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

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

Abstract

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

1. Introduction

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

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

2. The changing fiscal dynamics

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

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

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

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

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

Figure 1: Expenditure and Revenue

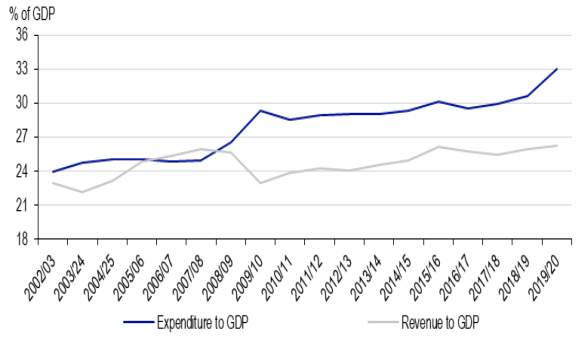


Figure 2: Risk premium (EMBI+)

3. Literature review

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

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

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

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

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

4. Methodology

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

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

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

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

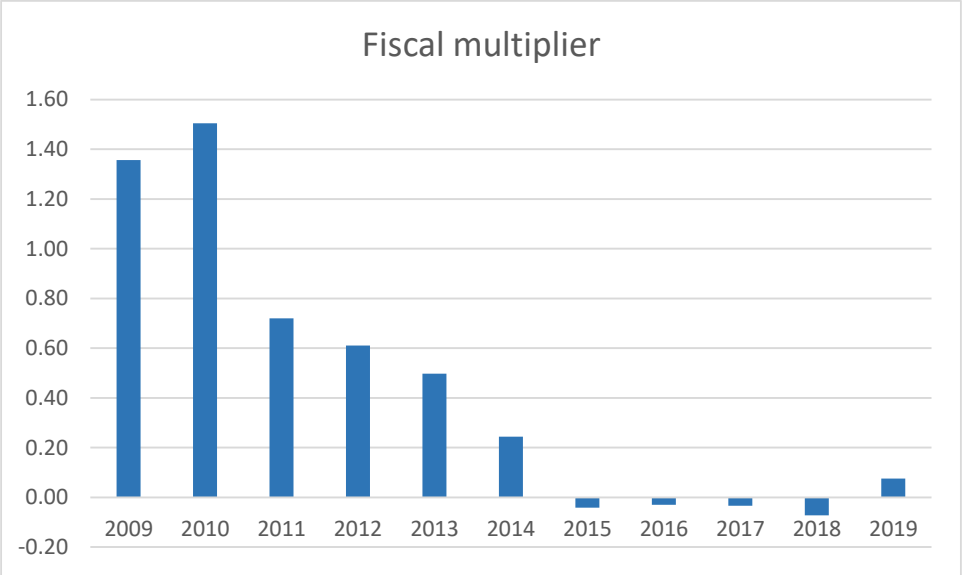
5. Results

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

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

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

Figure 3: The fiscal multiplier over the last decade



Source: Author's own calculation

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

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

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

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

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

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

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

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

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

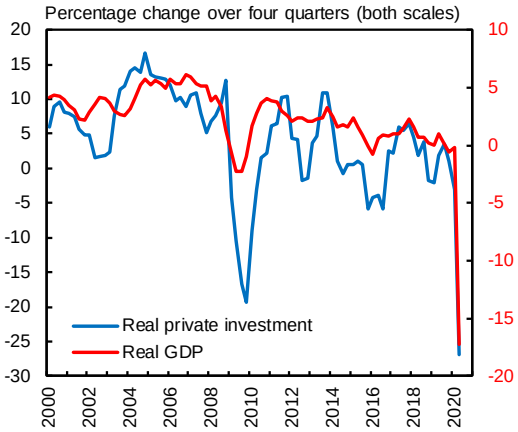
the estimates in our framework. The large multipliers in the initial period would be larger but the small and negative multiplier would also be more negative as the financial sector amplifies them.

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

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

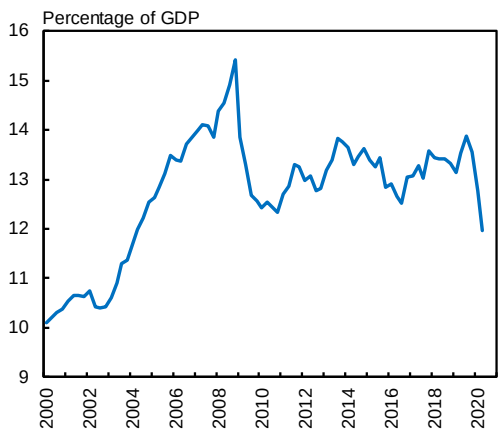
Figure 4: Key drivers of underlying conditions

A: Real GDP and real private investment



Sources: Stats SA and SARB

B: Real private investment

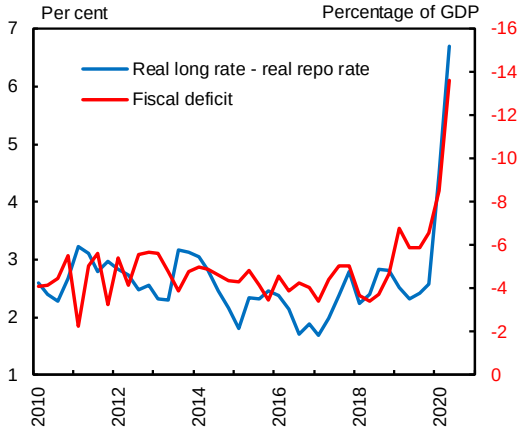


Sources: Stats SA and SARB

C: Import leakage

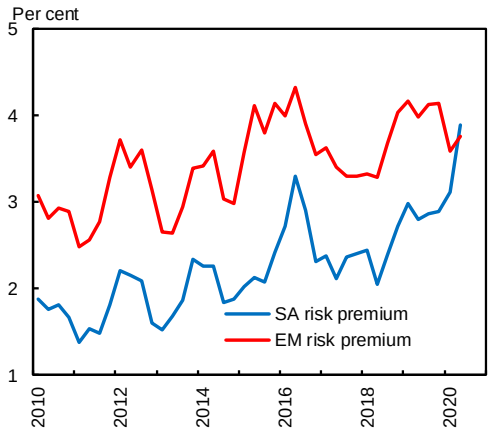
Sources: Stats SA and SARB

D: Term premium versus fiscal deficit (saar)



Sources: NationalTreasury and SARB

E: RSA risk premium and EM risk premium



Sources: Bloomberg, JPMorgan and SARB

6. Concluding remarks

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

Annexure A: Literature review

Table 1: South African literature on Fiscal multipliers

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

Annexure B: Brief non-technical overview of the model

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Annexure C: Model equations

Equation 1: Real private fixed investment

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

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

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

Equation 2: Real government long term interest rate

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

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

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

Equation 3: SA risk premium

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

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

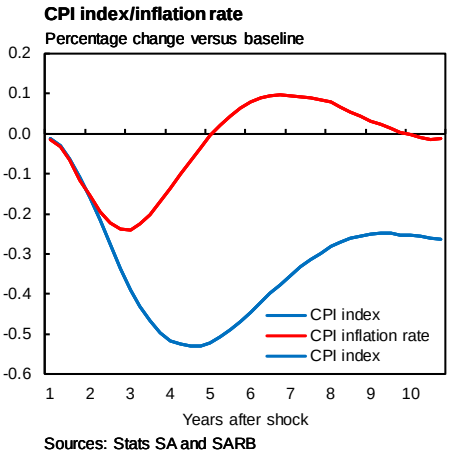
R-squared	0.887337	Mean dependent var	0.007242
Adjusted R-squared	0.876434	S.D. dependent var	0.590534
S.E. of regression	0.207584	Akaike info criterion	-0.210638
Sum squared resid	2.671642	Schwarz criterion	0.016011
Log likelihood	14.26700	Hannan-Quinn criter.	-0.120719
F-statistic	81.38587	Durbin-Watson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

MNEMONICS:

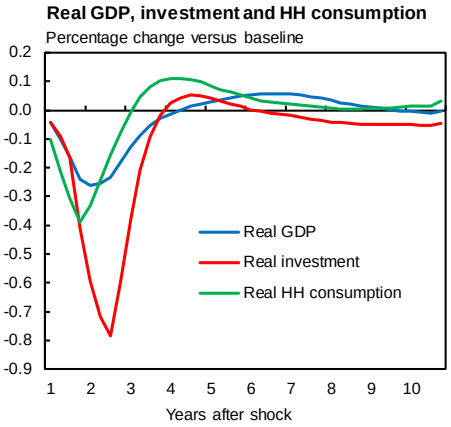
DUM09Q1	=	Dummy 2009q1=1, 0 otherwise
DUM09Q2	=	Dummy 2009q2=1, 0 otherwise
DUM15Q4	=	Dummy 2015q4=1, 0 otherwise
DUM19Q1	=	Dummy 2019q1=1, 0 otherwise
EMBI	=	Emerging markets risk premium
FGOVLR	=	Real long bond rate
FREPOR	=	Real Repo rate
IP1	=	Real private investment
REXD1	=	Real bilateral R/US$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

Annexure D: Model responses

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

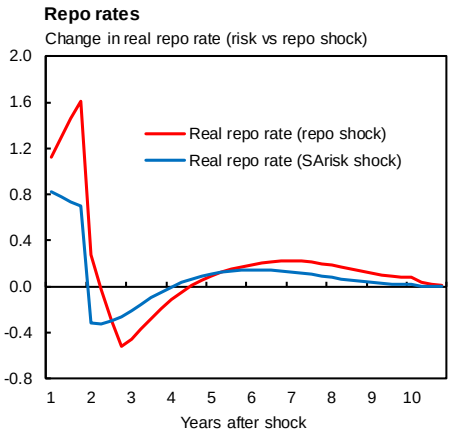


Sources: Stats SA and SARB

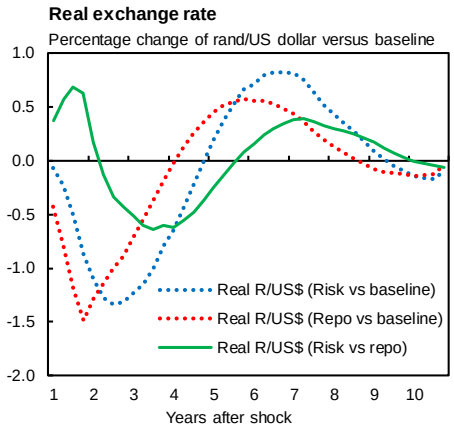


Sources: Stats SA and SARB

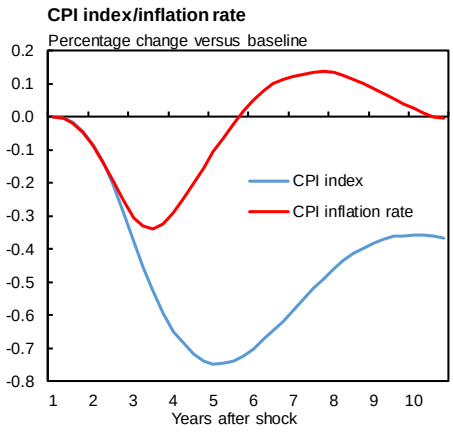
B) Model response to 4-quarter real SA risk shock



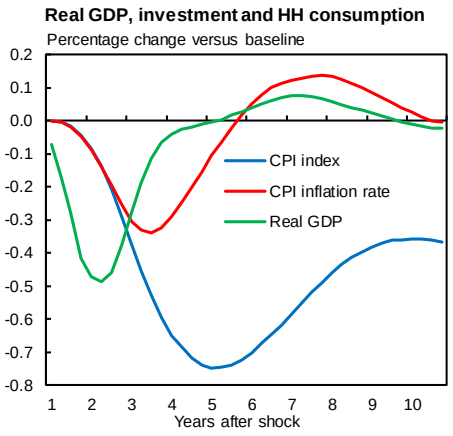
Source: SARB



Source: SARB



Sources: Stats SA and SARB



Sources: Stats SA and SARB

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