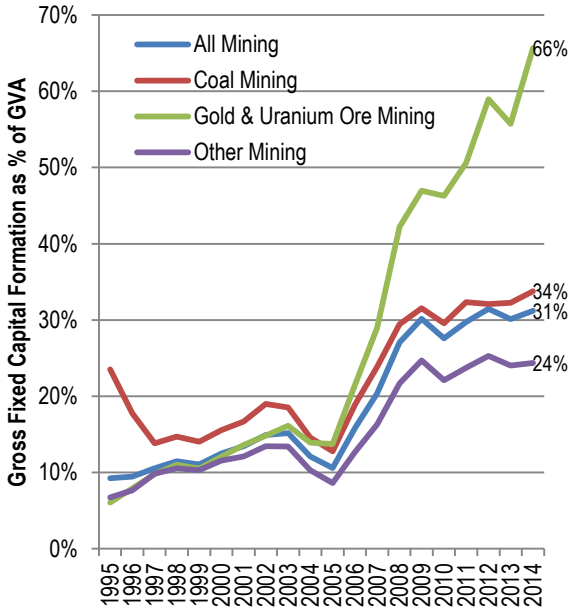
Figure 11: Comparative return on assets for different minerals, 2009 and 2013



Source of basic data: StatsSA Analysis of Annual Financial Statements – various editions

While there is no uniform desired value for an ROA ratio, projects that cannot deliver a return that is at least equal to the cost of funds would generally not be pursued. Certainly, the average returns achieved in 2013 are not – by themselves - consistent with decisions to increase levels of investment in the sector – especially since these returns would be negative if adjusted for inflation.

Figure 12: Gross fixed capital formation as a percentage of GVA



Source: Quantec Standardised Industry Database

In this context, aggregate real fixed capital formation in the mining sector appears to have held up relatively well over the past three-to-four years. However, it is debateable how long this situation can continue – particularly in respect of those commodity categories that have been making low returns or losses in recent years. Figure 12 indicates the ratio of gross fixed capital formation to gross value added across the major sub-sectors for which data

exists, and for mining as a whole. A central premise of the National Development Plan is that the ratio of GFCF to the GDP needs to increase from its current levels (around 20%) to closer to 30% in order for the economy to be able to sustain higher economic growth rates of 6% to 8% per annum. Average investment rates in the mining sector are already higher than this target ratio, and have been for some years, but the growth in output has not been forthcoming. In fact, output in the sector has been flat or declining for the past four years, with an average annual contraction in real GVA between 2010 and 2014 of -0.3%. Certainly, the levels of investment in the gold and uranium ore mining sector appear unsustainable, with GFCF equivalent to 66% of estimated value added in 2014, a contraction in output of more than 15%, and persistently low returns in recent years.

While low interest rates globally have made it possible for mining companies to restructure their balance sheets away from equity-funding and in favour of low cost debt, such funding carries increased exchange rate risk. It is also widely anticipated that the interest cycle is about to turn.

The principle motive for investing in the current environment would be in anticipation of an upturn in the commodity cycle. However, - as has been noted - this has been long-awaited and there is little sign of an imminent turnaround.

5. The nature of investment in mining in South Africa

The global investment trends reflected in Table 4 and Table 5 can be compared with equivalent data from the same source relating to investment projects in metals mining in South Africa. These are reflected in Table 6 and Table 7. In relation to the spilt between greenfield and brownfield projects, South Africa has a smaller proportion of the former (63% in 2012 and 60% in 2013, compared with 77% and 78% globally) and they are significantly smaller in scale (US$0.84 billion in South Africa in 2012 compared with US$2.3 billion globally, and US$0.39 billion compared with US$ 2.2 billion globally in 2013). According to the available information, the project "pipeline" only has one project in the conceptual or pre-feasibility stage[6]. The dramatic fall in the total and average value of projects between 2012 and 2013 suggests a significant down-scaling of project size post Marikana and points to more risk-averse, less confident investors.

Table 6: The number of greenfield mining investment projects in South Africa by stage and their aggregate and average value in 2012 and 2013

Year	Conceptual and Pre-feasibility	Detailed Feasibility	Construction	Total Number of Projects	Total Value of Projects (US$ Billion)	Average Value per Project (US$ Billion)
2012	1	6	3	10	8.4	0.84
2013	1	5	3	9	3.5	0.39

Source of basic data: E&MJ's Annual Survey of Global Mining Investment

[6] Lonmin/Shanduka's Akanani project moved from conceptual in 2012 to pre-feasibility in 2013.

While the number of brownfield projects is proportionately more significant in South Africa than the global average, there were no projects at the front end (feasibility) in 2013, and there was also a marked decline in both the total value of projects in the pipeline, and their average value. Whereas the average value of brownfields projects globally was around US$2 billion, in South Africa the scale of the investment was less than half that in 2013.

Table 7: The number of brownfield and sustaining mining investment projects in South Africa by stage and their aggregate and average value in 2012 and 2013

Year	Feasibility	Plans	Construction	Total Number of Projects	Total Value of Projects (US$ Billion)	Average Value per Project (US$ Billion)
2012	1	3	2	6	6.3	1.05
2013	0	3	3	6	4.4	0.73

Source of basic data: E&MJ's Annual Survey of Global Mining Investment

As has been noted, mining investment projects usually have extensive lead times, with individual projects taking a number of years to move from the conceptual and feasibility stages to production. The South African greenfield and brownfield project pipeline has effectively closed at the entry end (conceptual and pre-feasibility) and the scale of both types of investment has been slashed. This will almost certainly be reflected in declining aggregate levels of investment in the sector in coming years.

Table 8 summarises the key differences between metals mining investment projects in the rest of the world and those in South Africa. Globally, there is a more sustainable greenfield investment pipeline, with a higher percentage of projects at the conceptual or pre-feasibility stage. In relation to brownfield investments, the rest of the world is heavily weighted to the planning stage, whereas South Africa has a higher proportion in the construction stage. Open-cast mining is a bigger feature of mining in the rest of the world, with 87% of mining projects fully or partially open-cast. In South Africa, only 27% of the mining projects surveyed are open-cast.

Investment projects in South Africa are heavily weighted towards PGM mining – accounting for 73% of the projects in this country, but for only 7% in the rest of the world. It is worth remembering that the average ROA in PGM mining in South Africa was negative in 2013.

Table 8: Contrasting the structure and nature of mining in 2013 in the rest of the world with that in South Africa

Description	Global – excluding South Africa	South Africa
% of total projects that are greenfield projects	81%	60%
% of greenfield projects at conceptual or pre-feasibility stage	50%	11%
% of greenfield projects at feasibility stage	42%	56%
% of greenfield projects at construction stage	8%	33%
Average value of greenfield projects	US$2.2bn	US$0.39 bn
% of total projects that are brownfield projects	19%	40%
% of brownfield projects at feasibility stage	7%	0%
% of brownfield projects at planning stage	80%	50%
% of brownfield projects at construction stage	13%	50%
Average value of brownfield projects	US$2.2bn	US$0.73bn

% of projects that relate to open-cast mines	87%	27%
% of projects that relate primarily to gold mining	24%	13%
% of projects that relate primarily to PGM mining	7%	73%
% of projects that relate primarily to iron ore mining	16%	
% of projects that relate primarily to copper ore mining	20%	
% of projects that relate primarily to diamond mining	5%	13%
% of projects that relate primarily to nickel ore mining	13%	
% of projects that relate primarily to silver mining	2%	
% of projects that relate primarily to uranium ore mining	3%	
% of projects that relate primarily to zinc ore mining	6%	

Source of basic data: E&MJ's Annual Survey of Global Mining Investment, 2013

6. Looking for reasons to explain the observed investment trends and investment prospects in mining in South Africa

In addition to the desire to achieve a required rate of return, the act of investment is driven by one or more additional motives. The choice of location is based on the extent to which it satisfies these motives. Rationally, one possible location will be preferred over others by private investors because it gives rise to relatively greater "assets" that are not locationally-transferable. Based on the work done by Dunning (1997) on industrial organisation and multinational enterprise (MNE) behaviour, four primary motives are identified that underpin the location choices of investors:

i) Resource seeking investment;
ii) Market seeking investment;
iii) Efficiency seeking investment; and
iv) Strategic asset seeking investment.

The primary motive behind the location choice of investors in the mining sector will almost always be the presence and quality of a desired mineral resource. According to prevailing theory, resource seeking investment is usually directly tied to the presence of natural resources or their processing. It is generally seen as a locationally fixed investment, although processing activities may be more mobile than extraction activities. Governments are generally seen to have significant bargaining power over MNCs where this type of investment applies. Policy approaches to mineral rights and licenses are likely to be significant issues in this kind of investment.

In this regard, it is widely acknowledged that South Africa is richly endowed with a wide range of known mineral reserves. It has the world's largest reserves of platinum, manganese, chromium, gold and alumino-silicates. It is also a significant producer of ferrochrome, other platinum group metals, vanadium, ferromanganese and fluorspar. On the face of it then, South Africa should have little difficulty in attracting investment into mining. But while the presence of a particular resource is a necessary condition to attract investors it is not a sufficient one to ensure that the investment takes place. Firstly, the prospective miner needs to acquire the necessary rights to extract the resource. In South Africa's

case, a potential investor's willingness and/or ability to engage in the exploitation of a particular mineral deposit is not the Government's only consideration when deciding whether to issue mining rights. Once the necessary rights have been obtained, the mining entity needs to be able to extract the necessary resource cost effectively, and to then be able to get the extracted resource from the mine to a processing site and market. This requires competitively-priced intermediate inputs and production factors, and efficient transport and logistics infrastructure.

Figure 13 indicates the estimated value chain for gold and uranium ore mining in South Africa in 2014. Similar value chains for coal and other mining are included as Annexure 6 and Annexure 7 respectively. While the contribution of intermediate inputs to the value of sales is relatively small (21%) in relation to the value added of the mining itself (79%), there are many critical inputs, including electricity, explosives, construction materials, security, transport and financial services without which the mining operation itself will be unable to function. Given that most mines are run on a continuous basis, it is not simply the cost of these inputs that matters, but also the reliability of their supply.

Figure 13: Estimated value chain for gold and uranium ore mining in 2014

Source of basic data: Quantec Standardised Industry Database

It is also noteworthy that remuneration of labour constituted 63% of the value added in 2014. This is partly the result of depressed returns, resulting in a comparatively lower gross operating surplus. The average share of the gross operating surplus of South Africa's GVA in 2014 was 48%. Given that

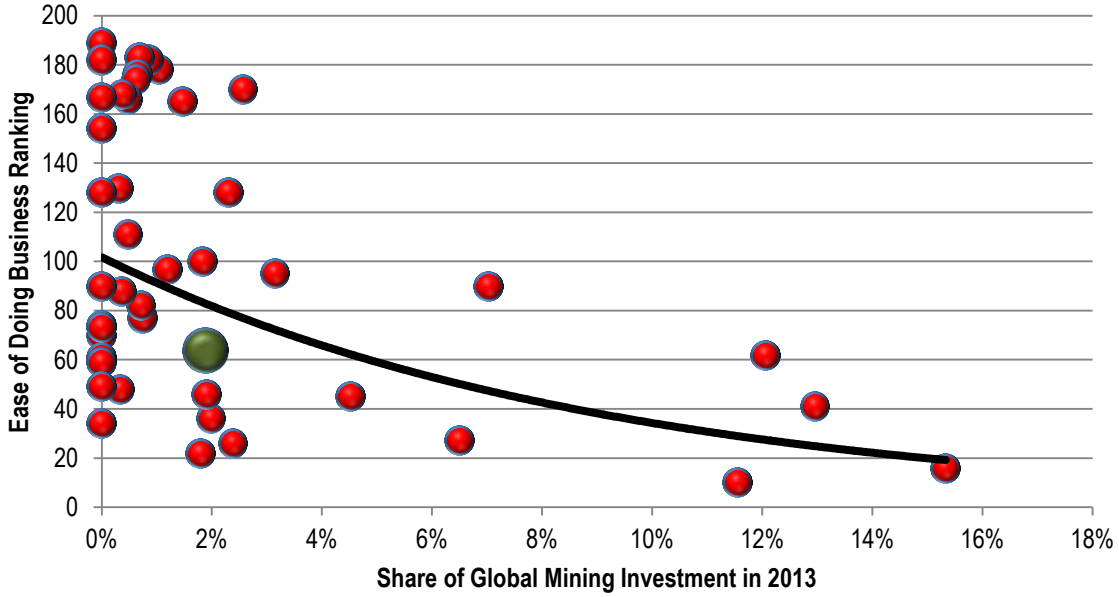
labour costs make up such a significant proportion of value added it is concerning that labour productivity in the sector (measured by real output per worker) has fallen by close to 40% over the past decade. This is not simply a function of a disrupted labour relations environment, but also a result of measurement: while the quantity of ore-bearing rock extracted might have increased, gold output per worker has declined due to the declining quality of the ore extracted.

The lack of domestic beneficiation of the output of the sector is reflected in the fact that less than 1% of the value of the sales is supplied to the local market.

Given South Africa's dominant share of many mineral resources, its declining share of global investment in mining is worrying and requires answers. Is this trend simply a function of changing demand patterns, which has seen demand for precious metals and stones decline in the depressed post-GEC global economy? If so, why is there still a fairly high degree of investor interest globally in the mining of these commodities? The share of investment projects outside South Africa in gold, PGMs, silver and diamonds was 38% of the total in 2013, and inside the country these products represent the only ones in the investment pipeline according to available sources. This then raises the question of whether there are other, country-specific drivers that explain relatively better investment performance.

This is first considered at a general level. Since the general business environment is likely to impact on the costs of extraction, countries that have are perceived to be easier places to do business should be able to attract a proportionately greater share of global investment flows into mining.

Figure 14: Relationship between Ease of Doing Business ranking and share of global mining investment project value in 2013



Source: E&MJ's Annual Survey of Global Mining Investment 2014, World Bank

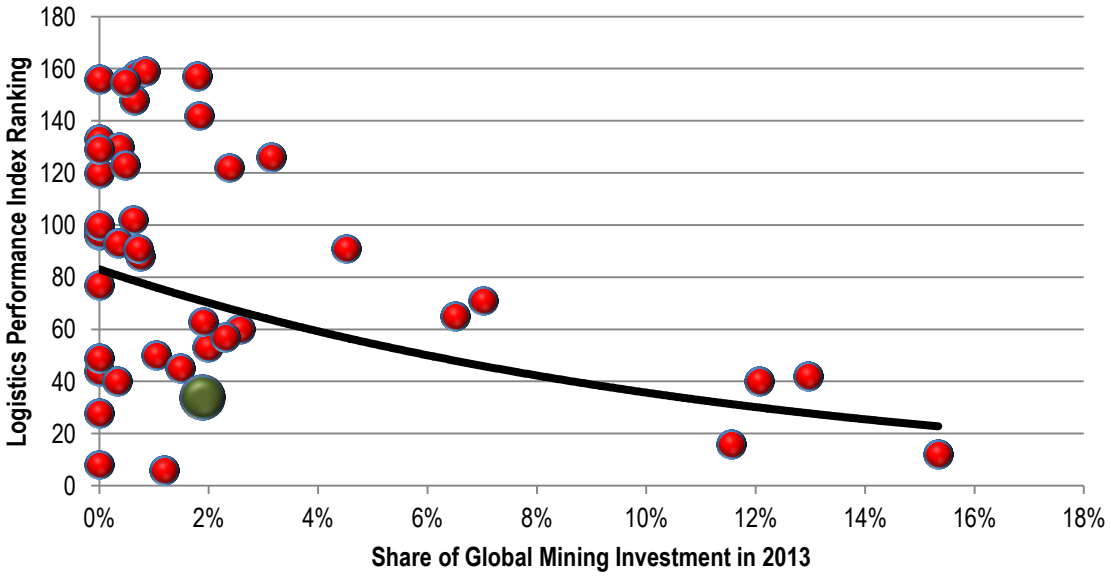
Figure 14 indicates that there is indeed some correlation between those countries that have succeeded in attracting large shares of mining investment and their Ease of Doing Business rankings as published

by the World Bank[7]. South Africa's position is shown in green. While there are some countries with less attractive Ease of Doing Business rankings and higher shares of global mining investment, there are also others with lower (better) rankings and smaller shares. The "best fit" function suggests that – if the easy of doing business was the only relevant factor determining investment shares - then South Africa should be able to attract at least double its present share of mining investment.

Since the efficiency and cost of getting the extracted product from its source to a processing facility and on to a local or global market can have a significant impact on the returns to mining, the relationship between logistics systems and investment performance were also examined. In this case the country rankings emerging from the World Bank's Logistics Performance Index (LPI) – which is the weighted average of the country's scores on the six key dimensions listed below – were correlated with the country's share of global mining investment.

i) Efficiency of the clearance process (i.e., speed, simplicity and predictability of formalities) by border control agencies, including customs;
ii) Quality of trade and transport related infrastructure (e.g., ports, railroads, roads, information technology);
iii) Ease of arranging competitively priced shipments;
iv) Competence and quality of logistics services (e.g., transport operators, customs brokers);
v) Ability to track and trace consignments;
vi) Timeliness of shipments in reaching destination within the scheduled or expected delivery time.

Figure 15: Relationship between Logistics Performance Index ranking and share of global mining investment project value in 2013



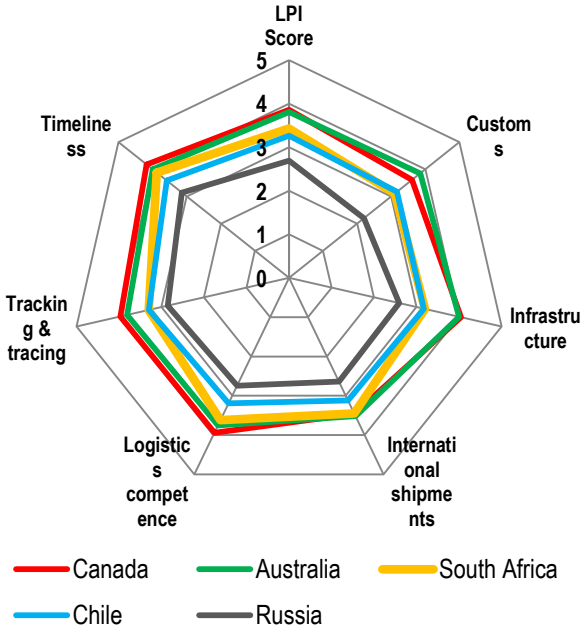
Source: E&MJ's Annual Survey of Global Mining Investment 2014, World Bank

[7] Ideally, this correlation should be tested further in order to try to establish whether there is a causative effect by examining changes in the indices and shares over time. Available data did not permit such an analysis at this time.

The results of this analysis are reflected in Figure 15. Once again, there is some positive correlation between the logistics performance of particular countries and their respective shares of global mining investment. However, if this was the only factor determining investment attraction, South Africa should have been able to attract around 10% of global mining investment (compared with the 2% actually attracted).

In order to try to determine whether any specific aspect of logistics was more important than others in relation to mining investment, the scores for each component of the LPI of the four largest destinations for mining investment in 2013 (Australia, Canada, Chile and Russia), and South Africa, were compared. These are shown in Figure 16. The detailed rankings and scores are included as Annexure 8. South Africa scores comparatively poorly in relation Australia and Canada in customs, infrastructure, and tracking and tracing, but scores better than Russia in all departments, and is largely on par with, or better than, Chile.

Figure 16: Comparative LPI component scores for major mining investment destinations



Source: World Bank

So while the rankings suggest some scope for areas of absolute and relative improvement, they do not – by themselves – explain differences in comparative attractiveness for mining investment. There appears to be little in the way of published research that seeks to explain why some mining destinations have been more successful at attracting mining investment than others.

Tax and other government-provided incentives do not seem to feature as a significant driver of investment in the mining industry, although the provision of appropriate infrastructure may be an incentive at a local level.

6.1 Australia

As the figures relating to fixed capital stocks and investment flows attest, Australia has been hugely successful at attracting investment into its mining sector. While it is a relatively easy place to do business, and it has sophisticated and competitive logistics systems, perhaps its biggest advantage is its relative proximity to China (and other major markets for its minerals such as Japan and Korea). Jin (2014) notes that:

> "*Australia is one of the earliest countries which Chinese companies have gone out for, and is the second largest target for China's overseas investment, second only to the United States. Mining is undoubtedly the industry that has attracted most investment from China into Australia."*

Commenting on Baosteel's hostile takeover of Aquila Mining, Jin notes that this was part of a long term strategy that first saw Baosteel acquire sufficient shares in Aquila to obtain a seat on the board – so it had an insider view of the company - and then to make an offer directly to shareholders at a time when the market for steel was depressed and share valuations low. It took a long term view of prospects, and the timing of the investment reflected this. Jin also notes that Baosteel's takeover of Aquila could have encountered greater regulatory hurdles and delays (as other Chinese investments had previously done) from Australia's Foreign Investment Review Board (FIRB), but that this was averted through the establishment of a partnership with Aurizon, a local company, as the engineering, procurement, construction (EPC) contractor.

The surge in Chinese investment in Australian mining follows on the heels of an earlier wave of investment from Japan in the 1960s. In both cases, the objective appears to have been to secure supply of necessary resources – most notably iron ore and coal. By taking a direct stake in the iron ore mining companies in the 1960s, Japanese steel mills were able to ensure security of supply of raw materials by signing long-term contracts to buy. Chinese steel mills are now replicating this approach.

6.2 Canada

Although Canada has also managed to attract significant amounts of investment into its mining sector, most of this is domestically-generated – with a much smaller proportion from foreign sources. Given that it is the second largest country in the world by area and is sparsely populated, Canada's status as a major mining country is not surprising. Although some of the mining operations are comparatively more remote, most of Canada's industries are centred in or near metropolitan areas close to the United States. In 2006, the United States imported over 65% of Canada's total mining exports, but the country also has well established logistics routes to Asian, European and South American markets.

Canada's mining companies, invest significant amounts in R&D, and in exploration, with the country consistently ranking first in its share of global exploration spending. The Toronto Stock Exchange also has substantially more mining companies listed than any other bourse and in 2014 it raised over C$8.9 billion in mining finance as part of 1,482 finance transactions. This was more than double the amount raised on the Australian Securities Exchange (ASX). The JSE only raised C$0.2 billion over the same period.

7. Summary and conclusion

Since 2011 a pronounced bear market has set in in relation to mining commodities, with prices falling significantly and steadily. This has had a marked impact on global investment in mining, with mining capex declining steadily over the past four years. However, even within this broader negative context,

South Africa's share of global mining investment has declined – suggesting that there are other, country-specific factors at play. Total investment in mining was valued at US$420 billion in 2013, of which Canada attracted the largest share (US$ 64.4 billion), followed by Chile (US$54.4 billion), Russia ((US$50.6 billion) and Australia (US$48.5 billion). Investment in the South African mining sector is estimated at US$7.9 billion.

There have been significant structural shifts in South Africa's earnings from mineral exports with precious metals and stones accounting for a steadily decreasing share, and exports of ores, slag and ash rising in importance from just over 3% of total merchandise export earnings in 2004 to more than 13% in 2014. An analysis of the export performance of individual commodities reveals that South Africa gained global market share in 18 mineral product categories which together accounted for 48.5% of the value of total mineral exports in 2014 and lost global market share in 21 mineral product categories which collectively accounted for 51.5% of mineral exports in 2014. The most significant of these was platinum (24% of mineral exports), gold (22% of mineral exports), and diamonds (9% of mineral exports).

While fixed investment in mining has not performed as well as some other sectors of the South African economy (construction, utilities, and transport and communications), it has performed relatively better than others – particularly agriculture, finance and insurance, manufacturing and trade. After an extended period of stagnation, the real fixed capital stock of the mining sector increased steadily between 2007 and 2014 – rising by more than 50%. This indicates that the rate on new investment has consistently exceeded the rate at which the existing capital stock is consumed, and should point towards greater production capacity within the sector.

Average investment rates in the mining sector are already higher than the 30% NDP national target ratio to GDP, and have been for some years, but the growth in output has not been forthcoming. Within the context of a contraction in output of more than 15% in 2014, and persistently low returns in recent years, the levels of investment in the gold and uranium ore mining sector (equivalent to 66% of estimated value added in 2014) appear unsustainable. Since mining investment projects usually have extensive lead times, with individual projects taking a number of years to move from the conceptual and feasibility stages to production, it is concerning that the South African greenfield and brownfield project pipeline has effectively closed at the entry end (conceptual and feasibility) and the scale of both types of investment has been slashed. This will almost certainly be reflected in declining aggregate levels of investment in the sector in coming years.

In the search for explanations for South Africa's comparatively poor investment performance, correlations with the general ease of doing business and the state of logistics were undertaken. Both analyses suggest that South Africa should be attracting more investment into mining than it is. However, in the context of depressed commodity prices and low (and sometimes negative) returns to most minerals mined, perhaps the biggest constraint the country faces is one of geography. The fact is that the country is located relatively far away from most of the major markets for the commodities it produces. When margins are already tight due to low prices, the additional costs associated with transporting relatively low value and bulky mined commodities to distant markets undermines the relative attractiveness of the South African mining sector. After being railed to Saldanha, iron ore from Sichen needs to travel 9322 nautical miles to get to Shanghai. This can be expected to take almost 39

days. By contrast ore shipped from Freemantle (Perth) in Australia to Shanghai needs to travel 4794 nautical miles – a trip that should take around 20 days. Delivery from ports close to mining areas in Chile to ports on the West Coast of the United States can typically take around 25 days.

In the context of global markets that are already over-supplied, it is unrealistic to expect significant growth in the levels of aggregate investment in the South African mining sector – which is already high in relation to the value added by the sector. Instead, the short-term investment focus needs to be on improving the efficiency of extraction in existing operations, and on seeking to limit some of the disadvantage imposed by South Africa's distance from major markets. Greater use and beneficiation of products mined within the local economy would help to limit this disadvantage.

8. References and data sources

Data sources

E&MJ Annual Survey of Global Metal-mining Investment, January 2014 accessed at http://emj.epubxp.com/i/239773-jan-2014/27

ITC Investment Map accessed at http://www.investmentmap.org

Quantec Standardised Industry Database accessed at http://www.easydata.co.za/

Statistics South Africa, P0021 - Annual Financial Statistics (AFS), 2006 to 2013 editions accessed at http://www.statssa.gov.za/?page_id=1854&PPN=P0021

World Bank Logistics Performance Index accessed at http://lpi.worldbank.org/international/scorecard/radar/254/C/ZAF/2014/C/AUS/2014/C/CAN/2014/C/CHL/2014/C/RUS/2014

World Bank Ease of Doing Business Rankings accessed at http://www.doingbusiness.org/rankings

Documents and articles

Anon. March 3, 2015. Leading the World in Mining Financing accessed at http://www.tmx.com/newsroom/newsfeed?id=289

Dunning, J. H. 1997. Re-evaluating the benefits of foreign direct investment, in *Alliance capitalism and global business*, J. H. Dunning. London: Routledge.

Fellows, M. 2015. How Does The Mining Sector Cycle Play Out? Insights for Industry Suppliers. SNL Metals and Mining

Jackson, Taylor,and Green, Kenneth P. 2015. Fraser Institute Annual Survey of Mining Companies, 2014. Fraser Institute. <http://www.fraserinstitute.org>.

Jin, X. November 20, 2014. Factors for Successful Chinese Investment in the Australian Mining Industry: A Case Study of Baosteel Consortium's Acquisition of Aquila accessed at http://www.chinalawinsight.com/2014/11/articles/corporate/factors-for-successful-chinese-investment-in-the-australian-mining-industry-a-case-study-of-baosteel-consortiums-acquisition-of-aquila/

McHugh, B. 15 January 2014. Australian mining continues to attract foreign investors accessed at http://www.abc.net.au/news/2014-01-14/foreign-investment-grows-in-mining/5199614

Peckham, V. and Budgell, P. 2008. Canada's Mining Industry – A Success Story. Mining.com. April 2008. Accessed at http://www.infomine.com/library/publications/docs/Mining.com/Apr2008e.pdf

SNL Metals and Mining. 2015. World Exploration Trends. Accessed at http://go.snl.com/rs/snlfinancialIlc/images/World-Exploration-Trends-WET-Report-2015-English-USletter.pdf

Annexures

Annexure 1: Accumulated stock value of FDI inflows into the mining sector as at end 2012

Rank	Country	Value of FDI Stocks in Mining and Quarrying at end 2012 US$ Million
1	Australia	212,346.8
2	South Africa	55,198.9
3	Chile	30,900.3
4	Canada	16,739.6
5	Malaysia	9,023.8
6	Denmark	6,283.4
7	Romania	4,246.6
8	Netherlands	3,641.3
9	Kazakhstan	3,439.8
10	France	3,308.2
11	Viet Nam	3,182.0
12	Finland	2,525.8
13	Thailand	2,517.1
14	New Zealand	2,473.9
15	Botswana	2,032.3
16	Austria	393.9
17	Macedonia	206.2
18	Estonia	91.2
19	Latvia	88.6
20	Japan	76.8

Source: ITC Investment Map, using UNCTAD and COMTRADE data

Annexure 2: Rankings of the top 10 countries in terms of the value of mining investment in the metals mining sectors

Country	Share of Global Mining Investment (% of Total)			
	2013	2012	2011	2009
Australia	13	14	15	11
Canada	15	14	14	11
Chile	9	9	8	9
Brazil	7	7	7	7
Russia	9	7	7	6
Peru	6	6	6	6
United States	6	5	5	5
South Africa	3	3	4	4
Philippines	2	2	3	3
Guinea			2	2
Mexico	2	2		

Source: E&MJ's Annual Survey of Global Mining Investment – various editions

Annexure 3: Revealed competitive advantage of South African mineral exports: 2008 to 2014

Exported Product	Share of Total SA Mineral Exports in 2014	Average Annual Growth in SA Exports in US$: 2008 to 2014	Average Annual Growth in World Exports in US$: 2008 to 2014	Net Annual Growth in SA Exports: 2008 to 2014*
Base metals, silver or gold, clad w plat, nfw than semi-manufactured	0.0%	201.0%	32.0%	169.0%
Zinc ores and concentrates	0.1%	76.5%	5.5%	71.1%
Tungsten ores and concentrates	0.0%	68.6%	7.9%	60.8%
Ores and concentrates, nes	0.9%	89.5%	28.9%	60.6%
Articles of goldsmith's/silversmith's wares&pts	0.0%	38.0%	-0.3%	38.4%
Articles of natural or cultured pearls, prec/semi prec stones	0.0%	44.8%	15.8%	29.0%
Ash & residues containing metals of metallic compounds	0.0%	35.6%	6.7%	28.9%
Granulated slag from the manufacture of iron or steel	0.9%	27.4%	5.7%	21.7%
Aluminium ores and concentrates	0.0%	23.2%	4.7%	18.5%
Cobalt ores and concentrates	0.1%	2.2%	-9.3%	11.5%
Imitation jewellery	0.1%	18.6%	7.4%	11.3%
Iron ores & concentrates; including roasted iron pyrites	25.1%	18.8%	10.0%	8.8%
Chromium ores and concentrates	4.0%	2.7%	-3.9%	6.7%
Coin	0.0%	7.7%	1.9%	5.8%
Manganese ores and concentrates etc	6.1%	-2.4%	-4.5%	2.1%
Coal; briquettes, ovoids & similar solid fuels manufactured from coal	16.2%	1.5%	0.4%	1.1%
Molybdenum ores and concentrates	0.0%	-9.4%	-10.0%	0.6%
Waste & scrap of precious metal	1.1%	-3.3%	-3.5%	0.2%
Niobium, tantalum, vanadium or zirconium ores and concentrates	1.4%	7.0%	7.8%	-0.8%
Platinum, unwrought or in semi-manufactured forms	24.3%	-6.6%	-5.1%	-1.5%
Copper ores and concentrates	1.7%	4.5%	7.7%	-3.2%
Titanium ores and concentrates	2.2%	6.0%	9.5%	-3.5%
Diamonds, not mounted or set	9.0%	1.0%	4.8%	-3.8%
Slag, dross other than granulated slag	0.2%	-6.2%	3.0%	-9.2%
Base metals clad with silver, nfw than semi-manufactured	0.0%	-12.3%	3.7%	-16.0%
Articles of jewellery & parts thereof	0.2%	-0.4%	17.0%	-17.3%
Lead ores and concentrates	0.2%	-6.6%	13.5%	-20.1%
Gold unwrought or in semi-manuf forms	18.0%	-0.3%	20.0%	-20.3%
Syn/reconstr prec/semi-prec stones, not strg/mounted/set	0.0%	-11.2%	13.9%	-25.1%
Dust & powder of precious or semi-precious stones	0.0%	-24.7%	3.8%	-28.5%
Silver, unwrght or in semi-manuf. form	0.0%	-24.1%	6.5%	-30.6%
Precious metal ores and concentrates	0.6%	-20.4%	13.4%	-33.7%
Slag & ash nes, including seawood ash (kelp)	0.0%	-37.9%	-4.1%	-33.9%
Articles of precious metal or metal clad with precious metal, nes	0.0%	-23.4%	16.2%	-39.6%
Nickel ores and concentrates	0.0%	-37.6%	6.5%	-44.0%
Tin ores and concentrates	0.0%	-23.1%	21.8%	-44.8%
Base metals or silver, clad with gold, nfw than semi-manufactured	0.0%	-60.3%	-3.6%	-56.8%
Precious & semi-precious stone,not strug,	0.0%	-26.5%	31.0%	-57.5%
Pearls, nat or cult, etc	0.0%	-61.6%	5.5%	-67.1%

Source of basic data: ITC TradeMap using UNCTAD and COMTRADE data

** A positive value indicates that SA exports are growing faster than world exports and that SA is gaining global market share. A negative value indicates that SA exports are losing global market share.*

Annexure 4: Estimated shares of the total fixed capital stock of the mining sector by type of mineral mined

Type of Mineral/Activity	2006	2010	2014
Gold & Uranium Ore	48.5%	41.8%	37.1%
Coal & Lignite	19.1%	20.5%	21.1%
PGMs	11.6%	19.8%	17.0%
Iron Ore	0.5%	4.0%	10.5%
Other Metal Ores	2.5%	2.8%	4.3%
Manganese	0.8%	1.8%	2.9%
Crude Oil & Natural Gas	2.5%	2.2%	2.6%
Diamonds	3.3%	2.8%	1.5%
Chrome	5.9%	1.4%	0.8%
Other Stone	0.6%	0.7%	0.8%
Service activities related to mining	2.8%	0.6%	0.4%
Other Mining n.e.c	0.4%	0.3%	0.4%
Copper	0.5%	0.7%	0.3%
Limestone	0.1%	0.0%	0.0%
Chemical & Fertilizer Minerals	0.7%	0.6%	0.0%
Dimension Stone	0.1%	0.2%	0.0%
Salt	0.0%	0.0%	0.0%

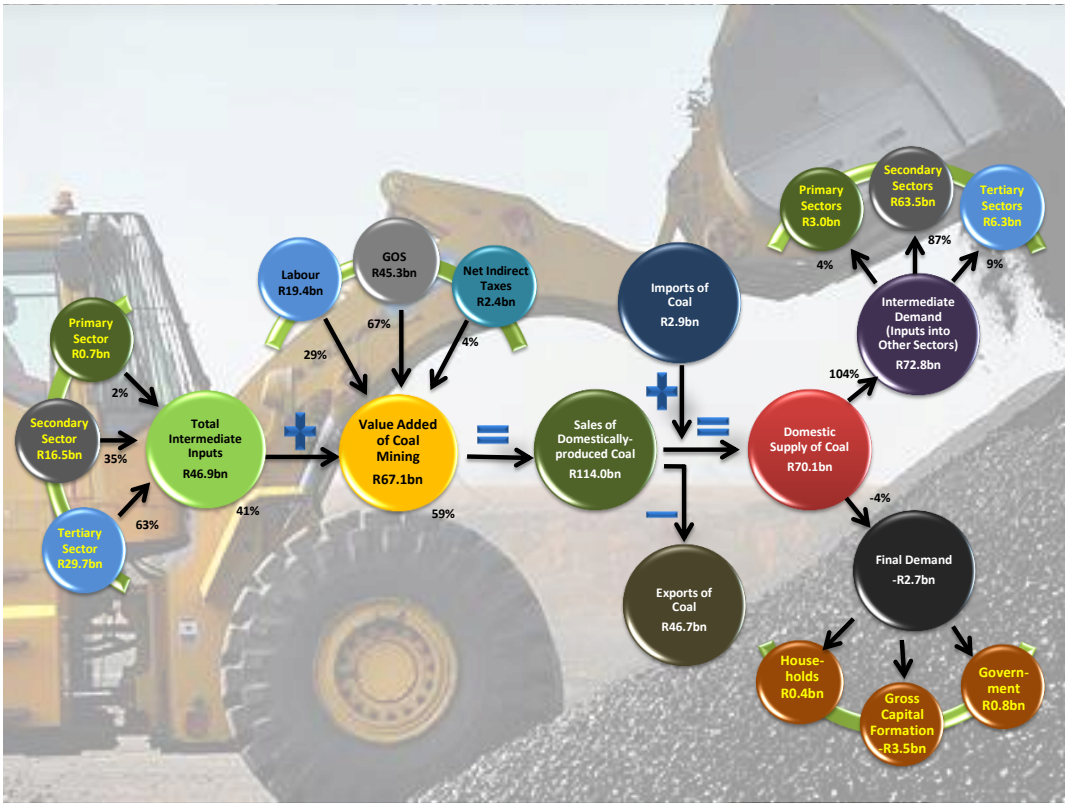
Source of basic data: Quantec Standardised Industry Database, StatsSA AFS data – various editions

Annexure 5: Return on assets by type of mineral mined

Type of Mineral/Activity	2008	2009	2010	2011	2012	2013
Mining of coal	11.2%	11.1%	4.6%	6.0%	8.6%	2.7%
Crude petroleum oils and natural gas	10.1%	10.1%	0.4%	6.4%	51.2%	5.9%
Mining of gold and uranium ore	1.7%	2.5%	-1.0%	2.9%	10.2%	4.0%
Mining of iron ore	33.8%	54.1%	28.2%	38.0%	25.5%	10.3%
Mining of chrome	15.8%	24.9%	8.1%	6.4%	4.2%	-2.2%
Mining of copper	25.9%	9.8%	3.1%	7.4%	4.9%	-0.2%
Mining of manganese	38.0%	38.7%	13.2%	8.0%	5.1%	2.7%
Mining of platinum group metals	22.2%	11.5%	3.9%	9.0%	6.2%	-3.4%
Other metal ore	15.6%	9.2%	3.3%	8.4%	5.8%	4.6%
Dimension stone	10.2%	0.9%	7.0%	-4.5%	-3.3%	-2.6%
Limestone and limeworks	26.0%	19.1%	35.6%	18.7%	13.3%	16.8%
Other stone quarrying	13.4%	6.8%	12.2%	7.6%	5.4%	5.2%
Mining of diamonds	17.1%	-0.5%	1.1%	8.1%	6.0%	5.0%
Mining of chemical and fertilizer minerals	24.0%	37.9%	-1.8%	6.1%	1.6%	12.4%
Extraction and evaporation of salt	9.0%	10.4%	-0.2%	10.8%	2.0%	8.8%
Other mining	12.8%	13.5%	-0.6%	23.4%	6.2%	-1.1%
Service activities	8.4%	5.0%	1.9%	5.2%	-7.7%	12.7%
Weighted average for all mining	**14.7%**	**11.6%**	**4.8%**	**9.3%**	**6.7%**	**2.7%**

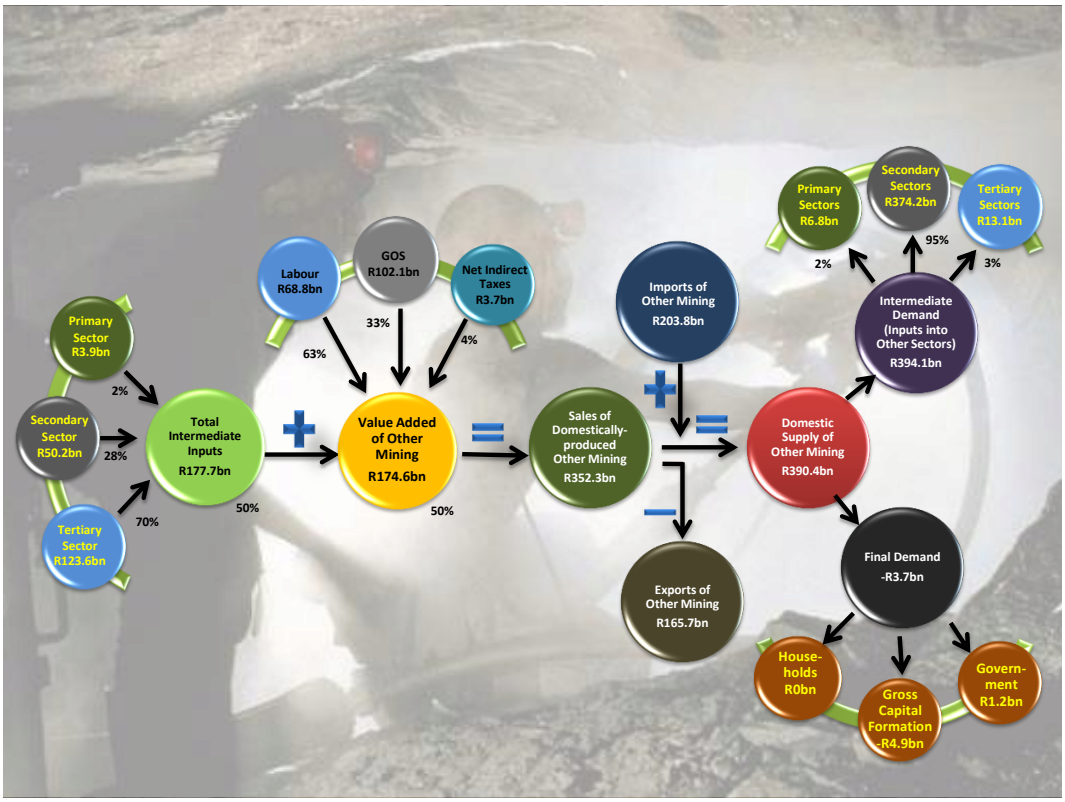
Source of basic data: StatsSA AFS data – various editions

Annexure 6: Estimated value chain for coal mining in 2014



Source of basic data: Quantec Standardised Industry Database

Annexure 7: Estimated value chain for other mining in 2014



Source of basic data: Quantec Standardised Industry Database

Annexure 8: Comparative World Bank Logistics Performance Index scores for major mining investment recipients - 2014

Country	Overall LPI		Customs		Infrastructure		Shipments		Logistics		Tracking		Timeliness	
	Rank	Score	Rank	Score	Rank	Score	Rank	Score	Rank	Score	Rank	Score	Rank	Score
Canada	12	3.86	20	3.61	10	4.05	23	3.46	10	3.94	8	3.97	11	4.18
Australia	16	3.81	9	3.85	12	4	18	3.52	17	3.75	16	3.81	26	4
South Africa	34	3.43	42	3.11	38	3.2	25	3.45	24	3.62	41	3.3	33	3.88
Chile	42	3.26	39	3.17	41	3.17	53	3.12	44	3.19	40	3.3	44	3.59
Russia	90	2.69	133	2.2	77	2.59	102	2.64	80	2.74	79	2.85	84	3.14

Source: World Bank Logistics Performance Index, 2014