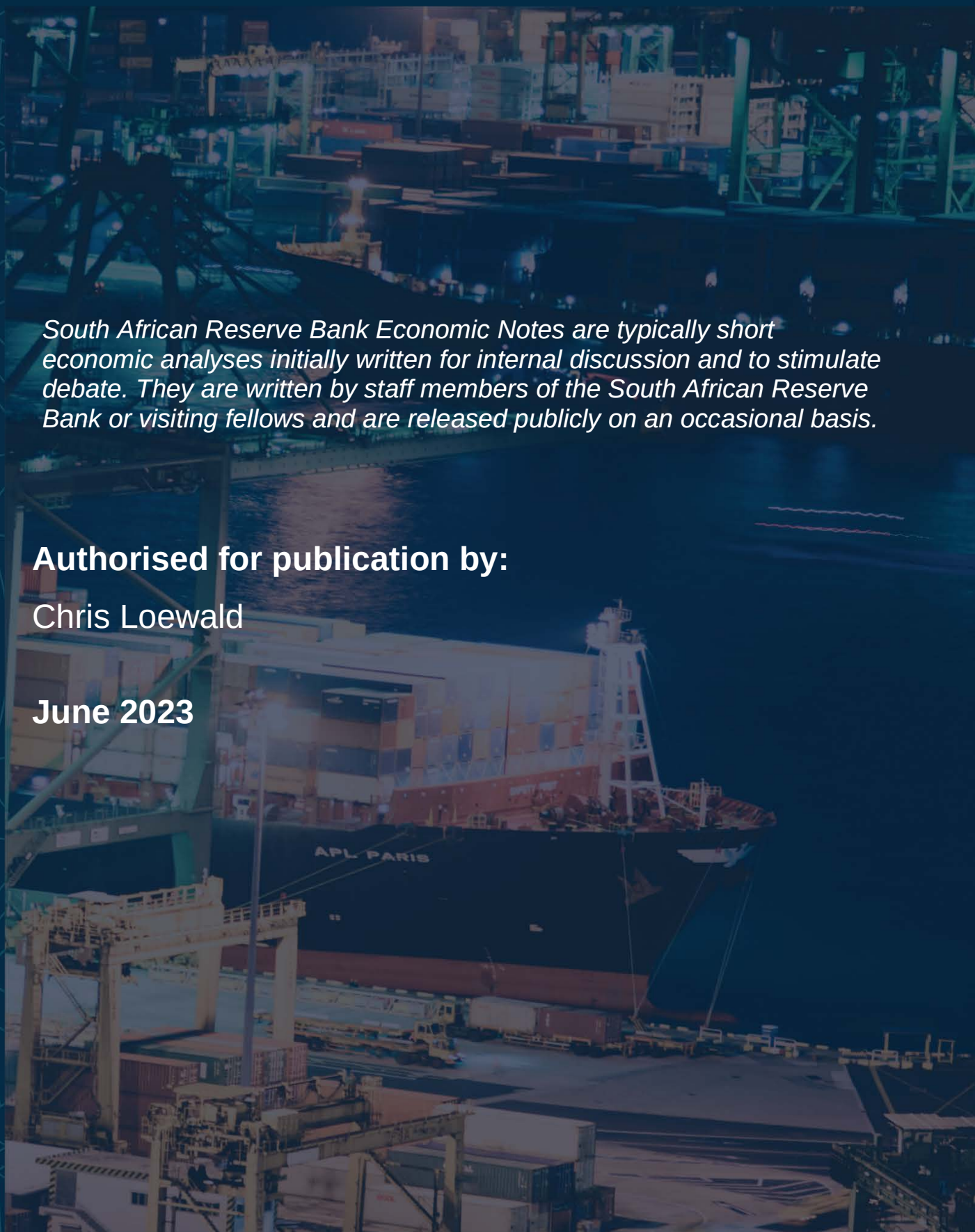
# South African Reserve Bank
# Occasional Bulletin of Economic Notes
# OBEN/23/01

SOUTH AFRICAN RESERVE BANK

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**Authorised for publication by:**

Chris Loewald

**June 2023**

# SARB Occasional Bulletin of Economic Notes
# June 2023

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# OBEN 2301* – July 2022

# South Africa's revenue performance during COVID and beyond: The impact of commodity prices

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**Abstract**

Revenue rebounded strongly in the 2021/22 fiscal year following a sharp decline in 2020/21. This recovery was supported by a strong rally in global commodity prices. We assess the performance of the primary tax revenue streams over the 2020/21 and 2021/22 fiscal period and model the impact of the raised commodity prices. We estimate that 30% of the increase in gross revenue during the 2-year period is attributable to the growth in commodity prices. Using our model estimates together with official SARB projections for GDP and commodity prices we projected a revenue surplus of R92 billion compared to National Treasury's Budget Review 2022 estimate of R1,588 billion for 2022/23. The budget deficit falls to 4.3% compared to National Treasury's estimate of 6.0%, however, significant expenditure risks remain.

## 1. Introduction

National government revenue rebounded strongly in the 2021/22 fiscal year after a sharp decline in the preceding fiscal year. Total tax revenue recorded a surplus relative to National Treasury's (NT's) Budget Review (BR) 2021 projections of close to R200 billion for 2021/22. Performance was driven by economic recovery from the Covid-19 lockdown fallout, and a strong rally in global commodity prices. This year, both growth and commodity prices are expected to moderate. In this note, we assess the impact of commodity prices on the primary tax revenue streams during the 2020/21 and 2021/22 fiscal years and provide new revenue estimates for the 2022/23 fiscal period.

## 2. Revenue outperformance in 2021/22

Table 1 provides a summary of the 2020/21 and 2021/22 revenue outcomes.[1] Revenue for the 2021/22 period performed better than estimates in the NT's February BR 2021 with actual gross revenue exceeding BR 2021 estimates by almost R200 billion (14.6%).

[1] There are three primary tax streams: Personal Income Tax (PIT), Company Income Tax (CIT) and Value Added Tax (VAT). A further two revenue streams particularly impacted by the pandemic form part of the analysis: Customs duty (Imp. dut.) and Specific Excise duties (Exc. Tax). The former was impacted by the trade movement restrictions during the lockdowns, while the latter was directly impacted by the regulations to prohibit/limit the sale of alcohol and cigarettes during the lockdowns.

**Table 1: SA tax revenue outcomes (R'bn)**

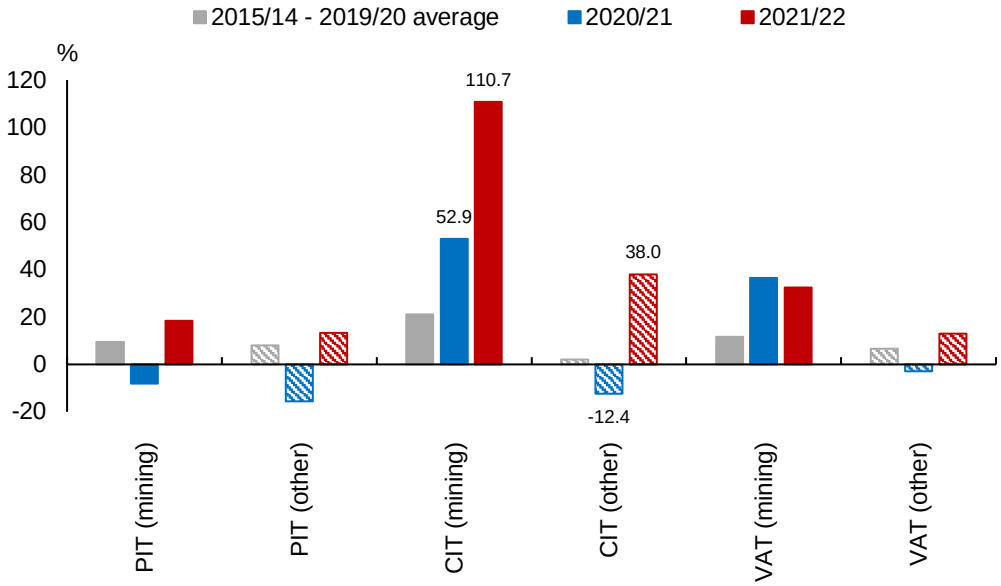
| Revenue stream | BR 2020 2020/21 est. | 2020/21 actual | BR 2021 2021/22 est. | 2021/22 actual | Surplus against BR 2021 | Surplus (%) |
|---|---|---|---|---|---|---|
| | (i) | (ii) | (iii) | (iv) | (v)=iv-iii | (vi)=v/iii |
| PIT | 546.8 | 487.0 | 516.0 | 554.0 | 38.0 | 7.4 |
| CIT | 230.2 | 202.1 | 213.1 | 320.4 | 107.3 | 50.4 |
| VAT | 360.6 | 331.2 | 370.1 | 390.9 | 20.7 | 5.6 |
| Exc. tax | 48.8 | 32.2 | 43.7 | 49.7 | 6.0 | 13.7 |
| Imp. dut. | 59.5 | 47.3 | 53.1 | 58.9 | 4.9 | 9.1 |
| Other | 179.5 | 149.9 | 169.1 | 190.8 | 21.8 | 12.2 |
| **Gross Revenue** | **1,425.4** | **1,249.7** | **1,365.1** | **1,563.8** | **198.6** | **14.6** |

Source: NT (2020; 2021)

Revenue from taxes on income, profits, and capital gains in the 2021/22 fiscal year was 20% greater than the BR 2021 estimates, mostly driven by strong provisional CIT tax payments. Corporate Income Tax (CIT) recorded the largest surplus of 52% which contributed more than half of the full gross revenue surplus. Figures 1 to 3 illustrate that revenue outperformance was driven largely by the mining sector. The mining sector directly contributes nearly 7% to GDP, but its indirect contribution is larger. Almost 60% of South Africa's exports are of raw mining material or mining-related products, and mining shares represent one-third of the overall JSE index (Makrelov & Spearman, 2021).

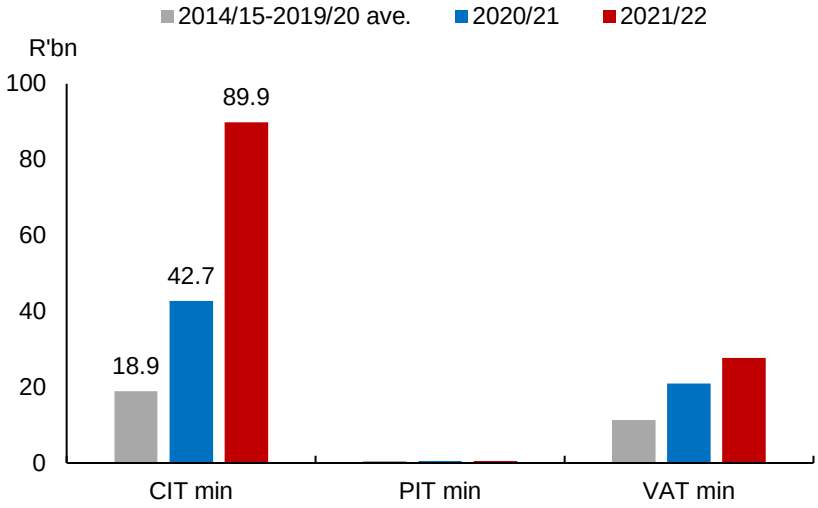
Growth in mining sector revenue contributions outperformed other sectors on aggregate across the main revenue streams. For example, CIT contributions from mining increased by 53% and 111% during the 2020/21 and 2021/22 periods respectively (Figure 1). By comparison, CIT in other sectors on aggregate grew by -12% and 38% respectively. CIT from the mining sector contributed approximately R90 billion in 2021/22 – more than double the 2020/21 contribution, and more than fourfold the average contribution of the pre-COVID period (Figure 2).

**Figure 1: Contribution to revenue stream by sector (% change y-o-y)**




Sources: SARS and SARB

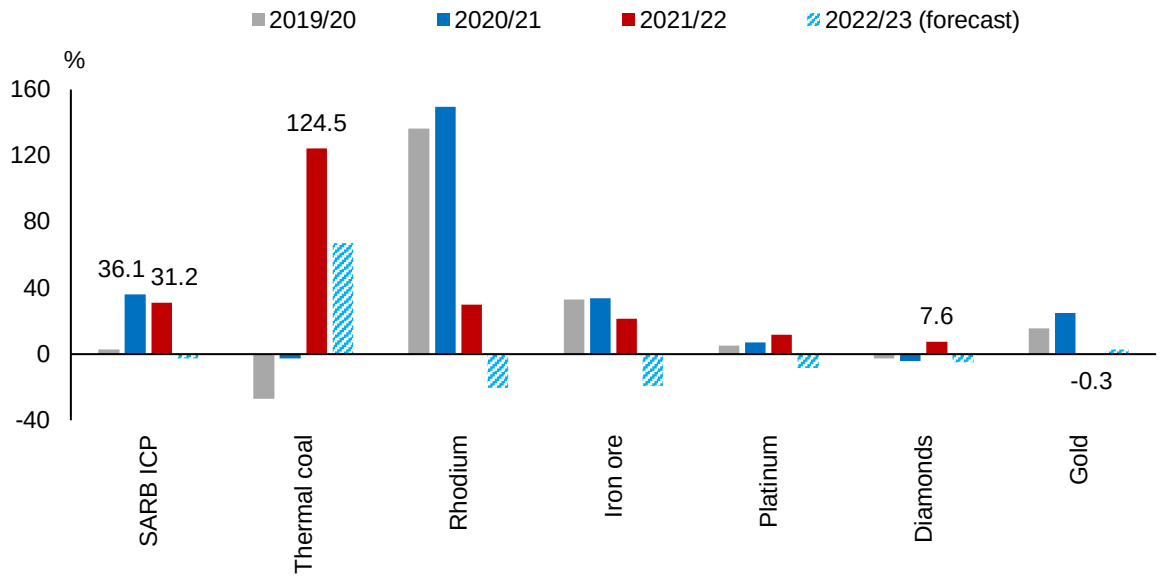
**Figure 2: Mining sector contribution to revenue by stream (R'bn)**




Sources: SARS and SARB

Mining sector performance has been driven by elevated commodity prices (Loewald & Makrelov, 2021). This also boosted GDP growth from the improving terms of trade (Janse van Rensburg & Visser, 2021). Figure 3 illustrates growth in the SARB index of commodity prices (ICP) and selected underlying commodity components. The SARB ICP increased by 36% in the 2020/21 fiscal year followed by a further 31% in the 2021/22 fiscal year. In the 2021/22 period, the prices of South Africa's biggest exports increased significantly: diamond prices increased by 7.6% and coal prices increased by 124%. Commodity prices are still largely higher than pre-COVID, but growth rates declined in the second half of 2021.

**Figure 3: Changes in commodity prices (% change y-o-y average)[2]**




Source: SARB

## 3. Assessing impact and forecasting gross revenue

We use generalised least squares (GLS) regression analysis to measure tax buoyancy and to estimate the impact of commodity prices on tax revenue. Tax buoyancy is a measure of the responsiveness of tax revenue to changes in revenue base and is defined as:[3]

$$\text{Tax buoyancy} = \%\Delta\text{Revenue stream} \div \%\Delta\text{Revenue base}.$$

The regression model takes the following form:

$$\%\Delta\text{Revenue stream}_t = \beta_0 + \beta_1 \%\Delta\text{Revenue base}_t + \beta_2 \%\Delta\text{ICP}_{t+x} + \varepsilon_t$$

where $\beta_0$ is a constant term, $\beta_1$ is the buoyancy ratio,[4] $\beta_2$ is the regression estimate of the commodity price impact, $\varepsilon$ is a white noise error term, and time-script factor x has a value of 0, -1, or -2 depending on the lag of the ICP factor used in each respective revenue stream regression.[5] Table 2 illustrates the revenue bases used for the revenue stream regressions.

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2 Plotted fiscal year percentage change is calculated as the y-o-y difference in the average monthly ICP value for the fiscal year to avoid end-of-year month changes from skewing the overall impact.

3 Revenue base is the key macroeconomic determinant of each revenue stream.

4 A buoyancy value above one means that revenues are growing faster than the revenue base; below one means revenues are growing below the rate of revenue base growth.

5 Correlation coefficients indicate highly significant levels of correlation among all revenue streams and their respective bases (see appendix Table A1). All revenue streams except excise taxes show highly significant correlation with commodity prices, however, correlation coefficient values and levels of significance vary across different lagged values of the ICP. Due to high levels of autocorrelation amongst lagged ICP values, only the ICP factor with the highest correlation coefficient and level of significance is used in each regression.

**Table 2: Tax revenue streams and corresponding tax base**

| Revenue stream | Revenue base |
|---|---|
| Gross tax revenue | GDP |
| PIT | Wages, |
| CIT | Gross operating surplus |
| VAT | Household consumption |
| Excise tax | Household consumption |
| Import duties | Imports |

We use the model coefficients to estimate the impact of economic activity and commodity prices on revenue streams for the 2020/21Q1 to 2021/22Q4 period,[6] and to forecast nominal gross revenue for the 2022/23 fiscal year.[7] To forecast nominal gross tax revenue we use the regression model estimates of real gross revenue tax buoyancy and commodity price effects, the SARB's Core Model forecasts for GDP and inflation, and the SARB's ICP forecast. The SARB's July 2022 Core Model vintage projects growth in nominal GDP of 6.4%, inflation of 6.6%, and a 15.2% decline in the ICP for the 2022/23 fiscal year. By comparison, GDP growth is more than double NT's February BR 2022 nominal GDP growth projection of 3.0%. A key factor in NT's forecasted slowdown is an anticipated reversal of both elevated inflationary pressures and the commodity prices rally; however, after the February budget global economic developments changed course. For example, war in Ukraine spurred a further rise in general commodity prices and global inflation has remained elevated. Table 3 shows NT's February projected commodity price growth rates compared to April forecasts by the SARB and Consensus Economics (2022). Similarly, the BER's April terms of trade projections for 2022 improved to -6.3% from -9.4% in November 2021, and nominal GDP projections increased from 4.2% to 5.4% (BER, 2021; 2022).

**Table 3: 2022 calendar year commodity price growth projections (y-o-y change %)**

| Commodity | NT | SARB | Consensus Econ. |
|---|---|---|---|
| Gold | 1.6 | 4.93 | 5.1 |
| Platinum | -5.0 | 1.61 | -0.6 |
| Coal | 16.3 | 95.88 | 103.1 |
| Iron ore | -24.3 | 24.89 | -17.9 |
| Palladium | -18.0 | 29.62 | 0.3 |

Sources: SARB; NT (2022); Consensus Economics (2022)

6 We use real quarterly values of revenue data and non-seasonally adjusted macroeconomic data from fiscal year 2000/01Q1 to 2019/20Q4 to estimate regression coefficients. Nominal data is adjusted for inflation to provide real values. The regression period covers 19 years with 76 observations. This period includes the mid-2000's commodity cycle and the global recession and recovery of the 2008/9 financial crisis. The time series are non-linear and upwards trending; augmented dickey-fuller (ADF) tests confirm all series have unit roots. We take the year-on-year first difference of the natural logarithm of the data. The transformed data series are therefore linearised year-on-year growth rates for each quarter from 2001/02Q1 that are adjusted for seasonality. Despite this transformation, Durbin Watson and Breusch Godfrey LM test statistics on OLS regression results indicate autocorrelation in OLS residuals. The Prais–Winsten and Cochrane–Orcutt GLS estimators are therefore used to limit the impact of autocorrelation.

7 For discussions on using tax buoyancy as a measure of tax revenue performance see Purohit (2005 ), Morris, et al, (2009), and IMF Fiscal Affairs Department (2011).

## 4. Model estimates

Coefficient estimates and their respective p-values are provided in Table 4. All tax base regressors are highly significant at the 1% level. Commodity prices are significant at the 5% level for gross revenue and PIT, and highly significant at the 1% level for CIT.

**Table 4: GLS regression model estimates**

| Revenue stream | Revenue base factor | | | ICP factor | | | Model $R^2$ |
|---|---|---|---|---|---|---|---|
| | $\beta_1$ | Coeff. | Std. err. | $\beta_2$ | Coeff. | Std. err. | |
| Gross rev. | GDP | 1.403 | 0.274 | $ICP_{t-1}$ | 0.084 | 0.039 | 0.450 |
| | p-val. | 0.000 | | p-val. | 0.035 | | |
| PIT | Wages. | 0.752 | 0.261 | $ICP_{t-1}$ | 0.067 | 0.029 | 0.203 |
| | p-val. | 0.005 | | p-val. | 0.025 | | |
| CIT | GOS | 1.133 | 0.401 | $ICP_{t-2}$ | 0.260 | 0.076 | 0.273 |
| | p-val. | 0.006 | | p-val. | 0.001 | | |
| VAT | Cons. | 1.771 | 0.328 | $ICP_t$ | 0.072 | 0.070 | 0.424 |
| | p-val. | 0.000 | | p-val. | 0.310 | | |
| Imp. duties | Imports | 0.710 | 0.150 | $ICP_t$ | 0.018 | 0.092 | 0.273 |
| | p-val. | 0.000 | | p-val. | 0.849 | | |
| Exc. tax | Cons. | 0.747 | 0.268 | $ICP_{t-1}$ | 0.027 | 0.033 | 0.160 |
| | p-val. | 0.007 | | p-val. | 0.411 | | |

The real gross revenue buoyancy estimate of 1.4 indicates that a 1% increase in real GDP generates a 1.4% increase in real gross revenue.[8] This estimate is in-line with real estimates calculated for South Africa by the IMF,[9] and IMF estimates across OECD countries (Belinga, et al., 2014; Dudine & Jalles, 2017). The ICP coefficient indicates that a lagged percentage change in the ICP results in a 0.08% increase in real gross revenue. Figure A1 illustrates the regression estimates of revenue performance.[10]

### 4.1. Revenue decomposition

We use the results from our regression model to decompose the impact of revenue bases and commodity prices on revenue performance over the 2020/21 and 2021/22 period. Table 5 shows the model estimates of the change in revenue attributable to revenue base impacts and commodity price effects over the two-year period.

8 Regressions are replicated using nominal data for comparison. These results are presented in Table A2. Haughton (1998) advises against using nominal measures of buoyancy as these are biased towards unit value. This is due to the impact of inflation on numerator and denominator values with higher inflation creating greater bias – see Haughton (1998, p. 1). Real measures of buoyancy omit this bias. Our nominal gross revenue buoyancy regression estimate is 0.98.

9 Using data from 1990 to 2014, Dudine & Jalles (2017) estimate a real gross revenue buoyancy regression coefficient for South Africa of 1.61.

10 Applying the model results to the 2020/21 – 2021/22 period indicates that the model underestimates but otherwise accurately captures the revenue dynamics during this period (grey highlighted area). The model severely underestimates the performance of excise taxes highlighting the unprecedented impact of the ban on cigarette and alcohol sales during the COVID lockdown period (Figure A1.f).

**Table 5: Revenue change decomposition (R'bn)**

| Revenue stream | Actual revenue (nominal)[α] | | | Model estimates (converted to nominal)[β] | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | 2019/20 | 2021/22 | Change (2022/21 – 2019/20) | Change (2022/21 – 2019/20) | Revenue base impact | Comm. price impact | Base-year inflation impact[γ] | Change (%) | Comm. impact (%) |
| | (i) | (ii) | (iii)=ii-i | (iv) | (v) | (vi) | (vii) | (viii)=iv/iii | (ix)=vi/iv |
| Gross rev. | 1,343.6 | 1,568.0 | 224.4 | 228.1 | 57.8 | 67.7 | 102.7 | 101.6 | 29.7 |
| PIT | 527.6 | 554.5 | 26.9 | 51.4 | -10.7 | 21.5 | 40.6 | 191.4 | 41.8 |
| CIT | 211.5 | 288.2 | 109.8 | 76.7 | 16.6 | 33.9 | 16.6 | 69.9 | 44.1 |
| VAT | 346.7 | 366.1 | 43.6 | 19.4 | -19.8 | 13.9 | 25.3 | 44.4 | 71.9 |
| Imp. duties | 55.5 | 60.4 | 2.7 | 4.9 | 0.3 | 0.5 | 4.1 | 183.0 | 10.8 |
| Exc. tax | 52.3 | 56.4 | 1.8 | 4.1 | -0.8 | 0.8 | 4.0 | 228.2 | 20.9 |

Notes:

[α] Revenue numbers differ from Table 1 due to revisions by SARS after publication of the BR.

[β] Model estimates treat 2019/20 as the base year and are adjusted by inflation to convert to nominal values.

[γ] Base-year inflation impact is calculated as 2019/20 revenue multiplied by the inflation rate for 2020/21 and 2021/22.

Source: SARS and model estimates

The model estimates 102% of the actual change in gross revenue for the period and attributes 30% of the estimated change to commodity price effects.[11] The model estimates 70% of the increase in CIT and attributes 44% to commodity price effects.

## 4.2. Revenue forecast

Using our regression coefficient estimates and the SARB's July 2022 Core Model projections for GDP, inflation, and commodity price growth, we forecast revenue for the 2022/23 period. Table 6 shows the forecasted impact of the model estimates on NT's main budget framework.

**Table 6: Main budget framework estimates (R' bn)**

| | BR 2021 2021/22 est. | BR 2022 2021/22 revised est. | BR 2022 2022/23 est. | Model 2022/23 est. |
|---|---|---|---|---|
| Main budget revenue | 1,351.7 | 1,549.1 | 1,588.0 | 1,680.4 |
| Main budget expenditure | 1,834.3 | 1,896.0 | 1,975.3 | 1,975.3 |
| **Main budget balance** | **-482.6** | **-346.9** | **-387.3** | **-294.9** |
| Nominal GDP | 5,352.2 | 6,251.5 | 6,441.3 | 6,824.4 |
| Balance / GDP (%) | -9.02 | -5.55 | -6.01 | -4.32 |

Source: SARS and model estimates

11 The gross revenue estimate for the full 2-year period obscures the fact that the model both underestimates the fall in revenue in 2020/21 and underestimates the rise in revenue in 2021/22. These counteractive effects improve the estimate for the full 2-year period; see appendix tables A3 and A4 for the yearly estimates.

Revenue increases to R1,680 billion, compared to NT's estimate of R1,588 billion (a surplus of R92 billion).[12] SARS' surplus revenue collection from April 2022 to June 2022 already exceeds R46 billion on the back of a R41 billion CIT surplus suggesting our forecast is aligned with current revenue trends. CIT is once again driven primarily by mining.

Our revenue figure translates into a simple year-on-year nominal tax buoyancy ratio of 1.01 compared to NT's estimate of 1.09.[13] Based on NT's main budget expenditure estimates, the budget deficit falls to 4.3% compared to NT's estimate of 6.0%; however, there are significant expenditure risks to this budget improvement. These include higher wage adjustments in the government sectors, support for SOEs, and extensions of the current COVID-19 grant support.

## 5. Concluding remarks

In this note we assess the performance of the primary tax revenue streams during the COVID period. We show that CIT improved disproportionately better than the other tax categories during that period. CIT benefitted most from mining sector revenue generated by a substantial and sustained commodity price rally. We estimate that over 30% of the gross revenue increase and 44% of the CIT increase during the COVID period is attributable to the growth in commodity prices.

Using the SARB's Core Model projections for GDP, inflation, and commodity price growth, we project revenue outcomes for 2022/23 and assess the corresponding budget deficit impact. Main budget revenue is projected to rise to R1,680 billion and the budget deficit to fall to 4.3% suggesting an improved budget position compared to NT forecasts.

Despite the improved fiscal outlook, risks remain and include the poor financial condition of several major state-owned companies, higher borrowing costs, and additional spending pressures. These risks will have negative consequences for achieving fiscal targets set by government.

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12 To align with NT's "gross tax revenue after proposals" figure as presented, our 2022/23 revenue estimate includes the adjustments totaling R10.4 billion as outlined in BR 2022.

13 Buoyancy is calculated as: $1.01 = \frac{1{,}690.8 - 1{,}547.1}{1{,}547.1} \div \frac{6{,}824.4 - 6{,}251.5}{6{,}251.5}$; $1.09 = \frac{1{,}598.4 - 1{,}547.1}{1{,}547.1} \div \frac{6{,}441.3 - 6{,}251.5}{6{,}251.5}$. The numerator figures are obtained by reversing the adjustments made in BR 2021 and BR 2022 to arrive at the "gross tax revenue after proposals" figures presented in Table 6. Figure A2 illustrates quarterly nominal tax buoyancy ratios for the regression data; the average for the period is 1.08. Our 2022/23 nominal buoyancy forecast is in line with this average and with year-on-year buoyancy measures published in BR 2020 (2016/17=0.97, 2017/18=1.00, 2018/19=1.23) and BR 2022 (2019/20=1.07, 2020/21=3.69, 2021/22=1.93, 2022/23=1.09).

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## Appendix

### Table A1: Revenue stream correlation coefficients

| Revenue stream | Base factor | ICP factors | | | |
|---|---|---|---|---|---|
| | | $ICP_t$ | $ICP_{t-1}$ | $ICP_{t-2}$ | $ICP_{t-3}$ |
| Gross rev. | 0.728 | 0.383 | 0.455 | 0.389 | 0.231 |
| p-val. | 0.000 | 0.001 | 0.000 | 0.001 | 0.050 |
| PIT | 0.599 | 0.337 | 0.440 | 0.381 | 0.281 |
| p-val. | 0.000 | 0.003 | 0.000 | 0.001 | 0.016 |
| CIT | 0.483 | 0.179 | 0.309 | 0.357 | 0.291 |
| p-val. | 0.000 | 0.121 | 0.007 | 0.002 | 0.013 |
| VAT | 0.604 | 0.425 | 0.292 | 0.081 | -0.160 |
| p-val. | 0.000 | 0.000 | 0.011 | 0.493 | 0.175 |
| Imp. duties | 0.647 | 0.432 | 0.402 | 0.283 | 0.120 |
| p-val. | 0.000 | 0.000 | 0.000 | 0.015 | 0.312 |
| Exc. tax | 0.308 | 0.222 | 0.226 | 0.084 | 0.069 |
| p-val. | 0.007 | 0.055 | 0.051 | 0.478 | 0.564 |

### Table A2: GLS regression estimates using nominal data

| Revenue stream | Revenue base factor | | | ICP factor | | | Model $R^2$ |
|---|---|---|---|---|---|---|---|
| | $\beta_1$ | Coeff. | Std. err. | $\beta_2$ | Coeff. | Std. err. | |
| Gross rev. | GDP | 0.982 | 0.376 | $ICP_{t-1}$ | 0.102 | 0.043 | 0.286 |
| | p-val. | 0.011 | | p-val. | 0.022 | | |
| PIT | Remun. | 0.596 | 0.266 | $ICP_{t-1}$ | 0.069 | 0.015 | 0.157 |
| | p-val. | 0.028 | | p-val. | 0.028 | | |
| CIT | NOS | 1.079 | 0.410 | $ICP_{t-2}$ | 0.259 | 0.075 | 0.263 |
| | p-val. | 0.010 | | p-val. | 0.001 | | |
| VAT | Cons. | 1.319 | 0.369 | $ICP_t$ | 0.117 | 0.083 | 0.269 |
| | p-val. | 0.001 | | p-val. | 0.164 | | |
| Imp. duties | Imports | 0.666 | 0.151 | $ICP_t$ | 0.027 | 0.089 | 0.251 |
| | p-val. | 0.000 | | p-val. | 0.764 | | |
| Exc. tax | Cons. | 0.219 | 0.313 | $ICP_{t-1}$ | 0.052 | 0.034 | 0.058 |
| | p-val. | 0.486 | | p-val. | 0.130 | | |

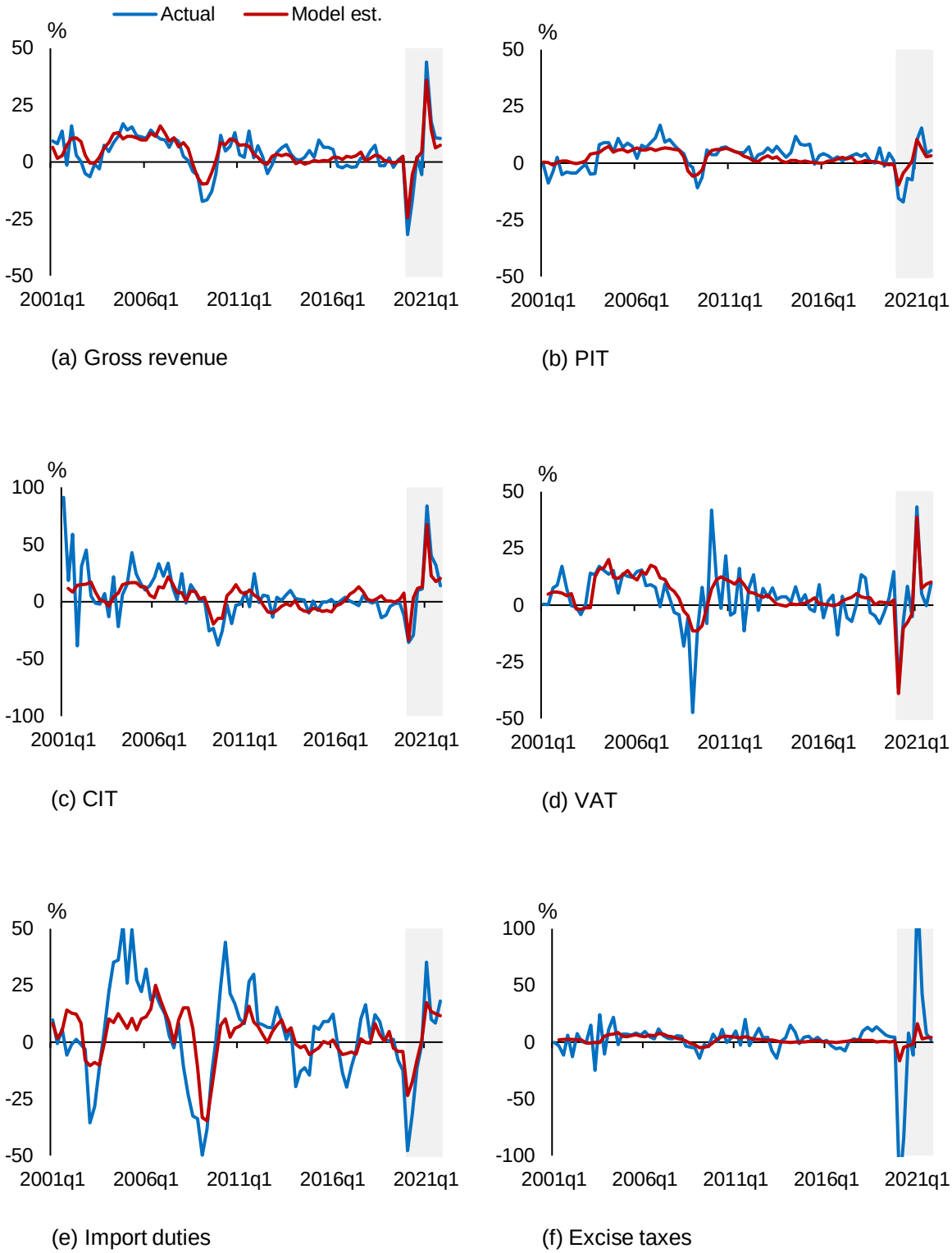
### Table A3: 2020/21 revenue decomposition (R'bn)

| Revenue stream | Actual revenue (nominal) | | | Model estimates (nominal) | | | |
|---|---|---|---|---|---|---|---|
| | 2019/20 | 2020/21 | Difference | Difference | Rev. base impact | Comm. price impact | Inflation impact |
| Gross revenue | 1,343.6 | 1,236.1 | -107.42 | -31.3 | -102.4 | 26.8 | 44.4 |
| PIT | 527.6 | 487.0 | -40.62 | -1.8 | -27.6 | 8.4 | 17.4 |
| CIT | 211.5 | 214.8 | -9.40 | 3.3 | -11.0 | 7.2 | 7.0 |
| VAT | 346.7 | 308.9 | -15.56 | -37.8 | -52.9 | 3.6 | 11.4 |
| Imp. duties | 55.5 | 51.1 | -8.13 | -4.4 | -6.6 | 0.3 | 1.8 |
| Exc. tax | 52.3 | 50.8 | -14.47 | -1.5 | -3.5 | 0.2 | 1.7 |

**Table A4: 2021/22 revenue decomposition (R'bn)**

| Revenue stream | Actual revenue (nominal) | | | Model estimates (nominal) | | | |
|---|---|---|---|---|---|---|---|
| | 2020/21 | 2021/22 | Difference | Difference | Rev. base impact | Comm. price impact | Inflation impact |
| Gross revenue | 1,236.1 | 1,568.0 | 331.87 | 250.4 | 151.1 | 40.9 | 58.5 |
| PIT | 487.0 | 554.5 | 67.50 | 53.3 | 16.9 | 13.2 | 23.2 |
| CIT | 214.8 | 288.2 | 119.17 | 73.4 | 37.2 | 26.7 | 9.5 |
| VAT | 308.9 | 366.1 | 59.16 | 57.2 | 33.0 | 10.3 | 13.9 |
| Imp. duties | 51.1 | 60.4 | 10.84 | 9.4 | 6.9 | 0.2 | 2.3 |
| Exc. tax | 50.8 | 56.4 | 16.25 | 5.6 | 2.7 | 0.6 | 2.3 |

**Figure A1: Model vs actual real revenue (% change)**




(a) Gross revenue

(b) PIT

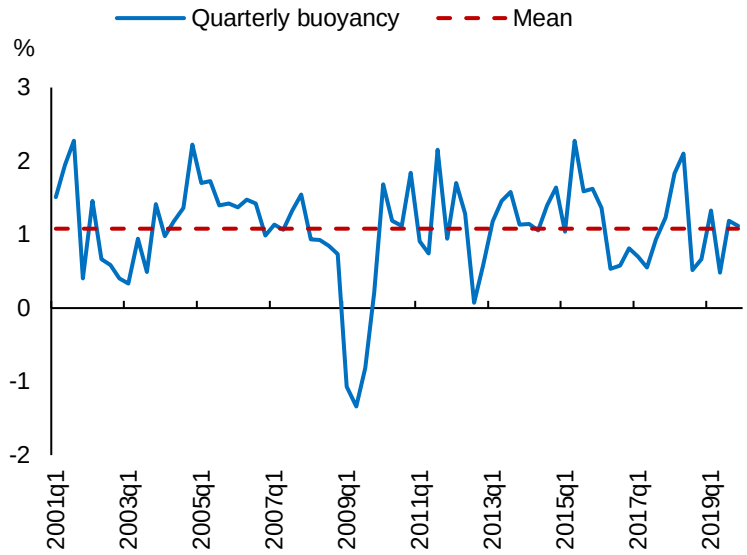
(c) CIT

(d) VAT

(e) Import duties

(f) Excise taxes

**Figure A2: Quarterly nominal gross revenue buoyancy ratios**



# OBEN 2301* – October 2022

# Mind second round effects! The effects of food and energy inflation on core inflation in South Africa

***Witness Simbanegavi and Andrea Leonard Palazzi***

**Abstract**

A review of the literature on second-round effects from food and energy (non-core) inflation shows that these effects are mainly transmitted via cost-push and demand-pull inflation channels. We deploy a gap model to investigate the presence of second-round effects in South Africa in the period 2003–2022. We find evidence that shocks to non-core inflation cause core inflation to revert to headline inflation, suggesting that these shocks transmit to core inflation. Core inflation reverts to headline inflation within one year, but the reversion is only partial, which could be interpreted as affirming the credibility of the South African Reserve Bank (SARB). Thus, following shocks to non-core inflation, policymakers should closely monitor conduits such as wage settlements and firms' mark-ups for signs of spillovers and pass-through. Keeping inflation expectations well anchored should minimise these risks.

## 1. Introduction

Monetary policy is designed primarily to deal with demand-side shocks to the economy. Shocks emanating from the supply side often require tools that typically are not available to central banks. Research, particularly on advanced economies, has generally found that shocks emanating from food and energy prices (non-core inflation) tend to be short-lived and not disturb inflation expectations.[1] Such shocks mostly affect relative prices rather than the general price level.[2] A fundamental view in monetary practice is that monetary policy should look through supply-side shocks because of their transitory nature.

When it comes to food and energy price shocks, there are important differences between advanced and emerging market and developing economies (EMDEs). First, food and energy generally carry larger weights in the consumer price index (CPI) baskets of EMDEs, which makes consumers more sensitive to price changes for these items. Second, EMDEs tend to have higher food inflation, which in turn has larger propagation effects compared to energy inflation.[3] Third, inflation expectations are generally not as well anchored in EMDEs as they are in advanced economies, which makes the former more susceptible to higher pass-through.

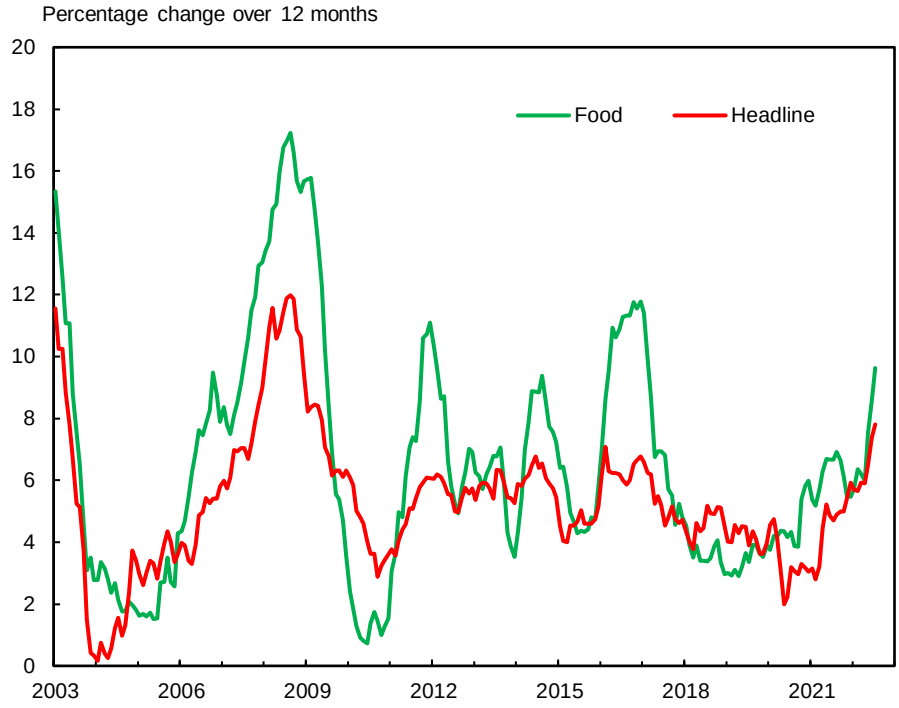
1 The current environment of multiple, large and overlapping demand and supply shocks could very well unsettle inflation expectations in advanced economies. However, the jury is still out on whether this means future food or energy price shocks would engender inflation persistence.

2 F U Ruch, 'Second-round effects on inflation, and underlying inflation', PhD dissertation, University of Stellenbosch, 2016.

3 J De Gregorio, 'Commodity prices, monetary policy, and inflation', *IMF Economic Review* 60(4), 2012, pp 600–633.

Lastly, the higher presence of administrative prices in EMDEs (in both energy and food) favours greater propagation of non-core price shocks, particularly in the absence of government subsidies.[4,5] Many scholars have shown that in EMDEs 'temporary' shocks to non-core inflation typically will embed into core prices.[6] Therefore, failure to diagnose and act on possible second-round effects amounts to a policy error and could result in supposedly temporary inflation becoming permanently embedded in core inflation.[7]

**Figure 1: Food and headline inflation in South Africa**




Source: Statistics South Africa

4 In South Africa, for instance, electricity and fuel prices are regulated.

5 Other factors, including trade openness, market competition, exchange rate volatility and taxes, affect the sensitivity of domestic prices to food and/or oil price shocks and thus potentially second round effects, particularly the size of these effects. See, for instance, Ruch (2016) and R Anand, D Ding and V Tulin, 'Food inflation in India: the role for monetary policy', IMF Working Paper, WP14/178, 2014.

6 See S C Cecchetti and R Moessner, 'Commodity prices and inflation dynamics', *BIS Quarterly Review*, 2008, pp 55–66; L Rangasamy, 'Food inflation in South Africa: some implications for economic policy', *South African Journal of Economics* 79(2), 2011, pp 184–201; J De Gregorio, 'Commodity prices, monetary policy, and inflation', *IMF Economic Review* 60(4), 2012, pp 600–633; Anand, Ding and Tulin (2014); L Rangasamy and E Nel, 'Reconsidering the role of food prices in South African headline inflation', *Agrekon* 53(4), 2014, pp 16–37; R N Misati and O Munene, 'Second round effects and pass-through of food prices to inflation in Kenya', *International Journal of Food and Agriculture Economics* 3(3), 2015, pp 75–87; G Gelos and Y Ustyugova, 'Inflation responses to commodity price shocks – how and why do countries differ?' IMF Working Paper, WP 12/225, 2012; G Peersman and I Van Robays, 'Oil and the euro area economy', *Economic Policy* 24(60), 2009, pp 603–651.

7 F U Ruch, 2016.

The aim of this note is twofold. First, we identify the propagation channels for second-round effects drawing from the literature, and second, we empirically investigate the presence of such effects during the 2003–2022 period in South Africa. We adopt the framework of Cecchetti and Moessner (2008) to test for the existence of second-round effects. This methodology is neutral as to the nature of shocks to non-core inflation (positive or negative), and simply tests whether changes to non-core inflation drive changes in core inflation.

We find evidence that second-round effects are present in South Africa. Following a shock to non-core inflation, headline inflation does not revert to core inflation while core inflation reverts to headline inflation. The former implies that shocks to food and energy prices do not dissipate quickly whereas the latter implies that shocks to food and energy embed into core inflation.

## 2. Related literature

There is a large body of literature on second-round effects. Evidence suggests that emerging market and developing economies are more exposed to risks of inflation pass-through from food and energy price changes than advanced economies. Second-round effects mostly transmit through demand-pull and cost-push dynamics such as increased production costs, higher nominal wages and a shrinking output gap.

### *Demand-pull*

Accelerating wages represent a primary vehicle for non-core inflation pass-through.[8] Under conditions of elevated inflation expectations and rising food and/or energy prices, workers often successfully negotiate higher wage increases to preserve their purchasing power.[9] This can potentially affect inflation via two channels. Firstly, real wage increases in excess of productivity growth can raise inflation expectations higher and cause firms to respond by adjusting their selling prices. Secondly, high real wage settlements can raise real demand, resulting in a generalised rise in prices. This is so because wages often do not adjust downwards once the inflation shock dissipates, and "stickiness" renders second-round effects difficult to unwind.[10]

Also, adverse supply shocks can narrow the output gap (if negative) or expand it, thereby increasing inflationary pressures on the real economy. Energy or supply-side shocks equate to a negative productivity shock and thus lower the economy's potential output, generating inflationary pressures.[11] While compelling, this argument relies on the assumption that the impact of supply-side shocks on potential output is greater than on current output. To consider the output gap as a viable transmission channel, it is therefore key to determine if energy shocks have a greater impact on current or full employment output.

8 See De Gregorio (2012, p 609); Anand, Ding and Tulin (2014, p 7); Rangasamy and Nel (2014, p 25); and Ruch (2016, p 11).
9 G Peersman and I Van Robays, 2009, p 618.
10 De Gregorio, 2012, p 609.
11 De Gregorio, 2012, pp 601–602.

*Cost-push*

A second channel for second-round effects concerns the increased production costs that follow from higher input prices and that are then passed on to consumers. As fuel and energy inflation increases, firms' input costs rise, which creates incentives to increase selling prices to protect profit margins.[12]

There are at least three channels through which temporary energy inflation may impact production costs and thus feed into core inflation. First, energy inflation spills over into firms' transportation costs.[13] Second, higher energy inflation raises overall inflation, and this depreciates the real exchange rate, which raises real marginal costs (i.e. firms pay more for imported raw materials).[14] Third, rising energy costs could drive up wages, and thus total labor costs, which could prompt firms to increase selling prices to preserve margins. Of course, firms need not respond to higher wage costs by raising selling prices to consumers. Depending on the sensitivity of demand to price changes, firms could permit some erosion of margins to preserve market share, or they could reduce employment to ease wage costs while pushing for greater productivity.[15,16] However, where demand is inelastic, firms may simply pass on the higher costs to consumers through price increases.

Given that labour costs are often a large share of total firm costs, sharp increases in wage costs, due to either higher food or energy inflation, could potentially trigger a self-reinforcing process – the so-called wage-price spiral.[17] Workers facing sharply higher non-core inflation could successfully bargain for wage increases, squeezing firms' profit margins.[18] To protect margins, firms may pass these higher costs back to consumers, who in turn may demand even higher wage increases – creating a wage-price spiral.

Monetary policy can help minimise the second-round effects of food and energy inflation even in EMDEs. Well-anchored inflation expectations reduce fluctuations in wage/cost adjustments and thus help to break wage-price spirals. Likewise, central bank credibility helps to curb volatility in price/wage adjustments by preventing speculation on inflation expectations.[19]

## 3. Data and methodology

The analysis in this note follows Cecchetti and Moessner's model (2008) to investigate the presence of second-round effects in South Africa. Econometrically, second-round effects can be assessed by considering whether headline inflation reverts to core inflation and whether core inflation reverts to headline inflation. We address these questions below.

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12 See De Gregorio (2012, p 615); Rangasamy and Nel (2014, p 25); and Ruch (2016, p 11).

13 C Chisadza, J Dlamini, R Gupta and M P Modise, 'The impact of oil shocks on the South African economy' *Energy Sources, Part B: Economics, Planning, and Policy*, 11(8), 2016, pp 739–745.

14 S Mija, D Slobozian, R Cuhal, and A Stratan, 'How core inflation reacts to the second round effects', *Romanian Journal of Economic Forecasting* 1, 2013, p 101.

15 Peersman and Van Robays, 2009, p 630.

16 Hlédik, 2004, p. 134. Quantifying the second round effects of supply-side shocks on inflation. *Prague Economic Papers*, 2, 2004.

17 Ruch, 2016, p 22.

18 T Janse van Rensburg, A Khoza and P Mathuloe, 'Food inflation and wages – more than meets the eye?' SARB Research Brief, 2002, RB/2022/02.

19 Peersman and Van Robays, 2009, p 628.

### *1. Does headline inflation revert to core inflation?*

If headline inflation reverts to core inflation, then food and energy price shocks are temporary, implying that second-round effects will be limited.[20] By contrast, second-round effects are large or persistent if headline inflation does not revert to core inflation. Intuitively, if headline inflation does not revert to core inflation, it must be because the shocks to non-core inflation (which are, by definition, temporary) have somehow become self-perpetuating. This can be studied using the following equation:

$$\pi_t^{headline} - \pi_{t-12}^{headline} = a + b\,(\pi_{t-12}^{headline} - \pi_{t-12}^{core}) + e_t \quad (1)$$

where $\pi_t^{headline}$ and $\pi_t^{core}$ indicate year-on-year CPI headline and core inflation.

If headline inflation reverts to core inflation, b must be negative and different from zero.[21]

### *2. Does core inflation revert to headline inflation?*

If core inflation reverts to headline inflation, then second-round effects are confirmed because the temporary shocks to non-core inflation cause core inflation to drift so that it catches with the trend for headline inflation.[22] This can be assessed using:

$$\pi_t^{core} - \pi_{t-12}^{core} = d + g\,(\pi_{t-12}^{core} - \pi_{t-12}^{headline}) + e_t \quad (2)$$

If g equals 0, core inflation does not revert to headline inflation, while an estimate of g= -1 and d=0 implies full reversion within one year.

We use seasonally adjusted monthly data from January 2003 to May 2022 from Statistics South Africa. We consider a lag of 12 months. In the first model, the null hypothesis is b=0. The interpretation is that headline inflation does not revert to core inflation. Similarly, for the second model, the null hypothesis is g=0, again assuming no possible causal relationship between core inflation and non-core inflation.

## 4. Results

Tables 1 and 2 below present the regression results for the two models.

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20 Anand, Ding and Vulin, 2014, p 6.
21 Gelos and Ustyugova, 2012, p 9.
22 Anand, Ding and Vulin, 2014, p 7.

**Table 1: Does headline revert to core?**

| Lag | $R^2$ | b (SE) | a (SE) | H0: b=0 | H0: b=-1 and a=0 |
|---|---|---|---|---|---|
| 12 months | .0101 | .17<br>(.11)<br>[.136] | -.00<br>(.00)<br>[.367] | [.000] | P>F= .000 |

Sample: 2003–2022

Source: Own calculations

Note: p-values in squared parenthesis

**Table 2: Does core revert to headline?**

| Lag | $R^2$ | g (SE) | a (SE) | H0: g=-1 | H0: g=-1 and g=-1 and d=0 |
|---|---|---|---|---|---|
| 12 months | .25 | -.99***<br>(.11)<br>[.000] | -.00***<br>(.00)<br>[.000] | [.9723] | P>F= .000 |

Sample: 2003–2022

Source: Own calculations

Note: p-values in squared parenthesis

*** indicates significance at the 1% level

The first question is whether headline inflation reverts to core inflation. We get a b coefficient of 0.17, which is positive. We test the null hypothesis of b=0, and this cannot be rejected. As we discussed above, reversion requires b to be negative and statistically significant. We thus conclude that headline inflation does not revert to core inflation – hence food and energy price shocks must be either persistent or large in South Africa.

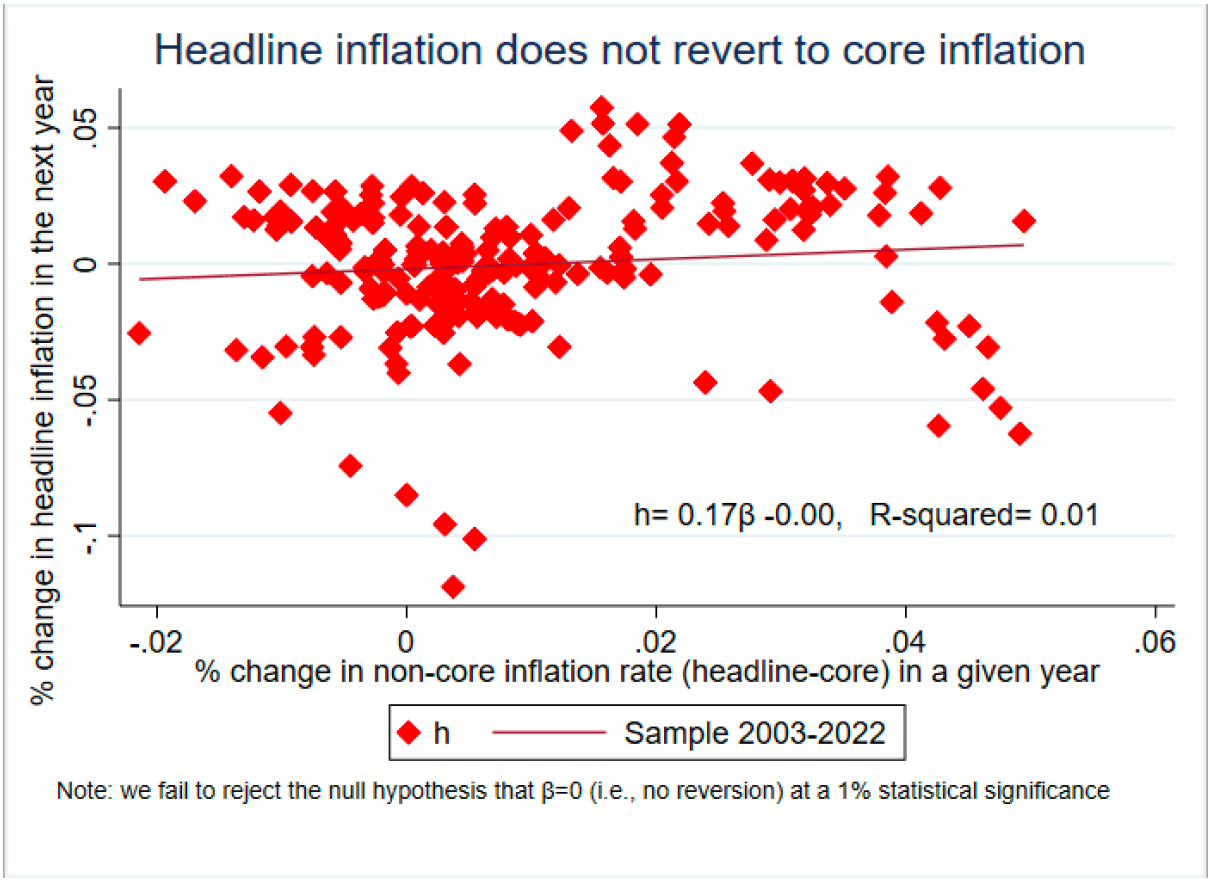
We next consider whether core inflation reverts to headline inflation. The estimated g coefficient is negative and close to -1, and statistically significant at the 1% level. The null hypothesis of g=0, that is, that core inflation does not revert to headline inflation, is thus rejected at the 1% significance level. This means we cannot reject the hypothesis that movements in non-core inflation cause core inflation to move towards the trajectory for headline inflation. We also test the hypothesis that g=-1, that is, that core inflation reverts to headline inflation within 12 months. This cannot be rejected. Finally, we test for full reversion of core inflation to headline inflation, that is, whether core inflation reverts to the exact trendline for headline inflation. This is a joint test of g=-1 and d=0. This joint hypothesis is however rejected, meaning that core inflation does not revert fully to headline inflation. A possible interpretation of the partial reversion is increased monetary policy credibility, whereby agents act on the belief that SARB would respond appropriately to any persistent deviations of inflation from the midpoint of the target range.

Considering the above findings, we conclude that second-round effects have been present in South Africa during 2003–2022, meaning that shocks to food and energy prices have partially fed into core inflation within one year.

The results are consistent with findings for other emerging markets like India[23] and Kenya,[24] as well as earlier studies for South Africa.[25] Following Rangasamy (2011), on average, over the 2003–2022 period a 1% increase in non-core inflation results in core inflation increasing by 0.99% within a 12-month period.

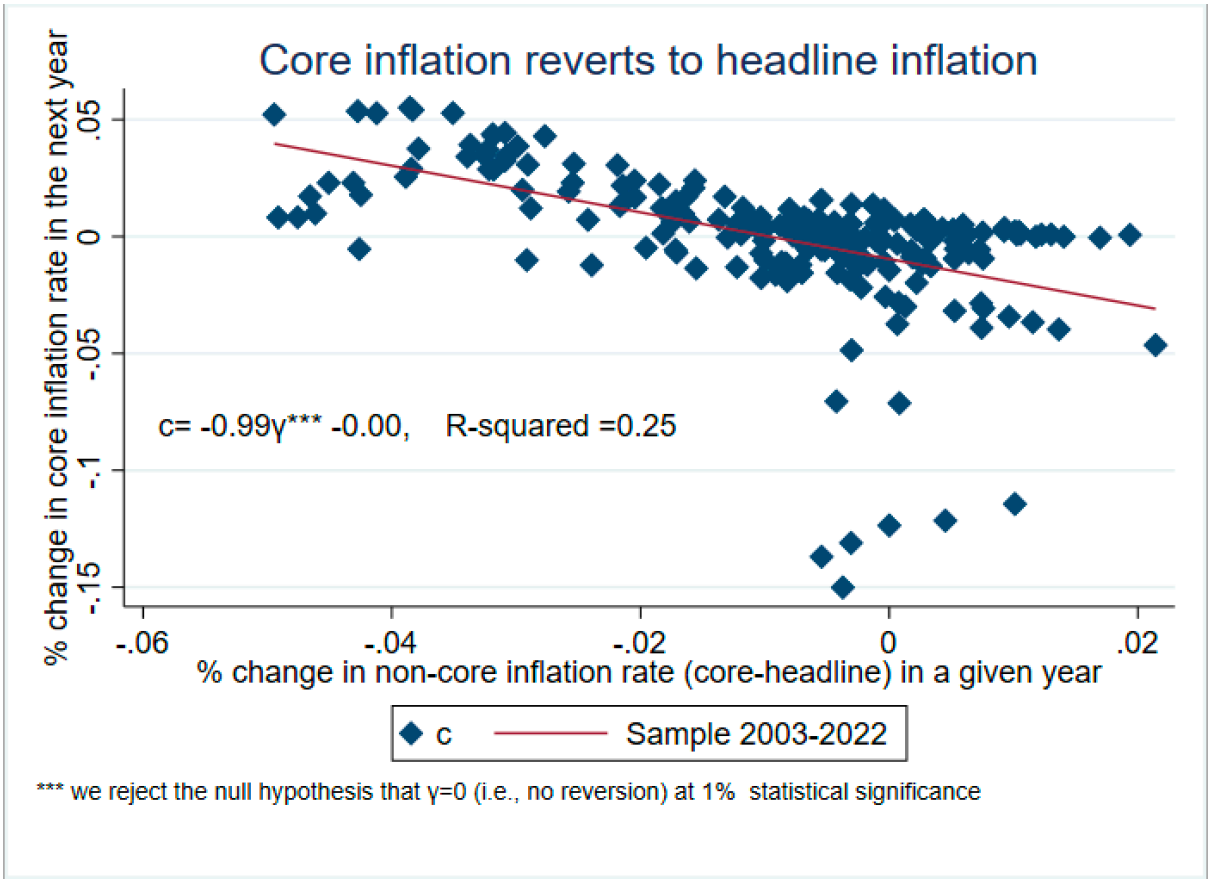
As shown in Figures 2 and 3, second-round effects are present if core inflation reverts to headline inflation and headline inflation does not revert to core inflation.

**Figure 2: Headline inflation does not revert to core inflation**




[23] Anand, Ding and Vulin, 2014.
[24] Misati and Munene, 2015.
[25] Rangasamy (2011) and Ruch (2016).

**Figure 3: Core inflation reverts to headline inflation**




## 5. Conclusion

This note assessed the existence of second-round effects from food and energy price shocks in South Africa. We found that South Africa is not immune to second-round effects from non-core inflation as core inflation reverts to headline inflation within a year. We find that pass-through of non-core inflation to core inflation is present but not complete, perhaps reflecting the credibility of the monetary policy regime in South Africa. The policy implication is that calibrations of monetary policy that ignore second-round effects from non-core inflation will invariably lead to a policy mistake.

# OBEN 2301* – January 2023

# Quo vadis, r-star?

***Jean-François Mercier***

**Abstract**

Economists generally agreed that neutral real interest rates (r*) had declined in the decades preceding the Covid-19 crisis, in both advanced and emerging economies. However, analyses differed as to the drivers of that decline. While past pandemics generally tended to depress neutral rates, policy responses and low mortality among the active population limited the direct impact of Covid-19 on r*, at least in major economies. Beyond Covid-19, trends in other drivers of neutral rates (demographics, potential growth, public debt) suggest that r* should remain low in coming years. However, r* may not be declining further and could even edge up modestly in the short term. That said, the latest supply shocks have increased challenges in measuring short-term changes to r*. Hence, central banks may place less focus on r* in the near term, at least until the current inflation shock has abated.

## 1. Introduction

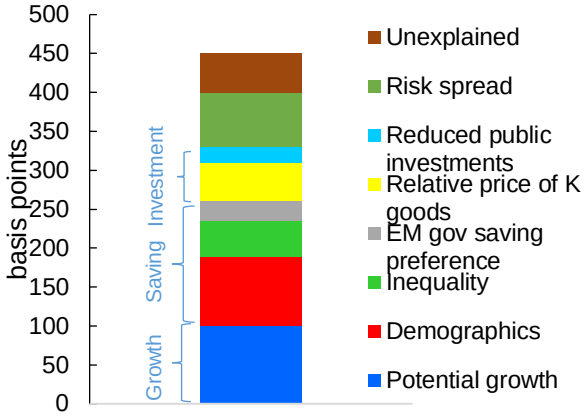
The concept of a neutral real rate of interest (r-star, or r*) has become an integral part of monetary policy calibration amid the generalization of inflation targeting (IT) regimes. By providing indications (albeit imprecise ones) about the interest rate level consistent with neutral monetary policy, it allows policymakers and investors alike to assess the policy stance, and project the most likely rate path under specific macroeconomic projections. It is central to Taylor rule-type estimates of optimal policy.

Prior to the pandemic, a broad consensus prevailed that r* had declined in most economies over the past few decades. However, the multiple shocks caused by the Covid-19 pandemic and related lockdowns have made estimating and projecting r* more difficult. This Note, after reviewing the key drivers of r* pre-pandemic as identified in the literature, analyses potential changes in these drivers in coming years, either directly or indirectly related to Covid-19. It then looks at whether r* remains as relevant as before 2020 for monetary policy, both internationally and in South Africa.

## 2. R* before the pandemic – theory and evidence

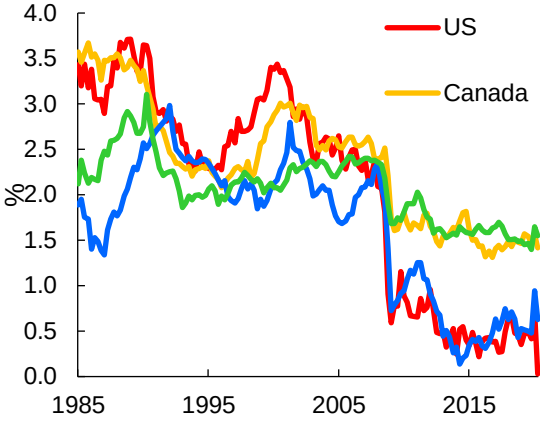
The concept of r* dates back to Wicksell's (1898) theory of the natural interest rate, an unobservable variable consistent with output equalling its potential and constant inflation. With money being seen as neutral in the long run, most theories have postulated that r* will reflect real economic drivers of ex-ante savings and investment demand. This includes demographics (a falling dependency ratio, or rising life expectancy would tend to raise desired savings), inequality (wealthier households typically save a higher share of their income), potential GDP growth and the relative price of capital goods (both being positively correlated with rising investment intentions). Furthermore, in a world of open capital markets with limited investor home bias, global (rather than domestic) saving and investment intentions would drive a country's r*, resulting in cross-country correlation and convergence of neutral rates.

**Figure 1: Contributions to 1980-2015 decline in r***




Source: Rachel and Smith (2015)

**Figure 2: Estimates of r* in four major economies, 1985-2020**




Source: Holston, Laubach and Williams

Such theory has informed econometric estimations of r*, which have all pointed to a sustained decline in past decades. Rachel and Smith (2015) estimated that neutral real rates declined by about 450bps since the early 1980s across advanced economies (AE) and emerging market (EM) economies, with slower potential growth accounting for about 100bp and the remainder being explained by demographics, inequality, falling relative prices of capital goods or a rising spread between the average return on capital and the risk-free rate (Figure 1). Estimates of the decline in r* based on the HLW methodology (Holston, Laubach and Williams, 2017) showed a somewhat smaller but still substantial decline across four major economies (Figure 2).[1] However, uncertainty around the estimates for r* is high.

Other research, while not disputing a decline in neutral rates, contests its size or the role of relative drivers. For example, Gagnon et al. (2016) estimate that r* declined by a smaller amount (as the 1980s was very much an outlier with unusually high real rates) and that demographics explain most of that decline.

[1] The HLW approach uses an IS function relating the output gap to the interest rate gap, a Phillips curve linking inflation changes to the output gap, and a Kalman-type filter to estimate potential GDP and hence the output gap.

Finally, Borio et al. (2017) dispute the assumption that money is neutral in the long run. They argue that standard real economic variables used to estimate r* lose their explanatory power when including decades prior to 1980, and that the role of changing monetary regimes was incorrectly ignored. In their view, the decline in r* may mostly reflect a normalization from high real rates needed to fight the 1970s Great Inflation, an asymmetric response to financial booms and busts, and central bank difficulties in pushing inflation back up to target in the 2010s.

## 3. How far did the pandemic affect demographics?

The last two and half years, however, have seen a multiplicity of shocks (the pandemic, lockdowns, reflationary policies and the inflation surge) with the potential to alter equilibrium economic variables, including r*. Typically, pandemics result in a higher capital/labour ratio – as workers die but physical capital is left intact – thus lowering returns on capital. They also raise the need for precautionary savings.[2] Both factors reduce the neutral rate.[3] Jordà, Singh and Taylor (2020) look at a sample of 19 major pandemics and wars since the 14th century, and observe that pandemics (in contrast to wars, which also destroy capital) have a negative impact on r*, which peaks on average after 20 years, at 150bp.

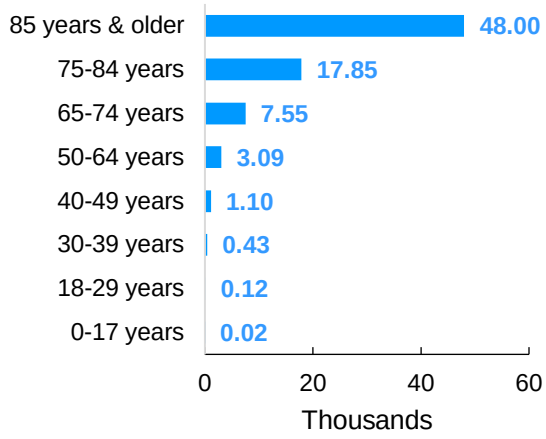
Covid-19 is estimated to have killed about 6.8 million people globally,[4] but it was perhaps not a "typical" pandemic: In contrast to earlier episodes, including the 1918 Spanish Flu, it disproportionally affected retirees, at least in advanced economies like the United States (Figure 3). Equally, the size of government transfers to households in 2020-21 should have reduced the need for precautionary savings. Nevertheless, even with limited mortality in the working-age group, Covid-19 may end up having long-term consequences on workforce participation, either via chronic illness limiting the ability to work, or by making some employees involved in "contact jobs" reluctant to return to work altogether. Goda and Soltas (2022) estimated that long Covid may have reduced the US workforce by at least 500,000 (0.2% of the adult population), and indeed older worker participation has yet to recover (Figure 4). But this observation is not valid everywhere: Botelho and Weissler (2022) do not observe unusual rates of early retirement in the euro area.

2 Specifically, the risk that the main breadwinner(s) in a household may die from the pandemic can entice the build-up of precautionary savings.

3 Inversely, the relative scarcity of labour versus capital implies real wages rise after a pandemic, and indeed this happened in the decades following the "Black Death" plague pandemic of the 14th century.

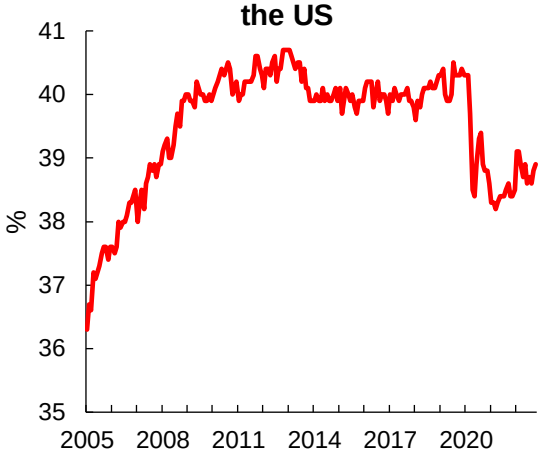
4 The figure is derived from worldometers.info and does not include recent unofficial estimates for China.

**Figure 3: Covid-19 deaths per million in the US**




Source: Center for Diseases Control (as of 4 January 2023)

**Figure 4: Workforce participation among the 55+ in the US**




Source: Bureau of Labor Statistics

## 4. Possible indirect effects of the Covid-19 shock

Beyond its direct impact on demographics and precautionary savings, the pandemic (and its aftermath) may have durably affected fundamental r* drivers. One uncertainty relates to long-term potential GDP growth: Declines in fixed investment during lockdowns may weaken productivity gains, while disruptions to schooling (especially in emerging countries) probably undermined future human capital growth. This would suggest lower potential growth going forward, though higher investments in ICT during the pandemic – as firms adapted to new ways of work – could have played an offsetting role. The jury is still out about the medium-term growth outlook, which can be used as a proxy for institutions' view on potential growth: The IMF has lowered its expectations for EMs, though not AEs, compared to just before the pandemic (Figure 5).

Government transfers to households during the pandemic, and the boost to asset prices (housing and financial assets) probably increased both wealth and income inequality, a driver of lower r*.[5] But the current broad-based monetary policy tightening, to deal with a global inflation surge, is starting to erode wealth gains. In addition, households may become more reluctant to save if expecting that inflation will be higher and more volatile than before the pandemic, as returns become more uncertain. The impact of higher inflation on saving, however, is unclear: For example, household saving rates were high in France and Italy in the high-inflation 1970s-80s, maybe a sign that households were saving even more to compensate for the risk of real wealth erosion and unexpected variance in real income.[6] But the 2021-22 inflation also seems to be accompanied by a stabilisation or even a rise in the relative price of capital goods, thus removing an earlier factor of downward pressure on r* (Figure 6).

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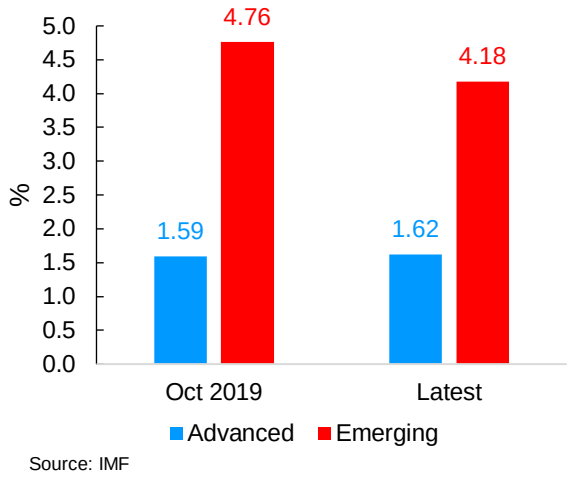
5 A survey by the Bank of England published in November 2020 showed that a majority of high- and middle-income households reported higher savings during Covid, in contrast to low-income households and the unemployed.

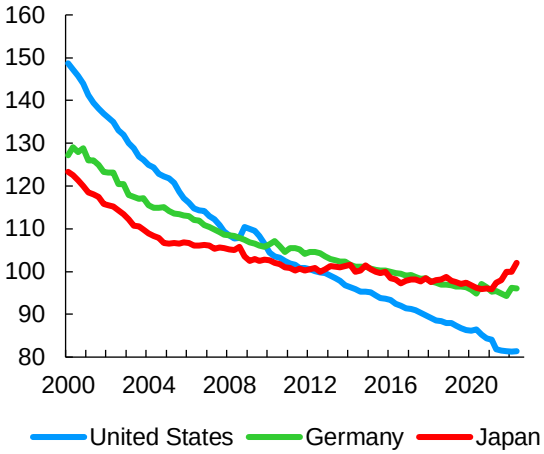
6 Howard (1978) found evidence of a negative correlation between real net liquid assets and saving in five major AEs (US, Japan, Germany, UK and Canada), as well as evidence in some of these countries of a positive link between rising inflation expectations and saving.

**Figure 5: 5-year ahead GDP growth projections**




Source: IMF

**Figure 6: Ratio of equipment investment to GDP deflators**




Policy-wise, the response of governments to the pandemic shock, and later (in some cases) to the energy price shock, has raised structural budget deficits and is likely to worsen debt/GDP dynamics relative to pre-pandemic projections (Figure 7). To the extent that rising debt ratios, by raising the supply of safe assets, limited the decline in r* before 2020 as Rachel and Summers (2019) argued, this further deterioration could push r* higher in coming years if other drivers cancel each other out. However, even that impact is ambiguous. As Adolfsen et al. (2020) argued, rising debt ratios are likely to be accompanied by a broad deterioration in sovereign ratings, meaning that while the overall supply of government bonds will rise, that of truly "safe" assets (highly rated bonds) may not.

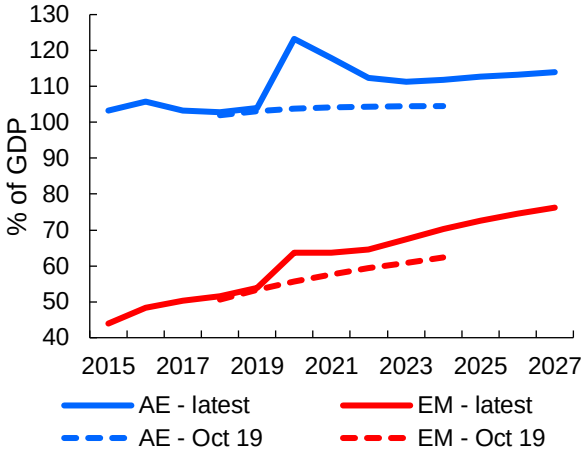
Finally, if one subscribes to the view that money is not neutral for r*, and that neutral rates were unusually depressed in the 2010s by private-sector deleveraging, quantitative easing (QE) policies and difficulties central banks experienced in lifting inflation up to target, then the current inflation spike – to the extent that it forces central banks to err on the side of tightness for an extended period and downsize balance-sheets – could raise r*. Neutral rates could end up moderately higher than pre-pandemic levels at least in the short term, and until inflation has stabilized again.

## 5. Consensus evolving towards mildly higher r* short term?

Both academics and private forecasters have been reluctant to pronounce on the outlook for r* post-pandemic. Holston, Laubach and Williams have not updated their estimates since early 2020, citing challenges in using filter equations to determine potential output. The IMF has also highlighted the higher-than-usual uncertainty surrounding r* estimates, though it suggested in the October World Economic Outlook that it may have risen somewhat in the US. IMF Deputy Managing Director Gita Gopinath (2022) recently indicated that the pandemic may not have made lasting changes to longer-term drivers of r*. These would encompass downside pressure from precautionary savings and inequality, upside from public debt trends and climate investments, and more neutral effects from demographics, as ageing societies

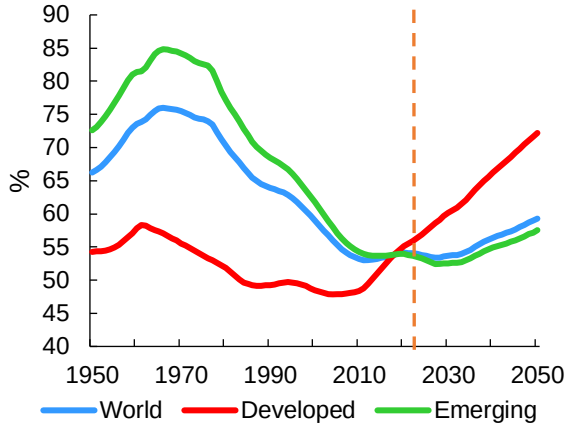
stop the decline in the dependency ratio (Figure 8). Over the longer run (say, 10 to 15 years) there is however a risk that rising old-age dependency raises r*, if as Goodhart and Pradhan (2017) argue, as ageing populations reduce desired savings by more than they curb desired investment.

**Figure 7: Debt projections before and after Covid**




Source: IMF

**Figure 8: Past and projected dependency ratios**




Source: United Nations

Major central banks have equally been reluctant to indicate changes in their neutral rate views, though they flag uncertainty as higher than usual. In the US, the FOMC's median forecast for long-term Fed funds – a proxy for nominal r* – has changed little since 2020 (Figure 9). The ECB does not publish such an estimate for the Eurozone, but Bank of France Governor François Villeroy de Galhau last year indicated he still saw nominal r* around 1.0%-2.0%.[7]

Furthermore, economists increasingly distinguish between longer-term r* (driven solely by slow-changing variables such as demographics and technical progress) and shorter-term measures, influenced by supply and financial shocks. Some consensus is emerging that the latter probably fell during the pandemic but has since rebounded, to slightly above pre-pandemic levels. Deutsche Bank (2022) estimates that it may now be around 0.7%-0.9% in the US, versus 0.5% pre-pandemic. UBS (2022) holds similar views.

## 6. The case of neutral rates in EM

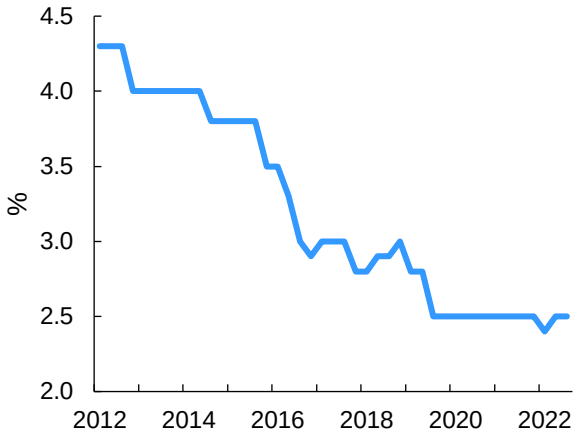
Most of the literature on r* refers to AEs. Still, several studies had identified a downtrend in r* in most EM regions over the past decades, that intensified following the Global Financial Crisis (GFC) but may have stalled in the late 2010s. The gap between r* in AE and EM was believed to have declined significantly over time. Amid growing trade and financial integration of EM, economists argued that global drivers of saving and investment intentions had become increasingly relevant for r* in EM, and that reduced global risk premia (together with greater domestic policy credibility) contributed to a narrower EM-AE neutral rate spread.

[7] Statements from some fellow Governing Council members also suggested that they are broadly in agreement. See "Is there room for the ECB to maintain its pace of hiking?", Europe Blog, Deutsche Bank Economic Research, 26 October 2022.

Recently, Ruch (2021) estimated that average EM r* co-moved with US r*, but fell faster, from 6.2% in 2000 to 2.2% in 2019. He also observed that slower potential growth only explained a small part of the decline, but that global savings and inequality provided no significant explanation – potentially a sign of key roles played by policy credibility and global risk appetite.

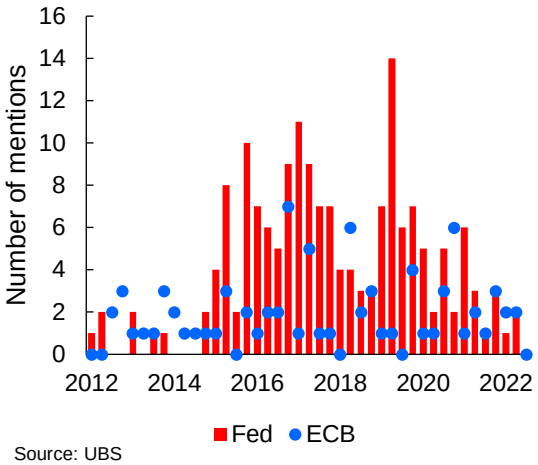
Consequently, to the extent that EMs remain globally financially integrated, world drivers of r* should continue to influence EM neutral rates. Looking at EM Asia, Tanaka et al. (2021) argue that long-term drivers of r* should reassert themselves once the effects of the pandemic have subsided, and that many of them (demographics, lower productivity gains) should keep r* relatively low. But in other EM regions that are structural capital importers, any sustained rise in global risk aversion and/or inflation expectations could easily raise the risk component of r*. Furthermore, were public and political pushback against globalization to result in a world that is financially more fragmented, the role of global drivers in driving specific-country r* might fade, resulting in a local r* that is both more volatile and less connected to AE r* levels than in the pre-pandemic years.

**Figure 9: Median long-term FOMC projection of Fed funds**




Source: US Federal Reserve

**Figure 10: Mentions of r* in Fed/ECB speeches**




Source: UBS

## 7. Has r* become less relevant for central banks?

As mentioned above, central banks have not pronounced on whether neutral rates have changed post-pandemic. But they have also reduced their reference to the concept altogether. UBS (op. cit.) shows that references to r* in Fed speeches have dropped a lot since 2019, whereas they remained infrequent in ECB communication (Figure 10). So, does this mean that r* has suddenly become less relevant for monetary policymaking?

Central banks are aware that successive supply shocks make it harder to estimate unobservable variables like potential GDP, and hence r*. More generally, they may feel that while drivers of long-term, steady-state neutral rates have not changed much, supply shocks have made short-term drivers, and thus estimates, of r* more volatile.

Central banks are also aware of growing criticism of models that assume stability of inflation expectations around the target – and imply, therefore, that the nominal neutral policy rate equals r* plus the inflation target. If inflation expectations prove sensitive to shocks, they introduce an additional degree of uncertainty (and volatility) to the nominal neutral rate. Consequently, central banks will be wary about providing too much forward guidance and communicating too clearly where the "terminal rate" in the cycle stands.[8] Similarly, the Fed and some of its peers want to see an extended period of restrictive financial conditions to curb inflation; hence, they are reluctant to speak too early about a return to neutral as this would encourage financial markets to rally on anticipation of a pivot. Once inflation is on a sustained downtrend and central banks grow more confident about inflation expectations stabilizing, they may again mention r* more frequently.

## 8. Implications for South Africa

South Africa being a relatively open economy, with a current account generally in deficit, theory suggests that its neutral rate should reflect both global drivers and the country's risk premium (as a fraction of foreign savings is required to fund domestic investment needs). Indeed, Kuhn et al. (2019) found that South Africa's r* fell post-GFC, but that the rise in the risk premium had halted that decline by 2016-17. The SARB's Quarterly Projection Model, which sets r* as the sum of weighted average G3 r* plus an equilibrium risk premium and the change in the equilibrium REER, showed a similar pattern, with a mild rise in r* in recent years. Looking ahead, while the global component may not move much, the risk is that a higher risk premium (were policy issues to remain unresolved) could drive domestic r* upwards. This highlights the importance for South Africa of having a credible fiscal stabilization path, and well-anchored inflation expectations, if it seeks to avoid structurally higher real interest rates even as potential growth remains weak.

## 9. Conclusion

The impact of the pandemic on neutral rates remains uncertain at this stage. Long-term drivers of r* may not have changed much, implying that it will remain largely unchanged in advanced economies. But for now, central banks would be wary of flagging an impending return to low average real rates (which they do not see as warranted), for fear of appearing complacent in their fight against the current inflation spike. For a similar reason, EM central banks should strive to keep inflation expectations anchored and limit risk premia in their domestic financial assets, as setbacks could again raise the gap between domestic and AE neutral rates.

[8] In a webinar hosted by Market News International on 7 September, Cleveland Fed President Loretta Mester indicated that the then level of Fed funds (2.25%-2.50%) could be construed as neutral if inflation was behaving normally; but she immediately added that the latter condition did not apply.

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# OBEN 2301* – March 2023

# Drivers of corporate credit in South Africa

*Kathryn Bankart, Xolani Sibande and Konstantin Makrelov*

**Abstract**

Corporate credit growth remains strong despite tighter monetary policy and deteriorating global and domestic conditions. Current drivers of corporate credit, particularly general loans and advances, are normalising to pre-COVID levels as the need for working capital has increased, investment has picked up in particular sectors of the economy such as agriculture and passthrough from monetary policy actions has been limited. A simple econometric model suggests that investment is a major driver of corporate credit growth in the long-run, while lending spreads and government borrowing rates are important determinants in the short-run.

## 1. Introduction

Despite recent policy rate increases, corporate credit continues to grow. The recovery follows the large contraction in 2020, following the lockdown of the domestic economy. In this note, we review some of the recent trends in corporate credit and identify possible drivers, using a simple econometric model. Our focus is on loans and advances, which is the largest component of corporate credit, and excludes investments and discounted bills.

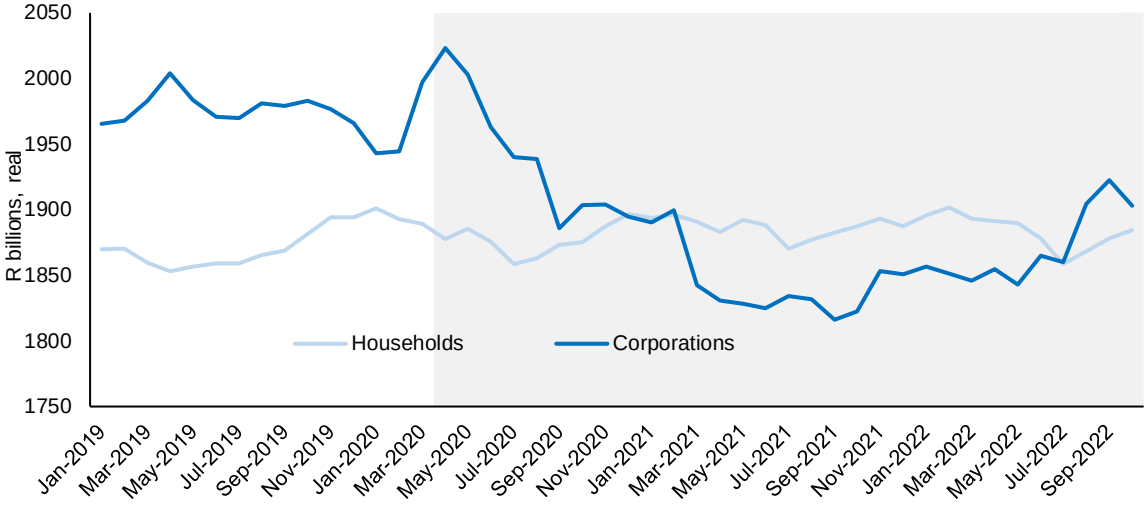
The literature identifies several macro- and microeconomic drivers of corporate credit. Macro factors include, for example, economic growth, policy rates, asset price changes, external deficits, and the type of exchange rate management framework (Mendoza and Terrones, 2008). Higher fiscal deficits or generally unsustainable government finances can increase borrowing costs throughout the economy, reducing credit extension (Hollander 2021). Micro factors are firm and sector specifics. They can include, for example, firm-level leverage measures and firm values. Micro-prudential and macroprudential actions can also reduce credit extension if it is costly for banks to increase capital (de Jager, Ehlers et al. 2021). The numerous drivers of corporate credit hinder the precise estimation of what drives credit growth at specific points in time.

## 2. Trends in corporate credit

Table 2 in the appendix, shows the recent trends in corporate credit extension. Corporate credit is recording stronger growth rates across the different subcategories. The largest category of general loans and advances recorded nominal growth of 12.2% in 2022 (5.0% inflation-adjusted). This subcategory has been the most volatile over the COVID period. It recorded the largest contraction in 2020 and it is also recording the strongest recovery (it exhibited similar behaviour in 2009 during the Global Financial Crisis).

However, in real terms the stock of corporate credit remains below its 2019 level after a significant drop during 2020 and at the beginning of 2021 as corporates reduced debt exposure (Figure 1). The stock levels of household credit remained more stable over this period. This suggests that a major driver of corporate credit growth is simply normalisation as economic growth recovers post-crisis.

**Figure 1: Real loans and advances to corporates and households (deflated with CPI)**




Source: SARB (2022)

The recovery in corporate credit is broad-based across sectors of the economy and financial institutions. Figure 2 shows the recovery in corporate credit extension across the major lending banks. Growth has been strong, particularly for ABSA, followed by FirstRand. Nedbank's slower recovery relative to other banks reflects a more selective credit origination strategy, particularly in areas such as commercial property and vehicle finance.[1]

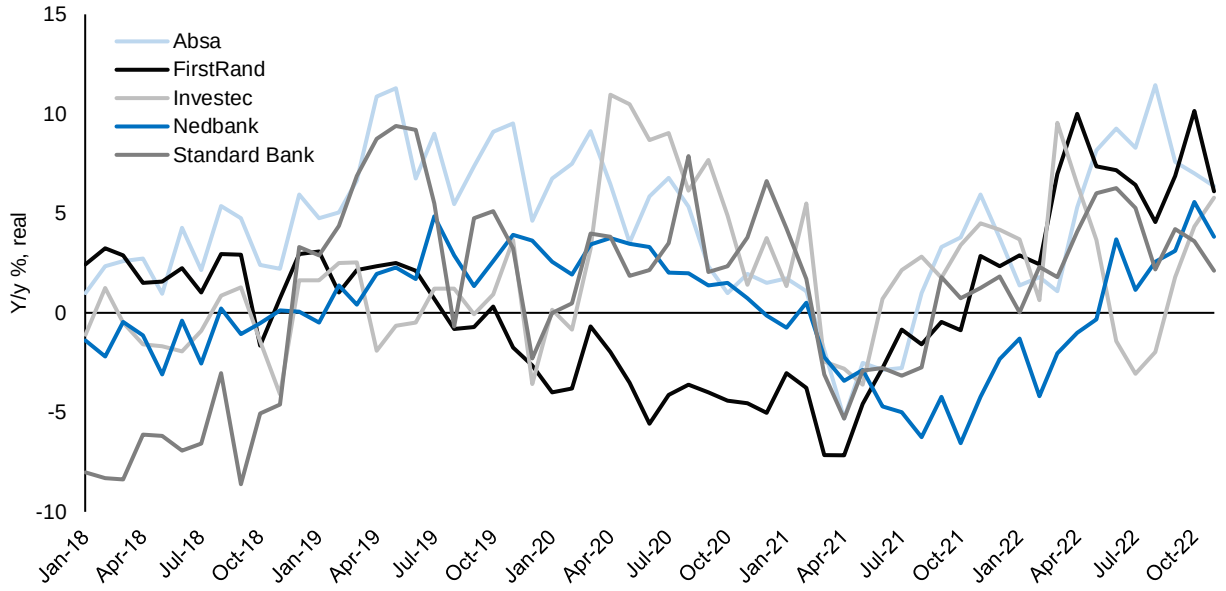
Growth in credit extension to primary sectors such as agriculture is recording growth rates of over 10% (Figure 3). This is driven by some sector specific factors such as the particular timing of the planting season (during which borrowing typically picks up for the agricultural sector). In the mining sector, borrowing activity has been attributed in part to smelter upgrades and rebuilds. Although actual production remains subdued, elevated commodity prices have supported activity in the sector generally, such that most of the sector's borrowing is likely based on working capital needs. Investment in renewable electricity generation is likely contributing to the recovery in credit extension to the electricity sector. A long-running decline in construction activity explains the declining trend in the sector's borrowing. Paired with weak investment in residential and non-residential building, this also explains declining credit extension to the real estate sector. [2] Identifying the exact drivers is difficult.

1 The sharp dip for Investec in 2022 reflects reduced property acquisitions.

2 The large spike in 2020 in credit extension to 'financial intermediation and insurance' is likely largely due to the purchase of Tiger brands by PepsiCo.

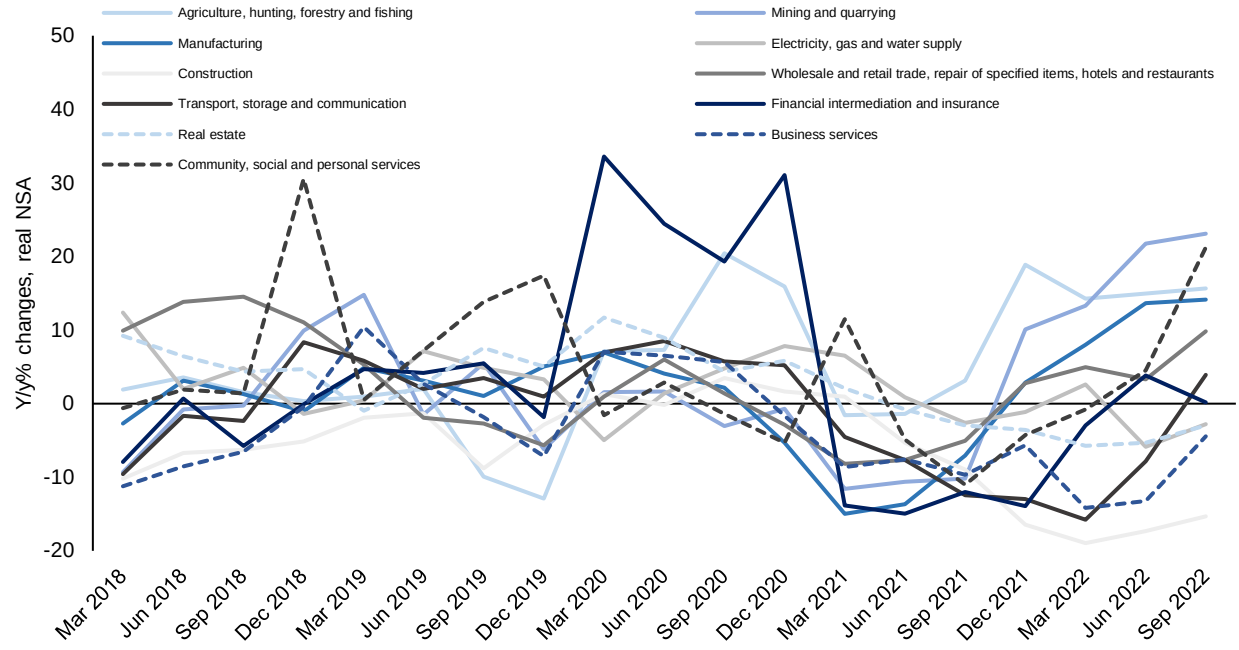
The disaggregation does not allow us to distinguish between credit extension for working capital[3] as opposed to investment. These often have different drivers, with investment being more sensitive to future expectations of economic activity. There is also a variety of idiosyncratic factors specific to some sectors (and firms) contributing to credit extension.

**Figure 2: Total credit exposure by major bank (deflated with CPI)**




Source: SARB (2023)[4]

**Figure 3: Total credit extension by sector**




Source: SARB (2023)

3 This could include bridging finance ahead of a planned share listing, larger scale purchases of inputs, motivated by a time-sensitive pricing advantage, or longer-cycle processes (e.g. planting season for agriculture), and even covering fixed costs in some months based on revenue shortfalls.

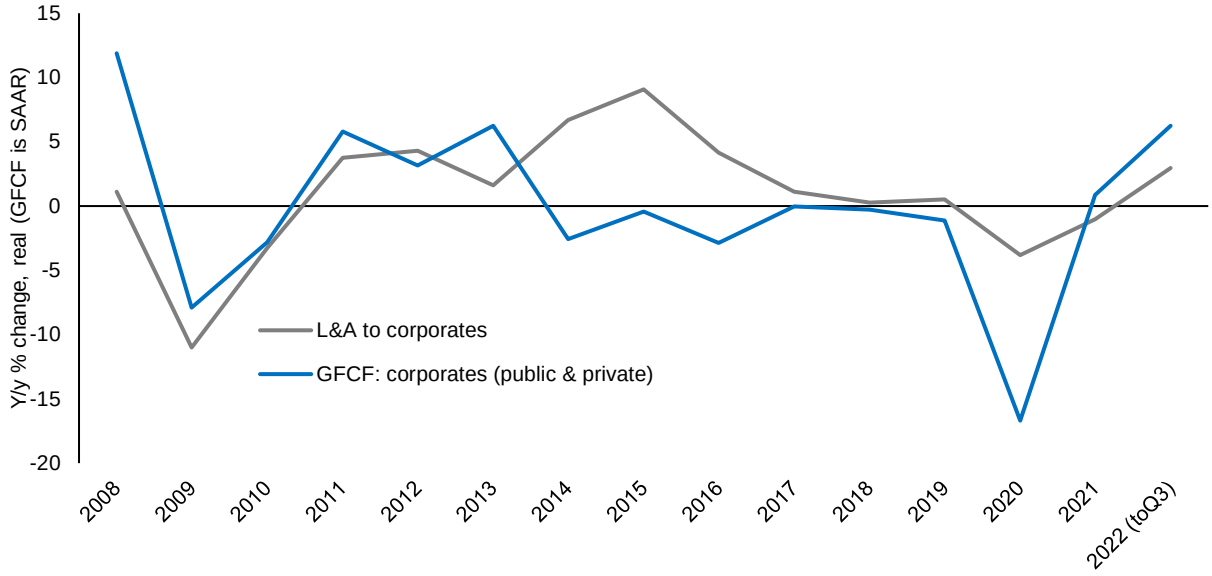
4 As this BA900 data does not differentiate between exposure to households or corporates, this chart does not depict corporate credit exclusively. Also, for Figure 3, which additionally does not refer exclusively to bank-borrowing.

## 3. Macroeconomic drivers

In this section, we review some of the macroeconomic drivers. We provide some descriptive analysis followed by the estimation of a simple econometric model. Our focus is on corporate investment, borrowing costs measured by the weighted average lending rate to corporates, business confidence, exchange rate (rand-dollar), the risk environment (EMBI), and the stock market (JSE ALSI). [5]

Firms also borrow to fund investment. Figure 4 plots the growth in investment against growth in general loans and advances. The two series generally co-move suggesting that higher investment may explain a portion of general loans and advances, despite multiple sources to fund investment, and the use of general loans and advances for working capital.

**Figure 4: Corporate investment and general loans and advances (y-o-y % change)**

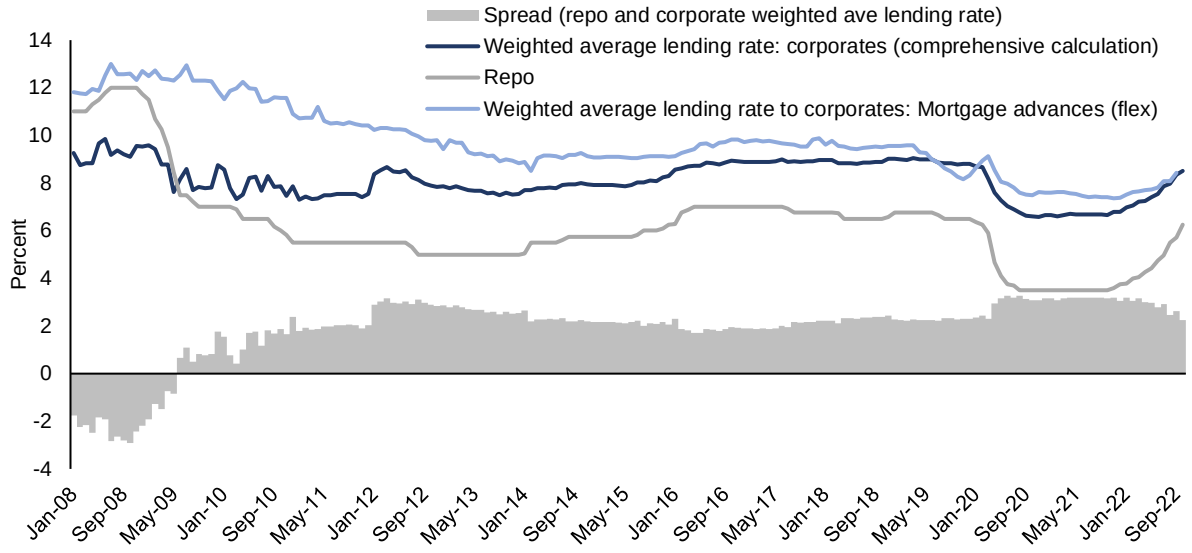



Source: SARB (2022)

Cost of borrowing should also be an important driver of credit extension. The monetary policy rate has increased by 375 basis points since November 2021 and yet credit extension has continued to grow. This raises questions about policy rate passthrough. Figure 5 shows that a decline in the lending spread has offset some of the impact of higher repo rate increases. Over the period February-to-October 2020[6], the lending spread declined by just over 50 basis points. The spread dynamics are in line with the economic literature with periods of significant risk aversion and economic slowdown associated with larger lending spreads (Borio and Zhu 2012). The change in the monetary policy implementation framework may have also contributed to lower passthrough. The spread between repo and JIBAR has declined marginally since the implementation of the new framework.

[5] A description of the data can be found in Table 3.
[6] Based on the difference between the installment sale lending rate and the repo rate.

**Figure 5: Lending rates and spread of corporate weighted average rate to repo**

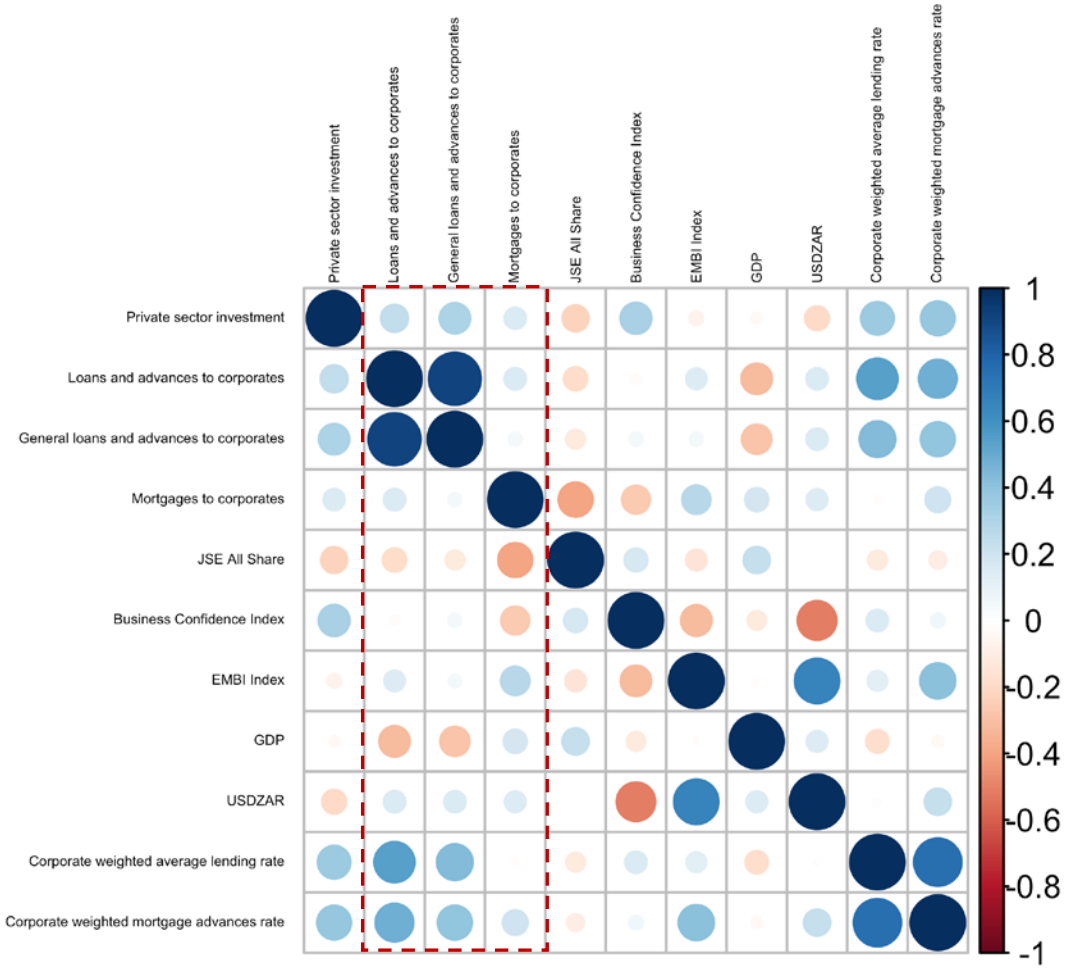



Source: SARB (2022)

Figure 6 provides correlation coefficients of aggregate differenced corporate loans and its components (general loans and advances, and mortgages), and the drivers (stationary series[7]). Aggregate and general corporate loans correlate positively with private sector investment. Surprisingly, measures of borrowing costs are also positively correlated. The remaining drivers appear to be weakly correlated.

[7] After differencing all the variables were stationary. Normalising is a variance reduction strategy which removes the effect of scale on correlation estimation.

**Figure 6: Differenced correlations between corporate credit and potential drivers**




Note: Perforated lines indicate credit driver correlations.

Next, we use a simple econometric model to identify the relationship between drivers and subcategories of corporate credit extension. We use 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. It involves simultaneous estimation of the long- and short-term parameters and is based on an unrestricted error correction autoregressive distributed lag model, or ARDL(p,q).

Our preliminary analysis suggests that investment and general loans and advances are cointegrated, hence this type of model is appropriate. We tested a variety of specifications using the drivers identified previously. We were not able to identify a significant relationship between general loans and advances and the EMBI index, Business Confidence, JSE All share index and the exchange rate, confirming the results from the corelation analysis.[8] The

[8] The framework does not allow for all the drivers to be tested simultaneously as this violates statistical requirements to ensure that the estimated coefficients are accurate. For example, the exchange rate is highly correlated with the Business Confidence and the EMBI index.

best fit equation specification is presented in Table 1.[9] Our specification does not have restrictions, which is intentional as we want our results to be more data-driven.

**Table 1: Estimation results**

| | **Dependent variable** | |
|---|---|---|
| **Explanatory variables** | General loans and advances (real) | Instalment sales (real) |
| | | |
| Adjustment coefficient | -0.024 | -0.044 |
| | | |
| Total real investment | 0.210 | 0.216 |
| *t-statistic* | *4.913* | 5.151 |
| **long-run elasticity** | **8.605** | **4.879** |
| | | |
| **Short-term drivers** | | |
| Lending spread | -2.036 | -1.352 |
| *t-statistic* | *-3.064* | -1.958 |
| | | |
| Real private investment | 0.078 | 0.080 |
| *t-statistic* | *2.426* | 2.425 |
| | | |
| Real long-term government bond yield | -0.520 | 0.062 |
| *t-statistic* | *-1.908* | 0.211 |
| | | |
| DUM2009Q2 | -0.013 | 0.002 |
| *t-statistic* | *-1.056* | 0.211 |
| | | |
| DUM2012Q2 | 0.032 | 0.002 |
| *t-statistic* | *2.320* | 0.189 |
| | | |
| R-squared | 0.688 | 0.630 |

The results show a strong cointegrating relationship between investment and general loans and advances. A percentage point increase in total investment increases real general loans and advances by 8 percentage points in the long-run. The low adjustment coefficient indicates that it takes a while for general loans and advances to reach the new equilibrium level.

The short-term drivers are the lending spread between the weighted average lending rate and the repo rate, real private investment, the real bond yield on long bonds and a set of dummy variables. All coefficients are significant.

[9] The Eviews estimation results are presented in appendix. We also present an estimated equation for mortgage advances using the same drivers. None of the drivers is significant highlighting that different components of corporate credit extension have different drivers.

Unlike the preliminary correlation analysis, in the econometric estimation, borrowing rates have strong negative relationship with general loans and advances. A percentage point increase in the lending spread, reduces lending instantaneously by 2 percentage points. Changes in the spread can be due to a variety of reasons, including higher risk aversion by banks due to rising fiscal or economic risks or macroprudential actions.[10] For example, de Jager, Ehlers et al. (2021) find the capital adequacy ratio to be an important determinant of overall credit extension. Over the estimation period, BASEL III was introduced, and banks were faced with significant domestic risks, which supports a strong negative relationship between the spread and growth in general loans and advances.

Another important determinant is real government long-term bond yields. There is a link between fiscal policy and corporate credit extension. Fiscal actions, which increase risk premia and long bond yields also reduce general loans and advances.

Finally measures of borrowing costs seem to be weightier drivers of credit extension in the short-run than private investment. While the coefficient is positive and significant as expected, it is very small. Our R-squared measures suggest that a large part of the variation remains unexplained by our model, highlighting the importance of idiosyncratic factors that drive credit extension at specific points in time.

We use the same specification for instalment sales. Investment and lending spreads remain important drivers, but the coefficients are smaller. Government bond yields are no longer a significant driver. Different components of corporate credit extension have different drivers. In the appendix, we show the estimation for mortgage advances using the same explanatory variables and none are significant.

## 4. Conclusion

The note shows that the recovery in corporate credit is driven by a variety of factors, including working capital and investment needs. This has also been the feedback from South African banks in response to questions about the pickup in the general subcategory.

Our simple econometric model indicates that in the long-run, total investment is an important determinant of credit extension. In the short-run, however, the lending spread and government long bond yields are important drivers. The lending spread is an indicator of rising domestic risk and increased risk aversion by commercial banks.

Identifying the specific drivers at any point is difficult. This is clearly illustrated by the flow of funds data, which shows the supply and use of funds by corporates. Corporate decisions to borrow are driven by investment and savings behaviour but also by decisions around accumulation of assets and liabilities and the type of instruments used to fund various company activities.

[10] See for example Makrelov, K., et al. (2021). "The impact of higher leverage ratios on the South African economy." Studies in Economics and Econometrics 45(3): 184-207.

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# Appendix A

## Table 2: Corporate credit extension

| | | Annual change (R billions, nominal) | | | | | Portion of total (%) |
|---|---|---|---|---|---|---|---|
| | | 2018 | 2019 | 2020 | 2021 | 2022 | 2022 |
| Instalment sale and leasing finance | R119.5 | 9.2 | 13.9 | -1.1 | 5.6 | 17.1 | 8.6 |
| Mortgage advances | R439.8 | 26.9 | 37.8 | 28.8 | 11.0 | 30.2 | 15.1 |
| Overdrafts | R171.2 | 19.3 | -2.2 | -30.3 | 24.2 | 30.6 | 15.3 |
| General loans | R931.9 | 23.9 | 30.5 | -7.5 | 20.3 | 120.5 | 60.4 |
| Credit card advances | R7.4 | 0.6 | -0.2 | -2.1 | 1.1 | 1.1 | 0.5 |
| Total loans and advances to corporate sector | R1679.6 | 79.9 | 79.8 | -12.1 | 62.2 | 199.4 | 100.0 |

Source: SARB (2022)

## Table 3: Data sources

| | Data | Measure | Source |
|---|---|---|---|
| Corporate borrowing | Loans and advances to corporates | Nominal | South African Reserve Bank |
| | General loans and advances to corporates | Nominal | South African Reserve Bank |
| | Mortgages to corporates | Nominal | South African Reserve Bank |
| Demand factors | GDP | Nominal | Statistics South Africa |
| | Private sector investment | Nominal | Statistics South Africa |
| | Corporate weighted average lending rate | Nominal rate | South Africa Reserve Bank |
| | Corporate weighted mortgage advances rate | Nominal rate | South Africa Reserve Bank |
| Macroeconomic conditions | Business confidence | Index | First National Bank |
| | JSE All share | Index | Johannesburg Stock Exchange |
| | USDZAR | Nominal rate | South African Reserve Bank |
| Macroeconomic vulnerabilities | EMBI | Index | South African Reserve Bank |

## Appendix B

### Table 4: Eviews estimation results: General loans and advances

Dependent Variable: DLOG(@MOVAV((GENERALLA/CPI),4))
Method: Least Squares
Date: 01/31/23 Time: 14:26
Sample (adjusted): 2008Q3 2019Q4
Included observations: 46 after adjustments

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| LOG(@MOVAV(GENERALLA(-1)/CPI(-1),4)) | -0.024388 | 0.009029 | -2.701254 | 0.0103 |
| LOG(I1(-1)) | 0.209869 | 0.042719 | 4.912836 | 0.0000 |
| C | -2.317682 | 0.499794 | -4.637274 | 0.0000 |
| D(RLENDINGCORP(-1)-REPO1(-1))/100 | -2.035856 | 0.664385 | -3.064273 | 0.0040 |
| DLOG(IP/CPI) | 0.078162 | 0.032215 | 2.426234 | 0.0201 |
| D(GOVBOND-@PCY(CPI))/100 | -0.520062 | 0.272612 | -1.907699 | 0.0640 |
| DUM2009Q2 | -0.013299 | 0.012588 | -1.056455 | 0.2974 |
| DUM2012Q2 | 0.032354 | 0.013945 | 2.320144 | 0.0258 |

| | | | |
|---|---|---|---|
| R-squared | 0.688053 | Mean dependent var | 0.009940 |
| Adjusted R-squared | 0.630589 | S.D. dependent var | 0.018303 |
| S.E. of regression | 0.011125 | Akaike info criterion | -6.002559 |
| Sum squared resid | 0.004703 | Schwarz criterion | -5.684535 |
| Log likelihood | 146.0589 | Hannan-Quinn criter. | -5.883425 |
| F-statistic | 11.97364 | Durbin-Watson stat | 1.590252 |
| Prob(F-statistic) | 0.000000 | | |

### Table 5: Eviews estimation results: Instalment Sales

Dependent Variable: DLOG(@MOVAV((INSTSALES/CPI),4))
Method: Least Squares
Date: 01/20/23 Time: 16:21
Sample (adjusted): 2008Q3 2019Q4
Included observations: 46 after adjustments

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| LOG(@MOVAV(INSTSALES(-1)/CPI(-1),4)) | -0.044311 | 0.023307 | -1.901145 | 0.0649 |
| LOG(I1(-1)) | 0.216202 | 0.041971 | 5.151187 | 0.0000 |
| C | -2.309394 | 0.525723 | -4.392793 | 0.0001 |
| D(RLENDINGCORP(-1)-REPO1(-1)) | -0.013522 | 0.006906 | -1.957924 | 0.0576 |
| DLOG(IP/CPI) | 0.079576 | 0.032819 | 2.424734 | 0.0202 |
| D(GOVBOND-@PCY(CPI)) | 0.000621 | 0.002946 | 0.210748 | 0.8342 |
| DUM2009Q2 | 0.002487 | 0.013137 | 0.189306 | 0.8509 |
| DUM2012Q2 | 0.021770 | 0.015072 | 1.444433 | 0.1568 |

| | | | |
|---|---|---|---|
| R-squared | 0.629717 | Mean dependent var | -0.002321 |
| Adjusted R-squared | 0.561506 | S.D. dependent var | 0.017340 |
| S.E. of regression | 0.011483 | Akaike info criterion | -5.939210 |
| Sum squared resid | 0.005010 | Schwarz criterion | -5.621185 |
| Log likelihood | 144.6018 | Hannan-Quinn criter. | -5.820076 |
| F-statistic | 9.232010 | Durbin-Watson stat | 0.801412 |
| Prob(F-statistic) | 0.000001 | | |

## Table 6: Eviews estimation results: Mortgage advances (corporate)

Dependent Variable: DLOG(@MOVAV((MORTGAGEADVANCE/CPI),4))
Method: Least Squares
Date: 01/20/23 Time: 16:24
Sample (adjusted): 2008Q3 2019Q4
Included observations: 46 after adjustments

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| LOG(@MOVAV(MORTGAGEADVANCE(-1)/CPI(-1),4)) | 0.016078 | 0.040621 | 0.395797 | 0.6945 |
| LOG(I1(-1)) | 0.059885 | 0.038460 | 1.557083 | 0.1277 |
| C | -0.864235 | 0.724584 | -1.192732 | 0.2404 |
| D(RLENDINGCORPMORG(-1)-REPO1(-1)) | 0.012910 | 0.006066 | 2.128161 | 0.0399 |
| DLOG(IP/CPI) | 0.005754 | 0.029268 | 0.196612 | 0.8452 |
| D(GOVBOND-@PCY(CPI)) | 0.002813 | 0.002310 | 1.217638 | 0.2309 |
| DUM2009Q2 | 0.009091 | 0.010269 | 0.885325 | 0.3815 |
| DUM2012Q2 | -0.002314 | 0.010179 | -0.227352 | 0.8214 |

| | | | |
|---|---|---|---|
| R-squared | 0.253180 | Mean dependent var | 0.000770 |
| Adjusted R-squared | 0.115608 | S.D. dependent var | 0.010417 |
| S.E. of regression | 0.009796 | Akaike info criterion | -6.256900 |
| Sum squared resid | 0.003647 | Schwarz criterion | -5.938876 |
| Log likelihood | 151.9087 | Hannan-Quinn criter. | -6.137767 |
| F-statistic | 1.840342 | Durbin-Watson stat | 0.687071 |
| Prob(F-statistic) | 0.107612 | | |

# OBEN 2301* – May 2023

# Reflections on load-shedding and potential GDP

***Theo Janse van Rensburg and Kgotso Morema***

**Abstract**

This economic note investigates the slowdown in South African growth since the global financial crisis. It finds that domestic growth (both actual and potential) has been on a declining trend largely due to structural constraints, which over the last two years have been exacerbated by load-shedding. SARB models estimate the impact of load-shedding at between -0.7 and -3.2 percentage points, while other institutions' estimated impacts range between -0.4 and -4.2 percentage points. In our view, load-shedding will likely continue for longer as Eskom embarks on major repairs, new capital investment and maintenance projects. To prevent further growth slippage, it is crucial that there is efficient implementation of energy reforms as well as private sector participation and investment.

## 1. Introduction

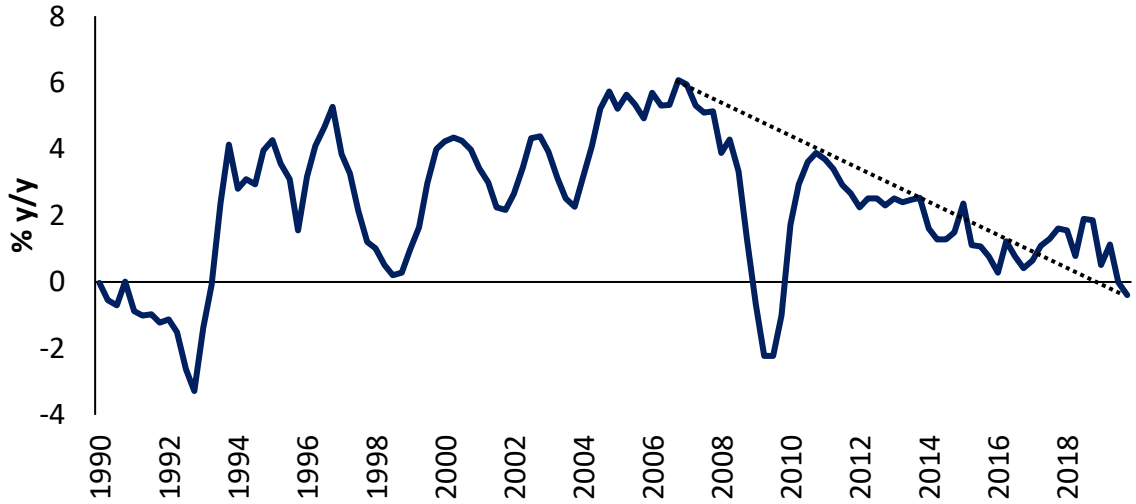
South Africa's domestic growth was declining long before the onset of the COVID-19 pandemic in 2020. Quarterly growth (on a year-on-year basis) peaked at around 6% prior to the global financial crisis (GFC) but fell below 0% at the end of 2019 (Figure 1). Such a prolonged growth decline is not cyclical but structural in nature and cannot be remedied with stimulatory demand policies. Moreover, structural growth (used interchangeably here with sustainable or potential growth) now risks being worsened by load-shedding.

The aim of this note is to briefly summarise South Africa's post-1994 growth and to demonstrate that growth has been on a declining trend for the past 15 years and that the slowdown is structural (largely productivity-related) in nature. Load-shedding is likely to slow potential growth even further over the near term. However, recently announced energy reforms should prompt increased private and public investment in electricity generation, thereby raising potential growth over the medium to long(er) term.

## 2. Domestic growth was slowing even before load-shedding

Following the democratic elections in 1994 and the reopening of global markets, South Africa's gross domestic product (GDP) growth accelerated from an average of 2.2% in the 1980s to an average of 2.7% per annum (p.a.) over the 1994–2000 period. It accelerated even further to 3.6% p.a. in the first decade of the new millennium on the back of policy reforms and higher commodity prices.

**Figure 1: Real GDP growth (1990–2019)**

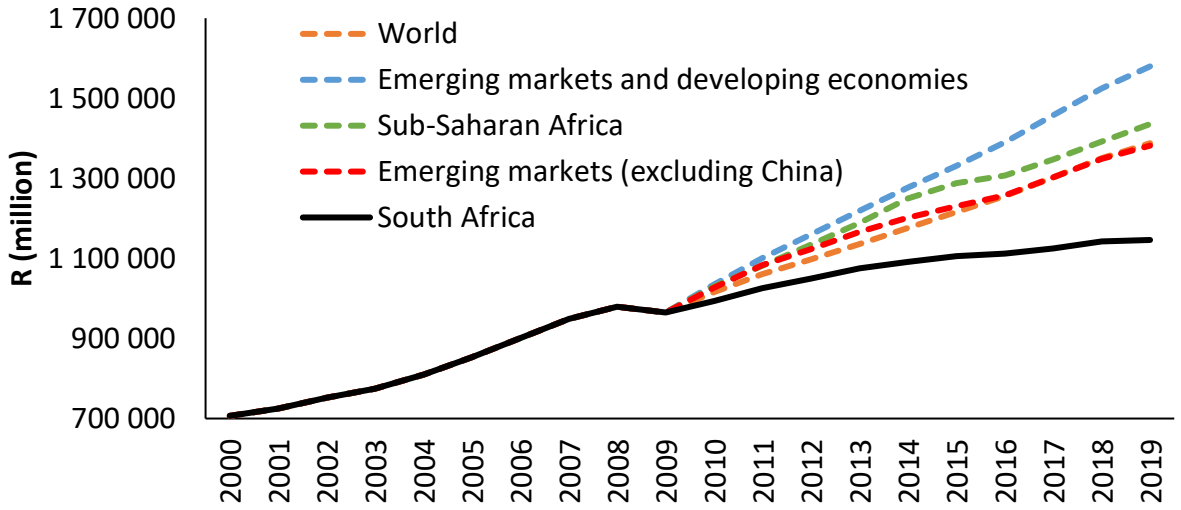



Source: Statistics South Africa (Stats SA)

But after the GFC, the growth picture changed dramatically. Even though growth temporarily recovered after the sharp decline during the GFC, it has been on a declining trend since it peaked at just below 6% in the final quarter of 2006 (Figure 1). Whereas growth averaged 3.6% p.a. over 2000–2009, it declined to 1.75% p.a. over the 2010–2019 period and decelerated even further to only 1.0% p.a. over the 2015–2019 period. South Africa's disappointing economic performance in the post-GFC period can be attributed to negative productivity shocks, exacerbated by corruption and misgovernment.

Moreover, domestic growth tracked global growth quite effectively before the GFC but diverged sharply thereafter. This suggests that most of the post-GFC growth slowdown can be attributed to domestic factors (rather than external factors). A similar picture emerges when South Africa is compared to other aggregate groups such as emerging markets and sub-Saharan Africa. In fact, if domestic growth had matched that of the world, emerging markets or sub-Saharan Africa after the GFC, South Africa's real GDP would have been significantly higher relative to its current level (see Figure 2).

**Figure 2: South Africa's real GDP growth scenarios**




Source: SARB, IMF and Stats SA

## 3. The growth slowdown is due to structural factors

Such a relentless growth slowdown over a period spanning more than 10 years (even when excluding the COVID pandemic years) cannot be explained by cyclical factors. It should rather be attributed to supply-side factors that in a broader macroeconomic context can be explained by the production function, which measures potential growth. The production function depicts the level of potential output commensurate with the quantities of productive factors (such as labour and capital), and how efficiently (productively) these factors are combined in the production process, while inflation is at target. To estimate potential GDP, the SARB uses a semi-structural multivariate filter that can be adjusted to account for temporary supply shocks (such as drought, load-shedding, strikes and floods) (Botha, Ruch and Steinbach 2018).

When analysing the production factors, it is well known that the domestic economy is characterised by an abundant labour supply – but, critically for production, there exists a shortage of skilled labour (Foko 2015; Daniels 2007). Although investment and capital stock growth have slowed since the GFC, the bulk of the decline in potential growth relates to negative productivity shocks.[1]

The South African literature has over the years highlighted reasons for the decline in domestic productivity. These include:

- fiscal policy, which has resulted in sharp increase in debt, in turn crowding out private investment – especially from 2017 onwards (Hausmann et al. 2022);
- sectoral developments in total factor productivity, particularly in the energy, transport and mining sectors (Hausmann et al. 2022);
- shrinkage of the non-mineral tradable sector, particularly export-orientated manufacturing (Rodrik 2008);

[1] See for instance calculations regarding sources of potential growth in Janse van Rensburg, Fowkes and Visser (2019).

- labour market inefficiencies (Suzuki 2018);
- deterioration of the business climate due to factors such as rising political and social risks, uncertainty over economic policy and the erosion of competitiveness (Faure 2017);
- the effects of state capture on productivity (Ofusori 2020; d'Agostino, Dunne and Pieroni 2012);
- inefficient investments across the economy and loss of skilled workers (both through leaving institutions and emigrating) (Suzuki 2018);
- intensifying levels of corruption, wasteful spending and misgovernment (Van Rensburg, Fowkes and Visser 2019); and
- load-shedding (Mpini, Walter and Makrelov 2019).

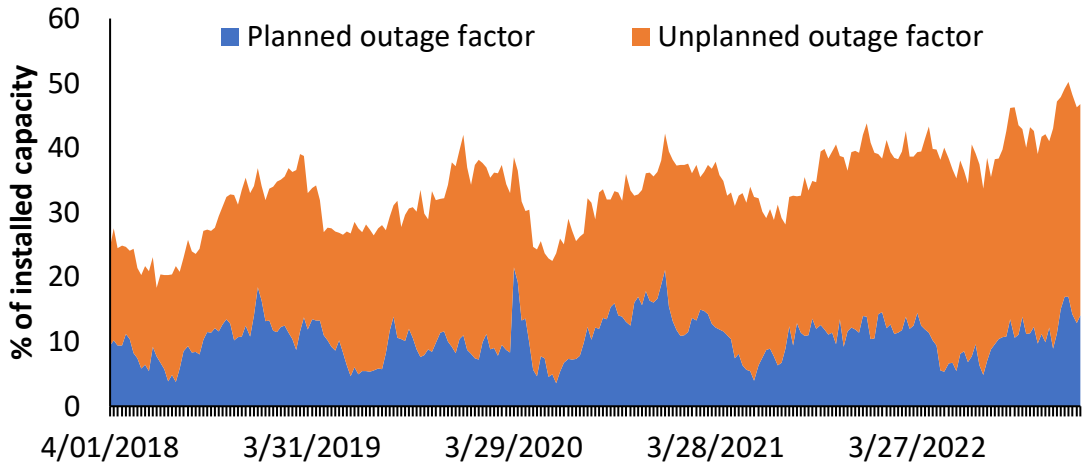
It is important to note that the economy's production potential is not directly observable and is derived from econometrically estimated models. The standard practice among central banks is to decompose real GDP in terms of a trend (a proxy for potential output) and a cycle, using various filtering techniques. The SARB – like most central banks – employs a semi-structured multivariate filter. The outcomes from such filtering techniques largely correspond with the more intuitive production-function approach described above but have the benefit of being less constrained by real-time data availability and limitations.

As mentioned, more recently load-shedding has led to negative productivity and hence a potential impact on output. In the next section we summarise how load-shedding has affected actual and potential output over the last few years and its likely effects in the near future.

## 4. Load-shedding has severely affected GDP growth over the last two years

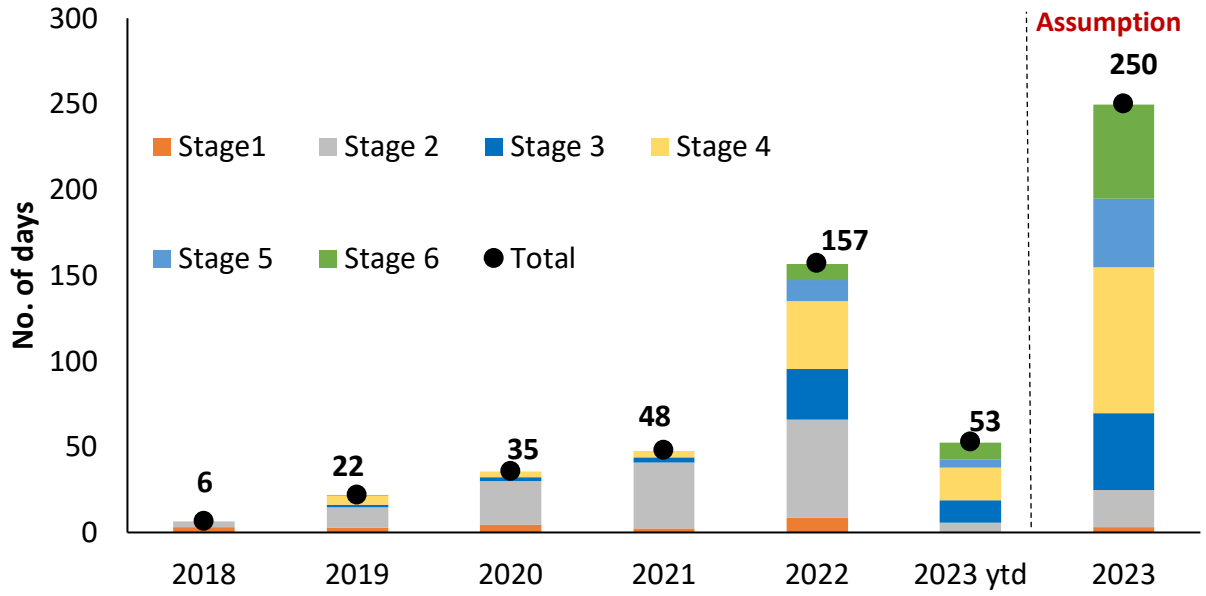
South Africa has experienced sporadic incidents of load-shedding since 2007, with a significant escalation in the last two years (largely caused by unplanned breakdowns at power plants – see Figure 3). The year 2022 was the worst year of load-shedding to date, with the country experiencing 3 776 hours (about 157 days) of power outages. This is significantly higher than the 2021 record of 1 153 hours (48 days) and the 844 hours (35 days) lost in 2020 (see Figure 4). Load-shedding has remained elevated in 2023, with the country already having experienced 2 434 hours, or 101 days, of power outages (i.e. almost every day), as of 16 April. By mid-February of 2023, load-shedding had already exceeded the cumulative totals of 2019 and 2020. It is thus likely that load-shedding will be much worse in 2023 (discussed further in the next section). Load-shedding has severe negative implications for production and overall confidence in the economy, as highlighted by several recent papers (Goldberg 2015; Morema et al. 2019; Mpini, Walter and Makrelov 2019).

**Figure 3: Power plant breakdowns have increased**




Source: Eskom

**Figure 4: Number of days of load-shedding**




Source: EskomSePush

## 5. Various methods used to estimate the impact of load-shedding on GDP

Quantifying the impact of load-shedding is key, as it informs the SARB's GDP and potential GDP forecasts. However, estimating this impact can be difficult, as there are numerous shortfalls and unknowns involved. In this section, we will discuss the various approaches used to estimate the impact of load-shedding on GDP.

## 5.1 The SARB's methodology

The SARB employs three models to estimate the impact of load-shedding, with each model identifying different impacts.

**Model 1** – The first model is based on a methodology developed by Morema et al. (2019)[2] that quantifies the direct impact of load-shedding per production sector, adjusting for weekends, holidays[3] and the electricity intensity of each sector.[4] Load-shedding that takes place after working hours is assumed not to have an impact on sectors that do not operate at that time.[5] We also assume that most businesses have learned how to operate effectively during stages 1 and 2 of load-shedding and that there is thus probably a minimal impact on economic activity at these lower stages.[6] According to Model 1, the direct impact of load-shedding is estimated at around 0.7 percentage points in 2022, with electricity-intensive sectors being more affected.

**Model 2** – The second methodology is a dynamic computable general equilibrium model developed by Mpini, Walter and Makrelov (2019). The model is calibrated using empirically estimated elasticities, with the electricity availability factor (EAF) as another key input. This is basically a sectoral model that estimates the impact of a decreasing EAF on the economy. The model has the advantage of being able to capture both direct and indirect effects of load-shedding. Using this model, we find the impact of load-shedding on 2022 GDP growth to be around 3.2 percentage points.

**Model 3** – The third model framework regresses quarterly real GDP growth (dependent variables – total and by sector) on the gigawatt hours taken off the grid per quarter (explanatory variable – one of three load-shedding intensity metrics) and a constant term. The load-shedding intensity metrics tested were an unadjusted version of the gigawatt hours taken off the grid, a second version that accounts for weekends and public holidays by half-weighting entries on those days and a third version that applies the same entries as the second version but discards non-conventional working hour load-shedding entries. This model suggests that one additional gigawatt hour of load-shedding will lower quarterly real GDP growth by 0.0003, 0.0004 or 0.0008 percentage points, on average, for the three respective intensity metrics. In particular, model simulations using these frameworks estimated that real GDP growth in 2022 could have been between 1.6 and 1.8 percentage points higher had there not been any load-shedding.

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2 The estimates from this method feed mainly into the SARB's baseline forecast, while the other methodologies are used as a benchmark.

3 Sectors assumed not to operate on weekends/holidays will not be affected by load-shedding during those times.

4 This captures sector-specific characteristics, with sectors that are less electricity intensive assumed to be less affected. Even for sectors that are very electricity intensive, we assume that not all operations are dependent on electricity and that a percentage of their operations will continue during load-shedding.

5 For example, the finance sector is assumed to work for nine hours a day, so load-shedding after 17:00 should not affect the sector. The mining sector, however, is assumed to operate non-stop, so load-shedding at night would still affect it.

6 Furthermore, as much as higher stages of load-shedding will have some impact on economic activity, the impact is assumed to be slightly minimised by businesses running back-up power in the first few hours of load-shedding.

## 5.2 Other institutions' methodologies and results

The SARB is cognisant that other methodologies can be used to measure the impact of load-shedding, and therefore conducted an analytical survey.[7] Appendix A summarises these methodologies and their estimates of the impact on GDP growth in 2022.

Intellidex's and Investec's models are similar to SARB model 1, while PWC's model is similar to SARB model 2, and FNB and Absa use a model similar to SARB model 3. However, the results are quite different, and this is largely due to differences in the underlying assumptions made by each institution. Overall, the SARB's estimate ranges between -1.2 and -3.0 percentage points, while other institutions' estimated impacts range from -0.4 to 4.2 percentage points (see Table 1). Although the wide range of estimates is indicative of the uncertainty related to quantifying the exact economic cost of load-shedding, it is nonetheless clear that load-shedding has had a severe negative impact on growth.

**Table 1: Expected load-shedding impact on 2022 GDP growth[8]**

| Institution | Methodology | Impact (%) |
|---|---|---|
| Absa | Ordinary Least Squares (OLS) | 1.3 |
| FNB | OLS | 0.4–0.5 |
| Investec | Working day adjustments | 0.2–0.4 |
| PWC | Input-output modelling | 3.5–4.2 |
| Intellidex | Working day adjustments | 0.9–2.2 |
| SARB (Model 1 – Morema, Rakgalakane, Alton and Mjandana (2019)) | Working day adjustments | 0.7 |
| SARB (Model 2 – Mpini, Walter and Makrelov (2019)) | CGE | 3.2 |
| SARB (Model 3 – SARB Quarterly Bulletin, March 2022) | OLS | 2.1 |

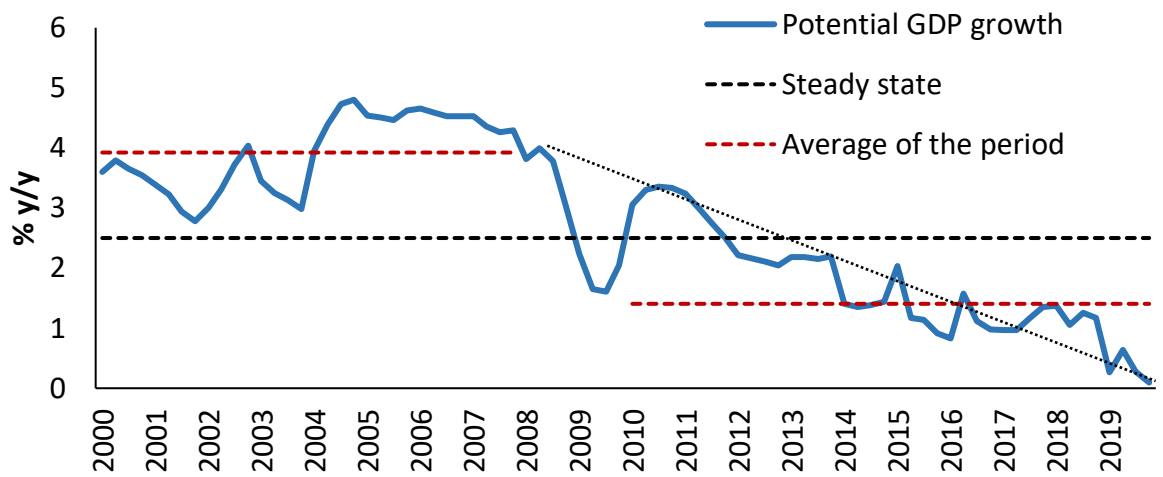
Source: SARB, Absa, FNB, Investec, PWC and Intellidex

## 6. Loadshedding also negatively impacted potential growth

Given the definition of potential output (discussed in Section 3), power cuts can be expected to reduce productive time, thereby limiting the economy's production capacity. For example, a machine that normally operates for 24 hours using electricity cannot operate for the full 24 hours when load-shedding is in effect. The direct impact of load-shedding (as described in Section 4) is incorporated into our potential GDP estimate. It is important to note that load-shedding thus equally impacts actual and potential GDP (and hence does not impact the output gap).[9] Not surprisingly, load-shedding has been one of the major factors contributing to potential GDP growth slowing in line with actual GDP. Figure 5 shows that potential GDP growth averaged 3.9% pre-GFC but slowed to an average of 1.4% post-GFC and is estimated to be around 0.7% in 2022. Given that load-shedding is expected to be worse in 2023, potential growth is forecasted at 0.0% in 2023. This is well below the steady state of 2.5%.

7 Many thanks to Nelene Ehlers, Konstantin Makrelov and analysts from Absa, FNB, Investec, PWC, Intellidex, BER, Econometrix and Momentum for their valuable responses.
8 Most of these estimates were received in November 2022.
9 The output gap measures the difference between actual and potential GDP.

**Figure 5: Potential GDP growth (1990–2019)**




Source: SARB

## 7. Load-shedding risk likely to remain high until at least 2024

The significant deterioration in Eskom's generation capacity has raised concerns about how long load-shedding will persist. In our view, the risk of rolling power outages will remain high in 2023 and into the early part of 2024 as a result of the unreliability of existing power capacity, alleged sabotage, corruption and other factors. Furthermore, prolonged load-shedding will likely continue as Eskom embarks on a major repair, new capital investment projects and maintenance projects that are only expected to be completed over the next 12 to 18 months (see Table 2). According to Eskom, these projects and breakdowns will remove at least 4 500 MW of generation capacity – equivalent to stage 5 load-shedding. This supports our view that Eskom's generation capacity will remain constrained for some time while repairs are in progress.

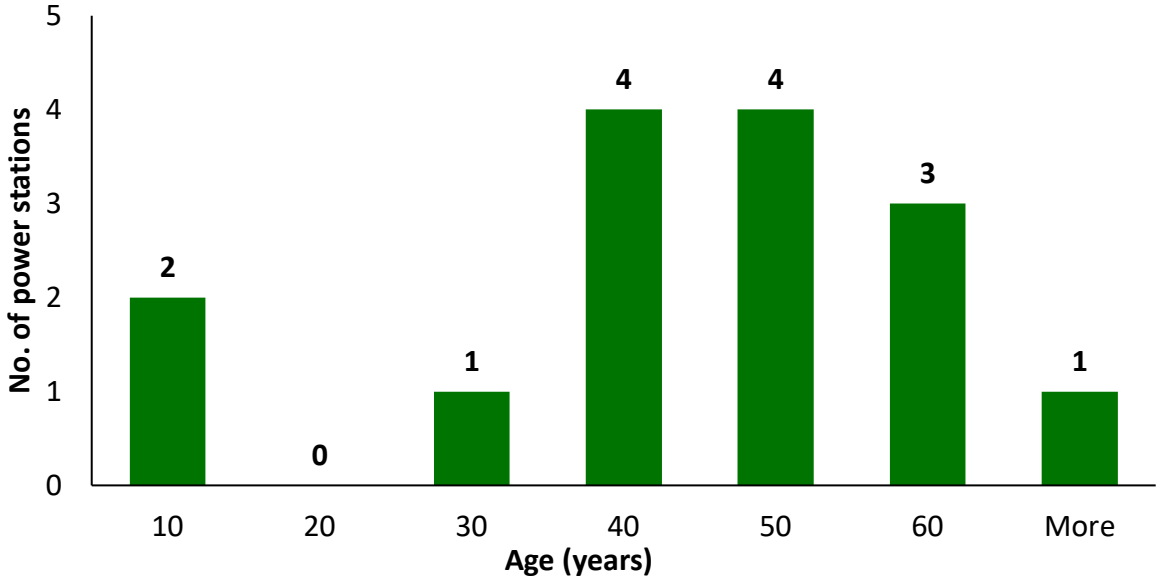
**Table 2: Eskom's major repairs and maintenance projects**

| Unit | Generating capacity (MW) | Reason | Date taken offline | Expected return to service |
|---|---|---|---|---|
| Koeberg 1 | 920 | Refuelling, regular maintenance and replacement of three steam generators | 8 December 2022 | June 2023 |
| Kusile 1 | 720 | Duct failure | 23 October 2022 | To be determined (anticipated to remain offline for months) |
| Kusile 2 | 720 | Precautionary delay due to Unit 1 duct failure | 23 October 2022 | To be determined |
| Kusile 3 | 720 | Precautionary delay due to Unit 1 duct failure | 3 November 2023 | To be determined |
| Kusile 5 | 800 | A fire during commissioning in the gas air heater delayed the commercial operation | 17 September 2022 | July 2023 |
| Medupi 4 | 794 | Generator explosition | 8 August 2023 | August 2024 |

Source: Eskom

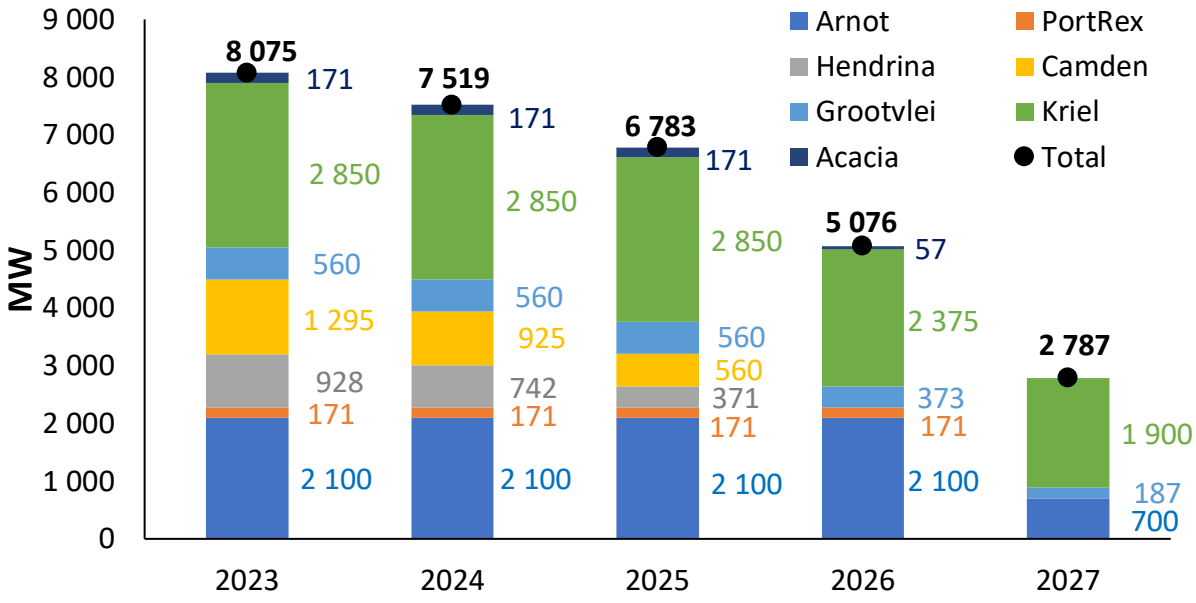
Furthermore, several existing coal-fired power stations are very old (see Figure 6) and will have to be taken offline at the end of their licenced operating lives, in line with the Minimum Emission Standards regulations. In October 2022, the 1 000 MW Komati power station became the first to be completely shut down. Seven other generating units (Arnot, PortRex, Hendrina, Camden, Grootvlei, Kriel and Acacia) are also expected to be gradually taken offline over the next five years. This is expected to reduce Eskom's generation fleet by 5 288 MW between 2023 and 2027 (see Figure 7). This will likely put further strain on Eskom's generation capacity – hence the need for energy reforms to help minimise these constraints.

**Figure 6: Age of Eskom's coal-fired power stations**




Source: Beeld Nuus

**Figure 7: Assumed capacity shutdown**




Source: Eskom

## 8. Energy reforms might bring some reprieve

The best opportunity to ease South Africa's energy constraints is through the implementation of key structural reforms. President Cyril Ramaphosa announced an 'energy action plan' in July 2022 that contains several interventions aimed at tackling the country's current electricity crisis.[10]

While these energy reforms are encouraging, the SARB assumes that they will only begin to have a meaningful impact on energy constraint towards the second half of 2024. There is upside risk to this assumption, as the government also aims to implement structural reforms in other sectors to resolve some of the structural constraints discussed in section 3. Details of these reforms are covered by Operation Vulindlela.[11] Table 3 (in Appendix B) shows some of the progress made in implementing structural reforms. If they are fully and efficiently implemented, these reforms could significantly boost both actual and potential GDP growth, which presents an upside risk to the SARB's forecast. However, it will take some time to undo the damage caused by the structural and productivity impediments described earlier, so the positive impact of these reforms will likely raise (potential) growth slowly.

## 9. The growth multiplier might disappoint

The SARB and other analysts assume that the recently announced energy reforms will lift the energy constraint towards the latter part of 2024. Although the additional investment is likely

[10] Further details regarding the energy action plan announced by the President can be found at https://www.stateofthenation.gov.za/.

[11] For more details on these reforms, see https://www.stateofthenation.gov.za/operation-vulindlela.

to raise overall gross fixed-capital formation, the growth multipliers might be smaller than is generally perceived, for at least two reasons:

1. Solar investment typically has a very high import content. Anecdotal evidence suggests this might be as high as 80% for typical household installations. Consequently, a large part of the investment stimuli will be lost via increased imports.
2. With industry allocating fixed-capital formation to electricity generation in favour of expanding capacity, the longer-term incremental capital output ratio (ICOR) will most probably come under further pressure. Janse van Rensburg, Fowkes and Visser (2019) argue that the marginal unit of capital has become steadily less productive over the post-crisis period, reflected in a rising ICOR from 2010 onwards, consistent with intensifying corruption and wasteful spending. There is a risk that the renewed shift from investing in capacity instead of expanding plant capacity may result in a new round of declining investment efficiency.

## 10. Concluding remarks

Due largely to structural constraints, South Africa's domestic growth has been on a declining trend since it peaked at around 6% prior to the GFC. Such a relentless growth slowdown over a period of more than 10 years (even when excluding the COVID-19 pandemic years) cannot be explained by cyclical factors. The growth slowdown should rather be attributed to supply-side factors. Although investment and capital stock growth have slowed since the GFC, the bulk of the decline in potential growth relates to a host of negative productivity shocks.

Over the last two years, load-shedding (largely caused by unplanned breakdowns at power plants) has had a significant negative impact on productivity – and hence on potential output. In 2022 the country experienced 157 days of load-shedding, its highest annual total to date. The economic cost of load-shedding is severe, as it negatively impacts production and overall confidence in the economy. In fact, the SARB models estimate the impact at between -0.7 and -3.2 percentage points of GDP growth, while other institutions' estimates range between -0.4 and -4.2 percentage points.

Eskom's generation capacity is likely to remain constrained for some time. The risk of rolling power outages will remain high in 2023 and into the early parts of 2024 due to unreliable power capacity, alleged sabotage and other factors. Consequently, prolonged load-shedding will likely continue as Eskom embarks on major repairs, new capital investment and maintenance projects over the next 12 to 18 months. Furthermore, several coal-fired powered stations are very old and will have to be taken offline as they reach the end of their licenced operating lives.

It is therefore essential that the implementation of energy reforms is hastened and that private sector participation and investment is strongly encouraged to avert a further slowdown in actual and potential economic growth.

## Appendix A: Other institutions' methodologies

**Absa** – Absa uses a simple OLS regression of real GDP growth (dependant variable) and electricity available for distribution (explanatory variable), including a dummy variable for the second and third quarters of 2020. This simple equation produces a statistically significant coefficient of 0.16. In other words, a 1% quarterly decline in electricity consumption is associated with a 0.16% quarterly decrease in GDP. From this, Absa estimates that power cuts reduced real GDP growth by 1.3 percentage points in 2022.

**Intellidex** – Intellidex runs a variety of models using Eskom's data, real GDP growth and monthly indicators. Load-shedding is treated like working-day adjustments. This information on the number of working days is found in a range of banking-sector data and anecdotal evidence from clients in different sectors, especially on adaptation and impact. Using this methodology, the impact of load-shedding per stage/per day is estimated at around R125 million on average. For 2022, load-shedding is estimated to have reduced real GDP growth by 0.9 percentage points.

**FNB** – FNB estimates an OLS simple regression using the SARB's Load-Shedding Intensity Index (explanatory variable) and sectoral and aggregate GDP levels. The Load-Shedding Intensity Index coefficient on GDP is estimated to be around -0.01121 (lower than that of SARB Model 1). FNB also assumes that stages 1 and 2 of load-shedding are relatively 'normal' and not problematic for most companies/sectors. On average, load-shedding is expected to shave off around 0.4–0.5 percentage points of 2022 growth (excluding the impact in the first quarter).

**Investec** – To calculate the total cost of energy lost per day across different stages of load-shedding, Investec uses Eskom's value of energy expected to be lost per day for the different stages of load-shedding, as well as the National Energy Regulator of South Africa's (NERSA's) 2020 estimate for the cost of unserved energy.[12] The result suggests that load-shedding is expected to shave off at least 0.9 percentage points of 2022 GDP growth. Investec then assumes that at least 60% to 80% of businesses have backup power (generators), resulting in a lower impact of between 0.2 and 0.4 percentage points.[13]

**PWC –** PWC conducted a literature review[14] of domestic and international approaches to find a link between the cost of unserved energy and the cost of load-shedding. It found that the ratio between planned and unplanned load-shedding is roughly 50%. This ratio is then applied to the last two total-cost estimates from NERSA, which were roughly R87/KWh and R100/KWh. These calculations were based on input-output modelling results and use a 50% ratio to determine a R44–R50/KWh estimate. PWC's results suggest that the impact of load-shedding was between 2.4% and 2.9% of GDP in 2021. Based on an estimate of 4 500 GWh of load-shedding for 2022, PWC estimates the impact for 2022 to be between 3.5% and 4.2% of GDP.

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12 The total cost arising due to an electricity outage for a unit of energy.

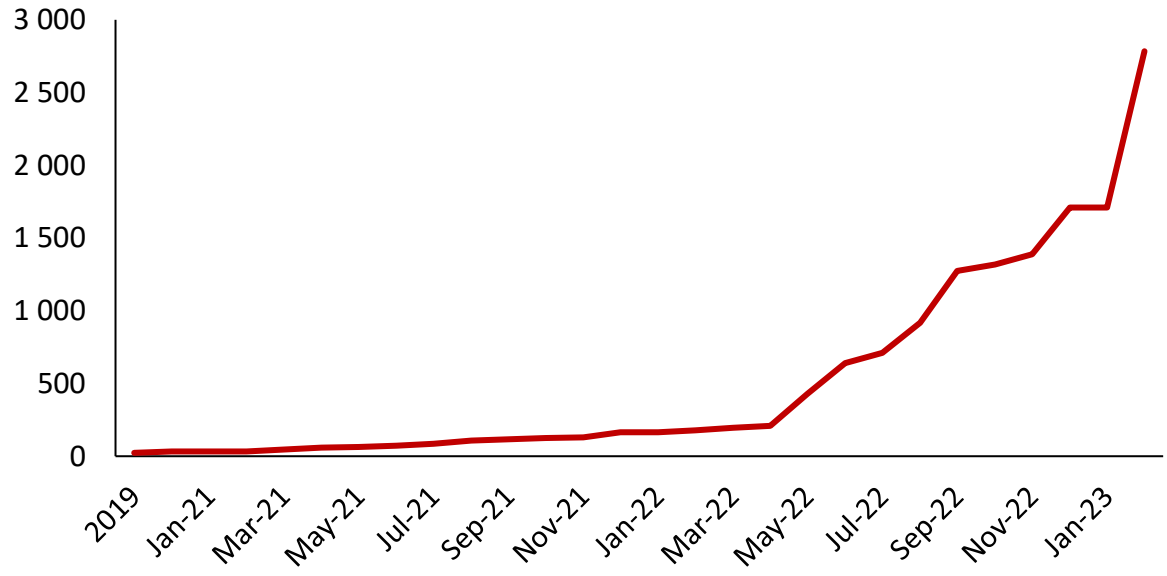
13 Load-shedding was assumed to continue at stage 2 from November and up until 15th December 2022.

14 The main assumption, based on our literature review and experience conducting our own Environmental Impact Assessment modelling, is that the cost of load-shedding is between R44/KWh and R50/KWh.

## Appendix B: Energy reforms

One of the key reforms in this package is the abolition of the licensing threshold for embedded self-generation. This is expected to contribute significantly to alleviating the energy crisis in South Africa. There is already some evidence that more private sector businesses are taking advantage of the removal of the licensing threshold.[15] Data from NERSA indicate that applications for around 2 600 MW worth of self-generation projects were received between January 2022 and February 2023. This is significantly higher than the applications for about 130 MW worth of projects received between 2019 and 2021 (see Figure 8).

**Figure 8: Cumulative applications for self-generation projects**

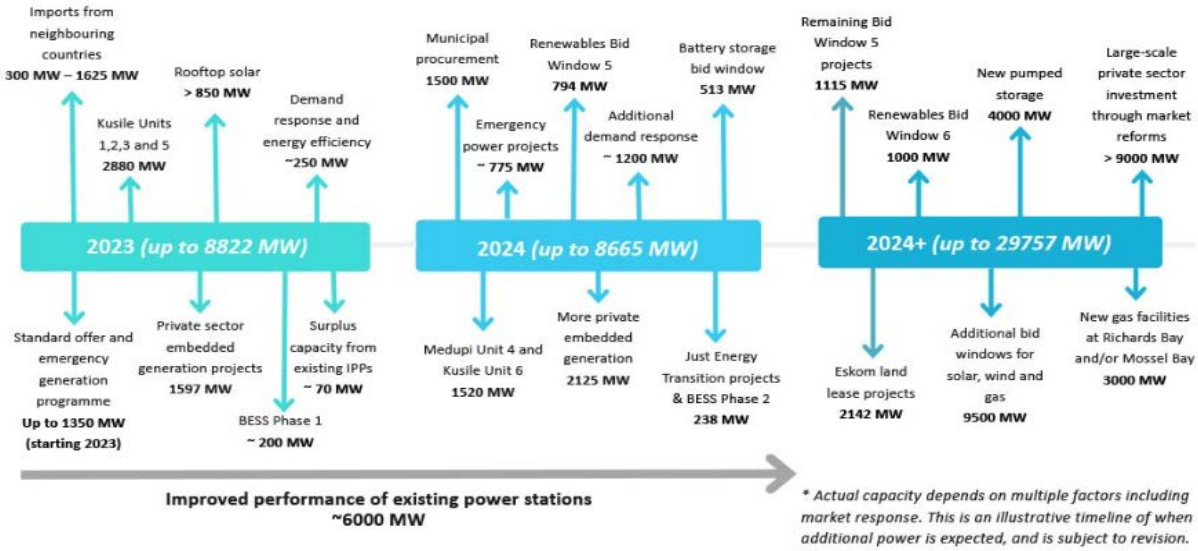



Source: NERSA

Other initiatives to reduce load-shedding include improving Eskom's coal-fleet performance; converting old coal-fired power stations to renewable sources as they reach the end of their life cycle; commissioning units 5 and 6 at Kusile as quickly as possible; the possible import of power from neighbouring countries; and demand-management strategies (see Figure 9). The roadmap to ending load-shedding indicates that 8 822 MW could be added in 2023 from other sources, a further 8 665 MW in 2024 and more than 29 000 MW beyond 2024.

[15] For example, Anglo American partnered with EDF Renewables to form a joint venture called Envusa Energy, with the aim of developing up to 600 MW of renewable power, and the potential to ramp it up to 3–5 GW by 2030. Gold Fields has also indicated that it will be developing its own solar power capacity for its mining operations. As of July 2022, a total of 73 self-generation projects were reported to be planned or under development in the mining sector with a plan to develop up to 5.1 GW of renewables capacity.

## Figure 9: Roadmap to end load-shedding




Source: The presidency and Engineering News

## Table 3: Status of reforms as of 2022Q2

| # | ACTIONS | STATUS |
|---|---|---|
| 1 | Raise licensing threshold for embedded generation | |
| 2 | Implement emergency procurement of 2 000 MW | |
| 3 | Procure new generation capacity in terms of IRP 2019 | |
| 4 | Enable municipalities to procure power from independent power producers | |
| 5 | Restructuring of Eskom | |
| 6 | Improve Energy Availability Factor (EAF) to over 70% | |
| 7 | Address institutional inefficiencies in municipal electricity distribution | |
| 8 | Complete spectrum auction | |
| 9 | Complete migration from analogue to digital signal | |
| 10 | Finalise Rapid Deployment Policy and Policy Direction | |
| 11 | Streamline process for wayleave approvals | |
| 12 | Improve water-use license application process | |
| 13 | Revive the Blue Drop, Green Drop and No Drop water quality monitoring system | |
| 14 | Establish an independent economic regulator for water | |
| 15 | Finalise the revised raw water pricing strategy | |
| 16 | Establish a National Water Resource Infrastructure Agency | |
| 17 | Address institutional inefficiencies in municipal water distribution | |
| 18 | Corporatise the Transnet National Ports Authority (TNPA) | |
| 19 | Improve efficiency of ports | |
| 20 | Establish Transport Economic Regulator through Economic Regulation of Transport Bill | |
| 21 | Finalise the White Paper on National Rail Policy | |
| 22 | Implement third-party access to freight rail network | |
| 23 | Publish revised Critical Skills List | |
| 24 | Review Policy Framework and processes for work visas | |
| 25 | Expand visa waivers and explore visa recognition system | |
| 26 | Implement e-Visa system in fourteen countries, including China, India, Kenya, Nigeria | |

| RAG STATUS | | | |
|---|---|---|---|
| REFORM COMPLETED | CRITICAL CHALLENGES IN IMPLEMENTATION | SOME CHALLENGES OR DELAYS IN IMPLEMENTATION | REFORM ON TRACK OR UNDERWAY |

Source: National Treasury

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# OBEN 2301* – May 2023

# Deglobalisation – trend or temporary shock?

***Josina Solomons***

**Abstract**

Since the 2008–09 global financial crisis (GFC), the rate of growth of global trade has been slowing. Global trade is likely to remain under pressure over the short to medium term, but a broad reversal of globalisation seems less likely. Trade and global value chains could become more resilient through greater diversification of suppliers as well as some degree of reshoring or near-shoring. South Africa has been slow in integrating into global value chains. However, an improved business operating environment, effective industrial policies and the development of stronger regional trade ties could help improve the country's global integration.

## 1. Introduction

Globalisation has provided clear economic benefits, including promoting economic growth and reducing poverty, but it has also exposed the negative effects of income inequality and the lack of job security, particularly in major advanced economies. Although the pace of globalisation has slowed over the last decade, it is still too early to label it as deglobalisation[1]. Global trade is likely to remain under pressure over the short to medium term, but a broad reversal of globalisation seems less likely. More time would be needed to assess whether factors relating to the COVID-19 pandemic and the ongoing war in Ukraine represent a deglobalisation trend rather than a temporary shock.

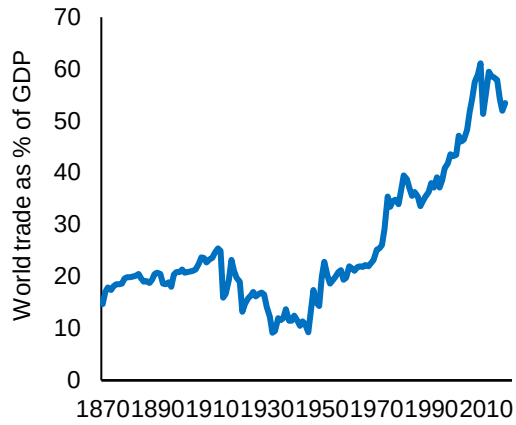
While the concept of globalisation is quite broad, the focus of this economic note is on goods and services. Sections 2, 3 and 4 provide a brief history of globalisation, its benefits, and its drawbacks for the world economy. Section 5 assesses the potential drivers of deglobalisation. Finally, Section 6 provides an outlook for globalisation as well as the implications for South Africa.

[1] Deglobalisation is generally defined as a movement towards a less connected world, where economic agents are increasingly cutting their international ties and beginning to reshore economic activity toward their domestic economies.

## 2. A brief history of globalisation

Over the last few centuries, there have been various waves of globalisation (Figure 1). Since the 2008–09 GFC though, there has been a slowdown in the rate of growth of global trade, exacerbated by events such as the withdrawal of the United Kingdom (UK) from the European Union (Brexit) as well as the United States-China (US-China) trade dispute. The impact of the COVID-19 pandemic disrupted trade even further, while the ongoing war in Russia and Ukraine raised the prospects of continued disruptions to global trade.[2]

**Figure 1: Globalisation over time**

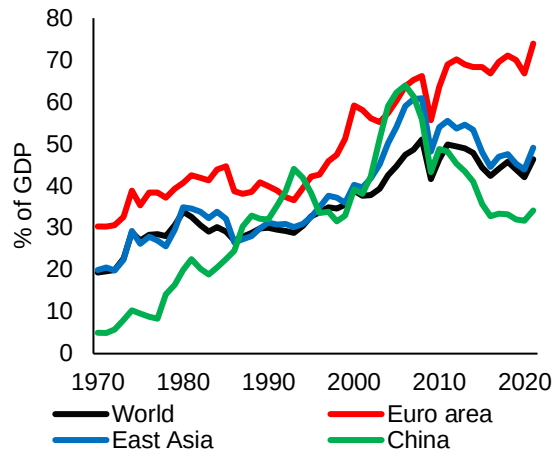



Source: World Bank

Evidence of deglobalisation, however, has been mixed. Global trade as a share of gross domestic product (GDP) appears to have peaked around 2008, due to slowing goods trade. Over the last two years, however, goods trade has gradually rebounded on account of pent-up demand for goods as economies opened after the COVID-19 pandemic (Figure 2). Services trade, on the other hand, continued its solid increase over the past decade (Figure 3). It was really during the pandemic that trade services – especially travel and transport – took a large hit.

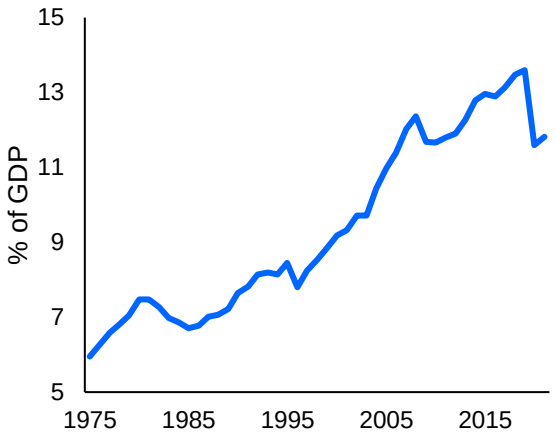
[2] Various other factors have potentially contributed to this slowdown, including the increasing weight of emerging market economies in global economic activity. Martin Wolf argues that globalisation has lost its dynamism due to factors such as slowing global growth, the exhaustion of new markets to exploit and a rise in protectionist policies around the world ('Globalisation has lost its dynamism', *The Irish Times*, October 2016).

**Figure 2: Goods trade as share of GDP**




Source: Haver, World Bank

**Figure 3: Services trade as share of GDP**




Source: Haver, World Bank

## 3. Benefits of globalisation

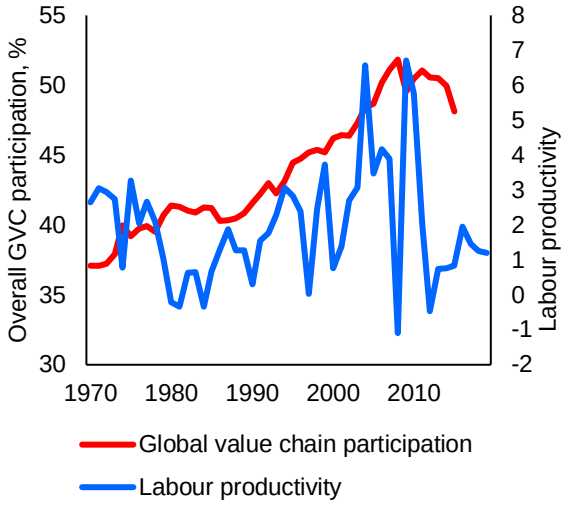
### 3.1 A boost in productivity and living standards

A key feature of globalisation has been the rise of global value chains.[3] The overall share of global value chain trade in total world trade rose sharply between 1980 and 2008. According

[3] This can be described as a process which breaks the production of goods into various stages and locations around the world. A car manufacturer, for instance, may design a car in Japan, produce its parts in the US and have it assembled in Mexico. Global value chains allow some countries, especially relatively small

to the World Bank,[4] a 1% increase in a country's global value chain participation could boost its per capita income by more than 1%. Globalisation has also contributed meaningfully to the rise in global productivity from 1980 to the late-2000s, and consequently to higher living standards. However, the slowing globalisation trend is one of the factors contributing to lower productivity trends over the last two decades.

**Figure 4: Global value chains and productivity***




Note: *Global value chain participation computes the share of global value chain exports in total world exports
Source: World bank, World Penn Tables

## 3.2 Globalisation and the great moderation

Globalisation has been associated with rising economic growth[5] and low inflation (Figures 5 and 6). Reversing globalisation could potentially have negative implications for the world economy. The President of the European Central Bank recently noted that a breakdown in global value chains could push world inflation up by around 5% in the short term and by about 1% in the long term.[6]

Countries that have sharply increased their trade openness, such as China, South Korea and Thailand, have benefitted meaningfully from higher growth in real per capita incomes. Regression estimates on a group of emerging markets have found that trade openness is

emerging market economies, to be part of a complex production process which they would be unable to fully run on their own.

4 World Development Report 2020, 'Trading for development in the age of global value chains', 2020.

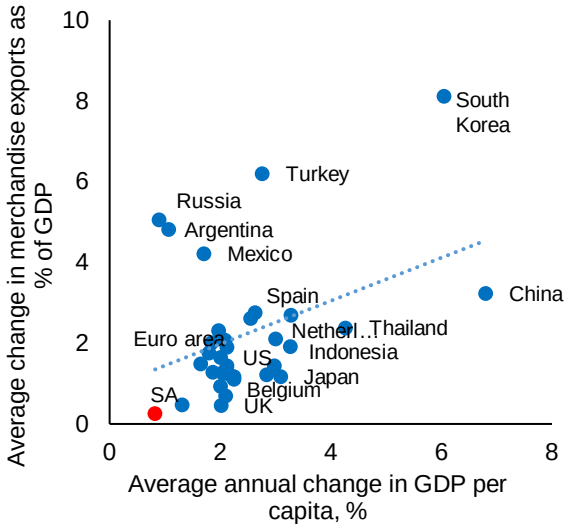
5 Broda and Weinstein find that trade enhances a country's economic growth through the increased product variety that globalisation makes possible (C Broda and D E Weinstein, 'Globalisation and the gains from variety', *The Quarterly Journal of Economics*, May 2006, 541–585).

6 C Lagarde, 'Central banks in a fragmenting world', speech at the Council on Foreign Relations' C. Peter McColough Series on International Economics, New York, 17 April 2023.

generally associated with higher GDP growth.[7] Globalisation is also widely considered to have helped reduce poverty in some emerging market economies.

Meanwhile, the literature suggests that several other factors, including the size of a country's economy and its distance from major markets, are key determinants of the gains from globalisation.[8] South Africa, as a small open economy where export intensity has stagnated over the last few decades, has seen little growth in per capita incomes over the years. South Africa's integration into global value chains has also been slow compared to its emerging market peers and has partly been undermined by a deteriorating economic operating environment, including business infrastructure and logistics services.

**Figure 5: Economic growth and trade**

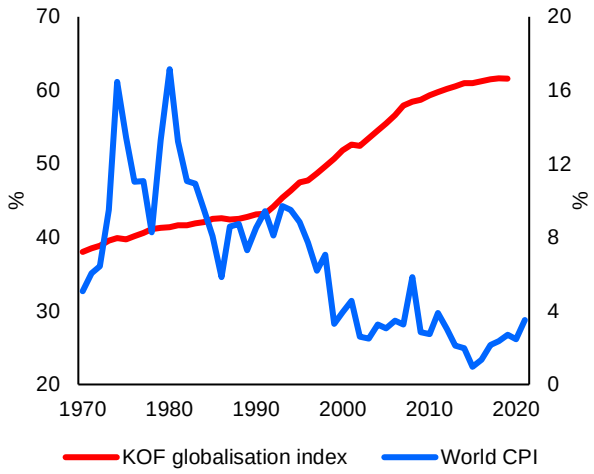



Source: Haver, World Bank

7 A Dreher, 'Does globalisation affect growth? Evidence from a new index of globalisation', *Applied Economics* 38(10), 2006.

8 G Miao, 'South Africa's integration into global value chains: status, risks and challenges', *SARB Working Paper Series*, WP23/01, 2023.

**Figure 6: Globalisation* vs world inflation**




Note: *The KOF globalisation index measures globalisation along the economic, social and political dimensions for countries in the world on a scale of 1 (least) to 100 (most globalised)

Source: SARB

## 4. Drawbacks to globalisation

Despite the many benefits of globalisation, there has been a backlash against it in recent years from several advanced economies as well as criticism from emerging market economies.

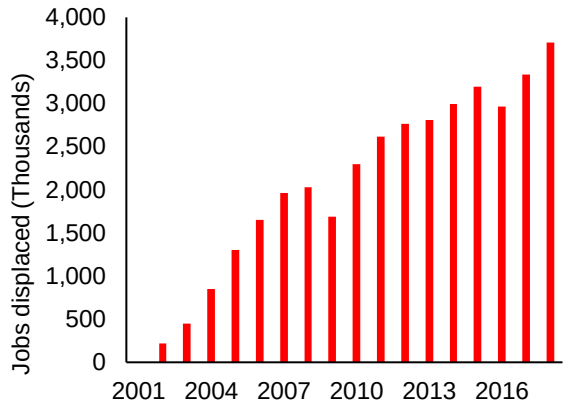
### 4.1 Globalisation and job security

While increased trade openness has been associated with improved living standards, there have also been concerns that some workers lose out from globalisation. A major criticism of globalisation, especially in advanced economies, is that it leads to increased job insecurity.[9] Over the last few decades, many manufacturing companies, especially in major economies, began outsourcing their manufacturing activities to other countries, such as China and India, where costs of manufacturing and wages are lower. This has led to job insecurity and higher unemployment in some advanced economies, as these skills were no longer in demand, resulting in political backlash against globalisation that gave rise to Brexit in the UK and the US-China trade dispute around 2016–17. Between 2001 and 2018, around 3.7 million jobs (of which 2.8 million were in the manufacturing sector) were reportedly lost in the US because of growing trade with China (Figure 7).[10]

9 OECD, *Globalisation, jobs and wages*, policy brief, June 2007.

10 US Bureau of Labor Statistics, and US International Trade Commission Interactive Tariff and Trade DataWeb database. Adapted from R Scott and Z Mokhiber, *Growing China trade deficit cost 3.7 million American jobs between 2001 and 2018*, report, Economic Policy Institute.

**Figure 7: US jobs displaced since 2001**




Source: US Economic Policy Institute

## 4.2 Globalisation and inequality

Another criticism of globalisation is that the benefits are not distributed evenly across and within countries. Various research studies show that globalisation has meaningfully contributed to rising wage inequality in the US.[11] Another study[12] shows that between 1991 and 2007 lower-wage manufacturing workers experienced large and lasting earnings losses, while higher-wage workers in the same industries did not.[13]

The elephant curve highlights the distributional consequences of globalisation.[14] The curve illustrates how a large group of people (referred to as the elephant's body), mostly located in China and other emerging markets, experienced strong real income gains between 1988 and 2008, while the working class in advanced economies (the lower part of the trunk) made almost no real income gains during the period and the lowest income groups (the tail of the elephant) did not experience any gains. Instead, large real-income gains were concentrated in the highest percentile of the global income distribution, which represents those who operated and owned the global value chains and thus benefitted through higher salaries and/or higher capital income. This phenomenon seems to explain the growing disappointment of the working class in many advanced economies over the last decade.

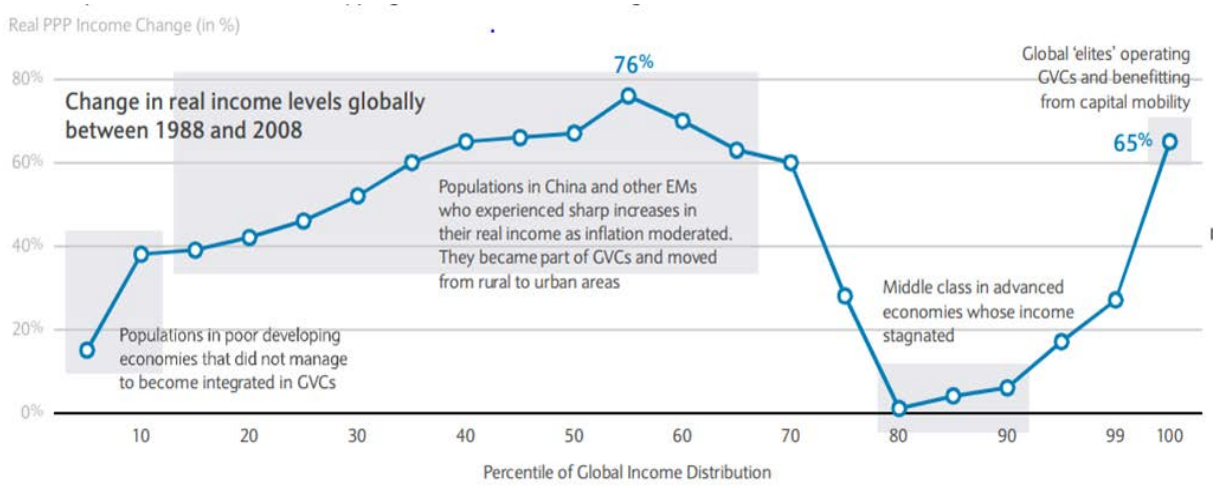
11 One explanation for rising inequality in the US is that technological advancements are reducing the demand for certain low- and middle-income workers and increasing the demand for high-skilled workers.

12 D Autor, D Dorn and G Hanson. 'The China shock: learning from labour market adjustments to large changes in trade', National Bureau of Economic Research (NBER) working paper no. 21906, 2016.

13 M Kolb, 'What is globalisation? And how has the global economy shaped the US', Peterson Institute for International Economics, 2018.

14 C Lakner and B Milanovic, 'Global income distribution: from the fall of the Berlin Wall to the great recession', Policy Research Working Paper Series 6719, The World Bank, 2013.

**Figure 8: The elephant curve**




Source: Branko Milanovic (2012).

## 4.3 Globalisation and the environment

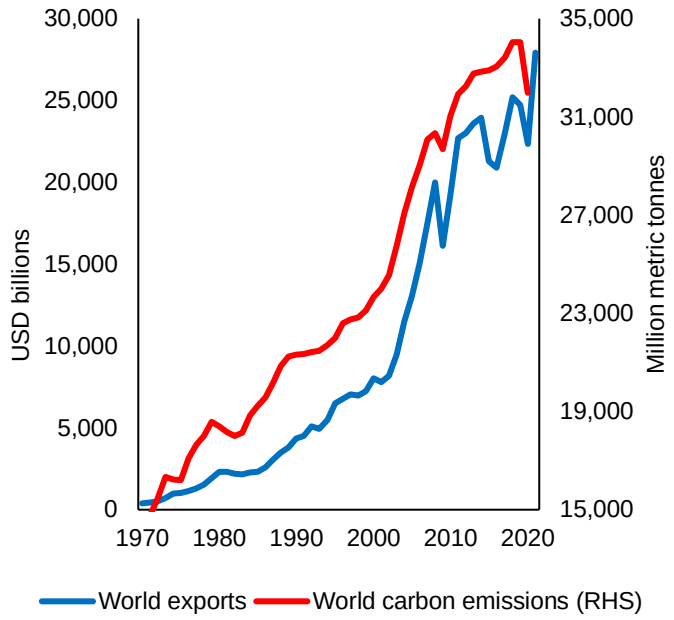
Globalisation has coincided with some challenging environmental trends. An increase in the share of energy-intensive manufacturing sectors has brought with it greater environmental risks, such as increased emissions of greenhouse gases. Sectors such as energy and transportation are estimated to account for about 75% of global greenhouse gas emissions.[15] There is also a tight link between trade openness and carbon dioxide emissions[16] (Figure 9). According to the World Trade Organization, the world's largest emitters of greenhouse gases are typically large economies,[17] such as China, the US, India and Russia.

15 World Trade Organization, 'The carbon content of international trade', *Trade and climate change*, Information brief no. 4.

16 Q Wang and F Zhang, 'The effects of trade openness on decoupling carbon emissions from economic growth – Evidence from 182 countries', *Journal of Cleaner Production* 279, 2021.

17 World Trade Organization, 'The carbon content of international trade', *Trade and climate change*, Information brief no. 4.

**Figure 9: Trade openness vs global carbon emissions**




Source: World Bank, Bloomberg

## 5. Potential drivers of the slowdown in globalisation

Some argue that the globalisation period of 1980 to 2008 was simply unsustainable and that a period of deglobalisation is inevitable.[18] Over the short to medium term, global trade is likely to remain under pressure from lasting consequences related to the COVID-19 pandemic as well as the Russia-Ukraine war. There is also a real risk that geopolitical tensions, such as a 'Cold War' type of situation between the US and China and other powers, could bring about a process of deglobalisation.

### 5.1 Decoupling from global value chains or reshoring

In recent years, there has been a broad slowdown in the expansion of global value chains.[19] While many factors may have contributed to the retreat in global value chains in recent years, there are others that could mitigate a major decline in trade over the short term. For instance, with global value chains generally taking a long time to develop, it is unlikely that factors such as investment and the availability of skilled labour could be repositioned over a short period of time. A recent study[20] found that no country can benefit from decoupling from global value chains. A 2021 World Bank report[21] warned against widespread reshoring, stating that this

18 P Antras, 'Deglobalisation? Global value chains in the post-Covid-19 age', NBER working paper no. w28115, November 2020.

19 Several factors have contributed to this decline, including the fact that many supply chains have potentially reached their optimal lengths and complexity levels. The decline in global economic growth, especially investment, is also believed to have further contributed to this downtrend. Moreover, trade conflicts between the US and major trading partners have resulted in many protectionist policies that have further slowed global value chains.

20 P Eppinger, G Felbermayr, O Krebs and B Kukharsky, 'Decoupling global value chains', CES ifo working paper no. 9079, May 2021.

21 P Brenton, M Ferrantina and M Maliszewska, *Reshaping global value chains in light of Covid-19 – Implications for trade and poverty reduction in developing countries*, World Bank report, 2022.

could reduce trade and increase poverty in low and middle-income countries; the report also notes that shorter global value chains are not necessarily less vulnerable to shocks.

## 6. The outlook for globalisation

Over the last two decades, the benefits of globalisation accrued at a much slower pace than before, while discontentment intensified about its drawbacks (e.g., inequality and job insecurity). The COVID-19 pandemic and the ongoing war in Ukraine further highlighted the vulnerabilities of many global value chains to shocks. It is still too early to conclude whether these factors represent a deglobalisation trend rather than a cyclical decline.

While trade and global value chains declined sharply in recent years, the global economy remains integrated and global trade has not collapsed. Globalisation could look very different a decade from now, but a complete reversal of it seems unlikely as there is still broad awareness that large-scale reshoring is in some cases not feasible or would entail significant welfare losses. Trade and global value chains could also become more resilient through greater diversification of suppliers as well as some degree of reshoring or near-shoring.

A further rise in protectionism and a breakdown of multilateralism as was experienced in the period between the two world wars is also less likely. Most major economies have not experienced the scale of disruption (such as the massive numbers of deaths during World War I and the destruction of savings during Germany's Great Inflation period of the early 1920s) experienced by the populations that lived during the inter-war years.

### 6.1 Implications for South Africa

Over the last two decades, South Africa has been slow in integrating into global value chains. The automotive industry, for instance, has lagged its emerging market peers despite receiving substantial government funding.[22] Factors such as distance from key markets and relatively high labour costs as well as rigid labour markets have made it difficult for South Africa to compete with its peers. The lack of structural reforms has also been a key impediment to the country's competitiveness. Additional structural constraints, such as electricity shortages, have further weighed on the country's attractiveness.

Trade policies that welcome foreign direct investment remain key for South Africa's successful integration into global value chains. The literature suggests that the country's business operating environment needs to be improved to help make existing industrial policies more effective.[23] South Africa could also leverage its large platinum resources to develop linkages in several global value chains.[24] Furthermore, South Africa's proximity to other resource-rich countries in sub-Saharan Africa could help open important opportunities for regional integration as well as for industrial and technological innovation. Research[25] shows that since

22 G Miao, 'South Africa's integration into global value chains: status, risks and challenges', *SARB Working Paper Series*, WP23/01, 2023.

23 A Andreoni, P Mondiwa, S Roberts and F Tregenna, *Structural transformation in South Africa – The challenges of inclusive industrial development in a middle-income country* (Oxford University Press, 2021).

24 ibid.

25 P Mitchell, 'Covid-19: how mining companies can build more resilient supply chains', EY Global Mining & Metals, 11 May 2020.

the COVID-19 pandemic, global mining companies have actively been exploring broader sources of supply to help manage supply chain risks. This could open opportunities for South African mining companies, provided the right industrial policies are put in place.