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Institutional and Economic determinants of sovereign debt ratings: A South African case

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by

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Abstract

The objective of this study is to find out which economic and institutional determinants are important for South African sovereign debt ratings agencies – S&P, Fitch and Mood's. In order to do this, the full sample period from 1995Q1 to 2017 Q1 is divided into three epochs: (a) 1995Q1 to 1999Q4, (b) 2000Q1 to 2007Q4 and (c) 2008Q1 to 2017Q1. The underlying phenomenon for this segmentation is the first democratic elections in South Africa (S.A) in 1994, the Dot com bubble of 2000 to 2001 and the financial crisis of 2008. The General-to-specific identification strategy is employed in order to filter redundant variables and retain those with explanatory power. Then, economic and institutional indices are created using the Principal Component Analysis (PCA) method. Empirical results are then obtained by regressing ordered probit models using the maximum likelihood method of estimation. The main findings of this study are twofold. Firstly, the variable External debts/ exports is important in all three epochs. Secondly, institutional variables such as political rights and the corruption perception index are found to be significant for assigning ratings. Therefore, policy implications are that: (a) policy makers should look to implement corporate and labour laws that allow exporting firms to thrive during economic upturns and hedge against downswings so as to improve tax buoyancy and (b) institutions which are "watch dogs" should be solidified to promote transparency because lenders take into account a country's political stance before supplying capital. The reason is that, a political turmoil can negatively affect a country's ability to service debt while corruption affects both the ability and willingness to repay sovereign debt. Therefore, S.A policy makers should consider these policy implications so as to achieve its developmental and financial objectives.

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1. Introduction

Different South African stakeholders regard sovereign debt ratings important for various reasons. The main reason is that one print – a ratings symbol – summarises the social, institutional, political, financial and economic conditions of a country. From a financial point of view, prudence is vital while social cohesion in its own right is important. Among other important issues, sovereign credit ratings are an indication of the likelihood that a particular sovereign will default on its foreign debt obligations (Cantor and Packer, 1996:38). According to Bissoondoyal-Bheenick (2005:252) "sovereign ratings are an assessment of each government's ability and willingness to service its debts in full and on time". The political, financial, social and economic stance of a country can be signalled by sovereign ratings (Erdem and Varli, 2014:43). In addition, sovereign ratings can be an indicator of the financial system's openness and level of development (Butler and Fauver, 2006:53). Sovereign ratings are instrumental in attracting foreign investment and capital inflows (Erdem and Varli, 2014:42). Peter and Grandes (2005) assert that the increased participation of South Africa in the global economy has increased the demand for sovereign debt ratings.

Three major ratings agencies are; Standard and Poor's (S&P), Moody's and Fitch. These ratings agencies issue letter ratings. Each letter rating has a meaning. For example, when S&P and Fitch issue letters in between AAA and BBB- and Moody's (Aaa and Baa3), it means that the country's foreign denominated debt is investment grade (S&P, 2017; Moody's, 2017; Fitch, 2017). Investment grade bonds are regarded as safe investments. Any letter ratings issued outside the investment grade letter ratings-as shown in Annex 9-are deemed to signal that the sovereign debt is non-investment grade. Non-investment grade bonds are characterised by high yields. This is because these bonds are risky, thus, they should pay relatively higher yields to attract investors with a risk appetite for high risk assets.

Sovereign debt ratings have an impact on the local currency dominated debt. This phenomenon is known as credit ratings ceilings. Often the private and public entities' ratings can be the same or below their sovereign nation's ratings but, rarely has their ratings outperformed those of their sovereign's (Bissoondoyal-Bheenick, 2005:252). Local banks and companies are affected by credit ceilings in terms of their access to the global capital market (Teker, Pala, and Kent, 2013:122). On the 6th of April 2017, S&P lowered its ratings for local financial institutions namely the FirstRand Bank, FirstRand Ltd., Investec Bank, and

Nedbank in light of sovereign ratings downgrade of South Africa on the 3rd of April 2017 (Fin 24, 2017).

"We lowered our ratings on the financial institutions because we do not rate South African banks above the foreign currency sovereign credit ratings" was the reason provided by S&P (Fin 24, 2017). This reason can be rationalised by taking into consideration the direct and indirect impact that sovereign ratings will have on the financial institutions' operations.

The South African bond market is the largest in Africa. The Johannesburg Stock Exchange (JSE) regulates the biggest listed debt market in Africa as measured by market capitalisation and liquidity (JSE, 2017). It has operated the largest debt market since the year 2009 when it acquired the Bond Exchange of South Africa. About 1600 listed debt instruments at the JSE totalling more than R1.8 trillion in nominal terms were outstanding. Moreover, more than half were owned by the South African government at the end of the year 2013 (JSE, 2017). Other issuers of these outstanding debts are the South Africa state-owned entities, corporates, local banks and other African countries. It is clear that not only do sovereign debt ratings matter to local stakeholders but they also matter to international stakeholders. According to Peter and Grandes (2005:6) the South African bond market is of interest because "(i) South African corporates are under-leveraged and will need more debt in the future to optimize their financing structures; (ii) local banks and institutional investors have a great appetite for this asset class because they are significantly underweight in fixed-income instruments compared to their peers in similarly developed capital markets; (iii) as the government has stabilized its fiscal deficits and increasingly resorted to foreign-currency borrowing to bolster its international reserves needed to cope with currency instability, the government's dominant role in the domestic debt market may gradually decrease, which in turn could crowd in demand for corporate bonds". Thus, by investigating the determinants that drive debt ratings, efficiency and effectiveness will prevail when stakeholders make decisions since knowledge is power in an uncertain world.

Determinants of the South African sovereign debt ratings are important not only for policy purposes but also for reducing the noise experienced pre-ratings announcements periods. Ratings agencies issue ratings accompanied by their reasons but they never reveal the relative importance of various determinants. When policy makers and stakeholders in the economy have an idea of the different weightings on various determinants, better predictions can be made so as to enhance hedging decisions. During the month of April 2017, the three major

ratings agencies namely Standard and Poor's, Fitch and Moody's downgraded the South African foreign denominated debt with a negative, stable, stable outlook respectively (Joffe, 2017; STANLIB, 2017; Fin 24, 2017). The common reasons among the three ratings agencies for the downgrades are largely twofold; weak economic growth and political instability. Even though the two determinants are revealed as the leading causes of the downgrades, their relative importance in the ratings decisions is not revealed. Thus, this study tries to investigate their relative importance in the decision-making process of the ratings agencies. Unlike, for example Pretorius and Botha (2016), this paper does this while accounting for idiosyncratic structural breaks in the data.

The contribution of this study is to analyse which economic and institutional determinants are important to ratings agencies – as given by an econometric model - over three periods. The sub-sample periods analysed will be divided into three epochs each informed by global and local economic events. Economic events that inform these epochs are; (1) the first democratic election in South Africa during the year 1994, (2) the Dot-com bubble of 2000 to 2001 and (3) the world economic recession of 2008. In the first epoch, S&P and Fitch lifted ratings from sub-investment to investment grade. In the following epoch, South Africa enjoyed high ratings on average from all three agencies. In the last epoch, ratings systematically declined. Ratings will be analysed comprehensively in subsection 3.1 below. The rest of the thesis is organised as follows: sections two presents the literature review while section three presents the Econometric Model Specification and Data. Section four gives results and provides an econometric analysis of the data. The last section (section 5) concludes and provides policy implications.

2. Literature review

The theoretical relationships of the studied determinants embodied in sovereign debt ratings are taken from various literature. We assert ceteris paribus in this paragraph unless stated otherwise. Block and Vaaler, (2004:925) expect per capita income to have a positive relationship with sovereign ratings because an increase in per capita income means that a country has the ability to repay its debt due to a larger tax base. An increase in inflation can result in political instability and that will be taken as a negative indication by the ratings agencies (Cantor and Packer, 1996:39). A negative relation is expected between the

unemployment rate and sovereign credit ratings, the relationship between the two is expected to be weak for developing countries, however (Bissoondoyal-Bheenick, 2005:255). Increased economic activity as indicated by real GDP growth has a positive impact on sovereign ratings as this means that the country can repay its debts through increased government revenue from tax (Erdem and Varli, 2014:48). The relationship between institutional indicators such as property rights, the corruption perception index and political rights is hard to concretely identified across literature as heterogeneous proxies are used across different literature (Altenkirch, 2005:471). Property and political rights are expected to have a positive impact on ratings while the corruption perception index is expected to have a negative relationship on ratings (Altenkirch, 2005:471; Mellios and Paget-Blanc, 2006:5). Block and Vaaler (2004; 926) asserted that national elections have a negative impact on sovereign debt ratings. Their conclusion is based on the Political Business Cycle. The real effective exchange rate is a measure of a country's competitiveness, therefore, when it takes an upward trajectory, ratings agencies process this information as positive a development (Mellios and Paget-Blanc, 2006:5). Pretorius and Botha (2016:14) and Cantor and Packer (1996:39) assert that a budget deficit that will affect a country's ability to pay off or service its debt. Hence a negative relationship is expected between ratings and budget deficits. A worsening debt position of a given country - as proxied by the government's external debt to exports and the current account balance as a percentage of GDP – should warrant one to expect a negative sovereign ratings outcome (Erdem and Varli, 2014:48). An increase in the ratio of foreign reserves to imports postulates that there are more reserves to cover debt hence ratings agencies will take this information as a positive indication (Mellios and Paget-Blanc, 2006:5). Gross domestic savings as a percentage of GDP can only increase if the aggregate nation's income has increased. That said, an increase of this variable can be used as a positive structural and potential growth indicator in the economy (Altenkirch, 2005). Ratings agencies are likely to upgrade ratings in light of this information.

Cantor and Packer (1996:37) are the first to study the impact of sovereign debt ratings and their determinants systematically. They investigated sovereign debt ratings of Moody's and S&P. The central questions their study was trying to answer were twofold: (a) is the criteria underlying sovereign ratings clear enough? and (b) what is the impact of sovereign debt ratings on the borrowing cost? (Cantor and Packer, 1996:37). In their quest of answering these questions, Cantor and Packer (1996) studied - in total - forty-nine cross-sectional developed and developing countries. South Africa was one of the developing countries

studied. Sovereign debt ratings were transformed linearly as follows: "B3/B- = 1, B2/B = 2, and so on through Aaa/AAA = 16" while the Ordinary Least Squares method was employed for regression analysis (Cantor and Packer, 1996:41). Their findings are that sovereign credit ratings announcements affect the movement of bond yields in a statistically significant manner and non-investment grade bonds are strongly affected by ratings announcements compared to investment grade bonds (Cantor and Packer, 1996:49). Significant determinants that they found to significantly affect sovereign debt ratings are reported in Table 2. The method of estimation they used namely the Ordinary Least Squares method, fits the Standard and Poor's ratings better as indicated by the R-squared (Cantor and Packer, 1996:42).

A more recent study by Erdem and Varli (2014:44) aims to investigate sovereign debt ratings determinants of global emerging markets using ratings by S&P - the first ratings agency to assign ratings to Turkey since 1992. Eight emerging economies inclusive of South Africa were studied. The status of emerging markets or economies is determined by the "…plethora of formed lists of economies in the category of emerging markets" as issued by the "…International Monetary Fund list, Columbia University's EMGP (Emerging Market Global Players) List, the FTSE Group list, MSCI Inc.'s list, Standard and Poor's list, the Dow Jones list, the Frontier Strategy Group (F10) list, the BBVA Research list, and the Emerging Markets Index compiled by Mastercard" (Erdem and Varli, 2014:44). These global emerging economies are: (1) Brazil, (2) China, (3) India, (4) Indonesia, (5) Mexico, (6) Russia, (7) South Africa, and (8) Turkey. Quarterly panel data is employed. In order to uncover significant determinants the Ordinary Least Squares, Ordered Probit and Log Likelihood Maximisation method of estimation (ordered response) are employed (Erdem and Varli, 2014:45-6). Sovereign debt ratings are transformed linearly into three ratings scales (Erdem and Varli, 2014:47). The first scale takes into account Credit Watch ratings by transforming sovereign debt ratings symbols one on one. This scale has the largest variation. The second scale overlooks Credit Watch in very low and high grades. Thus, it smooths out the first scale. Lastly, in the third scale, letter grades are transformed directly (Erdem and Varli, 2014:47). Significant determinants are reported in Table 2. Adding to the discovery of significant variables is an important finding that proves S&P credit ratings redundant for the Turkish economy, especially, for high (positive) credit ratings assignments. Arguably, leaving S&P's sovereign credit ratings open to criticism (Erdem and Varli, 2014:47).

Mellios and Paget-Blanc's (2006:2) study aims to find significant sovereign debt ratings determinants of S&P, Moody's and Fitch. A total of eighty-six countries inclusive of South

Africa are studied. Unlike studies of Erdem and Varli (2014) and Pretorius and Botha (2014) to name a few whose identification method is based purely on literature, they use the Principal Component Analysis (PCA) identification method (Mellios and Paget-Blanc's, 2006:8). The major advantage of employing this method is that it reduces multicollinearity. Determinants identified by the PCA method are then regressed using linear the OLS and Maximum likelihood method of estimation (Mellios and Paget-Blanc's, 2006:12-7). Sovereign debt ratings are transformed to numbers linearly (Mellios and Paget-Blanc's, 2006:8). In the end, the ordered logistic model was found to be superior to the OLS model as it relaxes the strong assumption of OLS: "…a rating is a continuous variable" (Mellios and Paget-Blanc's, 2006:17). Moreover, the ordered logistic regression yield better results than that of OLS (Mellios and Paget-Blanc's, 2006:19). Significant determinants are reported in Table 2.

Altenkirch's (2005:462) study has an objective of "...reaching a more accurate understanding of the determinants of credit ratings". Moody's sovereign debt ratings are employed in this study. The General-to-Specific Modelling Selection (GETS) procedure and Dynamic Panel Data Model Estimation procedure are employed (Altenkirch, 2005:464-5). There are two stages in the GETS methodology; firstly, to specify the General Unrestricted Model (GUM) which is over parameterised and secondly, the GUM is reduced systematically to a well-defined encompassing econometric model (Altenkirch, 2005:464). Unlike the aforementioned studies, this study includes a one period lagged sovereign debt ratings variable. The reason is that, it helps mitigate the high persistence of sovereign debt ratings. Sovereign debt ratings were converted to a logistic scale from a linear scale (Altenkirch, 2005:466). Moreover, the main assumption of a logistic scale is that, low (non-investment grade) ratings are likely to increases faster than high (investment grade) ratings (Altenkirch, 2005:466). The GETS model was estimated using an ordered probit model while the dynamic panel data model is estimated using: (a) Pool Ordinary Least Squares (POLS), (b) WG, (c) Difference-Generalised Method of Moments (GMM-DIF) (t-1) and (t-2) and (d) Systems-Generalised Method of Moments (GMM-SYS) (t-1) and (t-2) (Altenkirch, 2005:470). GMM-SYS is found outperform other estimation methods as it better mitigates the persistence of sovereign debt ratings (Altenkirch, 2005:470). Parsimonious determinants found in this study are reported in Table 2.

Bissoondoyal-Bheenick's (2005:253) study aims to do two things: (1) uncover significant economic determinants as stated by Moody's and S&P and (2) to investigate whether the

economic determinants carry the same weight in the ratings methodology of these two agencies over time. Relative to other studies to date, this study goes more in-depth in terms of the number of countries and time period studied, it investigates bank deposit ratings, notes and bonds ratings, foreign and local currency ratings. It uses the ordered response instead of the OLS model (Bissoondoyal-Bheenick, 2005:253). In addition, ratings are linearly transformed using two techniques: (1) each and every letter ratings for Moody's (S&P) is turned into a number e.g Aaa (AAA) are assigned the number 1 and Aa1 (AA+) the number 2 and so on and (2) Aaa (AAA) =1, Aa1 (AA+) =2, A1 (A+) =3, Baa1 (BBB+) = 4, Ba1 (BB+) = 5, B1 (B+) = 6, Caa1 (CCC+) = 7, Ca (CC) = 8 and C (SD)= 9 (Bissoondoyal-Bheenick, 2005:257). The advantage of the first technique is that it exhibits less variation compared to the second one. The second technique hides more than it reveals as letter ratings between A1 (A+) and Aa1 (AA+) are assigned the number 2 (Bissoondoyal-Bheenick, 2005:257). Any movement in the letter ratings between A1 (A+) and Aa1 (AA+) for example, will not be captured and that is a possible limitation of the second technique. Significant determinants are reported in Table 2. A limitation worth noting is that sovereign ratings determinants are by nature backwards-looking while sovereign ratings requires a forward-looking stance. Moreover, economic determinants are not that important in the analysis of sovereign debt ratings for developed countries while they are for developing countries (Bissoondoyal-Bheenick, 2005:279).

Block and Vaaler, (2004:919) aim to validate their assertion that incumbent behaviour as predicted by the Political Business Cycle (PBC) is important to domestic constituencies and foreign actors inclusive of bondholders and sovereign credit ratings by using: (1) "…data on market-determined credit spreads for representative dollar-denominated sovereign bonds from developing countries holding Presidential elections between 1987 and 1999" and (2) sovereign credit ratings that are foreign currency denominated. The PBC theory assumes that voters are naïve while government are opportunistic. In a period just prior to elections economic activity tends to boom, unemployment goes below normal levels, monetary and fiscal policy are accommodative and inflation remains below expectations. Post-elections, there are economic contractions, unemployment increases to levels last seen during the pre-election period, fiscal and monetary authorities tighten their belts and inflation accelerates quickly (Block and Vaaler, 2004:921).

Block and Vaaler (2004) studied sovereign credit ratings of Moody's, Standard & Poor's, Duff & Phelps Credit Rating Company, Fitch, International Bank Credit Analysis, and

Thomson Bank Watch. A dynamic panel regression model is used to specify the sovereign credit ratings econometric equation (Block and Vaaler, 2004:925). Thereafter, the equation is estimated using the ordered probit method. On the other hand, to model bond spreads, a general estimation equation (GEE) is employed (Block and Vaaler, 2004:927-8). Sovereign ratings are transformed linearly and bond spreads are derived from bond yields of developing countries minus those of the United Stated divided by those of the United States (Block and Vaaler, 2004:925-6). The advantage of calculating bond spreads like this is that the relative bond measure is a steady risk measure relative to absolute bond spread measures, especially, over the long-run when interest rates are fluctuating (Lamy and Thompson, 1988). Only significant determinants of sovereign debt ratings are reported in Table 2. Sovereign credit ratings agencies tend to downgrade developing countries in election years and bond spreads are lower sixty days after an election than they are sixty days prior to elections (Block and Vaaler, 2004:941-3). This reduces the ability of developing countries to borrow in the capital market during this period because of high costs of capital.

Some significant determinants tabled in Table 2 found in various literature are: (1) GDP per capita, (2) Inflation, (3) Financial balance, (4) Foreign reserves, (5) Net exports/GDP, (6) Government debt/GDP, (7) Real exchange rate, (8) GDP per capita average, (9) Inflation average, (10) Government debt, (11) Current account average, (12) Government effectiveness average, (13) External debt, (14) External debt average, (15) Reserves average, (16) Regional dummies, (17) Default history dummy, (18) Unemployment average, (19) Government balance, (20) Reserves, (21) Unemployment, (22) Current account, (23) Sovereign Default History, (24) Net Direct and Guaranteed Debt /Operating Revenue, (25) Presidential election, (26) Default indicator, (27) Indicator for economic development, (28) Gross National Income Power Purchase Parity, (29) Corruption perceptions index, (30) Non-manufactured goods (% of export), (31) Trade dependency-proxy for Dutch disease, (32) Gross domestic savings (% of GDP), (33) Government revenue (% of GDP), (34) Reserves (% of M2), (35) Exchange Rate, (36) GNI, (37) Revolutionary Warfare, (38) Political Rights and (40) Property rights (Cantor and Packer,1996; Afonso,2003; Block and Vaaler, 2004; Bissoondoyal-Bheenick, 2005; Altenkirch, 2005; Mellios and Paget-Blanc, 2006; Gaillard, 2009; Afonso, Gomes and Rother, 2011; Bozic and Magazzino, 2013; Erdem and Varli, 2014; Pretorius and Botha, 2016:14).

The importance of Table 2 over and above the fact that it summarises significant variables is that it included only studies that looked at developing countries, especially, South Africa. It

indicates which variables are significant at what time frame. Moreover, it also gives an indication of the expected signs of various determinants. With that being said, one variable that has a dubious sign is the regional dummy. According Afonso, Gomes and Rother (2011:11), "… some groups of countries of the same geographical location may have common characteristics that affect their rating". Therefore, regional dummies can be either positive or negative.

In all, the literature studied in this section highlights the importance of using rigorous statistical techniques to properly extract meaning from your regression results. That said, due to the persistence of the dependant variable namely sovereign ratings, an ordered probit model coupled with the maximum likelihood method of estimation seem to overshadow a linear model estimated using OLS. Therefore, this study will employ the ordered probit model and the maximum likelihood method of estimation to identify statistically significant sovereign ratings determinants.

Table 2. Literature summary			
This table summarises existing literature. Some of the prominent studies regarding the pursued topic are included in this table. Significant determinant variables with their signs in the parenthesis are included as well as the sample period and the number of studied countries.			
Study	Ratings agencies	Significant determinants	Sample
Bissoondoyal-Bheenick (2005)	Moody's and Standard & Poor's	GDP per capita (+) and Inflation (-).	December 1995-9. 95 Countries Developing and Developed.
	Moody's	Financial balance (+), Foreign reserves (+) and net exports/GDP (+).	
	Standard & Poors	Government debt/GDP (-), Real exchange rate (-), Foreign reserves (+) and net exports/GDP (+).	
Afonso, Gomes & Rother (2011)	Moody's, Standard & Poor's and Fitch.	GDP per capita (+), GDP per capita average (+), Inflation (-), Inflation average (-), Government debt (-), Current account average (-), Government effectiveness average (+), External debt (-), External debt average (-),	1970-2005. 130 Countries Developing and Developed.

		Reserves average (+), Regional dummies (-) and Default history dummy (-).	
	Moody's	Unemployment average (-), Inflation (-), Inflation average (-), Government balance (+) and Reserves (+).	
	Standard & Poor's	Unemployment (-), Inflation (-), Inflation average (-), Government balance (+), Government effectiveness (+) and Current account (-).	
	Fitch	Gov Effectiveness (+).	
Gaillard (2009)	Moody's	Sovereign Default History (-), GDP per capita (+), Net Direct and Guaranteed Debt /Operating Revenue(-).	2005. Local and regional governments of Developing and Developed Countries.

Afonso (2003)	Moody's and Standard & Poor's.	GDP per capita (+), Real GDP growth (+), Inflation (-) and Default history (-).	1998-2000. 52 Developing Countries.
	Moody's and Standard & Poor's.	GDP per capita (+).	1998-2000. 29 Developed Countries.
Block and Vaaler, (2004)	Moody's, Standard & Poor's, Duff & Phelps Credit Rating Company, Fitch, International Bank Credit Analysis, and Thomson Bank Watch.	Ratings (-1) (+), Per capita income (-), Inflation (-), Fiscal balance (+), External debt (-), Presidential election (-) and Default indicator (-).	1987-1998. 19 Developing countries
Cantor and Packer (1996)	Moody's and Standard & Poor's	Per capita income (+), Inflation (-), External debt (-) and Indicator for economic development (+)	1995. 49 Developing and Developed countries.
	Standard & Poor's	GDP growth (+) and Fiscal balance (+).	

Mellios and Paget-Blanc, (2006)	Moody's, Standard & Poor's and Fitch.	Default history (-), Gross National Income Power Purchase Parity (+), Index of Real Effective Exchange Rate (+), Gross Public External Debt/Current External Receipt (-), Consumer prices (-), Corruption perceptions index (-), Non-manufactured goods (% of export) (-), Trade dependency-proxy for Dutch disease (-), Gross domestic savings (% of GDP) (+), Government revenue (% of GDP) (+) and Reserves (% of M2) (+).	2003. 86 Developing and Developing Countries.
Erdem and Varli, (2014)	Standard & Poor's	Budget Balance/GDP (+), GDP per capita (+), Current Account/GDP (-), Governance Indicators (+), External Debt/Export (-), Reserves/GDP (+), Exchange Rate (-) and	2002-11. 8 Developing Countries.

		Inflation (-).	
Bozic and Magazzino (2013)	Moody's, Standard & Poor's and Fitch.	GNI growth (+), Per capita GNI (+), Inflation (-), Unemployment (-), Fiscal balance (+), Government debt (-) and Default history (-).	1957-2010. 139 Developed and Developing countries.
Altenkirch (2005)	Moody's and Standard & Poor's.	Total Debt/GDP (-), Foreign Reserves/GDP (+), Export Growth Rate (+), Inflation Rate (-), Gross Domestic Savings/GDP (+), Current Account/GDP (-), Political Rights (+) and Revolutionary Warfare (-).	1990-2000. 26 Countries.

Source: Author's tabulation, (2017)

3. Econometric Model Specification and Data

This study seeks to find significant sovereign debt ratings determinants for South Africa across three epochs. Ratings agencies that are of interest are S&P, Moody and Fitch. South Africa is currently rated by all three agencies. Fitch and S&P assign sovereign ratings using the same symbols while Moody's assigns different symbols. Regardless of the anonymity of the sovereign ratings symbols by Moody's, each symbol has its counterpart in S&P and Fitch's ratings scale. Comparing all three ratings agencies' sovereign ratings is made possible by the fact that each symbol has its counterpart. The highest sovereign ratings' symbol for S&P and Fitch is AAA (S&P, 2017; Fitch, 2017). For Moody's, Aaa is the highest symbol assigned to sovereign ratings (Moody's, 2017). Sovereigns assigned these ratings symbols are considered to have the lowest probability of default. Any ratings symbol assigned other than AAA and Aaa is considered to reflect a higher probability of defaulting relative the highest possible ratings (Pretorius and Botha, 2016).

Turning our attention to Table 3, it can be asserted that the symbols A for ratings of S&P and Fitch respectively and A3 for Moody's have a lower chance of default compared to the ratings assigned just below them like BBB+ and Baa1, for example. Sovereigns rated "BBB-" and "Baa3" and above are said to be investment grade while those rated below "BBB-" and "Baa3" are said to be non-investment grade (speculative or junk status) (Pretorius and Botha, 2016; Erdem and Varli, 2014:46). Ratings symbols can be accompanied by a negative (-) or positive (+) sign. These signs show the likely direction of the next sovereign ratings over the medium term (Erdem and Varli, 2014:46). The negative and positive signs are said to be an outlook. When the symbols are not accompanied by a sign they signify a stable outlook. In addition, a negative and positive sign asserts a negative and positive outlook respectively. An outlook is synonymous with a Rating Alert otherwise known as a Credit Watch which can be negative (-), positive (+) or stable (Moody's, 2017; S&P, 2017).

Table 3 shows how the qualitative sovereign ratings symbols are transformed into quantitative observations. This method of transformation is adopted from Kim and Wu (2008:8-9). Assuming a stable outlook ratings as a starting point, if a ratings agency decides to put its future ratings on a negative (positive) credit outlook, 0.25 will be deducted (added). Kim and Wu's ratings transformation scale is preferred to those of Bissoondoyal-Bheenick (2005:257), Borensztein, Cowan and Valenzuela (2013:4023), Gaillard (2009:12; 2009:203) -

to name a few - due to its comprehensiveness. The population of ratings by the three agencies examined is from 1995 quarter one to 2017 quarter one. The decision to conduct a study over these years was based on data availability. Due to the nature of economic evolution, the sample period is divided into three epochs. In that manner, the relevance of various determinants over time on ratings will be uncovered.

Table 3. The transformation of sovereign debt ratings					
Bond status	Watch	S&P	Fitch	Moody's	Linear transformation
Prime	Stable	AAA	AAA	Aaa	21
	Negative				20.75
High grade	Positive	AA+	AA+	Aa1	20.25
	Stable				20
	Negative				19.75
	Positive	AA	AA	Aa2	19.25
	Stable				19
	Negative				18.75
	Positive	AA-	AA-	Aa3	18.25
	Stable				18
	Negative				17.75
Upper medium grade	Positive	A+	A+	A1	17.25
	Stable				17
	Negative				16.75
	Positive	A	A	A2	16.25
	Stable				16
	Negative				15.75

	Positive	A-	A-	A3	15.25
	Stable				15
	Negative				14.75
Lower middle grade	Positive	BBB+	BBB+	Baa1	14.25
	Stable				14
	Negative				13.75
	Positive	BBB	BBB	Baa2	13.25
	Stable				13
	Negative				12.75
	Positive	BBB-	BBB-	Baa3	12.25
	Stable				12
	Negative				11.75
Non-investment grade speculative	Positive	BB+	BB+	Ba1	11.25
	Stable				11
	Negative				10.75
	Positive	BB	BB	Ba2	10.25
	Stable				10
	Negative				9.75
	Positive	BB-	BB-	Ba3	9.25
	Stable				9
	Negative				8.75

Highly speculative	Positive	B+	B+	B1	8.25
	Stable				8
	Negative				7.75
	Positive	B	B	B2	7.25
	Stable				7
	Negative				6.75
	Positive	B-	B-	B3	6.25
	Stable				6
	Negative				5.75
Substantial risk	Positive	CCC+	CCC+	Caa1	5.25
	Stable				5
	Negative				4.75
Extremely speculative	Positive	CCC	CCC	Caa2	4.25
	Stable				4
	Negative				3.75
Default imminent with little prospect for recovery	Positive	CCC-	CCC-	Caa3	3.25
	Stable				3
	Negative				2.75
	Positive	CC	CC	Ca	2.25
	Stable				2
	Negative				1.75

In default	Positive	SD	C	C	1.25
	Stable	D	DDD	C	1
			DD		
			D		

Source: Fitch (2017), Moody's (2017), Standard and Poor's (2017) and, Kim and Wu (2008:8-9)

3.1 A historical stance of sovereign debt ratings

In this study, a 21-point numerical transformation scale of the sovereign debt ratings data is employed. For example, a ratings symbol of AAA by S&P and Fitch or Aaa by Moody's is given the highest number on the scale 21 while a ratings symbol of CC by S&P and Fitch or Ca by Moody's is assigned a number 2. Additionally, when credit ratings agencies assign a ratings symbol accompanied by an outlook, either 2,5 is subtracted or added. When the outlook is positive 2,5 is added but, if it is negative 2,5 is subtracted (Kim and Wu, 2008:8-9). The purpose of this sub-section is to study the history of sovereign ratings in South Africa so as to unearth how Fitch, S&P and Moody's behaved over the three separated epochs.

Table 4a. Descriptive statistics for sovereign debt ratings for the period 1995Q1 to 1999Q4.

Variable	Observations	Mean	Standard deviation	Variance	Minimum	Maximum
Moody's ratings	20	11.99	0.056	0.003	11.75	12
S&P ratings	20	10.85	0.367	0.134	10	11
Fitch ratings	20	10.01	0.056	0.003	10	10.25

Source: Author's calculations

For the period 1995Q1 to 1999Q4 twenty quarters of sovereign ratings are studied for Moody's, S&P and Fitch as shown in Table 4a. On average, Moody's (Fitch) tends to rate South African sovereign debt higher (lower) than other agencies. Ratings assigned by S&P tend to be relatively uncertain as indicated by the variance. The lowest ratings assigned in this epoch by Moody's, S&P and Fitch are 11.75 (Baa3 negative outlook), 10 (BB stable outlook) and 10 (BB stable outlook), respectively. This means that, on one hand, Moody's ratings agency always assigned ratings above junk status (sub-investment grade). On the other hand, S&P and Fitch have assign ratings that are junk status in this period. The highest ratings assigned are that of Moody's (Baa3 stable outlook) which asserts how relatively generous this agency is to South Africa. They are followed chronologically by those of S&P (BB+ stable) and Fitch (BB positive outlook).

Table 4b. Descriptive statistics for sovereign debt ratings for the period 2000Q1 to 2007Q4.						
Variable	Observations	Mean	Standard deviation	Variance	Minimum	Maximum
Moody's ratings	32	13.29	0.711	0.505	12.25	14.25
S&P ratings	32	12.92	0.841	0.707	12	14
Fitch ratings	32	12.94	0.942	0.887	10	14

Source: Author's calculations

Thirty-two quarters of sovereign debt ratings descriptive statistics for the period 2000Q1 to 2007Q4 are presented in Table 4b. The general stance regarding the South African sovereign debt was higher than the last epoch of 1995Q1 to 1999Q4 as indicated by the higher relative mean ratings of each ratings agency. Just like the last epoch, Moody's ratings are the highest on average compared to those of S&P and Fitch. However, S&P's ratings instead of Fitch's are now the lowest on average. Moreover, Fitch's instead of S&P's ratings are now the most volatile. Under this epoch, South African sovereign debt was dubbed junk status by Fitch only. Baa3 positive outlook, BBB- stable outlook and BB stable outlook are the lowest ratings assigned by Moody's, S&P and Fitch respectively. S&P and Fitch assigned the same maximum ratings of BBB+ stable outlook. However, Moody's, as the last epoch, rated the highest- A3 positive outlook.

In the period 2008Q1 to 2017Q4 twenty quarters of sovereign ratings are studied (see Table 4c). The average sovereign ratings for each ratings agency are higher than the last two epochs. Continuing the trend of the last period, Moody's rated highest while S&P rated the least on average. Indifferent to the period 1995Q1 to 1999Q4, S&P and Fitch have the highest and lowest ratings variance, respectively. To add, S&P's sovereign ratings are more volatile than those of other agencies. In this period, the South African sovereign debt was always assigned ratings above junk status. Putting the analysis of this epoch in symbols, Moody's assigned at least Baa2 negative outlook (12.75) and at most A3 stable outlook (15).

S&P's and Fitch's minimum (BBB- negative outlook) and maximum (BBB+ stable outlook) ratings are in consensus.

Table 4c. Descriptive statistics for sovereign debt ratings for the period 2008Q1 to 2017Q1.

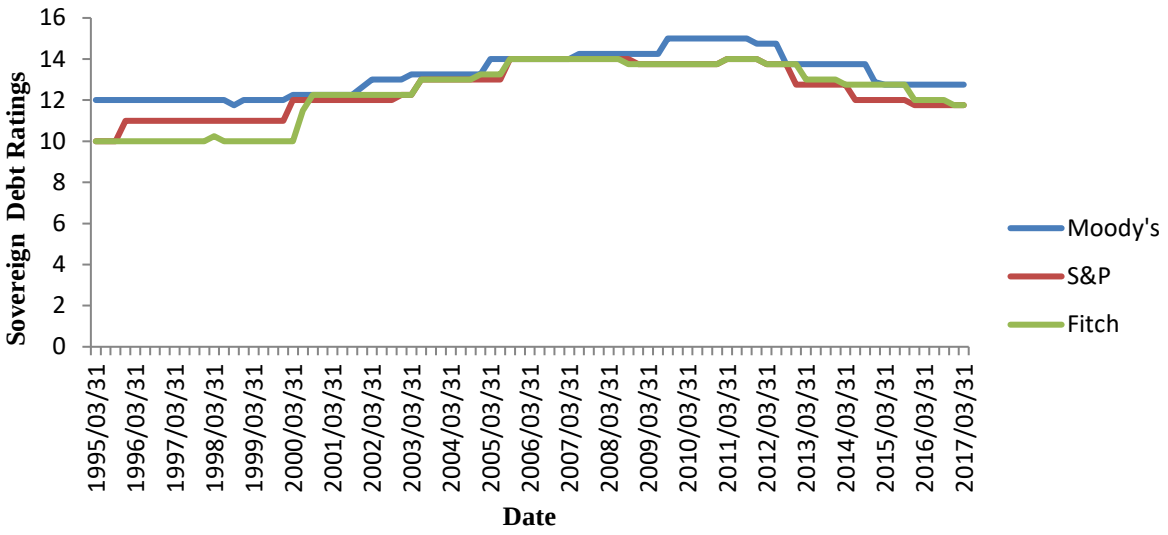
Variable	Observations	Mean	Standard deviation	Variance	Minimum	Maximum
Moody's ratings	37	13.95	.864	0.746	12.75	15
S&P ratings	37	13.03	.905	0.819	11.75	14
Fitch ratings	37	13.22	.738	0.544	11.75	14

Source: Author's calculations

There are three major movements in ratings over the observed population period. These movements are likely caused by structural breaks in the data. Hence this study is divided into three epochs that account for these breaks. Firstly, Figure 1 tells us the following: in the year 1994 Fitch led the way by assigning ratings of BB stable outlook (junk status) on the 22nd September 1994. Moody's and S&P followed suit both on the 3rd of October 1994 with ratings of Baa3 stable outlook and BB stable outlook respectively (Trading Economics, 2017). These ratings were assigned after the first South African democratic elections in April 1994. In the year 2000, another prominent movement in the ratings data occurred due to the Dot com bubble. In light of this, on February the 7th and 25th Moody's and S&P assigned sovereign ratings of Baa3 positive outlook and BBB- stable outlook respectively (Trading Economics, 2017). Moreover, Fitch assigned ratings of BB+ without specifying the likelihood direction of the next ratings on the 19th of May 2000 (Trading Economics, 2017). However, Figure 1 does not show the effect of the 2008 Financial crisis on the ratings data. Therefore, segmenting data into this third part is guided purely by econometric theory. Even though the effect of this event is not apparent in the ratings data, it is apparent especially on economic variables like the Gross Domestic Product. According to Trading Economics (2017), ratings of BBB+ with a stable and negative outlook were assigned by Fitch and S&P on the 17th July and 11th November 2008, respectively. Moody's only followed suit to assign ratings in the year 2009. Figure 1 compliments the summary statistics analysed above.

Moreover, it tells one a story above and beyond the pessimism or optimism of each ratings agency towards the South African sovereign debt. For example, we can see that during the three major economic and political events that affected South Africa, Fitch reacted first. However, being a first mover to assign ratings says nothing about Fitch in terms of market credibility and their impact on markets (Alaskka and ap Gwilym, 2013:149).

Figure 1. South African Sovereign Credit Ratings, 1995Q1-2017Q2



Source: Trading Economic (2017)

In all, after analysing the three epochs, one gets a sense of how each ratings agency perceives South Africa or behaves when rating the South African sovereign debt. More prominent findings are that; S&P's ratings are largely more uncertain compared to the two agencies and Moody's ratings are more generous relative to what other ratings agencies assign (Alaskka and ap Gwilym, 2013:149). Thus, with some degree of confidence policy makers can expect Moody's to have a better stance regarding the social, institutional, political and economic dealings of the South African economy at any point in time. On the other hand, S&P is likely to assign ratings in such a way that no one can confidently predict. However, Fitch is found to fall in between the above-mentioned ratings agencies in terms of the general stance about the South African economy. Interestingly, more often than not, Fitch sees eye to eye with S&P.

3.2 Institutional and economic determinants

In order to get a compact number of parsimonious determinants, we start our analysis with a population of determinants. The population variables as identified using various literature studies accompanied by their expected signs in brackets [.] are the: (1) Per capita income [+], (2) Inflation [-], (3) GDP growth [+], (4) Current account/GDP [-], (5) Index of real exchange rate [+], (6) Foreign reserves/Imports [+], (7) External debt/Exports [+], (8) Unemployment rate [+], (9) Budget balance [+], (10) Property rights [+], (11) Corruption perception index [-], (12) Political rights [+], (13) National elections [+/-] and (14) Gross savings % GDP [+]. All the variables studied are quoted in South African Rand (ZAR) terms and are quarterly reported unless stated otherwise.

Per capita income is calculated by dividing the South African population with real Gross Domestic Product (GDP) that is seasonally adjusted at an annualised rate (saar). Moreover, the GDP variable is measured in constant prices of the year 2010. The inflation rate is measured by the headline Consumer Price Index (CPI) based on a year on year percentage change. A quarter and quarter percentage change in GDP is reported as the GDP growth. The fourth variable is a ratio of the Current Account (CA) balance divided by GDP. An index of the Real Effective Exchange Rate (REER) average is calculated against the most important currencies like the US dollar, Euro and Pound Sterling. These currencies, especially the US dollar, are important because of their role in global trade. The index is calculated using the year 2010 as a base period. Imports and exports of goods and services are used to calculated foreign reserves/imports and external debt/exports, respectively. The gross foreign reserve of the South African Reserve Bank (SARB) is employed to approximate foreign reserves in this study. Gross foreign reserves were converted into the local currency by dividing the gross foreign reserves in US dollar (USD) terms by the ZAR/USD averages. The external debt variable represents the total national government foreign debt that is marketable in millions of ZAR. A percentage of labour unemployed is reported as the unemployment rate. The budget balance variable stands for the national government deficit or surplus as a percentage of GDP. Property rights, political rights and corruption perception index variables are annually reported. Just like ratings, these variables are left unchanged till the next announcement warrants a change i.e a new print. This line of reasoning is adopted from Cantor and Packer (1996), Afonso (2003) and, Block and Vaaler (2004) studies. National elections take place in South Africa every five years. Due to that, this variable is dichotomous

in nature. It will take the value of one when there is a national vote and zero otherwise. The gross savings % GDP variable is simply calculated as gross savings in the economy as a percentage of GDP. Table 5 below explains the variables' expected signs, definitions, and units of measurement. In order to find out where the author sourced the variables, Annex 1 outlines data availability for each variable.

Table 5. Variable expected sign, definition, and unit of measurement			
Variable name	Expected sign	Definition	Unit of measurement
Per capita income	When this ratio increases, either because of a decrease in population or an increase in GDP relative to the population, it indicates financial progress per resident. [+]	This is a proxy for the financial wellness of a specific country's residents. It is measured as GDP per capita.	Rands
Inflation	When prices in the economy increase (decrease) too much, the purchasing power of the local currency decreases (increases). This can hinder social and economic progress. In South Africa, the central bank targets inflation within a target band of 3% - 6%.[-]	Inflation can be defined as the continuous increase the general price level.	Percentage
GDP growth	When this variable increases, it signals to all interested stakeholders that the country's production and thus income (assuming constant prices) has improved compared to the previous period. [+]	This variable measures the growth in total value of goods and services produced within a specific period and country.	Percentage
Current account/GDP	If exports increase (decrease) relative to imports, the market will take this as a positive (negative)	The current account balance accounts for the difference in exports less imports under the	Ratio

	signal of economic progress (regress). The average current account balance has been negative from the first quarter of 1994 to the first quarter of 2017 which means South Africa in a net importing country. [-]	balance of payments.	
Index of real exchange rate	A positive change in the index of the Rand's real effective exchange rate relative to a basket of important currencies shows that the Rand is more competitive relative to a basket of other exchange rates. Ratings agencies will take this as a positive signal. [+]	Real effective rate against the most important currencies (Index: 2010=100, Averages)	Index
Foreign reserves/Imports	An increase of this ratio shows that more imports are covered by foreign reserves compared to the last period. [+]	This a measure of foreign reserves to imports.	Ratio
External debt/Exports	As export earnings increase relative to the external debt, it means that most external debt is covered by more export earnings than before. This will be a positive signal to the ratings agencies. If the external debt is largely used in corrupt activities, ratings agencies can take this as a negative signal. The directional effect of this variable is further	External debt can be defined as the national government debt denominated in foreign currencies (marketable foreign debt), while exports are the total good and services exported by South Africa. Both variables are measured in local curry millions.	Ratio

	confounded by the fact that both the external debt and export earnings are both income variables. [+]		
Unemployment rate	An increase in this variable sends negative signals as it shows that household consumption is decreasing and ultimately GDP. [-]	The unemployment rate that is studied in this paper is the official unemployment as pronounced by Statistics South Africa (StatsSA). It comprises of labour in the non-agricultural sector.	Percentage
Budget balance	When a developing country like South Africa has a positive budget balance, ratings agencies are likely to take this a positive signal. It shows that the South African government is more responsible in their expenditure and that government savings have increased. [+]	This is the budget surplus (deficit) that is published by the National Treasury of South Africa per quarter.	Rands
Property rights	Honouring such rights can be seen as a sign that South Africa is willing to do business with the world and that encourages brown-field investments. A higher percentage will likely increase ratings. [+]	Property rights describe governance practices associated with private or individual property rights	Percentage
Corruption perception index	This variable quantifies corruption. When a country is assigned an index of less than fifty percent, that country is deemed corrupt. The more corrupt a country becomes the likelihood of a downgrade	Corruption can be defined in this context as the abuse of office powers in a particular country.	Percentage

	becomes high. The higher the index the better the ratings will be. Despite this, the effect on ratings will be negative. Therefore, in line with literature we expect a negative impact on ratings. [-]		
Political rights	This variable measures how "free" citizens of a particular country are to exercise their political rights. The closer (further) the measure is to one (seven), the more citizens are deemed politically free. [+]	This is a measure of Political rights as measured by the heritage organisation.	1-7
National elections	If the national elections are peaceful and fair that can be seen as a good signal by the ratings agencies. On the other hand, they can bring about political uncertainty. Moreover, When they are violent and manipulated then they can send negative signals to the general market. If a new political party is elected, that can send mixed signals to the market. This can largely depend on the policies drafted by the new regime. The outcome of ratings given national elections is scenario dependent. [+]	National elections occur every five years. During the elections, South Africans vote for their political party of choice that will govern the nation for the next five years.	Dummy variable taking values 0 and 1.
Gross savings %	When gross savings increase they encourage	This a measure of the total national gross savings	Percentage

GDP	brown-field investments as interest rates might be driven downwards and thus making the price of borrowing low. The ratings agencies will take this as a positive signal. [+]	to GDP	

Source: Cantor and Packer (1996), Afonso (2003), Block and Vaaler (2004), Bissoondoyal-Bheenick (2005), Altenkirch (2005), Mellios and Paget-Blanc (2006), Gaillard (2009), Afonso, Gomes and Rother (2011), Bozic and Magazzino (2013), Erdem and Varli (2014), Pretorius and Botha (2016:14).

4. Presentation of Results and Analysis of Findings

The dependent variable- sovereign credit ratings- is a discrete latent variable that is ordered in nature. It reflects the probability of defaulting debt repayment across different rating scales. The sample periods that are studied are broken into three epochs that are informed by economic and political history. The epochs studied are; 1995Q1-1999Q4, 2000Q1-2007Q4 and 2008Q1-2017Q1. An advantage of segmenting is that it gives one an indication of how the importance of each determinant changes after a major economic and/or political event. Moreover, due to the nature of sovereign ratings, it helps address the problem of parameter inconsistency. That said, there is no sign of a structural break after segmenting data – see Figure 2, 3 and 4 in the appendix. For the period 1995Q1 to 1999Q4, S&P's ratings suggest a structural break. However, South African sovereign debt is upgraded by one notch. Against this backdrop, if we break the data into two, the second equation with flat ratings will not estimate as there is no variation in the dependent variable. Thus, when estimating persistent dependent variables such as ratings one must be careful to distinguish between a break and ratings notch. Since the dependent variable is qualitative in nature, the ordered probit model is more effective in estimating the effect of different explanatory variables on ratings than a simple linear Ordinary Least Squares (OLS) model. However, the OLS model is largely used as a benchmark model (Mellios and Paget-Blanc, 2006:12). The OLS model is specified in equation (1) as follows:

$$Ratings_t = \alpha + \beta X_t' + \varepsilon_t \quad (1)$$

After estimating the benchmark (OLS) model, some literature proceeds to estimate a more accurate model namely the ordered probit model (for example see: Mellios and Paget-Blanc, 2006:12-19). However, in this study, we move straight to applying the ordered probit model. The reason we do this is that, the OLS model wrongly assumes that the risk premium of being rated from AA/Aa2 to AA-/Aa3 is the same as that of being rated from BBB/Baa2 to BBB-/Baa3 (Bissoondoyal-Bheenick, 2005:257). Moreover, the ordered probit model produces more accurate results relative to the OLS method when regressing an ordered dependent variable (Pretorius and Botha, 2016:7). In addition, a model that properly accounts for risk premia given certain sovereign ratings is the ordered probit model specified as equation (2).

$$Ratings_t = \beta X_t' + \varepsilon_t \quad (2)$$

β is a vector of unknown parameters that will be estimated using the maximum likelihood method (Teker, Pala & Kent, 2013:125). The sovereign ratings will be ordered as shown in Table 3. The random variable ε_t is assumed to be independently and identically distributed with zero mean and a constant variance $IID{\sim}(0, \sigma^2)$.

Ratings will be given by an unobservable latent variable Ratings. The final sovereign ratings will be provided as:

$$Ratings_{it} = \begin{cases} Aaa\ (AAA)\ if\ Ratings^* > c_{20} \\ Aa1\ (AA+) if\ c_{20} < Ratings^* > c_{19} \\ Aa2\ (AA)\ if\ c_{19} < Ratings^* > c_{18} \\ . \\ . \\ . \\ Ca\ (CC)\ \ if\ c_1 < Ratings^* \end{cases}$$

where the c_s is the vector of known threshold parameters to be estimated using the maximum likelihood method (Afonso, Gomes & Rother, 2011:9; Teker, Pala & Kent, 2013:125).

The identification strategy that is employed in this study is the General-to-Specific identification strategy. This method helps a researcher to remove redundant variables and retain those that have explanatory power (Altenkirch, 2005:464). When applying the General-to-Specific identification strategy, redundant or non-converging determinants are left out of the analysis so as to retain determinants that have explanatory power for each ratings agency. After that, two (economic and institutional) indices are created using the Principal Component Analysis (PCA).

4.1 General-to-Specific results

In this section, the author's computations are presented. Determinants that have a significant contribution to sovereign debt ratings of Moody's, S&P and Fitch are explored. The analysis is divided into three epochs periods: (1) 1995Q1-1999Q4, (2) 2000Q1-2007Q4 and (3) 2008Q1-2017Q1. There are twenty, thirty-two and thirty-seven quarters of data in the periods 1995Q1-1999Q4, 2000Q1-2007Q4 and 2008Q1-2017Q1, respectively. Empirical results are derived using an ordered probit model which is estimated using the maximum likelihood method of estimation. When applying the General-to-Specific identification strategy, redundant or non-converging determinants are left out of the analysis so as to retain determinants that have explanatory power for each ratings agency (Altenkirch, 2005:464-5).

This strategy has two steps: (1) regressing ratings of each agency on every individual determinant that is in Table 5 and (2) retaining determinants for a specific ratings agency that are significant. STATA statistical software is utilised for all the analyses. The respective commands and codes are used for each estimation. The commands, codes and detailed results are available upon request.

In the period 1995Q1-1999Q4 the General-to-Specific identification strategy identified several economic and institutional determinants for the three ratings agencies. Economic determinants for Moody's are: (1) Current account/GDP, (2) Unemployment rate, (3) Foreign reserves/imports, (4) External debt/exports and (5) Per capita income. While only one institutional determinant was significant namely national elections. This is also the case for Fitch. However, in addition to national elections, S&P has another significant institutional determinant namely the corruption perception index. Thus, Fitch's and Moody's institutional coefficient is going to be interpreted as a variable rather than an index. Economic determinants for S&P are: (1) Real effective exchange rate, (2) Per capita income, (3) Budget balance, (4) External debt/exports and (5) Inflation. Moreover, economic determinants for Fitch are: (1) Real effective exchange rate, (2) Unemployment, (3) Foreign reserves/imports, (4) Inflation and (5) GDP growth. Significant economic and institutional determinants are summarised in Annex 2.

The current account coefficient for Moody's ratings took an unexpected sign. While, the real effective exchange rate and external debt/exports coefficients have unexpected signs for S&P's ratings. Moreover, the unemployment rate and GDP growth coefficients took unexpected signs for Fitch's ratings. It must be noted that the coefficient of national elections can take either sign depending on a ratings agency's perception regarding the way national elections are handled. According to Pretorius and Botha (2016), the negative sign of GDP growth in a developing country like South Africa can be attributed to the dynamics of income inequality, political unrest and poverty levels. Moreover, it might be that the economy is not growing at a rate that is required to avoid a downgrade. The unexpected sign of the GDP growth coefficient is not uncommon (Block and Vaaler, 2004:935; Erdem and Varli, 2014:50). Moreover, since this study is based on an African country some coefficients can have unexpected signs relative to what literature finds because most of them study developed and developing countries jointly (Pretorius and Botha, 2016). Determinants that have expected and unexpected signs will be combined as indices in Part A of Table 6 while only

those with conventional signs as identified by literature will be combined in Part B of Table 6.

Determinants that are identified by the General-to-Specific identification strategy for the period 2000Q1-2007Q4 are reported in this paragraph. Economic determinants for Moody's are: (1) Real effective exchange rate, (2) Current account/GDP, (3) Unemployment rate, (4) Budget balance, (5) Foreign reserves/imports, (6) External debt/exports, (7) Gross savings % GDP, (8) GDP growth and (9) Per capita income. There is only one significant institutional determinant for Moody's, S&P and Fitch namely political rights. This is not surprising because Brewer and Rivoli (1990) state that, political conditions in a country are an important economic indicator, especially, for sovereign ratings. Moreover, perceptions of lenders regarding a particular sovereign are influenced by political conditions. Thus, the institutional coefficient is going to be interpreted as a variable rather than an index. Significant economic determinants for S&P are: (1) Real effective exchange rate, (2) Current account/GDP, (3) Unemployment rate, (4) Budget balance, (5) Foreign reserves/imports (6) Inflation, (7) Gross savings % GDP and (8) GDP growth. For Fitch, (1) Real effective exchange rate, (2) Current account/ GDP, (3) Unemployment, (4) Budget balance, (5) Foreign reserves/imports, (4) Gross savings % GDP and (5) GDP growth are significant. Significant economic and institutional determinants are summarised in Annex 2. The External debt/exports coefficient has an unexpected sign for Moody's. Moreover, Gross savings % GDP coefficient has an unexpected sign for all the ratings agencies. Determinants that have expected and unexpected signs will be combined as indices in Part A of Table 7 and only those with conventional signs as identified by literature will be combined in Part B of Table 7.

In this paragraph, only significant determinants are reported for the period 2008Q1-2017Q1. Economic determinants for Moody's are: (1) Real effective exchange rate, (2) Current account/GDP, (3) Unemployment rate, (4) Per capita income, (5) Foreign reserves/imports, (6) External debt/exports, (7) Gross savings % GDP and (8) GDP growth. There are two significant institutional determinants for Moody's, S&P and Fitch namely Corruption perception index and Property rights. It is no surprise that property rights are pivotal in this period since the governing party – the African National Congress - in South Africa are now stepping up efforts to redistribute land to the "rightful" owners whom lost it unfairly during apartheid (African National Congress, 2012). However, the latter has an unexpected coefficient sign for all three ratings agencies. Economic determinants for S&P are: (1) Real effective exchange rate, (2) Unemployment rate, (3) Per capita income, (4) Foreign

reserves/imports (5) Inflation, (6) Gross savings % GDP and (7) External debt/exports. Moreover, economic determinants for Fitch are: (1) Real effective exchange rate, (2) Unemployment, (3) Per capita income, (4) External debt/exports, (5) Foreign reserves/imports, (6) Gross savings % GDP and (7) GDP growth. Significant economic and institutional determinants are summarised in Annex 2. The Current account/GDP and Inflation coefficients have an unexpected sign for Moody's and S&P, respectively. In addition, the per capita income coefficient has an unexpected sign for all the ratings agencies. Determinants that have expected and unexpected signs will be combined as indices in Part A of Table 8 and only those with conventional signs as identified by literature will be combined in Part B of Table 8.

Certain variables stand out so far as historical events are concerned. For the period 1995Q1-1999Q4, the statistical results for Moody's, S&P and Fitch agree that national elections played a significant role in sovereign debt ratings. Moreover, it should be noted that the sign of the coefficient can take a positive or negative sign depending on the ratings agency's perception regarding the smooth running or a lack thereof of the first South African democratic elections. For example, although not observed in the data, Fitch largely regarded the events during the first democratic national elections to be negative. Events that led to political violence like the rivalry between political parties; Azanian People's Liberation Army, Afrikaner Resistance Movement, Self-Defence/ Self-Protection Units, Internal stability unit and the "Third Force" might have influenced Fitch's perception. However, S&P and Moody's perception regarding political events in this period were positive. The Amendments to the Interim Constitution might have had a positive influence in their perception. In the period 2000Q1-2007Q4 and 2008Q1-2017Q1 Gross savings % GDP had a significant contribution to sovereign debt ratings of all the studied agencies albeit with an unexpected sign in the period 2000Q1-2007Q4. According to Taylor (2009:4), in the period before and after the global financial crises of 2008, savings - proxied by Gross savings % GDP in this study - played an important role. The Corruption Watch (2014) asserts that South Africans think corruption in the national government is getting worse as indicated by the Corruption Perception Index of the Transparency International organisation. Moody's, S&P and Fitch agree with these findings. For the period 2008Q1-2017Q1 the Corruption Perception Index was statistically significant for all three ratings agencies. In addition, inflation and the Corruption Perception Index are statistically significant for S&P. This

means that S&P perceives South Africa as a politically unstable country (Pretorius and Botha, 2016).

4.2 Principal component ordered probit model results

In order to gauge the importance of various determinants, empirical results are derived using an ordered probit model - estimated using the maximum likelihood. Firstly, the General-to-Specific identification strategy is employed to remove redundant or non-converging determinants and then retain determinants that have explanatory power for each ratings agency (Altenkirch, 2005:464-5). This strategy has two steps: (1) regressing ratings of each agency on every individual determinant that is in Table 5 and (2) retaining determinants that are significant for a specific ratings agency. Lastly, significant determinants are combined using the Principal Component Analysis (PCA) method to create two (economic and institutional) composite indices. At times, only one institutional determinant is significant for a given agency. Because of the aforementioned, institutional coefficients are not always interpreted as an index. To test for sampling adequacy, the Kaiser-Meyer-Olkin (KMO) test is employed to check if the use of the PCA method is justified (Teker, Pala & Kent, 2013:126). A KMO test statistic greater or equal 0.5 justifies the use of PCA. An advantage of using this analysis is that it reduces the problem of multicollinearity while the disadvantage is that it does not show the direction of impact a specific determinant has on ratings (Mellios and Paget-Blanc, 2006:9). As a concluding step, these determinants are transformed into indices and are employed as explanatory variables in the model. To estimate the models of respective agencies, the ordered probit equation is estimated through maximum likelihood estimation (MLE). The tables that follows (see table 6, 7 and 8) will be divided into two parts- Part A contains variables with expected and unexpected signs (see: Annex 3, 4 and5) and Part B contains only variables with expected signs (see: Annex 3.1, 4.1 and 5.1).

Indices and determinants that made model standard errors questionable were further filtered out using the General-to-specific method. All the economic models that are reported in table 6, 7 and 8 are multicollinearity robust. Moreover, all the standard errors are homoscedastic. Based on the average Pseudo R-squares, sign unfiltered models fit the data relatively well for the periods 1995Q1 to 1999Q4 and 2000Q1 to 2007Q4 (see Annex 6 and 7). For the period 2008Q1 to 2017Q1, the filtered model fits the data relatively well (see Annex 8). In addition, it is not uncommon for models that employ principal component and factor analysis to have

Pseudo R-squares below 0.5 (see: Mellios and Paget-Blanc, 2006:18 and Teker, Pala & Kent, 2013:127).

Table 6 for the period 1995Q1-1999Q4 is divided into two parts- Part A and B. Part A contains indices made up of determinants that have expected and unexpected signs. Part B reports indices made up of determinants that have expected signs. This paragraph will specifically concentrate on Part A. Based on coefficient signs, ratings agencies had a net negative perception about the South African debt in this period. All three ratings agencies have at least one significant index. Moody's economic index is significant at a 1% significance level. External debt/exports has the largest factor loading in this index. This variable was also found to be significant for ratings by Erdem and Varli (2014) and Mellios and Paget-Blanc (2006), albeit only S&P's ratings were studied in Erdem and Varli's (2014) study. S&P only looked at corruption when assigning ratings according to our findings. This institutional determinant is significant at a 1% level. Pretorius and Botha (2016) and Mellios and Paget-Blanc (2006:5) found corruption to be significant when assigning ratings, especially, for developing countries. Fitch's economic index is significant at a 5% level. Moreover, unemployment has the highest factor loading in this index. In accordance with our findings, Bozic and Magazzino (2013) found that unemployment is an important determinant for assigning ratings in developing countries for all three ratings agencies. Based on variables that have the highest factor loadings in Moody's and Fitch's economic indices, all coefficients in Part A are in line with literature.

When looking at Part B of Table 6, only two variables are significant. Therefore, the model in Part A better suits the given data in this period. However, variables that makeup indices in Part B are all in line with literature findings, therefore, it is worthwhile to investigate findings of this model. Both economic indices in this part are statistically significant at a 1% level. Moreover, just like in Part A, they have negative signs. As in Part A, External debt/exports has the highest factor loading for Moody's. The real effective exchange rate and the unemployment rate both have the highest factor loading for Fitch's economic index. Interestingly, the coefficient took the sign of the unemployment rate variable. Meaning, Fitch put more weight on negatives than positives in this period. It is not uncommon to find the real effective exchange rate significant for assigning ratings (see: Mellios and Paget-Blanc, 2006). In all, based on factor loadings the following variables are important for ratings in this period: External debt/exports, Corruption perception index, Unemployment rate and Real effective exchange rate.

Table 6. Part A and B regression results for the period 1995Q1-1999Q4				
Part A				
Ratings agency	Component	Economic coefficient	Component	Institutional coefficient
Moody's	C1	-.38*** (.15)	-	-
	C2	.09 (.14)		
S&P	-	-	Corruption perception index	-3.50*** (.88)
Fitch	C1	-.29** (.14)	-	-
Part B				
Moody's	C1	-.45*** (.16)	-	-
S&P	C1	-.48 (.33)	-	-
Fitch	C1	-.04*** (.12)	-	-

10%*, 5% and 1%*** level of significance respectively.**

Source: Estimation Results, (2017)

Ceteris paribus holds unless stated otherwise. In Part A of Table 6, should the economic index increase by one unit, Moody's will downgrade ratings by 0.38 units (ratings will be put on negative watch). In addition, the impact of a one unit increase in the economic index will make Fitch downgrade ratings by 0.29 units (ratings will be put on negative watch). On the other hand, if the perceived corruption in South Africa increases by one unit, S&P will downgrade ratings markedly by 3.5 units (three and a half notches and be put on a negative watch). Moving to Part B of the same table, should the economic index increase by one unit, Moody's will downgrade ratings by 0.45 units (ratings will be put on negative watch). On the other hand, the impact of a one unit increase in the economic index will make Fitch downgrade ratings by 0.04 units (no movement on ratings and outlook). Moody's ratings are lenient in Part A whereas those of Fitch are accommodative in Part B.

Looking at Table 7 (2000Q1 - 2007Q4), based on the number of significant indices, the model that best suits the data is that in Part A. Sticking on this part, all economic indices for Moody's have a positive significant impact on ratings at a 1% significance level. Determinants that have the highest factor loading on Moody's C1, C2 and C3 economic indices are: Foreign reserves/imports, External debt/exports and Budget balance. Moody's C2

index took the sign of the variable that has the second highest factor loading: Current Account/GDP - a variable that does not conform to literature - instead of the External debt/exports variable – the highest factor loading variable. Afonso, Gomes and Rother (2011) and Pretorius and Botha (2016) also found that the Current Account/GDP variable has a negative and significant impact on Moody's ratings. However, this variable will be removed in Part B as it does not conform to literature findings. The Budget balance variable is positive and significant for Fitch at a 1% level. Block and Vaaler (2004) found that the budget balance can have a positive impact on ratings. Finally, Moody's viewed South Africa's political rights as positive. This variable is significant at a 1% level. Budget balance has the highest factor loading on S&P's index. However, the index takes the sign of a variable with the second highest factor loading namely inflation. Moreover, this index is significant at a 1% level. Altenkirch (2005) found the variable political rights to have a positive and significant impact on sovereign ratings. In addition, the study was for Moody's and S&P's ratings.

When focusing on Part B of Table 7, Moody's has fewer significant economic indices. In addition, all three ratings agencies have only one significant economic index. As like Part A, only Moody's has a significant institutional determinant. Moreover, the budget balance variable has the highest factor loading for Moody's and Fitch's economic index. The coefficient for this index for both agencies is significant at a 1% level and positive. Unlike in Part A, inflation has the highest factor loading for S&P's index in Part B. Moreover, the coefficient took the sign of the second highest factor loading variable: Budget balance. It is not uncommon to find that the variable inflation has an important impact, particularly on developing countries (Pretorius and Botha (2016); Cantor and Packer, 1996; Block and Vaaler, 2004; Afonso, 2003; Bissoondoyal-Bheenick, 2005). Based on the highest factor loadings and coefficient signs Foreign reserves/imports, External debt/exports, Budget balance, Inflation Political rights and Current account/GDP are the most important determinants for ratings in this period.

Table 7. Part A and B regression results for the period 2000Q1-2007Q4				
Part A				
Ratings agency	Component	Economic coefficient	Component	Institutional coefficient
Moody's	C1	1.51*** (.35)	Political rights	7.00*** (.94)
	C2	1.16*** (.28)		
	C3	.95*** (.25)		
S&P	C1	-.82*** (.14)	-	-
	C2	.27 (.18)		
Fitch	C1	.90*** (.16)	-	-
	C2	.25 (.18)		
Part B				
Moody's	C1	.81*** (.14)	Political rights	6.03*** (.73)
	C2	-.09 (.18)		
S&P	C1	.89*** (.17)	-	-
	C2	.19 (.17)		
Fitch	C1	1.00*** (.17)	-	-

10%*, 5% and 1%*** level of significance respectively.**

Source: Estimation Results, (2017)

Ceteris paribus holds unless stated otherwise. In Part A of Table 7, if the economic index C1, C2 and C3 increases by one unit, Moody's would upgrade sovereign ratings by 1.51 units (one notch and be put on positive outlook), 1.16 units (one notch) and 0.95 units (a notch), respectively. On the other hand, should political rights improve by a unit, Moody's will upgrade ratings by a significant 7 units (seven notches). For other agencies, should an economic index increase by one unit, S&P will downgrade ratings by 0.82 units – the reason is that inflation has the highest factor loading in this index - (put on negative watch) whereas Fitch would upgrade them by 0.9 units (a notch). In Part B, S&P's stance changes as a one unit increase in the economic index leads to an upgrade of 0.89 units (ratings will be put on positive watch), Mood's upgrade is less dramatic as a one unit increase in the economic index results in a 0.81 units upgrade (ratings will be put on positive watch) and Fitch upgrades

ratings by one standard deviation (a notch) should the economic index increase by one unit. Moreover, if political right improve by one unit, Moody's upgrades ratings by 6.03 units (ratings improve by six notches). A possible explanation for this big jump is that South African political rights are off a lower base compared to international averages.

Just like the previous two tables, Table 8 is divided into two parts for reasons already explained in the above paragraphs. When looking at Part A of Table 8, C2 is not statistically significant across all ratings agencies. However, Moody's has two more significant economic indices compared to its counterparts. Although this is the case, Moody's does not seem to significantly take institutional determinants into account when assigning ratings to South Africa's foreign debt. Foreign reserves/imports and GDP growth are the economic determinants that had the highest factor loading for Moody's C1 and C3, respectively. The two indices are significant at a 1% level and have coefficient signs that follow determinants that have the highest loadings. Moreover, External debt/exports is an economic determinant that has the highest factor loading on C1 for both S&P and Fitch. In both cases, the C1 coefficient is statistically significant at 5% and 10% for S&P and Fitch, respectively. However, Fitch's C1 economic index follows the sign of an economic determinant with the second highest factor loading- Foreign reserves/imports- not reported in annex 5. The corruption perception coefficient for S&P and Fitch is significant at 1%. The crux of Part A is that, S&P and Fitch see eye-to-eye with regards to economic and institutional determinants.

Swiftly turning our attention to Part B of Table 8, the Corruption perception index coefficient is still significant for S&P and Fitch and still keeps the same sign as in the previous part. However, the coefficient is significant at a 5% and 1% level for S&P and Fitch, respectively. Foreign reserves/imports has the highest factor loading in Moody's economic index C1. The index's coefficient sign is in-line with that of the determinant with the highest factor loading. External debt/exports and Inflation have the highest factor loadings in S&P's C1 and C2 indices, respectively. C1's coefficient is not in-line with the coefficient sign of External debt/exports, therefore, suggesting that it took the sign of Foreign reserves/imports-the determinant with the second highest factor loading. Moreover, S&P's C1 and C2 indices are statistically significant at 1% and 10% levels. Fitch's economic (C1) coefficient is positive and significant at a 5% level. Foreign reserves/imports has the highest factor loading in this variable. In all, Moody's and Fitch look at the similar economic determinants while S&P and Fitch consider the same institutional determinant when assigning ratings.

Table 8. Part A and B regression results for the period 2008Q1-2017Q1				
Part A				
Ratings agency	Component	Economic coefficient	Component	Institutional coefficient
Moody's	C1	1.82*** (.33)	C4	-.19 (.32)
	C2	-.03 (.19)		
	C3	.66*** (.21)		
S&P	C1	-.99** (.39)	Corruption perception index	-1.27*** (.34)
	C2	-.19 (.17)		
Fitch	C1	.67* (.36)	Corruption perception index	-1.24*** (.29)
	C2	.03 (.19)		
Part B				
Moody's	C1	1.73*** (.34)	Corruption perception index	-.02 (.02)
	C2	.21 (.19)		
S&P	C1	1.32*** (.49)	Corruption perception index	-.86** (.33)
	C2	-.38* (.22)		
Fitch	C1	1.07** (.44)	Corruption perception index	-1.04*** (.32)
	C2	-.35 (.22)		

10%*, 5% and 1%*** level of significance respectively.**

Source: Estimation Results, (2017)

According to factor loadings, the following determinants are important as shown in the regression results in Table 8: Foreign Reserves/imports, GDP growth, External debt/exports, Unemployment rate, Corruption perception index. The variable Unemployment rate, External debt/exports and Foreign Reserves/imports has already been supported in the above paragraphs using various literatures. Therefore, to avoid being repetitive, we substantiate variables yet be supported in this study. Pretorius and Botha (2016) and Mellios and Paget-Blanc (2006:5) found corruption to be significant for developing countries. However, the latter authors found it to have a positive effect. Mellios and Paget-Blanc (2006:5) study both developed and developing nations, thus, developed countries according to them are largely not corrupt. Hence the corruption perception coefficient is positive. Altenkirch (2005) studied

the effect of property rights on ratings and the results proved that property rights are insignificant. However, this study proves otherwise. This may be proving that when one studies an individual country in depth more information can be unearthed. Afonso (2003) also found GDP to be significant for Moody's when assigning sovereign debt ratings. In all, results that are derived from Table 6, 7 and 8 are in line with literature findings.

Ceteris paribus holds unless stated otherwise. In Part A of Table 8, if the economic index C1 and C3 increases by one unit, Moody's will upgrade ratings by 1.82 (ratings will increase by a notch and be put on positive outlook) and 0.66 (ratings will be put on positive watch) units, respectively. Should the economic index improve and perceived corruption increase by one unit, S&P downgrade ratings by 0.99 (by one notch) – the reason is that the variable external debt/exports has the highest factor loading in this index - and 1.27 (decrease ratings by a one notch and put them on negative outlook) units, respectively. Turning our attention to Fitch, should the economic index improve and perceived corruption increase by one unit, Fitch will upgrade and downgrade ratings by 0.67 (put ratings on a positive watch) and 1.24 (decrease ratings by a one notch and put them on negative outlook) units, respectively. This means that S&P and Fitch really frown upon corruption. In Part B, if the economic index increased by one unit, Moody's would upgrade ratings by 1.73 units (increases ratings by a notch and put them on positive watch). Should C1 and C2 economic indices increase by one unit, S&P would upgrade ratings by 1.32 units (ratings would improve by a notch and be put on positive watch) and downgrade ratings by 0.38 units – inflation has the highest factor loading in this index - (ratings would be put on a negative outlook), respectively. In addition, if the perceived corruption increases by unit, S&P would downgrade ratings by 0.86 units (put ratings on a negative watch). Lastly if the economic index and institutional variable increase by one unit, Fitch would upgrade and downgrade ratings by 1.07 and 1.04 units (a notch), respectively.

5. Conclusion and Policy Implications

This study aims to find significant economic and institutional sovereign ratings determinants. In order to evaluate the degree of each determinant's importance overtime, the estimated periods are split into three. The first one is that of 1995 quarter one to 1999 quarter four, the second one from 2000 quarter one to 2007 quarter four and the last one from 2008 quarter one to the first quarter of 2017. The split of these three epochs was informed by the major

economic and political events that significantly affected South Africa. The first significant event was that of a change in the political regime in South Africa in the year 1994, the second was that of the Dot Com bubble of 2000 to 2001 and lastly, was that of the great financial recession in the year 2008.

After the split, sovereign ratings data of Fitch, S&P and Moody's is analysed to get a sense of how they behave when assigning ratings to South African sovereign debt. The more prominent findings are that: S&P's ratings are largely more uncertain compared to the other two agencies while Moody's ratings are more generous relative to what other ratings agencies assign (Alaskka and ap Gwilym, 2013:149). Thus, with some degree of confidence policy makers can expect Moody's to have a better stance regarding the social, institutional, political and economic dealings of the South African economy at any point in time. However, S&P is likely to assign ratings in such a way that no one can confidently predict. Fitch is found to fall in between the above-mentioned ratings agencies in terms of the general stance about the South African economy. Nonetheless, more often than not, Fitch sees eye to eye with S&P.

In order to gauge the importance of different determinants, empirical results are derived using an ordered probit model - which is estimated using the maximum likelihood. Firstly, the General-to-Specific identification strategy is employed to remove redundant or non-converging determinants. Then, determinants that have explanatory power for each ratings agency are retained (Altenkirch, 2005:464-5). Specifically, the General-to-Specific identification strategy is done by: (1) regressing ratings of each agency on every individual determinant that is in Table 5 and (2) retaining determinants that are significant for a specific ratings agency. Lastly, significant determinants are combined using the Principal Component Analysis (PCA) method to create two (economic and institutional) composite indices. At times, however, only one institutional determinant is significant for a given agency. Thus, institutional coefficients are not always interpreted as an index. To test for sampling adequacy, the Kaiser-Meyer-Olkin (KMO) test is employed to check if the use of the PCA method is justified (Teker, Pala & Kent, 2013:126). A KMO test statistic greater or equal 0.5 justifies the use of PCA. An advantage of using this analysis is that it reduces the problem of multicollinearity while the disadvantage is that it does not show the direction of impact a specific determinant has on ratings (Mellios and Paget-Blanc, 2006:9). As a concluding step, these determinants are transformed into indices using PCA and are employed as explanatory variables in the model. To estimate the models of respective agencies, the ordered probit equation is estimated through maximum likelihood estimation (MLE).

Indices and determinants that made model standard errors questionable were further filtered out using the General-to-specific method. All the economic models that are reported are multicollinearity robust. Moreover, all the standard errors are homoscedastic. Based on the average Pseudo R-squares, sign unfiltered models fit the data relatively well for the periods 1995Q1 to 1999Q4 and 2000Q1 to 2007Q4 (see Annex 6 and 7). For the period 2008Q1 to 2017Q1, the filtered model fits the data relatively well (see Annex 8).

Empirical results shown in Table 6, 7 and 8 are divided into two parts- Part A contains indices made up of significant variables with expected and unexpected signs (see: Annex 3, 4 and5) and Part B contains only variables with expected signs (see: Annex 3.1, 4.1 and 5.1). Focusing on the period 1995Q1 to 1999Q4 (Table 6), Moody's, S&P and Fitch's significant indices embody signs of External debt/exports, Corruption perception index and Unemployment rate in Part A, respectively. In Part B, the External debt/ exports and the Unemployment rate variables for Moody's and Fitch, respectively. In the period 2000Q1 to 2007Q4 (Table 7 Part A), Moody's important determinants are: Foreign reserves/imports, Political rights, External debt/exports and Budget balance. While, the determinants Foreign reserves/ imports and Budget balance are important for Fitch and S&P, respectively. In Part B, the budget balance variable has the highest factor loading for Moody's and Fitch's economic index. Inflation has the highest factor loading for S&P's. However, different from Part A, inflation has the highest factor loading in S&P's index in Part B. Moreover, the coefficient took the sign of the second highest factor loading variable: Budget balance. The only significant institutional variable is that of Moody's namely Political rights. Lastly, for the period 2008Q1 to 2017 (Table 8 Part A), Foreign reserves/imports and GDP growth have the highest factor loading for Moody's. Moreover, External debt/exports and Corruption perception index are the determinants that have the highest factor loadings for both S&P and Fitch. However, Fitch's C1 economic index follows the sign of an economic determinant with the second highest factor loading- Foreign reserves/imports- not reported in annex 5. In Part B, Foreign reserves/imports has the highest factor loading for Moody's and Fitch. The variables External debt/exports and Inflation have the highest factor loading in S&P's economic indices.

Results in all three regression tables are in line with literature findings for developing countries. In all epochs, the External debts/exports variable is important. Afonso (2002:72) also found that the variable external debt is particularly important for developing countries. Interestingly, both hedging variables – External debt/ exports and Foreign reserves/imports -

are important for the period 2000Q1 to 2007Q4. This means that, if South Africa country had enough amounts of these two variables it could have sufficiently cushioned the impact of the financial crisis. In the period 2008Q1 to 2017Q1, the problem of corruption in South Africa was well documented by the organisation Corruption Watch. It is therefore not surprising to find that the corruption perception index is significant for all ratings agencies during this period.

The main findings and policy implications of this study are twofold. Firstly, the variable External debts/ exports is important in all three epochs. The smaller this variable is the better South Africa is likely to be rated well. This means that should policy-makers strive to reduce debt and promoted exports, agencies might upgrade ratings and therefore reduce borrowing costs which ultimately bodes well for fiscal policy. Moreover, policy-makers can look to implement corporate and labour laws that allow exporting firms to thrive during economic upturns and hedge against downswings. This can increase tax buoyancy and reduce the external debt over time through primary budget surpluses. Secondly, institutional variables such as political rights and the corruption perception are significant for assigning ratings. Lenders take into account a country's political stance before supplying capital to sovereigns because a political turmoil can negatively affect the ability of a country to service debt. Corruption affects both the ability and willingness to repay sovereign debt. Therefore, if South Africa wants to achieve its developmental and financial objectives, politics should be conducted in such a way that will not deter financial inflows into the state and institutions which are "watch-dogs" should be solidified to promote transparency and expose collusion and unfair agent misconduct. If this is not done, South Africa's ambition of being a developed country will be threatened as investors might perceive the country's policies as uncertain and thus disruptive. Future research can delve into an investigation of how sovereign ratings downgrades and upgrades affect economic growth and development in different phases of the business cycle.

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Appendix

Annex 1. Variable availability			
Variable name	**Period**	**Frequency**	**Source**
GDP per capita	1994 - 2017	Quarterly	Quantec easy data
Inflation	1994 - 2017	Quarterly	Quantec easy data
GDP growth	1994 - 2017	Quarterly	Quantec easy data
Current account/GDP	1994 - 2017	Quarterly	SARB
Index of real exchange rate	1994 - 2017	Quarterly	Quantec easy data
Foreign reserves/Imports	1994 - 2017	Quarterly	IMF, Quantec easy data and SARB
External debt/Exports	1994 - 2017	Quarterly	Quantec easy data and SARB
Unemployment	1994 - 2017	Quarterly	Quantec easy data, Statistics South Africa and SARB
Budget balance	1994 - 2017	Quarterly	Quantec easy data
Property rights	1995 - 2017	Yearly	Heritage.org
Sovereign ratings	1994 - 2017	Variable	Trading Economics
Corruption perception index	1995 - 2017	Yearly	Transparency International
Political rights	1994 - 2017	Yearly	Freedom house
National elections	1994 - 2017	Every five years	Electoral Commission of South Africa (IEC)
Gross savings/GDP	1994 -	Quarterly	SARB

	2017		

Source: Author's own tabulation, (2017)

Annex 2. General-to-Specific approach results and determinant inclusion					
Sub-period	Ratings agency	Determinant	Coefficient sign	Significance level	Inclusion
1995Q1-1999Q4	Moody's	Current account/GDP	+	5%	
		Unemployment	-	1%	
		Per capita income	+	5%	
		External debt/exports	-	10%	
		Foreign reserves/imports	+	10%	
		National elections	+	1%	
	S&P	Real effective exchange rate	-	5%	
		Per capita income	+	5%	
		Budget balance	+	10%	
		External debt/exports	+	10%	
		Inflation	-	10%	
		Corruption perception index	-	1%	
		National elections	+	1%	
	Fitch	Real effective exchange rate	+	1%	
		Unemployment	+	1%	
		Foreign reserves/imports	+	5%	

		Inflation	-	10%	
		GDP growth	-	5%	
		National elections	-	1%	
2000Q1-2007Q4	Moody's	Real effective exchange rate	+	1%	
		Current account/GDP	-	1%	
		Budget balance	+	10%	
		Foreign reserves/imports	+	1%	
		External debt/exports	+	10%	
		Gross savings % GDP	-	5%	
		GDP growth	+	1%	
		Per capita income	+	1%	
		Unemployment	-	1%	
		Political rights	+	1%	
	S&P	Real effective exchange rate	+	1%	
		Current account/GDP	-	1%	
		Unemployment	-	1%	
		Budget balance	+	10%	
		Foreign reserves/imports	+	1%	
		Inflation	-	10%	
		Gross savings % GDP	-	5%	
		GDP growth	+	1%	
		Political rights	+	1%	
	Fitch	Real effective exchange rate	+	1%	

		Current account/GDP	-	1%	
		Unemployment	-	1%	
		Budget balance	+	10%	
		Foreign reserves/imports	+	1%	
		Gross savings % GDP	-	5%	
		GDP growth	+	1%	
		Political rights	+	1%	
2008Q1-2017Q1	Moody's	Real effective exchange rate	+	1%	
		Current account/GDP	+	5%	
		Foreign reserves/imports	+	1%	
		External debt/exports	-	1%	
		Gross savings % GDP	+	1%	
		GDP growth	+	10%	
		Per capita income	-	1%	
		Unemployment	-	1%	
		Corruption perception index	-	1%	
		Property rights	-	1%	
	S&P	Real effective exchange rate	+	1%	
		Unemployment	-	1%	
		Per capita income	-	1%	
		External debt/exports	-	1%	
		Foreign	+	1%	

		reserves/imports			
		Inflation	+	5%	
		Gross savings % GDP	+	1%	
		Corruption perception index	-	1%	
		Property rights	-	1%	
	Fitch	Real effective exchange rate	+	1%	
		Unemployment	-	1%	
		Per capita income	-	1%	
		External debt/exports	-	1%	
		Foreign reserves/imports	+	1%	
		Gross savings % GDP	+	1%	
		GDP growth	+	10%	
		Corruption perception index	-	1%	
		Property rights	-	1%	

Source: Author's own tabulation, (2017)

Annex 3. Sign unfiltered 1995Q1-1999Q4 PCA results							
Ratings agency	Determinants	Factor loadings	KMO test	Component	Eigenvalue	Proportion	Cumulative
Moody's	Unemployment	0.5842	0.5319	C1	1.98433	0.3969	0.3969
	External debt/exports	0.6176					
	Per capita	0.6380		C2	1.30253	0.2605	0.6574

	income						
	Gross savings % GDP	-0.5255					
S&P	Real effective exchange rate	0.5134	0.5754	C1	2.4696	0.4939	0.4939
	External debt/exports	-0.5726					
	Corruption perception index	-0.7071	0.5000	C2	1.21728	0.6086	0.6086
	National elections	0.7071					
Fitch	Real effective exchange rate	0.5915	0.5824	C1	1.82632	0.6088	0.6088
	Unemployment	-0.6443					

Annex 3.1. Sign robust 1995Q1-1999Q4 PCA results

Ratings agency	Determinants	Factor loadings	KMO test	Component	Eigenvalue	Proportion	Cumulative
Moody's	Unemployment	0.5819	0.5321	C1	1.97257	0.4931	0.4931
	External debt/exports	0.6152					
	Per capita	0.6348		C2	1.26359	0.3159	0.8090

	income						
	Foreign reserves/imports	-0.5600					
S&P	Budget Balance	-0.6834	0.5172	C1	1.41195	0.4706	0.4706
	Inflation	0.6379					
	Corruption perception index	-0.7071	0.5000	C2	1.21728	0.6086	0.6086
	National elections	0.7071					
Fitch	Real effective exchange rate	0.7071	0.5000	C1	1.24468	0.6223	0.6223
	Inflation	0.7071					

Source: Author's own tabulation, (2017)

Annex 4. Sign unfiltered 2000Q1-2007Q4 PCA results							
Ratings agency	Determinants	Factor loadings	KMO test	Component	Eigenvalue	Proportion	Cumulative
Moodys	Foreign reserves/imports	0.4425	0.6726	C1	4.79795	0.5331	0.5331
	External debt/exports	0.6474		C2	1.34667	0.1496	0.6827
	Budget balance	-0.7034		C3	1.11641	0.1240	0.8068
S&P	Foreign reserves/i	-0.4639	0.7351	C1	4.10328	0.5129	0.5129

	mports						
	Budget balance	0.6373		C2	1.43128	0.1789	0.6918
	Inflation	0.5727					
Fitch	Foreign reserves/imports	0.4792	0.7745	C1	3.97017	0.5672	0.5672
	Budget balance	0.7814		C2	1.16831	0.1669	0.7341
Annex 4.1. Sign robust 2000Q1-2007Q4 PCA results							
Moody's	Foreign reserves/imports	0.4626	0.7228	C1	4.40362	0.6291	0.6291
	Budget balance	0.8514		C2	1.0582	0.1512	0.7803
S&P	Foreign reserves/imports	0.4935	0.7229	C1	3.69204	0.5274	0.5274
	Budget balance	0.6151		C2	1.39927	0.1999	0.7273
	Inflation	0.6273					
Fitch	Foreign reserves/imports	0.5098	0.7871	C1	3.56768	0.5946	0.5946
	Budget balance	0.8639		C2	1.05385	0.1756	0.7703

Source: Author's own tabulation, (2017)

Annex 5. Sign unfiltered 2008Q1-2017Q41 PCA results							
Ratings agency	Determinants	Factor loadings	KMO test	Component	Eigenvalue	Proportion	Cumulative
Moody's	Foreign	0.4249	0.5538	C1	3.93093	0.4914	0.4914

	reserves/imports						
	Unemployment	0.6316		C2	1.62635	0.2033	0.6947
	GDP growth	0.6212		C3	1.44046	0.1801	0.8747
	Corruption perception index	0.7071	0.5000	C4	1.15681	0.5784	0.5784
	Property rights	0.7071					
S&P	External debt/exports	0.4794	0.6769	C1	3.65105	0.5216	0.5216
	Inflation	-0.6507		C2	1.90372	0.2720	0.7935
	Corruption perception index	0.7071	0.5000	C3	1.15681	0.5784	0.5784
	Property rights	0.7071					
Fitch	External debt/exports	-0.4679	0.6548	C1	3.68931	0.5270	0.5270
	GDP growth	0.6050		C2	1.52219	0.2175	0.7445
	Corruption perception index	0.7071	0.5000	C3	1.15681	0.5784	0.5784
	Property rights	0.7071					
Annex 5.1. Sign robust 2008Q1-2017Q41 PCA results							
Moody's	External debt/expor	-0.5009	0.5910	C1	3.10422	0.5174	0.5174

	ts						
	Foreign reserves/imports	0.5082					
	Unemployment	0.6328		C2	1.38409	0.2307	0.7481
	GDP growth	0.5209					
S&P	External debt/exports	-0.5271	0.5547	C1	2.95921	0.5918	0.5918
	Foreign reserves/imports	0.5041					
	Real effective exchange rate	0.5106		C2	1.17072	0.2341	0.8260
	Unemployment	0.7166					
Fitch	External debt/exports	-0.5009	0.5910	C1	3.10422	0.5174	0.5174
	Foreign reserves/imports	0.5082					
	Unemployment	0.6328		C2	1.38409	0.2307	0.7481
	GDP growth	0.5209					

Source: Author's own tabulation, (2017)

Annex 6. Pseudo R-squares for the period 1995Q1 to 1999Q4		
Ratings agency	**Unfiltered: Part A**	**Filtered: Part B**
Moody's	0.10	0.13
S&P	0.29	0.11
Fitch	0.07	0
Average Pseudo R-square	0.15	0.08

Source: Author's own tabulation, (2017)

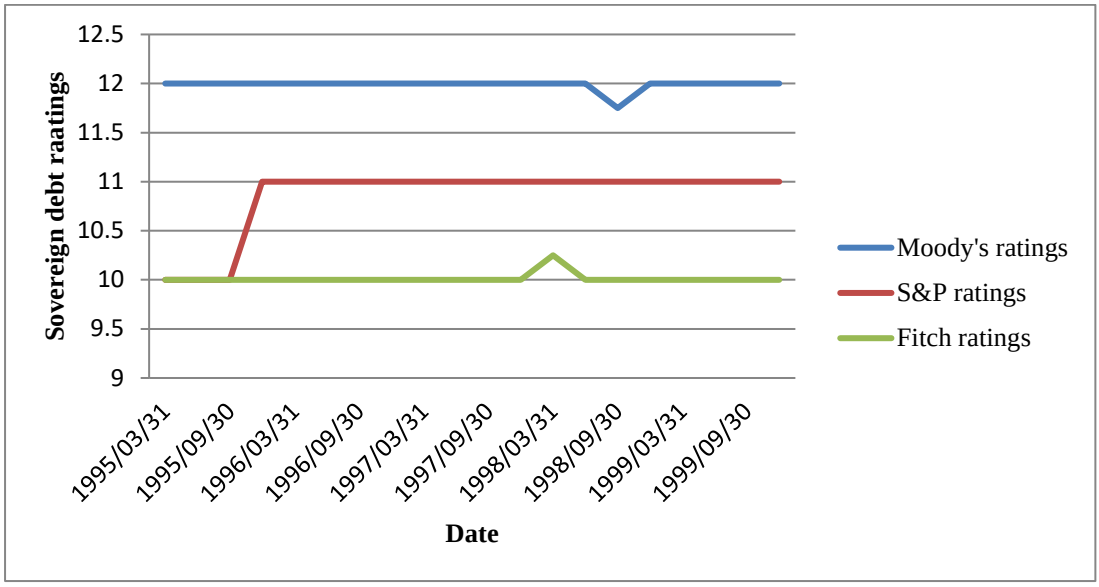
Annex 7. Pseudo R-squares for the period 2000Q1 to 2007Q4		
Ratings agency	**Unfiltered: Part A**	**Filtered: Part B**
Moody's	0.62	0.42
S&P	0.4	0.41
Fitch	0.37	0.4
Average Pseudo R-square	0.46	0.41

Source: Author's own tabulation, (2017)

Annex 8. Pseudo R-squares for the period 2008Q1 to 2017Q1		
Ratings agency	**Unfiltered: Part A**	**Filtered: Part B**
Moody's	0.65	0.61
S&P	0.56	0.59
Fitch	0.53	0.56
Average Pseudo R-square	0.58	0.59

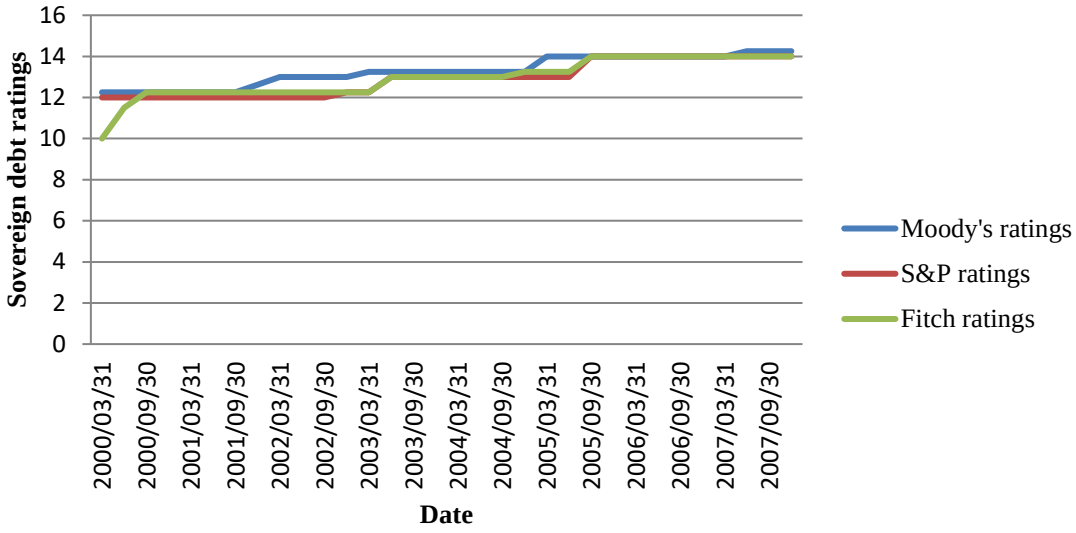
Source: Author's own tabulation, (2017)

Figure 2. Sovereign ratings from 1995Q1 to 1999Q4



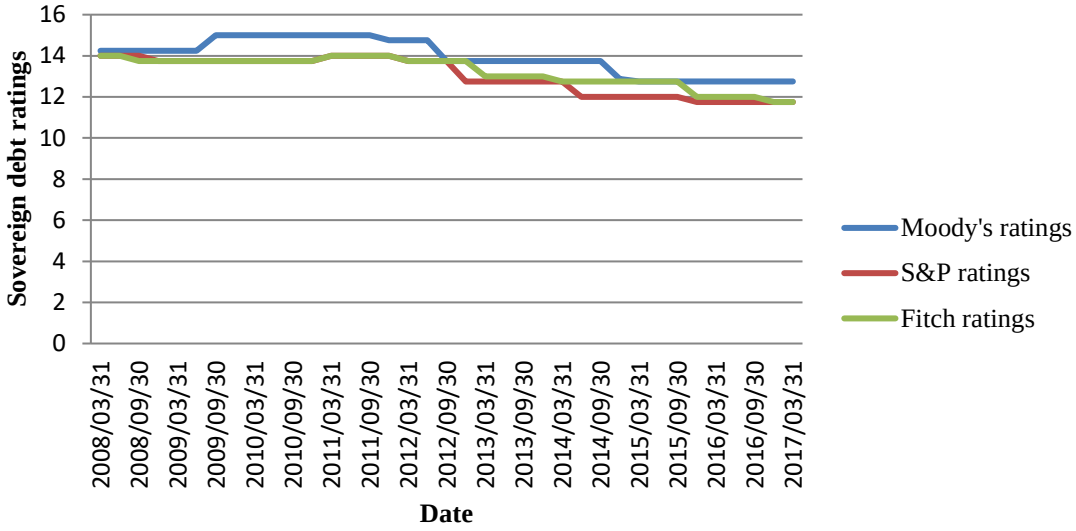
Source: Author's own calculation, (2017)

Figure 3. Sovereign ratings from 2000Q1 to 2007Q4



Source: Author's own calculation, (2017)

Figure 4. Sovereign ratings from 2008Q1 to 2017Q1



Source: Author's own calculation, (2017)

Annex 9. The sovereign ratings scale.			
Bond status	**S&P**	**Fitch**	**Moody's**
Prime	AAA	AAA	Aaa
High grade	AA+	AA+	Aa1
	AA	AA	Aa2
	AA-	AA-	Aa3
Upper medium grade	A+	A+	A1
	A	A	A2
	A-	A-	A3
Lower middle grade	BBB+	BBB+	Baa1
	BBB	BBB	Baa2
	BBB-	BBB-	Baa3
Non-investment grade speculative	BB+	BB+	Ba1
	BB	BB	Ba2
	BB-	BB-	Ba3
Highly speculative	B+	B+	B1
	B	B	B2
	B-	B-	B3
Substantial risk	CCC+	CCC+	Caa1
Extremely speculative	CCC	CCC	Caa2
Default imminent with little prospect for recovery	CCC-	CCC-	Caa3
	CC	CC	Ca
		C	
In default	SD	DDD	C
	D	DD	
		D	

Source: (Afonso, 2003:57)