



## **Assessing the Manufacturing Sector and its Multiplier Effects on the South African Economy**

Prepared by:  
**The Research Division**  
Pan-African Investment & Research Services  
Johannesburg, South Africa  
30 November, 2011

**Note:** This report is commissioned by Manufacturing Circle of SA and has two parts. No section of this may be reprinted and reproduced without the prior written permission of the Manufacturing Circle.



## Contents

Executive Summary .....	5
Section One:.....	6
Introductory Analysis and Remarks .....	6
Section Two: A Global Comparison – South Africa vs. Peer Countries.....	8
2.1. Introduction .....	8
2.2. Global Comparisons .....	9
2.3. Conclusion .....	13
Section Three: Assessing the Manufacturing Sector and its Multiplier Effects on the South African Economy .....	14
3.1. Introduction .....	14
3.2. Sectoral Multiplier Effects .....	14
3.3. Impact of a Sustained Boost in the Manufacturing Output.....	17
3.4. Conclusion .....	22
Section Four:.....	23
Concluding Remarks and Policy Recommendations.....	23
Appendix 'A' .....	26

## Figures

Figure 1: Manufacturing Growth and Contribution to GDP .....	7
Figure 2: Growth of 'Manufacturing Value Added 2000- 2010: SA vs. Peer Countries.....	8
Figure 3: Manufacturing as % GDP 2000- 2010: SA vs. Peer Countries.....	9
Figure 4: Average GDP Growth 2000- 2010 SA vs. Peer Countries .....	10
Figure 5: GDP Growth 2009 - 2010: SA vs. Peer Countries.....	10
Figure 6: Growth in Exports 2000- 2010: SA vs. Peer Countries .....	11
Figure 7: Currency Volatility 2000- 2010: SA vs. Peer Countries.....	12
Figure 8: Growth Rates of Administered Prices between 2000 and 2010: SA vs. Peer Economies .....	13
Figure 9: Manufacturing Output Growth Forecast Scenarios (%) .....	17

## Tables

Table 1: Output multiplier of a R1 investment.....	15
Table 2: Employment multiplier of a R1million investment.....	15
Table 3: Export earnings multiplier of a R1 investment .....	16
Table 4: Fiscal revenue multiplier of a R1 investment .....	16
Table 5: Ten-Year Cumulative Effects of the Economy-Wide Impact of an Increase in Manufacturing Output .....	19
Table 6: Impact on Sectoral Output (R billion) .....	20
Table 7: Impact on Sectoral Employment (no. of jobs) and Real Wages (R billion) .....	21
Table 8: Impact on Export Earnings (R billion) .....	22

## Abbreviations and Acronyms

<b>GDP</b>	Gross Domestic Product
<b>IMF</b>	International Monetary Fund
<b>IPAP</b>	Industrial Policy Action Plan
<b>MIDP</b>	Motor Industry Development Programme
<b>MTBPS</b>	Medium-Term Budget Policy Statement
<b>NGP</b>	New Growth Path
<b>PAIRS</b>	Pan-African Investment and Research Services
<b>SA</b>	South Africa
<b>SARB</b>	South African Reserve Bank

## Executive Summary

1. The Manufacturing sector's relative contribution to South Africa's Gross Domestic Product (GDP) has constantly been deteriorating since 1981. Manufacturing production reached a peak at 21.3% of the GDP in 1981 on the back of a closed economic system that operated in a sanction-burdened South Africa. As a result, growth of other sectors (such as Finance and Trade-related sectors) was hindered.
2. Manufacturing production recorded the highest growth rate of 9.3% in 1981 as well, a period coinciding with the gold boom. Such coincidence points to the complementarity between the Mining and Manufacturing sectors. The contractionary trend in manufacturing output observed from the mid-2000s has largely been attributable to poor macro-economic policies and was also exacerbated by the 2008/09 economic recession.
3. South Africa's Manufacturing sector faces serious and binding structural constraints compared to its counterparts in emerging economies such as China, the Philippines, Turkey, Brazil and India, to name but a few. Such constraints reduce the ability for the sector to reap the full benefits of favourable market conditions e.g. a depreciating currency. Importantly, structural constraints also erode the competitiveness of the sector.
4. Manufacturing remains an important sector within the South African economy given its potential to generate positive and significant spillover effects on the economy and the fact that the sector consistently features among the top-three sectors with the highest multiplier effects in terms of output, employment, export earnings and fiscal revenue.
5. A growth rate of at least 10 per cent in manufacturing production would be needed to place the sector back on a sustainable track that would also help promote other sectors in the economy. The desired sustainable growth rate requires an effective and meaningful accord between business and labour within the sector, an urgent re-examination of macroeconomic and foreign exchange policies and a removal of structural inefficiencies and infrastructural bottlenecks in energy, water and other regulatory fields.
6. Strategies that can be considered to generate favorable conditions for the Manufacturing sector to grow and initiate the re-industrialisation of the country include:
  - i. Adopting a favourable exchange rate policy for the Rand and a trade regime policy to promote Manufacturing;
  - ii. Differentiated electricity pricing policy to help energy intensive industries to manage costs and competitiveness;
  - iii. Emulating the Motor Industry Development Programme (MIDP) approach for relevant industries within the manufacturing sector;
  - iv. Accelerating beneficiation of the Mining sector to promote downstream and upstream Manufacturing industries;
  - v. Encouraging skills generation in line with Manufacturing needs as well as promoting immigration of *bona fide* skilled people; and
  - vi. Encouraging Manufacturing development programmes for artisans, technicians, etc.

## Section One: Introductory Analysis and Remarks

The relative contribution of the Manufacturing sector to South Africa's Gross Domestic Product (GDP) has consistently been on the decline post 1981. The Manufacturing sector's contribution to GDP reached a peak at 21.3% in 1981 possibly as a result of the closed economic system that operated in a sanction-burdened South Africa. At the time, growth in manufacturing production also peaked at 9.3%. However, in 2010, manufacturing output accounted for only 17% of GDP (Figure 1(a)) as growth in Manufacturing output moderated to 5%. In addition, the 2008/09 economic recession, sparked by the global financial crisis, spilled over onto the real economy where it exacerbated severe structural inefficiencies facing the Manufacturing and other sectors.. Three phases can be discerned from the growth trends of manufacturing output between 1970 and 2010 (Figure 1(b)):

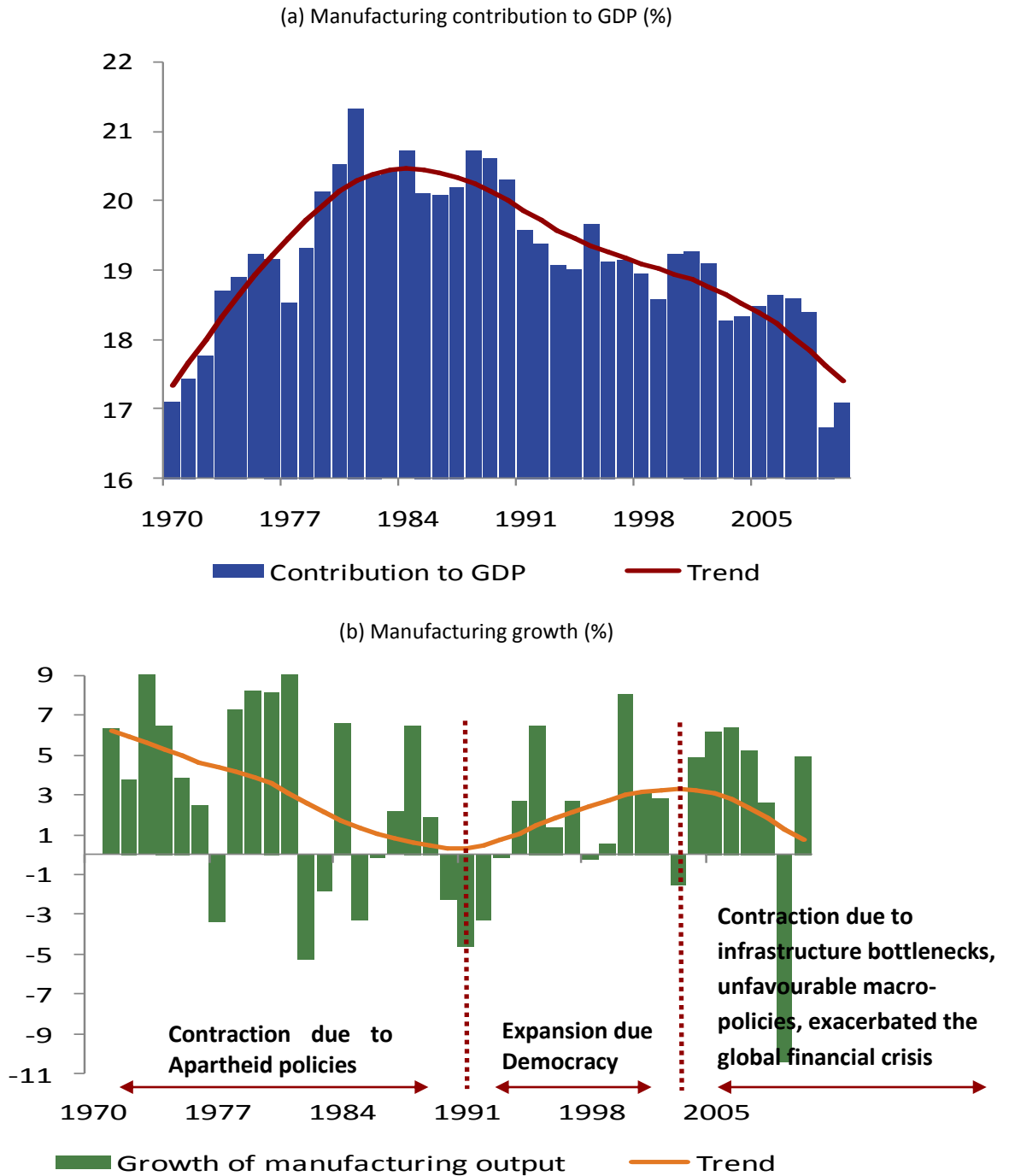
- a) Downward swing prior to 1990s (due to Apartheid policies)
- b) Upward swing between 1990s and early 2000s (due to democracy and associated removal of sanctions and liberalization )
- c) Downward swing post early-2000s (due to infrastructural bottlenecks, unfavourable macroeconomic policies, exacerbated by the global financial crisis)

The coincidence between the peak in Manufacturing production growth and the gold boom in 1981 illustrates the significance of the Mining sector in stimulating Manufacturing production. Given the complementary nature of the two sectors, the current perceived “anti Mining policies” in South Africa does not bode well for the Manufacturing sector.

With a liberalized economy from the 1990s, South Africa's economic portfolio began to change, as tertiary sectors, such as Finance and Trade began to gain an increasing share of economic activity. This saw a relative decline in the Manufacturing sector's contribution to GDP.. The recent global economic crisis coupled with the Manufacturing sector's susceptibility to global shocks has induced further deteriorations in the share of Manufacturing in GDP. Against this backdrop, a strategic turn-around is required for the sector to regain momentum. We therefore posit that the achievement of a sustainable long-term and job-inclusive growth will require the Manufacturing sector to grow, on average, at an annual rate not lower than 10%.

The remainder of the report is structured as follows: **Section Two** compares South Africa's Manufacturing sector to that of its peer emerging economies; **Section Three** assesses the multiplier effects and the impact of a sustained boost in manufacturing output. And lastly, Section **Four** provides concluding remarks and policy recommendations.

**Figure 1: Manufacturing Growth and Contribution to GDP**



Source: SARB and PAIRS

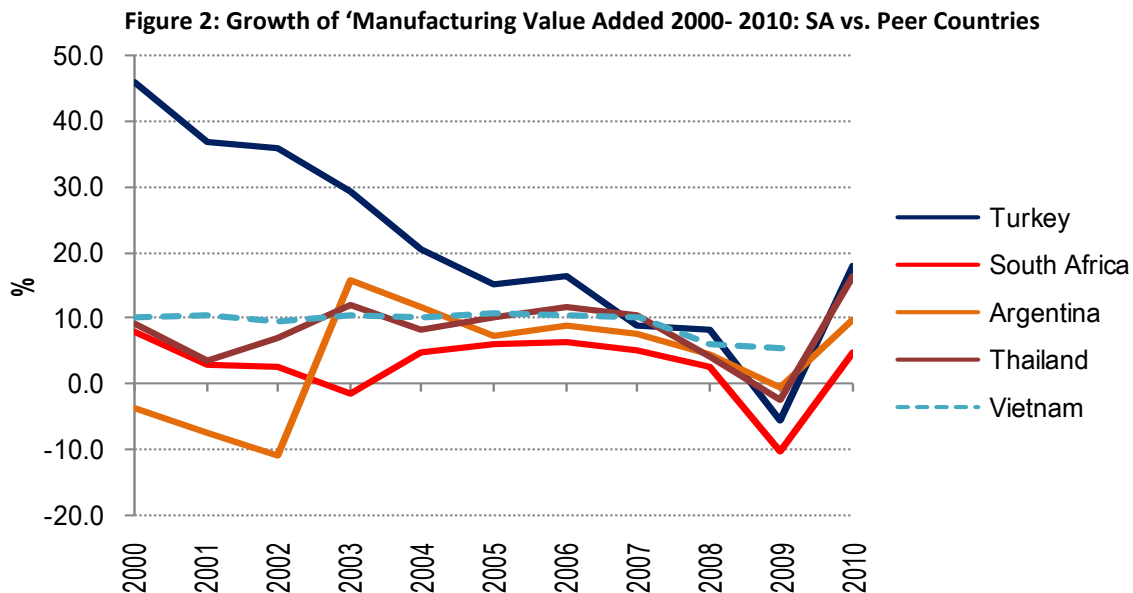


## Section Two: A Global Comparison – South Africa vs. Peer Countries

### 2.1. Introduction

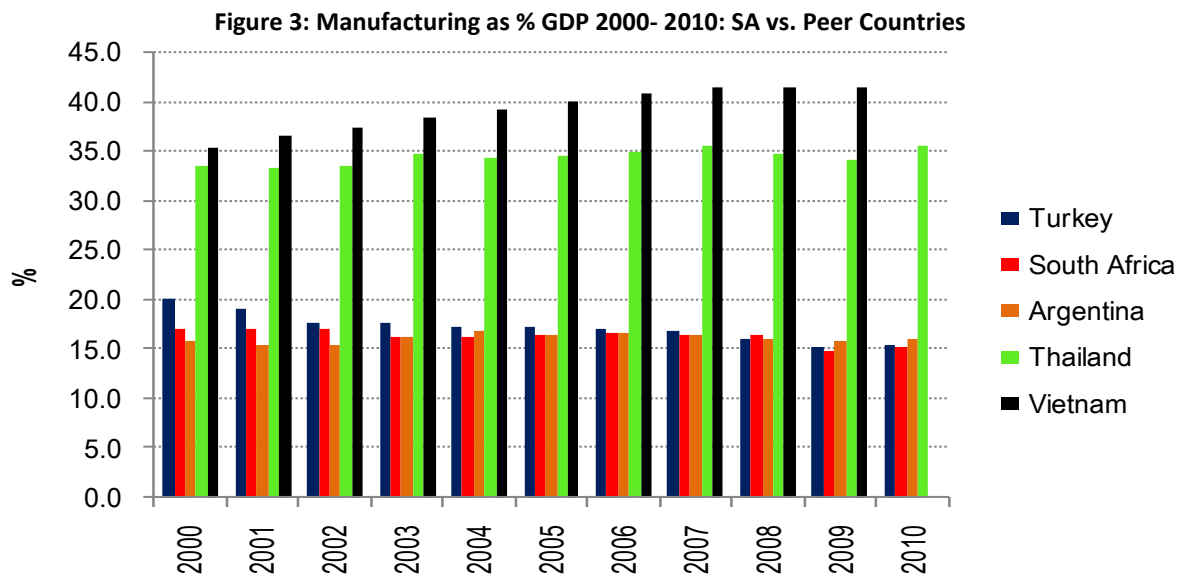
South Africa's manufacturing competitiveness has eroded over the past decade, due to a number of structural impediments, including rising input costs, inadequate infrastructure, energy shortages and most importantly the sector's long term competitiveness has not received the necessary attention, as is the case for the country's peer economies. This could be attributable to the fact that the key driver for the domestic economy's rapid growth over the decade has been consumption (in particular during the boom years of 2003-2007), on the back of the liquidity boom. As a result, the production side of the economy was neglected, the effects of which were felt during the recession of 2009. Imports into South Africa recorded an average nominal growth of 14.8% per annum, over the 10 year period, while export growth averaged 12.6% over the same period. Lower export growth saw the economy fall deeper into de-industrialization, as the economic structure shifted towards the tertiary sector activities. As seen in Figure 2, South Africa's manufacturing value-added is lower than that of its emerging market peers, in particular that of East Asian economies whose manufacturing base makes up a large contribution to total GDP (Figure 3).

Post the recession, strengthening South Africa's manufacturing base has been key in government policy and has been identified as an important element in rebuilding the country's growth, and reducing unemployment. These have been in the form of Industrial Policy Action Plan (IPAP) 2, the New Growth Path (NGP) and the recently announced manufacturing competitiveness rescue package.



Source: IMF & Respective Statistical Bureaus



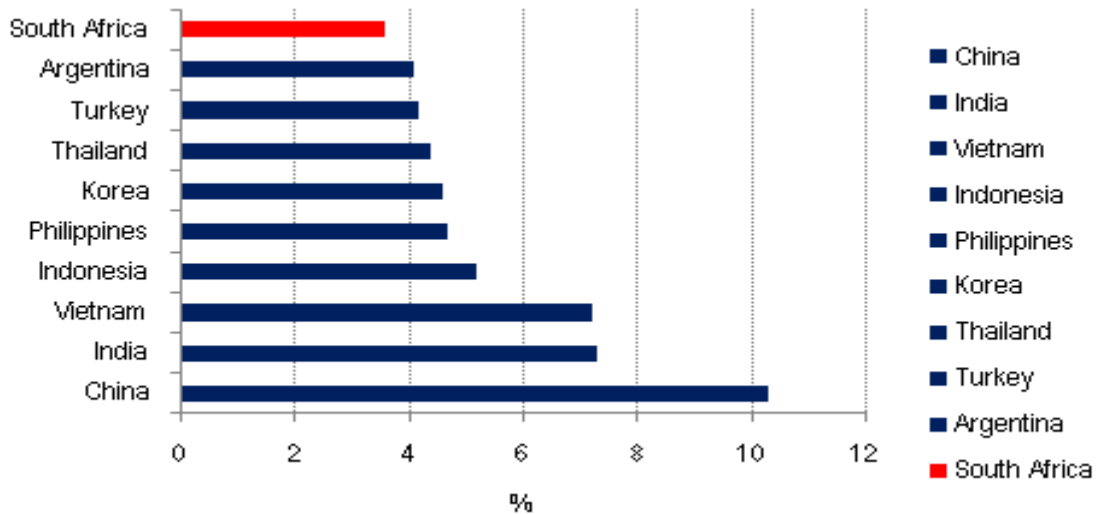


Source: IMF & Respective Statistical Bureaus

## 2.2. Global Comparisons

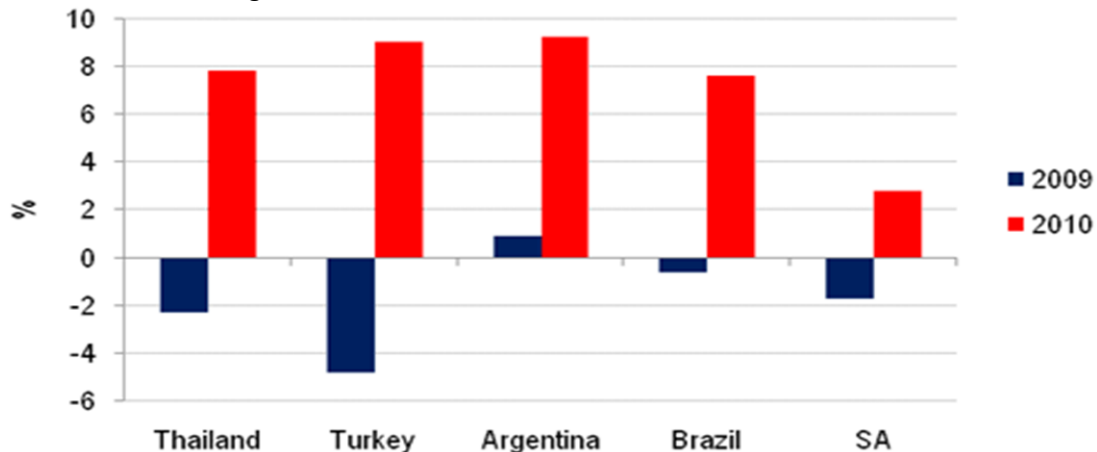
South Africa's average growth has been lower than that of its peer countries (Figure 4). Over the 10 year period, gross domestic output averaged 3.6%, which was the lowest growth in the pool of countries, and stands markedly below the peer average of 5.8%. Moreover, domestic expenditure accounts for 60% of the country's growth. This is in contrast with the economic profile of peer countries such as the East Asian giants and to a lesser extent South American peers, whose growth has been production led, characterized by a strong manufacturing base. As a result, these economies were quick to recover from the devastations of the global recession of 2009 (Figure 5), many of which have rebounded to their pre-crisis levels.

Figure 4: Average GDP Growth 2000- 2010 SA vs. Peer Countries



Source: IMF & Respective Statistical Bureaus

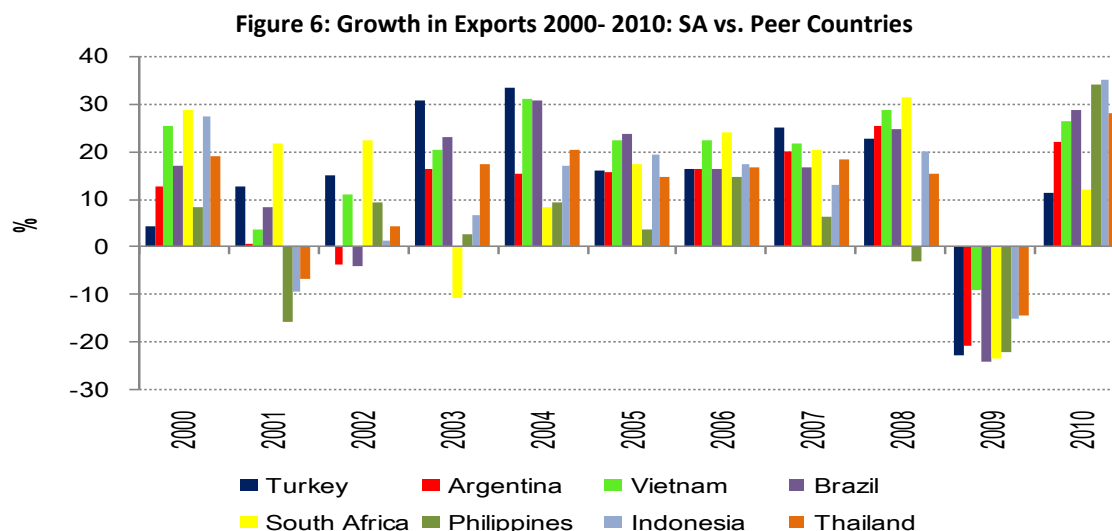
Figure 5: GDP Growth 2009 - 2010: SA vs. Peer Countries



Source: IMF & Respective Statistical Bureaus

Despite the slow pick up in global demand, due to the economic uncertainty amongst the developed economies, export growth has risen firmly in emerging market peers (particularly East Asian economies), making a full come back from the losses of 2009 (Figure 6). These economies not only strengthened regional trade, but benefitted from their already existing strong industrial policies which put great emphasis on driving manufacturing competitiveness. South Africa's failure to rebound firmly post the recession can be attributable the lack of emphasis on manufacturing competitiveness. While South Africa's peer countries enjoyed flourishing Manufacturing sectors, sound industrial policies and subsidies, the domestic sector, with the exception of the automotive industry, was left to market forces. At the same time, a strong rand was highly favoured ,as it saw large capital inflows and increased direct investment flourish into the country. A strong and

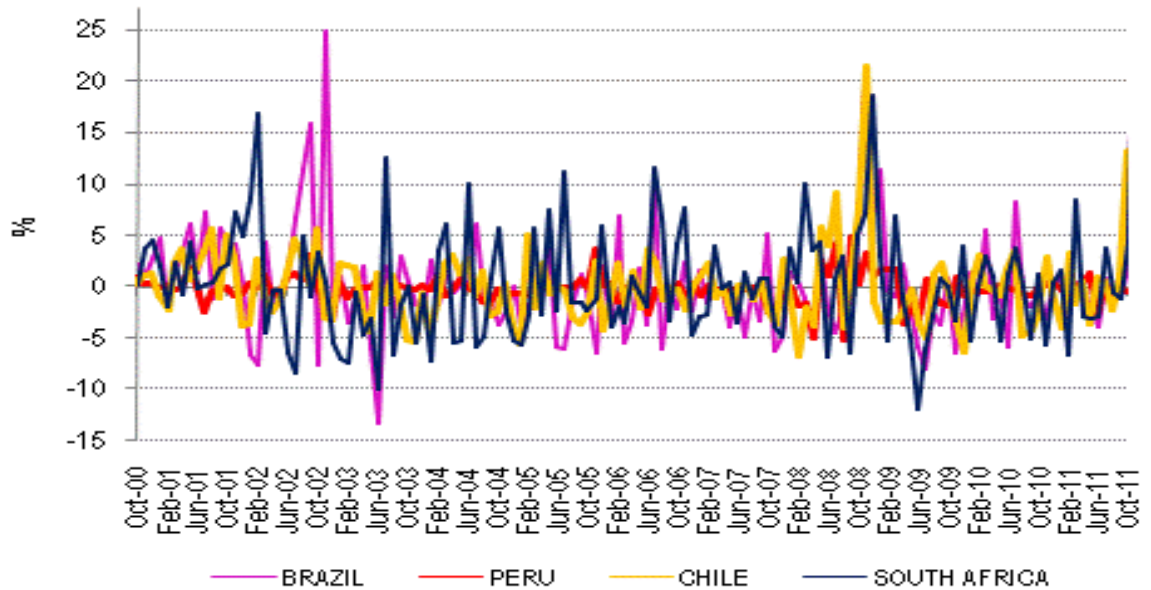
volatile rand, however, was not favourable for the Manufacturing sector and for South Africa's industrialization base.



Source: IMF & Respective Statistical Bureaus

Notwithstanding, the recent rand depreciation, the persistently strong and volatile rand has over the years eroded manufacturing competitiveness; this has particularly been harmful alongside a number of structural inefficiencies which hamstrung the sector. Even though the domestic currency has depreciated (since August 2011), the volatility in its movement (driven by global investor risk appetite) remains a key threat to profit margins. Moreover, it is important to note that the recent currency weakness was not confined to South Africa, but was spread throughout the emerging markets (Figure 7), making South Africa's relative position almost unchanged. And with these economies already highly competitive in the export market, South Africa's embedded structural inefficiencies limit the extent of the gains derived from a weaker currency.

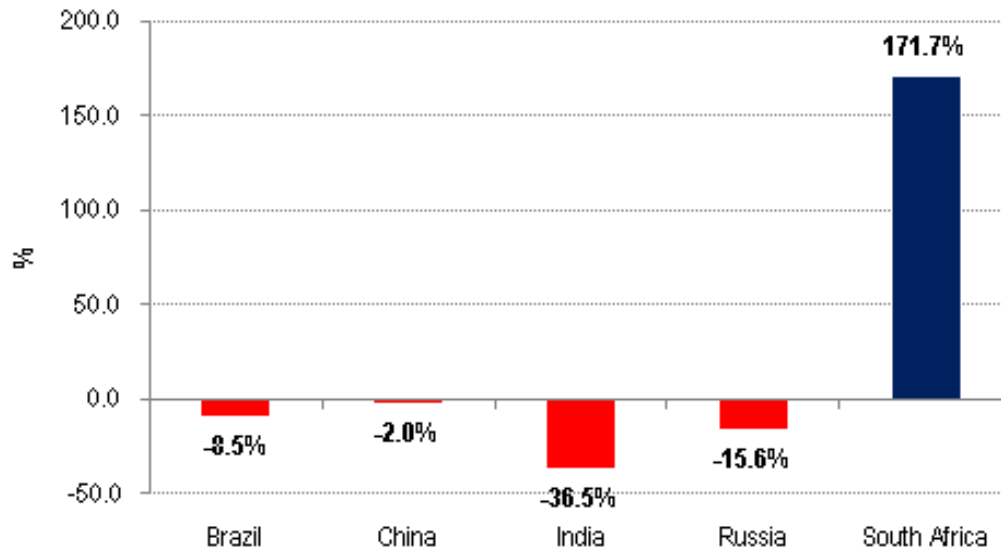
**Figure 7: Currency Volatility 2000- 2010: SA vs. Peer Countries**



Source: I-Net Bridge

One of the principal structural impediments to the depletion of South Africa's manufacturing competitiveness is high administered prices, in particular the negative impact of the ongoing surge in electricity prices. The ever increasing costs of Eskom's planned expansion of its generating capacity has had severe cost consequences and electricity tariff increases remain the principal upside risk to the country's input costs profile. To put it into perspective, over the ten-year period between 2000 and 2010, the growth in administered prices (mainly electricity) amongst all of South Africa's peer emerging economies, has fallen (Figure 8). In contrast, over the same period, South Africa has recorded a massive increase in administered prices, of over 170% suggesting a significant contributor to costs faced by the manufacturing sector. Such hikes are particularly detrimental to infant manufacturing industries.

**Figure 8: Growth Rates of Administered Prices between 2000 and 2010: SA vs. Peer Economies**



Source: Respective Statistical Bureaus

Notes: India (2000 & 2009): Fuel, Power, Light and Lubricants

Brazil: Electricity

China: Electricity

Russia: Public Utilities

South Africa: Electricity

Added to the above policy-driven impediments to the country's industrialization drive are:

- a) Shortage of skills;
- b) Inadequate infrastructure;
- c) Poorly managed cities;
- d) Lack of an integrated and sustained industrialization strategy.

### 2.3. Conclusion

The magnitude of structural constraints is relatively lower amongst South Africa's peer countries, allowing them to reap the full benefits of favourable market conditions (e.g. depreciating emerging market currencies). Therefore, emphasis on building South Africa's re-industrialization is important for the country's long-term growth sustainability and the creation of the targeted (government's objective of) 5 million jobs by 2020. With this in mind, paying special attention to addressing key structural impediments, such as the issue of an appropriate foreign exchange policy and the ongoing rise in administered prices (particularly electricity costs), should receive policy priority precedence.

## **Section Three:**

### **Assessing the Manufacturing Sector and its Multiplier Effects on the South African Economy**

#### **3.1. Introduction**

The global comparison discussed in the previous section revealed an important backdrop within which the SA Manufacturing sector is facing higher structural constraints relative to its peer countries. In the same perspective, infrastructure bottlenecks, unfavourable macroeconomic policies, the effect of the recent global economic crisis coupled with the Manufacturing sector's susceptibility to global shocks have induced considerable deteriorations in the performance of Manufacturing sector. To this end, and with a view to better understand the significance of the sector, this section assesses the importance of the manufacturing sector for the macro-economy using a macro-econometric model. The technical description of this model is summarized in Appendix 'A'.

#### **3.2. Sectoral Multiplier Effects**

Sectoral contribution to total output partly shows the importance of a particular sector to the economy but fails to reveal the susceptibility of a sector to any shock. However, evaluating the multiplier effects of a change in a macroeconomic variable is expected to provide a full picture of how significant the direct impact of a particular sector is on the entire economy. We aim to assess various multiplier effects of a change in investment spending across different sectors of the economy. Given that investment expenditure is the only component of domestic demand that is disaggregated in different sectors, an investigation of the multiplier effects as a result of increased investment spending is carried out. The multiplier process primarily takes place in the short-run and is an important driver of economic expansion/contraction. As such, the multiplier analysis can reveal the areas of the economy with relatively stronger impact that could help channel resources towards a process of generating sustainable growth and development.

##### **a) Output Multiplier Effects**

Results show that sectors with the highest output multiplier effects are the Agriculture and the Manufacturing sectors (See Table 1). These sectors respond markedly to a change in investment. For instance, a one rand (R1) investment spending in the Agriculture and Manufacturing sectors will lead to more than a rand value, R1.8 and R1.13 respectively in overall output. Due to the direct linkages that exist between Manufacturing and Agriculture, especially in the area of agro-processing industries, we can conclude that a boost in the Manufacturing sector will directly lead to an improved Agricultural sector. In addition to the direct multiplier effects, the Manufacturing sector is also indirectly linked to other sectors in the economy as the majority of the Manufacturing sector's outputs is used as inputs for production in other real sectors of the economy. Output multipliers in other sectors of the economy do not respond strongly to investment demand. A rand value of additional investment spending will result in less than a rand value in output changes. However, these results are in no way translating to a declining importance of these sectors to the economy

but rather reveal the direct impact of a sectoral shock on the entire economy. For instance, the Electricity sector, which reflects the lowest multipliers across board, does not represent a minor sector in the economy.

**Table 1: Output multiplier of a R1 investment**

<b>Sector</b>	<b>Multiplier</b>
<b>Agriculture</b>	R1.79
<b>Manufacturing</b>	R1.13
<b>Construction</b>	R0.81
<b>Wholesale and Retail</b>	R0.72
<b>Mining</b>	R0.60
<b>Finance</b>	R0.49
<b>Transport &amp; Communication</b>	R0.03
<b>Electricity</b>	R0.03

Source: PAIRS

#### b) Employment Multiplier Effects

It is estimated that about eleven decent and sustainable jobs will be created as a result of a million rand additional investment spending in the Agricultural sector. This is in line with the labour-intensive nature of the sector. With the same amount of investment spending in the manufacturing, wholesale & retail and construction sector, it is estimated that only about three decent and sustainable jobs will be created as a result of an increased investment expenditure of a million rand in each sector. However, in the case of the Transport & Communication and Electricity sectors, it is estimated that an investment of R10 million is required to create a single decent and sustainable job in the economy (See Table 2). This highlights the highly capital intensive nature of these sectors.

**Table 2: Employment multiplier of a R1million investment**

<b>Sector</b>	<b>Multiplier (no. of jobs)</b>
<b>Agriculture</b>	10.5
<b>Wholesale and Retail</b>	3.3
<b>Manufacturing</b>	3.0
<b>Construction</b>	2.5
<b>Finance</b>	1.0
<b>Mining</b>	0.5
<b>Transport &amp; Communication</b>	0.1
<b>Electricity</b>	0.1

Source: PAIRS



c) Export multiplier effects

The 'Transport & Communication' and Agriculture sectors show a more responsive reaction than the rest of the economy to an increase in investment spending in the export sector. This may be explicable in terms of the prevailing backlog in export transportation logistics as well as under-spending in agro-industries.. For every rand invested in Agriculture, Transport & Communication and Manufacturing, total exports will increase by R0.22, R0.15 and R0.13 respectively (See Table 3).

**Table 3: Export earnings multiplier of a R1 investment**

Sector	Multiplier
Agriculture	R0.22
Transport & Communication	R0.15
Manufacturing	R0.13
Construction	R0.11
Wholesale and Retail	R0.09
Mining	R0.07
Finance	R0.07
Electricity	R0.01

Source: PAIRS

Table 3 illustrates the relative significance of the multiplier effects on exports of investments in different sector.

d) Government fiscal revenue multiplier effects

Fiscal revenue will be boosted by an estimated R0.56 for every rand invested in Agriculture. Similarly, for every rand invested in the manufacturing and construction sectors, fiscal revenue will increase by R0.35 and R0.26 respectively. Therefore, government incentives to boost the sector's global competitiveness through increased investment spending will strengthen the country's fiscal revenue base (See Table 4).

**Table 4: Fiscal revenue multiplier of a R1 investment**

Sector	Multiplier
Agriculture	R0.56
Manufacturing	R0.35
Construction	R0.26
Wholesale and Retail	R0.23
Mining	R0.19
Finance	R0.16
Transport & Communication	R0.01
Electricity	R0.01

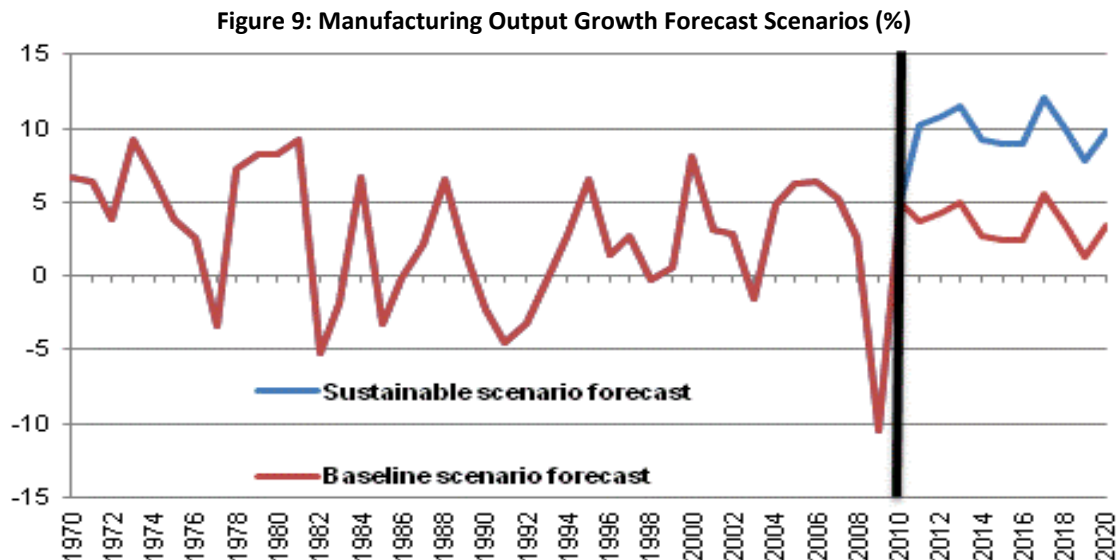
Source: PAIRS

The relative multipliers for different sectors are illustrated in Table 4. Manufacturing, as can be seen, has the second highest multiplier effects on the fiscus.

### 3.3. Impact of a Sustained Boost in the Manufacturing Output

The previous section investigated the direct importance of the major sectors of the economy using different kinds of multiplier effects. The Manufacturing sector remains amongst the top three sectors which will generate a considerable multiplier effect across the economy following an injection of investment. As such, given its linkages with most sectors of the economy, the Manufacturing sector should attract the highest priority.

Against this backdrop, this section investigates the impact of a boost in manufacturing output at the sectoral and macro levels of the economy over a sustainable period of time, i.e. over a decade or so. Two simulations are tested from the model based on the forecast scenarios presented in Figure 9. Given the current changes in the structure of the global economy, which mostly affects activities in the Manufacturing sector, the 10-year forecast in manufacturing GDP (baseline scenario) is averaged at 3.4% per annum. As discussed earlier, the sustainable GDP growth that will restore the strength of the Manufacturing sector is expected to average 10% per annum. Therefore, a critical intervention from government is needed to spur sustainable growth in manufacturing output.



Source: SARB & PAIRS

To capture the desired outcome, manufacturing output is exogenously increased in the model by 3.4% and 10% over the ten-year forecast period. The 10-year simulations represent a continuous boost to manufacturing output and the underlying responses of other variables in the system year after year<sup>1</sup>.

<sup>1</sup> The results are converted into real-time values from the percentage changes (elasticity) derived from the model. In other words, the results are not forecasts of various economic variables, but rather deviations from its 10-year path due

### Box: Model Design

The analysis of the manufacturing sector is done by using a time series macro-econometric model disaggregated at the sectoral level. The approach followed considers the impact of any shock on the economy in a dynamic system. Dynamic adjustments processes are taken into consideration and a contemporaneous feedback of any shock to the entire system are provided.

The model captures the following four major sectors of the economy:

- a) Real sector
- b) External sector
- c) Monetary sector
- d) Public sector

It is also important to note that the econometric analysis presented in this study is based on comparative static. This means that the models only take into consideration one particular shock to the system while every other thing remains the same. Therefore, the magnitude and direction of the response variables could have been cushioned by other shocks - monetary and fiscal shocks - in the system.

The disaggregated model captures macro impacts through an aggregation of the various sectors of the economy. Due to the difficulty encountered in data disaggregation, it is assumed that both households and firms face the same final prices but changes in inflation will feed through the system and eventually have different effects on major variables both at the macro and sectoral level. The price block serves as a linkage between the various sectors at the macro and sectoral production levels.

The data used in the study were obtained from the following sources:

- a) South African Reserve Bank (SARB)
- b) IMF (International Financial Statistics)
- c) World Bank
- d) Quantec

The dataset covers the period 1970-2010. Real figures were obtained using the GDP deflator (2005=100). Further details on the model design can be found in the Appendix.

---

to increases in manufacturing output. Elasticity values were removed from the forecasted scenarios to derive actual real-time values for the major macro variables. For instance, if the manufacturing sector is operating on the sustainable growth path and the 10-year impact of manufacturing output on exports is 2.9% per annum, and if exports are expected to register R504 billion in year three, then an additional R14.5 billion worth of exports will be generated. Therefore, it reveals the impacts of the changes in macro variables when the sector is set on different paths of growth.

Elasticities are computed by comparing every response variable's actual simulation path with its shocked simulation path. "Elasticity" is defined as the percentage change in the response variable relative to the percentage of the shock applied. The dynamic elasticities are determined along the simulation path, whereas elasticities at convergence are the long-run elasticity (Klein, 1982: 135).

### 3.3.1. Economy-wide Impacts

Due to the high susceptibility of the sector to external shocks, a direct boost in the manufacturing output will have an immediate impact on the macro variables in the system. In other words, a faster adjustment process exists as the shock affects output directly. Increasing manufacturing output by 3.4% and 10% per annum over a 10-year period will translate into an estimated cumulative R95 billion and R278 billion increase respectively (Table 6). Therefore, it is estimated that given a 3.4% growth per annum, overall economic output will increase by a cumulative R184 billion, and by R537 billion given a sustainable 10% growth per annum (Table 5).

In this regard, if the sector is left on the baseline scenario growth path (3.4%), the cumulative additional jobs that will be generated will come to an estimated 158, 000 leading to a real wage increase of about R61 billion over the same period. Investment and household consumption spending will receive an estimated R116 billion and R136 billion boost, respectively. In terms of exports, an estimated R52 billion additional exports will be generated under the assumption that global demand will improve moderately in favour of domestic manufactured goods. However, the slight appreciation of the rand (1.4%) will negate the impact on exports. On the other hand, the effect of the rand's appreciation will be mitigated by falling reduction in consumer inflation (-0.6%). The effects on imports will be largely determined by changes in output.

**Table 5: Ten-Year Cumulative Effects of the Economy-Wide Impact of an Increase in Manufacturing Output**

<b>Growth rate over ten years</b>	<b>3.4%</b>	<b>10%</b>
<b>Output</b>	R184 billion	R537 billion
<b>Employment</b>	158,000	454,000
<b>Investment</b>	R116 billion	R339 billion
<b>Household consumption</b>	R136 billion	R398 billion
<b>Real wages</b>	R61 billion	R177 billion
<b>Exports</b>	R52 billion	R151 billion
<b>Imports</b>	R102 billion	R297 billion
<b>Fiscal revenue</b>	R62 billion	R182 billion
<b>Exchange rate (R/\$)</b>	-1.43%	-4.08%
<b>Consumer inflation</b>	-0.58%	-1.66%

Source: PAIRS

Under a sustainable growth path of 10%, the additional increase in the macro variables will be almost three times higher than the baseline growth path. Additional employment of about 454,000 will be created, which will contribute positively towards the target set by the government's New Growth Path (NGP). This indicates that a sustainable boost in manufacturing could go a long way to provide the required job-creating growth for the economy.

### 3.3.2. Major sectoral impacts

The above-mentioned sectoral model developed in this study assumes that both households and firms face the same final prices. Therefore, the response of major sectoral variables to the shock in manufacturing output will depend on the extent of complementarities in the production process. However, it may be difficult to see the indirect impact, which may be considerable in some sectors.

Against this background, eight sectors of the economy (based on data availability) are investigated and sectoral impacts of the shocks, as applied above, are presented. The residual impact from the sectoral analysis is attributed to other sectors (government, personal and community service) not captured in the model.

#### a) Output effects

Table 6 presents the sectoral output effects of a 3.4% (R94.5 billion) and 10% (R277.8 billion) annual expansion in manufacturing output over a 10-year period. The impact is more pronounced in the wholesale (R14.4 billion), transport (R14 billion), and finance (R11 billion) sectors with a 3.4% growth over the 10-year period. The mining, agriculture and electricity sectors will receive a cumulative boost of about R8.5 billion, R2.7 billion and R5.5 billion, respectively while the construction sector will receive a boost of about R1.3 billion in the process.

**Table 6: Impact on Sectoral Output (R billion)**

<b>Growth rate over ten years</b>	<b>3.4%</b>	<b>10%</b>
<b>Manufacturing</b>	94.5*	277.8*
<b>Mining</b>	8.5	25
<b>Agriculture</b>	2.7	8
<b>Wholesale &amp; retail trade</b>	14.4	42
<b>Finance</b>	11	31.3
<b>Construction</b>	1.3	3.7
<b>Transport &amp; Communication</b>	14	41
<b>Electricity</b>	5.5	16.2

Source: PAIRS

Note: \* Cumulative shock amount

The boost in the output of the services sector (Finance, Wholesale and Transport) can be attributed to the direct link between the production of goods and services. In other words, an increase in the manufacturing of goods will also result in increased levels of services rendered in the economy. On the other hand, the other real sectors (Mining, Agriculture, Construction and Electricity) use manufacturing output as inputs in their production processes.

Notably, boosting manufacturing output by the estimated amount stated in Table 6 requires an estimated R23 billion (4.3% annual growth) and R67.5 billion (12.7% annual growth) in investment spending to achieve the respective 3.4% and 10% output growth per annum. In this regard, the new rescue package of R25 billion of investment for the Manufacturing sector (spread over 6-year period) as announced by the Minister of Finance in his Medium-Term Budget Policy Statement (MTBPS) is a profound step by the government to expand

the manufacturing base of the economy. However, an excess of around R43 billion is still required to achieve the job-creating growth target.

b) Employment and Real Wage effects

Employment and real wage impacts would follow the changes in output, induced by the increase in the manufacturing output. Under a 3.4% growth path, about 61,000 cumulative additional jobs will be generated in the Manufacturing sector. If the sector grows at a sustainable 10% per annum then about 173,000 cumulative additional jobs will be generated (See Table 7). Mining, Agriculture, Electricity and Construction will create cumulatively about 8,700, 2,500, 7,400 and 4,300 respectively. The percentage increase (elasticity) in jobs created in the agriculture sector is higher than other sectors in the economy. However, due to the declining contribution of the sector to GDP over the past decade, the number of additional jobs that could result will be contained (low-base effect). The Wholesale and Finance sector will create the most jobs after manufacturing.

**Table 7: Impact on Sectoral Employment (no. of jobs) and Real Wages (R billion)**

Growth rate over ten years	3.4% Real wage effects (R billion)	10% Real wage effects (R billion)	3.4% Employment effects (no. of jobs)	10% Employment effects (no. of jobs)
<b>Manufacturing</b>	39.3	114.6	61,000	173,000
<b>Mining</b>	1.2	3.5	8,700	25,300
<b>Agriculture</b>	1	2.8	2,500	7,100
<b>Wholesale &amp; retail trade</b>	6.3	18.3	39,800	112,400
<b>Finance</b>	5.2	15	16,600	47,500
<b>Construction</b>	0.55	1.6	4,300	12,500
<b>Transport &amp; Communication</b>	2.9	8.6	2,800	8,200
<b>Electricity</b>	1.3	3.8	7,400	21,800

Source: PAIRS

Real wages, which are greatly influenced by the level of productivity, will also follow a similar trend with sectoral output effects. The real wage bill in the Manufacturing sector will increase by an estimated R39 billion while wholesale, Finance and Transport will receive a wage boost of about R6.3 billion, R5.2 billion and R3 billion, respectively. These impacts will be much higher if the growth pattern follows a sustainable path over the 10-year period (See Table 7).

c) External sector effects

With regard to the external sector effects, exports of manufacturing output will only increase by around R19 billion if the sector continues on the current growth path. If the sector is set on a sustainable 10% average growth per annum, then a cumulative R55 billion of exports will be recorded. Mining will remain the second highest exports earning sector (R3.4 billion) in the economy while the Transport and Communication sector will follow, registering an estimated R2.8 billion over the period (Table 8).



**Table 8: Impact on Export Earnings (R billion)**

<b>Growth rate over ten years</b>	<b>3.4%</b>	<b>10%</b>
<b>Manufacturing</b>	19.1	55.4
<b>Mining</b>	3.4	10
<b>Agriculture</b>	0.3	0.9
<b>Wholesale &amp; retail trade</b>	0.24	0.7
<b>Finance</b>	0.13	0.4
<b>Construction</b>	0.004	0.011
<b>Transport &amp; Communication</b>	2.8	8
<b>Electricity</b>	0.002	0.006

Source: PAIRS

The above impact on export earnings across sectors is partly dependent on global economic conditions, which are assumed to improve moderately over the next ten years. However, a quicker recovery would translate in higher export earnings.

### 3.4. Conclusion

This section assessed the multiplier effects and impact of the Manufacturing sector on the economy at the sectoral and macro levels using a dynamic macro-econometric model.

The assessment of the output multiplier effects of an increase in investment spending by the same amount across major sectors reveals the need for an urgent intervention in areas with highest impact. The Manufacturing sector is amongst the top-three sectors with the highest output multiplier. Results show that a rand value investment spending in the Manufacturing sector will lead to notable changes in output, employment, exports and fiscal revenue. Given its linkages with other sectors in the economy, it should attract the first priority.

Results from the simulation of the impact of a boost in manufacturing output (sustainable scenario) revealed the macro-economic implications of an accelerated manufacturing performance. These simulations show that a boost in the Manufacturing sector will have a considerable impact on the major macro-economic variables (household consumption, GDP, investment, etc.). An increase in the number of people employed under the sustainable scenario growth path will help alleviate unemployment in the country.

At the sectoral level, sectors that will create the majority of additional jobs over the 10-year period are the Manufacturing, Wholesale & Retail Trade, Finance, and Mining sectors. The same trend is also reflected by the impact on GDP. Other sectors such as Agriculture, which is expected to receive a big boost due to its direct linkage with the Manufacturing sector, remain muted in terms of additional jobs and output generated. A higher elasticity was recorded for the sector. However, due to the low-base effect, lower numbers of jobs and output obtained.



## Section Four: Concluding Remarks and Policy Recommendations

Manufacturing remains an important sector within the South African economy given its potential to generate positive and significant spillover effects on the economy. Such a potential has been analysed by firstly considering the Manufacturing sector's output, employment, export earnings and fiscal revenue multipliers following an increased investment in the sector. Secondly, the analysis considered the impact of a sustainable growth in manufacturing production over a ten-year period on key macroeconomic variables as well as other sectors within the economy. Results emphasise the importance of the Manufacturing sector and its potential to act as one of the key propelling engines for the South African economy.

However, a sustainable growth in the Manufacturing sector requires some pre-conditions to exist. In particular, key factors relating to economic policies and structural constraints within the South African economy need to be fully addressed so as to create conducive environment for the sector to remain on a sustainable growth path. Strategies that can be considered include:

1. Adopting a favourable exchange rate policy for the Rand and a trade policy to promote Manufacturing: The Manufacturing sector's performance in terms of exports is linked to and affected by the movements in the exchange rate of the Rand. Trade policy relating to export taxes, tariffs, quotas, product specification and standards, etc. should be geared towards promoting South Africa's competitiveness.
2. Differentiated electricity pricing: The functioning of the Manufacturing sector heavily relies on energy mainly in the form of Electricity. Therefore, in addition to electricity availability, electricity pricing should be differentiated so as to help energy intensive industries to manage their cost of production. This would go a long way to enhancing competitiveness.
3. Emulating the MIDP for relevant industries within the Manufacturing sector: a number of Manufacturing industries in which South Africa has comparative advantage e.g. ferro-alloys need to be supported so as to enhance their global competitiveness as well as to expand exports and production both in terms of volume and scale. Furthermore, the strategic nature of some of these key industries is vital for the long term sustainability of the country's industrialization success.
4. Accelerating beneficiation of the Mining sector to promote down and upstream manufacturing industries: South Africa mostly exports raw minerals thereby sacrificing additional revenue and employment that could have been generated through domestic value addition.
5. Encouraging skills generation in line with manufacturing needs, manufacturing development programmes for artisans, technicians, etc. and immigration of skilled *bona fide* people: The amount and quality of skills are so important in Manufacturing that investment in training and development programmes as well as

sourcing skilled workers are crucial for the sector's competitiveness and sustainability.

6. Fast tracking infrastructural backlogs: a key source of re-industrialization of the country is an appropriate and urgent implementation of infrastructural backlogs, both national and municipal infrastructure.

## References

- Akanbi, O.A. and Du Toit, C.B. 2011. Macro-econometric modelling for the Nigerian economy: a growth-poverty gap analysis. *Economic Modelling*, Vol.28, pp.335-350.
- Allen, C.B., & Nixon, J. 1997. Two Concepts of the NAIRU. In Allen, C.B. and Hall, S.G. (eds), *Macroeconomic Modelling in a Changing World: Towards a Common Approach*. Chichester: John Wiley and Sons.
- Dornbusch, R. 1980. Exchange Rate Economics: Where Do We Stand? *Brookings Papers on Economic Activity*, 1980(1), pp. 143 – 185.
- Du Toit, C.B., & Moolman, E. 2004. A Neoclassical Investment Function of the South African Economy. *Economic Modelling*, Vol.21, pp.647-660.
- Du Toit, C.B. 1999. A Supply-side Model of the South African Economy: Critical Policy Implications. Unpublished Doctoral thesis. Pretoria: University of Pretoria.
- Enders W. 2004. *Applied Econometric Time Series*, 2<sup>nd</sup> ed. New York: John Wiley and Sons.
- Engle, R. & Granger, C. 1987. Cointegration and Error Correction: Representation, Estimation, and Testing. *Econometrica*, Vol.55, pp.251-76.
- Frankel, J.A. 1979. On the Mark: A Theory of Floating Exchange Rates Based on Real Interest Differentials. *American Economic Review*, Vol. 69, No. 4 (Sep., 1979), pp. 610 – 622.
- Klein, L.R. 1982. The Supply-side of the Economy: A View from the Prospective of the Wharton Model. In Fink, R.F. (ed), *Supply-Side Economics: A Critical Appraisal*. Maryland: University Publications of America.
- Layard, R. & Nickell, S. 1986. Unemployment in Britain. *Economica*, Vol.53, pp.S12-S169.
- Pretorius, C.J. 1998. Gross Fixed Investment in the Macroeconometric Model of the Reserve Bank. *Quarterly Bulletin-March 2002(no.207)*. Pretoria, South African Reserve Bank.

## Appendix 'A'

### A.1. Model Specification, Core Structural Equations and Closure

The model captures both the short-run and long-run dynamic properties of the economy. As mentioned earlier, four sectors of the economy were captured: the real sector, the external sector, the monetary sector, and the government (public) sector as in Akanbi and du Toit (2011).

The real sector consists of aggregate supply, aggregate demand and the price block. The aggregate supply determines real domestic output by estimating the production function, domestic investment, labour demand, and real wages. Aggregate demand determines aggregate household real consumption expenditure in the economy while the price block estimates producer and consumer prices.

The external sector identifies the major components in the current account of the balance of payment and the variation in the level of exchange rate. It estimates the real exports of goods and services, the real imports of goods and services and the rand/ U.S. dollar nominal exchange rate.

The model estimates money supply while assuming that the interest rate is exogenously determined in the system in line with the assumption that monetary authorities directly control the level of interest rates.

Government revenue is estimated in the model while government expenditure is assumed to be exogenously determined by the political leadership.

The important inter-linkages and feedbacks of the various macroeconomic variables and estimated equations in the system are revealed in the model closure. The type of closure reveals the features of the model developed and how the various policy simulations/scenarios would feed back into the entire system.

The production function (GDP) is estimated by making the supply-side of the economy more active than the demand-side. The price (producer and consumer) equations serve as the link between the demand-side and the supply-side of the economy through excess demand and capacity utilisation. This is presented as:

$$GDP = f(L, K, T)$$

$$\text{Excess Demand} = GDE / GDP$$

$$GDE = C + I + G$$

$$\text{Capacity Utilisation} = GDP / GDP\_POTENTIAL$$

where L is labour employment, K is capital stock, T is technology, GDE is gross domestic expenditure, C is household consumption expenditure, I is domestic investment, G is total government expenditure, and GDP\_POTENTIAL is the potential level of GDP.

The potential level of output in the economy is estimated by using the coefficients of labour and capital from the production function with the potential level of capital stock, labour employment and total factor productivity. These variables are generated using the Hodrick-Prescott (HP) Filter technique (Akanbi and du Toit, 2011).

The long-run core structural equations estimated from the four sectors of the economy are presented as follows:

#### A.1.1. The real sector

This sector consists of aggregate supply, aggregate demand and the price block. Aggregate supply captures the real domestic output by estimating the production function, the domestic investment, labour demand, and real wages. Aggregate demand captures the aggregate household real consumption expenditure in the economy while the price block estimates the producer and consumer prices.

##### a) Production function

The standard production function is estimated for the South African economy and is presented as:

$$Y_t = f(N_t^+, K_t^+) \quad (1)$$

where  $Y_t$  is the Gross Domestic Product (GDP),  $N_t$  is the labour employment and  $K_t$  is the capital stock

##### b) Domestic investment (real gross capital formation):

This study used the neoclassical approach (Jorgenson, 1963) in estimating the domestic investment function, since it incorporates all cost-minimizing and profit-maximizing decision-making processes by firms. This approach has also been adopted in du Toit (1999), du Toit and Moolman (2004), Pretorius (1998) and Akanbi and du Toit (2011). The long-run domestic investment function for South Africa is modelled as a function of output, user cost of capital, and capacity utilization and is presented as:

$$I_t = f(Y_t^+, ucc_t^-, cu_t^+) \quad (2)$$

where  $I_t$  is the gross domestic investment,  $cu_t$  is the level of capacity utilization, and  $ucc_t$  is the user cost of capital.

##### c) Labour Demand and Real Wage determination

In modelling the labour market, the standard labour demand equation and a wage adjustment equation are defined and estimated. However, the long-run labour demand function is presented as:

$$N_t = f(rw_t^-, Y_t^+) \quad (3)$$

where  $rw_t$  is the real wage rate

The real wage equation follows Allen and Nixon (1997:147) and is specified in this study as:

$$rw_t = f(labprod_t^+, unemp_t) \quad (4)$$

where  $labprod_t$  is the labour productivity and  $unemp_t$  is unemployment

d) Household Real Consumption Expenditure:

The long-run household consumption is a function of real disposable income, real wealth, and the real interest rate and this is specified as:

$$hh\_rconexp_t = f(hh\_dis\_inc_t^+, rwealth_t^+, rint_t^+) \quad (5)$$

where  $hh\_rconexp_t$  is the household real consumption expenditure,  $hh\_dis\_inc_t$  is the household real disposable income,  $rwealth_t$  is the real wealth (proxy by real domestic credit), and  $rint_t$  is the real rate of interest

e) Consumer and Producer Prices

The production price equation follows Layard and Nickell (1986) and the long-run specification is presented as:

$$P_t^p = f(w_t^+, cu_t^+, ucc_t^+, elect\_p_t^+, petrol\_p_t^+) \quad (6)$$

where  $w_t$  is the nominal wage rate,  $P_t^p$  is the production price index,  $petrol\_p_t$  is pump petrol prices and  $elect\_p_t$  is the electricity prices

Consumer prices which are directly related to production prices are specified as:

$$C_t^p = f(P_t^p, imp_t^p, excessd_t^+, exch_t^+) \quad (7)$$

where  $C_t^p$  is the consumer price,  $imp_t^p$  is the import price on consumption goods,  $exch_t$  is the exchange rate and  $excessd_t$  is the excess demand

#### A.1.2. The external sector

The external sector identifies the major components in the current account of the balance of payment and the variation in the level of exchange rate. It estimates the real exports of goods and services, the real imports of goods and services and the naira/ U.S. dollar nominal exchange rate.

##### a) Real Exports of Goods and Services

The demand for real exports of goods and services in the long-run is mainly driven by the level of world income, exchange rate and relative prices of goods and services. The real exports function is however, specified as:

$$r\exp_t = f(wY_t^+, relp_t^-, exch_t^+) \quad (8)$$

where  $r\exp_t$  is the real exports of goods and services,  $wY_t$  is the real world (U.S) income,  $relp_t$  is the relative price of goods and services (the ratio of domestic prices to U.S prices)

##### b) Real Imports of Goods and Services

The demand for real imports of goods and services in the long-run is mainly driven by the level of domestic income, exchange rate and relative prices of goods and services. The real imports function is therefore, specified as:

$$rimp_t = f(Y_t^+, relp_t^+, exch_t^-) \quad (9)$$

where  $rimp_t$  is the real imports of goods and services

##### c) Nominal Exchange Rate

The underlining theory behind the specification of the nominal exchange rate equation follows the Dornbusch (1976, 1980) and the Frankel (1979). The long-run nominal exchange rate is specified as follows:

$$exch_t = f(relY_t^-, relint_t^-, relp_t^+) \quad (10)$$

where  $relY_t$  is the relative income (the ratio of domestic GDP to U.S. GDP), and  $relint_t$  is the relative interest rate (the ratio of domestic interest rate to U.S interest rate)



#### A.1.3. Monetary sector

The model estimates the money supply while assuming that interest rate is exogenously determined in the system. This is done following the principle that the monetary authority directly controls interest.

The money supply equation is assumed to be an inverted interest rate function. This is derived as:

$$RM_{s_t} = f(\text{int}_t^-, Y_t^+) \quad (11)$$

where  $RM_{s_t}$  is the real monetary aggregate

#### A.1.4. Government sector

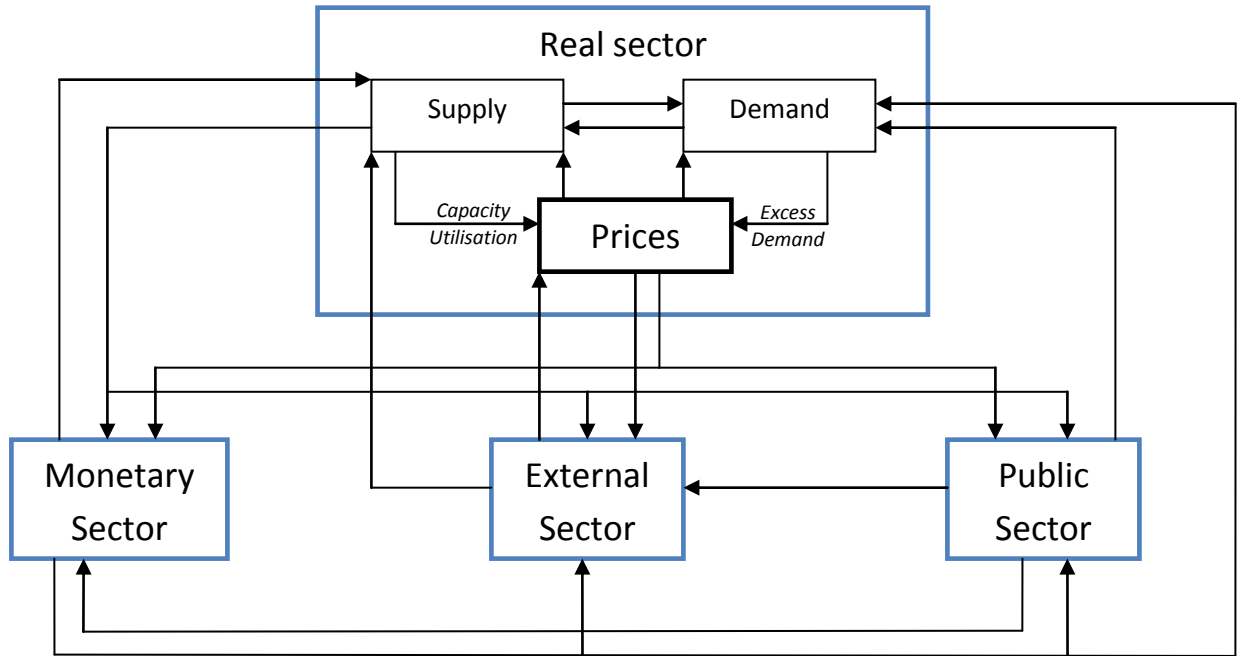
In this study, the government sector is assumed to be exogenously determined. Government revenue is estimated as a function of GDP and exchange rate, since about 95 per cent of revenue comes from taxes. This is derived as:

$$govtrev_t = f(exch_t^+, Y_t^+) \quad (12)$$

where  $govtrev_t$  is total government revenue

The summary of the entire model is presented in the form of the flow chart in Figure A1. The chart highlights the major contemporaneous feedback processes of the interactions between the segments investigated in the model.

Figure A1: Flow Chart of the Model



As shown in the flow chart above, the price block serves as a major linkage between the supply-side and demand-side through capacity utilisation and excess demand. Changes in these variables cause fluctuations in the price level, which in turn affect production and demand and also cause changes in the other sectors of the economy. The monetary, external and public sectors are linked directly to the supply-side and demand-side of the economy through changes in the interest rate, government spending and the exchange rate. The institutional characteristics of the economy, with its associated policy behaviour, are incorporated through the public and monetary sector, whereas the interaction with the rest of the world is captured through the external sector.

#### **Research Team**

**Dr. Iraj Abedian**

*PhD (Econ), SFU, Canada,*

Chief Economist

[abedian@pan-african.co.za](mailto:abedian@pan-african.co.za)

**Patrick Kanda**

*M.Com. (Econ) (cum laude), Univ. of Pretoria*

Senior Economist & Head of Research

[pkanda@pan-african.co.za](mailto:pkanda@pan-african.co.za)

**Nomava Zanazo**

*B.Com.Hons. (Econ. & Econometrics), Univ. of JHB*

Economist

[nzanazo@pan-african.co.za](mailto:nzanazo@pan-african.co.za)

**Gloria Mabindisa**

*B.Com.Hons. (Econ. & Econometrics), Univ. of JHB*

Economist

[gmabindisa@pan-african.co.za](mailto:gmabindisa@pan-african.co.za)

Contact us @

Pan-African Investment & Research Services (Pty) Ltd

2nd Floor, Summit Square

15 School Road

Cnr Rivonia & Summit Road,

Morningside 2196; Johannesburg, South Africa

Tel: (+27) 11 883 8036/37

Fax: (+27) 11 883 8038

[www.pan-african.co.za](http://www.pan-african.co.za)

#### **Disclaimer**

The information and opinions contained in this report have been obtained from public sources believed to be reliable, but no guarantee is made that such information is accurate or complete. All estimates and opinions included in this report constitute our judgements as of the date of this report. Analysis, statistics and opinions contained in the report are published for the assistance of recipients, but by no means should be taken as a substitute for the exercise of judgement by any recipient. Clearly, they are subject to change without notice. No Pan-African Group Company accepts any liability whatsoever for any direct or consequential loss arising from any use of material contained in this report. This report is for the use of intended recipients and may not be reproduced (in whole or in part) or delivered or transmitted to any other person without the prior written consent of Pan-African Investment and Research Services (Pty) Ltd.