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Article

The Effect of Risk Rating Agencies Decisions on Economic Growth and Investment in a Developing Country: The Case of South Africa

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Abstract: Over the last decade, the South African economy has endured prevailing economic challenges, including weak economic growth, unreliable electricity supply, rising fiscal deficits, declining investment inflows and the inexorable rise in government debt alongside the expected impact of the coronavirus pandemic. Credit ratings have significantly evolved, making them key elements in the modern financial markets because of their creditworthiness opinions, as many investors across the globe rely heavily on their opinions. A quantitative research approach was followed using data from 1994Q1 to 2020Q2. The analysis entailed a descriptive and econometric analysis where two models were estimated using the autoregressive distributed lag (ARDL) model. The findings reveal long-run relationships between economic growth (GDP), risk rating index, foreign direct investment (FDI), exchange rate, gross fixed capital formation and lending rates. The results also reveal a bi-directional causality between economic growth and the rating index and between FDI and the rating index. This study's findings suggest that investments and economic growth in the country need to be stimulated significantly to impact risk rating agencies decisions. Policymakers need to redirect resources towards effective and efficient capital-forming initiatives and development projects to improve the country's sovereign risk rating to re-ignite growth.

Keywords: autoregressive distributed lag; economic growth; foreign direct investment; sovereign risk rating; South Africa



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1. Introduction

Investments are crucial for any economy's socio-economic transformation, whether its foreign, or domestic in nature (Asongu et al. 2018). Studies have shown that an average growth rate of 7% or above in the medium to long term is needed in order for Africa to make a significant impact on economic development and poverty alleviation. Therefore, this will require an investment rate of at least 25% of GDP or above over a sustained period (Economic Report on Africa ECA; Clarke 2013 as cited by UNCTAD 2014).

An essential component in financial monitoring that acts as a source of information for investment decisions is the provision of sovereign credit ratings (SCR). SCR refers to assessing a governments ability and willingness to services its debt on time and in full (Bissoondoyal-Bheenick 2005). Therefore, a rating is defined as: "the alpha-numerical results announced by the credit rating agencies in terms of long-term foreign currency" (Yildiz and Gunsoy 2017). Over the last decade, the SCR assigned to emerging markets and developing countries has taken different paths. Unlike many of its developing counterparts, South Africa has since struggled to maintain its sovereign ratings above non-investment grade since the 2007/2008 global financial crisis. The downgrade pattern has since continued, and as in 2018, Fitch and Standard & Poor confirmed that South Africa

had been rated as “junk investment” status whilst Moody’s changed the country’s outlook from negative to stable (Investec 2019). The outlook provided by Moody’s was short lived, as Moody’s downgraded the country into sub-investment grade in March 2020 (Moody’s Investor Service 2020).

Along with the unstable economic growth conditions in South Africa, Stats SA (2020) recorded the third consecutive quarterly decline of 2.0% in GDP, followed by FDI, which has also taken a turn for the worst with a 15% decline in 2019 (Phakathi 2020). The declining FDI flows into South Africa has not made reviving economic growth in the country any easier. Following Moody’s sovereign rating downgrade, South Africa has lost its investment-grade rating from the three globally recognized risk rating agencies (Smith 2020). Research on SCR mainly focuses on its impact on financial markets, such as Ntswane (2014) study. Other studies such as those of Chen et al. (2016) focus on SCR models used by Fitch, Moody’s and Standard & Poor to identify the fundamental determinants of sovereign ratings. As such, because the literature has identified the determinants used by of risk rating agencies, the question is: how do changes in the risk rating of a country affect macroeconomic variables such as economic growth and investment? The premise of this paper is thus to investigate the impact of risk rating agencies decisions on economic growth and investment in South Africa.

In this paper, we argue that, even though numerous studies have identified the determinants of risk rating agencies, in other words, what causes risk rating agencies to change their risk rating for a country, only a hand full of studies have investigated how these changes (risk ratings adjustments) affects economic growth and investment. This paper, therefore, bridges the gap in the literature by identifying how changes in risk ratings affects economic growth and investment. In essence, this paper will investigate how the credit rating issued by the top three rating agencies affects economic growth and investment in a developing country such as South Africa.

2. Literature Review

To set up international portfolios for investors, several requirements need to be met, and credit ratings are amongst the most vital requirements (Fatnassi et al. 2014). If a country is downgraded and rated below investment grade, many institutional investors must hold investment-grade securities. Studies have shown that most foreign investors are likely to withdraw funds if a country does not have an investment-grade rating (Mugobo and Mutize 2016). The literature also points out that, although various factors have underlining effects on the economy, more recent studies have come to acknowledge the significance and impact of sovereign credit ratings.

Turning towards various macroeconomic indicators identified in the literature as determinants of sovereign credit ratings, theoretically, the link between sovereign credit rating decisions and the economic and financial outcome is not always linear (Hanusch et al. 2016). Be that as it may, credit rating downgrades are linked to real economic variables such as investments and growth (Hanusch et al. 2016). Credit ratings are also vital for stimulating investments and promoting economic growth (Boumparis et al. 2017). The literature also asserts the importance of avoiding sovereign credit downgrades as this, at an economic level, is essential to achieve growth (Hanusch et al. 2016). The importance of FDI is highlighted in the literature where FDI represents international business activities incorporating a transfer of technology and know-how, a movement of capital, thus contributing to employment, trade and competitiveness, which could promote economic growth and development (Derado 2013). Compared to domestic investment, FDI is also vital for its increasing contribution towards economic growth (Borensztein et al. 1998). Many developing countries, likewise, prioritize it because domestic capital accumulation remains too low to stimulate economic growth (Farole and Winkler 2014). The augments provided by the neoclassical and endogenous growth models indicate that FDI, directly and indirectly, contributes towards economic growth (Mugowo 2017).

Furthermore, the literature has also shown that the relationship between economic growth and FDI is not always straight forward, since the development level and income level of a country seems to also have a significant impact on the host countries' response towards attracting FDI. The literature further postulates that there seems to be a threshold for a country's income level, which has proven to be important, since country's who surpass this threshold have seen a positive impact of FDI on growth, whilst country's with an income level below the threshold experience a negative relationship between FDI and growth (Wan 2010). Furthermore, Sunde (2016) further asserts that the outcomes and contributions of FDI are somewhat not straightforward because the effect of FDI depends on the FDI absorption ability of the host country and how this links with the host country's policies. Be that as it may, investors prefer rated securities compared to unrated securities. Thus, having a sovereign credit rating is vital for attracting foreign investments. Simultaneously, the relationship between SCR and lending rates is somewhat intricate due to asymmetric information and transparency problems, as developing countries are affected more by credit rating changes (Kaminsky and Schmukler 2002). One significant advantage of financial institutions is that they provide access to international capital markets for economic participants who cannot access these markets themselves. A subject of debate proves to be the role of SCR in the international financial system. Gennaioli et al. (2014) argue that, because developed countries are associated with a significant reliance on banks for loans from the private sector, heavy credit rights protection and a more significant government holding by banks transfer a sovereign risk over to affect the lending supply of banks.

The impact through which SCR can affect banks is through the lending channel via a country's monetary policy. This describes the banks' ability to provide credit and, most importantly, also indicates at what cost. The exchange rate channel, asset price channel, interest rate channel and the credit channel are four channels identified in the literature (Mishkin 1995). Through the interest rate channel, access to funding and the banks' ability to provide loans is restricted due to a reduction in deposits (Bernanke and Blinder 1988). During periods of economic distress, the value of a bank's collateral will decrease due to the exchange rate channel. This could cause borrowers to require more compensation, and should this condition not be met, lending will be reduced (Meeuwissen 2014), implying higher leading costs. The literature also reiterates that banks tend to increase their prices during times of economic distress and reduce the number of loans (Bofondi et al. 2013).

Since credit rating agencies assess the risk of a sovereign's default, currency depreciation imposes a heavy burden on sovereign debt repayment, leading to an increased risk of default by the sovereign. Rating agencies reveal new information to financial markets, which supports the idea that there is a relationship between credit ratings and market returns (Ozturk 2012). The literature further asserts that significant negative returns on the stock and bond markets are associated with credit rating downgrades. However, the impact of a credit upgrade on the stock and bond market is rarely noticeable (Ozturk 2012). As such, Mutize and Nkhalamba (2020) in their investigation of the impact of long term foreign currency credit rating changes on a 30-year bond yield in South Africa, further reiterates that, bond yields rise significantly before, during and after a sovereign rating downgrade as well as when a negative outlook is established. Be that as it may, their study also found no association between bond yields, positive economic outlook and credit rating upgrades.

The debate about the relationship between sovereign credit ratings and the exchange rate remains somewhat ambiguous. On the one hand, the literature suggests that rating agencies can generate short term fluctuations and currency depreciation occurs first, then a sovereign credit downgrade follows (El-Shagi 2010). On the other hand, foreign currency is associated with negative excess returns after a rating downgrade, whilst a rating upgrade has shown no significant excess return (Brooks et al. 2004).

The literature has also shown that sovereign credit announcement affects the exchange rate volatility (Yang and Zhang 2011). A few empirical studies have been conducted

to investigate the link between sovereign credit ratings and macroeconomic variables. One of the earlier studies that focused on sovereign ratings and their determinants is the study by [Cantor and Packer \(1996\)](#), where a sample of 49 countries for the year 1995 was used. The study also considered eight economic variables as determinants of sovereign credit ratings. Their results revealed that external debt, default history, GDP, per capita income, inflation, and economic development level all significantly impact sovereign credit ratings. Following the study of Cantor and Packer, numerous studies such as the studies of [Bissoondoyal-Bheenick \(2005\)](#); [Bayar and Kilic \(2014\)](#); [Asongu et al. \(2018\)](#); [Derado \(2013\)](#); [Mellios and Paget-Blanc \(2006\)](#) have identified other variables such as growth rate, level of development, openness to trade, foreign exchange effects, labor costs, return on investment and infrastructure, FDI inflows, size of the banking sector, government indicators and political risk as determinants of sovereign credit ratings. [Aras and Öztürk \(2018\)](#) also found a positive and significant relationship between inflation rate, external debt and sovereign credit ratings in Turkey, whilst [Slabbert et al. \(2019\)](#) investigated the importance of sovereign credit ratings in relation to government debt of developing countries, and further highlighted the importance and relevance of sovereign credit ratings in determining the cost of government debt for developing nations.

The theoretical position of the significance of sovereign credit ratings was examined in various studies, such as [Chen et al. \(2016\)](#), who investigated the relationship between sovereign credit rating revisions and economic growth from 1982–2012. Their findings reveal that a one-notch credit rating upgrade leads to an average increase of a 0.6% annual growth rate through the interest rate and capital flow channels that changes in a country's credit rating could affect economic growth. [Dudian and Popa \(2012\)](#) analyzed the relationship between sovereign credit ratings and GDP for Central and Eastern European countries between 1996–2010. Their results revealed a negative relationship between sovereign credit rating and GDP. Contrary to these results, [Aras and Öztürk \(2018\)](#) used a panel regression from 2002–2014 to investigate the determinants of sovereign ratings in Turkey and EU countries. Their results reveal that foreign trade balance negatively affects a sovereign's credit rating, while the economic growth rate positively affects a sovereign credit rating.

[Brooks et al. \(2004\)](#) investigated the national market impact of sovereign rating changes. They found that a credit rating downgrade negatively affects the domestic stock market and the dollar value of the country's currency. Similar findings were also found by [Alsakka and Gwilym \(2013\)](#), who investigated the ratings agencies' signals during the European sovereign debt crisis. Their study revealed that ratings agencies' signals impact the country's exchange rate and have also identified strong spillover effects on other countries' exchange rates within the region.

The literature further contends that an economy cannot function efficiently and effectively without vital components such as financial institutions. This is because banks serve as an intermediary between borrowers and lenders, and as a result, there is a link to sovereign ratings through the credit and interest rate channels. [Mensah et al. \(2017\)](#) investigated sovereign credit ratings and bank funding costs in Africa and revealed a statistically significant inverse relationship between sovereign rating upgrades and bank funding costs. Their results further highlight that it becomes easier and cheaper for banks to access funds from the capital and global markets during a period of sovereign credit upgrades compared to rating downgrades. Moreover, [Adelino and Ferreira \(2016\)](#) investigated bank ratings and lending supply with evidence from sovereign downgrades. They concluded that sovereign downgrades bring about a reduction in loan amounts from banks and lead to higher loan spread increases.

Additionally, [Luitel and Vanpée \(2018\)](#) examined the importance of having a sovereign credit rating for a country's financial development. Their study revealed that credit ratings attract foreign investors, both FDI as well as portfolio investments. The study further concluded that SCR's play a vital role in enabling financial development in a country. The impact of Sovereign credit ratings on FDI in South Africa was investigated by [Mugobo and Mutize \(2016\)](#). Their results revealed a significant relationship between

FDI and sovereign credit rating downgrades. Furthermore, their study also revealed that not all downgrades affect investor decisions, as Moody's SCR's tend to dominate, causing FDI to have a more extensive reaction than other rating agencies. [Walch and Worz \(2012\)](#) found a non-linear effect of credit ratings, indicating that rating upgrades had a more significant positive impact on FDI inflows. This effect is reduced when the risk level is more significant. [Ozturk \(2012\)](#) used 61 developing countries to analyze the relationship between FDI inflows and the private sector's external finance. The study found that having an investment-grade rating brought about an increase in FDI inflows. Meanwhile, the study of [Bayar and Kilic \(2014\)](#) observed a positive relationship between FDI inflows and sovereign credit ratings, following a two-way causality between sovereign credit ratings and issued by Moody's and FDI inflows in Turkey from 2005–2013.

In conclusion, there is no conclusive empirical evidence from the literature review that shows the relationship and direction of causality between sovereign credit rating decisions and economic variables. Therefore, this study bridges the literature gap by providing a developing country perspective for South Africa through, firstly, the provision of two econometric models where economic growth and FDI inflows are be used interchangeably as dependent variables. Secondly, this study also considered other economic variables identified as determinants of sovereign credit ratings within the literature. The development of two econometric models assists in findings based on both FDI and economic growth models in terms of how they are affected by sovereign credit ratings. This will assist with specific policy recommendations, especially considering the country's recent loss of investment-grade by the top three rating agencies. Thirdly, this study provides a current perspective of how sovereign credit ratings affect investment and economic growth from a developing country's perspective.

3. Materials and Methods

The paper utilizes a quantitative research methodology to determine the impact of risk rating agency decisions on economic growth and investment using quarterly time-series data from 1994Q1 to 2020Q2. The selection of the econometric model was based on the stationarity of variables included in the study. The long and short-run time series analysis options were between the Johansen cointegration model and the autoregressive distributed lag (ARDL) model. The stationarity or unit root tests results indicated a mixture of the level of stationarity at levels (I-0) and first difference (I-1).

Therefore, the ARDL method was selected as the most appropriate in this case. The ARDL model was developed by [Pesaran et al. \(2001\)](#). Table 1 provides a summary of the variables included in the study. The analysis entailed the descriptive and econometric time series analysis. Specifically, an autoregressive distributed lag (ARDL) model was employed to determine the long and short-run impacts of sovereign credit ratings on investments and economic growth in South Africa.

The consistency in the results drove the choice of this estimation model it produces while at the same time allowing the use of data regardless of its stationarity (I(0), I(1) or a combination. In addition, a Granger causality test was employed to determine causality between the selected variables. The study estimated an econometric model using sovereign credit ratings from Standard & Poor, Fitch and Moody's.

A risk rating index was developed, including equally weighted values from 1994 to 2020 from the three risk rating agencies. The data was then transformed into numerical scores, where the sovereign rating grades are from the highest risk rating of AAA to the lowest rating of D. Numerical values were assigned on a linear scale for each of the rating grades from 20 for AAA to 0 for D. Secondary data used in the study were collected from the [South African Reserve Bank \(2020\)](#) and [World Government Bonds \(2020\)](#) from 1994 to exclude the period of apartheid from the South African economic environment. All variables were converted to natural logarithms to ensure the data are interpreted on the same scale and to minimise the possibility of any variance existing within the dataset.

Table 1. Summary of variables included in the study.

Variable	Abbreviation Used in the Equations (Log Format of a Variable in Brackets)	Role of the Variable and Anticipated Impact
GDP at constant prices	GDP (LGDP)	The dependent variable for Equation (1) and independent variable in Equation (2). It should have a positive relationship with the risk rating index and on FDI.
FDI inflows	FDI (LFDI)	The dependent variable for Equation (2) and independent variable in Equation (1). Should have a positive relationship with the risk rating index and on GDP.
Risk rating index	RRIND (LRRIND)	Independent variable for both equations and a higher index should have a positive impact on other variables.
Gross fixed capital formation	GFCF (LGFCF)	Independent variable for both equations and a higher index should have a positive impact on other variables.
Lending rate	LDRATE (LLDRATE)	Independent variable for both equations and higher rates should have a negative impact on other variables.
Nominal exchange rate	NERATE (LNERATE)	Independent variable for both equations and an increasing or appreciating index should positively impact other variables.

Source: [South African Reserve Bank \(2020\)](#) and [World Government Bonds \(2020\)](#).

The following ARDL model equations are estimated:

Equation (1):

$$LGDP_t = a_0 + \alpha_1 LGDP_{t-1} + \alpha_2 LagLFDI_{t-1} + \alpha_3 LagLRRIND_{t-1} + \alpha_4 LagLGFCF_{t-1} + \alpha_5 LLDRATE_{t-1} + \alpha_6 LagLNERATE_{t-1} \tag{1}$$

Equation (2):

$$L LFDI_t = a_0 + \alpha_1 LFDI_{t-1} + \alpha_2 LagLGDP_{t-1} + \alpha_3 LagLRRIND_{t-1} + \alpha_4 LagLGFCF_{t-1} + \alpha_5 LLDRATE_{t-1} + \alpha_6 LagLNERATE_{t-1} \tag{2}$$

where $LGDP_t$ represents the change in natural logarithm value of total GDP_t at time t ; $LFDI_t$ denotes a change in the natural logarithm value of FDI_t inflows at time t ; $LRRIND_t$ denotes a change in the natural logarithm value of risk rating index at time t , $LGFCF_t$ is the logarithm value of the gross fixed capital formation at time t , $LLDRATE_t$ is the logarithm value of the lending rate at time t ; and $LNERATE_t$ denotes a change in the natural logarithm value of the nominal exchange rate at a time t . The a_0 denotes the intercept, and n represents the optimum number of lags. The parameters α_i , $i = 1, 2, 3, 4, 5$ indicate the long-run multipliers. The following steps were included in the econometric model:

Unit roots test used the augmented Dickey–Fuller (ADF), correlation analysis, bound-test for cointegration, estimation of error correction model, diagnostic tests and Granger causality test. An ARDL equation was constructed to perform the bound F test in the process of testing for the possibility of cointegration property between variables. In the bound-test process, the computed F-statistic value is assessed against both the lower and upper bounds’ critical values. If the F-statistic is below the lower bound, it is an indication that there is no cointegration. Similarly, the cointegration property is rejected when the computed F-statistic exceeds the upper bound. Whereas inconclusive is said to occur when computed F-statistic falls between the lower and upper bounds. When the cointegration property is not supported, a short-run version of the ARDL only is estimated. If the bounds-test indicates cointegration between variables, an error correction model (ECM) is estimated and includes both short and long-run dynamics. It captures the degree to which

short-run shocks are corrected to equilibrium (Dağdeviren et al. 2012). The error correction term's coefficient has to be negative and with a significant p -value, indicating convergence to equilibrium and cointegration relationship between variables. Granger causality tests were implemented to determine causality between all of the variables included in the two equations. Lastly, model diagnostic checks were done by testing for robustness through employing two diagnostics tests of the residuals namely Breush–Godfrey, Breusch–Pagan–Godfrey test for autocorrelation and heteroskedasticity respectively.

4. Results and Discussion

4.1. Descriptive Analysis

Table 2 summarises the descriptive statistics for all the variables included in the econometric equations indicating components such as the mean, median, maximum etc., per variable. All of the variables were collected quarterly from 1994 to 2019, with a total of 106 observations. Only the three main variables, namely GDP, FDI and the risk rating index, are explained. The mean for GDP over the period was R 2 469 billion at constant prices with a maximum of R 3 162 billion. FDI had a mean of R 8.1 billion and a maximum quarterly value of R 52.7 billion. Lastly, the risk ratings index had a mean of 12.4 and a maximum value of 14.4 (out of 20) and a minimum of 9.66.

Table 2. Descriptive data.

	GDP	FDI	GFCF	Risk Rating Index	Lending Rate	Nominal Effective Exchange Rate
Mean	2469	8.142	448.3	12.40	6.21	173.1
Median	2595	4.661	496.1	12.42	5.75	158.4
Maximum	3162	52.70	645.1	14.33	16.70	431.0
Minimum	1623	−13.91	209.1	9.66	2.20	79.2
Std. Dev.	516	11.560	150.1	1.31	2.86	75.1
Skewness	−0.141	1.496	−0.167	−0.07	1.25	1.05
Kurtosis	1.512	6.029	1.333	1.54	4.59	3.63
Jarque-Bera Probability	10.13	80.112	12.761	9.52	39.18	21.38
	0.006	0.000	0.001	0.008	0.001	0.000

Figure 1 consists of six graphs indicating trends of the variables included in the analysis. GDP at constant prices shows the impact of the financial crises in 2008/2009 and the low growth period after the crises up to the end of 2019. In addition, also important is the massive impact on GDP of COVID-19; the results are that GDP in Q2 of 2020 is lower than the GDP in pre and post the financial crises. The same trends are evident from the GFCF graph, where domestic investment never recovered after the financial crises in 2008/2009. Levels of investment are also currently lower than before the financial crises. Regarding FDI, the inflows have been volatile over the period with a maximum inflow in 2001 in Q2. The rating risk index shows an inverted U-shape. The index peaked in 2007 Q4 with an index of 14.2 and reached a low point of 9.7 in 2002 Q2. The lending rate (interest rate) started volatile at the beginning of the study period up to 1998 when the lending rate peaked at 16.7%, but has since then stabilised at much lower rates and are currently at below 5%. In terms of the nominal effective exchange rate, the South African Rand has depreciated over the entire period from a high point of 431 in 1994 to a low point of 82 in 2020.

4.2. Correlation Coefficients Analysis

Table 3 summarises the correlation coefficients for all the relationships between the variables included in the study. The two dependent variables, firstly GDP, have significant and positive correlations with all the independent variables except for a negative relationship with the lending rate and the exchange rate. GFCF has the highest coefficient with GDP followed by the exchange rate. The same relationships are recorded with FDI

as the dependent variable, with all other variables having significant p -values with the lending rate having the highest coefficient. When analysing the relationships between the risk rating index and all other variables, it interesting to note that all relationships are statistically significant and positive except for lending rate and exchange rate.

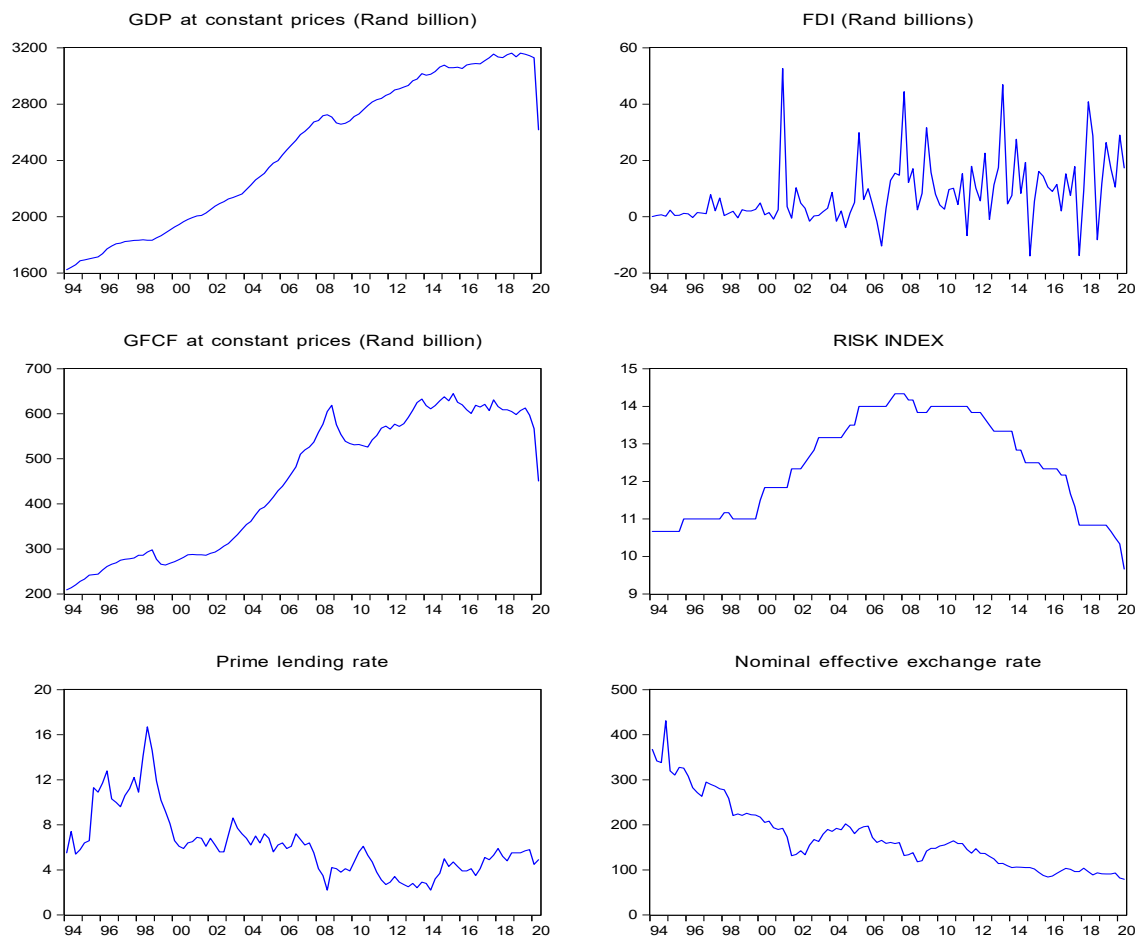


Figure 1. Trend analysis.

Table 3. Correlation coefficients analysis.

Probability	GDP	FDI	GFCF	RRINDEX	LDRATE	NERATE
GDP	1.0000 —					
FDI	0.2204 (0.0232) *	1.0000 —				
GFCF	0.9851 (0.0000) *	0.2230 (0.0216) *	1.0000 —			
RRINDEX	0.4055 (0.0000) *	0.1290 (0.1872)	0.4740 (0.0000) *	1.0000 —		
LDRATE	−0.7454 (0.0000) *	−0.2874 (0.0028) *	−0.7409 (0.0000) *	−0.4998 (0.0000) *	1.0000 —	
NERATE	−0.9141 (0.0000) *	−0.2200 (0.0234) *	−0.8671 (0.0000) *	−0.2283 (0.0185) *	0.6542 (0.0000) *	1.0000 —

Note: * indicates significance at 5% level, p -values are indicated in brackets.

4.3. Graphical Representation of Correlation Coefficients

Figure 2 shows the correlation coefficients between the two dependent variables and the risk ratings index. Both relationships are significant and positive, with coefficients of 0.41 and 0.13 for GDP and FDI, respectively. The relationship between the risk rating index and GDP is relatively more substantial than that of FDI and the risk ratings index.

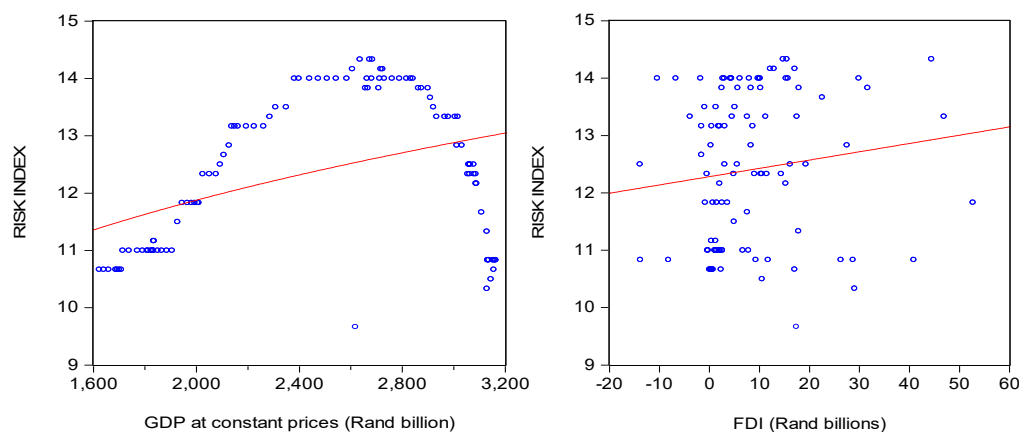


Figure 2. Graphical correlation coefficients.

4.4. Unit Root Test

Table 4 provides a summary of the unit root tests results. The test results indicate that all variables are stationary at I(1) or 1st difference except for the variable FDI. The unit root test results are essential for the selection of the specific econometric model. The ARDL cointegration model could be used when variables are mixed or even if all variables have the same stationarity level. The ARDL model was therefore selected due to the mixed nature of the set of variables. Consequently, a long-run relationship between the variables ought to be assessed.

Table 4. ADF unit root type (*p*-values).

Variable	ADF Level	ADF 1st Difference	Integration Order Result
LGDP	0.6347	0.0009 *	I(1)
LFDI	0.0002 *	—	I(0)
LRRIND	0.9710	0.0059 *	I(1)
LGFCF	0.4618	0.0079 *	I(1)
LLDRATE	0.3111	0.0032 *	I(1)

Note: * indicates significance at 5% level.

4.5. Bounds Tests

The Akaike information criteria (AIC) was used to select the best ARDL model with the optimal number of lags. The best models that were selected via the AIC test for both models were: Equation (1): 1, 1, 0, 2, 0, 0 and Equation (2): 3, 2, 4, 1, 1, 0. The ARDL bounds test was subsequently determined to test the possibility of a long-run relationship between the variables. Table 5 is a summary of the bounds test results for both equations. Within this test, the F-statistic values are required to exceed both the lower and upper bound values. The null hypothesis of this test is that there is no long-run relationship between the different variables. The result of the test is that a long-run relationship exists between the variables.

Table 5. ARDL bounds test.

Equation (1) Results		
Test Statistic	Value	K
F-statistic	4.0820	5
Critical Value Bounds		
Significance	I(0) Lower Bound	I(1) Upper Bound
10%	2.16	3.25
5%	2.73	3.65
2.5%	2.85	4.09
1%	3.23	4.83
Equation (2) Results		
Test Statistic	Value	K
F-statistic	11.6080	5
Critical Value Bounds		
Significance	I(0) Lower Bound	I(1) Upper Bound
10%	2.45	3.76
5%	2.89	3.89
2.5%	2.99	4.34
1%	3.56	4.98
Significance	I(0) Lower Bound	I(1) Upper Bound

4.6. Long Run Results

From the ARDL estimation, the following long-run equation has been formulated for the two equations:

$$LGDP = 4.7422 + 0.0094 * LFDI + 0.1010 * LRRIND + 0.5938 * LGFCF + 0.0167 * LLDRATE - 0.0630 * LNERATE \quad (3)$$

Equation (3) indicates the coefficients of the long-run relationship between the variables included in Equation (1). All of the independent variables positively impact the dependent variable except for LNERATE, namely LGDP. A negative relationship between exchange rates and GDP especially in developing countries—like South Africa—is caused by the fact that a rise in exchange rates makes production inputs more expensive since the input structure of production relies heavily on capital and intermediate goods which are in most cases imported goods, as such, this negatively affects economic growth (Karahana 2020). The independent variables with the highest coefficient with LGDP are LGFCF with a coefficient of 0.59, meaning that a 1% increase in LGFCF could lead to an 0.59% increase GDP. In addition, the independent variables of LFDI, LLDRATE and LNERATE have the following coefficients in relation to LGDP of 0.01%, 0.02%, and 0.06%, respectively. In terms of the long-run impact of LRRIND, the relationship is positive, indicating that an increase in risk rating index has a positive impact on the country's GDP. A 1% increase in the risk rating index could boost GDP by 0.1%. An increase in the risk rating index means that the three main risk rating agencies included in this study, have a more positive sovereign risk outlook for the country. Similar results were estimated by Boumparis et al. (2017), where risk ratings have been vital for economic growth and investment. Mugowo (2017) found that FDI also is an essential factor for economic growth. Chen et al. (2016) found that a one-notch upgrade in the risk rating could increase GDP of 0.6%. However, other studies also found economic growth leading to improved risk ratings (Aras and Öztürk 2018).

$$LFDI = 9.5193 + 1.4320 * LGDP + 0.7010 * LRRIND + 1.1101 * LGFCF + 0.4215 * LLDRATE + 0.1031 * LNERATE \quad (4)$$

Equation (4) indicates the coefficients of the long-run relationship between the variables included in Equation (2). All of the independent variables have a positive impact on the dependent variable, namely LFDI. The independent variables with the highest coefficient in relation to LFDI are LGDP with a coefficient of 1.43, meaning that a 1% increase in LGDP could lead to a 1.43% increase in LFDI. In addition, the independent variables of LGFCF, LLDRATE and LNERATE have the following coefficients in relation to FDI of 1.1%, 0.42%, and 0.1%, respectively. In terms of the long-run impact of LRRIND, the relationship is positive, indicating that an increase in risk rating index has a positive impact on the FDI of the country. A 1% increase in the risk rating index could boost FDI by 0.7%. Similar results were estimated by [Luitel and Vanpée \(2018\)](#).

4.7. ECM and Short Run Results

Table 6 is a presentation of ECM and short-run analyses. The existence of cointegration amongst the variables allows for the ECM estimation to calculate the speed of adjustment for long-run equilibrium. The ECM results and the cointegration equation confirm the long-run relationships for both equations via the existence of a negative coefficient and a significant *p*-value as required. Both models as a whole reverts to equilibrium in the long-run over a period of 11.3 periods for Equation (1) and 2.8 periods for Equation (2). For Equation (1), only LRRIND and LGFCF have significant and positive short-run impacts on LGDP, with coefficients of 0.3 and 0.47, respectively. These results are similar to the results obtained by the study of [Aras and Öztürk \(2018\)](#) who found a positive relationship between GDP and credit ratings and the results of [Ncanywa and Makhenyane \(2016\)](#) who found a positive relationship between gross fixed capital formation and GDP. The other variables do not have a significant impact on the short-run. Similar results were also found by [Njangang et al. \(2018\)](#) who also observed no significant relationship between GDP and FDI in African countries in the short run, however their study found that FDI does have a significant relationship on GDP in the long run. As such, this could be caused by the fact that, in many developing countries which are characterised by high unemployment, inequality and poverty like South Africa, the benefits of foreign investment are only visible in the long run and not in the short run due to things such as time lags, skills shortages, immobility of resources, etc. Furthermore, this indicates that FDI alone is not enough to sufficiently enhance economic growth in the short run, however, combined with other variables, it's possible for FDI to significantly continue to economic growth in the long run. In Equation (2), again, the only two independent variables that significantly impact LFDI are LGFCF with a negative coefficient of 5.2 and LLDRATE with a coefficient of 1.3. These results are similar to those found by [Belloumi and Alshehry \(2018\)](#) who found a negative relationship between FDI and gross fixed capital formation, and those of [Emmanuel et al. \(2019\)](#) who found a negative relationship between lending rates and FDI.

Table 6. ECM and short-run analysis.

Dependent Variable: LGDP (Equation (1))				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LRRIND)	0.2999	0.0876	3.4219	0.0009 *
D(LFDI)	0.0008	0.0020	0.4156	0.6786
D(LGFCF)	0.4669	0.0436	10.7065	0.0000 *
D(LLDRATE)	0.0014	0.0042	0.3439	0.7316
D(LNERATE)	−0.0055	0.0084	−0.6620	0.5096
CointEq(−1)	−0.0886	0.0445	−1.9873	0.0498 *
Dependent Variable: LFDI (Equation (2))				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LGDP)	1.3732	4.8333	0.2841	0.7770
D(LRRIND)	0.3037	6.8745	0.0441	0.9649
D(LGFCF)	−5.2155	2.9497	−1.9681	0.0406 *
D(LLDRATE)	1.2918	0.3581	3.6073	0.0005 *
D(LNERATE)	0.1609	0.4508	0.3569	0.7220
CointEq(−1)	−0.3603	0.1913	−8.1555	0.0000 *

Note: * indicates a significance level at 5%.

4.8. Granger Causality

The Granger causality results are listed in Table 7. The causality tests provided additional short-run results. Several interesting causal relationships exist between the variables, which indicates the strong inter-relationships between the variables as selected. Firstly, a focus on the dependent variable, LGDP. LGDP causes changes in LFDI, LGFCF and also LLDRATE. This shows that when there is an improvement in a country's economic growth, this attracts foreign and domestic investment and improves the country's interest rates which ultimately has an impact on the transmission mechanism of the country. These results are similar to those of [Sarker and Khan \(2020\)](#) who found a unidirectional causal relationship between GDP and FDI, followed by [Pasara and Garidzirai \(2020\)](#) who found a unidirectional causal relationship between GDP and LGFCG. In comparison, a bi-directional causality exists between LGDP and LRRIND. This is because economic growth can stimulate positive credit ratings, whilst on the other hand, positive risk ratings can stimulate economic growth through attracting more investments into the country. Other significant causality results are: a bi-directional causality was found between LGFCF and LRRIND; while both LLDRATE and LNERATE causes changes in the LRRIND. Furthermore, the results also show that LFDI significantly causes changes in LRRIND and this is because when there is a significant amount of FDI inflow in the country, these funds could be used to improve the general economy of the country, and as such, this could stimulate positive risk ratings. On the other hand, the Granger causality test further shows that LRRIND does not cause changes in LFDI on the short-run, but only on the long-run. This could be due to the long-term nature of FDI flows.

Table 7. Granger causality test.

Null Hypothesis	Prob.	Outcome
LFDI does not Granger cause LGDP LGDP does not Granger cause LFDI	0.6008 0.0079 *	Uni-directional causality
LGFCF does not Granger cause LGDP LGDP does not Granger cause LGFCF	0.2999 0.0461 *	Uni-directional causality
LRRIND does not Granger cause LGDP LGDP does not Granger cause LRRIND	0.0738 ** 0.0007 *	Bi-directional causality
LLDRATE does not Granger cause LGDP LGDP does not Granger cause LLDRATE	0.6150 0.0866 **	Uni-directional causality
LNERATE does not Granger cause LGDP LGDP does not Granger cause LNERATE	0.3963 0.2716	No causality
LGFCF does not Granger cause LFDI LFDI does not Granger cause LGFCF	0.1204 0.6029	No causality
LRRIND does not Granger cause LFDI LFDI does not Granger cause LRRIND	0.8010 0.0169 *	Uni-directional causality
LRRIND does not Granger cause LGFCF LGFCF does not Granger cause LRRIND	0.0125 * 0.0003 *	Bi-directional causality
LLDRATE does not Granger cause LRRIND LRRIND does not Granger cause LLDRATE	0.0842 ** 0.2323	Uni-directional causality
LNERATE does not Granger cause LRRIND LRRIND does not Granger cause LNERATE	0.0163 * 0.3853	Uni-directional causality

Note: * indicates the rejection of the null hypothesis at 5% level of significance; ** indicates the rejection of the null hypothesis at 10% level of significance.

4.9. Diagnostics

Diagnostic and stability tests are designed to authenticate the accuracy of the results the model produces. The tests consist of the normality test, serial correlation, the Breusch–Pagan–Godfrey heteroscedasticity test, which was intended to decipher whether variables are homoscedastic or heteroscedastic, as listed in Table 8. The results indicate that it can be concluded that both models are stable.

Table 8. Diagnostics and stability tests.

Test	Prob.	Result	Prob.	Result
		Model 1		Model 2
Normality test	0.2521	Normal distribution	0.1286	Normal distribution
Heteroskedasticity test: Breusch–Pagan–Godfrey	0.3821	No heteroskedasticity	0.1130	No heteroskedasticity
Serial correlation LM test: Breusch–Godfrey	0.8984	No serial correlation	0.3804	No serial correlation
Normality test	0.2521	Normal distribution	0.1286	Normal distribution
Heteroskedasticity test: Breusch–Pagan–Godfrey	0.3821	No heteroskedasticity	0.1130	No heteroskedasticity

5. Conclusions

From the literature, empirical analysis and the econometric results obtained in this study, a clear relationship has been identified between sovereign credit ratings decisions and investment, and economic growth in South Africa. The critical results as estimated, are that decreasing risk ratings (down grades) by the risk rating agencies, negatively impact economic growth and both domestic investment and FDI. This study’s findings present implications on economic policy in general and other policy spheres such as the monetary

policy of South Africa. For example ensuring policy certainty, including stable prices and the currency. South Africa has experienced a decade of low growth and this situation coupled with poor governance has resulted a rapid increase in government debt with a debt a GDP ratio of close to 80%. Low economic growth and rising government debt are two key factors for risk ratings agencies and after a decade of these conditions, it was no surprise that the sovereign risk rating was adjusted to sub-investment levels. This led to an outflow of capital from the country and domestic firms held back investments due to policy uncertainty. Government needs to clear all policy uncertainty as a matter of urgency and this will encourage domestic firms specifically to invest in the economy. The econometric analysis indicated that fixed gross capital formation is a key driver of economic growth. Accelerated economic growth would then assist government to collect more taxes and this could lead to a turn-around in the debt situation. The results also found that domestic investment could encourage an increase in FDI. The improving economic situation and government debt environment would allow risk ratings agencies to adjust the risk level of the country upwards. Economic growth and investment need to be stimulated to revive its government debt position and return its credit ratings to investment grade. However, the challenge is thinking of other ways to attract investment and grow the South African economy amidst the loss of investment grade and frail economic conditions. The uni-directional causality between economic growth, FDI, and sovereign credit ratings proves that the government needs to direct its resources towards effective and efficient capital forming initiatives to attract investors, stimulate growth, and put the country back to investment-grade rating.

Finding more productive ways to deal with growth and investment inflow challenges will help contribute towards improving the economic conditions prevalent in the country and thus lead to better sovereign ratings. By achieving investment-grade ratings, will increase investment inflows into South Africa, thus putting the government in a position where its economic conditions will improve. Key strategies need to be developed and directed towards various investment and development projects and incentives, both domestically and internationally, to improve the country's sovereign credit rating. More in-depth follow-up studies on this important research topic are planned. Such studies on this topic will include more in-depth analysis of developing countries in Africa, Asia and South America including the BRICS countries. Comparisons and best practice analysis will be estimated. As part of these analysis, a determination will also be done for countries that have been down-graded and what strategies could be used to regain investment grade. Future analysis will also include alternative variables such as government debt and other country risk indexes. Limitations of this study include the relatively short periods of data sets since the 1990s, the lack of large numbers of previous research studies on sovereign risk rating agencies decisions and its link to economic growth and investments. This lack of previous studies on this topic indicates the gap in the research that this paper attempts to cover. Furthermore, another limitation of the study includes the availability of sovereign risk ratings prior to 1994.

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