

Capital intensity, employment and sustainability in the South African manufacturing sector

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Abstract

Large scale structural employment is South Africa's number one problem. The economy is also exceptionally energy and emission intensive. These attributes are exemplified in the manufacturing sector which is unusually capital and energy intensive compared to other, similar developing countries. At the same time, the sector's employment performance has been poor.

This paper examines the links between capital and energy intensity on the one hand and employment on the other. It does this by providing a detailed analysis of structural change in manufacturing over the last few decades, but especially since 1994. Sectoral changes and shifts in value added, capital intensity, export and import penetration are examined with manufacturing sub-sectors being divided into capital intensive, labour intensive and intermediate categories.

The share of capital-intensive, heavy industry in manufacturing value added (MVA) grew rapidly until 2000 but has since declined. Labour-intensive sectors such as metal products, textiles, garments and footwear showed significant declines in MVA share and employment over the period.

With regards to manufacturing export trends, exports have grown at over 6% per annum since 1990. Although the share of capital intensive manufactures in total manufactured exports grew from 32.4% in 1970 to 53.4% in 1990, since then this trend has been to some extent reversed with the capital intensive export sector declining in relative importance. The share of ultra labour-intensive sector exports has also declined, from 14.8% in 1995 to 10.7% in 2013. South Africa's exports remain more capital intensive than output and have continued to become relatively less labour demanding than gross output.

One of the most striking features of manufacturing development since democratization has been the huge rise in import share. The import penetration ratios (IPRs) for manufacturing as a whole

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increased from 16.8% in 1990 to 41.5% in 2012 with the largest expansion taking place in the ultra labour-intensive sector.

It is clear that South Africa's 'revealed' comparative advantage has been in relatively capital intensive, products including heavy industry. This is something of a paradox in an economy with massive unemployment and very high poverty rates compared to other upper middle income economies. Policy needs to shift South Africa's comparative advantage so that the country can compete more effectively in labour-demanding economic activities and move to a more labour absorbing growth path. Apart from addressing the employment problem, such a growth path would be far less emission and energy intensive.

1. Introduction

Large scale structural unemployment is South Africa's number one problem. At 26% the official unemployment rate is an extreme international outlier. The economy is also exceptionally energy and emission intensive. Primary energy consumption per unit of GDP is among the highest in the world and emissions per capita in 2008 were higher than in many rich countries (OECD, 2013). These attributes are exemplified in the manufacturing sector which is unusually capital and energy intensive compared to other, similar developing countries. At the same time, the sector's employment performance has been exceptionally poor.

This paper examines the links between capital and energy intensity on the one hand and employment on the other. The focus is on employment and we therefore adopt a broad definition of sustainability to incorporate political, economic and environmental sustainability.² Unemployment is the biggest threat to political and economic sustainability but we argue further that the capital intensive growth path that South Africa has been on for the past few decades is a factor underlying both low employment growth and high energy- and emission-intensity. Capital intensity is of course not the same as energy intensity but the two are strongly correlated. Heavy industries such as steel, aluminium smelting and basic chemicals are both highly capital-intensive and very energy-intensive.

Manufacturing's share of GDP has declined very rapidly since 1990 and manufacturing output has grown slowly compared to other upper middle income countries. There is also evidence that capital intensification has proceeded rapidly. Combined with relatively low output growth, the result has been that employment in manufacturing has fallen at a compound annual rate of 1.3% per annum from 1994-2011 (Zalk, 2014:348).

² This is in line with the World Commission on Environment and Development (1987), commonly known as the Brundtland Report.

Some context is important here. Manufacturing is not a direct creator of new jobs in middle income countries. Most upper middle income countries are losing employment in manufacturing and there is a decline in its share of GDP. There is evidence, moreover, that in developing countries deindustrialisation appears to have happened at an earlier stage or ‘prematurely’ (Dasgupta et al, 2006; Rodrik, 2015, Tregenna, 2009). Rodrik (2015) shows that the share of manufacturing in GDP in developing countries peaked at significantly lower income levels than was the case for the developed world. In many cases, these countries appear to be deindustrializing without having ever become fully industrialised.

One conventional explanation is that of rapid technological progress. Rodrik (2015) argues that this is a convincing explanation of the situation in the developed world because employment deindustrialisation has been much more pronounced than output deindustrialisation. But it is less convincing for developing countries given the relatively larger decline in output share in the latter.

Rodrik thus assigns much greater weight to globalisation and trade liberalisation as the drivers of premature deindustrialisation in the developing world. The demise of import substitution policies and globalisation have led to the retreat of manufacturing in countries lacking comparative advantage. Furthermore, developing countries have “imported” deindustrialisation because declining relative prices in the advanced countries have squeezed manufacturing in the rest of the world (Rodrik, 2015:4).

Moreover, South Africa’s manufacturing sector is unusually capital intensive compared to comparator countries. The importance of heavy industry is also a key contributor to the economy being so emission intensive. High and growing capital intensity is a particularly striking feature given the country’s extraordinarily high rates of unemployment. One argument may be that South Africa has adopted what Lin (2009) refers to as comparative advantage defying (CAD) strategies. Lin argues that many developing countries have failed to exploit comparative advantages such as unskilled labour but instead have encouraged production in sub-optimal capital intensive sectors. The outcome is reduced scope for employment creation and unsustainable firms and production sectors that cannot compete without government support (Lin, 2009). The adoption of comparative advantage following (CAF) strategies would encourage industries to make optimal usage of the country’s natural labour endowments and thus have the greatest potential to create employment. This will ensure the production sector operates at maximum competitiveness, yields the best possible returns and forms a stepping-stone in terms of moving the economy towards a more capital-intensive path. It also follows that countries pursuing CAF strategies would export goods from sectors within which they operate optimally, while importing goods only in sectors where they have no comparative advantage (Lin, 2009).

A number of studies have investigated these issues in the South African context. Levy (1992) points out for, example, that from 1961 to 1965, South Africa had 112% more capital per worker

in the manufacturing sector than Mexico, despite the two countries having similar characteristics in other aspects.

Kaplinsky (1995) rejected the neoclassical factor price distortion argument and instead concludes that the capital-intensive trend was due to 'the absence of investment in labour-intensive sectors'. For example, between 1972 and 1990, R251 million was invested in the four most labour-intensive sectors of the economy yet this amounted to the average amount of investment made in the basic chemicals sector in under three months (Kaplinsky, 1995).

Bell and Cattaneo (1997) investigated foreign trade-related effects on employment growth in manufacturing and found that South Africa's imports were more labour-intensive than exports. As exports and imports expanded with trade liberalisation, employment in manufacturing declined. From 1985 to 1993, labour-intensive industries experienced the highest increases in import penetration ratios. They concluded that paradoxically, the country's revealed comparative advantage is based in capital-intensive sectors.

Lewis (2001) found that the shift towards trade liberalization policies and the opening of South Africa's markets to international forces has led to a structural change in production towards capital-intensive sectors. He also attributes the lack of job creation in the manufacturing sector to the fact that South Africa's exports utilize more skilled unskilled than unskilled workers, and the fact that the greatest growth in exports took place in capital-intensive sub-sectors. Furthermore, he suggests that the failure to exploit 'comparatively abundant labour supplies' could be due to increasing real wages in South Africa's rigid labour markets (Lewis, 2001).

Alleyne and Subramanian (2001) also questioned 'the functioning of South Africa's labour market institutions' when they find that the country mostly exported capital intensive goods and that this phenomenon, rather than being reversed, actually increased from 1989 to 1997. They found that the more capital needed to produce a product, the higher the likelihood that South Africa will export that good (Alleyne and Subramanian, 2001).

Samson et al (2001) also argued that capital intensification contributed to 'jobless growth'. They found that South Africa's capital intensity levels are 'typical of industrialized economies with far lower unemployment rates.'

Apartheid era policy clearly played a major role. Not only was there a lack of attention paid to education and skills improvement, but there was direct and indirect state support for various forms of heavy, industrial development. More surprisingly, however, support for heavy industry in the form of cheap energy and other incentives continued post 1994. More labour intensive downstream sectors were further constrained by import parity pricing and the ongoing failure to develop a skilled industrial workforce (Black and Hasson, 2016).

A recent study by Cali and Hollweg, (2017) analyses the labour content of all exports, including mining, in order to explain the apparent phenomenon of 'jobless export growth'. They found

that from 2001 to 2010, the total number of jobs supported by South Africa's exports declined from 3.0 million to 2.9 million. This was in spite of the fact exports grew by 10.3 % annually over this period. They find that South Africa is one of the middle income countries in the sample with the least employment associated with exports. This arises from both growing capital intensity as well as a change in sector composition, for instance away from labour intensive manufacturing.

The purpose of this paper therefore is to examine the nexus of poor manufacturing performance, capital intensification and declining employment. Section two provides an overview of trade and industrial policy in South Africa. In section three, we assess the performance of manufacturing both in relation to other comparator countries and in terms of indicators such as output, trade and employment at the sector and sub-sector level. In particular we examine the issue of capital intensification and the relative performance of capital and labour intensive sectors. Section four then goes on to examine the reasons for poor performance by separately examining major subsectors within manufacturing. Section five concludes.

2. An overview of industrial and trade policy post 1994

During the apartheid era, there was quite rapid development of South Africa's manufacturing sector up until the early 1970s, driven by import substitution as well as the development of a 'mineral energy complex.' This expansion was based on the existence of raw materials coupled with state support including low priced energy. Another feature of the economy was a high degree of concentration with large swathes of manufacturing dominated by (mainly mining based) conglomerates. Levels of state ownership were quite high and included firms such as Iscor and Sasol whilst the state owned Industrial Development Corporation (IDC) played a central role in promoting the development of heavy industry. In addition, the state built a large armaments industry. However, the limitations of this development model were apparent by the early 1980s and government started to promote manufactured exports with some liberalisation of trade and the introduction of measures such as the General Export Incentive Scheme (GEIS).

The problem of slow industrial expansion was the subject of much debate at the time of the transition to democracy. World Bank analysts characterised the South African economy as a protected and distorted economy of the Latin American type, resulting from apartheid policies compounding an import substituting industrialisation strategy (Fallon and Pereira da Silva, 1994; Levy, 1992). The Bank argued that negative real interest rates and the nature of government investment support led to a bias towards capital intensity and recommended trade liberalisation and a reduction of distortions in factor markets (seen as mainly due to the state) to provide an enabling environment to stimulate exports (Fallon and Pereira da Silva, 1994).

A somewhat different perspective was offered by Fine and Rustomjee (1996) who argued that the dominance of the large scale mineral-based industry that comprised South Africa's 'minerals

energy complex’ should be the starting point for an understanding of industrial development and appropriate industrial policy.

Industrial policy post 1994 sought to promote a multiplicity of objectives, with international competitiveness as a central theme. While these objectives included support for non-mineral based sub-sectors and higher value added activities it was understood that mineral based manufacturing would remain important and should be supported by further beneficiation (Black and Roberts, 2009).

Some of the key events in the evolution of industrial and trade policy are indicated in Table 1. Trade liberalisation was an important element. Some liberalisation had already taken place by the early 1990s. This included a reduction in quantitative controls on imports, the beginnings of tariff reductions and significant privatisation. This liberalisation process accelerated after 1994. Average tariffs in 1990 were 28% and declined to 23% in 1994 and then to 8% by 2006 (Zalk, 2014). This was accompanied by the conclusion of two major free trade agreements with SADC (1994) and the EU (1999).

Table 1: A chronology and industrial and competition policy

1989	Board of Trade and Industry publishes ‘A Policy and Strategy for the Development and Structural Adjustment of Industry’ (outlines interventionist industrial strategy but is never fully adopted)
1991	Introduction of Section 37E of the Income Tax Act (accelerated depreciation for large scale export oriented projects) Introduction of Regional Industrial Development Programme (RIDP) (establishment grants and incentives for industrial expansion on a regional basis)
Early 1990s	Introduction of Support Programme of Industry Innovation (SPII) and Technology and Human Resources for Industry Programme (THRIP)
1994	South Africa joins SADC
1995	Introduction of Motor Industry Development Programme (MIDP)
1995-96	Establishment of small business support agencies: Centre for Small Business Promotion, Ntsika Enterprise Promotion Agency, Khula Enterprise Finance and the National Small Business Council
1995-98	Introduction of supply side incentives including Competitiveness Fund (aimed at encouraging competitiveness particularly by small, medium and micro enterprises); Short Term Export Finance Guarantee Facility (aimed at SMME exporters); Life Scheme (low interest financing to export oriented projects through the IDC); Duty Credit Scheme (temporary measure to promote exports by offering import rebate certificates to exporters of clothing and textiles); Sectoral Partnership Fund (to promote groups of firms to collaborate in addressing common problems); Workplace Challenge (to improve productivity by facilitating joint training of workers and managers)
1996	Cancellation of Regional Industrial Development Programme (RIDP) Tax holiday scheme introduced Spatial Development Initiatives (to coordinate public infrastructure provision with private sector investment on a regional basis)
1998	Competition Act introduced
1999	End of tax holiday scheme Establishment of new competition authorities

1999	Free trade agreement with EU
2002	Announcement of Integrated Manufacturing Strategy with emphasis on knowledge and technology Introduction of Strategic Investment Programme (SIP) and Critical Infrastructure Programme
2003	Introduction of Advanced Manufacturing Technology Strategy
2005	Introduction of the Developmental Electricity Pricing Programme (DEPP) Formation of Small Enterprise Development Agency (SEDA) via the merger of Ntsika and the National Manufacturing Advisory Centre Establishment of Apex Fund to support loans to micro-businesses
2007	Announcement of National Industrial Policy Framework and Action Plan
2010	Industrial Policy Action Plan 2010/11-2012/13 introduced
2011	Manufacturing Competitiveness Enhancement Programme (MCEP) established.
2011	Announcement of New Growth Path by Department of Economic Development
2012	National Development Plan introduced.
2012	Amendment of regulations under the Preferential Procurement Policy Framework Act (PPPFA) to allow for designation of specified industries for domestic procurement in public spending programmes
2012	Industrial Policy Action Plan 2010/11-2012/13
2015	Industrial Policy Action Plan 2015

Sources: Black and Roberts (2009); Zalk (2014); Department of Trade and Industry (2015)

To complement trade liberalisation, a range of measures to support small firms, as well as encourage investment, technological improvements and exports were introduced. These included sector specific adjustment programmes, investment incentives, ‘supply-side’ incentive programmes, subsidised infrastructure, support measures for skills development and technology, special loan facilities and support programmes for small firms. There were also efforts to encourage more ‘knowledge-intensive’ activities through the introduction, for example, of the *Advanced Manufacturing Technology Strategy* (NACI/DST, 2003).

While there was no shortage of industrial policy interventions and new programmes, the net impact is far from clear. Together with trade liberalisation, it was expected that these measures would counteract the apartheid government’s support for large-scale capital-intensive industries and address the legacy of poor productivity, whilst also facilitating the development of non-traditional manufactured exports (Hanival and Hirsch, 1998; Joffe et al., 1995). However, this has only happened to a limited degree. While the stated objective of policy has been to encourage higher value-added activities, labour-intensive activities and smaller firms, in practice the weight of support has been focused on larger scale capital-intensive activities.

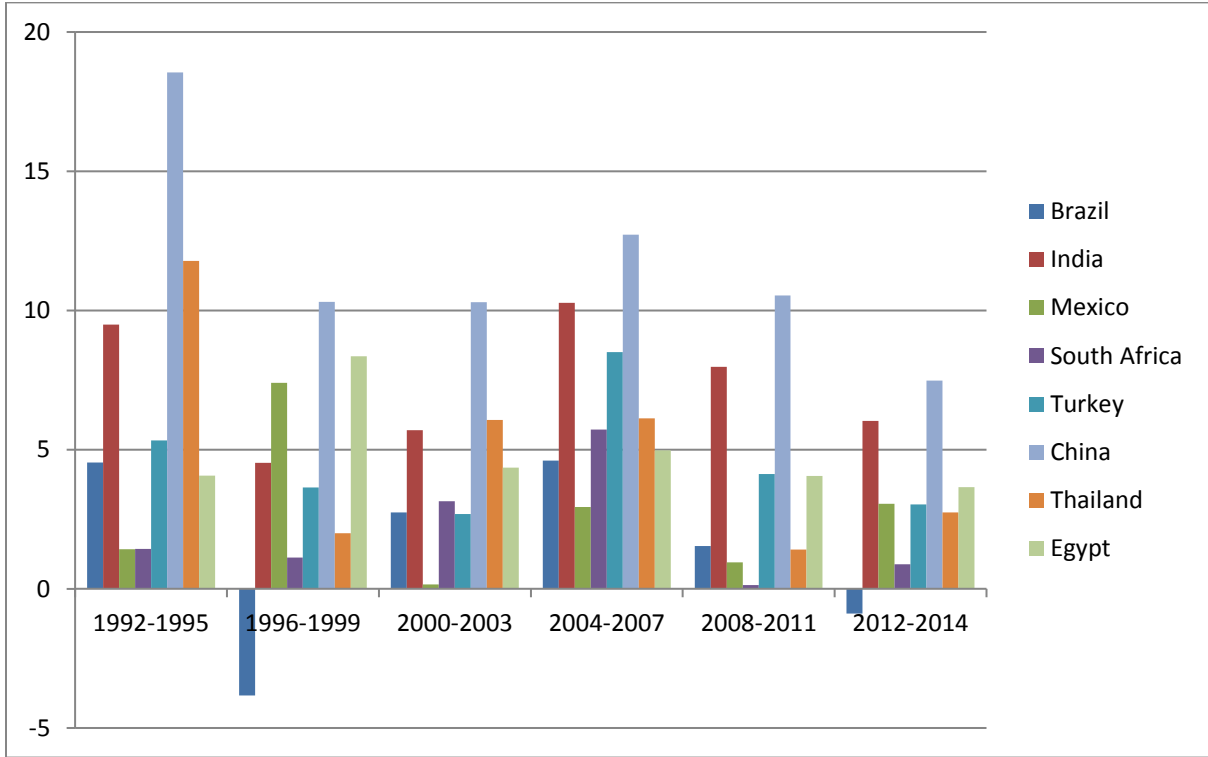
In 2007 the National Industrial Policy Framework, and Industrial Policy Action Plan (DTI, 2007) was introduced. According to Zalk (2014) this marked a break with previous more Washington Consensus aligned policies that had been in place since 1994. Industrial policy was now more targeted by sector and sought to stimulate diversified activities outside of resource-based industries, albeit with identification of a long list of priority sectors and activities. This policy direction was refined in a series of Industrial Policy Action Plans. New financing measures such as the Manufacturing Competitiveness Enhancement Programme (MCEP) were introduced. Tariff policy also became more targeted with the objective of reducing input prices. Another area

of focus has been around the opportunities for further localisation of government procurement. The 2012 Preferential Procurement Policy Framework Act allows for ‘designated’ products being procured by government to have a specified percentage locally produced.

The combined effect of all these measures has been somewhat ambiguous. There was substantial ongoing support for heavy industry especially in the early stages of the democratic transition. While downstream development and diversification featured heavily in policy statements the effect of policy has been less clear as indicated in the following section.

3. The performance of the manufacturing sector

Figure 1: Annual average manufacturing growth rates, selected countries, 1992-2014



Source: World Development Indicators

The performance of the South African manufacturing sector has been exceptionally poor since 1990. All comparator countries indicated in Figure 1 have performed better than South Africa. This includes upper middle income countries such as Brazil, Mexico and Turkey. It is, therefore, not surprising that manufacturing’s share of GDP has declined precipitously from 24% in 1990 to 13% in 2014.

Figure 2 shows the long term performance of output and employment in the manufacturing sector. Output has shown steady growth interrupted by the recession years of the 1980s and the global financial crisis. Growth was particularly rapid from 2000-2007 but employment, which peaked in the late 1990s, fell during much of this period.

Table 2 disaggregates growth trends of key indicators from 1970-2013. The most noticeable trend is the marked, continual decline in employment growth rates from 1970 to 2013. Exports have expanded but so have imports, which started from a larger base. The growth rate of imports tended to increase between 1970 and 2013, reflecting trade liberalization which started in the late 1980s. However, exports generally grew faster than gross output levels, as can be seen in the increase in the export-output ratio.

Figure 2: Manufacturing employment and real output

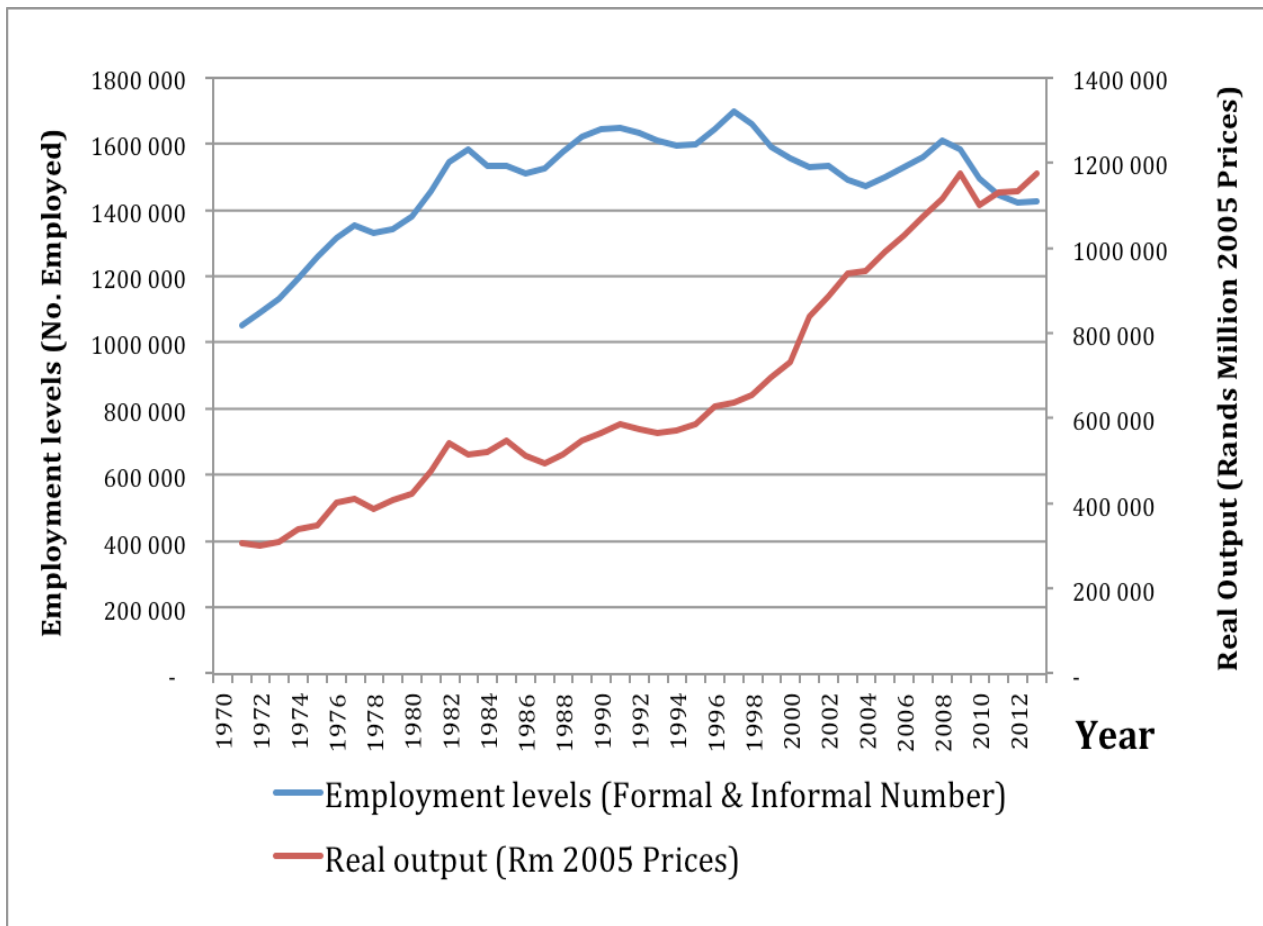


Table 2: Key Indicators in South African Manufacturing, 1970-2013

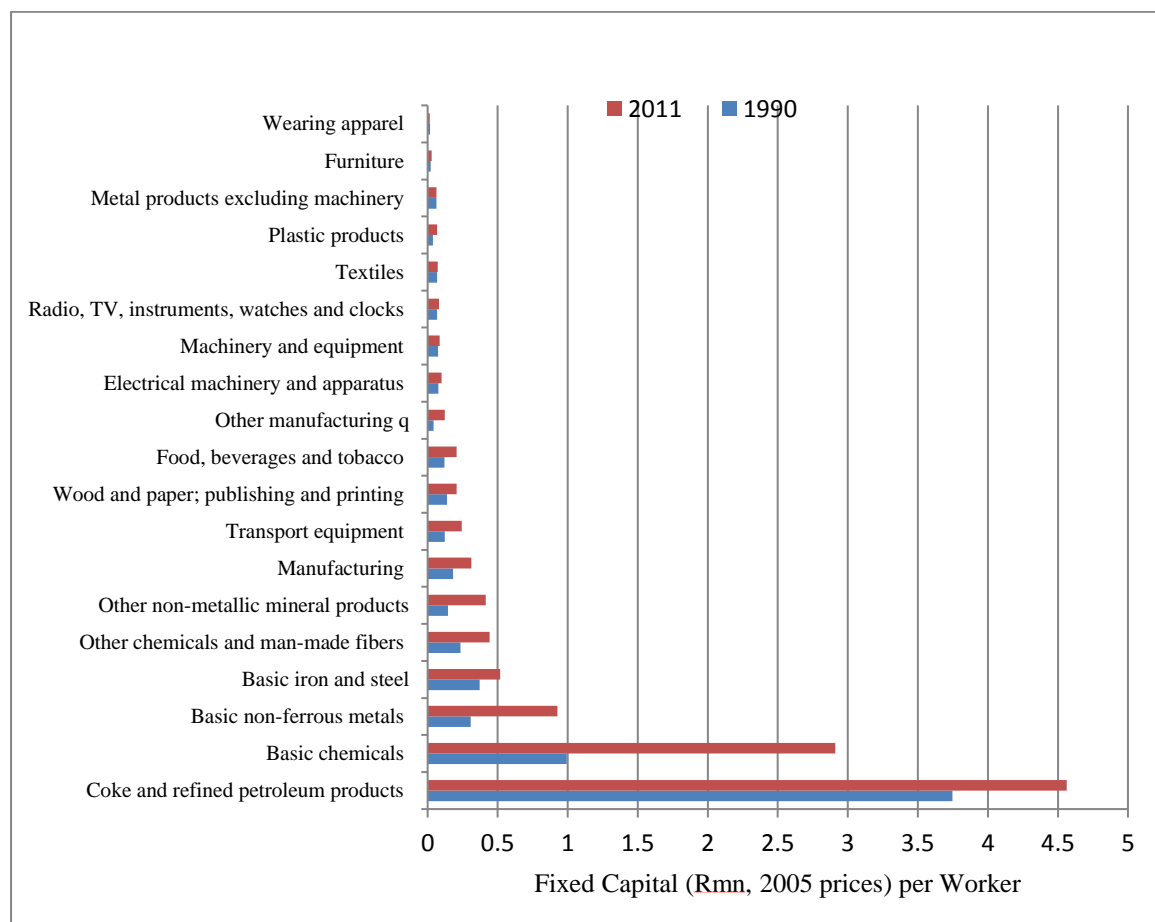
Average Annual Growth Rates (%)	1970-1974	1975-1979	1980-1984	1985-1989	1990-1994	1995-1999	2000-2004	2005-2009	2010-2013
<i>Employment</i>	4.6	1.5	1.8	0.4	-2.3	-1.7	-0.7	-1.5	-1.4
<i>Value-Added</i>	6.5	3.7	3.4	1.4	-1.5	2.2	3.5	2.1	2.9
<i>Gross Output</i>	3.5	4.1	5.5	0.8	0.7	4.6	6.3	2.3	1.2
<i>Exports</i>	9.7	3.2	-7.4	9.0	8.3	7.5	3.5	2.1	8.3
<i>Imports</i>	8.5	-5.8	4.6	0.7	4.7	5.5	6.7	6.0	9.0
Ratios (%)	1975	1980	1985	1990	1995	2000	2005	2010	2013
<i>Exports/Output</i>	16.9	16.9	13.5	15.3	23.2	22.6	22.9	21.7	26.1
<i>Imports/Output</i>	38.0	29.7	21.2	20.2	29.6	24.9	32.1	35.3	42.0

Source: Derived from Quantec data

Apart from the low growth mentioned above, there is considerable evidence that the South African manufacturing sector has been relatively capital intensive and that this has increased over time (Levy, 1992; Lewis, 2001; Pollin et al, 2006; Black and Roberts, 2009; Black and Hasson, 2016). This partly reflects the large share of heavy industry in South Africa but is also an outcome of the relative weakness of labour intensive manufacturing. It also reflects a degree of capital intensification within sectors.

Figure 3 demonstrates, there is a vast difference in capital per worker between the highly capital-intensive manufacturing sub-sectors such as petroleum products, basic metals, basic chemicals and labour-intensive sectors including apparel, metal products and textiles.

Figure 3: Capital intensity by industry in South Africa, 1990 and 2011

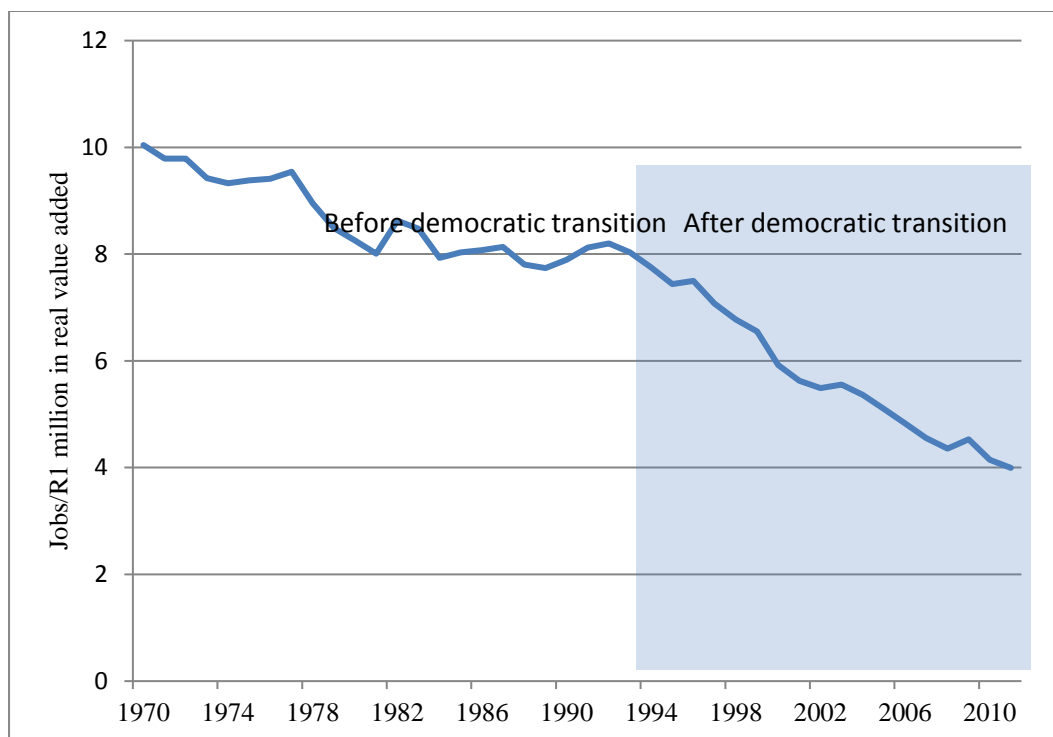


Source: Derived from Quantec data.

It is also clear that the amount of fixed capital per worker has increased significantly between 1990 and 2011. It is to be expected that as economic development proceeds, capital per worker will grow and there is likely also to be a shift out of labour-intensive manufacturing into more capital-intensive and higher technology sectors. But the pace of these changes in relation to growing output is important as it determines employment outcomes.

Figure 4 shows that the ratio of formal manufacturing employment to gross value added in South Africa has declined steadily and there appears to be a structural break in the early 1990s when the pace of decline accelerated. This is indicative of the trends mentioned above and also of more rapid economic expansion from the mid-1990s. Higher output per worker is clearly important but needs to be viewed within the more general context of high unemployment. A number of factors could be driving rapid productivity growth. These include rapid capital intensification, or shifts within sectors, for example, the rapid growth of capital intensive sectors and/or the relative decline of labour intensive sectors.

Figure 4: Ratio of formal employment to GVA for manufacturing, 1970-2011

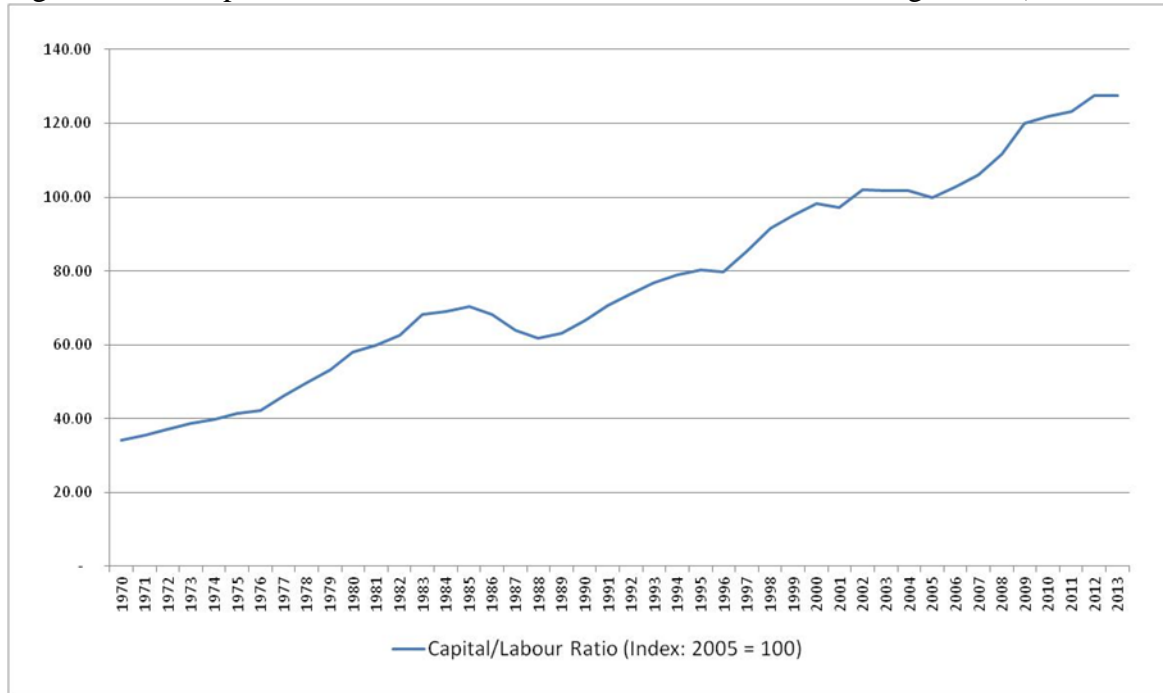


Source: Derived from Quantec data.

This trend is further illustrated in Figure 5, which highlights the clear increase in the capital-labour ratio of South Africa's manufacturing sector. With some interruptions, the capital labour ratio in the manufacturing sector has climbed consistently during the period 1970-2013.

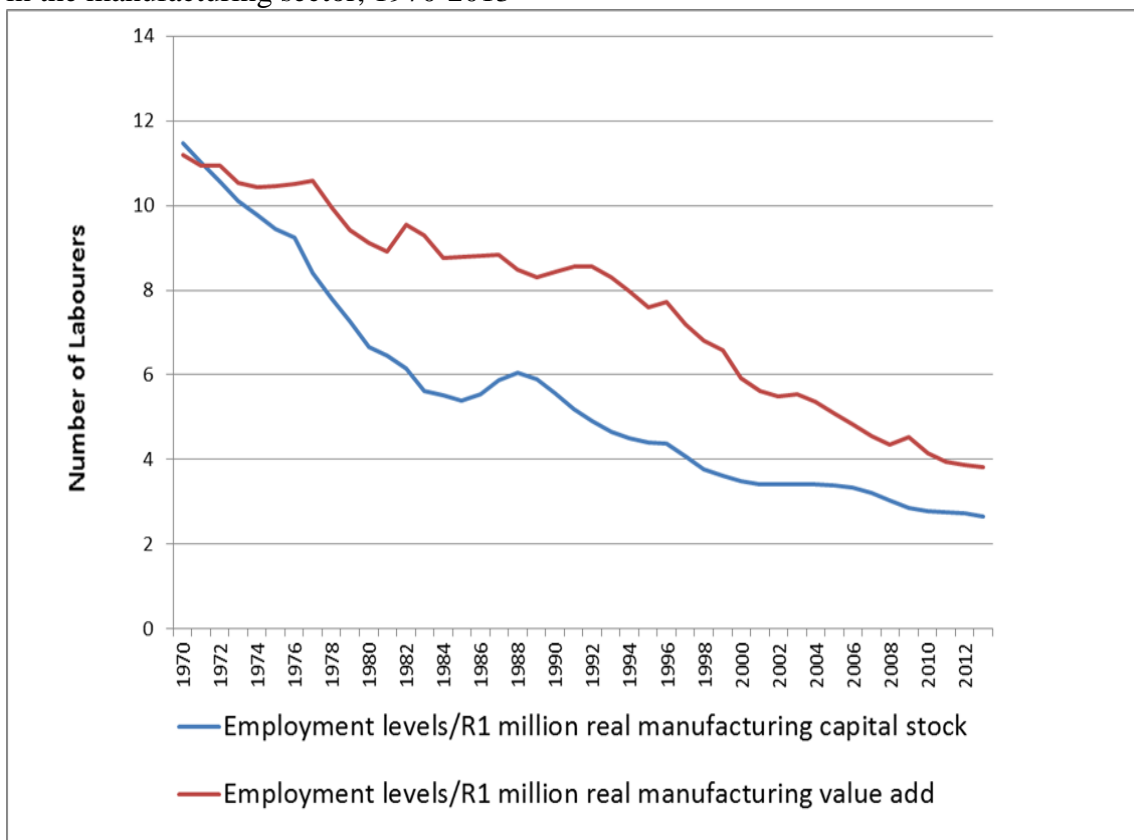
Furthermore, the ratio appears to have significantly increased from 2008 onwards and given the recession occurring at that time, it is likely that this increase can be attributed to a decline in employment levels, as opposed to rising capital investment levels. The same point can be illustrated by considering employment levels in relation to the real capital stock and real value added in manufacturing (Figure 6).

Figure 5: The Capital-Labour Ratio in the South African manufacturing sector (1970-2013)



Source: Derived from Quantec data

Figure 6: Formal employment levels per R1 million of real capital stock and real value added in the manufacturing sector, 1970-2013



Source: Derived from Quantec data

Changes at the sub-sector level

Important trends are apparent in the brief review of sector wide evidence above. But to better understand these trends, it is important to disaggregate by sub-sector. Manufacturing value added grew by over 3% per annum from 1994-2014 in only 8 sectors (**Error! Reference source not found.**). In no less than 16 sectors, growth over the period was less 2% per annum. Heavy industry generally did better with three out of the five heavy industry sectors growing at 3% or more. Light manufacturing performed poorly with the exception of leather.

Table 3: Compound annual average growth rate (CAGR) of manufacturing value added (MVA) and employment, by sub-sector, 1994 – 2014 and share in 2014

	MVA CAGR 1994 – 2014 (%)	Share 2014 (%)	Employment CAGR 1994 – 2014 (%)	Share 2014 (%)
All manufacturing	2.4		-1.2	
Coke and refined petroleum products*	6.6	9.7	2.7	2.4
Motor vehicles, parts and accessories	4.6	6.7	-1.2	7.7
Other chemicals and man-made fibres*	4.3	6.9	2.1	4.7
Basic iron and steel*	4.3	5.5	-2.4	2.9
Electrical machinery and apparatus	3.8	2.5	-1.0	3.7
Food	3.4	14.3	-1.6	14.9
Leather and leather products	3.4	0.3	-3.4	0.4
Basic Chemicals*	3.3	4.1	-1.4	2.1
Machinery and equipment	2.5	5.3	1.2	10.0
Plastic products	2.0	2.9	-0.2	3.5
Television, radio and communication equipment	2.8	1.1	-2.1	0.5
Wearing apparel	2.8	1.6	-3.5	4.0
Basic non-ferrous metals*	1.9	2.9	-1.9	1.8
Beverages	1.9	5.6	-1.2	3.2
Paper and paper products	1.7	2.9	0.8	3.5
Furniture	1.6	1.1	-2.3	2.4
Professional and scientific equipment	1.6	0.5	0.2	1.0
Other manufacturing	1.6	6.2	-2.2	3.1
Other transport equipment	1.2	1.2	-0.7	1.3
Metal products excluding machinery	1.2	5.4	-0.9	10.0
Glass and glass products	1.0	0.7	-3.1	0.8
Wood and wood products	0.9	2.3	-0.5	3.7
Printing, publishing and recorded media	0.9	3.4	0.4	4.6
Textiles	0.5	0.9	-3.6	2.5
Non-metallic minerals*	0.4	3.9	-3.9	3.7
Rubber products	-0.2	0.9	-3.7	1.0
Footwear	-1.3	0.43	-5.4	0.8
Tobacco	-7.3	0.8	-0.2	0.3

*Heavy industry and capital-intensive sectors

Source: Quantec RSA Standardised Industry Database

The combination of low growth and capital intensification has been disastrous for employment which declined at 1.2% per annum over the period with particularly severe declines in labour intensive sectors such as footwear, textiles and apparel. Even the fast growing leather sector saw a decline in employment.

Long term trends in the growth of value added are indicated in Table 4. The table uses Bell and Cattaneo's (1997) classification of sub-sectors into capital-intensive, intermediate capital-intensive, labour-intensive and ultra labour-intensive categories.

A number of trends are evident. The share of capital-intensive industry grew rapidly until 2000 but has since declined with a corresponding increase in the share of intermediate capital-intensive products, most notably vehicles and food. The latter is now by far the most important manufacturing sector. Among the labour-intensive sectors, metal products and textiles showed dramatic declines in MVA share over the period. The ultra labour-intensive category only accounted for 15.3% of MVA in 2013, down from 17.4% in 1995.

The growth of exports

Manufactured exports have grown at over 6% per annum since 1990. Disaggregating export growth by sub-sector indicates some significant shifts in the relative growth of exports between sectors (Table 5). Bell and Cattaneo (1997) attributed declining employment in manufacturing to the expansion of trade and the concomitant rapid growth of (capital intensive) heavy industry exports coupled with expanding (relatively labour-intensive) imports. For example, the share of capital-intensive manufactures in total manufactured exports grew from 32.4% in 1970 to 53.4% in 1990. Iron and steel basic industries alone accounted for 28.9% of manufactured exports in 1990. This trend has to some extent been reversed at least as far as capital-intensive exports are concerned with this sector declining in relative importance. In 2013 they accounted for 41.9% of exports with iron and steel basic industries, paper and non-ferrous metal, all recording sharp declines in export share.

The share of ultra labour-intensive sector exports has also declined, from 14.8% in 1995 to 10.7% in 2013. A striking feature is the collapse of clothing, textile and footwear exports. In 1995 this labour intensive cluster accounted for 5.7% of manufactured exports but this had declined to only 0.8% of the total in 2013. Figure 7 illustrates the sharply divergent growth of exports in two important sectors – basic chemicals, which is highly capital intensive and clothing, which is very labour intensive. Intermediate capital intensive industries increased in importance significantly over the period. This was mainly due to motor vehicles and parts which increased their share of total exports from 4.4% to 14.8%.

Although heavy industry exports have become less dominant, exports are more capital intensive than output in general and have continued to become relatively less labour demanding than gross output. In 1970, export production of a unit of output required 96.9% of the labour required for output in general. In 1990 this had dropped to 86.2% and by 2012 was only 76.9% (Craig, 2013).

Table 4: Manufacturing value added by factor-intensity, 1970-2013 (%) Source: Quantec

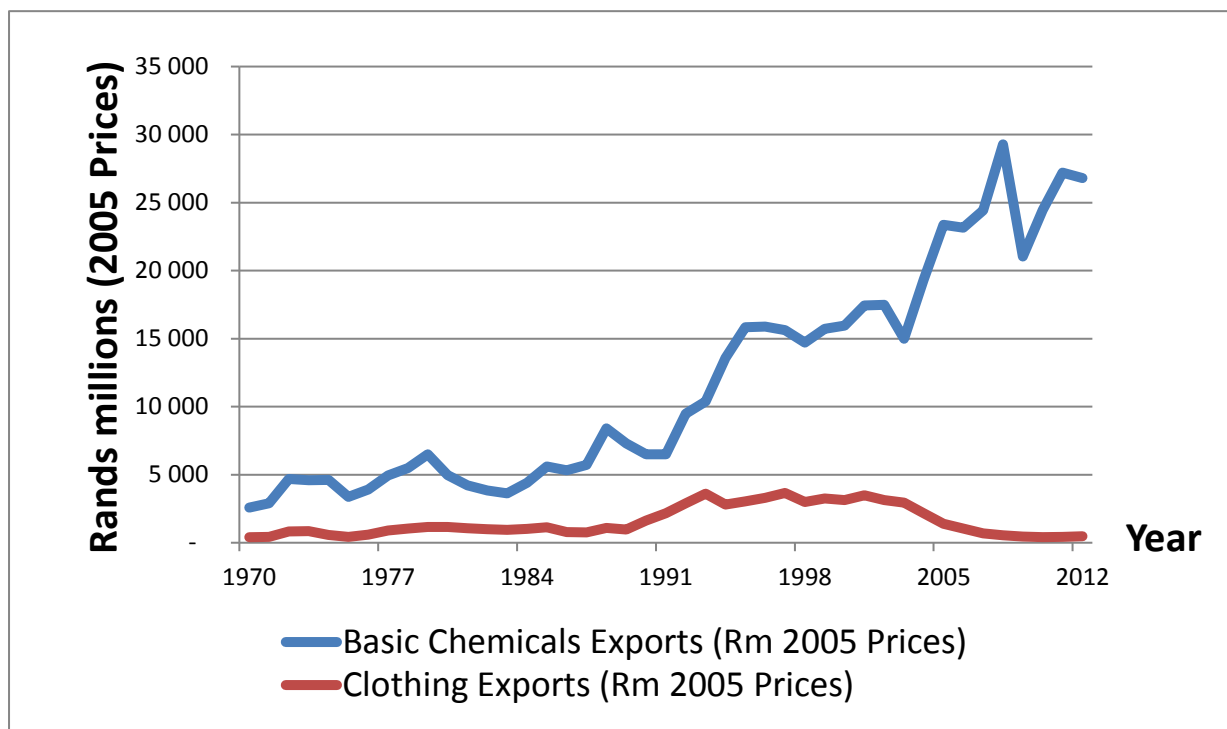
Manufacturing Sub-sector	1970	1975	1980	1985	1990	1995	2000	2005	2010	2013
<i>Capital-Intensive</i>	19.94	21.36	22.19	24.34	26.78	27.84	30.25	29.00	26.56	26.28
Chemical Products	2.95	2.65	3.06	4.06	4.63	4.89	6.51	5.89	6.80	5.76
Iron and Steel basic industries	6.15	7.28	6.13	4.85	4.96	5.12	5.00	7.24	6.12	6.47
Paper and paper products	3.45	3.20	3.45	4.05	3.94	4.44	4.33	4.41	4.15	4.05
Beverages	6.11	6.32	7.61	8.99	10.83	9.96	9.38	6.95	6.27	6.39
Non-ferrous metal basic industries	1.28	1.90	1.94	2.40	2.41	3.43	5.03	4.50	3.23	3.61
<i>Intermediate-Capital-Intensive</i>	34.86	33.82	32.59	31.47	29.87	29.50	28.14	30.83	31.99	32.61
Glass and glass products	0.68	0.70	0.64	0.66	0.71	0.95	0.74	0.96	0.92	0.84
Other non-metallic mineral products	7.87	7.17	6.34	5.82	5.79	5.91	4.63	4.53	3.99	4.15
Tobacco products	2.12	1.44	1.44	2.53	1.49	1.11	1.22	0.87	0.75	0.76
Other transport equipment	6.30	4.59	5.35	3.82	2.45	1.29	0.74	1.45	1.24	1.28
Motor Vehicles and parts	6.53	7.81	7.34	6.76	7.74	7.56	8.72	9.40	10.00	10.78
Rubber Products	1.50	1.17	1.33	1.30	1.30	1.30	1.42	1.20	0.81	0.72
Food	9.87	10.94	10.15	10.59	10.40	11.38	10.67	12.42	14.29	14.09
<i>Labour-Intensive</i>	32.54	32.46	34.03	31.81	26.03	25.26	24.67	24.25	25.33	25.84
Electrical machinery	1.69	2.58	2.89	2.65	2.67	2.92	3.31	3.16	3.54	3.61
Machinery	8.30	8.33	8.71	8.34	6.05	5.49	4.84	5.56	7.21	7.15
Printing and Publishing	5.79	4.57	4.71	5.16	4.27	4.28	4.28	3.16	3.46	3.62
Metal Products	12.09	12.46	12.14	10.39	7.94	7.05	6.57	6.67	5.99	6.27
Plastic Products	1.00	1.17	1.79	1.94	2.59	3.43	3.94	3.97	3.16	3.25
Textiles	3.67	3.35	3.79	3.34	2.50	2.09	1.74	1.73	1.97	1.95
<i>Ultra-labour-intensive</i>	12.66	12.35	11.19	12.37	17.33	17.40	16.94	15.93	16.12	15.27
Wood and wood products	3.39	3.31	3.05	2.96	2.78	3.30	3.31	2.94	2.55	2.75
Other manufacturing industries	4.80	4.58	3.83	4.89	10.35	9.29	9.19	8.45	8.49	7.78
Leather products	0.29	0.30	0.22	0.22	0.20	0.24	0.26	0.38	0.25	0.27
Furniture	0.53	0.57	0.61	0.64	0.59	0.75	1.07	1.41	1.45	1.31
Footwear	1.37	1.44	1.13	1.14	1.00	0.90	0.65	0.60	0.74	0.81
Clothing	2.28	2.16	2.36	2.51	2.41	2.91	2.46	2.14	2.65	2.35
TOTAL	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00

Table 5: Composition of manufactured exports by factor intensity

Manufacturing Sub-sector	1970	1975	1980	1985	1990	1995	2000	2005	2010	2013
<i>Capital-Intensive</i>	32.44	36.75	45.07	51.75	53.40	51.29	46.03	46.28	43.95	41.88
Chemical Products	6.43	7.30	9.71	9.32	8.85	13.12	11.66	11.03	11.95	12.29
Iron and Steel basic industries	16.52	17.68	23.33	26.42	28.89	21.50	19.38	22.49	20.80	18.08
Paper and paper products	4.11	3.90	3.02	4.56	5.18	8.05	4.88	3.10	2.91	2.78
Beverages	0.32	0.32	0.37	0.28	1.06	2.16	2.32	2.51	3.05	3.37
Non-ferrous metal basic industries	5.07	7.56	8.63	11.17	9.43	6.47	7.79	7.15	5.25	5.37
<i>Intermediate-Capital-Intensive</i>	32.28	34.36	24.78	21.40	18.83	16.01	23.53	26.60	27.51	28.01
Glass and glass products	0.57	0.44	0.60	0.43	0.48	0.32	0.37	0.34	0.34	0.36
Other non-metallic mineral products	7.98	8.11	3.47	2.06	1.34	1.72	1.34	1.37	1.00	1.08
Tobacco products	0.02	0.03	0.02	0.01	0.05	0.22	0.39	0.40	0.45	0.37
Other transport equipment	0.70	0.90	0.77	0.67	2.48	0.72	1.08	1.06	0.81	1.11
Motor Vehicles and parts	8.24	6.90	7.98	9.29	6.50	4.43	13.04	17.52	18.99	17.79
Rubber Products	0.28	0.19	0.25	0.16	0.34	0.85	1.05	0.93	0.70	0.82
Food	14.49	17.80	11.69	8.77	7.65	7.74	6.25	4.98	5.21	6.48
<i>Labour-Intensive</i>	20.63	17.62	15.51	14.34	13.96	17.94	16.98	17.18	18.24	19.42
Electrical machinery	0.87	1.36	1.48	0.78	1.66	2.10	1.85	1.51	1.62	1.88
Machinery	10.95	9.44	6.11	4.37	4.71	8.82	9.11	10.41	11.32	11.76
Printing and Publishing	0.50	0.18	0.24	0.19	0.11	0.27	0.32	0.51	0.27	0.24
Metal Products	2.40	2.17	1.97	1.77	3.62	3.21	3.29	2.81	3.50	3.90
Plastic Products	0.51	0.24	0.17	0.17	0.36	0.82	0.71	0.89	0.92	1.17
Textiles	5.40	4.23	5.54	7.06	3.49	2.72	1.70	1.05	0.61	0.47
<i>Ultra-labour-intensive</i>	14.64	11.27	14.64	12.51	13.81	14.76	13.47	9.95	10.30	10.69
Wood and wood products	0.43	0.51	2.01	1.90	1.48	2.45	2.42	1.96	0.97	0.90
Other manufacturing industries	11.07	8.11	6.88	6.84	8.52	5.60	5.55	4.47	7.00	8.17
Leather products	0.32	0.53	0.76	0.89	0.69	0.99	0.92	0.88	0.57	0.67
Furniture	0.07	0.03	0.44	0.24	0.66	2.70	2.22	1.93	1.46	0.67
Footwear	1.73	1.19	2.56	0.84	0.33	0.59	0.18	0.06	0.09	0.05
Clothing	1.02	0.89	2.00	1.80	2.12	2.43	2.17	0.66	0.21	0.23
TOTAL	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00

Source: Derived from Quantec data

Figure 7: Basic chemicals and clothing exports, 1970-2012



Source: Derived from Quantec data

Import penetration ratios in the manufacturing sector

Perhaps the most striking feature of manufacturing development since democratization has been the huge rise in import share. Table 6 presents import penetration ratios (IPRs)³ within manufacturing sub-sectors. Despite remaining constant from 1970 to 1985, the IPR for manufacturing as a whole increased from 16.8% in 1990 to 41.5% in 2012. Trade liberalization clearly played the major role. The largest expansion took place in the ultra labour-intensive sector, which saw its IPR rise from just 6.3% in 1990 to 31.2% in 2012. Imports of clothing increased from 6.1% of domestic demand to 41.5% over the period. All sub-sectors in this category experienced significant growth in import share. The share of imports in labour intensive sectors doubled to account for 48.4% of domestic demand.

Import penetration also increased very rapidly in the intermediate-capital-intensive sectors especially in large sectors such as motor vehicles and parts which account for a substantial part of the import bill. By 2012, imports accounted for 60.8% of domestic demand in the sector. The net result has been growing import penetration with especially rapid increases in the labour intensive categories which account significantly for declining employment.

³ Import penetration ratios are defined as the ratio of imports to domestic demand.

Table 6: Import penetration ratios in South African manufacturing sub-sectors (%). Source: Derived from Quantec data

Manufacturing Sub-sector	1970	1975	1980	1985	1990	1995	2000	2005	2010	2012
<i>Capital-Intensive</i>	17,3	18,6	14,7	14,5	12,9	19,9	19,9	20,3	23,4	28,1
Chemical Products	35,7	35,9	33,9	34,6	31,1	49,2	31,9	34,8	37,7	46,4
Iron and Steel basic industries	12,7	23,6	6,9	7,9	10,7	13,7	10,7	16,4	21,0	28,4
Paper and paper products	19,3	16,4	17,2	14,5	11,4	16,5	11,5	11,0	14,8	16,4
Beverages	3,3	4,1	3,9	4,5	4,1	3,8	4,0	4,9	6,8	8,2
Non-ferrous metal basic industries	27,8	14,6	16,6	19,9	18,3	25,6	38,5	34,8	46,0	53,7
<i>Intermediate-Capital-Intensive</i>	21,5	20,3	23,2	21,7	16,8	21,8	25,7	32,5	36,8	44,2
Glass and glass products	21,6	21,4	21,3	19,1	14,0	18,9	25,2	19,4	21,2	22,1
Other non-metallic mineral products	11,2	16,2	9,2	10,3	9,4	13,5	20,1	16,4	17,4	19,0
Tobacco products	4,8	3,0	1,7	3,0	2,0	1,7	0,9	2,2	3,6	3,9
Other transport equipment	36,5	36,7	37,5	41,9	28,3	32,2	34,8	44,3	50,8	61,4
Motor Vehicles and parts	38,7	23,6	40,0	42,8	29,2	29,9	30,3	41,6	49,9	60,8
Rubber Products	14,2	13,8	12,9	15,2	15,8	23,4	25,6	33,8	39,2	47,4
Food	7,1	7,5	4,4	7,1	4,8	9,0	8,8	9,1	12,7	16,2
<i>Labour-Intensive</i>	22,5	23,4	22,2	21,6	24,8	33,9	32,6	38,7	41,1	48,4
Electrical machinery	24,6	24,5	26,5	27,5	25,5	34,4	25,2	29,8	38,6	45,1
Machinery	49,0	47,6	47,1	44,4	46,6	61,7	66,4	75,5	75,5	86,2
Printing and Publishing	8,0	8,3	8,1	9,6	9,2	14,2	13,4	15,7	6,7	7,2
Metal Products	7,3	7,2	7,4	7,8	7,8	10,0	11,4	13,9	17,4	18,9
Plastic Products	8,1	9,7	8,3	11,0	9,7	13,2	14,0	15,9	23,3	27,9
Textiles	25,0	21,2	16,8	17,9	20,3	24,4	23,8	26,5	28,4	34,2
<i>Ultra-labour-intensive</i>	16,9	10,3	10,1	9,5	6,3	10,9	15,6	21,4	25,4	31,2
Wood and wood products	13,9	11,2	9,3	6,5	8,3	11,9	11,4	12,4	8,2	10,0
Other manufacturing industries	9,6	9,6	11,6	12,1	5,8	8,9	13,4	14,7	19,9	33,1
Leather products	26,1	19,5	22,4	19,7	21,7	36,4	35,3	32,9	38,9	44,6
Furniture	3,1	3,7	3,2	3,8	3,0	7,0	12,4	24,1	23,9	23,8
Footwear	10,0	12,7	11,5	12,8	4,5	21,7	32,0	39,9	45,4	52,8
Clothing	16,2	11,0	8,8	7,8	6,1	7,3	14,8	31,9	39,4	45,5
TOTAL	20,0	20,1	20,0	19,0	16,8	23,4	25,0	30,7	34,4	41,5

4. Explaining poor manufacturing performance

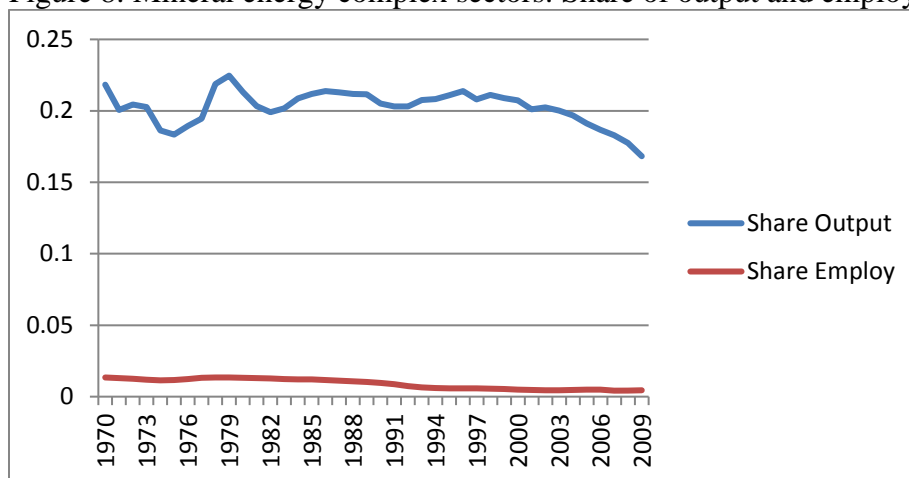
As we have indicated above, the manufacturing sector has performed poorly in terms of contribution to GDP, export expansion and competing with imports. The result has been highly negative for employment. What explains this decline? There are a number of possible causal factors, many of which are interrelated. Clearly, overall economic performance has been quite weak and manufacturing has contributed to this. But this does not explain the weakness of manufacturing relative to other sectors. One explanatory factor could be skill biased technical change. In turn this could be a function of increasing capital intensification within sectors or a shift to more capital intensive sectors. But investment rates have not been particularly high in manufacturing. Another explanation is globalisation and import liberalisation. Import penetration in the economy has increased hugely and this certainly helps explain the poor performance of labour intensive manufacturing, in particular. Export growth in manufacturing on the other hand has been unimpressive and has become less employment intensive so the economy has been unable to take advantage of the supposed benefits of globalisation. These various explanations are considered in more detail below.

It is certainly the case that the dynamics of manufacturing differ fundamentally across the sector. It is obvious, for example, that steel faces different challenges to the garment sector. Rising electricity prices are negative for all firms but clearly fall most heavily on energy intensive sectors. Equally, the cost of semi-skilled labour is more of a problem for light manufacturing. In the sections which follow, we have divided manufacturing sub-sectors according to level of capital intensity – heavy industry, light manufacturing and a mid-range group mainly comprising the automotive industry and sectors such as food.

The rise....and fall of heavy industry

Bell and Cattaneo (1997) argued that in the period up to the early 1990s, South Africa's exports were highly capital intensive and became more so. As Table 5 shows the share of capital intensive manufactures in total exports increased from 27.9% in 1970 to 49.4 % by 1990. But this trend has not continued and since the mid 1990s, their share of exports has declined reaching 41.9% in 2013. The capital intensive manufactured export sector contains many of the heavy industries which make up the MEC. The more recent relative weakness of the MEC is also evident in Figure 8 which illustrates the relative decline since the mid 1990s in mining and associated heavy industries. This is in spite of the fact that heavy industry continued to receive quite significant government support (Black and Hasson, 2016). But the mining sector failed to take advantage of the commodities boom and has performed poorly over the past two decades. Since 2008, electricity constraints have placed a brake on heavy industry and led to the abandonment of a number of major proposed investments in the sector.

Figure 8: Mineral energy complex sectors: Share of output and employment



Note: The MEC has been defined to include the following sectors:
A1121: Coal mining [21] A1122: Gold and uranium ore mining [23]
A1123: Other mining [22/24/25/29]
A12131: Coke and refined petroleum products [331-3]
A12132: Basic chemicals [334]
A12133: Other chemicals and man-made fibers [335-6]
A12134: Rubber products [337]
A12135: Plastic products [338]
A12141: Glass and glass products [341]
A12142: Non-metallic minerals [342]
A12151: Basic iron and steel [351]
A12152: Basic non-ferrous metals [352]
A1221: Electricity, gas and steam [41]

Given the profile of manufactured exports, one could easily conclude that South Africa's revealed comparative advantage indicates that we cannot compete in more labour demanding sectors. This would obviously have very negative employment implications and is problematic because our revealed comparative advantage has been fundamentally distorted in two main ways.

Firstly, the market power of large upstream producers in sectors such as steel and chemicals has profoundly disadvantaged more labour intensive downstream production (Roberts and Rustomjee, 2009). Downstream development in sectors such as steel and chemicals has been hindered by the market power of large, upstream producers such as Iscor (now Arcelor-Mittal) and Sasol. The lack of competition has enabled them to use import parity pricing, meaning that local fabricators of metal and plastic products have derived no advantage from low domestic production costs of key inputs such as steel, aluminium and basic chemicals.

Secondly, while the rapid development of heavy industry partly reflects South Africa's rich mineral endowment, it has benefited enormously from very substantial direct and indirect state support. The growth of resource-based manufacturing sectors has been on the back of cheap (coal-based) energy and government support. For example, aluminium production is based entirely on low priced electricity to process imported bauxite. Cheap electricity has been a

function not just of abundant coal resources, but also the extraordinary electricity pricing policy. Heavy over investment in electricity capacity in the 1970s and early 1980s by Eskom, led government to set extremely low tariffs to attract huge investments in a series of metal processing plants. And with capacity running out, agreements were still being reached in 2007 with Alcan for an aluminium smelter at Coega, reportedly at an electricity price around US\$0.02/kWh or R0.14, compared with average prices of R0.18 for other industrial users and R0.45 for households (Black and Roberts, 2009). In addition, the smelter investment was in line for multi billion rand investment and tax allowances before the severe constraints on South Africa's generation capacity led to its cancellation in late 2009. This R21 billion greenfield investment would have employed just 800 people, with the output expected to be almost entirely exported in primary form.

There has been public outrage at the disclosure of Eskom's preferential pricing arrangements with other large, energy intensive industries, such as BHP Billiton's aluminium smelters. The long history of artificially low electricity prices has led the economy to its current predicament: where electricity supply is inadequate and prices are rising sharply as Eskom battles to fund massive expansion in new capacity. In 2008, electricity prices increased by 27.5% followed by similar size increases for the next four years. But in 2011 they still remained the lowest for industrial users among the 35 OECD and other countries surveyed as part of an OECD study (OECD, 2013).

While the clearly stated objective of industrial policy is to restructure the economy to promote growth and jobs, some of the very substantial support programmes provided by government have reinforced rather than altered the industrial development path. An accelerated depreciation allowance under the 37E incentive was given to major resource-based projects in the 1990s such as Columbus Stainless Steel and Saldanha Steel. The Strategic Industrial Projects (SIP) programme provided tax relief equivalent to R7.7bn from 2002 to 2005 for large capital-intensive projects, mostly in sectors such as steel, ferroalloys, aluminium and basic chemicals (Black and Roberts, 2009).

Another related dti initiative has been the funding of mega projects (defined as more than R1 billion) and industrial development zones. State support for such projects is multifaceted including infrastructure support, industrial subsidies, cheap land and water as well as preferential electricity tariffs. These developments have generally been aimed at large scale capital-intensive and energy-intensive projects such as Saldanha Steel. The Coega Industrial Development Zone in the Eastern Cape, is perhaps the most controversial because of its huge scale and underutilised capacity.

Further direct state support for heavy industry has been provided by the state owned Industrial Development Corporation (IDC), which plays an important role in influencing economic growth in accordance with government's strategic objectives. The IDC supports firms by providing equity finance and loans, frequently at concessional rates. Historically, it has funded large-scale

mineral beneficiation projects and has been closely associated with the parastatals as well as with the large private sector conglomerates. The IDC has only more recently increased the emphasis on labour-intensive sectors such as tourism, agriculture and smaller scale enterprises (Black and Hasson, 2016). But it is also a partner with China's Hebei Iron and Steel Company in a proposed new \$5bn steel mill. This is in spite of the fact that global over supply of steel has recently forced South Africa to raise tariffs on steel imports to 10%.

So South Africa's historical 'revealed comparative advantage' in heavy industry is, in part, the outcome of its distorted pattern of development. Powerful interests have coalesced around this capital- and energy-intensive growth path. Naturally these interests are opposed to any reduction in this support. While industrial policy has sought to shift industrial development onto a different trajectory, this has proved extraordinarily difficult and has met with limited success. The bias in favour of heavy industry has been damaging, not only for employment but also for growth.

Intermediate capital intensive sectors: The automotive industry

Motor vehicles and parts accounted for 6.7% of manufacturing value added in 2014 and since 1994 have been one of the faster growing manufacturing sectors with a CAGR of 4.6% from 1994-2014 (**Error! Reference source not found.**). The sector has also experienced the most rapid increase in export share and increased their share of manufactured exports from 4.3% in 1995 to 17.8% in 2013. But this is more a story of rapid international integration than developing competitiveness. Exports have risen rapidly but so have imports and South Africa remains a net importer of automotive products.

In comparing the South African and Thai automotive industries, Barnes et al (2017) argue that while exports have expanded rapidly from both countries, global integration appears to have been less favourable for the South African automotive industry. Imports of vehicles and components into South Africa have increased rapidly and supplier development has been quite limited. Rapid market liberalisation may not only limit market seeking FDI, but also lock out localisation opportunities, thereby ensuring that the creation of efficiency seeking investments that complement market seeking FDI opportunities are stymied. South Africa's high input costs into manufacturing, particularly for skilled labour (artisans, technicians and managers), is potentially crippling to its competitiveness. Since 1994, what can generously be described as the 'false start' in the rehabilitation of black education and artisanal training has continued to militate against competitiveness in more labour demanding sectors. A striking feature about the labour market in South Africa is not so much that wages of production workers are higher than competitors (although in many cases they are), but the exorbitant costs of managers and skilled staff. Based on detailed international survey data in manufacturing and some service sectors, a 2007 World Bank study found that unskilled workers in South Africa earned slightly less than in Poland but somewhat more than in Brazil (Clarke et al, 2007). However, managers' wages were 2.5 and 3 times higher than in Poland and Brazil respectively, and wages of professional and skilled employees in South Africa were also much higher than in the other two countries. A

benchmarking study of the Thai and South African automotive industries came to similar conclusions. It found that the ratio of production workers wages in South Africa compared to Thailand's was nearly three to one, for professionals 6:1 and for artisans an incredible 12:1 (Barnes et al, 2015). Other costs are also higher in South Africa. Port charges, a critical factor in the trade intensive auto industry, are notoriously high. Electricity used to be very cheap in South Africa but charges are rising rapidly.

An unfavourable geographic position, mediocre economic growth, the failure to develop a low cost manufacturing environment and a broader set of government policy interventions which have placed consumption ahead of production interests, have clearly limited SA's attractiveness as an FDI location, in comparison to Thailand. This has affected the comparative nature of multinational investment in the two countries in three main ways. Firstly, the level of investment has been much higher in Thailand; secondly South Africa appears to be seen more as a potential mid-sized market than an export platform; and thirdly, the development of the component supply base has been more advanced in Thailand.

Although both countries have seen very rapid export expansion, Thailand provides a genuine export platform. Export growth has far exceeded the expansion of imports and Thailand runs a large automotive trade surplus. In South Africa, investment in exports has in part been driven by the desire to earn import rebate credits, which support the import of vehicles and components.

The automotive industry is a flagship of South African industrial policy and much has been achieved. However, it is indicative of the weaknesses in manufacturing and the same factors which militate against real competitiveness in the sector are obstacles to downstream manufacturing in South Africa.

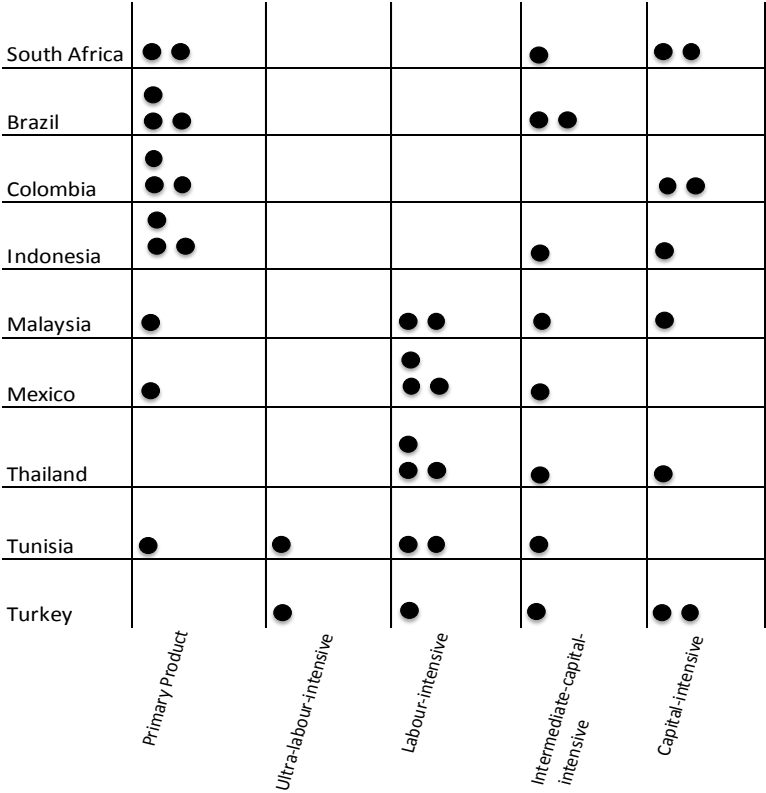
The weakness of light manufacturing

Light manufacturing has performed poorly. Ultra labour-intensive products feature heavily in the bottom half of **Error! Reference source not found.** The key garment sector saw employment fall by 3.5% per annum from 1994-2014 although there has been a recent recovery with the aid of government support. The footwear industry has almost disappeared over this period. The leather sector is dominated by automotive leather which grew rapidly supported by the Motor Industry Development Programme (MIDP) but is now in sharp decline.

The share of ultra-labour intensive manufactured exports has been in steady decline since 1970 (Table 5). By 2012, this category represented only 9.7% of manufactured exports. As incomes rise, it is to be expected that the relative share of labour-intensive sectors will decline as these industries shift to lower wage economies. But this has been happening particularly rapidly in South Africa. It is clear that South Africa has a low density of employment in labour intensive manufacturing. An important contributing factor is limited exports in these sectors. Figure 9 categorises the top five exports in South Africa and comparator middle income countries. South Africa's manufactured exports are concentrated in capital-intensive and intermediate capital-

intensive sectors. The top five exports are non-ferrous metals, vehicles and parts, iron ore, coal and steel. The contrast with comparator countries is striking. Malaysia, Mexico, Thailand, Tunisia and Turkey all have at least two of their top five export products in the ultra-labour-intensive or labour-intensive categories. Mexico’s main exports are cars and oil, but it exports \$87 billion worth of products in the labour-intensive categories of consumer electronics and machinery and office equipment. Turkey exports \$14.3 billion of apparel. Malaysia’s main export is consumer electronics, a labour intensive sector. Its fourth most important export sector is computer equipment, which is also labour intensive. Together these sectors accounted for exports of \$57 billion in 2012. Brazil is a resource rich country and its top three exports are primary products. The largest of these is agriculture, a labour-intensive sector. Indonesia is also reliant on primary exports but it does export \$7.6 billion of apparel, which constitute its 6th largest export sector.

Figure 9: Top five export products by labour intensity category, 2012



Source: Derived from WITs Database, World Bank.
 Note: Classification of sectors made use of ISIC Rev. 2 and is based on Bell and Cattaneo’s (1997) definition of sectors.

The result is that the South African manufacturing sector has performed poorly compared to comparator countries, in labour-intensive sectors and the decline in labour-intensive manufacturing accounts for a large part of the overall decline in manufacturing employment. In

structural metal products employment declined by 26% from 2007 to 2011 compared to 12.5% for manufacturing as a whole (Table 7).

South Africa's poor position in light manufacturing compared to other upper middle income countries is all the more striking if account is taken of its exceptionally high poverty rates. Brazil, Turkey, Mexico, Thailand and Malaysia all have higher per capita incomes on a PPP basis and much lower poverty levels than South Africa. Although South Africa is an upper middle income country, a large sector of the population have characteristics approximating that of a lower middle income country. In fact, the poorest quintile have average purchasing power which approximates the average incomes in the very poorest countries (van der Berg, 2014: 198).

Table 7: Employment in labour intensive manufacturing in South Africa

	2007	2008	2009	2010	2011
Spinning, weaving and finishing of textiles	17,275	15,586	13,689	9,988	8,805
Other textiles	31,313	31,527	27,172	26,749	25,763
Wearing apparel, except fur apparel	63,716	55,892	49,698	51,557	48,212
Tanning, dressing and processing of leather	7,569	7,321	7,650	5,642	5,468
Products of wood, cork, straw, etc.	31,519	29,582	24,404	21,500	20,296
Structural metal products; tanks; steam generators	83,688	80,862	73,800	68,443	61,857
General purpose machinery	38,644	40,463	39,744	43,877	44,266
Total labour intensive manufacturing	273,724				214,667
Total manufacturing	1,323,498	1,306,586	1,219,847	1,187,010	1,158,256
Share of labour intensive manufacturing employment in total (%)	20.7				18.5

Source: Statistics South Africa

Furthermore, the decline in manufacturing employment in South Africa has been unusually rapid and most of this decline is accounted for by labour intensive sub-sectors. The largest contributor

to this decline has been the poor performance of the labour intensive textiles and clothing sectors (Morris and Barnes, 2014). Their share of manufacturing output declined from 7.6% in 1990 to just 1.8% in 2010. While other middle income comparator countries have also seen declines in the sector, none has been as rapid as in South Africa (Table 8).

This decline has particularly affected some poorer regions of the country. For example, in the Eastern Cape the textiles, clothing and leather sector was the largest manufacturing employer with 26,000 workers in 1996, equal to 19.8% of the manufacturing labour force in the province. By 2012 employment had collapsed to just 10,700 workers just 11.8% of a much smaller manufacturing labour force (Kaplan et al, 2013: 25).

Table 8: Share of manufacturing value added in textiles and clothing, 1996-2010

	1996	2000	2004	2008	2010
South Africa	7.6	4.9	4.9	3.0	1.8
Brazil	8.1	6.9	5.9	5.4	6.1
Malaysia	4.6	4.1	2.8	1.9	1.9
Mexico	4.4	3.9	3.4	2.8	3.4
Thailand	8.6	12.4	n/a	n/a	n/a
Turkey	17.2	15.7	21.5	15.5	n/a

Source: World Bank: World Development Indicators

5. Conclusion

The share of manufacturing both in terms of output and employment has shown a marked decline. Weak export performance, growing import competition and capital intensification account for this. We have briefly investigated three groups of manufacturing sectors; heavy industry, labour intensive manufacturing and an example of an intermediate capital intensive sector, the automotive industry. Heavy industry and the mineral energy complex have been losing ground recently. So has light manufacturing in spite of the fact that South Africa has a very high unemployment rate. The automotive industry has hugely increased its share of exports but is not particularly competitive compared to export hubs such as Thailand.

As indicated, there has been no shortage of industrial policy interventions and new programmes, but the net impact is far from clear. Together with trade liberalisation, it was expected that these measures would counteract the previous government's support for large-scale capital-intensive

industries and the legacy of poor productivity, and would facilitate the development of non-traditional manufactured exports. While the stated objective of policy has been to encourage higher value-added manufacturing, labour-intensive activities and smaller firms, even after 1994 the weight of support continued to be focused on larger scale, capital-intensive firms and sub-sectors. It is therefore not surprising that a striking feature of manufacturing development since the early 1990s has been a rapid increase in manufacturing capital intensity, in part due to the poor performance of labour intensive sectors. So while manufactured exports have grown, they have not led to the expected jobs bonanza. It turned out South Africa's 'revealed' comparative advantage was, somewhat paradoxically, in relatively capital intensive products and not in relatively labour intensive products.

The nature of industrial policy must depend on context and the South African context is one of massive structural unemployment. Unemployed human resources on this scale represent the most glaring 'inefficiency' afflicting the South African economy. But it is also a context of mineral wealth. Unfortunately this wealth also poses certain problems. Policy makers are rightly concerned with adding more value to these resources and a number of policies have been proposed which would encourage such a process. But these metal processing sectors are highly capital- and energy-intensive. Thus, despite these sectors growing rapidly, this competitive advantage was in part artificial and supported by a long history of subsidies.

What we have tried to show is that the real problem is not one of forcing mining firms to process their output. South Africa does a lot of this to the extent of even beneficiating coal into petrol. There is little point providing support to beneficiate iron ore into steel and (imported) bauxite and coal into aluminium, if these products are then simply exported, which is frequently the case. 'Conventional' beneficiation policy may encourage more smelters and metal refiners which then charge local fabricators import parity prices for these processed metals.

The other side of the coin is the very weak performance in light manufacturing. While industrial policy is sometimes narrowly defined as a set of selective interventions to promote industrial upgrading, we would prefer a broader conception – 'improving economy wide efficiency.' In the South African context of large scale structural unemployment, this leads in turn to a focus on employment. Moreover, the bulk of our unemployed labour is unskilled or semi-skilled and can most easily be absorbed into labour intensive activities.

It may be theoretically possible and sensible, especially in a mineral rich economy, to have an industrial policy which promoted capital intensive, resource based exports with employment being generated elsewhere in services, (protected) manufacturing for the domestic market or agriculture. Or industrial policy could target more advanced, leading sectors which may lead to little direct employment growth but which would generate the export expansion required to finance development with employment being generated in the protected sectors of the domestic economy. We argue, however, that industrial policy should be aligned with other policies and directly aimed at supporting more employment intensive growth.

Government has very clearly stated the case for a growth path which is more labour absorbing and less emission intensive – but an economy cannot efficiently shift its growth path without shifting its comparative advantage. To move to such a growth path will need to compete more effectively in labour demanding economic activities which also happen to be less emission-intensive. It is not being suggested that we can suddenly out-compete China in ultra labour-intensive manufactures and neither should South Africa support, unsustainable, low margin activities. However, competition in labour intensive tradeables cannot be avoided and for the unemployment rate to be reduced, South Africa needs to do much better than it has been doing. This does not mean that wages should, be driven down although policy does need to investigate specific labour market rigidities. Incentives should subsidise labour and training rather than capital investment, electricity and infrastructure for capital intensive firms. A central challenge for South African industrial policy, therefore, is to tilt the playing field towards labour absorbing growth in order to mobilise the potential of an under-employed and poorly skilled workforce.

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