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OBEN/20/02

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Authorised for publication by:

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OBEN 2002* – June 2020

What's different about the current business cycle downswing?

Philadelphia Makhanya

Abstract

South Africa is in the longest business cycle downswing in its history. This note examines the behaviour of different components of GDP during downswings, and contrasts the current downswing with historical patterns. We find particularly stark differences in imports (stronger during this downswing) and public investment (significantly weaker than usual). The note further considers drivers of business cycle upswings, for clues as to how the current downswing might ultimately end. Analysis of upswings shows that imports and private sector investment spending, which tend to contract sharply during downswings, are also the components that tend to expand the most during upswings, with imports growing strongly from the start of the upswing.

1. Introduction[1]

South Africa is in the longest business cycle downswing in its history. This note examines the behaviour of different components of GDP during downswings, and contrasts the current downswing with historical patterns. We find particularly stark differences in imports (stronger during this downswing) and public investment (significantly weaker than usual). The note further considers drivers of business cycle upswings, for clues as to how the current downswing might ultimately end.

2. Putting business cycles in context

The Business Cycle Unit of the South African Reserve Bank (SARB) determines the reference turning points in the South African business cycle in terms of the growth cycle of the business cycle. Growth cycles refer to fluctuations around the long-term growth trend of aggregate economic activity, also called trend-adjusted business cycles. The reference turning points of the business cycle distinguish between upward phases (or upswings) – where aggregate growth rate in economic activity either matches or exceeds its long-term growth trend – and downward phases (or downswings) – where aggregate economic activity either contracts or increases at a slower pace than its long-term growth trend. The growth cycle definition differs from the classical definition of the business cycle which looks at periods of absolute increases and contractions in aggregate economic activity[2].

The Business Cycle Unit has dated business cycle phases since the end of World War II and dates them according to the number of months that fall within each phase[3]. According to the Unit, South Africa has had 16 upswings since the post war period and also 16 downswings, including the current one, which started in

[1] A special thank you to Iaan Venter, David Fowkes and Witness Simbanegavi for their valuable inputs and comments

[2] Venter, J. C., Business cycles in South Africa from 2009 to 2013, Quarterly Bulletin, p. 102 – 112, March 2016, South African Reserve Bank

[3] SA's business cycle chronology are regularly published on page S-159 of the SARB Quarterly Bulletin

December 2013. Worryingly, the current downswing, with 77 months to May 2020[4] represents the longest downswing on record. The second longest downward phase on record is the March 1986 – May 1993 downswing, which comprised 51 months and which also represented a period of extreme political and economic turmoil for the country. Historically, downswings have on average lasted for about 20 months.

3. Analytical methodology

The analysis in this note will start from 1960, which corresponds with a period for which South Africa's national accounts data is available on a quarterly basis. For this reason, the business cycle phases will also be converted from months to quarters. For a quarter to fall within an upward or downward phase, it has to have at least two months that fell within that phase[5]. The analysis will be done up to the third quarter of 2019.

Figure 1: GDP performance during business cycle upswings since 1960s

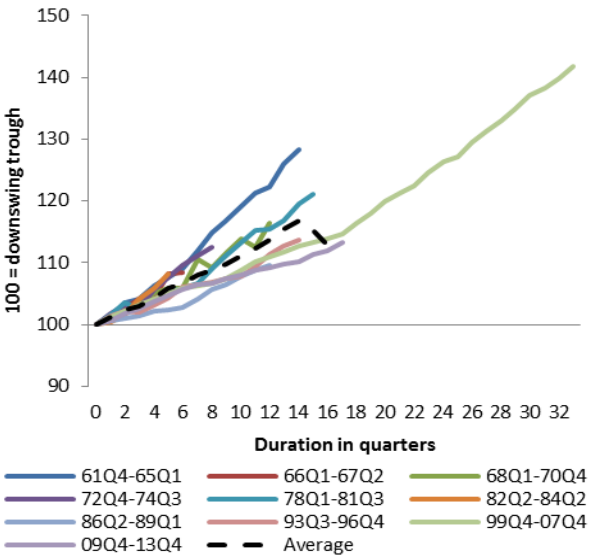
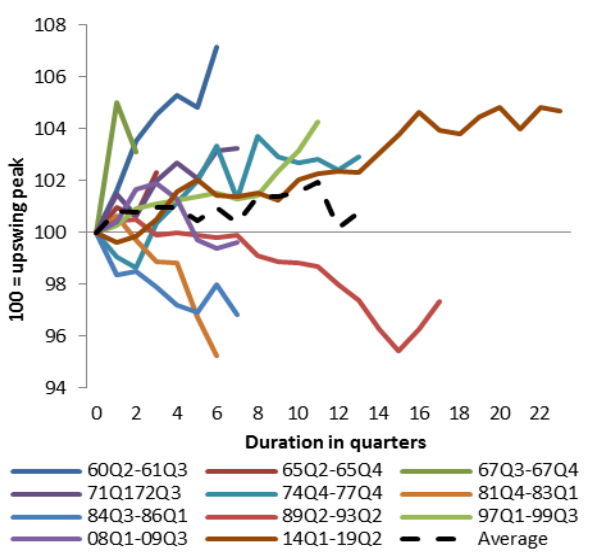


Figure 2: GDP performance during business cycle downswings since 1960s



Source: SARB

Figures 1 and 2 depict quarterly real GDP performance (seasonally adjusted and annualised)[6] during upswings and downswings since 1960, in order to illustrate the methodology used for the analysis. Each phase is indexed, where the base of each upswing represent the last quarter (or trough) of the downswing and where the base of each downswing represents the last quarter (or peak) of the upswing. There were 10 upswings and 11 downswings, including the current, since the 1960s.

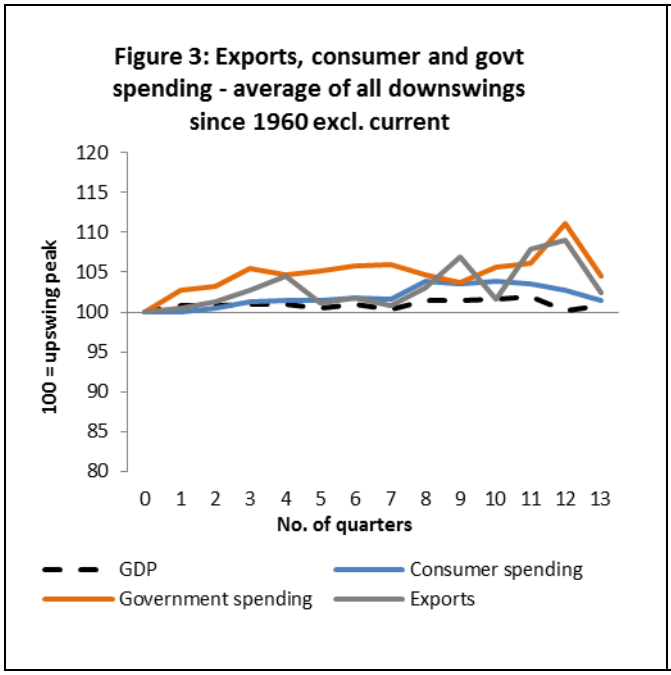
To explore how the current downswing compares with previous ones, this note analyses the behaviour of the different components of GDP during the current downswing relative to the average of all previous downswings and relative to overall GDP growth. Similarly, in order to determine how various components of GDP tend to behave during upswings, the note examines the average behaviour of GDP components during historic upswings relative to overall GDP growth. This methodology is similar to that used by the Bureau for

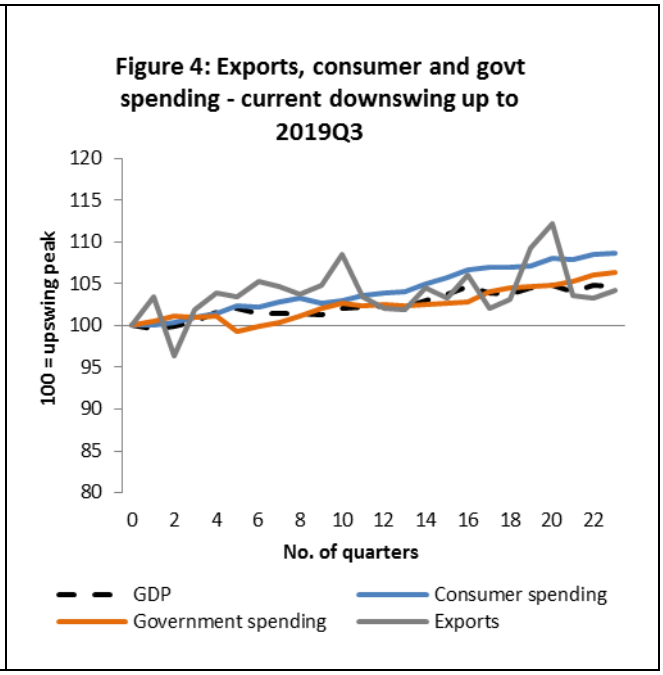
[4] This assumes the economy has not since entered an upswing, which is plausible given the COVID-19 shock.
[5] The methodology was recommended by the South African Reserve Bank's Business Cycle Unit
[6] All quarterly GDP components analysed in this note are constant, seasonally adjusted and annualised

Economic Research (BER)[7] and the SARB's Business Cycle Unit[8], both of which examine the components of GDP that tended to lead a recovery into the upward phase of the business cycle by examining their average performance during historic upswings. A similar methodology is also seen in a paper by the by the Reserve Bank of Australia, which compares the performance of durable goods consumption to spending on non-durable goods, services, machinery and equipment investment, and GDP by looking at their average performance during periods of economic weakness since the 1960s[9]. Appendix 1 and 2 depict the performance of GDP components during historic downswings and upswings, respectively, since the 1960s.

4. Salient features of the current downswing

It was noted earlier that the current downswing is by far the longest on record. When looked at on a quarterly basis, the current downswing entered its 23rd quarter during the third quarter of 2019, compared with an average of 8 quarters of all the other previous downswings dating back to 1960. To explore how the current downswing compares with previous ones, this note analyses the behaviour of the different components of GDP during the current downswing relative to the average of all previous downswings and relative to overall GDP growth. The average is limited to 13 quarters (roughly 3 years) from the start of the downswing, which is the last quarter for which there are values for at least two downward phases excluding the current phase.





Source: SARB

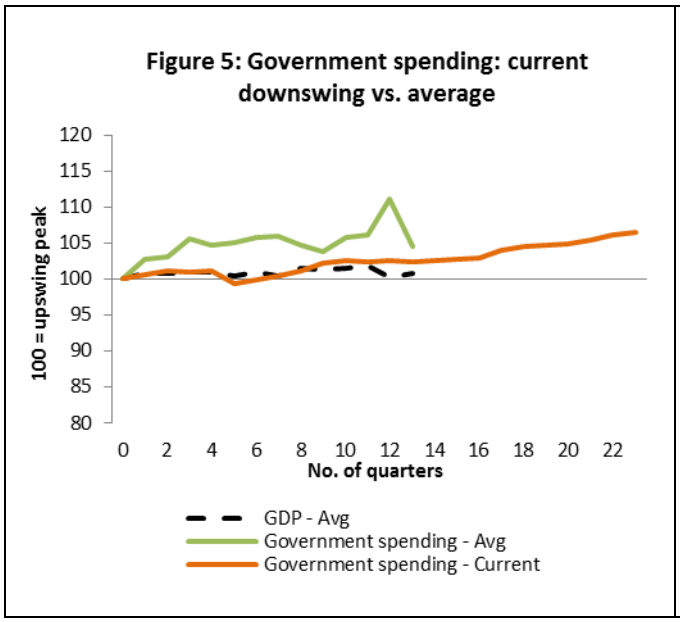
Figure 3 shows that on average, exports, consumer spending, and government spending tend to do relatively better during downswings, recording positive (albeit marginal) growth and outpacing GDP. Furthermore, government spending has, on average, tended to grow faster than exports and consumer spending, particularly during the first two years of the downswing. In this downswing, however, government spending

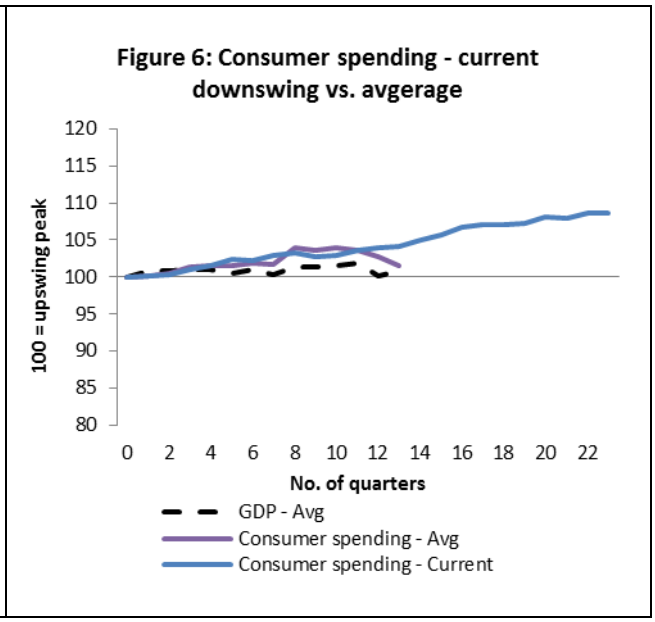
[7] The findings of this analysis was presented by Hugo Pienaar, BER Chief Economist, on 15 August 2019 at the annual BER Conference themed *"Searching for growth: A post-election policy and macroeconomic outlook"*

[8] Wolhuter, A., Bosch, A., and Venter, I. *"Which components of GDP drive the initial part of an upswing in the South African* economy", South African Reserve Bank, Economic Statistics Department Analytical Note 03/2019, December 2019

[9] Wolhuter, Black, S. and Cusbert, T. *"Durable Goods and the Business Cycle"*, Reserve Bank of Australia: Quarterly Bulletin. September 2010.

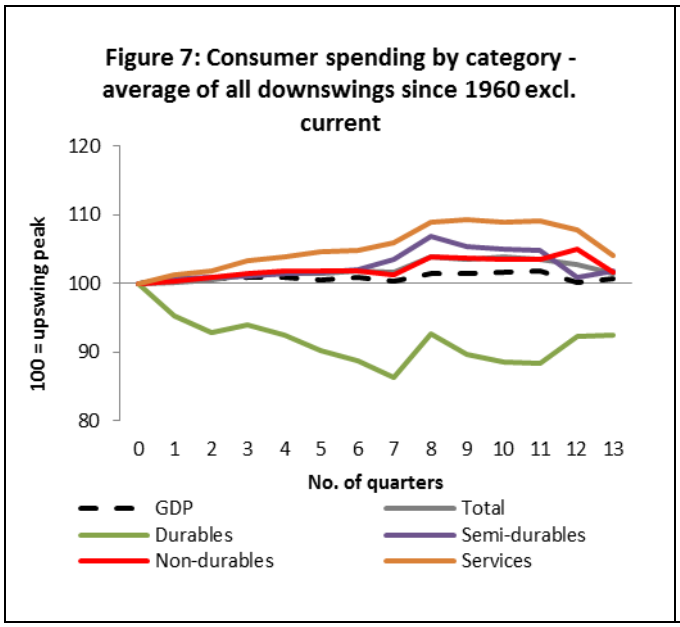
is weaker than consumer spending and exports, and is growing more or less in line with GDP (Figures 4 and 5).

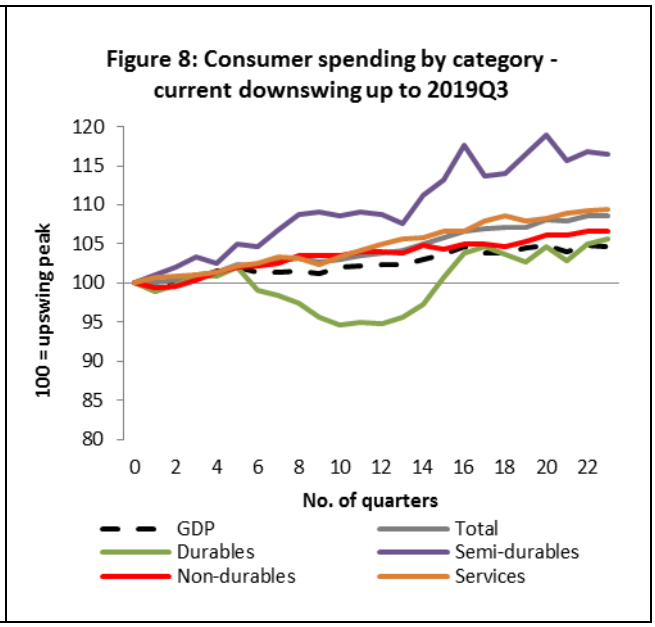




Source: SARB

Consumer spending in the current downswing has performed largely in line with previous downswings in the first three years (Figure 6). Household expenditure has since continued on a relatively strong upward trajectory, reaching levels around 10% above its starting point by the third quarter of 2019. However, although overall household spending in the current downswing has behaved similarly to its historical trend, there has been a shift in the performance of the various spending categories in the current phase relative to previous ones. Whereas services tend to do better than other categories and durables tend to fall more sharply during downswings, the current downswing has seen semi-durables performing better than other categories and displaying more buoyant growth while durables only started falling about a year into the downswing and have fallen less sharply (Figures 7 and 8).

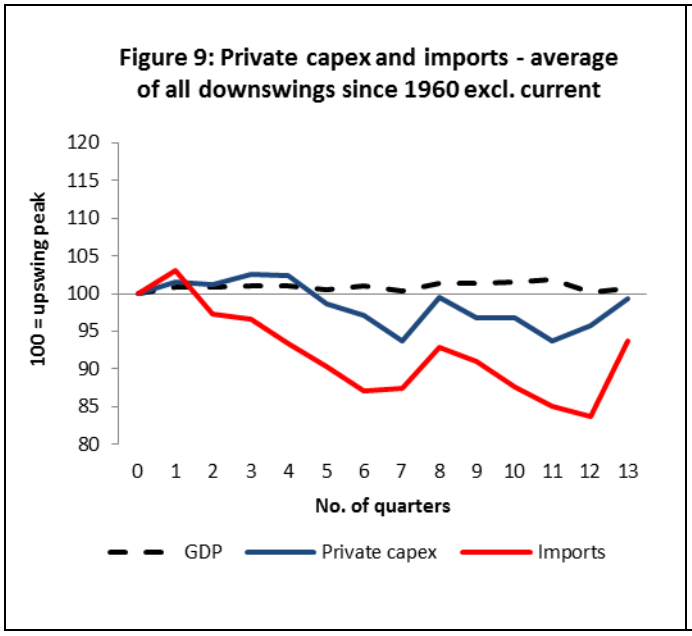


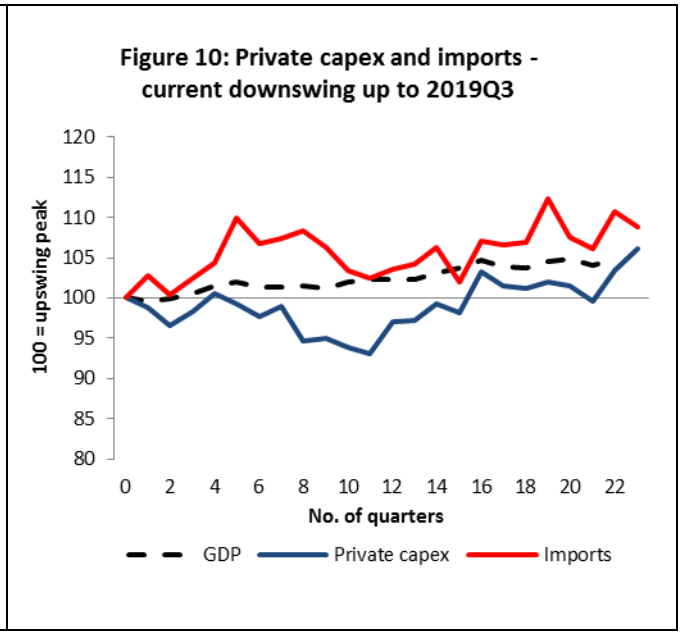


Source: SARB

The striking difference with the current downswing pertains to the behaviour of imports and public sector investment spending. Figure 9 shows that during downswings, imports collapse from the start of the downswing, falling by as much as 15%, on average, below their starting point and remaining about 5% below that point by the end of the downswing. Private sector investment spending displays similar performance as that of imports, but only starts to decline a year into the start of the downswing. The decline in private investment spending is also less pronounced than that of imports (at 7% below its starting point at its lowest), and it also recovers to its starting point level towards the end of the downswing.

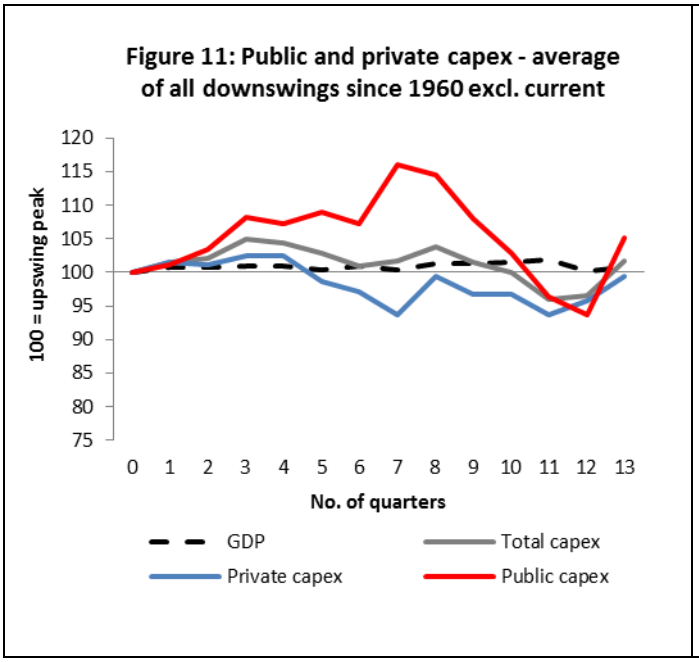
The significant difference with the current downswing is the relatively strong performance of imports, which have remained positive and above GDP growth throughout the period (see Figure 10). While imports tend to end the downswing close to 5% below the starting point, on average, in the current downswing they were almost 5% higher after three years (when most downswings are concluded) and about 10% above their starting point by the third quarter of 2019. The unusually strong growth in imports in the current downswing could possibly be explained by a combination of supply-side weakness (including electricity shortages and policy uncertainty) and relatively demand-supportive macroeconomic policies, which would be consistent with the growth in household consumption of durables and semi-durables discussed above. Additionally, import growth has been boosted by investment projects, including renewable energy projects.

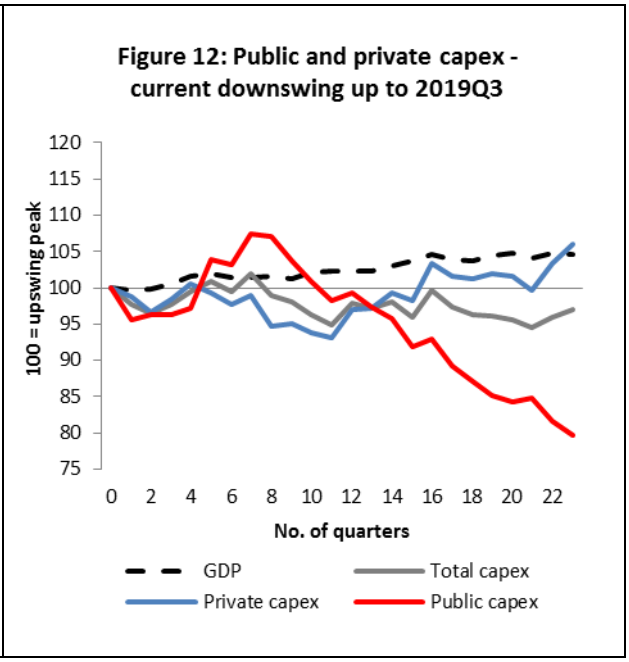




Source: SARB

Another salient characteristic of the current downswing, as noted above, relates to the performance of public sector investment spending, which comprises investment spending by general government and public corporations. Figure 11 shows that on average, public sector investment spending tends to increase in the first two years of the downswing and then slumps quite sharply, only posting a recovery during the last quarter of the downswing. Public sector investment spending displays a similar trend in current downswing – increasing during the first two years and then falling sharply. The stark difference however is that unlike in previous downswings where public investment spending recovered in the last quarter, it has continued to decline quite sharply during the current downswing (Figure 12). While public sector investment only falls about 5% below its starting point, on average, in the current downswing it has now fallen by almost 20% below its starting point (by the third quarter of 2019).





Source: SARB

The sharp decline in public investment spending is largely driven by a significant contraction in investment spending by public corporations. State-owned enterprises supported a rise in public sector investment spending after 2009, with spending primarily on transport and electricity generation sectors. The conclusion of some key projects as well as operational, governance and financial challenges in some key state-owned entities have contributed to the uncharacteristically prolonged and sharp decline in investment spending by these institutions in the current downswing.

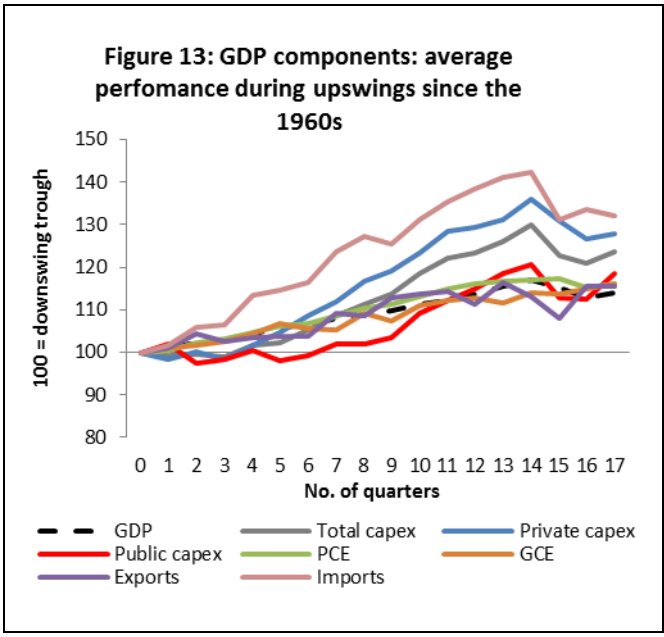
5. What are the early drivers of upswings?

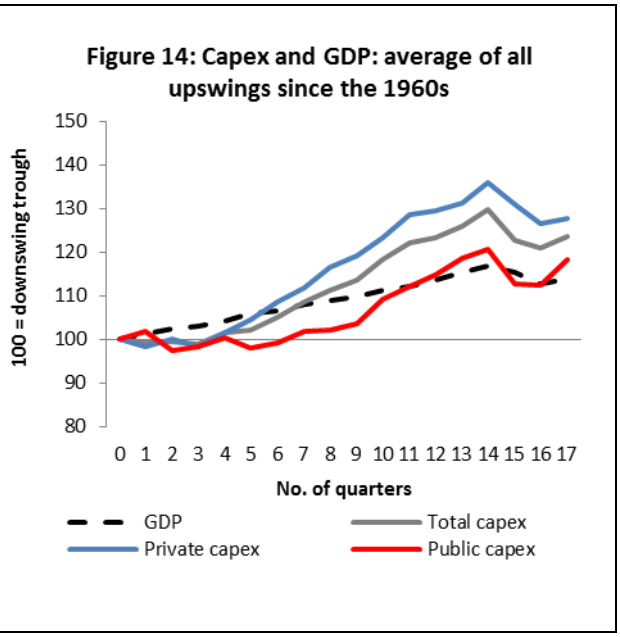
This section follows a similar method of analysis as above but focuses on the upward phase of the business cycle, in order to determine how various components of GDP tend to behave during upswings, particularly during the early stages[10]. The analysis of upswings is limited to 17 quarters (roughly 4 years) from the start of the upswing, which is also the last quarter for which there are values for at least two upswings. As was noted earlier, the Bureau for Economic Research (BER) and the SARB's Business Cycle Unit both performed similar analysis in 2019, looking at which components of GDP tended to lead a recovery into the upward phase of the business cycle. The findings of this analysis are contrasted with those of the BER and the Business Cycles Unit below.

Figure 13 shows that imports and private sector investment spending, which tend to decline quite sharply during downswings, are also the two components that expand most during upswings. Imports tend to grow strongly from the start of the upswing and significantly outpace all other GDP component, reaching an average high of about 42% above the starting point during the fourth year of the upswing. Private sector investment spending, on the other hand, tends to underperform GDP growth during the first year of the upswing, but gains significant traction thereafter, growing significantly faster than GDP and its other subcomponents, excluding imports, to peak 36% above its starting point. This is in line with the BER and the

[10] An interesting point to note regarding upswings is that the upswing preceding the 2008 Financial Crisis (from September 1999 to November 2007) was by far the longest in history, spanning 99 months (or just over 8 years). Historically, upswings have, on average, lasted just under 3 years (or 31 months). The upswing following the 2009 Great Recession was the second longest historically, which lasted just over 4 years (or 51 months). Analysed in quarters, the September 1999 to November 2007 upswing lasted 33 quarters, compared to an average of 14 quarters since 1960.

Business Cycle Unit analyses, which find that private sector investment spending tends to lag in early stages of the upswing and accelerates quite significantly thereafter.





Source: SARB

The analysis also shows that government and household expenditure tends to grow in line with GDP during the initial stages of the upswing, before moving marginally higher. This is consistent with the BER and the Business Cycle Unit's findings. Exports also generally track GDP, which is consistent with the Business Cycle Unit findings, but not the BER's argument that exports help drive upswings in their initial stages.

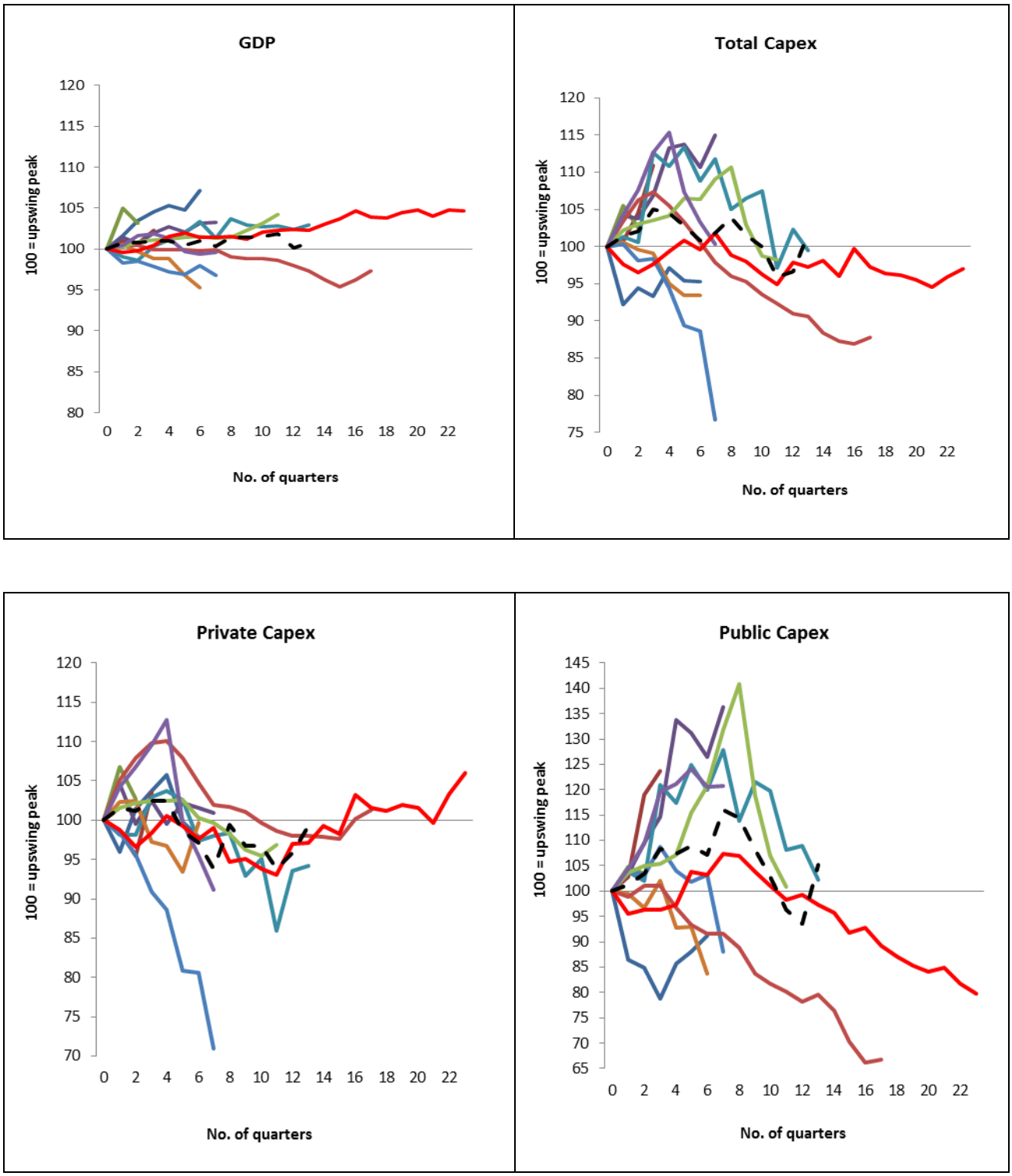
Public sector investment spending tends to underperform GDP for about three years into the upswing, barring for the first quarter of the upswing. In fact, public sector investment spending contracts (relative to its starting point) for about a year into the upswing, and continues to grow below GDP until the third year. The BER comes to a very similar conclusion on the performance of public sector investment spending. By contrast, the Business Cycle Unit finds public sector investment to be a driver of the initial stages of the business cycle upswing, but we are unable to replicate this finding.

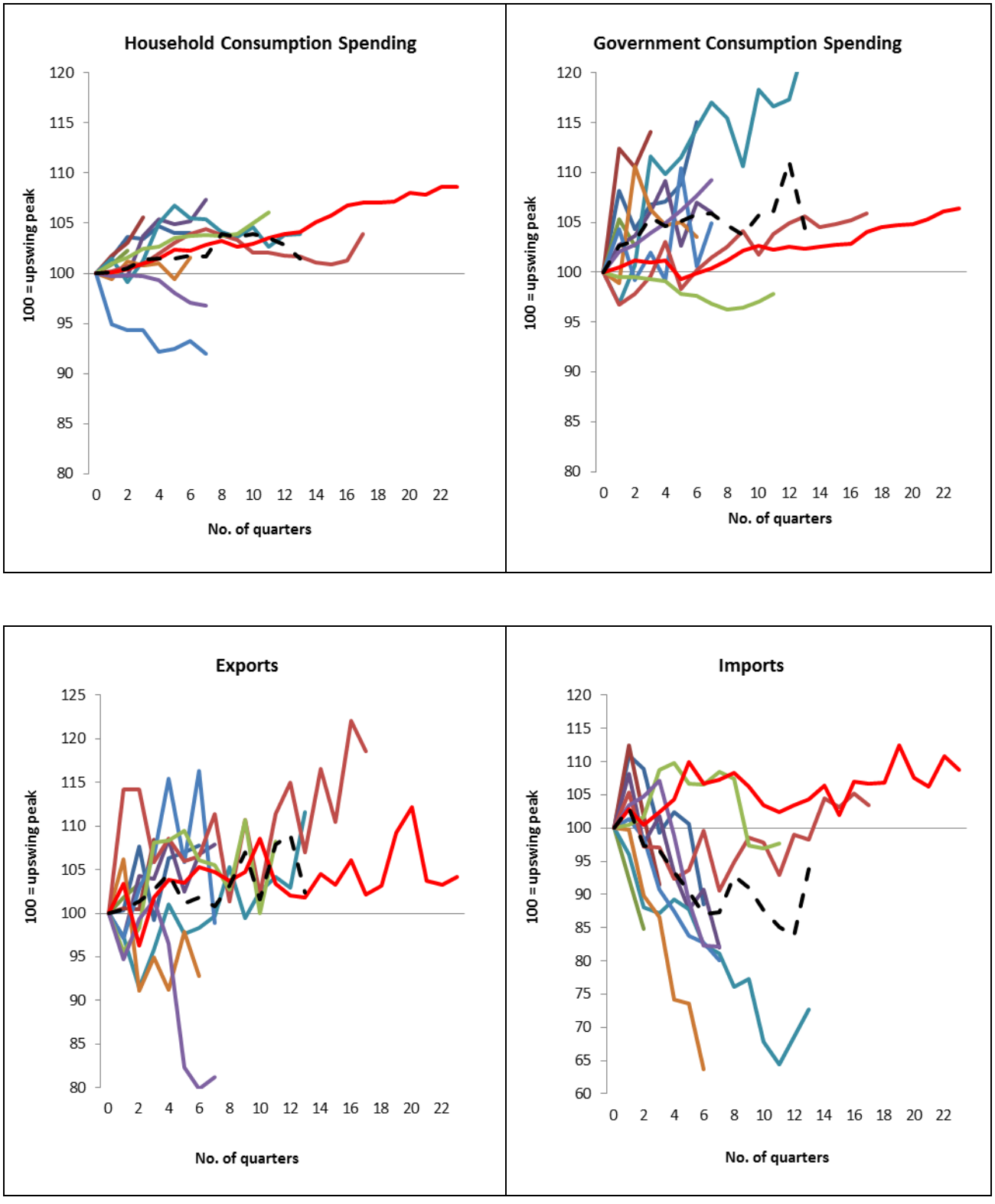
6. Conclusion

The current downswing has two unusual properties. Imports are unusually strong, relative to previous downswings, while the contraction in public sector investment spending has been more pronounced.

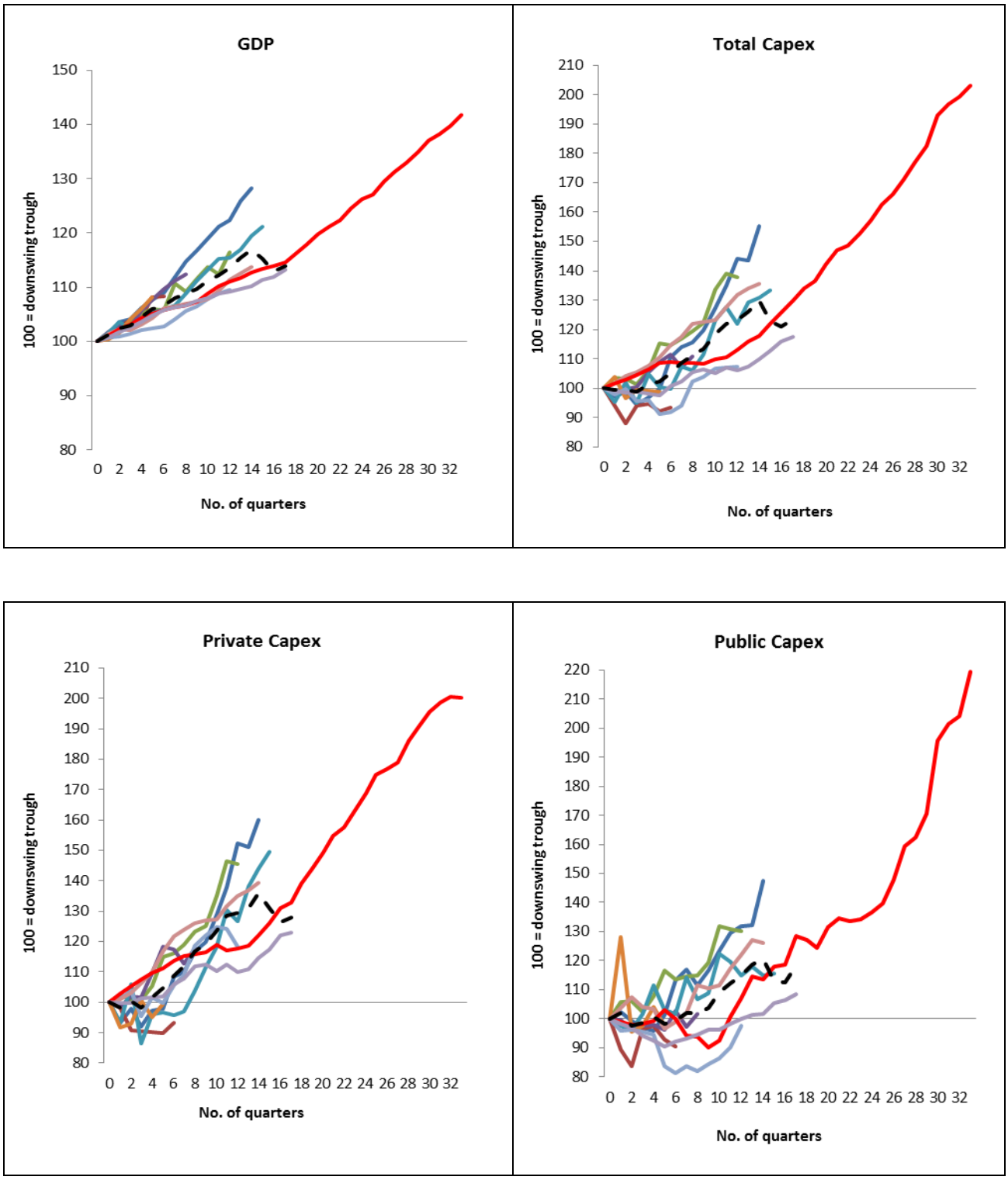
We also find that imports and private sector investment spending, which tend to contract sharply during downswings, are also the components that tend to expand the most during upswings. Imports tend grow strongly from the start of the upswing and significantly outpace all other GDP components, while private sector investment spending tends to underperform GDP growth during the first year of the upswing, before gaining traction subsequently.

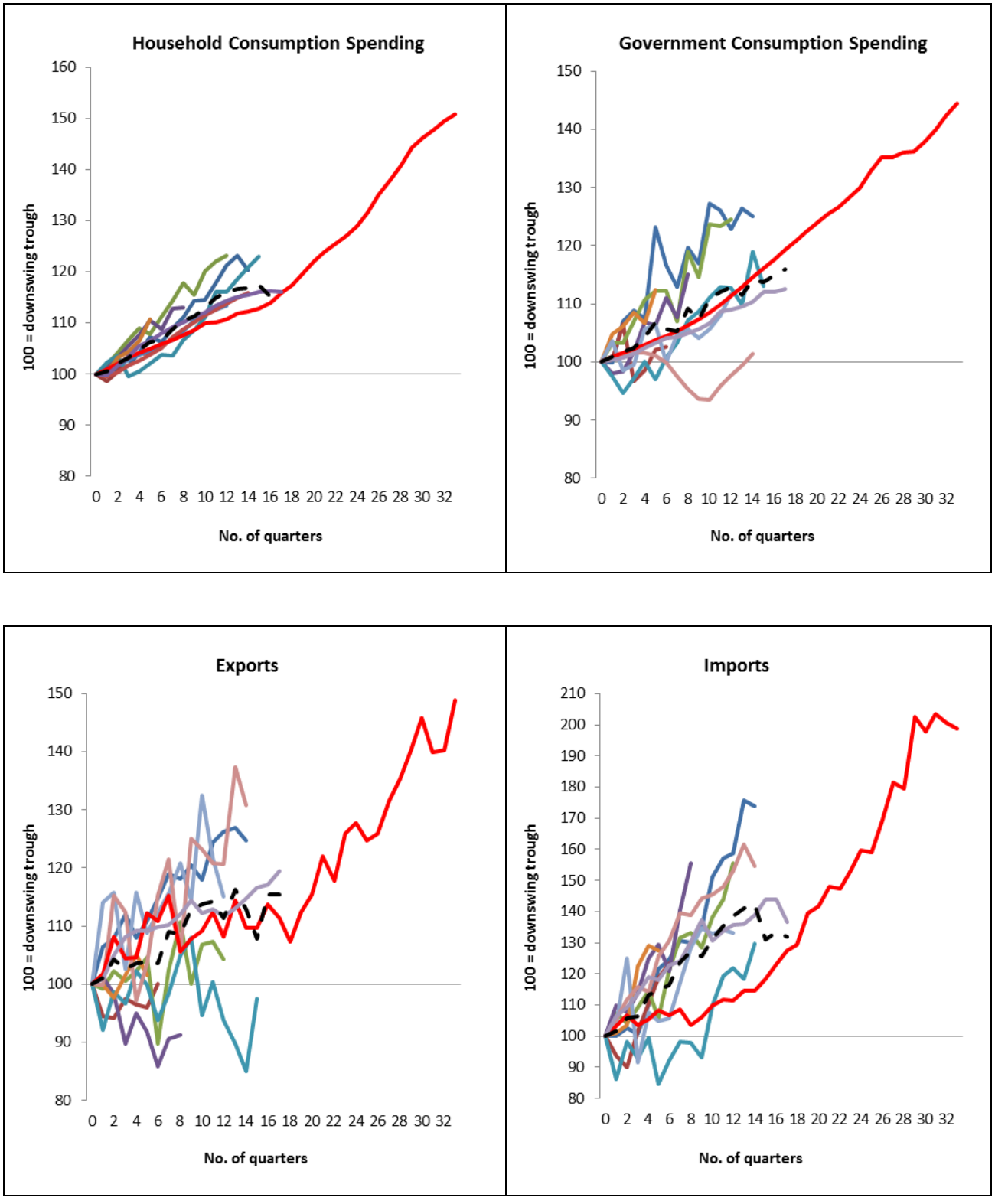
Appendix 1: GDP components during downswings since 1960




Household Consumption Spending
100 = upswing peak
No. of quarters
Government Consumption Spending
100 = upswing peak
No. of quarters
Exports
100 = upswing peak
No. of quarters
Imports
100 = upswing peak
No. of quarters
60Q2-61Q3
65Q2-65Q4
67Q3-67Q4
71Q172Q3
74Q4-77Q4
81Q4-83Q1
84Q3-86Q1
89Q2-93Q2
97Q1-99Q3
08Q1-09Q3
14Q1-19Q2
Avg (excl. current)

Appendix 2: GDP components during upswings since 1960




Household Consumption Spending
100 = downswing trough
No. of quarters
Government Consumption Spending
100 = downswing trough
No. of quarters
Exports
100 = downswing trough
No. of quarters
Imports
100 = downswing trough
No. of quarters
61Q4-65Q1
66Q1-67Q2
68Q1-70Q4
72Q4-74Q3
78Q1-81Q3
82Q2-84Q2
86Q2-89Q1
93Q3-96Q4
99Q4-07Q4
09Q4-13Q4
Average

OBEN 2002* – July 2020

Covid-19 lockdowns: Impact more severe than previously thought

Palesa Mnguni, Mpho Rapapali, Konstantin Makrelov and Witness Simbanegavi

Abstract

This note improves on earlier work assessing the economic impact the Covid-19 pandemic by incorporating fiscal and monetary policy stimulus. We find that lockdown measures will lead to a GDP contraction of 28% (saar) in Q2 relative to Q1; with annual GDP contracting by between 16% and 8.6% depending on the speed with which the economy normalises. The fiscal and monetary policy package is expected to reduce the contraction in annual GDP by around 2.4% under modest assumptions. The scenarios suggest a revenue shortfall of between R259 billion and R544 billion, with the intermediate value of R354 billion, higher than the current National Treasury estimate of R304 billion. Two policy implications are immediate. First, policy efforts should be directed towards reducing risk aversion, increasing confidence and improving the pass-through of the current measures to aggregate demand. Second, government needs to take bold action to stabilise the debt trajectory to avoid an economic implosion.

1. Introduction

This note expands on an earlier note estimating the impact of the Covid-19 lockdown on the South African economy.[1] These estimates are different to the official forecast as they include the indirect impacts through sector linkages but exclude some important relationships such as the Phillips curve. The current estimates complement the forecast by illustrating the role that sector linkages play in amplifying the negative effects of the lockdown levels and the positive effects associated with the policy relief package.

The nationwide lockdown, which began in March 2020, was implemented to slow down the spread of Covid-19 and help buy time for the healthcare system to address capacity challenges. There are five lockdown levels, each with different rules and regulations governing the degree of movement and economic activity. Level 5 has the most stringent restrictions, with firms required to halt operations, except for those providing essential goods and services, while under level 1 majority of the sectors of the economy are allowed to operate, with some restrictions on travel and tourism. South Africa is currently under lockdown level 3, where some sectors of the economy such as, agriculture, mining and manufacturing are allowed to operate at full capacity while others (e.g. construction, tourism, and retail) are still subject to restrictions.

Similar to the previous note, we use the multiplier approach based on Arndt et al. (2020) to estimate the impact of these lockdown measures. The multiplier model is developed from a 2015 Social Accounting Matrix for South Africa and captures both direct and indirect impacts.[2] We distinguish four channels through which the lockdown is expected to impact economic activity, namely (i) the forced reduction in production as a result of a national lockdown and other restrictions on non-essential business operations, (ii) the impact of the lockdown on household demand for goods and services (e.g., tourism as a result of travel and movement restrictions), (iii) the

[1] See EN13

[2] A SAM is a matrix showing the flows of goods and services around the economy over a given period.

effect of disrupted global production and supply chains on South African exports, and (iv) the effect of uncertainty on business investment.

In the earlier note, assumptions were based solely on the announced regulations, as there was no hard data on actual activity at that point. Here, we improve on the previous work in at least two dimensions. First, we take advantage of the data that has come out since the lockdown began, allowing for refinement of the assumptions underpinning the analysis. Second, we evaluate the extent to which the government fiscal (and monetary) policy stimulus announced in April 2020 will cushion the impact of the Covid-19 pandemic on the South African economy. Third, we assess the likely impact on tax revenue and the fiscal deficit.

2. Results

In this section, we estimate the impact of different lockdown levels on output in Q2 and provide annual estimates based on assumptions regarding the likely lockdown levels in the third and fourth quarter. The results are informed by government regulations on which sectors are allowed to operate under different levels as well as assumptions regarding the recovery in exports and investment. These assumptions are summarised in Table 1 and Table 2, below.

Table 1: Assumptions on sector activity under the lockdown levels 3, 2 and 1[3]

	Level 3	Level 2	Level 1
Agriculture	Agriculture at 100% employment.	Agriculture at 100% employment.	Agriculture at 100% employment.
	Production across all subsectors operates at 100% capacity. The easing of restrictions globally boost export demand.	Production across all subsectors operates at 100% capacity.	Production across all sub-sectors operates at 100% capacity.
Mining	All mining at 100% employment.	All mining at 100% employment.	All mining at 100% employment.
	Production capacity is expected to improve to 70%, as restrictions are eased. Increased demand from trading partners will provide some support to demand.	Production capacity is expected to improve to 80%, as restrictions are eased.	Production capacity is expected to improve to 85-90%, as restrictions are eased. Worker infections constrain full scale operations.
Manufacturing	All level 4 manufacturing allowed but now scaling up to 100% employment. All other manufacturing is permitted to scale up to 50% employment.	All manufacturing is scaling up to 100% full capacity.	All manufacturing at 100% employment capacity.
	Production capacity is expected to improve to 80%, as restrictions are eased. The resumption of other sectors in the economy will likely increase activity in the sector.	Production capacity is expected to improve to 90%, as restrictions are eased.	Production capacity is expected to improve to 100%, as restrictions are eased.
Electricity	All electricity, gas and water at 100% capacity.	All electricity, gas and water at 100% capacity.	All electricity, gas and water at 100% capacity.
	Production capacity 80% employment as most of the activity in the economy begins to normalise.	Production capacity 90% employment as most of the activity in the economy begins to normalise.	Production capacity will be at full employment as most of the activity in the economy normalises.
Construction	All level 4 sub-sectors are allowed to continue to operate. Additionally, all other public works civil engineering is allowed as well as commercial building projects.	Expands to permit private residential building projects.	100% capacity. All construction projects are permitted.

[3] Assumptions for lockdown levels 4 and 5 are presented in the appendix. We do not make adjustments for the recent relaxation of the level 3 regulations which allow a number of businesses to reopen (e.g. personal care services, cinemas and theatres and sit-down meals at restaurants).

	70% capacity as private sector is slowly permitted to return to normal activity.	80% capacity as more of private sector is allowed to resume activity.	Sector doesn't quite recover to full capacity as many projects would likely have been abandoned. Operates at around 85% capacity.
Trade, catering and accommodation	Retail trade of goods have been expanded to include all clothing, home textiles and footwear and alcohol (under certain restrictions). Vehicle sales are also permitted.	All retail trade is permitted. Alcohol sales are allowed, albeit with restrictions. Both takeaways and deliveries services at restaurants.	All retail trade is permitted. Alcohol sales are allowed, albeit with restrictions. All restaurants services are also permitted.
	Operations increase to 62% of full capacity, as restrictions in the sector are eased. However, activity constrained by the uncertain economic environment and increased financial strain (households and firms).	Sector operating at 70% of full capacity. The sector will likely be constrained by the low business and consumer confidence and overall slow economic recovery.	Operations at 80% of full capacity. Low business and consumer confidence remain a constraint.
Transport	Limited domestic travel. Ocean travel allowed for limited cargo. Public transport will resume at levels subject to further directions.	Limited domestic travel as well as ocean transport. Public transport will resume at levels subject to further directions.	The following is permitted: air, ocean travel and transport. Essential imported goods will continue be prioritised through ports. Export to neighbouring countries will be expanded. Public transport will resume at levels subject to further directions.
	The sector operates at 65% of full capacity, as restrictions are eased to allow transportation of more goods. Air travel largely restricted.	Sector operates at 75% of full capacity. Freight and shipping activity will likely improve as other sectors increase production.	Sector operates at 85% of full capacity.
Telecommunications	All telecommunication services and infrastructure is allowed.	All telecommunication services and infrastructure is allowed.	All telecommunication services and infrastructure is allowed.
	Operates at full capacity, unchanged from level 4.	Operates at 100% of full capacity, as economic conditions improve.	Operates at 100% of full capacity, as economic conditions improve.
Finance	Employees are encouraged to work from home. Where this is not possible and the service provided is essential in supporting other services permitted under level 3, activity will be permitted.	Employees are encouraged to work from home. Where this is not possible and the service provided is essential in supporting other services permitted under level 2, activity will be permitted.	All financial business and activity is permitted. However, employees are still encouraged to work from home.
	The sector operates at 90% of full capacity. Majority of transactions carried online.	The sector operates at 100% of full capacity. Branches begin to open and economic conditions improve.	Finance operates at 100% of full capacity.
Real estate	Commercial real estate activity is permitted.	All real estate activity is permitted.	All real estate activity is permitted.
	Activity operates at 45% of full capacity, as the sector operates partially. Agents mostly work from home and offer virtual viewings to prospective buyers. The deeds office opens, allowing for transactions to take place. However, a potential downside risk is buyers choosing to delay their purchasing due to financial strain and economic uncertainty.	Operations at 55% of full capacity, despite all activity being permitted. The sluggish activity will likely be due to the slow recovery of the sector, and buyers choosing to delay their purchases due to financial strain and economic uncertainty.	Operations at 70% of full capacity, despite all activity being permitted. The sluggish activity will likely be due to the slow economic recovery, buyer financial strain and uncertainty. However, on the upside, lower interest rates may attract new home buyers.

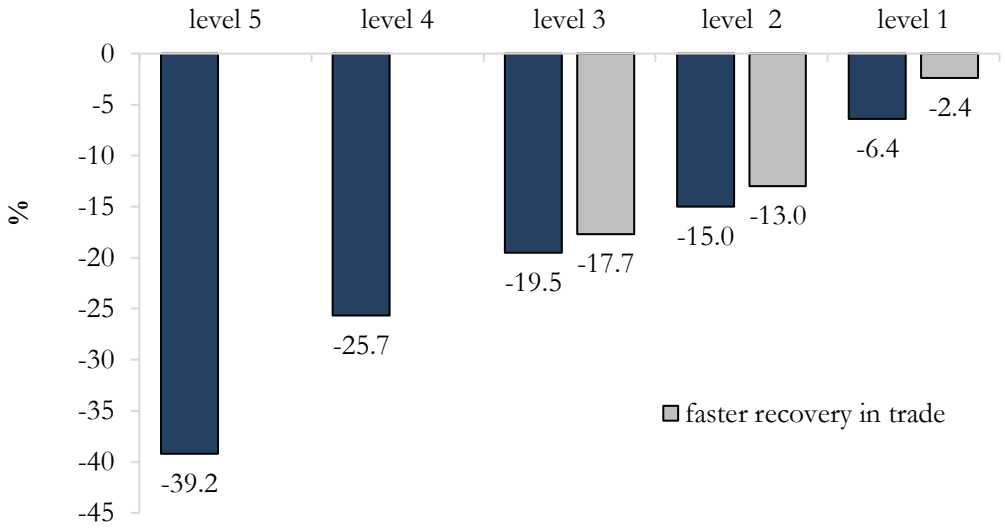
Table 2: Assumptions on exports and investment[4]

Level 3	Level 2	Level 1
Investment demand is 30 to 35% lower than in Q1 Exports are lower by 20 to 37% than in Q1	Investment demand is 19 to 22% lower than in Q1 Exports are lower by 8 to 15% than in Q1	Investment demand is 13 to 15% lower than in Q1 Exports are lower by 4 to 7.5% than in Q1

Impacts excluding fiscal Covid-19 package

Figure 1 presents estimates of the impact of different lockdown levels. The level 5 lockdown leads to a 40% decline in GDP.[5] In our previous analysis, we argued that the impact would be just below 35%. New information, however, suggests that this impact is likely to be larger. For example, at the time of the initial estimates we assumed that the health sector would expand during lockdown level 5. However, indications are that demand for health services fell by roughly 50% during level 5 lockdown.

Figure 1: Impacts on GDP under different lockdown levels (deviation from baseline)



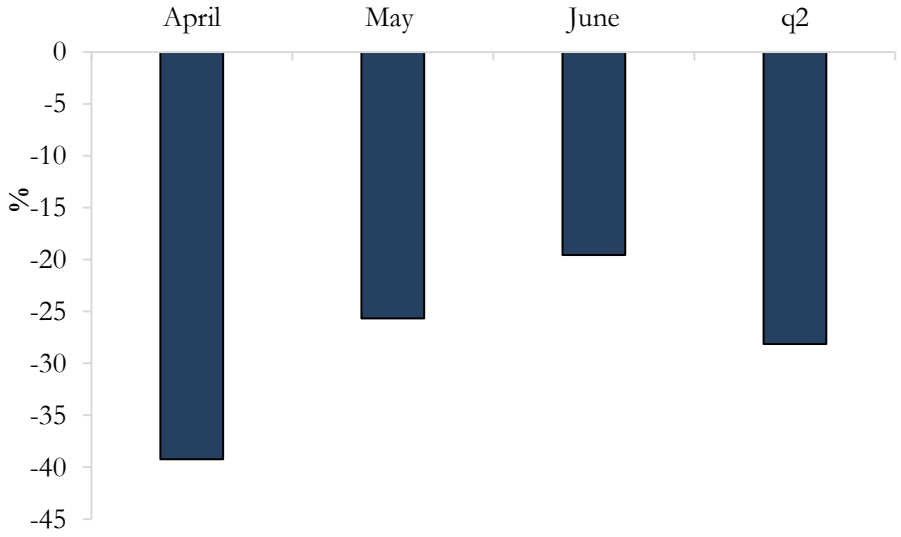
Source: Authors' own calculations.

Our estimates suggest a sizable impact on the economy even under lockdown level 1. While most restrictions are removed under this level, we still expect an impact through investment expenditure and global demand for South African exports. We assume that investment expenditure remains below 10 to 15% below Q1 levels as confidence remains low and real long-run borrowing costs remain elevated. Export receipts are 4 to 7% below Q1 levels owing to weak global recovery. Assuming that exports recover completely (faster recovery in global growth and trade), lockdown level 1 leads to a smaller reduction in GDP (from 6.4% to 2.4%). The sizable effect is also driven by indirect effects. Our methodology takes into account both the direct and indirect effects.

[4] The estimates for trade are based on a global economy contraction of 5% in 2020, which is in line with current estimates from the IMF and World Bank, and decreased trade intensity of global growth.

[5] The results are interpreted as the contraction per unit time, which can be a month or a quarter. For example if level 5 was for just one month, then the contraction in the month would be 40%, if level 5 was applicable for the entire quarter then the contraction would also be 40%.

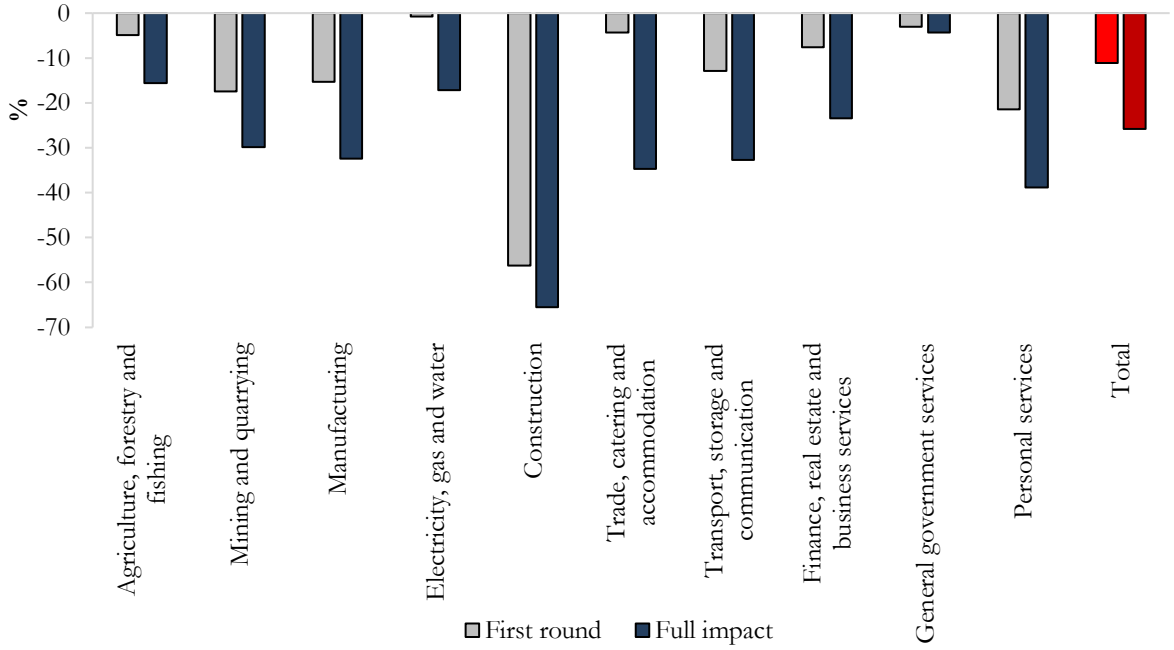
Figure 2: Estimate for Q2 (deviation from baseline)



Source: Authors' own calculations.

Using the output estimates for the different lockdown levels, we provide a revised Q2 estimate. We now expect that output will contract by 28% (saar) in Q2 relative to Q1 (see Figure 2). Sectors, which are not subject to restrictions contract as well due to indirect effects from other sectors. For example, even though the electricity, gas and water sector is not subject to restrictions, the sector contracts as the demand for electricity from restricted sectors such as mining and manufacturing declines. In Figure 3, we show the direct and indirect effects for the main sectors of the economy. The indirect effects dominate the direct impacts.

Figure 3: Q2 direct and indirect impact on specific sectors (deviation from baseline)

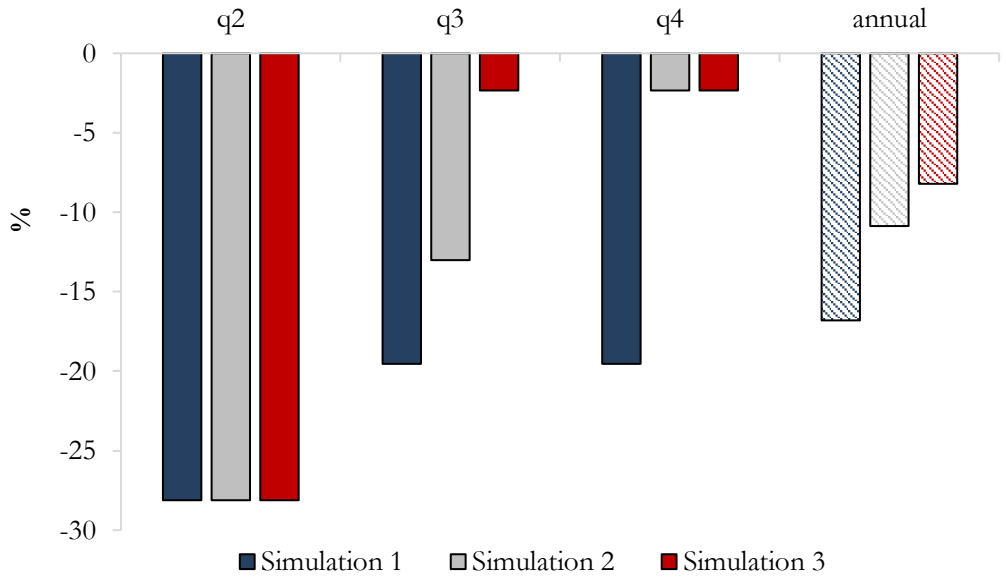


Source: Authors' own calculations.

In Figures 4 and 5 we present the outcomes for annual GDP and employment under three simulations. In simulation 1, we assume that the lockdown level 3 remains for Q3 and Q4. In simulation 2 we assume that in Q3 we move to level 2 and in Q4 we move to level 1, while in simulation 3, the economy moves to level 1 in Q3 and remains at that level in Q4.[6,7]

Under the first simulation, the annual deviation from the baseline is 16%, while simulation 2 yields a decline of just over 10%. This is in line with our estimates presented in our previous note.[8] If the economy returns to level 4 or 5 for three months before the end of the year, the decline will be over 18% relative to the baseline. The most optimistic scenario still generates a sizable contraction of 8.2% and this is if exports recover strongly in Q3 and Q4. Our preferred scenario is simulation 2. Comparing it with other forecasts, we find that the estimated decline of 10% is far larger than that of the QPM (6.95%) and Reuters poll (6.5%). Our estimate is larger as we take into account the indirect effects. The impact of the Covid-19 relief measure on economic activity can reduce the contraction and we illustrate this in the next section.

Figure 4 : Annual GDP impacts

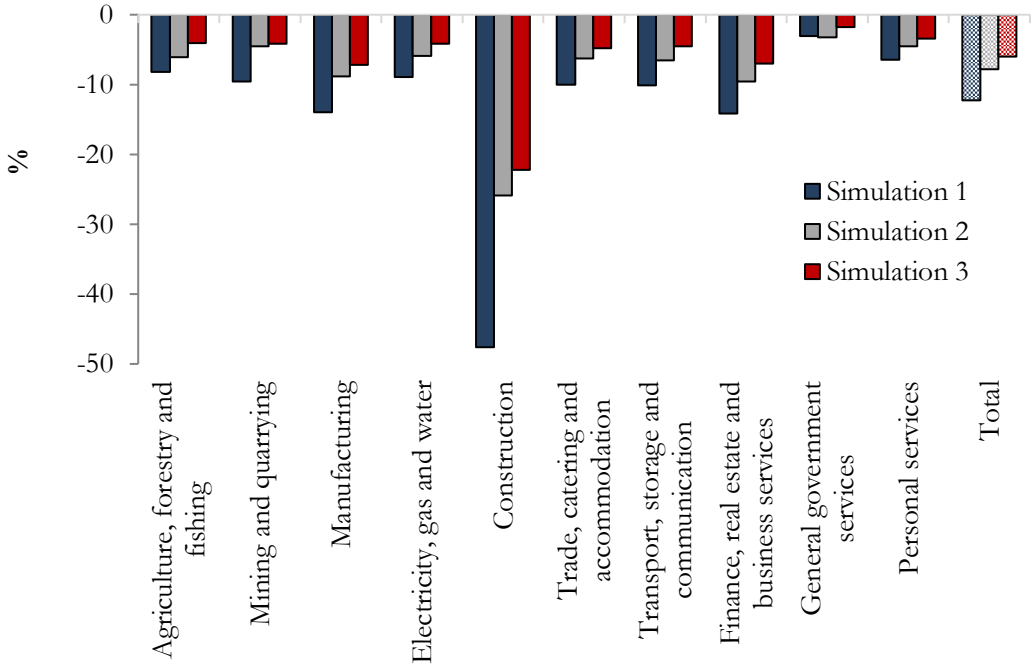


Source: Authors' own calculations.

Total employment is expected to contract by 12% in simulation 1, 7.8% in simulation 2 and 6% in simulation 3. The construction sector is expected to record the largest declines. Under simulation 1 close to 50% of those employed in the sector are projected to lose their jobs. Although not presented in the figure, we also consider employments impacts by income decile. The bottom deciles of the income distribution record smaller declines in their income as government grants are their major income source rather than income from employment. Transfers from government are sheltered from the downturn and these transfers comprise almost 70% of total income for households in the lowest income decile. This share falls roughly linearly to 28% for households in decile 5 and then quickly becomes a minor share of income for households in the upper half of the income distribution. Most affected are deciles 5 to 8.

[6] We don't show Q1 in Figure 4 as there is no deviation. The output level is Q1 is the baseline level. The annual deviation is a function of the weighted average of the quarterly deviations.
[7] It is possible that we could move back to level 5 but we see this as a low probability event. It is also possible that we could move between levels more frequently.
[8] See EN13

Figure 5: Annual employment impacts



Source: Authors' own calculations.

Results including the support package

Table 3 below summarises the Covid-19 support package. We assume that the government budget support of R130bn does not increase overall aggregate demand as the funds are prioritised from other programmes. The net new support is equivalent to R800bn.[9] The impact of this support package on aggregate demand depends on the take up of various programmes, the marginal propensity to save (which is likely to be very high for high-income households given constrained spending opportunities), and the financial sector decisions regarding lending or buying other financial assets as well as the timing. For example, the capital regulatory relief measures may not translate into higher lending if banks are highly risk averse or the demand for lending takes time to recover. The impact of the credit guarantee scheme and the regulatory relief measures is most uncertain. Extension of loans through the credit guarantee scheme is well below what was expected. We assume that only R240bn of the R800bn translates into higher aggregate demand in the current calendar year, and this is made up of around R60bn in repo rate relief, R40bn from the capital regulatory relief measures, with the rest coming from the fiscal side, including the credit guarantee scheme.[10]

[9] The changes in the composition of government expenditure can generate large indirect effects. For example, investment expenditure by government can have a larger impact on the domestic economy than consumption expenditure, which may be more import intensive. Government has not finalized what programmes will see budget cuts. We have assumed that the reprioritization of expenditure does not change the indirect effects.

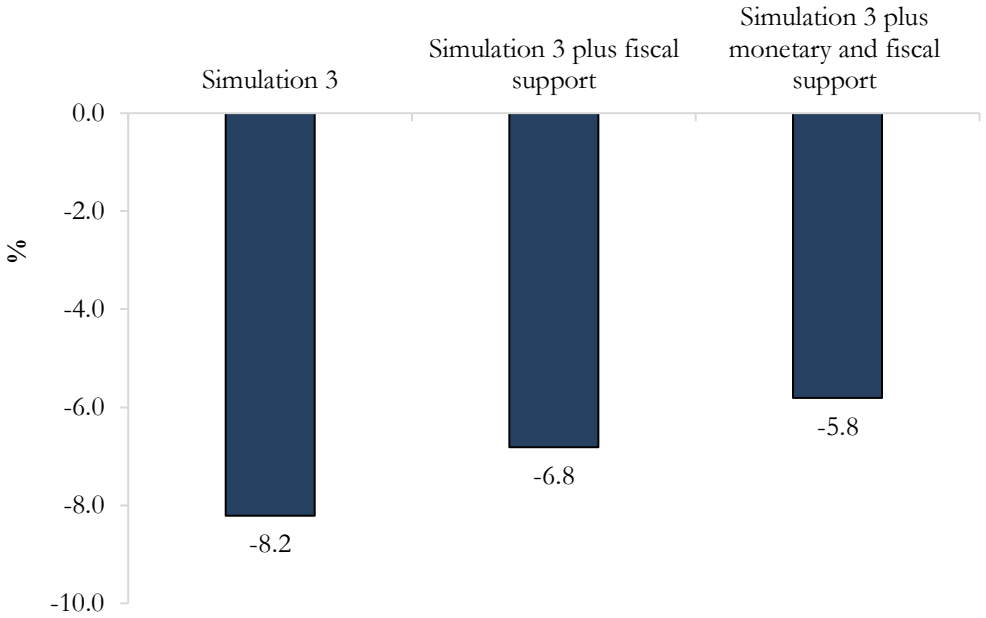
[10] We assume that out of the R170bn of government support additional to budget reprioritization, R100bn translates into an increase in aggregate demand. This reflects difficulties with disbursement and higher propensity to save. We also assume that the credit guarantee scheme translates into additional R40bn. Because the model is linear, a pass-through of R120bn would generate half the current impact. In other words, the weaker the pass-through the smaller the impact. For the same reason (linearity), the impact of fiscal and monetary stimulus is independent of the simulation considered (i.e., impact of same pass-through is the same across different simulations).

Table 3: Total Covid-19 Package

R million	2020/21
Budgetary support (spending)	130,000
Credit guarantee scheme	200,000
Measures for income support (including further tax deferrals, SDL holiday and ETI extension)	70,000
Drawdown on government balance sheet for wage protection (e.g. UIF, Compensation Fund)	40,000
Contingent amount for additional employment and wage support	60,000
Repo rate reduction estimate	80,750
Regulatory relief measures	250,000
Total Covid-19 package	830,750
% of GDP	16.78%

Note: The Pillar 2A relief amounts to a further R31. 2 billion and if we assume that the average minimum capital adequacy ratio of all banks amounts to 12.48% and the average risk weighting of exposures to bank clients are 100%, an additional amount of R250 billion could be supplied to the South African economy. Source: National Treasury and SARB.

Figure 6: Policy impacts[11]



Source: Author's own calculations.

The results, presented in figure 6, indicate that the fiscal and monetary package have reduced the contraction by around 2.4%. This reduction, however, is dependent on the pass-through of policy measures to aggregate demand and supply. Higher pass-through can reduce the contraction further. Our result suggests that the current challenge for policymakers is not the size of the package but the transmission of support measures to economic growth.

Dealing with risk aversion by firms and consumers can increase this pass-through. Addressing the deteriorating fiscal situation can reduce risk perceptions and improve confidence. Our results, however, indicate further deterioration in the fiscal framework. Table 4 below presents the revenue shortfall for the current fiscal year based on a combination of tax buoyancies and nominal GDP growth estimates. Using our estimate for annual GDP contraction of around 10% and assuming GDP inflation of 4% (nominal GDP contraction of 6%) and a buoyancy of 3.5 generates a revenue shortfall of R354bn. This implies a fiscal deficit of 17.5% for the current fiscal year. Government needs to take bold action to stabilise the debt trajectory.[12]

[11] The credit guarantee scheme is assumed to be part of fiscal support.
[12] Larger buoyancy reflects close to 50% reduction in CIT and sin taxes.

Table 4: Tax revenue shortfall

	Buoyancy		
Nominal GDP growth (%)	1.5	2.5	3.5
-10	272.9	408.5	544.1
-6	191.6	272.9	354.3
-4	150.9	205.1	259.4
-2	110.2	137.3	164.5

Source: Author's own calculations.

3. Conclusion

Refining the assumptions owing to recent data releases allows us to better estimate the impacts of Covid-19 on the economy. Results suggest that GDP will contract by 28% in 2020Q2 relative to 2020Q1 on a seasonally adjusted annualised basis. On an annual basis, GDP is expected to contract by 16% under simulation 1, and by 10% and 8.6% in simulations 2 and 3, respectively. The covid-19 fiscal and monetary stimulus packages can reduce the contraction in annual GDP by around 2.4%, depending on the pass-through of policy measures to aggregate demand. Policy efforts should be directed towards reducing risk increasing confidence and improving the pass-through of the current measures to aggregate demand and supply. Revenue shortfall is projected at R354bn in the intermediate scenario, implying a fiscal deficit of 17.5% for the current fiscal year. Government needs to take bold action to stabilise the debt trajectory to avoid an implosion.

Appendix

Table 5: Assumptions on sector activity under the lockdown levels 5 and 4

	Level 5	Level 4
Agriculture	Food-related agriculture, livestock, transport of live animals and auctions (subject to health directions) and related agricultural services. All fishing and related activities that are essential to prevent the wastage of primary agricultural goods.	All agriculture, hunting, forestry, fishing and related services, including the export of agricultural products permitted.
	Production across all subsectors operates at 90 % capacity. The impact of the lockdown is likely to be mildly negative, as the sector is deemed as essential.	The eased restrictions under level 4 will provide some relief to the sector which saw a large proportion of business activity temporarily shut down in level 5, even though the lockdown regulations called for the sector to largely remain operational.
Mining	Coal production for Eskom scaling up to full employment; and all other mining starting in batches scaling up towards 50% employment. All other mining starting in batches scaling up towards 50% employment.	Production is permitted to gradually be scaled-up over the lockdown period subject to the sector's ability to put the necessary safety measures in place. Open-cast mines will gradually be increased to a baseline of 50% of capacity and thereafter increase to full capacity.
	Production capacity is around 40% to 50%. Production capacity was likely very constrained. Particularly in the PGMs sub-sector (a major player in the industry) that is comprised mostly of deep-level mines.	60.7% of mining should be operational. The sector had warned that it wouldn't be easy to ramp up production given the difficulties around the complex logistics and processes of returning thousands of miners to work after a long stoppage. Even though coal, for instance, is permitted to operate at full capacity, it is unlikely to have been operating at that level given the amount of electricity Eskom has been producing.
Manufacturing	Manufacture of all retail products permitted to be sold under Level 5, and all input products, permitted scaling up to full employment, except where otherwise indicated. Manufacture of paper, packaging, petroleum smelters etc. allowed to scale up to full employment.	Further loosening of regulations. Essential segments of the textiles sub-sector are allowed to initially operate at 25% and thereafter increase production to 50%. The automotive, steel and other metals subsectors, as well as rail and ships building will be scaled up in phases to 50% of full capacity over the level 4 lockdown period. All other manufacturing are permitted to scale up to 30% employment.
	Production capacity is at around 45%. Food and beverages as well as the petroleum and chemicals make up almost half of manufacturing's gross value added, representing a large share of manufacturing. However, these sub-sectors would not have been operating at full capacity during the lockdown.	Around 68-73% of manufacturing should be operational. However, if we consider that alcoholic beverages sub-sector, for example, is not permitted to operate during this time, operation in the food may be lower. Additionally, other manufacturing sub-sectors in the value-chain tied to tobacco or alcohol industries are also impacted.
Electricity	All electricity, gas and water at 100% capacity.	All electricity, gas and water at 100% capacity.
	Around 75% of the normal capacity is utilised considering the sharp fall in net energy sent out in comparison to the corresponding period in 2019 due to the reduced demand from heavy industry.	Capacity would be at around 80% as some sectors are permitted to gradually scale up production.
Construction	Civil engineering for public works projects (including water, energy, sanitation) is permitted. Only critical public works construction; and maintenance and repairs is allowed.	Regulations are loosened to include critical maintenance and repairs as well as road and road and bridge projects (including local road repairs).

	Utilisation levels are at around 30 %. A small amount of construction activity is expected. The only activity allowed under the level 5 lockdown is necessary infrastructure, road works and maintenance. However, this will unlikely offer significant offset to a reduction in building and construction activity.	40-60% utilization levels, however, this is likely to be lower given that private civil engineering and building are still not permitted to operate.
Trade, catering and accommodation	Only trade that relates to essential goods and services is permitted.	Restrictions have been eased to include sales of winter clothing, footwear, bedding and heaters, children's clothing and fabrics, hardware supplies, and personal information and communication technology (ICT) equipment under level 4. Restaurants are also permitted to operate, but only for food delivery services subject to a curfew.
	Production capacity is at around 40%. Only a few sub-sectors are allowed to operate during the level 5 lockdown (i.e. food and pharmaceuticals). This will have a significant bearing on activity in the sector.	Operations in the sector to be around 45% of full capacity. The boost is expected to come from restaurants and sales from online shopping. A downside risk to this trajectory is lower than expected demand due to households' experiencing increased financial strain.
Transport	Rail, ocean and air transport permitted only for the shipment of cargo. Public transport is restricted on capacity and times.	Passenger transport is permitted to provide services to the boarder public, however, certain restrictions apply. All transportation may not carry more than 50% of its permissible passenger carrying capacity, except for minibus taxis. Freight transport, warehousing and logistic services is now limited to the transportation of essential medical, hygiene and food items, mining outputs (e.g. coal) as well as manufactured goods permitted under level 4 lockdown regulations.
	Approximately 40% of operations in the sector is able to continue.	Operations in the sector will operate at 59% of full capacity.
Telecommunications	All telecommunication services and infrastructure is permitted while postal services and courier services related to transport of medical products are allowed. ICT services support essential services only.	All telecommunication services and infrastructure is permitted while postal services and courier services related to transport of medical products are allowed. ICT is expanded to support all private and business customers.
	All telecommunications and infrastructure is allowed to operate. Activity in the sector will likely be positive as adaptation to the lockdown prompts employees to work remotely, increasing demand in telecommunication and internet products.	All telecommunications and infrastructure is allowed to operate.
Finance	Employees are encouraged to work from home. Where this is not possible and the service provided is essential in supporting other services permitted.	Financial services continue to operate during level 4, albeit partially, with employees encouraged to work remotely. For banks, activity in physical branches will be limited.
	Approximately 80% of operations in the sector is able to continue. Financial services will be least impacted by the lockdown, as the sector is deemed essential. While activity in branches is expected to be limited, the increase in online transactions will provide some offsetting effects.	The finance sector operates at 90% of full capacity.
Real estate	Not permitted to operate.	Real estate services are not listed as essential under level 4, unchanged from level 5. Commercial and residential real estate activity will only be allowed at level 3 and level 2. This means that agents, property managers, property practitioners or

		landlords are not permitted to travel to, do or conduct any activity in the ordinary course of business.
	Approximately 20% of the sector is able to operate. Real estate activity is not listed as essential under level 5. Moreover, the increased economic uncertainty will likely see house prices come under significant pressure and buyers delay their purchasing decisions.	The sector operates at 30% of full capacity. Real estate activity remains relatively muted under level 4, with restrictions unchanged from level 5. This will have a considerable bearing on the sector's performance.

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South African Manufacturing: A situational analysis

Palesa Mnguni and Witness Simbanegavi

Abstract

This note provides a synopsis of the manufacturing sector in South Africa, and attempts to explain the evolution of the sector, including its recent lacklustre performance Although Manufacturing's contribution to GDP has declined, having peaked at around 23% in the early 1980s, the sector remains important for South Africa. It comprised 12% of GDP, 12% to formal sector employment and 42% of exports in 2019. While the evolution of MVA appears to be in line with global trends, South Africa's manufacturing performance is below the EM average. Capacity utilisation and capital stock declined sharply following the 2009 recession, and have stabilised at lower levels, consistent with de-industrialisation. The sector has failed to diversify and manufacturing remains concentrated in energy and capital-intensive subsectors. The foregoing points to the need for (industrial) policies geared at building capabilities and developing new sources of competitive advantage to arrest/reverse de-industrialisation.

1. Introduction

Manufacturing is an engine of economic growth, a source of resilience to economic shocks and an important contributor to GDP. It has high economic multipliers due to its forward and backward linkages to both downstream and upstream production sectors of the economy. Additionally, it contributes to exports and employment, and the jobs tend to be better paying, stable and less vulnerable to shocks compared to other sectors.[1] These attributes have historically made, and continue to make, manufacturing a focus sector for development efforts by many countries, and South Africa is no exception. This note provides a synopsis of the manufacturing sector in South Africa, and attempts to explain the evolution of the sector, including its recent lacklustre performance.

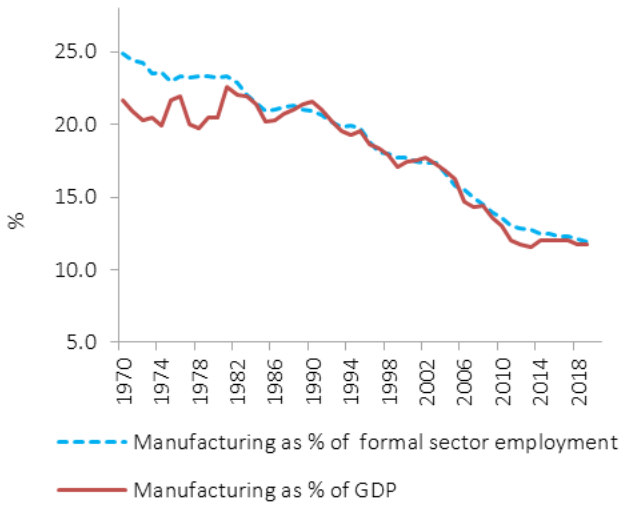
[1] Cantore N.,Clara, M., Lavop, A.,Soare, S. 2017. Manufacturing as engine of growth: which is the best fuel? *Structural Change and Economic Dynamics*, Vol. 42:56-66. See also OECD Observer No 292, 2012.

2. Manufacturing in South Africa: A bird's eye view

Manufacturing is an important part of South Africa's economy, contributing 12% of GDP, 12% to formal sector employment and 42% of the rand value of exports in 2019. Manufacturing has strong linkages with a variety of supplier and supporting industries, particularly mining and agriculture, as well as service providers.[2] The sector, which contributed about 23% of GDP at its height in the early 1980s has been in sharp decline since the early 1990s (Figure 1). Manufacturing's share of formal non-agricultural employment has followed a similar trend, declining from 25% in 1970 to reach an all-time low of 12% in 2019.

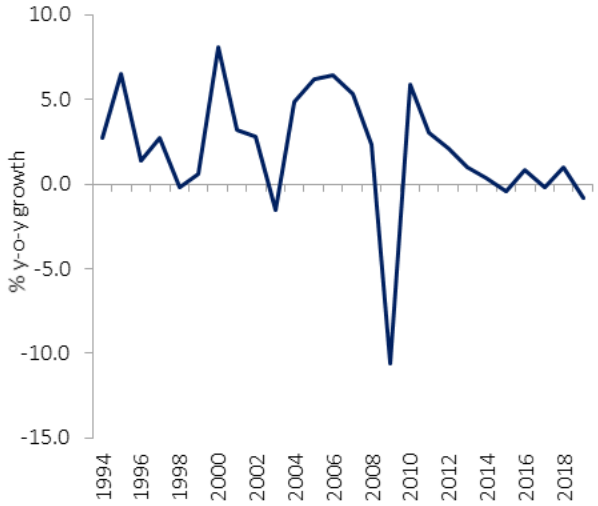
Real manufacturing gross value added (GVA) grew strongly during the commodity boom period, rising at an average annual rate of 4.2% between 2000 and 2008, but contracted by 10.6% in 2009. Growth post the great financial crisis (GFC) was a tepid 1.3% (Figure 2).

Figure 1: Manufacturing's share in GDP & employment



Source: StatsSA

Figure 2: Manufacturing GVA growth



Source: StatsSA

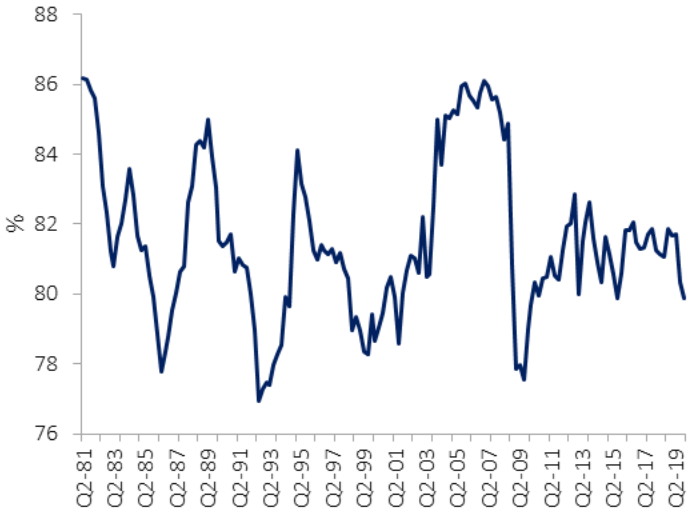
Manufacturing capacity utilisation and investment

Capacity utilisation, which peaked at around 86% in the mid-2000s, fell considerably during the global financial crisis and settled at a lower level (Figure 3). The sustained lower level of capacity utilisation, by creating 'stranded' assets, disincentivised investment. Figure 4 points to dampened investment both in absolute and relative terms post 2010, resulting in destruction of capital (Figure 5). With the decline in capital stock came job losses, with approximately 150,000 jobs lost between 2008 and 2016 (SARB QB 2017). The sustained decline in manufacturing capital stock post 2009 supports the view that the sector is de-industrialising. The combination of weak demand

[2] According to IDC (2019), manufacturing's GDP and employment multipliers are respectively 4 and 5.02. See also the DTI's Industrial Policy Action Plan 2018/19-2020/21.

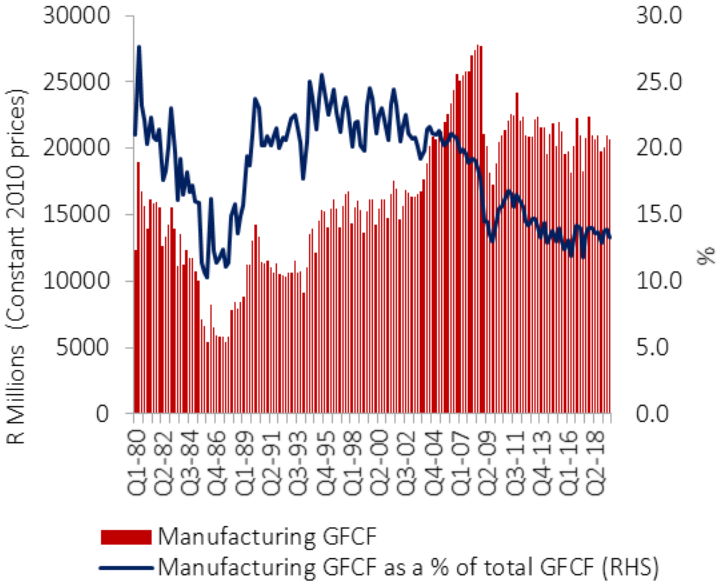
post the GFC (both domestic and global), political climate and rising electricity prices (Figure 6) may explain the sharp decline in capital stock.[3]

Figure 3: Capacity utilisation



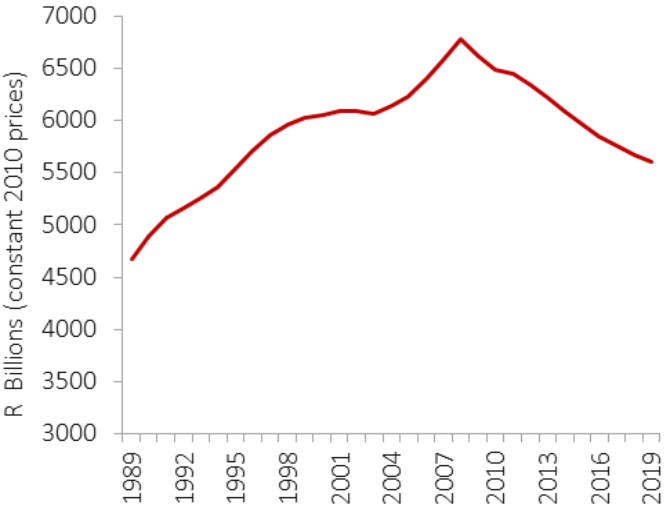
Source: StatsSA

Figure 4: Manufacturing investment



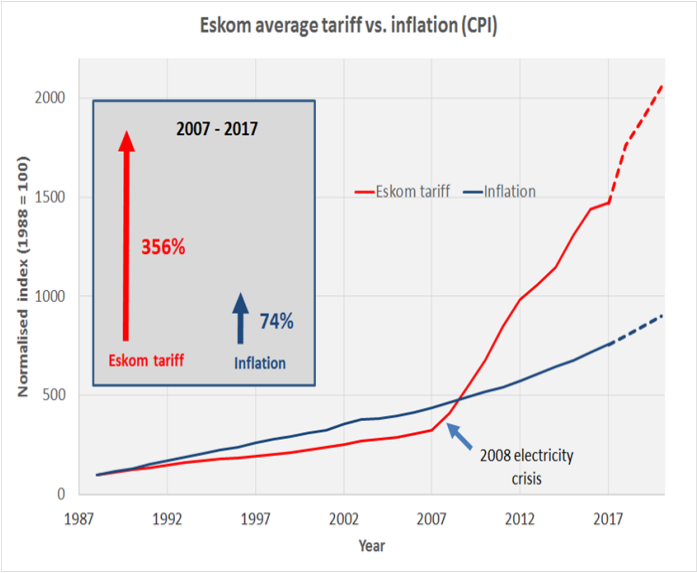
Source: SARB

Figure 5: Manufacturing capital stock



Source: SARB

Figure 6: Evolution of electricity prices



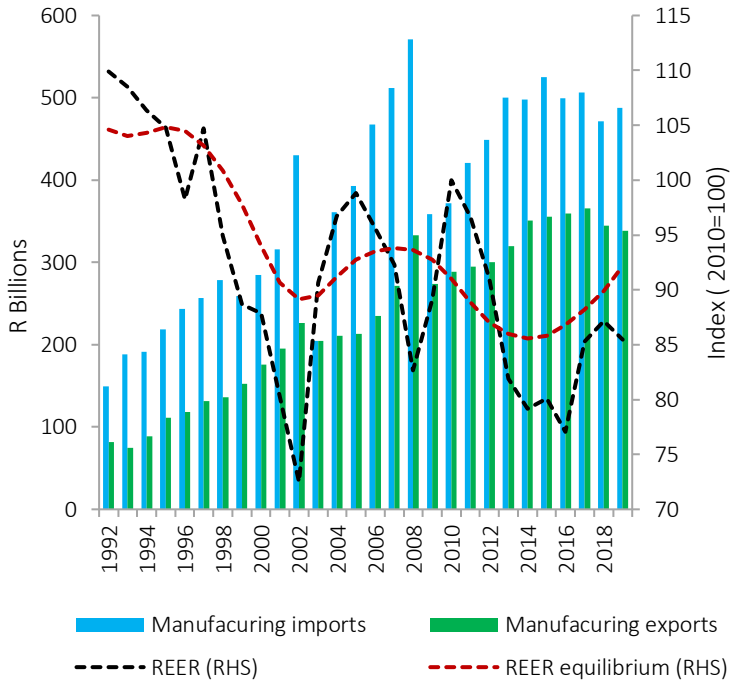
Source: Power Optimal

implying a persistent manufacturing real trade deficit (Figures 7 & 8). This raises the question of competitiveness of South African manufacturing.

[3] The BER Manufacturing Survey identifies political climate and insufficient demand as major constraints. Rising electricity prices hit the energy intensive sectors the hardest, except perhaps for those with long term price agreements with Eskom.

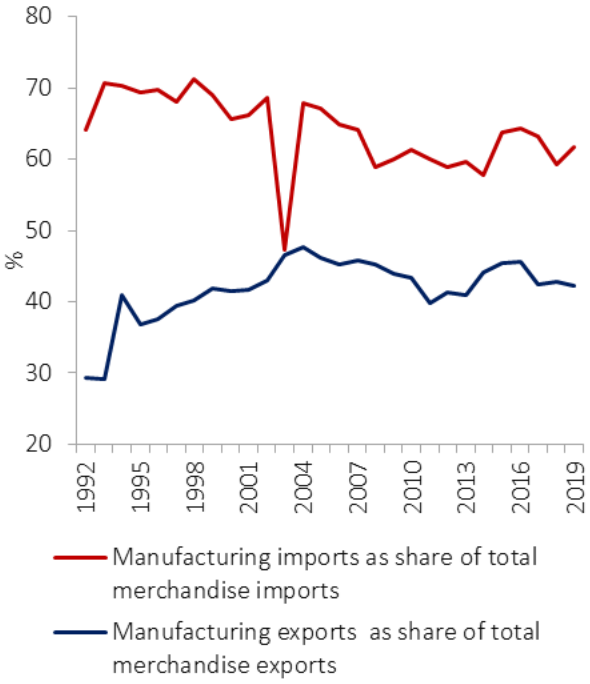
The real effective exchange rate has oscillated between episodes of appreciation and depreciation in line with commodity price cycles. The real exchange rate was overvalued between 2003 and 2007 and between 2009 and 2012. The data suggests a weak response of manufactured exports to real exchange rate depreciations, though episodes of overvaluation seem to coincide with much weaker export performance.[4] Somewhat paradoxically, imports appear to respond positively to real rand depreciations, suggesting that the quantum of imports is not unaffected by the exchange rate. The import compressions in 2003, 2009 and 2010 however seem to suggest a lagged response of imports to depreciations.[5]

Figure 7: Real manufactured imports and exports



Source: DTI, SARB

Figure 8: Share of manufactured imports/exports



Source: Authors' calculations, DTI

Sophistication of South African manufacturing

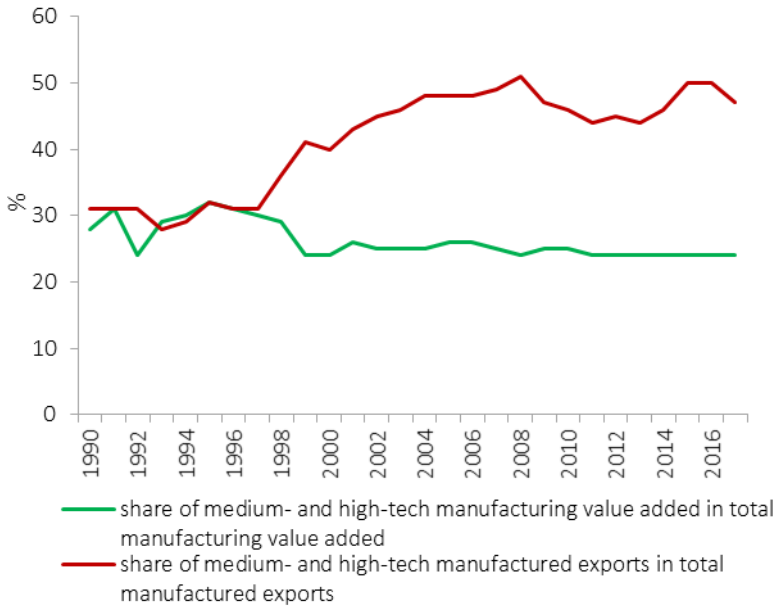
Sophistication or technology intensity of manufacturing is a measure of the direct R&D intensity and R&D embodied in intermediate and investment goods, and is an important indicator of robustness and competitiveness of manufacturing.[6] South Africa is ranked the regional lead in sub-Saharan Africa, and 45th globally, with respect to the competitiveness and industrial development index (CIP)[7], but is the lowest ranked BRICS member. The CIP is composed of three dimensions. *Dimension 1* assesses a country's capacity to produce and export manufactured goods,[8] *Dimension 2* assesses technological deepening and upgrading[9] and *Dimension 3* assesses a country's world impact.[10] South Africa is ranked 67/150 in dimension 1; 52/150 in dimension 2; and

[4] Edwards and Hlatshwayo (2019) find evidence of weak response of exports to rand depreciation.
[5] The sharp fall in manufactured imports in 2003 (Figures 7 & 8) appears to be anomalous.
[6] Hatzichronoglou, T. (1997), "Revision of the High-Technology Sector and Product Classification". OECD Science, Technology and Industry Working Papers, No. 1997/02.
[7] Competitive industrial performance report 2018, UNIDO.
[8] Measured by manufacturing value added per capita and manufacturing exports per capita.
[9] Measured by industrialization intensity and export quality.
[10] Measured by impact of a country on world MVA and impact on world manufacturing exports.

36/150 in dimension 3, indicating that the country does relatively poorly with respect to competitiveness of manufacturing as well as technology intensity of manufacturing.

Technology intensive goods are more likely to command higher unit margins and to be more globally competitive. High sophistication in manufacturing engenders economic complexity and provides scope for knowledge spillovers across industries, and thus diversification of the economy.[11] Despite having the most advanced manufacturing sector in the continent, South Africa has done poorly in deepening technology intensity. The share of medium- and high-tech manufacturing value added in total manufacturing value added fell from a high of 32% in 1995 to 24% in 2017 (Figure 9), suggesting declining competitiveness.[12]

Figure 9: Sophistication of manufacturing



Source: UNIDO

Encouragingly, the share of medium- and high-tech manufactured exports in total manufactured exports increased from 31% in 1990 to 47% in 2017. A possible interpretation of this (in light of the declining share of medium and high tech MVA) is that South African manufacturers seem to be exploiting niche markets, wherein they supply increasingly more technology intensive goods. In other words, while the composition of the export basket is becoming more tech-intensive, the domestically oriented manufacturing subsector is becoming less competitive. This is consistent with the decline in the share of South Africa's MVA in world MVA and share of manufactured exports in world manufacturing exports,[13] as well as the decline in manufacturing fixed capital stock (Figure 5).

[11] In turn, diversification engenders resilience of the economy by reducing vulnerability to price shocks (Aiginger, 2014).
[12] The 1990s saw substantial economic and trade liberalization as South Africa re-integrated into the global economy. The sector, largely built on the back of protectionist policies and subsidies, appears to have initially struggled to cope with global competition.
[13] Unido data.

3. South Africa an outlier?

South Africa's experience with de-industrialisation is shared by other emerging markets, in particular, Brazil and Mauritius, though some have bucked the trend (Figure 10). Indeed, South Africa performs worse than many developed countries (Figure 11 & Table 1). Ordinarily, the expectation would be that manufacturing's share in GDP would be higher for emerging economies like South Africa, given their low per capita income—the inverted U relationship.

Figure 10: Manufacturing's share in GDP (EM's)

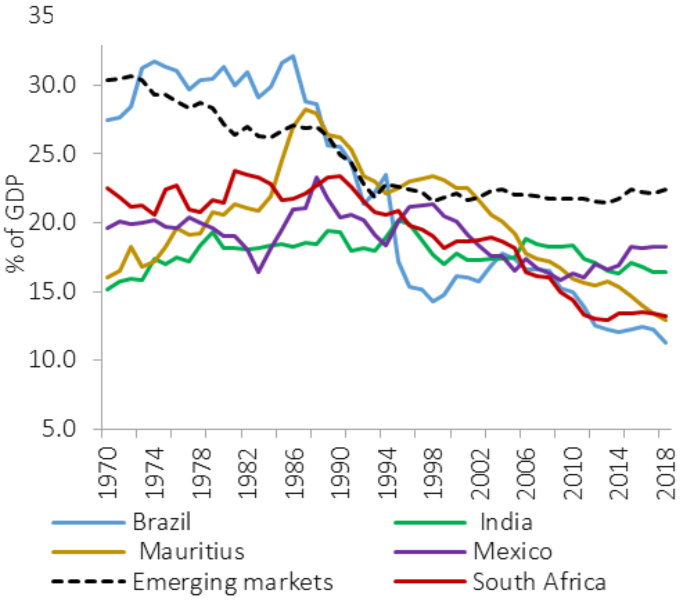
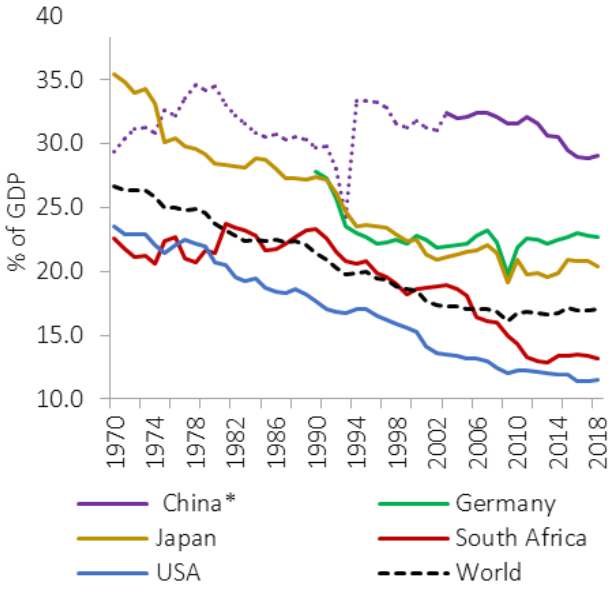


Figure 11: Manufacturing's share in GDP (All)



* Values for China in the dotted line were either estimated or imputed
Source: UNCTAD

Table 1: Share of Employment in Manufacturing, 1973-2010

Country	1973	1990	2000	2010	% change
USA	24.8	18.0	14.4	10.1	-14.7
Canada	22.0	15.8	15.3	10.3	-11.7
Australia	23.3	14.4	12.0	8.9	-14.4
Japan	27.8	24.3	20.7	16.9	-10.9
France	28.8	21.0	17.6	13.1	-15.7
Germany	36.7	31.6	23.9	21.2	-15.5
Italy	27.9	22.6	23.6	18.8	-9.1
Netherlands	25.3	19.1	14.8	10.6	-14.7
Sweden	27.6	21.0	18.0	12.7	-14.9
South Africa[14]	18.5	17.7	14.9	13.3	-5.2

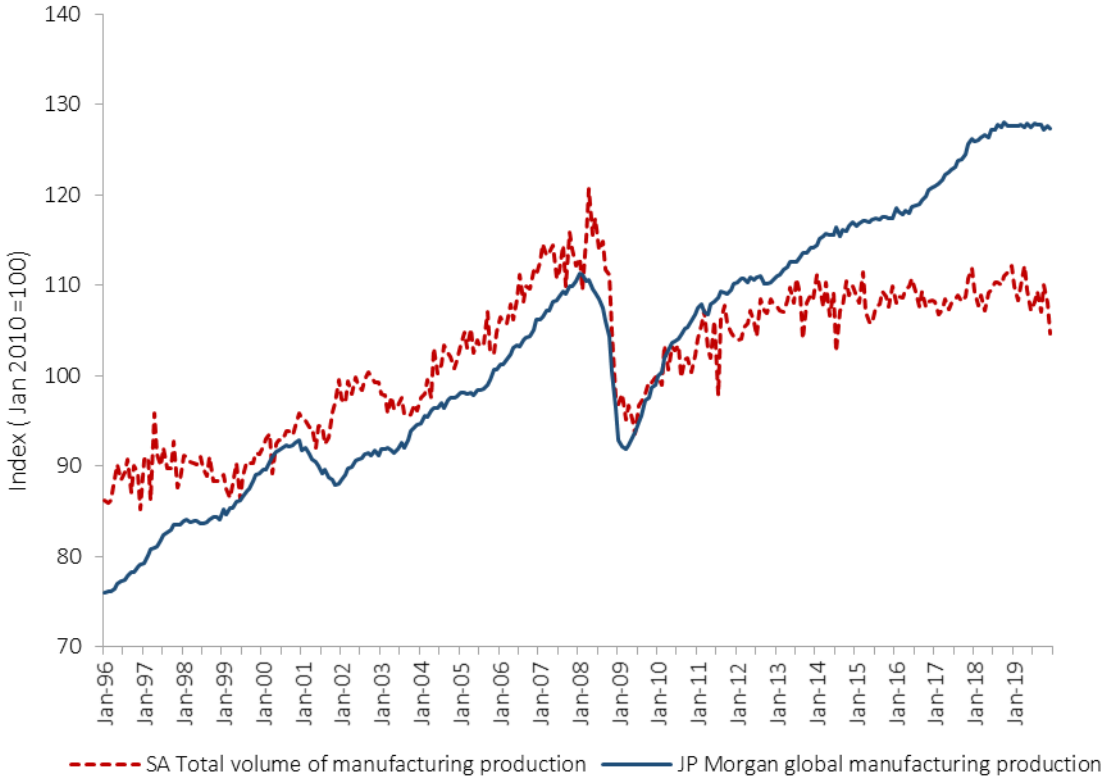
Source: Lawrence (2018)

It is also instructive to compare South Africa and global manufacturing production indices. Since 1996, South Africa's industrial production has trailed behind global manufacturing production, but appeared to grow at more or less the same pace, with the two series tracking each other relatively well up until 2010, where South Africa seems to decouple from the global trajectory (Figure 12). This suggests that, since 2010, SA manufacturing might

[14] Data for South Africa is from UNIDO (2019) as well as Jenkins and Edwards (2015).

be more influenced by idiosyncratic factors than global ones. This could be explained in part by weak domestic demand, high electricity prices and electricity shortages, weak performance of mining sector, and the unfavourable political climate.[15]

Figure 12: Decoupling of SA manufacturing from global manufacturing



Source: StatsSA and JP Morgan

The poor performance of South Africa's manufacturing sector documented above is suggestive of premature de-industrialisation.

4. The South Africa's manufacturing sector: A closer look

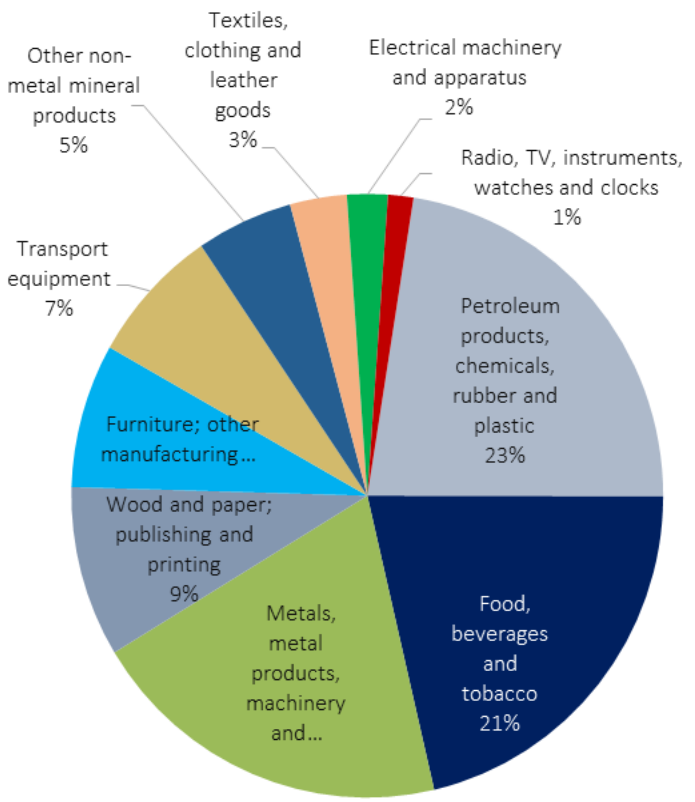
Figure 12 decomposes the manufacturing sector into ten constituent subsectors. Petroleum and chemical products is the largest subsector over the 1993-2017 period, contributing 23% of total manufacturing value added, followed by food and beverages (21%) and metals and machinery (20%). These three comprise 64% of total manufacturing activity in South Africa.[16] The more labour intensive subsectors, including wood and paper,

[15]Skills shortages and the resultant wage premia for highly skilled labour, as well as the strong bargaining power of unions could also explain the deterioration in manufacturing.

[16] The high concentration of manufacturing in these three industries makes South Africa exposed and vulnerable to internal and external events (see DTI; IPAP 2018/9-2020/21), and may partly explain the country's premature de-industrialisation.

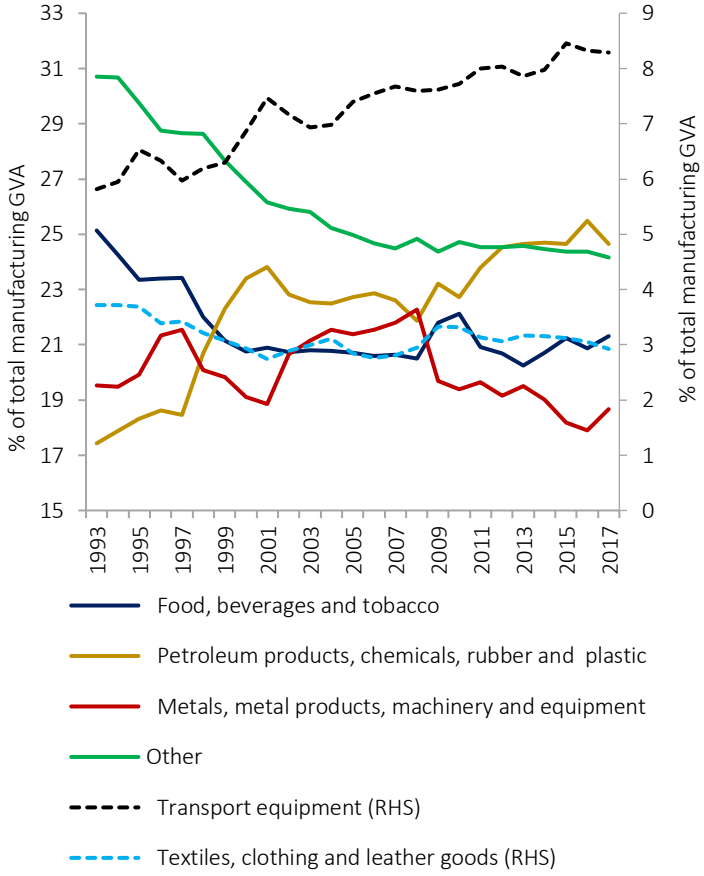
publishing and printing; furniture and other manufacturing, textiles, and electrical machinery and equipment, contribute the balance of MVA.

Figure 13: Manufacturing sub-sector shares: 1993-2017



Source: Authors' calculations, StatsSA

Figure 14: Evolution of MVA: selected sub-sectors



Source: Authors' calculations, StatsSA

The metals and food subsectors shares in total manufacturing have trended lower over the period, with a notable decline for the metals subsector post the GFC (Figure 14). This coincides with the period of heightened electricity blackouts in South Africa and rising electricity prices, which could have dented momentum in this subsector.[17] The decline also coincides with the period of reduced global demand post the GFC, particularly in Europe, a major market for South African manufactured products. The transport equipment's share, albeit still small, has increased along with the chemicals sector.[18] Labour intensive manufacturing, most of which is captured by the 'other' category in the graph, have fallen as share of total MVA while textiles decreased during the 1990s but has remained broadly unchanged following that period.[19]

Table 2 breaks the study period into three distinct time periods: the liberalisation period (1993-1999), during which South Africa implemented various trade reforms; the commodity boom period (2000-2007) and the post

[17] Cheap electricity, especially in the 1990s, encouraged energy-intensive metals refineries particularly in aluminium and steel production- many of which are no longer viable because of higher electricity prices (see: Woods et al, 2018. The Real Economy Bulletin: TIPS).
[18] The growth in the transport equipment can be attributed, at least in part, to the substantial incentives afforded to the auto sector through the MIDP and APDP programmes.
[19] Textiles, clothing and leather is one of the sectors that have received substantial retooling support from government.

GFC period (2008-2017). For the sector as a whole, GVA increased by 14.4% during the 1993-1999 period, by 30.5% during the commodity boom period, but stalled post the GFC (Table 2).[20] Metals, metal products, machinery and equipment, as well as other non-metal mineral products were the main drag to growth post GFC.

Table 2: Percent change in gross value added

	1993-1999	2000-2007	2008-2017
		% change in GVA	
Manufacturing	14.4	30.5	1.1
Food, beverages and tobacco	-3.8	29.7	5.2
Textiles, clothing and leather goods	-5.3	24.7	0.4
Wood and paper; publishing and printing	7.3	9.3	1.0
Petroleum products, chemicals, rubber and plastic	46.4	26.1	14.0
Other non-metal mineral products	-7.4	24.7	-18.7
Metals, metal products, machinery and equipment	16.2	49.0	-15.2
Electrical machinery and apparatus	37.2	30.4	5.9
Radio, TV, instruments, watches and clocks	-15.6	36.9	31.0
Transport equipment	23.8	45.8	10.4
Furniture; other manufacturing	2.5	21.0	-0.8

Source: Authors' calculations, StatsSA

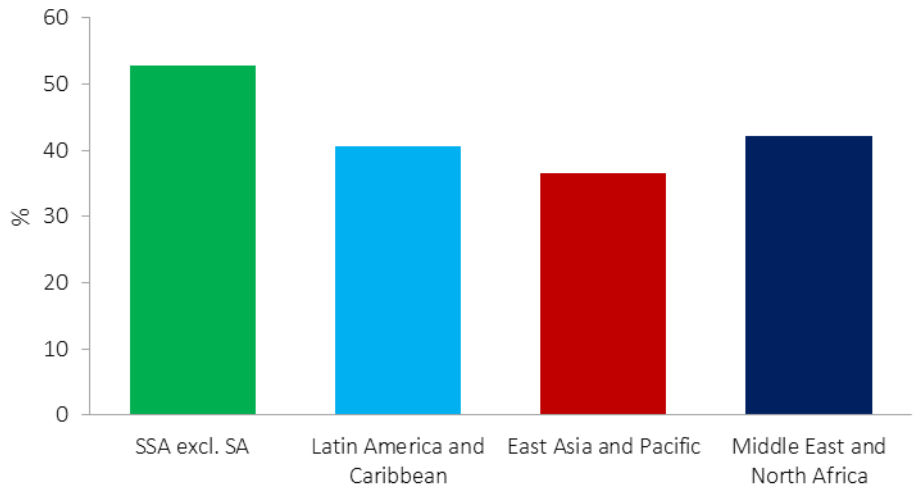
While a few subsectors struggled during the 1993-1999 period, possibly as they grappled with liberalisation of the economy, the 2000s was a period of strong growth, aided by increased domestic and foreign demand, the commodity super cycle, and a sound macroeconomic environment.

A closer look at the food, metals and petroleum subsectors

The food and beverages sector benefitted from a growing consumer market in Sub-Saharan Africa on the back of robust economic growth, spurred in part by the commodity boom, the presence of many South African retail chains in the continent, and the region's high propensity to consume food and beverages (Figure 14). The World Bank (2010) notes that household and non-profit institutions serving households (NPISHs) consumption expenditure per capita for the region expanded by an average of 4.4% per annum between 2000-07, after having contracted by 0.3% per annum between 1993-99. Post the GFC, growth in household expenditure was muted at 0.3%. In South Africa, rising unemployment and lower economic growth in the aftermath of the GFC have slowed household consumption growth.[21]

[20] Abstracting from the impact of GFC, manufacturing GVA increased by 6.8% between 2010 and 2017.
[21] Amendments to the National Credit Act in 2013 may also have played a role.

Figure 15: Household expenditure on food and beverages by region



Source: Authors calculations, World Bank

Manufacturing in South Africa was built around the so-called minerals-energy complex (MEC)[22], with many manufacturing subsectors relying on the demand or supply from the mining sector. The metals and machinery, petroleum products, electrical machinery, wood, as well as transport equipment are some of the largest suppliers to the mining sector.[23] Resultantly, their performance is inextricably tied with that of the mining sector and in turn the global commodity price cycle.

Strong growth and demand in the region during the commodity boom benefited the metals and metal products sector, which saw an increase in exports of machinery and equipment for the mining sectors on the continent, transport equipment, electrical machinery, parts and accessories, etc. However, the slump in commodity prices post GFC took along with it the capital investment and demand, hence the sharp decline in metals, metal products, machinery and equipment.

The petroleum products subsector exhibits strong performance across the three periods, with the strongest GVA expansion in the 1990s. The dynamics are largely driven by Sasol, the dominant player in this subsector. During the 1990s, Sasol invested heavily in R&D in the chemicals sectors, which allowed the conglomerate to diversify its product range and enhance competitiveness.[24] Simultaneously, it developed joint ventures with international companies, growing its international footprint.

The intrinsically labour-intensive sectors such as textiles, clothing and leather, furniture, other manufacturing, wood and paper, publishing and printing, seem to be struggling to attain global competitiveness.[25] Well-designed industrial policies could be devised to turn these subsectors around and enhance competitiveness. South Africa could learn from countries like China who have enhanced competitiveness in similar industries by among other

[22] The MEC characterises the origins of manufacturing in South Africa, which was initially financed by the mining sector profits and the availability of cheap electricity, fostering a pattern of industrialization which is capital and energy intensive (heavy manufacturing). Additionally, government incentives continue to be geared towards easier access to capital thus reinforcing this pattern (see EN 2019-22: Getting industrial policy right).
[23] IDC, (2013). http://www.tips.org.za/files/interface_between_mining_and_manufacturing_-_j_maia_.pdf
[24] Verhoef, G.2003. Innovation for globalisation or globalisation of innovation: Sasol in the chemical industry during the 1990s. South African Journal of Economic History. Volume 18, Issue 1_2; 188–212.
[25] Zalk, N. 2014. [online]: https://www.econ3x3.org/article/what-role-manufacturing-boosting-economic-growth-and-employment-south-africa

things offsetting employment wages with higher social wages (cheap housing close to factories, affordable healthcare and public transport).[26]

5. Conclusion

Manufacturing remains important for economic growth and employment in South Africa. However, the sector appears to be de-industrialising. While South Africa is not an outlier with regards to the diminishing role of manufacturing, it is concerning given its status as a developing economy, with high unemployment, poverty and inequality. Also concerning is the high concentration of manufacturing in the capital-intensive mineral-energy complex. Labour-intensive manufacturing subsectors continue to perform poorly, with detrimental impacts for employment. The implication of this is that South Africa, more than ever before, needs (industrial) policies geared at building capabilities in the sector and developing new sources of competitive advantage to arrest/reverse de-industrialisation (see EN2019-22 for a discussion on how to get "industrial policy right").

[26] Zalk, N. 2014. *ibid*

OBEN 2002* – October 2020

Weathering the Covid-19 storm: The response of macro-prudential policy

Palesa Mnguni, Mpho Rapapali and Witness Simbanegavi

Abstract

In response to the Covid-19 pandemic, the PA reduced the LCR from 100% to 80%; lowered Pillar 2A capital requirements from 1% to 0%; provided capital relief on loan restructures; and issued guidance on dividends and the application of IFRS 9. The Pillar 2A capital relief has likely made about R280 billion available, increasing banks' unencumbered capital and creating room for banks to absorb losses. Risk-sharing through the loan guarantee scheme should help support credit extension. Paradoxically, the reduction in the LCR threshold to 80% has coincided with the LCR rising to 150% in July, on the back of investment by banks in government bonds. This is suggestive of crowding out. Credit extension remains subdued. Increased credit risk, heightened uncertainty and lower profitability may partly explain banks' reluctance to extend new credit. The capital relief measures, while sound, carry potential downside risks that should be monitored to maintain confidence in and resilience of the banking sector.

1. Introduction

The Covid-19 pandemic has strained global economies, and South Africa is no exception. The lockdowns implemented in South Africa to help contain the spread of the coronavirus have resulted in a substantial economic slowdown, company failures and unemployment. To help blunt the economic impacts, the Prudential Authority (PA) of the SARB implemented temporary regulatory relief measures to alleviate pressure on the banking system and to help support the economy. This note discusses the PA policy interventions in light of their stated objectives, likely impacts on the economy and the soundness of the banking sector.

2. PA capital and liquidity relief measures

Capital relief measures implemented by the PA include; lowering of the liquidity coverage ratio (LCR), lowering the Pillar 2A capital requirement, allowing banks to draw down against their capital conservation buffers after consultation with the PA and capital relief on restructured loans that were in good standing before the Covid-19 crisis. To complement these measures, the PA issued guidance on the payment of dividends and bonuses, and the application of the expected loss accounting principle (IFRS 9).

2.1 Liquidity coverage ratio

Financial markets were volatile in March 2020, as risk-averse depositors moved out of long-term funding into short-term funding.[1] This caused market liquidity to decrease and consequently placed banks under pressure to meet their LCR requirements.[2] At the same time, high-quality liquid assets (HQLAs) decreased in value due to negative mark-to-market adjustments caused by increases in the yields of the underlying instruments. In light of this, the LCR requirement was temporarily reduced to 80% from 100% to ease (financing) pressure on banks, and to boost resources at the disposal of banks to meet liquidity demands and reduce the likelihood that lending is curtailed.[3]

Paradoxically, the LCR increased to 150% in July 2020, following a slight decrease to 130% in March 2020, and well over the new minimum requirement of 80% (Figure 1). The higher LCR followed from banks increasing their holdings of HQLAs, which mostly consists of government securities.[4] Bank holdings of government bonds reached R509 billion in July 2020, after rising to R477 billion in April 2020 following South Africa's exclusion from the FTSE World Government Bond Index. Treasury bills increased to R311 billion in July 2020, from R286 billion in April 2020 (Figure 2), possibly reflecting government's increased funding at the short end, given the historically low short term rates. It appears that banks utilised excess funds to purchase 'risk-free' interest-bearing assets rather than increasing their risk exposure by supplying additional loans to households and firms, or in response to weak demand for credit. As the economy reopens, banks should use part of the 20% LCR 'fat' to supply new loans.

Figure 1: The liquidity coverage ratio

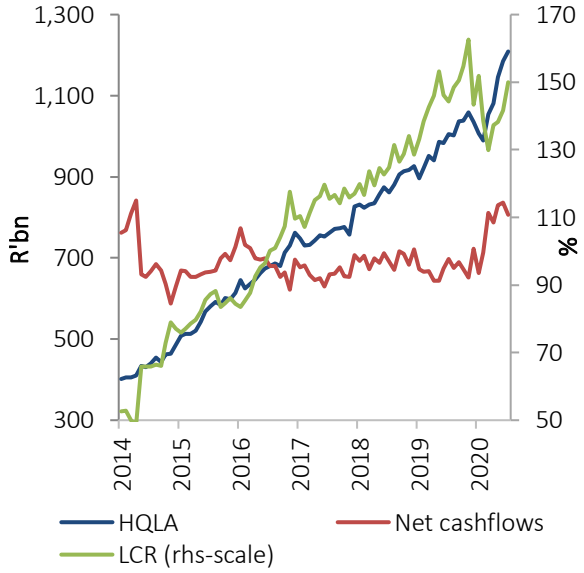
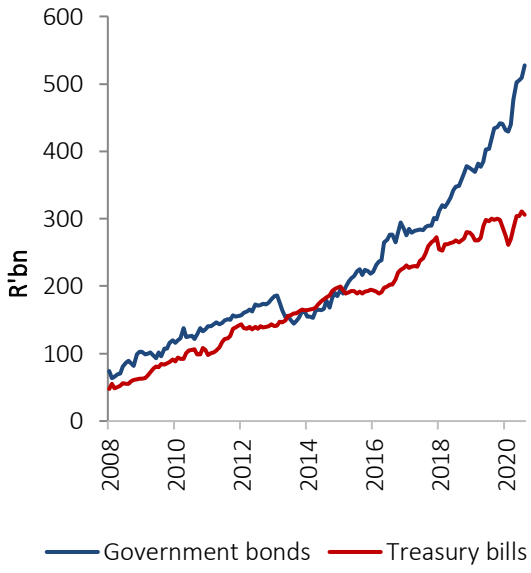


Figure 2: Banks' holdings of gov. securities



Note: Net cash outflows are the denominator of the LCR ratio, and refer to cash outflows from deposits, loans, secured lending, credit/liquidity facilities, etc., during a 30 day stress period.
Source: Prudential Authority and SARB BA900.

[1] D1/2020: Temporary measures to aid compliance with the liquidity coverage ratio during the Covid-19 pandemic.
[2] The LCR engenders bank resilience by requiring that banks hold adequate stocks of high quality liquid assets to meet their liquidity needs during a 30 calendar day liquidity stress scenario.
[3] This is notwithstanding the fact that South African banks had ample liquid assets to cover net cash outflows prior to the Covid-19 crisis, with the LCR well above the minimum requirement of 100% (Figure 1).
[4] It is likely that the high average LCR masks bank specific dynamics which may have driven the decision to lower the LCR. It is likely that the policy announcement itself helped reduce uncertainty about bank compliance to LCR regulations, thereby reducing pressure on banks. The high LCR can be explained in part by the recovery in bond prices and the increased demand for credit by government.

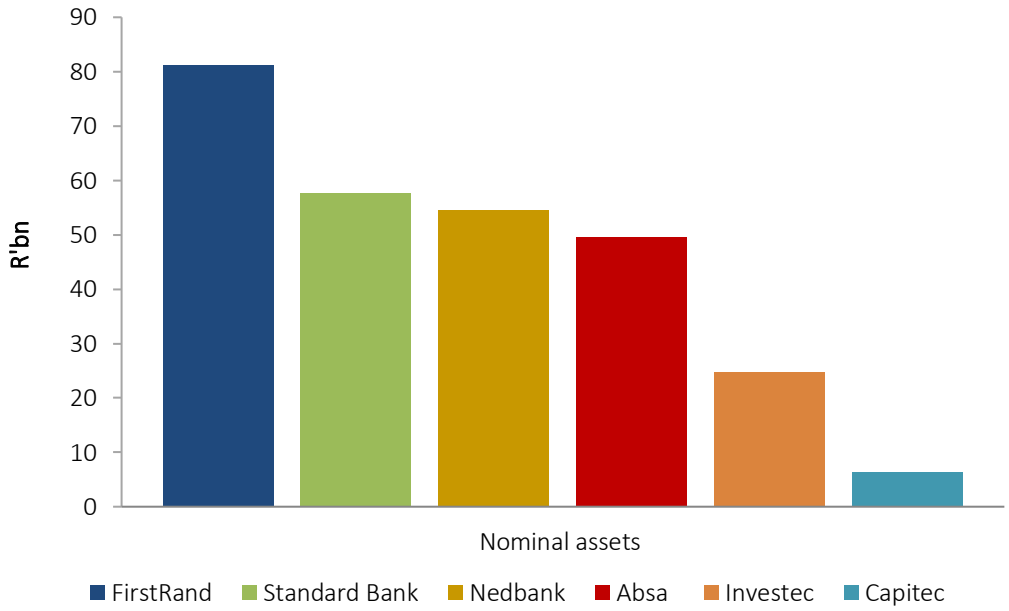
2.2 Pillar 2A capital relief and restructured loans

In response to pressure on banks' capital supply due to Covid-19, the Pillar 2A capital requirement for systemic risk management was temporarily reduced from 1% of risk-weighted assets (RWA) to 0%.[5] This was done to provide banks with funds to use for operations without the need to draw against the capital conservation buffer. In addition, banks may also draw down against their capital conservation buffers (currently 2.5%) after consultation with the PA.

Additionally, the PA allowed banks to restructure loans that were in good standing before the pandemic, provided the borrower risk profile remains unchanged. This means banks are not required to hold additional capital and reserves for the loan restructures meeting the set criteria.[6] This reduces capital pressure on banks and increases the supply of loanable funds relative to a no intervention scenario. Equally, banks have allowed borrowers to restructure with minimal to no penalty.[7]

Figure 3 shows that for the top 6 banks (FNB, ABSA, Standard Bank, Nedbank, Investec and Capitec), the Pillar 2A relief has potentially made about R280 billion available.[8,9] Evidently, banks have ample funds available at their disposal to supply new loans.

Figure 3: Resources made available through pillar 2A relief



Source: The Basel III risk and capital management annual report, authors' own calculations.

[5] Banks are required to hold a minimum capital requirement of 8% of risk-weighted assets, a systemic risk capital requirement (Pillar 2A), an idiosyncratic risk capital requirement (Pillar 2B), a capital conservation buffer, a countercyclical capital buffer (currently inactive) and a domestic systemically important bank (D-SIB) buffer.

[6] Ordinarily, distressed loan restructuring raises the credit risk, requiring banks to increase loan provisioning – D7/2015

[7] Anecdotal evidence suggests that banks have been reluctant to provide further loans to borrowers who benefited from the Covid-19 debt restructures - a form of penalty.

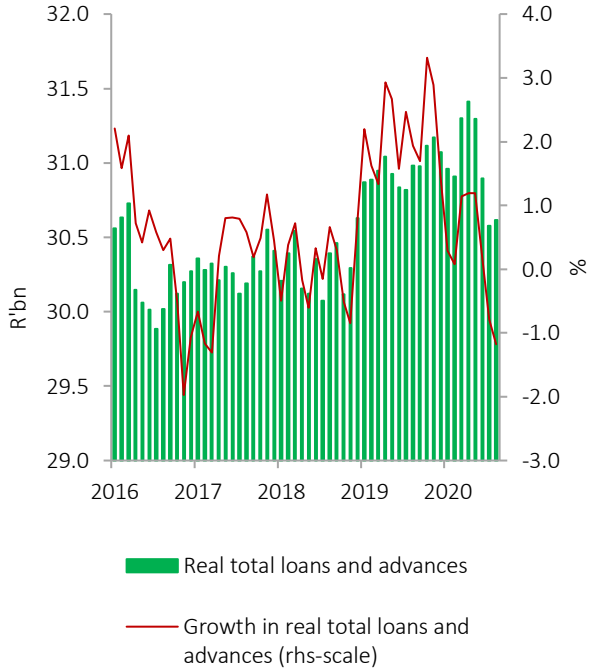
[8] We follow the methodology proposed by Rand Merchant Bank (RMB), which uses banks' average RWA density (the ratio of average RWA to total assets) to estimate funds available for lending. Unlike the Prudential Authority, who decreases the total capital adequacy ratio (CAR) by 1% due to the reduced Pillar 2A, we first lower the common equity tier 1 (CET1) ratio by 0.5% and then subtract the remaining 0.5% from the CAR.

[9] Our estimate of about R280 billion is close to the Prudential Authority's R300 billion. The slight difference could be due to the fact the PA's estimate is based on the total banking market, while our measure is calculated for the top 6 banks, which make-up about 82% of the market.

Growth in real total loans and advances rose to 1.2% in April 2020, but decelerated thereafter, contracting by 1.2% in August 2020 (Figure 4). Real growth in loans to the corporate sector continued to decelerate after rising by 1% in April, to eventually contract by 2.2% in August. Real loan growth for households has also slowed from 0.4% y-o-y in April to contract by 0.1% in August.[10] Both the number of loan applications received and granted declined significantly in April due to the level 5 lockdown, but have since largely recovered (Figure 5).

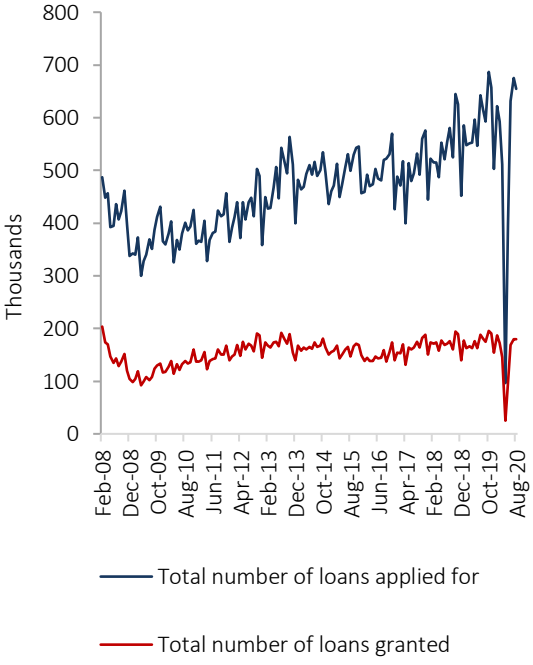
The key question is whether banks will use the available space to increase lending to the real economy. Banks may take a more cautious approach for several reasons. First, credit risk has been trending upwards for the last two years (Figure 6) and is likely to continue as households and firms experience increased financial strain due to the pandemic. Second, the Covid-19 loan restructures have increased bank exposures, and thus banks may want to first see how these exposures evolve as the economy recovers.[11] Third, banking sector profits have come under pressure this financial year, hence the funds from capital relief measures are likely to be used to absorb losses.[12] Lastly, the lure of low-risk and reasonably high-yielding government bonds may discourage lending to the real economy. Indeed, the observed high LCR may be indicative of crowding out.

Figure 4: Growth in real credit extension



Source: SARB BA900.

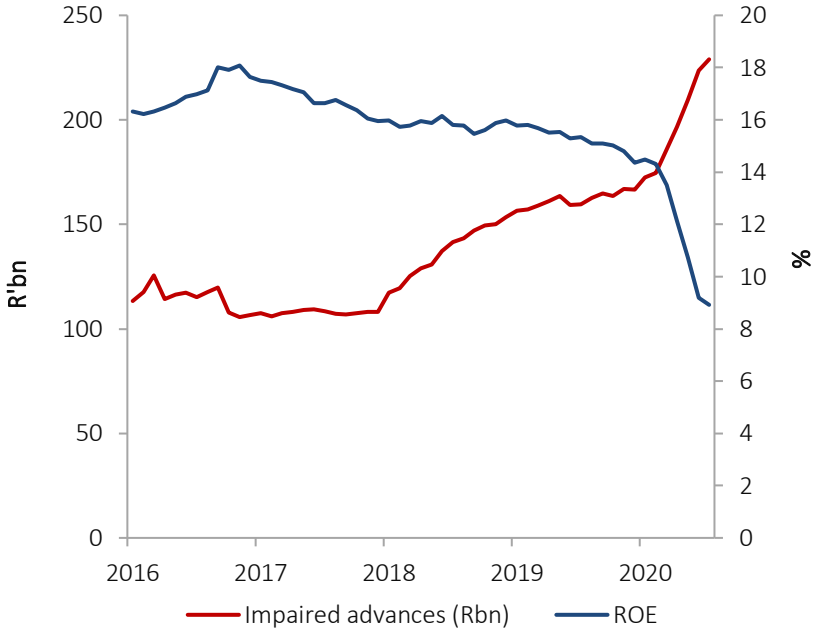
Figure 5: Total number of loans applied for and granted[13]



Source: SARB BA900.

[10] The m-o-m picture shows a stronger pick-up in credit extension to households as the economy has reopened (Figure A1 in Appendix).
[11] As of August 2020, banks provided R33.5 billion in Covid-19 related debt restructuring; with consumers granted R19.5 billion in restructures (84% of applications were approved) while businesses received debt restructures of R14.01 billion (95% of applications approved).
[12] Return on equity decreased from 10.7% in May to 9.2% in July, trending downwards for three consecutive years (Figure 6).
[13] This includes only instalment sale, leasing finance and mortgage advances.

Figure 6: Bank profitability and credit risk exposure



Source: Prudential Authority of the SARB.

2.3 Guidance on dividends, bonuses and IFRS 9

To complement the capital relief measures, the PA requested banks to consider withholding the distribution of dividends and executive bonuses during the crisis, and instead use the relief for the purposes for which it was granted—i.e. to support the resilience of banks, continued credit extension and to absorb the losses that the banks may incur.[14] Based on the dividends from five banks, the guidance, if adhered to, could result in R50 billion worth of capital being retained in 2020 (Table A1, in the appendix).[15] However, dividends may be lower this year on account of lower bank profitability.

The PA also provided guidance on the implementation of the International Financial Reporting Standard 9 (IFRS 9) with respect to the determination of expected credit losses.[16] The guidance allows banks flexibility in interpreting IFRS 9 to reduce the strain on their expected loss provisioning levels and thus help ease their capital requirements during the Covid-19 crisis period. Specifically, accounts affected by payment holidays, loan restructures and government guarantees need not automatically be treated as having had a 'significant increase in risk'. Rather, consideration has to be made as to whether the perceived 'substantial' increase in risk will be sustained post the temporary relief period. This stance supports enhanced credit extension relative to a stricter interpretation of IFRS 9.[17]

[14] South Africa is not alone in this. See for instance Mathias Drehmann et al. 2020. "Buffering Covid-19 losses – the role of prudential policy".
[15] The five banks include Standard Bank, ABSA, FNB, Nedbank and Capitec.
[16] G3/2020: International Financial Reporting Standard (IFRS) 9 in response to the Coronavirus pandemic (Covid-19).
[17] Under IFRS 9, when banks create credit they are required to recognize provisions on 12-month expected losses (i.e. stage 1 loans). Once a loan experiences a 'significant increase in risk', it moves to stage 2, and if it is impaired, to stage 3; where provisions are calculated over the lifetime of the loan.

2.4 The loan guarantee scheme

While the capital relief measures are necessary for banks to continue to credit extension, they are not sufficient. To incentivise credit extension, risk-sharing between the financial and public sectors is critical.[18] Government, through the SARB, has made a R100 billion loan guarantee scheme available to support lending to small and medium sized firms, with the option to extend the scheme by another R100 billion should it be deemed necessary. The drawdown on the guarantee has been disappointing however, with only R14.5 billion lent to firms by August 2020. Many firms and banks have reduced their appetite for risk in light of the Covid-19 pandemic and the uncertainty it has caused.[19] Other possible reasons for the low uptake include restrictive scheme conditionalities and that the scheme was made available late. Take-up is expected to improve as the economy reopens and following adjustments to the scheme conditionalities.

3. The potential dark side of capital relief measures

The capital relief measures implemented by the PA, while sound, have potential (but low probability) pitfalls which require continual monitoring. First, the additional capital provided by the relief measures could lead banks to take excessive risks by lending to already distressed borrowers, thereby increasing the debt burden for households and firms.[20] This could result in the deterioration of asset quality, with potential ripple effects for bank balance sheets, and ultimately credit availability. Second, aggressive credit extension spurred by excess liquidity could feed inflation, particularly if demand were to recover faster than supply. Third, reduced capital buffers may negatively impact the resilience of banks, and thus their ability to absorb future shocks. Lastly, if not adequately coordinated, the guidance concerning dividend payments and IFRS 9 implementation pose risks, including the potential to raise the equity funding costs for South African banks and raising investor concerns about the credit risk exposure of banks. These risks are neither immediate nor high, particularly given the conservative nature of the SA financial sector, but we flag them here as worthy of monitoring.

4. Have the regulatory relief measures met their objectives?

While it is too early to tell, we note the following. Market liquidity has improved and the LCR remains strong. Relief measures have likely provided about R280 billion—funds that could be loaned to households and businesses. Debt restructuring in excess of R30 billion has been granted and banks remain sound, with no drawdowns against the capital conservation buffer as of June 2020. Lastly, some R14 billion has been accessed through the loan guarantee scheme.

However, growth in credit extension remained muted in July 2020, though m-o-m data is more encouraging. The Covid-19 pandemic and the uncertainty around it may have affected both the demand and supply of loans. Banks may have tightened lending standards due to increased credit risk and pressure on profits, while households and firms may have reduced their demand for loans due to increased financial strain and uncertainty, and closure of large parts of the economy during this period. The increase in LCR may also be suggestive of some crowding out.

[18] In terms of the scheme a bank's loss is limited to 6 percentage points of the amount loaned by that particular bank. Losses are distributed as follows: the first loss buffer is the net margin on the loan portfolio (2%), followed by the credit premium (0.5%) and then the bank. Any remaining losses are borne by the National Treasury.

[19] See Intellidex.

[20] The household debt to income ratio was 73% in 2019Q4, down from its 90% peak during the 2008/09 financial crisis—pointing to greater capacity by households to take on more debt.

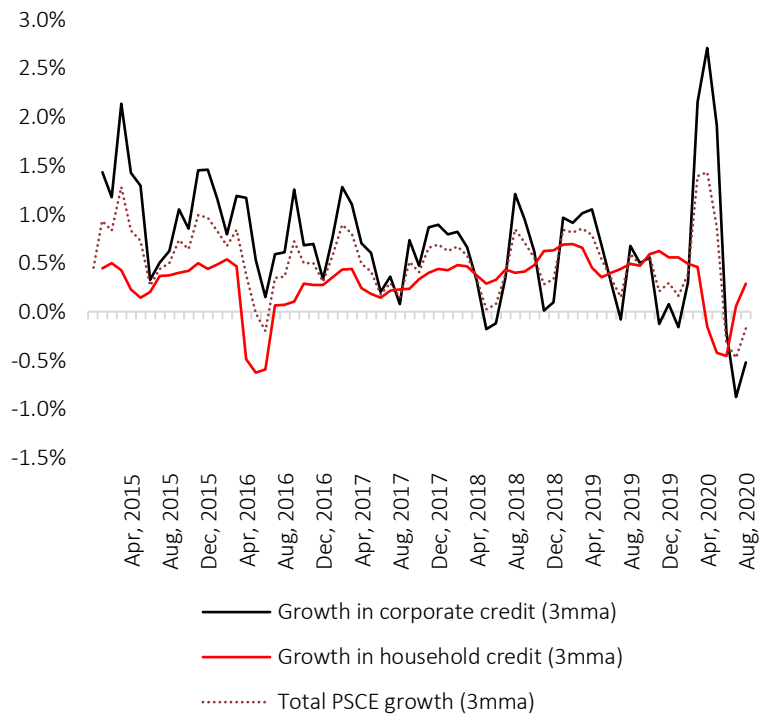
5. Conclusion

The easing of macro-prudential regulations could release an estimated R280 billion, while the R100 billion loan guarantee scheme facilitates risk-sharing. These measures should incentivise banks to continue lending—supporting preservation of productive capital and economic recovery. Banks have granted over R30 billion in debt restructures to date. However, high credit risk and low profitability may see banks becoming more risk-averse, while the lure of high-yielding government bonds may lead to crowding out of the private sector.

The PA capital relief measures should not compromise financial sector stability, particularly given that banks entered the crisis with excess capital and liquidity. However, there are risks that require continuous monitoring. There is a need to strike a balance between encouraging banks to make use of the flexibility in regulations, while also maintaining market transparency, and have the confidence that banks will absorb instead of exacerbate risk.

Appendix

Figure A1: Credit extension—3-month moving average



Source: own calculations

Table A1: Dividends of the top 5 banks

R' billion	FY17		FY18		FY19	
	Interim	Final	Interim	Final	Interim	Final
Absa	4.83	3.99	4.96	4.42	5.17	5.71
Capitec	0.79	0.52	0.93	0.61	1.09	0.73
FirstRand	6.62	6.62	7.63	8.22	8.13	8.38
Nedbank	3.11	2.97	3.35	3.40	3.54	3.57
Standard Bank	7.10	6.45	8.21	6.90	8.68	7.30
Total	22.45	20.55	25.08	23.53	26.62	25.69

Source: Respective banks' financial statements.

OBEN 2002* – October 2020
Industry TFP estimates for South Africa

Julius Pain, Mpho Rapapali and Daan Steenkamp

Abstract

Productivity is the main driver of per capita income growth over the long-term and is therefore crucial for assessment of the historical and potential growth of an economy. We produce estimates of Total Factor Productivity (TFP) for industries in South Africa as no up-to-date estimates exist for South Africa.We show that productivity growth has slowed meaningfully since the global financial crisis, and that production has shifted to sectors with little exposure to international competition and low productivity growth. We argue that this augurs ill for the long term sustainable growth rate of the economy. We argue that structural reforms aimed at boosting the supply-side performance of the economy are overdue and discuss the initiatives that other economies have implemented to improve productivity.

1 Introduction[1]

Total Factor Productivity (TFP) measures the efficiency with which inputs into production are used to produce economic output (e.g. Gross Domestic Product). It is sometimes approximated as the ratio of GDP and the weighted average of the volume of labour and capital in the economy, where the weights of the inputs are based on their share in income. Economists often use a production function approach to estimate TFP, where GDP is expressed as a function of inputs such as capital and labour, and TFP is measured as the residual ('unexplained') growth in output that cannot be accounted for by the accumulation of inputs (as in Solow 1957).

This note produces TFP growth estimates for South African industries. TFP is the main driver of per capita income growth over the long-term (see Klenow and Rodriguez-Clare 1997 for discussion in cross-country context). TFP measurement is therefore crucial for assessment of the historical and potential growth performance of an economy. An industry perspective on TFP measurement is also important, as it helps identify sectors that have been performing poorly and to inform where reforms could have a meaningful impact on economic growth and distributional outcomes.

South Africa's long term productivity performance has been poor compared to other economies: Penn World Table estimates and those from the Conference Board suggest that there was been virtually no TFP growth in South Africa for the last two decades (see Table 2 and discussion in Rapapali and Steenkamp 2019). Little is also known about industry-level productivity developments in South Africa, as there has been very little empirical work on industry productivity measurement in South Africa. The only study that produces industry estimates is Fedderke (2018), which produces estimates for 7 industries for the period 1960-2012.[2] Rapapali and Steenkamp (2019) construct 'tradable' and 'nontradable' TFP estimates for South Africa and show that tradable TFP growth has outstripped non-tradable TFP growth, but that productivity growth since the 1990s has been relatively low compared with other economies.

The contribution of this note is to produce up-to-date estimates for the full range of industries in South Africa defined in the Quarterly Bulletin. We use a simple and commonly used production function approach, and consider the implications of varying some of the assumptions used for the estimates obtained. We show that TFP growth has slowed dramatically post-global financial crisis, and that there has been a structural shift towards low productivity growth industries.

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[1] Thanks to Shaun de Jager and Bart Stemmet for comments.

[2] The only other recent papers we are aware of are Kreuser et al. (2015), which produce firm-level estimates for the manufacturing sector for 2010-2013, and Fedderke (2002), who produces estimates for 1970-97 for 28 manufacturing sub-sectors.

2 Methodology

To estimate TFP, GDP can be expressed as a function of physical capital and labour:

$$Y = AF(K, L) \tag{1}$$

where Y is Gross Value Added in constant prices, A is an index of TFP, K is domestic capital stock, and L is labour input. Table 6 describes the data and data sources used in detail. We use Gross Value Added at basic prices for each industry, along with gross fixed capital formation in constant 2010 price for investment, as well as industry employment levels from various sources. Using the perpetual inventory method, capital stock is initialised at the level of real output in the first year data is available, and in each subsequent year, it is adjusted for depreciation and investment (with the depreciation rate δ at 10 percent annually, following Fedderke 2018, in $K(t) = (1 - \delta) * K(t - 1) + I(t)$).[3] Data availability prevents adjustment of labour input for human-capital accumulation.[4] Implicitly, this production function assumes that factors receive their marginal product in compensation. We do not make any adjustments for potential mark-ups over marginal cost when estimating TFP given industry data constraints.[5] We estimate a range of different production functions. The first set of functions are of Cobb-Douglas form, i.e.:

$$F(K, L) = [K^{\alpha} L^{(1-\alpha)}]^{\gamma} \tag{2}$$

where α is the share of capital used in production (proxied using difference between unity and the nominal value of labour remuneration over the nominal value of gross value added) using and γ measures returns to scale (ie. $\gamma < 1$ decreasing returns to scale and $\gamma > 1$ increasing). We also estimate a range of constant returns to scale (i.e. $\gamma = 1$) constant elasticity of substitution (CES) production functions:

$$F(K, L) = [\alpha K^{\rho} + (1 - \alpha) L^{\rho}]^{(1/\rho)} \tag{3}$$

where $\rho = \frac{(\sigma-1)}{\sigma}$ where σ is the elasticity of substitution between capital and labour. Under a constant return Cobb-Douglas production function $\sigma = 1$ and $\gamma = 1$. For South Africa, industry estimates from Kreuser et al. (2015) (covering 1994-2012) and aggregate estimates from Steenkamp (2018) (1999Q1-2017Q1) suggests that the elasticity of substitution is generally below one. We use 0.9 following the benchmark Solow-residual model from Steenkamp (2018) for our Cobb-Douglas estimates but also consider the impact of varying this assumption in Table 5 Appendix. Our benchmark estimates are based on a 50 percent labour share (since the aggregate labour share is approximately 48 percent currently), but we allow industry variation in labour shares in the alternative estimates.

3 Comparison to other estimates

TFP growth is notoriously difficult to estimate and sensitive to the data used, production function parameterisation, and the estimation approach used. The aim of this note is to provide up-to-date estimates based on available data using a simple commonly-used estimation approach. Figure 1

[3] Given a lack of empirical estimates for South Africa, we use an initial capital-output ratio of one, which is often used for emerging markets. We exclude the 1960s period from our comparisons since this approach underestimates capital stock in the beginning of the sample. It would be useful to extend this research once industry capital stock estimates become available in 2021.

[4] The implication is that quality changes that affect factor inputs is inadequately controlled for, which could create some upward bias in TFP estimates. Fedderke (2018) presents evidence that service intensive industries in South Africa have the highest proportion of skilled labour. However, Fedderke (2018) shows that the correlation between skill growth and TFP growth has been low across industries, implying that such changes have not accounted for a very large share of productivity growth.

[5] In a South African context, the lack of strong link between wages and productivity imply that this is an unrealistic assumption, and a question worth pursuing in future work. Fedderke (2018) produced industry-mark up estimates, but one could use the 'supply-side system' approach of Klump et al. (2007) to estimate mark-ups endogeneously alongside TFP and industry σ.

presents our benchmark estimates and Table 1 compares these to those from Fedderke (2018). Estimates for the earlier decades are generally higher than from Fedderke (2018), but lower for the post GFC years.[6] Relatively tradable industries like manufacturing and finance have experienced rapid TFP growth according to both Cobb-Douglas and CES estimates. In spite of historically high terms of trade, the TFP growth of mining is estimated to have been negative since the global financial crisis. The same is true for the electricity sector. While further research would be required to assess the factors responsible for this TFP decline, it is likely that this reflects the poor growth of output in these industries, which could be related to policy uncertainty (such as over licensing and mineral rights) over the last decade, and poor management of the electricity fleet and budget overruns in the development of new electricity capacity. The CES estimates for community services production are surprisingly high, although the Cobb-Douglas estimates are generally much lower.[7]

Figure 1: Benchmark TFP growth estimates

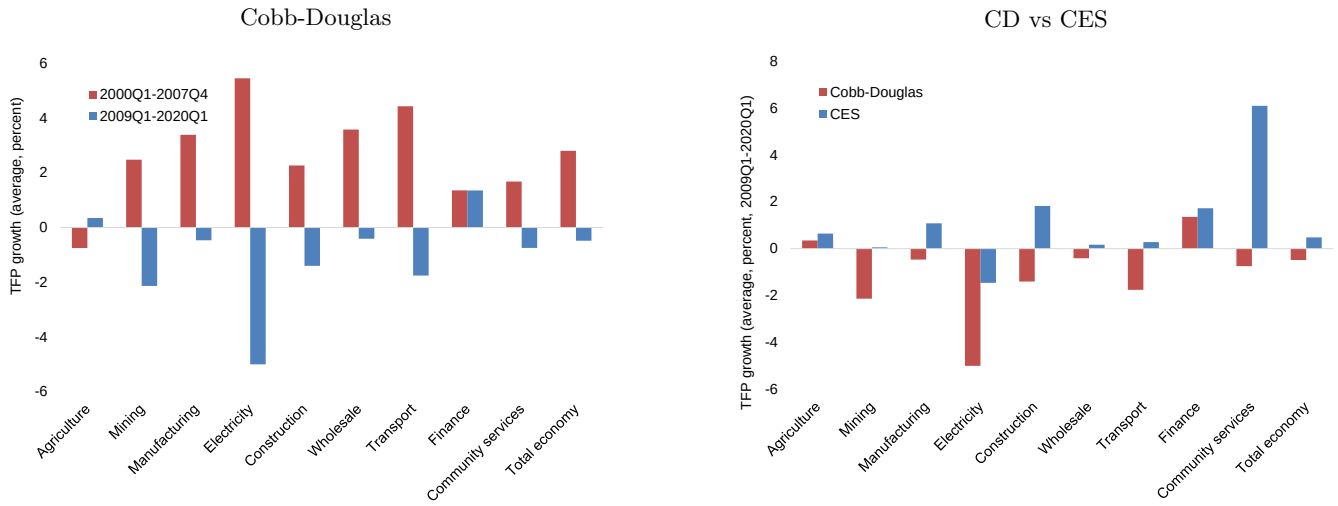


Table 2 compares aggregate estimates from our approach (using total economy data) to estimates from other sources, including the 'Core model' (Smal et al. 2007), Steenkamp 2018 and Rapapali and Steenkamp 2019).[8] Our estimates are higher than estimates from the Conference Board or Penn World Tables. Compared to the Core model estimates, our estimates are lower between 1999Q1 and 2020Q1, but similar for the post-financial crisis period.[9] Since the financial crisis, aggregate TFP growth is estimated to have been very tepid, with some estimates suggesting TFP growth has actually been negative. In advanced economies, there has been a vigorous debate about whether the decline in TFP growth after the crisis (Figure 2 shows this for South African data) could reflect the lingering impacts of the crisis (such as persistent demand or financial shocks) or a 'secular stagnation', driven by persistent excess savings over investment demand (see Summers 2015).[10] For South Africa, The

[6] Fedderke (2018) used a primal decomposition of the Solow residual, where TFP is estimated as the differential of the growth rate of output and the weighted growth rates of capital and labour.

[7] We do not show estimates for the government sector separately as we argue that the sector's TFP estimates industries are probably unreliable as it is difficult to accurately measure capital stock and depreciation for the public sector.

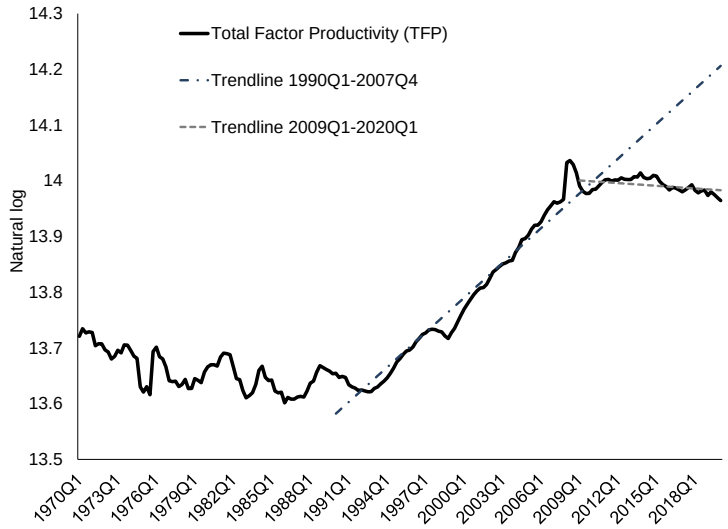
[8] In the core, model TFP is estimated using a Cobb-Douglas production function using private sector capital stock and real compensation. Steenkamp (2018) calculates TFP as $TFP_t = \frac{Output_t}{(1-\alpha)L_t+\alpha K_t}$ where output is in constant prices, $1-\alpha$ is the labour share (total employee remuneration over total income), α is the capital share (gross operating surplus over total income), and L and K are labour and capital input, respectively. Steenkamp (2018) estimates a CES function using a factor-augmenting specification. Botha et al. (2018) estimate TFP using a semi-structural framework that includes a Cobb-Douglas production function, estimated using a filtering approach. Conference Board TFP is calculated as the residual of GDP growth less the contributions to capital quantity and labour quantity and quality to output. Productivity South Africa calculates TFP residually from an equation that captures changes in real output, labour inputs and capital inputs.

[9] The difference to the estimates from Steenkamp (2018) in large part reflect differences in the Quantec capital and labour stock estimates used, with detailed comparisons available on request.

[10] TFP estimates have been shown to be procyclical for many economies (i.e. rising in economic booms). While

World Bank (2017) suggests that the decline in TFP in South Africa since the GFC can largely be attributed to productivity declines within-sectors rather than between-sectors. Between-sector losses reflect the change in aggregate TFP resulting from the reallocation of labour and capital to sectors with lower productivity levels. The study suggests that factors contributing to decline in within-sector productivity losses include a decrease in machinery and equipment investment, the reduction in spill-over effects from technological leaders in advanced economies, a loss of skilled labour mainly driven by emigration by professionals, and slow growth of small productive firms. Thakoor (2020) argues that rising market power, inefficient state-owned enterprises and labour market rigidities and skills mismatches have been correlated with South Africa's low growth and productivity.

Figure 2: TFP slowdown around the financial crisis (Cobb-Douglas estimates)



4 Change in structure of the economy

As has been the case in advanced economies, the share of primary sectors in total output has been in long-term decline in South Africa, while the shares of service industries, finance and real estate and government have steadily increased (Figure 3).[11] The same picture emerges when looking at industry shares (note that the level shift in Figure 4 reflects the lack of historical data for the government category). However industry labour shares have not fallen to the same extent as in many advanced economies, with it only falling meaningfully in wholesale trade, transport and construction (Figure 5). Consistent with the findings of Fedderke (2018), we show that labour and production have shifted to low productivity growth sectors over time. Figure 6 shows that industries with high productivity growth and exposure to international competition have generally had falling share in output, especially from 2009 onwards.[12]

adjusting factor inputs for variation in factor utilization (which we have not done here owing to a lack of industry factor utilisation data) tends to explain some of this procyclicality for major economies, there is a large literature that provides explanations for this observed regularity (including, for example, factor 'hoarding', 'hysteresis' effects or that TFP shocks are themselves a driver of the business cycle.

[11] Table 6 describes the data used in this note.

[12] Many industries in South Africa are highly concentrated and not exposed to meaningful competition (Purfield et al. 2014 and Buthelezi et al. 2019).

Table 1: Comparison of baseline estimates to Fedderke (2018)

Average TFP growth rate (Cobb-Douglas)										
	Agriculture	Mining	Manufacturing	Electricity	Construction	Wholesale	Transport	Finance	Community services	Total economy
1970s		-1.40	1.22	2.20	0.13	2.09		-0.10	-0.33	-0.55
1980s		-3.06	1.15	2.76	-0.66	2.95	1.11	1.22	3.33	0.19
1990s		-0.33	-1.03	3.46	-0.72	1.42	3.41	2.14	2.18	0.84
2000s		-2.49	0.73	0.92	5.21	1.15	2.10	3.64	0.91	2.46
2010s	0.53	-1.30	0.75	-4.58	-1.73	0.00	-1.30	1.57	-0.44	-0.07
2000Q1-2007Q4		-0.75	2.48	3.39	5.45	2.27	3.58	4.43	1.68	2.80
2008Q1-2012Q4	0.30	-5.32	-0.82	-6.36	-0.03	-0.22	-2.47	1.39	-1.08	0.87
2009Q1-2020Q1	0.35	-2.13	-0.47	-5.00	-1.40	-0.41	-1.76	1.35	-0.75	-0.48
Average TFP growth rate (CES)										
	Agriculture	Mining	Manufacturing	Electricity	Construction	Wholesale	Transport	Finance	Community services	Total economy
1970s		-2.24	1.15	-0.61	0.51	-0.27		-3.00	0.70	-2.24
1980s		-2.11	0.17	2.61	-3.14	1.10	1.12	-3.90	0.25	-1.12
1990s		4.86	0.95	4.30	2.83	-0.39	5.83	-1.04	0.33	1.19
2000s		-2.28	3.08	1.71	5.67	1.44	2.24	4.33	-3.21	3.74
2010s	-0.19	0.41	1.86	-1.33	0.82	0.18	0.53	1.49	4.83	0.51
2000Q1-2007Q4		-1.30	4.31	3.81	4.64	1.77	3.02	4.81	2.29	2.94
2008Q1-2012Q4	3.82	-3.80	2.07	-4.33	3.23	1.42	-0.92	2.08	-8.78	3.48
2009Q1-2020Q1	0.64	0.06	1.08	-1.46	1.82	0.17	0.28	1.72	6.09	0.48
Fedderke (2018)										
	Agriculture	Mining	Manufacturing	Electricity	Construction	Wholesale	Transport	Finance	Community services	Total economy
1970s		-1.22	0.14	-0.08	0.05	-0.30	0.09	-0.42		
1980s		-1.05	-0.09	0.46	-0.63	0.28	0.38	-0.38		
1990s		0.75	0.12	1.09	0.75	0.20	1.30	0.20		
2000-2007		-0.34	1.05	0.66	0.99	0.53	1.02	1.21		
2008-2012		-1.53	0.41	-2.32	0.04	0.35	-0.27	0.53		

Table 2: Comparison of aggregate TFP estimates to other studies

	Sample	TFP growth estimate (average, percent)
CD baseline	1999Q1-2020Q1	1.20
CES baseline	1999Q1-2020Q1	2.14
CD baseline	2009Q1-2020Q1	-0.48
CES baseline	2009Q1-2020Q1	0.48
SARB Core model	1999Q1-2020Q1	0.43
SARB Core model	2009Q1-2020Q1	-0.40
Rapapali and Steenkamp (2019)	1993-2017	2.0
Steenkamp (2018)	1999Q1-2017Q1	1.7
Botha et al. (2018)	2000Q1-2017Q1	1.1
Productivity SA	1999-2015	1.5
Conference Board	1999-2019	-0.1
Conference Board	2009-2019	-1.1
Penn World Table	1999-2017	1.0

Figure 3: Industry constant GVA shares over time

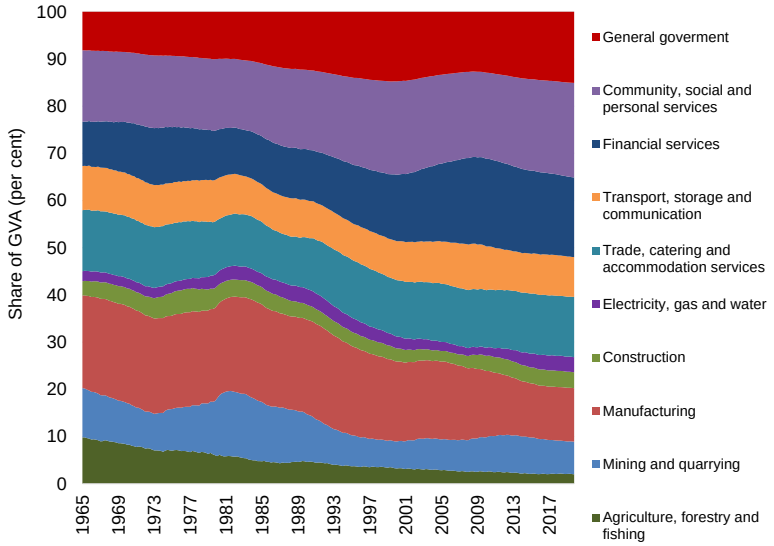


Figure 4: Employment shares over time

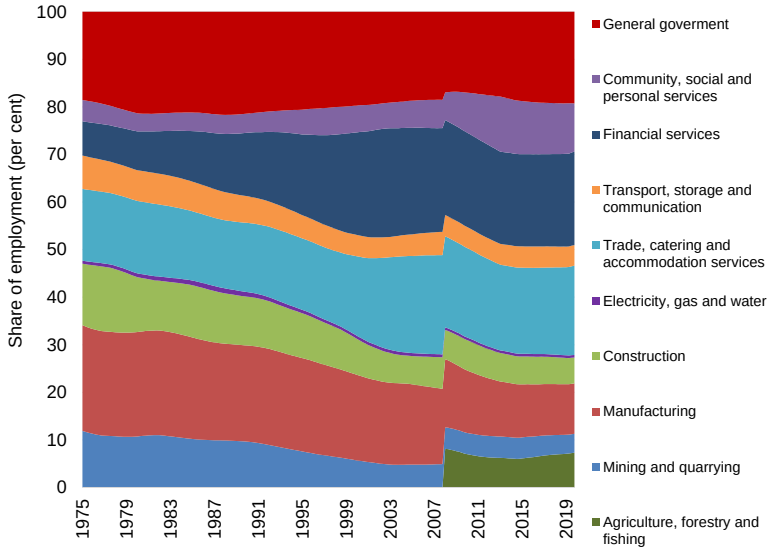
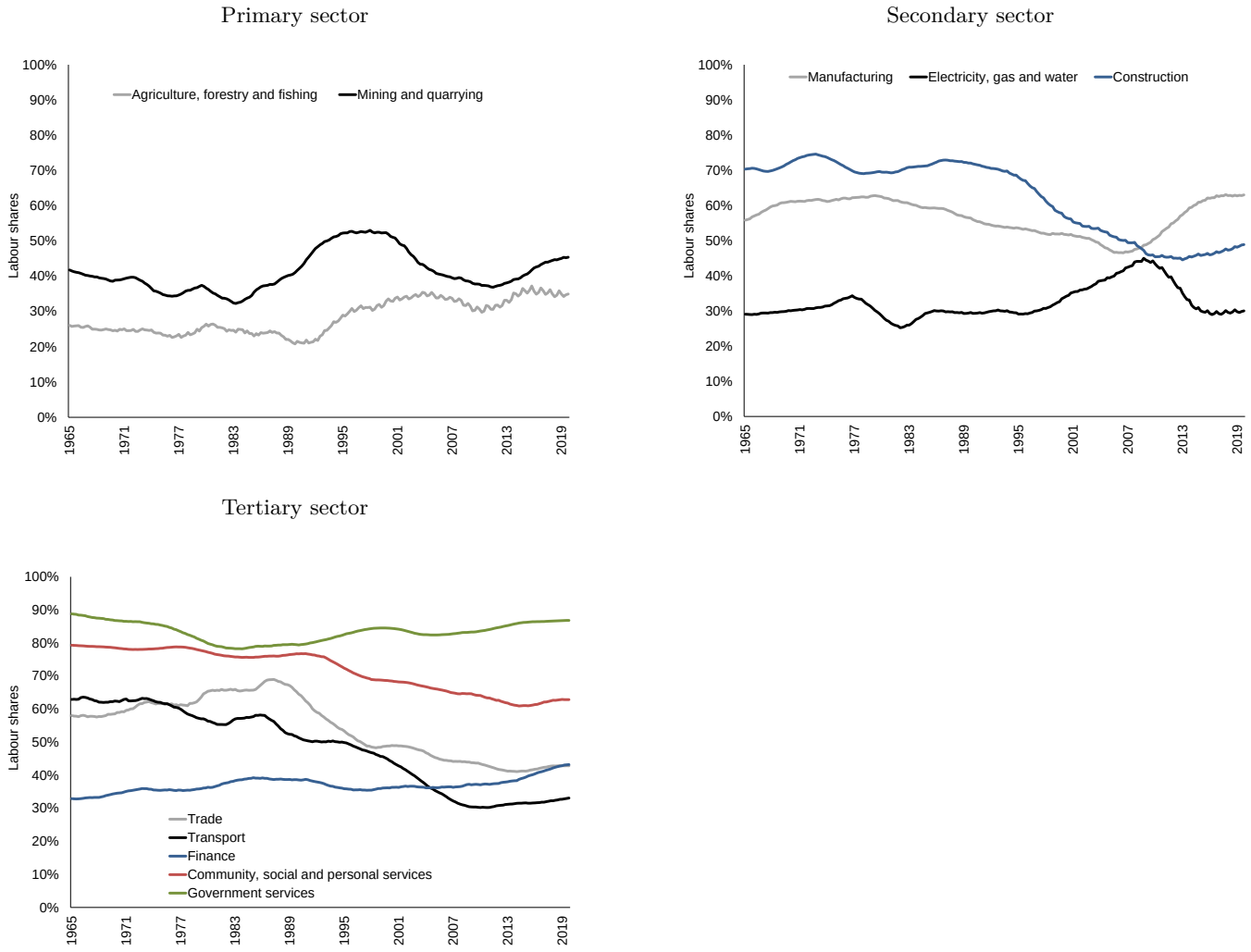
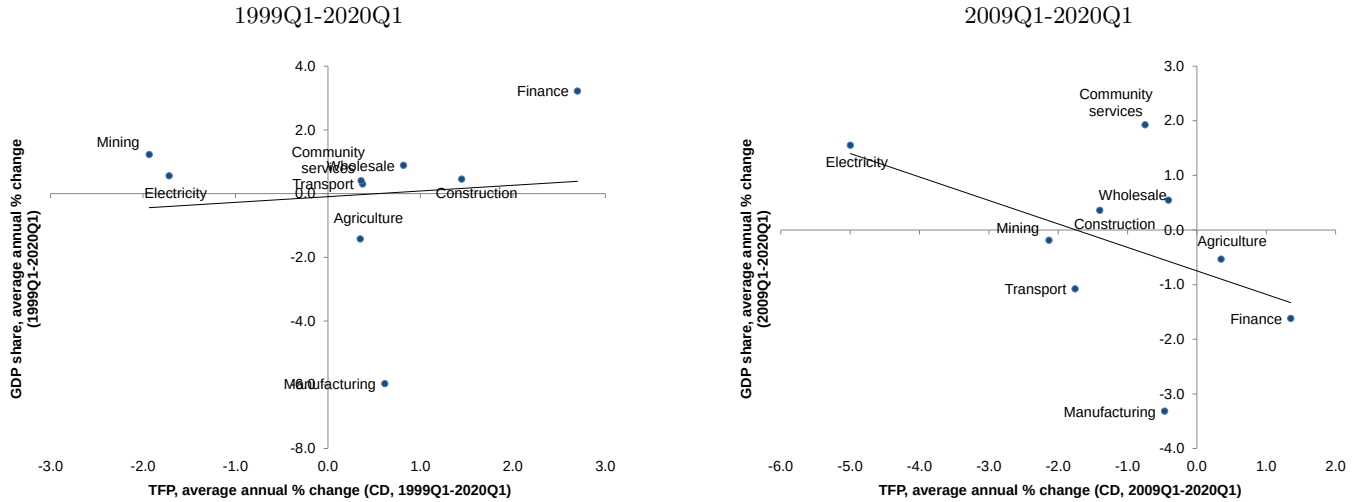


Figure 5: Industry Labour shares



Note: Labour share calculated as industry remuneration over nominal gross value added (5 year average).

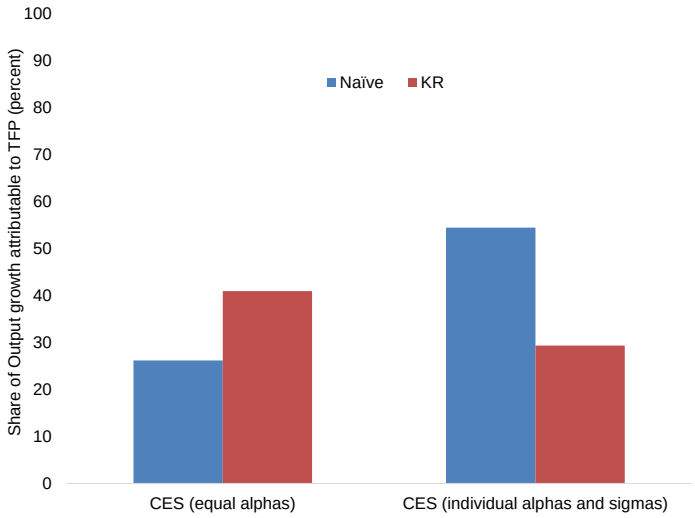
Figure 6: Structural change and productivity



5 Relationship between TFP and economic growth

To estimate the relationship between TFP and economic growth, we calculate a 'naive' relationship as TFP growth divided by GDP growth, as well as using the ratio of the covariance between productivity growth and output growth divided and the variance of output growth (the latter follows the approach of Klenow and Rodriguez-Clare 1997).[13] Based on different CES specifications, the contribution of TFP to output growth is estimated to range from about 25 to 55 percent since 2009 (Figure 7).[14] Given the low estimates of TFP growth over the last two decades, this raises concern over the capacity of the economy to grow more rapidly on a sustainable basis.

Figure 7: Contribution of TFP to GDP growth (2009Q1 to 2020Q1)



6 Conclusion

Despite the importance of productivity for assessing the growth potential of the economy, there has been very little empirical work on industry productivity measurement in South Africa. We produce estimates of TFP for industries in South Africa, and show that TFP growth has been low overall, and that there has been a structural shift towards industries with low exposure to competition and with low productivity growth, such as the electricity sector.

There are many possible explanations for the observed productivity slowdown: weakening competition, low effectiveness of infrastructural or education spending, or corruption and political uncertainty, but there is little research linking TFP outcomes to specific contributing factors in a South African context. Further research to understand the factors contributing to the decline in TFP and the reallocation of production to low productivity growth industries is clearly important. Our estimates are also based on a very simple methodology, and further refinement to account for unmodelled factors such as adjustments to inputs for quality changes (i.e. years of education to account for human capital accumulation) would be useful. To sharpen our understanding of productivity developments and enable us to characterise the drivers of changes in productivity industry data measuring input and output quality and competition is crucially important.

We argue that the slowdown in TFP augurs ill for the long term sustainable growth rate of the economy. An important policy implication of these results is the need for structural reforms aimed at boost the supply-side performance are overdue. Such reforms include those that enhance competition,

[13] The latter approach has the advantage of measuring the additional growth attributable to TFP growth by accounting for the endogeneity between TFP and factor inputs, and is typically higher for most economies.
[14] We do not show the Cobb-Douglas based estimates as these produced implausible growth contribution estimates.

skill development and the use of technology in production. Examples of initiatives that are typically undertaken in emerging economies to boost productivity include ensuring effective infrastructure development and policies and programmes that attract foreign direct investment and investment in information and communication technology.

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A Sensitivity of estimates to production function specification

The specification of the production function affects the TFP estimates obtained. As some of the parameters of the function (such as σ) are not observable, it is also important to test the sensitivity of our TFP estimates to the parameter assumptions made. We compare our baseline TFP estimates to the following alternative specifications:

- Cobb-Douglas and CES estimates with industry-specific α
- Cobb-Douglas estimates with a lower depreciation rate (i.e. 5 percent)
- CES estimates with industry-specific α and industry-specific σ (based on Kreuser et al. 2015)

The capital share value used in estimation affects the weight on the growth rate of capital relative to labour when estimating TFP. The only industries with meaningfully $\alpha > 50\%$ on average are agriculture, electricity, and finance, implying lower TFP estimates when allowing industry-specific α values (Table 3). A lower depreciation rate generally produces lower Cobb-Douglas estimates, though there are several exceptions (Table 4).[15] Estimates with industry varying technical change generally produce slightly lower TFP estimates (Table 5).

[15] A 10 percent depreciation rate, for example, implies an average service life for all assets of around 10 years under the perpetual inventory method. This is likely too long for industries that primarily invest in short-lived assets such as machinery and transport equipment (such as agriculture or transport), but too short for the property sector or electricity where much of the fixed investment is in construction works with services lives of several decades.

Table 3: Comparison of industry specific alpha estimates

Average TFP growth rate (Cobb-Douglas)										
	Agriculture	Mining	Manufacturing	Electricity	Construction	Wholesale	Transport	Finance	Community services	Total economy
1970s		-1.53	1.82	0.49	1.36	2.20		-0.97	1.30	-0.30
1980s		-3.48	1.32	1.83	-1.18	2.99	1.07	0.70	3.44	0.30
1990s		-0.36	-0.78	3.83	0.04	1.46	3.38	1.95	2.38	0.89
2000s		-2.81	1.07	0.57	6.52	1.39	1.98	3.07	1.97	2.77
2010s	0.29	-1.59	0.85	-6.08	-0.36	0.17	-1.41	1.36	0.46	0.06
2000Q1-2007Q4		-0.97	2.81	3.49	6.36	2.49	3.48	3.90	2.67	2.94
2008Q1-2012Q4	0.16	-5.93	-0.56	-8.43	2.15	0.02	-2.63	0.97	0.01	1.36
2009Q1-2020Q1	0.12	-2.47	-0.35	-6.57	0.18	-0.23	-1.87	1.11	0.20	-0.35
Average TFP growth rate (CES)										
	Agriculture	Mining	Manufacturing	Electricity	Construction	Wholesale	Transport	Finance	Community services	Total economy
1970s		-2.24	1.35	-0.92	0.94	-0.31		-3.05	1.28	-2.19
1980s		-2.37	0.19	2.23	-3.33	1.05	1.10	-3.54	-0.07	-1.11
1990s		4.45	1.13	4.32	3.17	-0.44	5.79	-0.75	0.19	1.22
2000s		-2.44	3.30	1.43	6.10	1.54	2.19	3.98	-3.16	3.88
2010s	-0.20	0.17	1.94	-2.43	1.32	0.26	0.46	1.40	5.88	0.57
2000Q1-2007Q4		-1.36	4.51	3.79	4.91	1.85	2.98	4.51	2.67	2.99
2008Q1-2012Q4	2.86	-4.16	2.29	-5.53	4.01	1.58	-1.00	1.80	-8.93	3.73
2009Q1-2020Q1	0.40	-0.24	1.18	-2.65	2.42	0.26	0.21	1.56	7.39	0.55

Table 4: Comparison of the impact of a different depreciation rate estimates (depreciation rate =5 percent annualised)

Average TFP growth rate (Cobb-Douglas)										
	Agriculture	Mining	Manufacturing	Electricity	Construction	Wholesale	Transport	Finance	Community services	Total economy
1970s		-1.77	0.81	1.79	0.01	0.97		-1.05	-0.93	-1.00
1980s		-2.91	0.46	2.15	-1.34	2.29	-0.10	0.75	2.56	-0.36
1990s		-0.88	-1.14	2.48	-1.28	1.16	3.04	1.70	1.87	0.44
2000s		-2.18	0.84	1.17	6.15	1.69	2.53	3.85	1.36	2.59
2010s	0.68	-1.35	0.37	-3.96	-1.68	-0.04	-1.33	1.26	-0.45	-0.06
2000Q1-2007Q4		-0.64	2.59	3.11	6.38	2.79	3.90	4.61	2.08	3.00
2008Q1-2012Q4	0.40	-4.58	-0.97	-4.52	0.70	0.06	-1.96	1.27	-0.80	0.90
2009Q1-2020Q1	0.49	-2.07	-0.82	-4.21	-1.27	-0.41	-1.72	1.07	-0.73	-0.43

Table 5: Estimates based on industry-specific alpha and sigma parameter estimates

Average TFP growth rate (CES)										
	Agriculture	Mining	Manufacturing	Electricity	Construction	Wholesale	Transport	Finance	Community services	Total economy
1970s		-2.24	2.02	-0.24	1.78	-0.55		-3.06	1.74	-1.80
1980s		-1.36	0.25	3.07	-3.68	0.73	1.37	-3.49	-0.32	-1.03
1990s		5.98	1.71	4.28	3.84	-0.75	6.58	-0.71	0.09	1.39
2000s		-1.86	4.02	2.06	6.95	2.28	2.99	3.93	-3.09	4.97
2010s	-0.18	1.08	2.21	0.01	2.29	0.75	1.53	1.39	6.72	0.98
2000Q1-2007Q4		-1.15	5.14	3.85	5.44	2.34	3.52	4.47	2.98	3.37
2008Q1-2012Q4	4.25	-2.78	2.99	-2.85	5.51	2.64	0.36	1.76	-9.00	5.56
2009Q1-2020Q1	0.76	0.88	1.53	-0.01	3.57	0.87	1.37	1.54	8.44	1.05

B Data description

Table 6: Variable identifiers and sources

Sector	**Gross Value Added (constant prices)**	**Gross Value Added (current prices)**	**Gross fixed capital formation**	**Remuneration (Current prices)**	**Employment**
Agriculture, Forestry and Fishing (AFF)	NRI6631D	NRI6631K	NRI6080C	NRIV031K	LABD009B
Mining and quarrying (M and Q)	NRI6632D	NRI6632K	NRI6081C	NRIV032K	LABC003B
Manufacturing (Man)	NRI6634D	NRI6634K	NRI6082C	NRIV034K	LABC004B
Electricity, Gas and Water (EGW)	NRI6635D	NRI6635K	NRI6085C	NRIV035K	LABC007B
Construction (Con)	NRI6636D	NRI6636K	NRI6086C	NRIV036K	LABC005B
Wholesale and retail trade, catering and accommodation (TCA)	NRI6638D	NRI6638K	NRI6087C	NRIV038K	LABC016B
Transport, storage and communications (TSC)	NRI6639D	NRI6639K	NRI6088C	NRIV039K	LABC170B and LABC220B
Finance, insurance, real estate and business services (FIREBS)	NRI6640D	NRI6640K	NRI6091C	NRIV040K	LABC017B
General government (GG)	KBP6643D	NRI6643K	NRI6100C	NRIV042K	LABC270B
Community, social and personal services (CSP)	NRI6642D	NRI6642K	NRI6094C	NRIV041K and NRIV044K	LAB140B

OBEN 2002* – October 2020

The great descent: Fiscal multiplier now a fraction of what it was a decade ago

Theo Janse van Rensburg, Konstantin Makrelov and Shaun de Jager[1]

Abstract

We use a small econometric model to calculate the evolution of the fiscal multiplier over the past decade. Our estimates take account of the specific fiscal conditions for each year, in particular the non-linear relationship between debt and the sovereign risk premia as well as the impact of tax increases. The model indicates that the fiscal multiplier has declined from 1.5 in 2010 to around zero in 2019 as the debt levels have become progressively more unsustainable and large tax increases have muted the aggregate demand effects from higher government expenditure. The low fiscal multiplier suggests that fiscal consolidation will be less costly in terms of growth forgone than generally perceived.

1. Introduction

The fiscal expenditure multiplier tells us what happens to the rest of the economy when government changes its spending. If a fiscal multiplier is 1, GDP changes by exactly R1 for every extra R1 of government spending. If it is more than 1, extra spending by government crowds in even more domestic output. If it is less than 1, activity does not rise as much as the spending increase, perhaps because of import leakage, capacity constraints or crowding out effects.

This study makes use of a small Quarterly Macro econometric Model (QMM) that is specifically designed to highlight the relationships between the government and the real economy. In our estimates we take into account the specific fiscal conditions for each year, which are based on the non – linear relationship between debt and the sovereign risk premia over the last 10 years, the impact of tax increases on economic activity as well as the presence of certain supply constraints such as those in the electricity sector. Our results show that the fiscal multiplier has declined from 1.5 in 2010 to almost zero in 2019 as the government debt levels have become progressively more unsustainable and large tax increases have muted the aggregate demand effects from higher government expenditure.

2. The changing fiscal dynamics

In 2008/09, South Africa's debt to GDP ratio stood at 26 per cent, hardly unsustainable. The fiscal policy decisions in the 10 years prior to the Global Financial Crisis (GFC) created the space for a strong fiscal response. While the initial post GFC response was justified, the stimulus deviated from two key conditions. It was not temporary and it was not well targeted as a rising part of expenditure was spent on wages rather than on investment.[1] Strong real growth in spending was achieved, with growth averaging almost 4% per year over the entire period, and increased by more than 7% in the last fiscal year.

[1] Loewald, Faulkner, and Makrelov (2020) and Burger and Calitz (2020) provide a review of fiscal policy over the last 10 years.

Figure 1 indicates that the ratio of expenditure to GDP increased from 27% in 2008/09 to 33% in 2019/20. Initially fiscal deficits were funded by debt issuance at very competitive rates as South Africa benefitted from the quantitative easing policies in advanced economies. This suggests that the expenditure multipliers were large. However, government started using tax increases to fund expenditure, which raised the tax to GDP ratio by 2 percentage points, from 23.9% in 2010/11 to 25.9% in 2016/17, muting the positive aggregate demand effects from higher government expenditure. Tax increases were also accompanied by large tax shortfalls suggesting substantive negative impacts on GDP.

The SA risk premium as measured by the EMBI+ measure decreased in the period immediately after the GFC (Figure 2). Soobyah and Steenkamp (2020) show that a large part of the decline was driven by domestic factors, suggesting, that at that time fiscal policy was perceived as sustainable and having a positive impact on economic activity. However, over the period 2013 to 2019, the risk premium increased by 200 basis points, generating crowding out effects.

The later part of the period was also characterised by large supply shocks such as very disruptive labour strikes in the mining and manufacturing sectors, drought conditions, rising levels of policy uncertainty and increasingly more binding electricity constraints. These factors decreased potential growth and the effectiveness of expansionary fiscal policy.[2]

Figure 1: Expenditure and Revenue

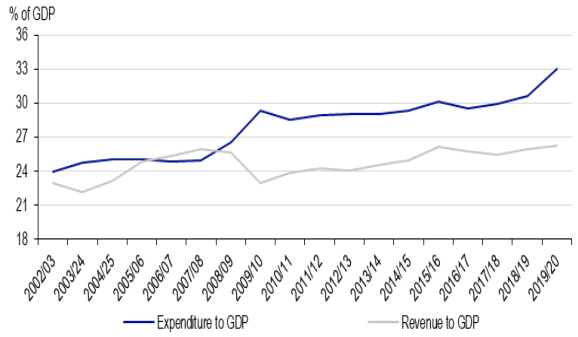


Figure 2: Risk premium (EMBI+)

3. Literature review

This literature identifies a range of channels through which government spending can affect broader GDP. The simplest is that an increase in spending raises aggregate demand. This impact is reduced, however, if the extra expenditure pulls in more imports. Multipliers also vary depending on the composition of spending, with investment having the most positive multiplier. The size of the multiplier is further affected by the business cycle: if an economy is already operating at full capacity, multipliers will be smaller than when there is a negative output gap (Batini, Eyraud, and Weber 2014). Advanced economy estimates also show much larger multipliers when monetary policy is constrained by the zero lower bound (Christiano, Eichenbaum, and Rebelo 2011). Financing channels matter too. If government spending is paid for with higher taxes, multipliers will tend to be low. Funding through debt can support a higher multiplier where debt is perceived as sustainable. Where sustainability is in doubt, more debt will tend to reduce capital inflows, raise interest rates for the entire economy, and undermine confidence in the economic outlook, thereby lowering the multiplier (Bonam and Lukkezen 2019). This effect is stronger where there is a large financial sector that holds government bonds as safe assets: rising fiscal risk weakens these balance sheets, in turn negatively affecting the supply and pricing of loans (Dell'Ariccia et al. 2018). Even in the absence of large holding of government debt, financial sectors concerns regarding the fiscus and the

[2] See Fedderke and Mengisteab (2017) for estimates of potential growth.

economy can increase lending spreads (Borio and Zhu 2012). Given these channels, we should expect multipliers to be time varying.

The relationship between government debt and risk premium is particularly important for our analysis. The economic literature suggests strong non-linear relationship. At low debt levels, the risk premium remains unchanged and it even decreases if the fiscal policy intervention is temporary and targeted. At high debt levels, the risk premium starts to rise rapidly.[3] The economic literature also finds that the tax multipliers are larger than the expenditure multipliers.[4]

An overview of the South African literature on expenditure multipliers is presented in Appendix A. The studies have different assumptions and limitations, but suggests that under the current conditions the expenditure multiplier is small. Also, most studies find that the fiscal multiplier is zero in the long-run.

4. Methodology

In the QMM the structure of the economy is represented by a set of econometric equations and identities based on economic theory and the relationships in the system of national accounts. Long term dynamics are represented by a set of co-integrating relationships while the methodology also allows for deviations in the short-run from the long-run equilibrium.

The economy is continuously bombarded by a range of shocks, which are transmitted via changes in prices (exchange and interest rates and consumer prices) affecting income and in turn the decisions to invest and consume. The adjustment by economic agents to these shocks occurs over several periods, depending on the particular shock and the specific characteristics of the sector. The model has 38 behaviorally estimated equations and more than 100 identities.

A particularly important feature of the QMM with regard to this study is the presence of five major tax rates, an endogenous risk premia and a lending spread. A brief overview of the model is presented in Annexure B, important equations in Annexure C, while results from a shock to the real repo rate and the risk premium are presented in Annexure D.

The model provides a laboratory to calculate the multipliers under different conditions. We identify two main periods. The first period is immediately after the global financial crisis, which is characterised by falling risk premia, large negative output gaps and large capital inflows. In the second period post 2011, these conditions start to reverse and government also starts to use tax increases to reduce the fiscal deficits. We estimate the multipliers taking into account these different conditions and in particular how government funded its expenditure and the impact thereof on risk premia.

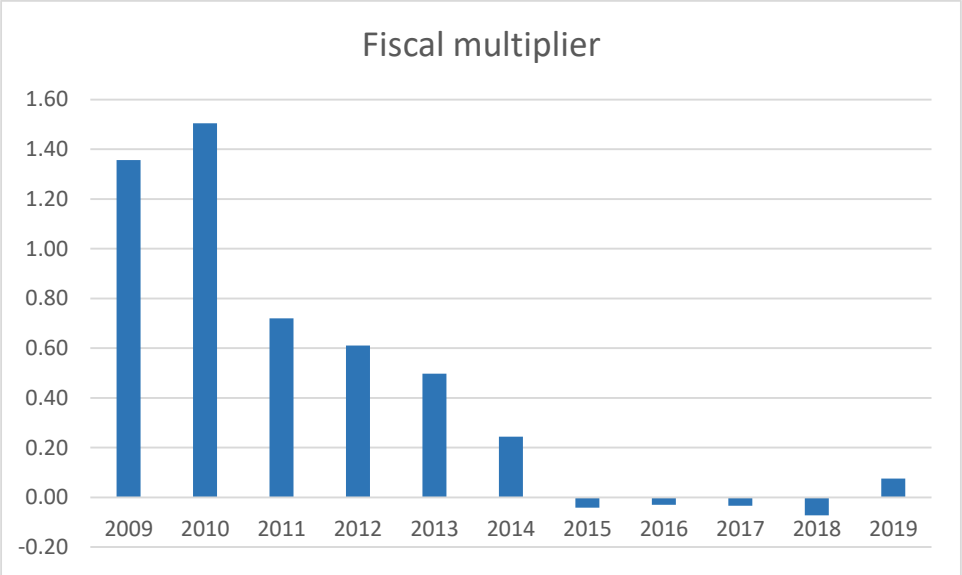
5. Results

We calculate the fiscal multipliers for each year. Figure 3 shows the impact multipliers, these are calculate as the change in GDP divided by the change in real government consumption expenditure. The fiscal multiplier is time-varying and "state dependent". Initially, it increases to 1.5 post GFC, but gradually declines towards zero as expenditure to GDP continues to increase but the underlying conditions change.

[3] See for example Bayoumi, Goldstein, and Woglom (1995) and Haugh, Ollivaud, and Turner (2009).

[4] For review of the global literature see Alesina, Favero, and Giavazzi (2018). Kemp (2020) finds that the tax multipliers for South Africa are much higher than the expenditure multipliers.

Figure 3: The fiscal multiplier over the last decade



Source: Author's own calculation

We now briefly explain how these results are generated in our framework. Investment is an important driver of aggregate demand in the short-run and supply in the long-run. This is captured in our framework through a long-run econometrically estimated relationship between gross fixed capital formation and real GDP. The estimated equation (see Appendix C, equation 1) for real gross fixed capital formation in the private sector indicates a strong long run homogenous (1:1) relationship between the levels of real private investment and real GDP over the long run (Figure 4 A). Over the period government had reduced its spending on investment as a share of total spending, reducing the fiscal expenditure multiplier. At the same time private investment as share of GDP has also fallen from 15½ per cent at the end of 2008 to 12 per cent in the first quarter of 2020 (i.e. even before the impact of the COVID pandemic) (Figure 4 B), also contributing to a lower multiplier.

The size of the fiscal multiplier is also dependent on the import leakage. Although the import penetration ratio has declined from its highs of about 34.3% in 2014q1, it remains relatively high and between a quarter and a third of stimulus leaks to the rest of the world in the form of increased imports. (Figure 4 C).

The model framework also incorporates output gap dynamics which affect the repo rate and inflation. A more positive output gap indicates raised demand pressures, which improves the incentive to invest, but also raises imports. The initial output gap was large and negative, but it declined as the economy was hit by several supply shocks as explained earlier, reducing potential growth.

Another important channel is the relationship between higher debt levels, risk premia and interest costs. We capture these through equations 2 and 3 presented in annexure C. In our framework, higher deficit ratios affect the long bond yield directly and also indirectly via the risk premium, which in turn is effected by debt levels (as % of GDP). The risk premium also impacts the lending spread with a higher risk premium leading to higher lending spread.[5,6] In a savings constraint economy, government issuance can generate crowding out effects very quickly, which will be amplified if the increase is perceived as unsustainable.

[5] For a theoretical explanation of the channel see Borio and Zhu (2012).
[6] In our framework, we do not generate financial accelerator effects. These reflect the ability of the financial sector to amplify economic shocks through real economy-financial sector feedback loops. The inclusion of such effects would amplify

This has been much of the case over the last decade when government debt/GDP ratios have doubled from roughly 30 per cent in 2010 to 60 per cent by 2019. Related to this, real interest rate costs (long-term government bond yields) have peaked at more than 5% at the end of 2009 (post GFC), before declining to levels just above 1% by mid-2013 (Figure 4 D). This decline was initially beneficial to the fiscal multiplier, but since then, real long rates have increased to levels around 6%, which has greatly reduced the size of the fiscal multiplier.

This increase in the interest rate also reflect South Africa's rising risk premium (even relative to other emerging markets [EM risk premium]) in the post 2013 period, which relates to the deterioration in both political and macroeconomic fundamentals – in particular government's unsustainable fiscal situation (Figure 4 E). In the QMM model, the risk premium is affected by the debt to GDP ratio as well as the size of the US FED balance sheet (See Appendix C, equation 3).

We have already indicated earlier on that the overall tax burden (tax to GDP ratio) has increased from 23.9% in 2010/11 to 25.9% in 2016/17. The increase in personal income tax revenues was particularly steep over the past decade. Our analysis takes into account these changes which have a strong negative impact on economic activity.

Finally, the multiplier for 2020 is difficult to judge, given some factors that suggest a large, positive multiplier (especially a deeply negative output gap, cheaper government financing from multilaterals and tax deferrals) and others that suggest a low one (downgrades and a higher risk premium). It appears to be in a range between 0.6 and 0.8. Looking beyond 2020, it is likely that based on the ending of tax deferrals[7], raised government borrowing costs[8] and the intensification of the "crowding-out" effects, the multipliers will once again decline to the low levels seen at the end of the past decade.

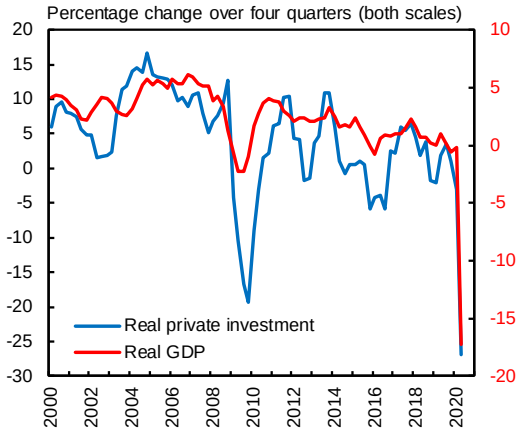
the estimates in our framework. The large multipliers in the initial period would be larger but the small and negative multiplier would also be more negative as the financial sector amplifies them.

[7] Government is also planning some tax increases over the medium term to help with consolidation efforts.

[8] Government is funding a large part of the fiscal deficit in 2020/21 through low interest rate loans and cash reserves.

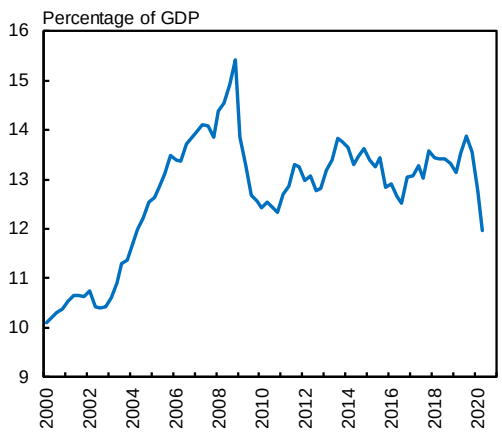
Figure 4: Key drivers of underlying conditions

A: Real GDP and real private investment



Sources: Stats SA and SARB

B: Real private investment

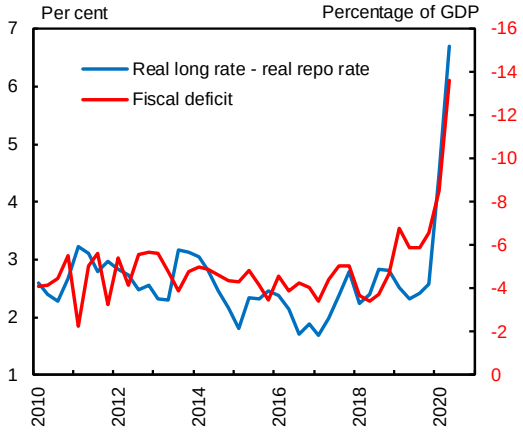


Sources: Stats SA and SARB

C: Import leakage

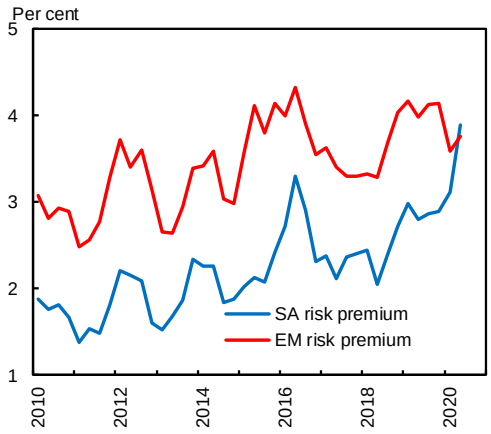
Sources: Stats SA and SARB

D: Term premium versus fiscal deficit (saar)



Sources: NationalTreasury and SARB

E: RSA risk premium and EM risk premium



Sources: Bloomberg, JPMorgan and SARB

6. Concluding remarks

Our results show that the space for a fiscal expansion has long gone. The multiplier was close to zero by 2015. Yet, government has been growing expenditure, increasing taxes and growing debt. The outcome of this policy has been declining growth and no fiscal space to respond to the Covid crisis. Our results also suggests that the costs of fiscal consolidation will be less harmful to growth than generally perceived as the multiplier is very small.

Annexure A: Literature review

Table 1: South African literature on Fiscal multipliers

Author and date	Country	Short-term Expenditure Impact Multiplier (number or range)	Comments
Jooste, Liu, and Naraidoo (2013)	South Africa	0.77	The size of the expenditure multiplier depends on the methodology used, the business cycle, the import intensity of the economy and the share of Ricardian households. The multiplier can exceed one. Monetary dynamics, but no financial dynamics in the model. Long-run multipliers close to zero.
Jooste and Naraidoo (2017)	South Africa	0.6	The results are based on closed economy dynamic stochastic general equilibrium (DSGE) model and depend on the values of the labour supply elasticity, the foresight of households and the degree of sticky wages. Monetary dynamics but no financial dynamics. The long-term multipliers are zero.
Mabugu et al. (2013)	South Africa	0.73 to 0.76	The results are based on Computable general equilibrium (CGE) model, which is supply and savings constrained. No monetary dynamics or financial dynamics
Akanbi (2013)	South Africa	0.82	The results are based on macro econometric model, which does not distinguish between pre and post 1994 structural differences. Supply constrained multipliers are smaller. No financial dynamics. Long term multiplier close to 0
Makrelov et al. (2020)	South Africa	2.5	Results based on stock and flow consistent financial CGE model. The multiplier is large only in the presence of sustainable fiscal outlook, large negative output gap and low financial frictions. Small multipliers otherwise. Financial sector dynamics. Long term multiplier close to 0.
Kemp (2020)	South Africa	0.01 to 0.78	Different VAR models. Varies depending on length of period, the methodology used, the business cycle and the monetary policy response. No financial dynamics. Long-term present-value government spending multipliers range from −0.24 to 1.06
Kemp and Hollander (2020)	South Africa	0.31	The results are based on an open economy dynamic stochastic general equilibrium model (DSGE). Household and Government consumption are substitutes. No monetary policy accommodation. Differentiation between low and high debt regimes. No financial dynamics or distinction of different phases of the business cycle. Long-term multipliers are close to zero
Schröder and Storm (2020)	South Africa	1.87	Input-output model, closed economy, no financing channels, no supply constraints under all economic conditions;

Annexure B: Brief non-technical overview of the model

In this section, we provide a brief overview of the quarterly macro model (QMM) used in this analysis[9]. The QMM aims to describe the behaviour of agents in the South African economy at an aggregated level. The structure captures the key expenditure and income variables reported in the National Accounts.

The model is suitable for both in-sample policy analysis and forecasting purposes. There are roughly 200 economic variables, of those $\pm$140 are endogenous of which 38 are separately estimated equations. More specifically, the model was estimated by employing the single equation co-integration technique.[10] The estimated equations explain the behavior of households, policy makers (both monetary and fiscal), the rest of the world and their interactions in the markets for capital, financial assets, goods and labour.

Potential output is exogenously determined by applying an HP Filter to GDP data, where out-of-sample forecasts are used to overcome the end-point restriction critique. At times, actual output (real GDP or demand), may be below or above the estimated level of the economy's potential, so that when actual output exceeds potential, the output gap becomes positive and vice versa. In turn, the positive output gap generally suggests an economy "overheating" or operating above capacity causing an increase in demand and associated price pressures. Policy actions are aimed at closing the gap to potential so that over the longer-term, excess demand pressures become constrained and prices gravitate towards target.

To produce goods and services in the economy (real GDP), firms hire labour and invest in capital, with the usual wage bargaining conflict between industry and the workforce. Over the long run, the costs of additional workers are compensated by the extra revenue they generate, implying that the pace of growth in real wages cannot exceed the growth in labour productivity (output per worker). There is a homogenous relationship between growth and employment so that employment growth only exceeds output if its accompanied by reduced real wages. However, over the short(er) term, prices and wages are "sticky" so that labour can temporarily make relative gains (losses) against firms through higher (lower) real wages or employment. Nominal wages are set according to real wages and inflation expectations.

Private investment draws from the neo-classical and Keynesian traditions by emphasizing the role of income and prices, i.e. where income reflects demand (the real GDP accelerator) and the price as the cost of capital (interest rate). Both fiscal and monetary policy initiatives have an impact on income and the real cost of capital, and thereby affects aggregate expenditure growth and output. Actual output is calculated by adding the net exports of goods and services (exports less imports) to aggregate demand defined as the sum total of household and government consumption, investment and the change in inventories.

The household sector consumes imported and domestically-produced goods and services, with increases in consumer spending consistent with the permanent income hypothesis where consumption responds to changes in permanent real after tax income. There is also a link between the SARB's official repo rate and the banks effective lending rates to ensure the realistic functioning of the monetary policy transmission mechanism.

Government provides employment opportunities and purchases output and goods from domestic firms and the foreign sector (imports). QMM distinguishes between government consumption (split into wages and non-wages), transfers (mostly to households), subsidies and the interest payments on government debt. Government

[9] The QMM is an independent econometric model developed in the SARB Economic Research Department (ERD) based on a similar structure to that of the SARB's core macro-econometric model.

[10] Each equation is estimated as a single dynamic regression equation following an approach proposed by Wickens and Breusch (1988). This approach produces similar results to the Engle and Granger two-step method and eliminates the small sample bias associated with the latter. It involves simultaneous estimation of the long and short term parameters and is based on unrestricted error correction autoregressive distributed lag model, or ARDL(p,q).

expenditure is largely financed by tax revenues and and/or the issuing of bonds (debt securities). The model provides for 5 major taxes, namely personal and corporate income taxes, VAT, fuel levies and custom receipts which are modeled as an exogenous effective rate on the relevant tax base. These 5 taxes constitute more than 90% of total tax incomes, with the residual tax revenues captured under "other" taxes.

The role of monetary policy is to anchor prices at the mid-point of the target range. The QMM uses a Taylor rule which allows the policy interest (repo) rate to react to changes in the foreign equilibrium real interest rate (referenced by the USA Fed rate), South Africa's risk premium, the output gap and the deviation of inflation from target. The real repo rate in the model would then show an increase when the risk premium rises and/or when the output gap is positive and inflation expectations exceed the target level.

Conventional theory suggests real long-term interest rates reflect the trend in the real short term policy (repo) rates, and the fiscal balance (as % of GDP). The SA risk premium is depicted by a weighted spread of SA's long bonds to the matched risk free (USA) rates compiled in EMBI+ for emerging markets, and enters the cost of capital channel via the repo rate.

The long run equilibrium rand/US$ exchange rate reflects interest rate parity conditions, i.e. the UIP calculated as the real risk adjusted interest rate differential to the USA. The bilateral real Euro/US$ exchange rate captures dollar movements related to other international events and the USA, while the balance on the current account and the need for foreign funding also has an impact on the domestic exchange rate.

With regard to international trade, QMM follows the conventional import- and export volume specifications. Here, the long run equilibrium for real export volumes is determined by a foreign demand (income) variable and a competitiveness (price) indicator. The export competitiveness variable depicts relative price movements via the rand equivalent of export commodity prices to domestic producer input costs. Import volumes react to the equilibrium level of domestic demand as the income variable and a competitiveness indicator in the form of import prices (i.e. the rand equivalent of foreign inflation and oil prices) relative to the GDP deflator. Positive and negative output gaps will also affect import volumes over the short term, with an output level above potential raising the import propensity to GDP and vice versa.

Finally, changes in aggregate demand (output gap) affect prices and the deviation of inflation from target. The ultimate impact depends on how households, industry, policymakers and the rest of the world interact with each other, although, "*ceteris paribus*" raised demand pressures usually lead to higher wages, and escalated efforts by firms to pass on these domestic input cost increases to the consumer. Likewise, changes in world prices or exchange rates affect import prices which together with unit labour costs affect domestic producer price inflation (PPI). Over the longer-term these changes in PPI then feed-through to consumer prices via the CPI inflation rate.

Annexure C: Model equations

Equation 1: Real private fixed investment

Dependent Variable: DLOG(IP1)
Method: Least Squares
Date: 19/10/20 Time: 09:20
Sample: 2005Q1 2019Q4
Included observations: 60

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LOG(IP1(-1))-LOG(Y1(-1))	-0.345851	0.094257	-3.669250	0.0006
FGOVLR(-3)/100	-0.329543	0.126710	-2.600774	0.0121
YCU(-1)/100	0.523932	0.312946	1.674193	0.1001
C	-0.683079	0.189529	-3.604088	0.0007
DLOG(IP1(-1))	0.198688	0.084069	2.363411	0.0219
DLOG(REXD1)	0.152256	0.038301	3.975301	0.0002
DUM09Q1	-0.087509	0.021093	-4.148705	0.0001
DUM15Q4	-0.064707	0.017513	-3.694747	0.0005

R-squared	0.689075	Mean dependent var	0.006615
Adjusted R-squared	0.647220	S.D. dependent var	0.028482
S.E. of regression	0.016917	Akaike info criterion	-5.197450
Sum squared resid	0.014881	Schwarz criterion	-4.918204
Log likelihood	163.9235	Hannan-Quinn criter.	-5.088221
F-statistic	16.46328	Durbin-Watson stat	1.876323
Prob(F-statistic)	0.000000		

Equation 2: Real government long term interest rate

Dependent Variable: D(FGOVLR-FREPOR)
Method: Least Squares
Date: 19/10/20 Time: 09:20
Sample (adjusted): 2000Q3 2020Q2
Included observations: 80 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
FGOVLR(-1)-FREPOR(-1)	-0.265269	0.051452	-5.155621	0.0000
RGNATDEFF(-1)	-0.211377	0.042103	-5.020471	0.0000
C	-0.281851	0.110543	-2.549689	0.0129
D(FGOVLR(-1)-FREPOR(-1))	0.409953	0.091490	4.480839	0.0000
D(SARISK(-1))	0.234231	0.117927	1.986235	0.0507
DUM19Q1(-4)	1.424237	0.580519	2.453385	0.0165

R-squared	0.484016	Mean dependent var	0.049893
Adjusted R-squared	0.449153	S.D. dependent var	0.762736
S.E. of regression	0.566096	Akaike info criterion	1.771932
Sum squared resid	23.71438	Schwarz criterion	1.950584
Log likelihood	-64.87728	Hannan-Quinn criter.	1.843559
F-statistic	13.88308	Durbin-Watson stat	2.090673
Prob(F-statistic)	0.000000		

Equation 3: SA risk premium

Dependent Variable: D(SARISK)
Method: Least Squares
Date: 19/10/20 Time: 09:20
Sample: 2003Q1 2020Q1
Included observations: 69

Variable	Coefficient	Std. Error	t-Statistic	Prob.
SARISK(-1)-EMBI(-1)	-0.065752	0.034512	-1.905194	0.0614
LOG(USAFEDL(-3))	-0.128472	0.070551	-1.820984	0.0734
RGNATDEB(-2)/100	0.885765	0.490703	1.805094	0.0759
C	1.476974	0.907982	1.626655	0.1089
D(EMBI)	0.642682	0.066468	9.669081	0.0000
DUM09Q1	1.321113	0.315455	4.187960	0.0001
DUM09Q2	-1.395167	0.215135	-6.485086	0.0000

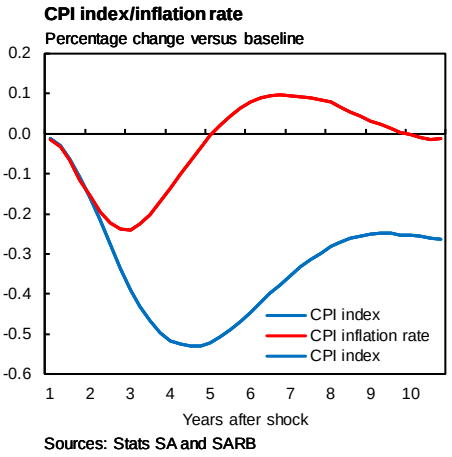
R-squared	0.887337	Mean dependent var	0.007242
Adjusted R-squared	0.876434	S.D. dependent var	0.590534
S.E. of regression	0.207584	Akaike info criterion	-0.210638
Sum squared resid	2.671642	Schwarz criterion	0.016011
Log likelihood	14.26700	Hannan-Quinn criter.	-0.120719
F-statistic	81.38587	Durbin-Watson stat	1.762468
Prob(F-statistic)	0.000000		

MNEMONICS:

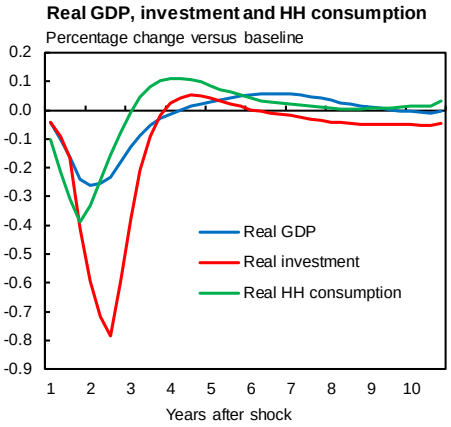
DUM09Q1	=	Dummy 2009q1=1, 0 otherwise
DUM09Q2	=	Dummy 2009q2=1, 0 otherwise
DUM15Q4	=	Dummy 2015q4=1, 0 otherwise
DUM19Q1	=	Dummy 2019q1=1, 0 otherwise
EMBI	=	Emerging markets risk premium
FGOVLR	=	Real long bond rate
FREPOR	=	Real Repo rate
IP1	=	Real private investment
REXD1	=	Real bilateral R/US$
RGNATDEB	=	National Government debt (% of GDP)
RGNATDEFF	=	National Government fiscal balance (% of GDP)
SARISK	=	SA risk premium
USAFEDL	=	USA Fed balance sheet - Liabilities
Y1	=	Real GDP
YCU	=	Output gap

Annexure D: Model responses

A) Model response to 4-quarter real repo rate shock

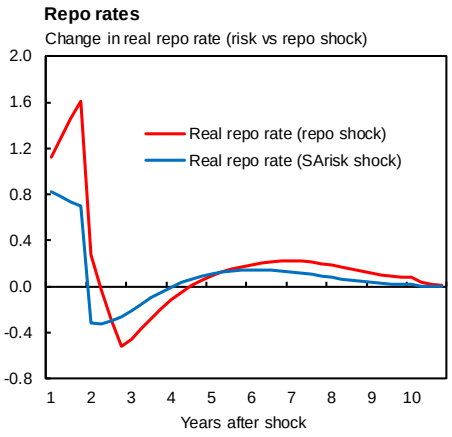


Sources: Stats SA and SARB

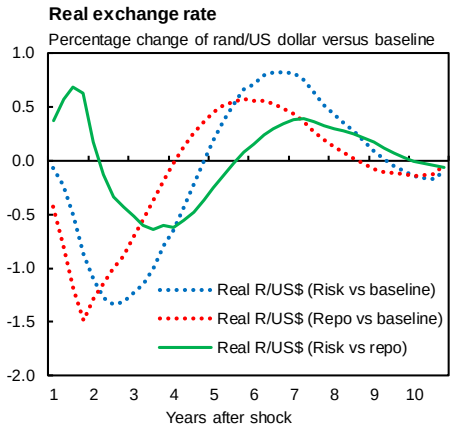


Sources: Stats SA and SARB

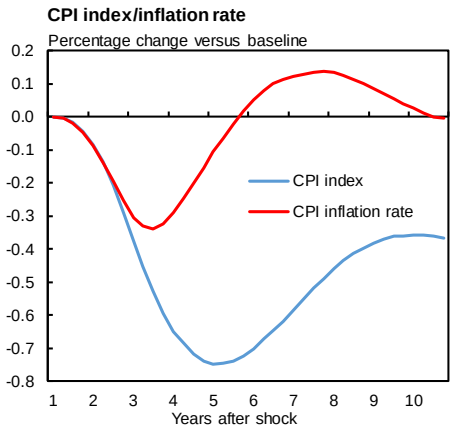
B) Model response to 4-quarter real SA risk shock



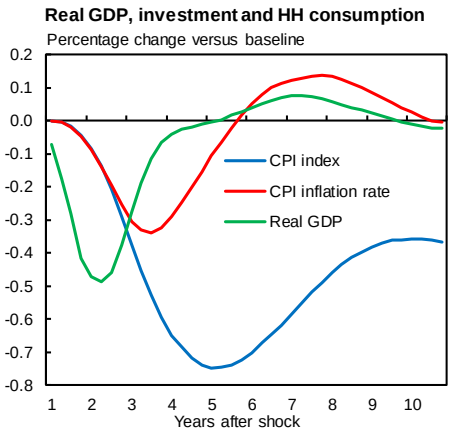
Source: SARB



Source: SARB



Sources: Stats SA and SARB



Sources: Stats SA and SARB

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