Nottingham University Business School

Sovereign Credit Ratings: Reframing the Orthodox Paradigm

by **CHOY Swee Yew**

Student ID: 023922

Dissertation submitted to The University of Nottingham for the Degree of Doctor of Philosophy

Under the supervision of Dr TEO Wing Leong and Dr MYINT Moe Chit

Submitted on 11th August 2020

Abstract

This dissertation makes an inquiry into the contested and variegated perspectives of the determinants of sovereign credit ratings given the need to understand both orthodox and unorthodox narratives which drive sovereign rating assessments. Unlike prior studies on sovereign ratings, this dissertation employs a novel approach through exploratory factor analysis, a dimension reduction approach and quantitative grounded theory to distill key factors influencing sovereign ratings. Furthermore, conventional research on sovereign ratings adopt an orthodox and limited selection of variables in their regression analysis, whereas this dissertation engages a large variable set before selecting significant variables through panel regression analysis. The relevance of both the factor approach and the use of unorthodox variables which differ from existing academic literature is validated by methodologies applied by the major credit rating agencies. The results of the panel regression and exploratory factor analysis in this research are systematically compared against existing literature, in order to categorise both orthodox and unorthodox factors and variables, forming a structured basis for theory generation. Consequently, the amalgamation of the empirical results through quantitative grounded theory develop a novel paradigm of sovereign credit ratings, expanding the scope of narratives influencing its determinants. The results suggest methodological refinements in approaching sovereign ratings need to be made. Furthermore, sovereign ratings prioritise the factors of external financial strength, institutional and socio-political quality over other factors. Among others, the discovered unorthodox narratives which influence sovereign ratings include public sector financial health and banking system quality.

Acknowledgements

I would like to thank my supervisors, Dr Myint Moe Chit and Dr Teo Wing Leong for their valuable advice and time throughout all stages of my research. I am also grateful to Dr Tang Kin Boon for his guidance on both scholarly and administrative matters.

The journey through the PhD programme has been made more meaningful with the support of my friends and family. I would also like to thank The University of Nottingham for making possible the opportunity for this deeply gratifying area of research.

Table of contents

Abstract... i

Acknowledgements ii

Table of contents iii

List of Tables vi

List of Figures vii

Chapter 1 Introduction & Overview 1

1.1 Background, relevance & importance 1

1.2 Research Question: Reframing The Orthodox Paradigm?.............................. 5

1.3 Unique Contributions of this Study 7

1.4 Research Process & Methodology Overview... 10

Chapter 2 Literature Review.. 13

2.1 The Paradigm In Praxis: Sovereign Credit Rating Variables In Major Rating Agencies.. 13

2.1.1 Fitch's Sovereign Rating Criteria 13

2.1.2 Moody's Sovereign Rating Criteria 16

2.1.3 Standard & Poor's Sovereign Rating Criteria 21

2.2 The Paradigm In Academia: Conventional Sovereign Credit Rating Variables In Academic Literature.. 25

2.3 Literature Synthesis: In Search of Unorthodox Variables & Gaps In Academic Research 29

Chapter 3 Introduction & Overview of Empirical Chapter 49

3.1 Epistemology and research philosophy 49

3.2 Overview of the three methods used.. 56

3.3 Data.. 58

Chapter 4 Methodology... 60

4.1 Exploratory Factor Analysis (EFA) 60

4.1.1 Methodological context... 60

4.1.2 Other common factor analysis methods 61

4.2 Panel Regression Analysis (PRA) 63

4.2.1 Methodological context 63
4.2.2 Other common regression methods 64
4.2.3 Panel regression model 66
4.2.4 Explanatory/independent variables 70
4.3 Quantitative grounded theory (QGT) 73
4.3.1 Methodological context 73
4.3.2 Elements in the application of QGT 74
4.3.3 Structuring GT in this disseration's scope 77
Chapter 5 Results & Analysis 79
5.1 EFA results & analysis 79
5.1.1 Tests for EFA suitability 79
5.1.2 Factor rotation & extraction 81
5.1.3 Pattern matrix analysis 83
5.1.4 Structure matrix analysis 86
5.2 PRA results & analysis 89
5.2.1 Independent variables distilled through significance levels 89
5.2.2 Independent variables distilled through frequency of occurrence 91
5.2.3 Robustness & predictive checks including extended sample data 93
5.3 QGT results & analysis 100
5.3.1 Structuring comparative analysis, coding and memos 100
5.3.2 Summary of core QGT results 109
5.4 Results discussion: the empirical-theoretical link 117
5.4.1 Factors and latent constructs 117
5.4.2 Independent variables 129
Chapter 6 Conclusion 147
6.1 A new theoretical framework for rating factors 148
6.1.1 Theoretical structure 148
6.1.2 Prioritising two key narratives 150
6.1.3 Synthesising A New Paradigm for Sovereign Credit Analysis 153
6.2 Policy recommendations 157
6.3 Limitations 160

6.4 Future research 161
Appendix A: Transformation of ratings to a numeric scale 163
Appendix B: Analysed variables 164
Appendix C: Example of a structured use of quantitative methods in grounded theory 173
Appendix D: Technical notes and panel regression details 174
References 179

List of Tables

Table 1.1: Explanatory variables within Fitch Ratings criteria (2012)

Table 1.2: Independent variables within Moody's criteria (2013)

Table 1.3: Underlying independent variables within Standard & Poor's criteria (2013)

Table 2: Studies on the variables influencing sovereign ratings

Table 3: 2007-2016 rating variability data

Table 4: Variance explained by extracted factors

Table 5: Random effects panel regression's independent variables

Table 6: Common and distinct variables to each rating agency & frequency of occurrence

Table 7: Robustness test results

Table 8: Predictive likelihoods of PRA equation using 2017 data

Table 9: Structuring comparative analysis, coding and memos: comparative analysis

Table 10: Structuring comparative analysis, coding and memos: coding

Table 11: Structuring comparative analysis, coding and memos: memos

Table 12: Comparison of orthodox and unorthodox factors

Table 13: Comparison of orthodox and unorthodox variables

Table D1 (Appendix D): Results summary comparing fixed effects (FE) and random effects (RE)

Table D2 (Appendix D): Random effects panel regression's independent variables

Table D3 (Appendix D): Descriptive statistics for the variables of Table D2

Table D4: Variance inflation factors (VIF)

List of Figures

Figure 1: Scree plot of factors

Figure 2: Pattern matrix

Figure 3: Structure matrix

Figure 4: A New Paradigm for Sovereign Credit Analysis

Chapter 1 Introduction & Overview

1.1 Background, relevance & importance

Sovereign credit ratings aim to assess the creditworthiness of a nation's (i.e. sovereign borrower's) ability and willingness to repay its debt obligations through an assessment of both quantitative and qualitative criteria (Fitch, 2012; Moody's, 2013; and Standard & Poor's, 2013). This information of creditworthiness is conveyed through an ordinal ranking of letter grades. The importance of the Credit Rating Agencies (CRAs) and their information output is reviewed in the introductory section of this Theoretical Chapter, which discusses the importance of CRAs in context of their impact to economies and capital markets, and how CRAs are formally institutionalised within the capital markets. Subsequent sections detail, explain and tabulate the explanatory variables which will form the basis of research for this dissertation.

Despite sovereign credit ratings being subject to much criticism and heavy scrutiny, their relevance has not diminished and in fact, their importance and need for users' understanding is further emphasised by the presence of such critical narratives. Partnoy (1999) and Bruner & Abdelal (2005) raise the concern of CRAs' hegemony over perceived creditworthiness, with both papers explaining the need for improved oversight and transparency over rating methodologies; Frost (2007) corroborates this concern by discussing the intrinsic subjectivity of the rating process while D'Agostino & Lennkh (2016) explain the need to disentangle the conflation of objective and subjective components of sovereign credit ratings. Issues with the rating criteria or explanatory variables influencing credit rating outcomes have been discussed by Bhatia (2002) and Reisen (2003), who explain that the emphasis placed on particular variables have changed following the Asian Financial Crisis, evidencing a structural break, supported by Galliard (2012) who analyses that rating criteria has expanded with the passing of economic crises. Within these criticisms, information frictions apparent within credit ratings processes can be distilled: (i) lack of methodological or procedural clarity; and (ii) the inter-related problems regarding independent variables, namely, changes in the number of explanatory variables and shifts in the importance being placed on these variables; this dissertation focuses on the latter problems related to an understanding of the independent variables which influence credit rating results. Furthermore, there is a lack of research which examines the situation of rating drivers and variables within the context of methodology papers presented by the dominant rating agencies, highlighting the skewed primacy towards research on variables specified on a theoretical rather than practiced basis.

The relevance and importance of sovereign credit ratings can first be discussed in terms of their role in stimulating capital markets activity, given the impact of rating changes on the prices of financial securities such as bonds, equities and debt derivatives, as investigated by Hand, Holthausen & Leftwich (1992), Hull, Predescu & White (2004) and Ismailescu & Kazemi (2010). Ultimately, since sovereign credit ratings are essentially a measure of a country's willingness and ability to repay its debts, the information effects emanating from these Big 3 CRAs (i.e. Fitch, Moody's and Standard & Poor's) would be accordingly valued and priced into sovereign credit spreads, as affirmed by Cantor & Packer's (1996) landmark paper which constructed a regression model explaining the determinants of sovereign ratings. Notably, Cantor & Packer (1996) describe sharper market reactions as sovereign borrowers cross the Investment Grade (IG) and High Yield (HY) boundary, which is suggestive of the importance of not only granular credit rating grades, but an ontological status accorded by the IG-HY classifications bestowed by the CRAs. Research on the IG-HY taxonomical significance alongside the announcement effects of rating changes has been supported by bond price or yield reactions to migrations between the category, as explained by Hite & Warga (1997), Reisen & Von Maltzan (1999) and Chen et al (2014). On this point, it is also worth noting that present research regarding the determinants of sovereign ratings from the perspective of creditworthiness (as opposed to their relevance to capital markets prices) has yet to explicitly consider the IG-HY categories as dependent variables, rather, choosing to focus their findings on specific letter grades assigned to countries; however, limited quantitative research through a delineation of the IG & HY populations could be due to the expected loss of creditworthiness information for such analysis.

Subsequently, these price effects by CRAs' ratings would have an impact on the real economy, through investing and financing decisions via the conduit of the credit supply market (Sufi, 2006; Tang, 2009). The correlationship and the likely pro-cyclicality of credit ratings in deepening economic contractions through variants of economic and financial markets malaise such as currency crises and systemic liquidity bottlenecks have been well-documented since the Asian Financial Crisis of 1997/98 by Ferri, Liu & Stiglitz (1999), Radelet & Sachs (1998), Reinhart (2002), Manasse, Roubini & Schimmelpfennig (2003), and Sy (2004), amongst others. Similar findings of the correlated impact of rating changes on the economy and capital markets were supported by findings related to the 2007/08 Great Financial Crisis by authors such as Arezki, Candelon & Sy (2011), De Santis (2012), Afonso, Furceri and Gomes (2012), Acharya, Dreschsler & Schnabl (2014).

The CRAs and their ratings have added significance when their structural entrenchment within the capital markets' regulatory and institutional architecture is considered. In fact, Partnoy (1999) and Marandola & Sinclair (2014) suggested that the vesting of quasi-regulatory authority in CRAs could result in a misguided focus on endorsement by rating users as opposed to a rightful focus on substantive creditworthiness and trustworthy information. Bruner & Abdelal (2005) alongside Jorion, Liu & Shi (2005) discuss this endorsement effect from both the implicit significance conferred by ratings as well as explicit regulatory devices such as “Reg FD” pertaining to financial disclosure in the US. Furthermore, apart from government regulations, the use of credit ratings are embedded within the mandates of institutional investors (Gonzalez et al, 2004; Loffler, 2004; Cantor, Gwilym & Thomas, 2007) and the risk management parameters of banks (Cantor, 2001; Carey & Hrycay, 2001; King & Sinclair, 2003).

1.2 Research Question: Reframing The Orthodox Paradigm?

Macroscopically, the philosophical framework of rating agency inputs in order to derive a sovereign credit rating has been largely reliant on the discipline of macroeconomics, and at the same time, requires a significant degree of cross-disciplinary knowledge particularly from the discipline of politics, as can be observed from the sovereign rating methodology reports which will be tabulated in the following sections of this literature review (Fitch, 2012; Moody's, 2013; Standard & Poor's, 2013). As a result, this creates a cornucopia of both rating dimensions and a large range of variables linked to these dimensions.

Essentially, this dissertation attempts to reveal the explicit and implicit variables which are utilized to arrive at a sovereign credit rating. Consequently, the literature review forms a major core of this dissertation since the distillation of these variables within the narratives of the rating agencies will be compared against broader narratives such as those informed by academic, practitioner and inter-disciplinary research, in order to explore potentially underappreciated explanatory variables and to reassess the hegemony of common factors affecting sovereign credit ratings. It is hoped that a broader view and a potential substitute or proxy model of sovereign credit ratings can be derived beyond the dominant narrative, at least as a partial resolution to the information asymmetries presented by uncertainties over CRAs' procedural knowledge. To detail this research concept, the research questions and objectives which may reframe the orthodox paradigm are as follows:

1. What is the represented *paradigm in praxis* and variables considered by the Big 3 CRAs according to their latest methodology papers?

2. What is the represented *paradigm in academia* or the commonly considered independent variables affecting sovereign ratings in academic research?

3. Which variables have yet to be considered in academic research? Has the breadth of variables been comprehensively captured?

4. What is the *practiced paradigm* based on empirical exploration and how does this contrast with CRAs' methodology papers?

5. Can we model a stable paradigm which represents an empirically-derived version of the reality in practice? What are the characteristics and latent constructs of this model, if any?

Collectively, the above research questions are useful in helping answer this dissertation's hypothesis as indicated in the title: **should the orthodox paradigm of sovereign credit ratings be reframed and in what manner?**

1.3 Unique Contributions of this Study

This dissertation contributes to the existing literature in several ways. Firstly, it is the first study to extract variables for research from sovereign rating methodologies, and in this case, the reference point are the methodology papers published from 2012-2013 by the three dominant CRAs. This is unlike existing research which conducts empirical studies on a priori macroeconomic concepts which affect sovereign creditworthiness and hence, focus on the idea of theoretical creditworthiness rather than sovereign ratings as represented in praxis by the dominant CRAs. Nonetheless, this dissertation does not ignore theory but rather, takes the starting point of research originating from variables in practice, followed by a conceptualization by relating the practiced variables and empirical results to theory. Furthermore, value is added because the methodology of the literature review is deliberately extensive for this study since it compares the literature in praxis against the literature in academia in order to sieve out additional variables for research.

Secondly, this research uses the largest variable set amongst existing research in its variables specification, which shall be revealed in the following literature review sections. Consequently, the literature review in this research is the most comprehensive study thus far in terms of enumerating the variety of variables influencing sovereign credit ratings. To summarise, the existing academic literature utilises a theoretically pre-specified set of 7 to 24 variables, while the literature review methodology in this study discovered an additional 20 variables which are being utilised by the dominant CRAs. The purpose of including a broad variable range for research is to avoid a preconceived bias which theoretically pre-selects variables since this study investigates if the existing paradigm needs to be reframed.

Thirdly and related to the second point above, the primary methodology of this research relates to exploring data and forming new theoretical frameworks, rather than model specification and prediction which are secondary methods and upshots of exploratory analysis. Hence, the exploratory method requires the starting point from a large variable set. This is a unique contribution since existing research focuses on using empirical data for building models of predictive analytics rather than using empirical data to question whether the basis of the variables are relevant.

Fourthly, a key output from this research is dimension reduction through the primary exploratory factor analysis (EFA) methodology in order to detect latent constructs rather than individual variables which drive sovereign credit ratings. This is the first study to utilise exploratory factor analysis in order to understand sovereign credit ratings although a close cousin is the use of principal components analysis, another exploratory method, as researched by Mellios & Paget-Blanc (2006). In essence, this study attempts to compare the differences between the broad four or five factors driving ratings as represented by rating agencies (which shall be explored in the literature review section) against the dimensions or latent constructs which are empirically evident from exploratory factor analysis. Furthermore, the exploration of new variables and communalities leading to a better understanding of latent constructs could potentially raise the narratives of linked macroeconomic conceptualisations (as opposed to individual factors) which are important to sovereign credit rating determinants. The other methods employed to complement exploratory analysis is a panel regression method common to research in sovereign credit ratings although the usage here is unique since it focuses on variable exploration and whether the generated regression equations support the results of the EFA. The EFA and panel regression are then melded through quantitative grounded theory for the generation of a new theoretical framework to assist in deciphering sovereign credit ratings. Chapter 4 explains these three methodologies and their use in greater detail.

Fifth, this research does not attempt to build an accurate predictive model unlike the focus of previous studies on the determinants of sovereign ratings. The starting point here is one of scepticism rather than the assumption of variable validity or model consistency. This study questions the paradigm and as such, is the first study to investigate the epistemology of variable selection and ontology of latent construct conceptualisation. Thus, should the regression modelling find inconsistencies in the predictive model of this study, this serves to reinforce the literature concerning epistemological problems and the conflation of subjective and objective variables which could lead to deviations from modelled and actual ratings in practice, as propositioned by Frost (2007) and D'Agostino & Lennkh (2016). It is important to emphasise that this study primarily attempts to unearth the practiced narrative regarding the latent constructs and discover previously under-narrated variables in sovereign credit ratings, with a limited objective in predictive analytics.

1.4 Research Process & Methodology Overview

To achieve the research objectives, the following sections representing the literature review will firstly discuss the paradigmatic and orthodox narrative through the lens of the dominant Big 3 CRAs, namely, Fitch, Standard & Poor's and Moody's, by analysing their methodology papers with the aim of extracting a listing of variables used in praxis. These methodology papers to be assessed are the latest major methodology paper publications in 2012 to 2013, hence the data to be assessed for this dissertation would include information which is based on variables described post-publication of these papers, to be discussed in the following literature review. In consideration of both variable and data completeness, including a time lag for the implementation of the CRAs' new methodology, data employed in this research begins from 2014, and this is also partly due to different fiscal years of reporting governments (e.g. India's fiscal year ends in March). Secondly, the orthodoxy of sovereign credit rating variables in academic literature will be examined through a literature search to enumerate the commonly researched variables in regression equations. Thirdly, the literature review will analyse and highlight issues influencing sovereign credit ratings and risks through the lens of non-credit rating agency sources, such as academic journals and books. From this, the literature review will be able to synthesise the above sources of information to extract variables which have yet to be researched via academic literature. In other words, the variables to be extracted are the "unorthodox" variables which have not been met with sufficient attention as compared to the standard, "orthodox" variables in academic research. Furthermore, a note on the epistemological problem of both procedural and propositional knowledge will be discussed in Chapter 4, to place into context the focus of the investigation on the latter (i.e. explanatory variables) rather than the former (i.e. methodological treatment, such as the nature of the statistical or computational method used).

The synthesis of the variables from both academia and praxis, alongside information from the broader literature linked to sovereign creditworthiness, would form a broad range of variables for research in the Empirical Chapters. The wide range of variables would allow the application of Exploratory Factor analysis of the cross-sectional data which is subsequently employed to distil key dimensions (i.e. latent constructs) and variables to discover key drivers of sovereign credit ratings on an empirical basis without the assumption of an *a priori* paradigm. Following the data exploration, the next step in the empirical study would be to potentially derive a model, through exploratory factor analysis dimension reduction and variable prioritisation in a panel regression model. A quantitative grounded theory methodology would be used to meld the factor analysis with the panel regression results to assist in the systematic generation of a new theoretical framework.

Due to the non-assumption of a priori theoretical variables or dimensions for this study, the latent constructs observed from the results of the dimension reduction methodology needs further theoretical development which follows the empirical results as expected of exploratory research. Furthermore, the importance of the latent construct aspect in this study is based on the next section (i.e. literature review) which explains a dual-layered process in sovereign credit ratings practice (i.e. latent constructs are broad concepts used in ratings criteria, which in turn comprise specific variables), consistent with the methodology of exploratory empirical research in this dissertation.

Chapter 2 Literature Review

2.1 The Paradigm In Praxis: Sovereign Credit Rating Variables In Major Rating Agencies

The following sub-sections explain an outline of the variables considered within rating agencies' methodologies, followed by a table of variables for each of these agencies. Generally, the CRAs utilise a broad factor-based approach whereby related variables are grouped within each factor; as we shall see, these broad factors are related to economic growth, domestic or internal finances, international or external finances and institutional factors. Hence, it can be observed that the paradigm in praxis is essentially a dual-layered process, where a broad range of variables are a subset of four to five dimensions.

2.1.1 Fitch's Sovereign Rating Criteria

Fitch's (2012) methodology explores the strengths and weaknesses in the following factors or latent constructs in order to arrive at a letter grade rating result for a sovereign nation:

1. **macroeconomic** aptitude and outlook;
2. **structural factors** which can either weaken or strengthen a nation to shocks, such as those arising from the economy or political environment;
3. sustainability and structure of **public sector finances**; and

4. **external finances** as indicated by the international financial position of the economy such as trade balances and capital flows.

Table 1.1: Explanatory variables within Fitch Ratings criteria (2012)

Variable	Derivation and description
Macroeconomic	
Consumer price inflation	3 year average CPI, calculated from the previous year, current year, and 1 year forward forecast.
Real GDP growth	3 year average real GDP growth, calculated from the previous year, current year, and 1 year forward forecast.
Real GDP growth volatility	Natural log of the past 10 years' standard deviation of average annual real GDP change.
Public finances (general government)	
Budget balance	3 year average general government (budget) balance as a percent of GDP, calculated as the previous year, current year, and 1 year forward forecast.
Gross debt	3 year average gross (general) government debt as a percent of GDP, calculated from the previous year, current year, and 1 year forward forecast. Countries with reserve currency status are further differentiated within this input.
Interest payments	3 year average gross government interest payments as a proportion of general government revenues.
Public foreign currency debt	3 year average public foreign currency denominated debt as a proportion of gross (general) government debt.
External finances	
Commodity dependence	Non-manufactured merchandise exports as a proportion of current account receipts. *Note: There was a lack of specificity regarding the time frame from which this variable is drawn.*
Current account balance plus net foreign direct investment	3 year average current account balance plus net foreign direct investment as a percent of GDP, calculated from the previous year, current year, and 1 year forward forecast.
Gross sovereign external debt	3 year average gross sovereign external debt (GPXD) as a share of gross external debt, calculated from the previous year, current year, and 1 year forward forecast.
External interest service	3 year average gross sovereign external debt (GPXD) as a share of gross external debt, calculated from the previous year, current year, and 1 year forward forecast.
Official international reserves	Year-end international reserves (including gold), denominated as the number of months' that reserves can cover import payments.

Structural	
Money supply	Natural log of broad money supply as a ratio to GDP. *Note: the definition of broad money is not specified.*
GDP per capita	GDP per capita percentile ranking in US dollars at market exchange rates. *Note: the computation method of market exchange rates was not specified.*
Composite governance indicator	World Bank governance indicators average percentile ranking: 'Rule of Law'; 'Government Effectiveness'; 'Control of Corruption'; 'Voice & Accountability'. *Note: the computation method and description of the "average" was not specified.*
Reserve currency status	Reserve currency status classified in categories of 'strong'; 'medium'; 'low'; or none.
Years since default	The time since the last default (since 1980), the impact of which is dependent on a non-linear function which diminishes the further the country is rated from the period of default.

Fitch (2012) admits that qualitative and intangible factors play an important role in the rating research process, stressing the inter-relationships between variables alongside the difficulty of imputing a linear relationship between rating criteria and the rating letter grade being assigned. In other words, inter-correlations or the factor structure are expected to play an important role in sovereign credit analysis, which goes beyond discriminant analysis common to existing research as we shall see further on in this literature review. Through this, it can be inferred that subsequent research on variables influencing the credit rating result can at best, procure an approximation rather than a precise result. Furthermore, as noted in the last Table 1.1, there are specificities in definitions and calculations which are not clear (as noted in the table), while the use of ex ante forecasts in macroeconomic numbers such as GDP growth and government debt levels would naturally result in data variations which can lead to differences in rating results between rating agencies alongside discrepancies with modelled results.

2.1.2 Moody's Sovereign Rating Criteria

Moody's (2013) describes the variables involved in arriving at the sovereign rating as "key rating factors", and like the other two major rating agencies, considers a broad factor framework which overarches specific variables as follows:

1. **economic strength**;
2. **institutional strength**;
3. **fiscal** or **government financial strength**; and
4. **susceptibility to event risk**.

It worth noting that Moody's (2013) was explicit in explaining the historical relative weight of each rating factor as follows, highlighting the role of represented latent factors:

1. economic strength: 10% of sovereign default cases were due to an adverse economic situation and outlook which lasted over the long term, and was associated with a high level of debt. Moody's also considers adjustment factors, in particular: i) whether economic strength is being artificially boosted by excess credit growth; and/or ii) economic diversification which serve as a buffer against sector-specific downturns.
2. institutional strength: 30% of sovereign default cases were due to institutional and governance weaknesses affecting the sovereign's ability to manage the budget, coupled with political instability such as those associated with civil and military unrest. Adjustment factors may be used

by Moody's in the event certain institutional factors are reasonably expected to explain the riskiness of debt repayment, for example, re-default risk by ex-defaulters.

3. fiscal strength: over a third of sovereign defaults were observed alongside higher debt levels, although this explanation is likely to be a lagging rather than causal indicator. Furthermore, this factor is not straightforward since: i) Moody's (2013) explains that some sovereigns are able to weather a higher level of debt than others; and ii) a government's financial assets and contingent liabilities are taken into account, and these would require investigative interpretation and some human judgment of their materialization since these are off-balance sheet items which may lack transparency (Irwin, 2012; Block & Fall, 2015).

Similar to Fitch's admission that intangible and qualitative factors play a major role in deriving rating results (as explained above in section 2.1), Moody's methodology has significant flexibility in adjusting ratings from the quantitatively derived indicators shown in the following Table 1.2. Moody's (2013) also suggested that the weights provided to each factor could vary, and that the published methodology does not identically match the considerations of the actual rating process. Essentially, idiosyncratic risks need to be accounted for, and Moody's (2013) explains that economic strength can mean a positive rating adjustment due to economic diversification and a negative adjustment factor due to the presence of a credit boom. Furthermore, institutional strength can be adjusted through the track record of default. Fiscal strength can be adjusted to reflect general public sector debt beyond that which is direct from the government, and also adjusted to reflect the presence of liquidity through the government's sovereign wealth fund and financial assets.

Apart from the above, there is also the factor of event risk which comprises political, government liquidity, banking sector and external sector vulnerability risks considered by Moody's (2013) which follows a maximum function approach; this maximum function approach suggests that these risk factors are not additive and hence, they can only worsen a sovereign's credit score up to a limited level. Also, it is worth noting that the quantitative definition for the variables under event risk have not be clearly specified in the methodology report, so one could assume that there are several ways of arriving at the variable measurement result. It would be remiss not to mention that the variables measuring event risks could overlap with other variables already considered, for example, government liquidity with the government debt-to-GDP ratio as described in the following table Table 1.2. As such, the potential co-dependencies of variables reinforce the exploratory purpose of this research in investigating the contribution of both orthodox and unorthodox variables in assessing sovereign credit ratings.

Table 1.2: Independent variables within Moody's criteria (2013)

Variable	Derivation and description
Economic strength	
Average real GDP growth	10 year average CPI, calculated from the past 4 years, current year, and 5 years forward forecast.
Real GDP growth	3 year average real GDP growth, calculated from the previous year, current year, and 1 year forward forecast.
Real GDP growth volatility	Current and past 9 years' standard deviation of average annual real GDP change.
WEF Global Competitiveness Index	Latest index data
Nominal GDP	Latest period nominal GDP in US$
GDP per capita	GDP per capita in US$ in Purchasing Power Parity terms
Credit boom	Adjustment factor - negatively correlated
Diversification	Adjustment factor - positively correlated adjustment factor
Fiscal strength	
General government debt/GDP	Latest period general government debt as a percent of GDP
General government debt/revenues	Latest period general government debt as a percent of revenues
General government interest payments/revenues	Latest period general government interest payments as a percent of revenues
General government interest payments/GDP	Latest period general government interest payments as a percent of GDP
Debt trend	Adjustment factor - 1 year forecast considered with last 5 years.
General Government Foreign Currency Debt/General Government Debt	Adjustment factor – data as at latest period data
Other Public Sector Debt/GDP	Adjustment factor – data as at latest period data
Public Sector Financial Assets or Sovereign Wealth Funds/GDPt	Adjustment factor – data as at latest period data
Institutional Strength	
Institutional effectiveness & framework	World Bank indices on Government Effectiveness, Rule of Law, and Control of Corruption
Inflation Level	Average from the past 4 years, current year, and the forward 5 years forecast.
Inflation volatility	Volatility (whether this is a standard deviation or other measure was not specified) calculated over the last 10 years.

Track record of default.	Adjustment factor, dependent on Moody's expectations of recurrent default
Susceptibility to Event Risk	
Domestic political risk 1	World Bank's Voice & Accountability index
Domestic political risk 2	GDP per capita
Geopolitical risk	Case dependent, for example, North and South Korea tensions.
Government liquidity risk 1	Foreign share of general government debt
Government liquidity risk 2	Gross borrowing requirements as a proportion of GDP
Market funding stress 1	Secondary capital market measures such as CDS; market implied ratings
Market funding stress 2	Presence of bilateral or multilateral funding sources, regional or global programmes supportive of liquidity risk mitigation such as the IMF or EU.
Banking sector risk 1	Contingent liabilities and their risk of materialization (i.e. expected value),
Banking sector risk 2	Likelihood and track record of government support when the banking system is stressed, and presence of explicit guarantees.
Banking sector risk 3	Size of banking system: Total domestic bank assets relative to GDP
Banking sector risk 4	Funding vulnerabilities Loan-to-deposit ratio
External vulnerability risk 1	Latest period data of (Current account balance+FDI)/GDP
External vulnerability risk 2	External vulnerability indicator: Current year due debt and foreign deposits in domestic banks as a share of previous year's official foreign reserves – positively correlated with the vulnerability indicator.
External vulnerability risk 3	Net international investment position/GDP: latest period data of market value of country assets less liabilities as a percent of GDP

2.1.3 Standard & Poor’s Sovereign Rating Criteria

According to Standard & Poor’s (2013), a sovereign credit rating’s criteria or methodology comprises an assessment of the following broad factors:

1. institutional and governance effectiveness;
2. economic structure and growth prospects’
3. external finances;
4. fiscal position; and
5. monetary flexibility.

Standard & Poor’s (2013) suggest that a majority of sovereign defaults were due to both policy and economic problems, alongside a change in investor perceptions. Thus, the rating process comprises both a qualitative and quantitative approach, although the precise weight given to each of these approaches and/or rating criteria was not revealed, suggesting some methodological flexibility involved in arriving at a rating.

The methodological subjectivity is further evident from adjustment factors as described by Standard & Poor’s (2013) which use a good measure of human judgment:

1. A credit rating may fall above or below the systematically-derived credit rating in the event a positive or negative expectation has yet to be completely accounted for.

2. Projected sustainable performance against the peer group is taken into account.
3. There is the expectation that the directional change (i.e. whether positive or negative) in one criteria is counterbalanced by another criteria.

Consequently, Standard & Poor's (2013) like the other CRAs makes use of supplemental factors which are based on expectations, and may even be judged as a dominant factor sufficient enough to imbalance a rating out of the systematically- or model-derived credit rating. As described by Standard & Poor's (2013), some of these vital factors can include projections of a major deterioration in international liquidity, severely weak direct government debt and contingent liabilities position, extremely large liquid assets position, major risks in institutions and governance, and event risks such as civil instability.

Table 1.3: Underlying independent variables within Standard & Poor's criteria (2013)

Variable	**Derivation and description**
Economic structure & growth prospects	
GDP per capita growth	10 year average GDP per capita, calculated from last 6 years, current year and 3 years forward forecast.
GDP per capita	GDP per capita in USD, ordinal ranking within 6 categories of GDP per capita ranges and periodically adjusted to reflect relative changes.
Economic concentration to cyclical sector	Typically a negative adjustment for concentration to a cyclical sector with greater than 20% share of GDP, or major concentration in industry susceptible to force majeure risks.
Size of liquid assets	Typically a positive adjustment for assets, less debt, of over 50% of GDP.
Consumer price index	Average percent change of prices of common consumer goods,
GDP per capita	GDP per capita in US$ in Purchasing Power Parity terms
Deposit claims by corporations	Percent change in private sector depository claims
Monetary base	Local currency in circulation plus depository corporations' deposits at the central bank, a measurement of credit growth.

External finances	
Current account receipts	Net exports of goods and services including transfers to residents from non residents.
Official reserves	Monetary authority's foreign liquid assets. Time span undefined.
Useable reserves	Liquid reserves useable for debt repayment and foreign exchange operations.
Gross external financing needs	Current account payments plus short-term (1 year) external debt stock and maturing debt plus foreign deposits, as a percent of current account receipts plus useable reserves.
Narrow net external debt / current account receipts	Foreign borrowings minus official reserves minus net foreign assets as a percent of current account receipts. More applicable for actively traded currencies (see below variable).
Net foreign direct investment / GDP	Net foreign direct investments as a percent of GDP.
Net external liabilities / current account receipts	Net external liabilities inclusive of physical investments and marketable securities as a percent of current account receipts.
Terms of trade	Price of goods exports relative to imports.
Reserve currency status	Reserve currency status (more than 3% of global currency market turnover) provides financial flexibility for the issuance of government debt during volatile economic periods.
Active trading of currency	Active trading of currency (more than 1% of global currency market turnover) leads to monetary flexibility, which permits more short term debt and less reserves accumulation.
Currency status	Qualitatively determined by: (i) credibility of policies & institutions; (ii) size of capital markets; (iii) open capital markets and free floating exchange rates; (iv) use of currencies in global capital markets; and (v) financial system strength.
Balance of payments expectations	Considerations include: (i) access to global financing; (ii) volatility in term of trade; (iii) consistency, errors and omissions in external data.
Fiscal position	
Change in general government debt / GDP	Change in latest year-end and prior year-end general government debt (inclusive of national, regional, local government debt, including social welfare and pension liabilities), as a percent of GDP.
Net general government debt / GDP	General government debt less government liquid assets, as a percent of GDP.
Gross general government debt / GDP	General government debt, as a percent of GDP.
General government interest / general government revenues	Interest payments on government debt as a percent of government revenues.
Access to funding & debt structure	Considerations include: (i) net government debt is over 10% of GDP; (ii) foreign holdings of government debt is consistently over 60% of GDP; (iii) average debt maturity under 3 years; (iv) vulnerability in debt repayment profile caused by acceleration triggers; (v) over 20% of bank lending

	towards the government.
Contingent liabilities	Expected value of liabilities related to potential banking system bail-out, government-related companies, guarantees and off-balance sheet liabilities. Ordinal ranking as limited, moderate, high or very high, at levels of <30%, 30-60%, 61-80%, and >80%.
Institutional & governance effectiveness	
Effectiveness, stability and predictability of policymaking, political institutions & civil society	Qualitatively determined, indicators were not mentioned. Considerations: crisis management, policy framework, political institutions' changes, degree of civil society.
Transparency and accountability of institutions, data and processes	Qualitatively determined, specific indicators were not mentioned. Considerations: checks & balances, corruption, rule of law, independence of media and data providers.
Debt repayment culture	Qualitatively determined, specific indicators were not mentioned. Considerations: willingness to default, arrears in debt, questions over legitimacy of debt transferred between governments, frequency and history of default.
External security risks	Qualitatively determined, specific indicators were not mentioned. Considerations: geopolitical risks and risks of war potentially arising and the type of impact on the economy.
Monetary flexibility	
Ability to use monetary policy and exchange regime	Related to the consideration of the "impossible trinity" in international economics and finance. Sovereigns will risk economic instability of exchange rates are pegged, monetary policy is used, and the capital account is open.
Monetary policy credibility, effectiveness and inflation trends	Considerations include: (i) legal framework and independence; (ii) monetary authority's track record in managing economic downturns; (iii) price stability; and (iv) ability of monetary authority to acts as lender of last resort.
Development of financial system and capital markets	Breadth, depth and advancement of capital markets which should facilitate open capital markets.
Exchange rate regime	A negative adjustment occurs if the exchange rate is controlled
Market transmission and conditions	A negative adjustment occurs if market liquidity and valuation is faced with a sharp decline, or the funding market faces unexpected increasing credit costs.
Monetary union	A negative adjustment occurs where an economy's conditions are incompatible and unsynchronised with the monetary union's policies and economic outlook. For example, an economy could face deflation internally but is unable to adjust interest rates lower since this is controlled by the monetary union's collective interest rate policy.

2.2 The Paradigm In Academia: Conventional Sovereign Credit Rating Variables In Academic Literature

Galliard (2012) explains there had been significant similarities in the range of variables utilized by both academicians and credit rating agencies. However, as the next section (i.e. section 2.3 which is a synthesis of sections 2.1 and 2.2) of this literature review reveals, there are also quite a number of variables which are being considered by CRAs but have yet to be researched as influencing variables to the sovereign rating. As a result, while both credit rating agencies and the academic community have reinforced the importance of some of the key variables which influence sovereign credit ratings, there remain some variables which remain relatively underappreciated. The prevalence of conventional variables which had been researched despite the presence of several other components as suggested by the CRAs imply that existing research had been largely based on known and tested measures, rather than a wider exploratory investigation. Hence, this section of the literature review contributes by broadening the narrative of variables influencing sovereign credit ratings.

The academic literature regarding sovereign credit ratings had been brought into the spotlight since Cantor & Packer's (1996) landmark paper which explained the key variables influencing rating results in a cross-sectional study, in which the following were deemed pertinent: (i) GNP per capita; (ii) GDP growth; (iii) inflation; (iv) fiscal balance; (v) external balance; (vi) external debt; (vii) economic development; and (viii) default history. Subsequent authors such as Afonso (2003) and Bissondhoyal-Bheenick (2005) corroborate these findings alongside others as shown in the following Table 2. It is worth noting that this dissertation relates specifically to literature which focus on the determinants of *sovereign credit ratings* rather than the broader concept of *sovereign creditworthiness*; as such, only research after the mid-1990s is being considered because prior to that, the idea of sovereign credit risk has yet to be narrated through the hegemony and representational devices of sovereign rating agencies. During the early-1990s, information sources of sovereign risk and country risk, was provided by the magazines, Institutional Investor, Euromoney, and the Economist Intellegence Unit (EIU) (Brewer & Rivoli, 1990; Cosset & Roy, 1991; Lee, 1993); 1970s to 1980s literature focused on macroeconomic factors which did not considered the subtext of non-economic variables (e.g. default history) as influencers of sovereign creditworthiness; pre-1970s literature emphasised developing debtor countries and did not appear to perceive developed countries as "borrowers" (Finch, 1951; Mikesell, 1965; Khatkate, 1966; Strange, 1967; Narasinham et al, 1969).

Table 2: Studies on the variables determining sovereign ratings

References	*Model*	*Type of data study; sample size (no. of countries)*	*Period*	*CRA*	*Variables studied*
Cantor and Packer (1996)	OLS	Cross-section; 49	1995	Moody's and Standard & Poor's	7 variables: GNP per capita, GDP growth, inflation, external debt-to-exports ratio, fiscal balance, economic development, and default history.
Afonso (2003)	OLS	Cross-section; 81	2001	Moody's and Standard & Poor's	7 variables: GDP per capita, inflation, developed nation status, external debt-to-exports ratio, development status, default history, fiscal balance.
Borio & Packer (2004)	OLS	Panel; 52	1996-2003	Moody's and Standard & Poor's	24* variables: GDP per capita, GDP growth, inflation, investments, savings, current account balance, net debt, external balance, foreign exchange reserves, government debt, fiscal balance, corruption, political risk, central bank independence, default history, time since last foreign currency default, inflation > 40% (potential default risk), GDP size, domestic private credit, equity market capitalization, loans and credit market size, currency derivatives and spot market turnover, foreign currency liabilities (original sin), sensitivity of income to exchange rate changes (currency mismatch).
Bissondhoyal-Bheenick (2005)	Ordered probit	Panel; 95	1995-1999	Moody's and Standard & Poor's	10 variables: GNP per capita, inflation, fiscal balance, government debt, real exchange rate, foreign reserves, current account balance, net exports, unemployment rate, and unit labour cost.
Mellios & Paget-Blanc (2006)	Ordered logit	Cross-section; 70	2003	Fitch Ratings, Moody's and Standard & Poor's	9 variables: REER, savings, external debt, GNI per capita, trade dependence, inflation, government revenue, corruption, and default history.
Afonso, Gomes & Rother (2007)	OLS and ordered probit	Panel; 58-66	1995-2005	Fitch Ratings, Moody's and Standard & Poor's	12 variables: GDP per capita, GDP growth, inflation, government debt, fiscal balance, government effectiveness, external debt, foreign reserves, current account balance, default history, monetary union, regional cohort effects.
Galliard (2012)	OLS and ordered probit	Cross-section; 95	2006	Moody's	8 variables: GDP per capita, inflation, current account balance, government debt, external debt, foreign reserves, government effectiveness, and default history.
Canuto Dos Santos & de Sá Porto (2012)	OLS	Panel; 66	1998-2002	Fitch Ratings, Moody's and Standard & Poor's	9 variables: GDP per capita, GDP growth, inflation, central government debt-to-central government receipts, trade openness, development level, default history, pensions and social security liabilities, and net external debt.

Bozic and Magazzino (2013)	OLS	Panel; 139	1975-2010	Fitch, Moody's and S&P	10 variables: GNI per capita, GNI growth, inflation, unemployment, fiscal balance, current account balance, government debt, default history, real interest rate, and reserves.
Reusens and Croux (2017)	Ordered probit	Panel; 90	2002-2015	Fitch, Moody's and S&P	10 variables: GDP per capita, government debt, GDP growth, inflation, financial balance, external debt, current account, economic development, Eurozone membership and default history.

Note: In establishing relevant variables relevant to the research question, this table comprise studies which specifically aim to determine the fundamental variables (rather than financial market variables) which influence sovereign credit ratings through the use of general global data, rather than papers which address a sub-space. For example, this table excludes papers which limited the studies to either emerging or developed countries (e.g. Haque et al, 1996; Hilscher and Nosbusch, 2010), excludes papers which consider ratings under contingent economic conditions, such as during financial crises (e.g. Teixeira et al, 2018), and excludes studies that researches the variables as a subset of a broader research aim such as the risk management purposes of ratings (e.g. Hu, Kiesel and Perraudin, 2002). It also excludes papers which focus on methodological improvements through model innovation (e.g. Alexe et al, 2003; Bennell et al, 2006)]. This table is a compilation of papers which consider the determinants of ratings in general.

*In Borio & Packer (2004), permutations of ratios over the same variable which measure similar concepts are excluded for consistency with the above note, and to also adhere to the principles of parsimony and uniqueness given the extant range of variables mentioned (e.g. formulae for overlapping concepts are not individually listed, such as ratios of short-term external debt-to-GDP, short-term external debt-to-foreign exchange reserves, and short-term external debt-to-total external debt). Where concepts being measured are distinct, they are included (e.g. inflation measures economic quality while inflation > 40% indicates a potential default incentive).

2.3 Literature Synthesis: In Search of Unorthodox Variables & Gaps In Academic Research

A triangulation across multiple and varied sources of knowledge could improve the understanding of sovereign credit ratings and unearth the presence of significant but unorthodox predictor variables. As discussed by Pratschke (2003) and Olsen & Morgan (2005), this critical approach encourages the use of methods which target the uncovering of important variables in a pluralist fashion with the scepticism of stylised facts, hence the search for unorthodox predictor variables and demi-regularities in our understanding of sovereign credit ratings.

Guided by this research philosophy, this dissertation utilises a systematic literature review methodology, which is a first comprehensive review of the 3 dominant CRAs' methodology papers to determine the paradigm in praxis. Furthermore, this systematic review is unique as it follows a triangulation process which starts with a comprehensive review of journals to determine the paradigm in academia, followed by a comparison of the academic with perspectives in praxis to unearth "unorthodox" variables for research. It is through this comparison where the literature is synthesised and gaps in the narrative analysed. The relevance of these variables are assessed through a further literature review for each variable.

Since this research does not presuppose the standard usage of orthodox variables directly into the regression analysis, this is an innovation compared to existing literature relating to research on the determinants of sovereign credit ratings as previously shown on Table 2 which tended to focus on the similarities rather than dissimilarities and additions of unexplored variables. Furthermore, unlike the regression and associated observable variable approaches in present academic literature, this dissertation contributes by highlighting that all three dominant rating agencies utilise a paradigm in which atomised variables are combined as the molecules of broader factors (i.e. latent constructs) driving sovereign rating results; the recognition of this approach is then reflected in the dimension reduction methodology (through Exploratory Factor Analysis) and the elaboration of latent constructs to be discussed in the Empirical Chapter.

Based on a comparison of CRA methodology papers (Fitch, 2012; Moody's, 2013; and Standard & Poor's 2013) and pertinent research (Table 2) on the predictor variables of sovereign credit ratings, several gaps can be detected on the components discussed in the following paragraphs. Also, since some of these variables are new to existing research on sovereign ratings or introduce variables which are not commonly measured (for example, as compared to credit growth rates, bank regulations are not as commonly or easily measured with frequent database updates), it is worth elaborating the theoretical rationale and potential measurement tools of these within the broader literature as follows:

1. **Commodity dependence**. Sarr et al (2011) discuss sovereign creditworthiness from the perspective of the *resource curse* where both indebtedness and economic prospects were explained to have suffered in resource-rich countries whose economies are concentrated in the primary exports sector. As elaborated by Ross (1999), Gylfason (2001), Isham et al (2005) and Sarr et al (2011), the explanation of the negative impact to

economic prospects and development due to the resource curse spans several topics including conventional macroeconomics, institutional quality, behavioural economics, civil and political stability which are of course inter-linked with sovereign quality as explained by the rating agencies. Fitch Ratings (2012) proxies this through non-manufactured merchandise exports as a proportion of current account receipts. Sachs (2001) and Isham et al (2005) measures this as natural resource exports as a proportion of GDP, and also suggest the proxy of primary exports as a share of merchandise exports.

2. **Economic diversification**. Moody's (2013) believes that a well-diversified economy which is not particularly exposed to a single sector is more resilient and better positioned to withstand an economic shock, a concept corroborated by Koren & Tenreyro (2004). Kraay & Ventura (2007) and Caselli et al (2015) suggest a finer view where it is not diversification per se which improves economic resilience, but rather, the extent of concentration towards the technological value-add or cyclical sectors in an economy. From this, it may be difficult to conclude with a fixed definition of economic diversification, since it could refer to the degree of industrial diversification, exposure to the primary sector, government regulation or intervention in business, or a focus on the result of economic sensitivity through cycles, or GDP volatility (Christopherson, Michie & Tyler, 2010). Other definitional variants include Borchert & Mattoo (2010) and Ariu (2016) whom suggest that economies inclined towards the services sectors are more resilient, and

measure this as an assessment of the services (as opposed to goods) sector contribution towards GDP growth.

3. **Global competitiveness**. Haidar (2012) discusses the adverse impact that poor industrial competitiveness had on government credit risk, as reflected by budget positions and institutional quality, highlighting the case of Greece, Italy, Portugal and Spain. Like Haidar (2012), Moody's (2013) utilises the World Economic Forum's Global Competitiveness Index, but Haidar (2012) additionally uses the World Bank Doing Business Report as a measurement tool. According to the World Economic Forum (2015), the Global Competitiveness Index assesses factors which promote progress which are needed to maintain prosperity and economic productivity. The World Bank's Doing Business Report (2016) measures the ease of operating a business given factors related to regulatory constraints, operating needs and government administrative requirements. Bissondhoyal-Bheenick (2005) presents a different perspective by incorporating Unit Labour Cost from OECD's database to measure competitiveness in the context of international trade, rather than the operating and internally-focused aspects as discussed by Haidar (2012), Moody's (2013), the World Economic Forum (2016) and the World Bank's Doing Business Report (2016).

4. **Credit or money supply growth**. The CRAs view excess credit growth or money supply as a negative effect due to the risk of creating asset bubbles through over-investments, a concept reinforced, amongst several others, by

Minsky (1992), McKinnon & Pill (1998), Edison, Luangaram & Miller (2000), Borio & Lowe (2002), Adalid & Detken (2007), Orlowski (2008), Schnabl & Hoffmann (2008), Gerdesmeier, Reimers & Roffia (2010), and Haidar (2012) in their analysis of debt creation as causal to economic crises and heightened sovereign credit risk. Fitch (2012) measures this through broad money supply as a ratio to GDP, Moody's (2013) assesses whether credit growth is excessive relative to GDP growth, while Standard & Poor's (2013) examines the monetary base's growth. Unlike the CRAs, the abovementioned journals such as that of Gerdesmeier (2010), links asset prices and excess credit growth directly and as such, includes a proxy for measuring this risk through equity and/or housing prices. As such, it is important in this research to examine the sign of the beta coefficient of the empirical result to detect if it is credit growth on its own which is negative and whether credit supply or market size is a problem in itself.

5. **Reserve currency characteristics**. The presence of being a reserve currency has positive implications on a sovereign's credit rating. For example, Fitch (2012) suggests that reserve currency status is dependent on their internal ordinal classification which is derived on characteristics such as being an IMF Special Drawing Right and constituting a major share of global foreign currency trading turnover. In Moody's (2013) case, reserve currency status is modelled indirectly and contingently, where countries of reserve currencies are accorded a higher weight on debt affordability (i.e. a focus on interest

payments with the implicit assumption of ease of refinancing) while poorer countries are accorded a higher weight on debt burden (i.e. a focus on debt principal). Moody's (2013) then defines a reserve currency as being held in large quantities by central banks although the quantitative definition here is unclear, apart from the recognition that Japan, Switzerland, UK and the US are reserve currencies although this appears to be an accorded "status" with little clarity over the "characteristics"; Fitch (2012) admits to the lack of a common definition for "reserve currency", while Standard & Poor's (2013) explains this as having more than 3% of global foreign currency trading turnover. In fact, reserve currency status appears to be a function of a first mover advantage, and is hence a time-varying factor, entrenched through institutional arrangements (Eichengreen 2005; Eichengreen, 2010). Otherwise, there is a lack of literature exploring the correlationship between reserve currency status and sovereign creditworthiness other than the explanation given by rating agencies.

6. **Net government assets** involve a deduction of government liabilities from assets, hence a larger value of net assets would be positive for the sovereign credit rating. Gray, Merton & Bodie (2007) explain this as an issue of government capital structure and define assets as foreign reserves, net fiscal assets (as the present value of cash flows from revenues less non-discretionary expenditures), and other public assets (such as equity in public sector entities and less tangible aspects such as a monopoly over the supply of currency). Gray, Merton & Bodie (2007) define liabilities as base money

which includes bank reserves and circulating currency, local and foreign currency debt, as well as guarantees such as those to the systemically important financial institutions. Apart from this economic balance sheet approach, Dooley (2000) explains how government assets act as a shield against capital flight and a weak financial system. Moody's (2013) quantifies public sector financial assets and sovereign wealth funds in its assessment of this metric. Standard & Poor's (2013) incorporates liquid assets into its net government debt ratio and also accounts for this as a positive adjustment factor where net assets exceed 50% of GDP, although this is an arbitrary threshold.

7. **External geopolitical risk** (Moody's 2013; Standard & Poor's, 2013)**.** Waldenström & Frey (2011) empirically explain that war and its perceived threat is burdensome to public sector finances and is reflected in higher sovereign financing costs through capital markets, which supports the fundamental economic notion that military or security spending drives up government debt (Barro, 1979; Bohn, 1998). The credit rating agencies judge geopolitical or external security risks on case assessments, hence the lack of a quantitative measure in practice.

8. **Banking sector risk**. The self-reinforcing economic and capital costs feedback loop between sovereign credit risk and the banking sector had been documented by Acharya, Drechsler & Schnabl (2012; 2014) through a transmission via balance sheets where banks are exposed to government

credit risk via bond holdings. Hence, a weakness in the banking sector is expected to be positively correlated to a weakness in the sovereign credit rating. As such, governments have either direct or implicit guarantees to ensure that the financial system continues to function smoothly in the event of economic dislocations. Alter & Schüler (2012) also found evidence of a co-dependence between bank and sovereign credit spreads given negative credit events of the financial sector. Gerlach, Schulz & Wolff (2010) further explain that large banking sectors are perceived by capital markets as additive to risk when overall risk aversion increases, given expectations of costlier government support to banks and higher fiscal deficits in the event banking sector risks materialise. A game-theoretic approach of the sovereign-to-banking sector co-dependence is proposed by Farhi & Tirole (2016) which suggests sovereign and banking sector credit ratings could be proxies to each other. This co-dependence is considered by Moody's (2013) assessment of the size, strength and funding risks of the banking system. Fitch (2012) elaborates this point where banking ratios such as the non-performing loans and capital adequacy ratios are assessed, alongside the amount of contingent liabilities from the financial sector. Standard & Poor's (2013) similarly analyses banking sector risk with contingent liabilities analysis.

9. **Net international investment position**. The net international investment position which combines both external assets and liabilities is considered a more holistic terminology towards assessing external balance as opposed to the more one-sided but conventional definition of external debt (Nakonieczna-

Kisiel, 2011). This definition in assessing external balances is particularly pertinent given the growth of international investments which in turn can contribute to cross-border financial contagion or wealth accumulation (Kubelec, Bjorn-Erik Orskaug & Tanaka, 2007; Jordà, Schularick, & Taylor, 2011). However, it is difficult to assess in which direction does a positive or negative position in this metric affect sovereign creditworthiness, while highly integrated global financial markets has rendered this measure less explanatory as a cause of adverse macroeconomic events (Jordà, Schularick, & Taylor, 2011). Furthermore, valuation gains from quantitative easing and negative interest rates support liability creation and asset inflation, contradicting the reversal expected by Lane & Milesi-Ferretti (2007), for example, as demonstrated by sustained US deficits up till today. Moody's (2013) suggests this metric assesses strains on external financing but also recognises the US as the largest net debtor and Japan being the largest net creditor with no suggestion of which is better, which in turn points to this being contingent on other factors such as reserve currency status. Hence, it is ambiguous as to whether the net international investment position is supportive to a sovereign credit rating or not.

10. **Foreign share of government debt**. This is also known as the non-resident share of government debt and essentially measures the degree of foreign holdings, since this adversely affects the liquidity risk of a government in the event of capital flight where foreign holdings unexpectedly exit the capital market (Kaminsky, Reinhart & Vegh, 2003; Moody's, 2013). However, the

effect of global financial integration of capital markets is debatable. For example, Peiris (2010), find that foreign holdings decrease government bond yields and their volatility. Regarding causality, Rojas-Suarez (1990) and Brutti & Sauré (2013) characterize the level of foreign holdings as a result of macroeconomic issues and sovereign credit risk rather than a cause. However, Dooley (1988) and Conesa & Kehoe (2015) suggest that as debt or foreign portfolio capital builds up, the causality may be unclear, creating a circular feedback loop where debt crises become a function of investors' sentiment. Chuhan, Claessens and Mamingi (1998) take an integrated perspective where both endogenous country factors and exogenous global factors play a role in capital flow changes for an economy. Hence, it is debatable if the proportion and size of foreign holdings in the capital markets is supportive to a sovereign credit rating.

11. **Financial market conditions**. Aikman et al (2009) consider market funding stresses in the context of systemic stability, particularly relating to the financial system rather than in direct relationship to sovereign credit risk, although this relationship can be linked to the issue where sovereign and banking sector risk are correlated, as abovementioned. From this indirect perspective, it is inferred that financial market conditions can be a cause of variation in sovereign credit risk, although the broader literature tends to investigate this with a different view of the causal arrow, that is, the impact of fundamentals and liquidity on the spreads of emerging markets bonds in particular (rather than developed markets); for example, Ferucci (2003) and Hilscher &

Nosbusch (2010). Furthermore, much of the literature continues to emphasise a one-sided causality where sovereign ratings are a cause of higher credit spreads (Reinhart, 2002; Ismailescu & Kazemi, 2010; Afonso, Fuceri & Gomes, 2012). However, the discussion by Moody's (2013) on market implied ratings and more recent literature such as the investigation of credit spreads by Giglio, Kelly & Pruitt (2016) suggests that funding stresses can also be causal to increased sovereign credit risk with the latter emphasising risks to the economic outlook. Thus, sovereigns which finance their governments and refinance through bonds which bear higher interest would have to bear the burden of higher debt repayments. Here, one can conclude that engaging financial market conditions with sovereign credit ratings can lead to a bi-directional causal arrow, which implies that the researcher would have to take a stance as to whether fundamentals reflecting financial market conditions or financial market indicators affect sovereign credit ratings. This dissertation adopts the former stance and considers how financial market conditions proxied by banking sector risk affects sovereign credit ratings, and it would be expected for poor financial market conditions to negatively affect sovereign ratings and vice versa.

12. **Short term liabilities liquidity risk**. Maturity structures that are short raise liquidity risk (Diamond, 1991) and this manifested in the Asian Financial Crisis of 1997/98 where the skew of short term borrowings caused a liquidity squeeze to banks when capital outflows occurred against a backdrop of insufficient reserves (Radelet & Sachs, 1998; Rodrik & Velasco, 1999; Chang

& Velasco, 2000a; Chui, Gai & Haldane, 2002). Similarly, Standard & Poor's (2013) consider this in the context of external financial vulnerability through its assessment of debt maturing within one year, while Moody's recognises this as maturity structure risk and also adds the dimension of non-resident deposits which are essentially liabilities within the banking system that poses capital flight risk. Both rating agencies consider this against external liquidity sources such as international reserves and current account receipts, in line with Chui, Gai & Haldane (2002). Thus, one would expect higher liquidity risk in short term liabilities to negatively impact sovereign ratings and vice versa.

13. **Terms of trade**. The terms of trade, the ratio of export prices against import prices, were found to be statistically significant in its impact on sovereign credit spreads (Hilscher & Nosbusch, 2010), supported by the impact that the terms of trade has on the ability of sovereigns to service their external liabilities which in turn affects international markets access (Bulow & Rogoff, 1989; Catão & Sutton, 2002; Gelos, Sahay & Sandleris, 2011), and its correlationship with longer term economic growth prospects (Mendoza, 1997). However, the terms of trade's significance is not unambiguously positive and is dependent on whether the country is developing or developed (Reinhart, 2002; Cuadra & Sapriza, 2006). The literature on terms of trade is extensive, given its relationship with sovereign creditworthiness and economic prospects, although only Standard & Poor's amongst the Big 3 Credit Rating Agencies explicitly account for terms of trade as a distinct variable, but one could also argue that that this variable may have already been indirectly considered in

other metrics of external financial strength. A such, a healthy terms of trade should be positive to a sovereign credit rating although its impact is not expected to be generally applicable for both developed and developing nations.

14. **Government revenues and interest payments**. From its description, this ratio appears particularly relevant to sovereign credit analysis, given the cointegration between government revenues and spending, and interest payments are a component of that spending (Trehan & Walsh, 1988; Hakkio & Rush, 1991). Quintos (1995), refines the cointegration explanation by focusing on the need for debt to grow at a slower pace than interest payments to be sustainable, corroborating the consensus methodology of all three rating agencies which extract only the interest payments component as an indicator of debt affordability. However, while debt sustainability is a function of interest payments, the literature suggests credence needs to be given to the overall government expenditure function, with Alesina & Ardagna (2010) suggesting that deficit consolidation is more responsive to spending cuts than tax increases. Regardless of whether the revenues or interest rates component is more important in this ratio, one would expect a higher level of government revenues relative to interest payments to be helpful to a higher sovereign credit rating, and a lower ratio to be unfavourable.

15. **Size of public sector lending**. Public sector borrowing and proxies of public sector crowding out of the private sector is viewed as negative to a sovereign credit rating. Standard & Poor's adjusts a rating negatively in the event that over 20% of the banking sector's assets represent government borrowing. This is an issue of directed-lending and state control of banks, which could be a manifestation of an inadequate tax system, corporate governance problems and a maximisation of political interests rather than welfare maximisation, causing a misallocation of resources by reducing banks' earnings, hampering financial development and dampening economic growth (Stiglitz, 1993; Cull & Xu, 2003; La Porta, Lopez-de-Silanes & Shleifer, 2002; Sapienza, 2004; Clarke, Cull & Shirley, 2005; Dinç, 2005; di Patti & Hardy, 2005). At a higher level, excessive public sector lending is symptomatic of financial repression and is antithetical to financial liberalisation (Fry, 1997).

16. **Contingent liabilities**. Contingent liabilities are viewed as a "hidden" or off-balance sheet debt which would add to the sovereign credit risk of a nation. Contingent liabilities are jointly considered by all three rating agencies, although specific ratios used for its measurement was not evident, partly due to the lack of data availability. Corroborating this issue, despite their growth and importance (Hofmans & Van De Coevering, 2014), there lacks an internationally widely-used standard for its classification. As explained by Towe (1990) contingent liabilities measurement is difficult and is largely a probabilistic estimate, for example through an options pricing model or actuarial method. Nonetheless, the rating agencies and Brixi (1998) assess

contingent liabilities through facets such as: i) the risk of financial sector liabilities materialising in the event of banking sector crises; ii) direct government guarantees to debt; iii) implicit guarantees or support to public sector companies; iii) insurance, pensions and age-related expenditures in relation to a social safety net; and iv) non-federal levels of government debt and liabilities of its entities materialising as an actual financial cost, such as sub-national, state and local government debt. While difficult, Brixi (2001) advocates the need for greater information disclosure and analysis of contingent liabilities since it continues to represent an additional cost to public finances in the form of higher interest rates while information opacity by opportunistic governments can lead to the excessive build up of contingent liabilities, creating risks for fiscal stability. Brixi (2001) explains these contingent liabilities will need to be eventually paid, through either higher taxes, selling assets, reducing expenditures, default or a combination of these actions which are unhealthy for credibility, public accountability and economic performance. Furthermore, on the economic impact, Towe (1990) discusses that contingent liabilities such as social security claims can create an intergenerational subsidy which then creates a debt to be paid for by future generations. Empirically, Arslanalp & Liao (2013) find evidence that banking sector contingent liabilities had a positive correlationship with sovereign CDS spreads, suggesting it causes sovereign credit risk to rise.

17. **Policy credibility, stability & predictability**. All three rating agencies place significance on policy stability, in which their assessment includes: i) GDP

growth volatility; ii) CPI volatility and; iii) REER volatility. Hence, lower volatility for these metrics would correlate positive to sovereign ratings. These measures of macroeconomic performance follows the model of policy credibility as evaluated by the state of an economy, rather than credibility with regards to actual actions matching intended actions or normative honesty (Drazen & Masson, 1993; Henisz, 2004). Looking across the literature as compared to the rating agencies' interpretation, the latter dichotomises absolute measures of the key macroeconomic variables of GDP growth, CPI and REER versus their related volatility measures in an attempt to use these results-based measures to gauge policy performance. The orthodox literature as outlined under Table 2 suggests these volatility measures were not seen in this light of assessing policy credibility and as such, were not specifically included in the selection of variables. Indeed, the definition and measurement of policy credibility and stability is varied, such as the use of fiscal and government spending volatility (Henisz, 2004; Fatás & Mihov, 2013) or monetary policy measures (Blackburn & Christensen, 1989; Svensson, 1997, Blinder, 2000).

18. **Monetary flexibility** (Fitch, 2012; Standard & Poor's, 2013). Monetary flexibility is understood by the rating agencies through the ability of the monetary system to adjust to shocks through independent actions by the central bank. Therefore, a higher degree of monetary policy flexibility would be supportive to a nation's sovereign rating. Thus, fixed exchange rate regimes and currency or capital controls are viewed negatively by Standard &

Poor's, and so is a high degree of dollarisation, although the literature on this suggests it can have both positive and negative effects (Alesina, 2001; Edwards, 2001b; Bahmani-Oskooee & Domac, 2003). Additionally, Fitch (2012) considers the inability of a central bank to target inflation to a desired and stable level as a risk, and while this is a valid point as corroborated by Lohmann (1992) and Devereux & Engel (2003), care must be taken to avoid repeating this as a factor since rating agencies had already given consideration to inflation levels under their macroeconomic assessment. Thus, the Standard & Poor's (2013) approach subscribes to the open, liberalised economy model, a common case for flexible exchange rates as expressed both normatively and empirically by Mundell (1961), Obstfeld & Rogoff (1995), Chang & Velasco (2000b), Corsetti (2006), and Duarte & Obstfeld (2008), amongst many others. Similarly, the case against capital controls have gained much traction with the current epoch of open markets, as argued by Edwards (1999) who explains that capital controls are ineffective in controlling capital outflows and are a hurdle for monetary policy independence, while Edward's (2001a) and Edison et al (2004) suggest that the lack of capital controls is generally positive for economic growth. Furthermore, Dooley (1996) suggests that capital controls have been ineffective from the perspective of debt consolidation, particularly relevant when assessing sovereign credit risk.

19. **Extent of civil society**. Standard & Poor's explicitly mentions civil society as a rating consideration, which is a unique sub-factor within the sphere of political and institutional quality. Hence, the concept of qualitative societal

welfare rather than net economic benefits is included in Standard & Poor's analysis, considering issues such as political priorities and how they pertain to the people, social cohesiveness, social mobility and the presence of civic organisations. Knack & Keefer (1997) in their analysis of the World Values Survey and Guiso, Sapienza & Zingales (2004) in their study of financial development, find that social capital has a positive impact on the economy and capital markets. The positive association between civil society, democracy and economic development has further been supported by the influential work of Lipset (1959), Almond & Verba (1963), Rueschemeyer, Stephens & Stephens (1992), Przeworski (2000) and Fukuyama (2001), amongst others. Democracy, in the modern sense of the word, alongside civil society and economic development are believed to form a self-reinforcing nexus and in this context, is critical for the economic assessment conducted by rating agencies. Hence, the concept of civil society gives rise to a closely associated variable of democratic quality and its impact on economic and human development. Collectively, these variables which measure the extent of civil society are expected to be positively correlated with sovereign credit ratings.

20. **Financial system development**. The rating agencies recognise the importance of financial system development as having a positive effect on a sovereign's rating, corroborating the synthesis of literature by Levine (1997) which suggests a positive relationship between economic growth and financial system development. Developed depth and diversification of the financial

markets is also supportive to monetary policy flexibility, transmission and expands the availability of funding avenues (Fitch, 2012; Moody's 2013). Standard & Poor's (2013) evaluates this by measuring the degree of financial intermediation by measuring the extent of local currency deposits and the size of the corporate bond market relative to GDP; also, Čihák et al (2013) enumerate a greater range of indicators used in the World Bank's Global Financial Development Database which encompass measures on the equity market, turnover ratios and bid-ask spreads. Through another facet, Fitch (2012) suggests that the efficacy of financial system regulations and governance are important apart from markets depth, which in turn affects the prior-mentioned variable of banking sector risk. Fitch's (2012) comments are further corroborated by the findings of Čihák et al (2012) who suggest that weak banking system regulation was a major cause of the Great Financial Crisis of 2007/08. Relating to this, Barth, Caprio Jr. & Levine (2004), who developed a database of Bank Regulation and Supervision for the World Bank, find that regulations are supportive when they adhere to information disclosure, private sector ownership and control, and avoidance of moral hazard through optimally aligned incentives, which are particularly important within the assessment of banking system regulatory factors. Given these factors, it appears that financial development comprises several components hence the possibility of several proxy variables, such as those related to banking sector risk as discussed above.

Although these 20 additional concepts (some variables are embedded within these factors) and variables are novel considerations against the prevalent literature, it needs to be noted that these variables are as current as the methodology papers of reference from the Big 3 rating agencies as at 2012-2013, while methodological updates over time could eventually lead to new factors or variables being added. Nonetheless, a reference point must be decided on as with any research to form a structured foundation. Rather than being an impediment, the recognition of this evolutionary process encourages further literature and research updates on sovereign credit ratings which strengthen the case for ongoing investigation in this subject matter. The next chapter also serves as a novel basis as to how this investigation can be conducted in the future as an ongoing process.

Chapter 3 Introduction & Overview of Empirical Chapter

In this chapter, the epistemological context will be initially discussed in light of its relevance to the research question and methodology. Next, the subsequent sections of this chapter will discuss the profile of the data, the quantitative methods of Exploratory Factor Analysis (EFA) and linear panel regression, limitations and delimitations. EFA and linear panel regression will be utilised to complement the purpose of this dissertation, which is to construct and reconstruct the paradigm of how sovereign credit ratings are arrived at, as suggested by this dissertation's title ("Sovereign Credit Ratings: Reframing The Orthodox Paradigm"). Consequently, a substantiated basis of paradigm construction which generates theory needs to be included in the methodology, and this dissertation uses Quantitative Grounded Theory (Glaser, 2008) as a method to systematically generate a theoretical paradigm from the aforementioned EFA and linear panel regression methods.

3.1 Epistemology and research philosophy

The methodology and empirical chapters continue to relate to the research question of evaluating the ontology of published latent constructs or factors within the Big 3 Rating Agencies' methodology papers, affirm important independent variables, and unearth unorthodox variables. It is also worth clarifying the purpose of this research, whereby the goal is not to formulate a deterministic equation or procedural knowledge which predicts sovereign ratings with high statistical significance, but the central goal is to explore the data for the purpose of theory generation or propositional knowledge creation, which allows a holistic assessment of sovereign credit ratings based on the expectation that theoretical gaps exist following methodological changes and the dearth of theoretical advancements in this area of research.

The distinction between procedural and variable (propositional and conceptual) investigation must be clarified since this dissertation emphasises an investigation on the latter issue due to the goal of theory generation, that is, to evaluate if the paradigm needs to be reframed or reconstituted. To achieve this goal, it is necessary this research presents a novel challenge to the epistemological aspect of present research and literature on factors influencing sovereign credit ratings. In the methodological challenge, the investigation has to do with the currently prevalent statistical procedures of combining variables to approximate a sovereign credit rating, although the following paragraphs explain why this is questionable and warrants scrutiny. This proposition leads to the logic that it would be preferable to extend the range of factors (also known as latent constructs) and variables for consideration in arriving at a comprehensively analysed measure of sovereign creditworthiness, rather than compelling an organically evolving rating process into a deterministic mould. This philosophical approach reflects the critical realist notions discussed by Pratschke (2003) and Olsen & Morgan (2005) whereby stylised facts are viewed with scepticism and to be placed under investigation, while unorthodox variables and demi-regularities are sought. Furthermore, this philosophical notion is necessary to set an appropriate backdrop for the use of Quantitative Grounded Theory (Glaser, 2008) as a methodology within the approach of Classic Grounded Theory (Holton & Walsh, 2016), to be further described under section 4.3.

This philosophical perspective is important since it gives basis to the research question, which interrogates model consistency of the practiced paradigm against the narrative in published methodology papers by the CRAs. In other words, do rating agencies apply rating models consistently? Do rating agencies practice what they preach? What are they really practicing? Therefore, it is a novel goal of the empirical study to discover the extent to which existing quantitative approaches such as regression models are helpful in yielding rating results which match published ratings, without the ex-ante prerequisite to develop a statistically accurate model. Rather than being a failure of this dissertation's investigation, a negative result would merely support the notion of a non-linear, dynamic stochastic process in arriving at sovereign credit rating results; conversely, a positive result would also be helpful in presenting a systematic model for understanding the drivers of sovereign credit ratings. The basis for investigating the possibility of a non-linear, judgmental and possibly non-systematic approach being practiced in sovereign credit ratings is explained as follows.

From the literature review, it can be hypothesised that the procedural knowledge (i.e. the methodology by which variables and factors are transformed to the rating) of sovereign credit ratings suggest that deterministic systems are probably less likely to be helpful given the importance of dynamic stochastic processes. As can be seen from Standard & Poor's (2013) consideration of variables above, circumstantial credit adjustments can occur, and in this sense, monetary unions are a good example which identifies the presence of contingent factors towards a negative or positive rating adjustment. In other words, it is not possible to expect a deterministic and even less so, binary outcome which is either a positive or negative result for the variable "monetary union", and hence requires analytical human judgment. To illustrate, consider the case of Greece's predicament during the 2007/08 Great Financial Crisis, where its membership of the European Union meant that it neither could export its way out of a crisis through currency devaluation, nor could monetary and fiscal policy be specifically adjusted to suit Greece's specific need for much greater accommodation, since economic policies had to be paced according to the collective interest of the European Union. Essentially, this is a classic problem of external and internal imbalances amid policy incongruity, as discussed by Giavazzi & Spaventa (2010) and Lane & Milesi-Feretti (2012) in the context of the aftermath of the Great Financial Crisis of 2007/08. Conversely, a booming economy may not wish to suffer the ill effects of excessive inflation if the monetary union requires accommodative economic policy to support laggard neighbours. Additionally, it would be difficult to assess at what point does membership of a monetary union provide benefits beyond the costs of policy rigidities, and an active debate surrounds this issue (Dagnis Jensen & Snaith, 2016; Dhingra & Sampson, 2016; Obara-Minnitt, 2016).

Another stochastic process of consideration is the behavior of serial defaulters under the variable of default history as highlighted by Moody's (2013). According to Moody's (2013), corroborating Reinhart, Rogoff & Savastano (2003), Reinhart & Rogoff (2004) and Asonuma (2012), serial defaulters are more likely to default if they had done so in the past due to the diminishing expected cost to reputation. Again, since this theory can be drawn from the concept of moral hazard through the lens of behavioural and information economics, and since this is a multi-outcome game (Asonuma, 2012), the variable of "default history" remains non-deterministic. The complexity of the model is further amplified when we consider the expected value at risk of seizure of extra-jurisdictional assets, together with the assumption of a utility-maximising sovereign which engages in the moral hazard of risk-shifting behaviour (Grossman & Van Huyck, 1988).

The rating agencies also rely on contingent inputs prior to obtaining a rating result, and as such, methodological sequencing can lead to outcomes which a deterministic linear model is unable to predict. For example, the three CRAs (Fitch 2012; Moody's 2013; Standard & Poor's, 2013) explain that an assessment of the financial system is an integral element of the sovereign credit rating result, and that is in turn dependent on the rating agency's internal assessment of the strength of an economy's banking system, with each country being assigned an appropriate banking system credit rating, and that is in turn dependent on the assessment of individual banks which comprise the banking system alongside the institutional architecture which amalgamates the system. From this perspective, it can be seen that the process of the banking system assessment itself is multi-layered, and the ensuing compromise is one in which information asymmetry inherent in multiple agency relationships creates outcomes which may result in a benefit transfer from end-users to self-interested agents (Ross, 1973; Arrow, 1984; Eisenhardt, 1989). Thus, the informational utility of the rating agency assessment remains constrained given the structural presence of multiple agents and hence, is likely to contain subjective elements rather than a purely objective rating outcome of a deterministic system.

The evolutionary nature of arriving at a sovereign credit rating result thus points to the need to recognise that non-linear methods could be employed in a ratings approach. Bissondhoyal-Bheenick, Brooks and Yip (2006) and Galliard (2012) explain the focus of major research on sovereign credit ratings has been limited to the typical statistical approaches, especially ordinary least squares regression and ordered probit approaches (as tabulated in Table 2 of the literature review). As a result, and perhaps in response to the limitations of a deterministic versus dynamic stochastic system, Bissondhoyal-Bheenick, Brooks and Yip (2006) explained the worth of using case-based reasoning, while Bennell et al (2006) explore the use of artificial neural networks. Consequently, whether a mathematical function can sufficiently explain what comprises a major process of human judgment by the rating analyst is highly questionable.

Whether suitable or not, the fact that various methodological approaches to address concerns of procedural knowledge have been tested suggest a continuing search to define and refine the process by which sovereign credit ratings are understood due to the existence of non-deterministic, stochastic elements. This dissertation, unlike the focus on methodological refinements as seen in Bennell et al (2006) and Bissondhoyal-Bheenick, Brooks and Yip (2006), focuses on propositional knowledge (i.e. independent variables and factors), hence no attempt is being made to reframe the common methodological treatment of independent variables involved in sovereign credit ratings, but rather, focuses on an assumption-free exploration of independent variables which influence the result of the dependent variable, the sovereign credit rating. Reflecting the tenets of exploratory research design, this dissertation tests propositional and conceptual knowledge through the exploration of unorthodox independent variables (and latent constructs) which could explain the drivers of sovereign credit ratings, focusing on an inductive reasoning approach.

The literature review suggests an extensive list of variables have been employed in the practice of assigning sovereign credit ratings, although existing research suggests the full gamut of independent variables have yet to be employed and analysed. This could be due to practical reasons, such as allowing the operationalisation of time series research which has been frequently used thus far. As such, the methodological gaps have been two-fold: (i) a limited range of independent variables partly caused by an *a priori* variable selection assumption; (ii) a focus on time series methods which skips dimension reduction and lacks sufficient investigation of the cross-sectional element; and (iii) the lack of a systematic methodology employed to generate theory for sovereign credit ratings but rather, a rehashing of commonly used variables in equation modelling.

3.2 Overview of the three methods used

Recognising the aforementioned epistemological gaps, this dissertation contributes to understanding sovereign rating variables by utilising three methods in sequence:

(i) exploratory factor analysis (EFA) as the data dimension reduction technique, for each of the rating agencies, providing an empirical basis for revealing the latent constructs;

(ii) panel regression analysis to detect independent variables of importance for the universe of rated countries; and

(iii) quantitative grounded theory (QGT) which completes the loop between data, data processing through EFA and panel regression analysis, and creating a complete nexus through which theory can be methodically generated.

The above methods are necessary in complementing each other since EFA takes a macroscopic approach through the development of factors, while panel regression takes a microscopic approach through the analysis of variables which are part of the overarching factor structure. QGT is useful in pairing up the results of EFA and panel regression analysis to generate theory through a systematic basis, and goes beyond results description to develop theoretically sensitive constructs which comprehensively encompasses the overt and covert meanings and inputs of sovereign credit ratings. Here, the grounded theory is termed “quantitative” by the founder of grounded theory, Glaser (2008), due to its use of quantitative methods in the development of theory as opposed to the common perception that grounded theory is mainly a qualitative exercise. QGT here is philosophically and methodologically viable as explained in the earlier discussed epistemological context using critical realist notions, the dependence on data to form theory analysed through EFA and panel regression, and its structured basis towards theory generation which is especially purposive for this dissertation.

The nuances of the use of EFA, panel regression and grounded theory will be further discussed in the subsequent sections. In particular, attention will be paid to explaining the epistemology, varying concepts, and processes of QGT which are required to integrate EFA and panel regression to create a methodological synergy designed to generate theory through systematic codification which incorporates the formal pillars and processes of Grounded Theory.

3.3 Data

This section explains the sample of sovereigns used in the research, the timeframe, independent variables and dependent variables, and the data sources.

The sample space involves all sovereigns which are rated by at least one of the three major rating agencies from 2014-2016, which presents the available data following the Big Three rating agencies' methodology revisions from 2012-2013. Additional data for 2017 was also subsequently included for the robustness tests. The population of rated sovereigns by the rating agencies' was employed, and where independent variables lacked data, it was excluded on a list-wise basis for the purpose of operating the statistics. Resultantly, for the EFA which groups the observations for the three rating agencies, there are 270 observations across 2014-2016 for all three rating agencies. However, this does not detract from the empirical unearthing of latent constructs through EFA since the three rating agencies have presented a similar approach in their methodology papers with regards to their latent constructs. For the panel regression run on each of the rating agencies' data, there were 193 to 198 observations across 2014-2016 for each of the rating agencies due to differences in the number of rated countries. Data periodicity was annual since not all variables were reported on a more frequent basis (such as a quarterly); for example, the World Bank Governance indicators are reported annually. Furthermore, annual data is appropriate because rating agencies conduct their regular rating reviews on an annual basis following the completion of the government's fiscal year.

Amstad & Packer (2015) explain that certain variables have gained in focus for the credit rating agencies after the Financial Crisis of 2007/08, which would clearly impact the structure of EFA results and the beta coefficients indicating important variables in the panel regression. Thus, this research creates a link between the 2007/08 Financial Crisis with a review of important variables of sovereign credit ratings, of which unorthodox variables and latent constructs may have arisen following the Big Three Credit Rating Agencies' methodological reviews in 2012-2013.

As explained in the literature review, the number of independent variables assessed by the rating agencies far exceeds the number of variables that has been evaluated by academic research thus far (up to 24 variables), where all three rating agencies have a database of at least 40 variables. For the purpose of this research, data sources include the rating agencies, the IMF and World Bank. 50 variables representing the results of the literature review will be used in this research as listed and described in the Appendix B, the widest range of independent variables which have been used in research concerning the determinants of sovereign ratings. This large range of variables is relevant for the dimension reduction method of EFA where we hope to discover relevant variables and how they form communalities with other variables. The dependent variable or target variable, which are the ratings, are transformed into an ordinal scale, with 22 being the highest such that all notches are considered between (and including) the lowest rating at D to the highest at AAA; a table describing this is shown in the Appendix A.

Chapter 4 Methodology

A description and explanation of the three methodologies of Exploratory Factor Analysis (EFA), Panel Regression Analysis (PRA) and Quantitative Grounded Theory (QGT) will be explained as follows. As explained in section 3.2, these methodologies are necessary in complementing each other rather than in producing separate results which are not integrated.

4.1 Exploratory Factor Analysis (EFA)

4.1.1 Methodological context

A purpose of the empirical methodology is to examine the underlying structure of latent variables through the dimension reduction method of exploratory factor analysis (EFA), which could then generate theories which explain the drivers of sovereign credit ratings. A key principle of EFA is the avoidance of a pre-supposition of how relevant variables are to be further categorised as a subset within a structure of broad factors. For this dissertation, a goal is to evaluate if the rating agencies' factor analysis as explained in their methodology papers (Fitch Ratings, 2012; Moody's, 2013; and Standard & Poor's, 2013) are consistent with the observed sovereign credit rating results, whereby the four or five primary factors are generally discussed (depending on which rating agency) as: i) economic profile; ii) public finances; iii) external finances; iv) political and institutional quality, and v) event risk. Within these, there are several independent variables which inform of the quality of each of these broad factors. As such, EFA would allow one to understand if these variable clusters indeed fall into such broad factors as classified by the rating agencies, or whether there are additional or fewer factors than what can be empirically examined. Therefore, this research compares explained notions by the credit rating agencies against a factor structure which is empirically derived through EFA. Hence, the use of exploratory factor analysis here echoes DeCoster (1998) and Field (2014) where the purpose is to discover the cluster of underpinning variables, relationships or communalities between variables, and how they influence a measure (credit ratings in this case).

4.1.2 Other common factor analysis methods

Mellios & Paget-Blanc (2006) utilised the dimension reduction method of principal component analysis (PCA) to extract factors, following which proxy variables are then run through an ordered logistic regression. Mellios & Paget-Blanc (2006) extracted 13 factors which suggests weightier importance amidst the large range of variables used by rating agencies, suggesting a filtering and prioritisation of independent variables which contribute uniquely to the rating assessment. The difference of this dissertation is that it utilises EFA rather than PCA since the latter focuses on dimension reduction while attempting to retain each variable's variance, whereas the former has the added benefit of discovering underlying factors or variable clusters while recognising variable interconnections through shared variances (DeCoster, 1998; Field, 2014).

However, the analysis does not stop at EFA, since EFA heuristically formulates the factor structure through which credit ratings are estimated which allows one to compare the extent to which it matches the constructs of the rating agencies. Therefore, in the second methodological instrument, a panel regression is run to understand the important specific underlying variables by distilling statistically significant and meaningful beta coefficients which are helpful towards understanding today's approach in analysing sovereign credit ratings, particularly after the major methodological changes by the Big Three credit rating agencies from 2012 to 2013. The value of extracting specific variables from the panel regression is to compare if there are new, unorthodox variables being analysed by credit rating agencies in recent years as compared to the prior literature as collated in the literature review. This will then aid in constructing a new paradigm by integrating these quantitative analyses into quantitative grounded theory.

4.2 Panel Regression Analysis (PRA)

4.2.1 Methodological context

A panel regression analysis (PRA) was conducted to understand important variables utilised by credit rating agencies from the wide span of 50 independent variables available for selection. It is important to first highlight that the primary purpose here is to detect variables which contribute are statistically significant to sovereign rating variation. While the panel regression would yield an equation, using this blindly out of context of this research just to lay claim to predictive analytics is dangerous, since this research primarily aims to discover potentially new variables and latent constructs with the recent structural break of rating agencies' methodologies in 2012 to 2013. Furthermore, the panel regression in this case utilises three years of data which is particularly short term, which suggests that the cross-sectional dimension in this panel data analysis is relatively large as compared to the time dimension, which is relevant given the original research question of possibly discovering unorthodox variables and possibly reinforcing orthodox variables following the methodological structural break in 2012 to 2013. Looking forward, if absolutely necessary, the possibility of utilising the panel regression equation for predictive analytics must be viewed with caution. This problem is expected of research which contributes to understanding variables of importance and unorthodox variables on an ex ante basis using short term data for future research and praxis, rather than as an ex post empirical analysis with long term data availability. Therefore, the panel regression here facilitates the process of variable discovery to complement the EFA, and in this research, the panel regression seeks out individual variables of importance unlike the latent structure analysis provided by EFA.

4.2.2 Other common regression methods

Apart from the linear panel regression model, ordered logit and probit frameworks were considered such as those of Mellios & Paget-Blanc (2006) and Afonso, Gomes & Rother (2011), although a conscious choice was made for the former rather than the latter for several reasons. Firstly, with 22 categories of rating notches, an ordered probit model is not coherent as compared to five or six categories, for example. The granularity of the rating differences (i.e. the dependent variable) essentially results in an output which can be likened to a continuous variable which makes the linear panel regression framework more appropriate compared to an ordered probit approach. Secondly, the large number of variables means that the ratio of observations-to-variables is too low, causing the maximum likelihood estimates in the ordered probit model to be inoperable. Thirdly, information is lost with the output of an ordered probit model when compared to the linear model, because the result is forced into a discrete, non-continuous variable and hence, the output loses information richness. For example, being able to detect if the rating output is equivalent to a certain rating with a negative or positive outlook which could have an impending downgrade or upgrade respectively, can be derived from a continuous variable rating result. To clarify through an example, consider a AA-rated sovereign which translates as a numerical rating identifier of 20. The ordered probit model would result in either 19 (AA-) or 20 (AA) or 21 (AA+) as a discrete number, whereas the linear panel model would allow a result of 20.5, for example, which suggest the sovereign has the chance of an upgrade or may even be tagged formally with a “positive outlook” by the rating agency. Also, assuming the result of 20.9 is generated by the linear model, one could have a more convincing equation-driven argument to explain a good likelihood of the sovereign’s upgrade from AA to AA+.

While a delimitation of this research focuses on regression methods, the literature on sovereign ratings has explored other techniques such as artificial neural networks and case based reasoning (Bennell et al, 2006; Bissoondoyal-Bheenick, Brooks, & Yip, 2006). Although these methods are beyond the scope of this dissertation, the presence and emerging role of stochastic, non-linear, non-regression methodologies should be recognised as relevant to sovereign credit ratings research. These artificial intelligence, stochastic models claim the advantage of replicating some aspects of human judgment although it is also somewhat contradictory because it remains based on historical data which does not factor in the idiosyncrasies and changeability of human judgment. However, future research may consider how these methods might be helpful in unearthing new unorthodox variables, and whether these methods need to strictly rely on the a priori specification of variables for input into the artificial intelligence model. Thus far, the known literature suggests that the use of artificial intelligence models have only been utilised for predictive analytics given the availability of large data sets in sovereign ratings and not for the specification of independent variables and latent constructs. For example, Bennell et al (2006) explain the presence of hidden layers in multi-perceptron artificial neural networks which may allude to the presence of an analytical process which related to latent constructs, although nothing has been said of the description or explanation of these hidden layers, corroborating the criticism of artificial intelligence models' black box approach (Benitez, Castro & Requena, 1997).

4.2.3 Panel regression model

Now that the basis of the linear model is established for this research, we move on to discuss the linear panel regression model and its nuances, and the assumptions surrounding the appropriate use of the model. The cross-section specification to panel data can be basically defined by the following equation:

$$R_{it} = \beta X_{it} + \lambda Z_i + \alpha_i + \mu_{it} ;$$

where we have R_{it} a quantitative dependent variable, obtained by a linear transformation which represents the numerical equivalent of the sovereign credit rating. X_{it} represents a vector of time-varying independent variables, and Z_i represents a vector of time-invariant independent variables. i denotes the country for N number of observations or sovereigns in this research, t denotes the period for T number of periods and α_i denotes the individual effects for each country i. β accounts for the sensitivity of the dependent variable R_{it} to independent variable

X_{it}, and the statistical significance of β is important in the variable selection process in this research.

A major assumption of panel data analysis is for the error term μ_{it} to be independent across countries and across time applicable to normal macroeconomic conditions, although the panel regression result will be less useful during, for example, periods of global financial crises and correlated contagions which would naturally render most panel regressions ineffective. This does not invalidate the use of panel regression analysis although it must be highlighted that models have their assumptions of which independent error terms are common in regression models and that the researcher needs to remain aware of the potential breaches of assumptions in certain cases at certain times, such as in the abovementioned financial market contagion and crisis.

Additional assumptions need to be discussed, and apart from the common assumption of independent error terms, a choice needs to be made as to whether a fixed effects or random effects technique is more appropriate, which is explained in the context and assumptions of this research as follows. In the fixed effects variant of linear panel regression, it is assumed that the country-specific effect α_i could be correlated with the independent variables. In line with Mundlak's (1978) formulation discussed in Hsiao (2003), Wooldridge (2002) explains a fixed effects model allows for a correlationship between unobserved effects (i.e. a latent variable or construct) and the observed independent variables. In a random effects model, the time invariant λZ_i is modelled, while the fixed effects model excludes this component. This research delimits the time period of data, hence both the independent variables and dependent variables are relatively time-invariant, leading to the use of a random effects model, similar to Afonso, Gomes & Rother (2011). The research also includes the time-invariant data which is “development status”, important for this research as it would allow one to relate the results to the explanation of rating bias against developing countries by Tennant & Tracey (2016). Furthermore, given that credit rating agencies use a through-the-cycle approach (Löffler, 2013), relatively time-invariant treatment of explanatory variables is to be expected. It is also reasonably expected that equation heterogeneity congruent with random effects is relevant here since each country is unique and furthermore, a fixed effects model requires the onerous assumption of slope convergence. Additionally, Plümper & Neumayer (2012), explain the random effects model does not eliminate variation between observations when estimating coefficients, and hence the random effects model is useful in cases where co-trended data is expected, useful for this study since global and regional economic effects are reasonably expected to contain co-trending data between observations. The following Table 3 supports the time-invariant rationale behind the use of random effects regression in this research, where rating variability is highly limited and even through a 10 year period, where the median change was a mere two notches (which is less than a 10% change within the overall scale of 22 notches within the sovereign ratings ordinal scale).

Table 3: 2007-2016 rating variability data

	Fitch		Moody's		Standard & Poor's		Overall average	
N	102		103		106		311	
	Range of changes	No. of changes	Range of changes	No. of changes	Range of changes	No. of changes	Range of changes	No. of changes
Mean	2.05	1.89	2.30	1.78	2.41	2.25	2.25	1.97
Median	1.00	2.00	1.00	2.00	2.00	2.00	1.33	2.00
Mode	1.00	1.00	0.00	0.00	1.00	2.00	0.67	1.00
Credit rating range / no. of changes	No. of observations by range / no. of changes		No. of observations by range / no. of changes		No. of observations by range / no. of changes		Avg. no. of observations by range / no. of changes	
≥ 7	4	0	6	0	4	3	4.67	1.00
6	3	4	5	1	4	6	4.00	3.67
5	4	4	7	6	4	3	5.00	4.33
4	9	11	4	12	7	10	6.67	11.00
3	11	12	12	11	12	19	11.67	14.00
2	15	22	13	22	24	24	17.33	22.67
1	32	25	22	17	27	21	27.00	21.00
0	24	24	34	34	20	20	26.00	26.00

Whether the fixed effects or random effects model is more appropriate for this particular research is somewhat moot because the research question aims to discover the variables which provide better explanatory power within a given model rather than predictive generalisability. In line with Shmueli (2011), the focus should be on the coefficient of determination or R-squared, and the random effects model appears to provide better explanatory power as can also be seen where the overall R-squared was consistently high across the three rating agencies' sovereign credit ratings, of above 0.81, further detailed in the subsequent PRA results table in the next section 5.2 which lists the notable independent variables. As an additional check, the Hausman tests for the panel regressions were conducted and the results suggest that Fitch and Standard &

Poor's models were appropriately of random effects while Moody's was not. The anomaly of Moody's results could be linked to a non-linear framework, a higher degree of judgmental analysis, and greater reliance on unobserved variables or latent constructs in arriving at final sovereign rating results. As earlier mentioned in the literature review, Moody's explained flexibility in adjusting ratings from quantitatively derived independent variables, that the weights provided to each factor or latent construct could vary, and that the published methodology is not identical to the considerations of the actual rating process. In the language of panel data analysis, this statement could then describe the Moody's rating approach as being ambivalent to its treatment of time-invariant effects, more certain as to its recognition of unobserved variables within a latent construct framework and flexible with its treatment that the country-specific α_i may be correlated and embedded with X_{it}. Therefore, while the coefficient of determination affirms that a large amount of variation in the rating is explained by the variables themselves, there could be a lack of precision in the predictive robustness of a random effects equation due to the a more dominant effect of unobserved latent variables in Moody's approach.

4.2.4 Explanatory/independent variables

Two approaches were considered in the construction of the linear panel regression equation. One approach would be to filter the 50 variables for analysis through the latent constructs as provided by the pattern or structure matrices in the EFA. The second would be to include all variables and have a sequential filtering out process to be determined by the significance of beta coefficients of the independent variables. The first approach which is similar to Mellios & Paget-Blanc (2006) was not used since this may exclude variables inadvertently and the substance of the EFA is still maintained by analysing its results independently from the panel regression analysis. This dissertation utilises the second approach.

This independent usage between EFA and panel regression also ensures that the EFA does not become a filter which causes variable selection bias in the panel regression by a researcher implanting variables for the sake of congruence with the EFA. In fact, gaps between latent construct-to-independent variable comparisons, where for example, a latent construct is not represented saliently in statistical terms by an independent variable, provides an opportunity for rich analysis.

The EFA assists in determining narratives of combined variables while the panel regression analysis explains the importance of individual variables, hence each has its own purpose. The EFA serves to compare the empirically-discovered latent constructs against the presented latent constructs of the rating agency's methodology reports. Meanwhile, the panel regression analysis compares the empirically-discovered specific variables to narrow down a massive list of independent variables to significant ones and from thereon, be determined as orthodox or unorthodox by comparison against existing literature.

Hence, it should be noted that this dissertation maintains an open, wide-angle view of variables for inclusion to the panel regression, hence it is unlike Mellios &

Paget-Blanc (2006) which uses an exploratory method (PCA in their case) to narrow down the variables prior to choosing explanatory variables; but rather, the panel regression is separately conducted for later comparison with EFA results to analyse the extent of latent construct-to-independent variable corroboration and assist in eventual theory generation under QGT. The narrowing or distilling of variables is done through a restricted regression, by first including all variables through the PRA followed by the elimination of individual variables which did not pass the statistical significance test of 10%. The 10% significance test was used due to the exploratory nature of this research and to reduce the inadvertent exclusion of variables which nay have significance substance in advancing the understanding of sovereign ratings (a further explanation on the use of the 10% significance level is explained under Appendix D). Hence, each equation started with all variables, followed by single variable elimination on a sequential basis. This wide to narrow distillation process maintains the philosophical and theoretical openness required for QGT (to be subsequently explained) and the exploratory nature of this research. Since the PRA covers all three rating agencies, another distillation process used on the PRA results entails detecting common variables which suggest a strengthening of the voices of variables which are captured by two to all three rating agencies, as compared to variables which are unique to a single rating agency.

4.3 Quantitative grounded theory (QGT)

4.3.1 Methodological context

We had earlier discussed in section 3.1 regarding epistemology on the importance of the critical realist notion and discovery of propositional knowledge for theory generation in this research. This notion is in line with the concept of Grounded Theory (GT), of which several variants exist, although its origins can be traced back to the seminal book *The Discovery of Grounded Theory* by Glaser & Strauss, written in 1967 (Holton & Walsh, 2016). Due to the ongoing evolution and massive scope of GT, it is important to clarify that this research situates its methodological approach within the "original" form of Classic GT, drawing specifically on the branch of QGT (Glaser, 2008). The specific use of the term QGT helps avoid the common confusion that GT is suitable only for qualitative research, and to ensure that this dissertation is delimited and pragmatically bounded by its focus on the use of quantitative methods within the many Classic GT methods.

The methodological context and philosophy of QGT has extant scope, but it is worth pointing out reiterated strands of thoughts by Glaser (2008) whom explains that QGT: i) essentialises the basis of theory within data; ii) emphasises the prerequisite use of data to derive theory; ii) clarifies the importance of theory generation over hypotheses testing; iii) distinguishes generated QGT from conjectural or speculative grand theory; and iv) differentiates description of quantitative analyses against theory construction *from* quantitative analyses. As such, GT is particularly useful for the purpose of this research in reframing the paradigm of how sovereign credit ratings are assessed (as suggested by this dissertation's title) through the evaluation and generation of theory.

4.3.2 Elements in the application of QGT

As discussed in Glaser (2008) and Holton & Walsh (2016), a common problem in the execution of GT is the risk of GT being carelessly defined and utilised without clear conception of methodological structure, and hence Holton & Walsh (2016) have aptly named their book *Classic Grounded Theory* in recognition of "non-classic" forms of GT and to indicate that the common and contemporary perception of GT might not be similar to intentions of the original authors of GT. Similarly, Classic GT should not be viewed as being dogmatic as this would be oxymoronic to the epistemology of GT, but rather, Classic GT should be viewed as having solid bases through which a common methodological approach across users of GT allows for a structured and identifiable process which allows the researcher to claim to have implemented GT appropriately. To advance this notion, Classic GT is explained as comprising three central tenets which should guide the exercise of QGT towards a systematic standard (Holton & Walsh, 2016):

1. **Emergence.** In GT, theories and concepts should emerge from data, with data being the foundational basis prior to the creation of theories. Hence, GT is very clear at the onset that preconceived notions should not enter

the theoretical narrative, and as earlier mentioned, propositional knowledge is created, rather than the testing of hypotheses. The research approach taken here has found it necessary to conduct a literature review in order to understand the macroeconomic variables which contribute to sovereign credit risk assessment, but does not narrow down the range of variables as found in previous literature reviews. Through this perspective, the principle of emergence in GT is practiced by considering the widest possible range of quantifiable variables for study prior to a narrowing down of variables found to be important through quantitative analysis. In addition, the literature review was used not so much to frame a research question or formulate hypotheses, but to assist in theoretical sensitivity required in GT for the purpose of informed theory generation.

2. **Constant Comparative Analysis.** This technique leads to the unearthing of indicators which are linked to concepts. In QGT and given the aforementioned methods of EFA and PRA, EFA develops concepts while PRA unearths specific variables, and through the interweaving of prior literature, EFA and PRA results allows constant comparative analysis to occur. In this part of GT, the goal would be categorical verification, conceptual and pattern studies, while the presence of many variables being used would serve the purpose of categorical saturation for enhancing theoretical density. Thus, we would be able to determine which concepts and theories appear more important, more dominant, or less important based on constant comparative analysis. As Douglas (2003) and

Lee (2002) suggest, this ranking then allows for the development of core codes, subsequent theoretical sampling for empirically grounded theory formation, and the central theoretical vein which creates the basis for integrating the use of various variables to thicken the notions emanating from the core code. Similarly, concepts and theories would have earned their quantitative relevance through the comparison of results from EFA and PRA, although memoing with theoretical sensitivity by the researcher is also required to provide conceptual and theoretical saturation.

3. **Theoretical Sampling.** It is envisaged that the constant comparative analysis would yield theoretical codes, which can then guide the exploration of the usefulness of a concept in assessing sovereign credit ratings. This would mean allowing the quantitative methods to lend weight to the determination of important and less important concepts and indicators (i.e. variables) which help form the narrative and assessment of sovereign credit ratings. While GT language often discusses sub-groups and sub-samples for consideration in theoretical sampling, the goal of this research is to examine the current state of sovereign credit rating determinants through an open-minded GT approach which uses the aggregated population space of rated sovereigns. In essence, theoretical sampling attempts to lend itself towards developing theoretical saturation and hence, the goal would be to sample the use of the theory upon the emergent factors and variables for the purpose of due diligence. In this

case, the robustness check in the PRA would provide a basis for this theoretical sampling.

4.3.3 Structuring GT in this disseration's scope

In fact, GT is useful for this research as it helps one avoid an unstructured approach to theory generation, which is the ultimate goal of this research. GT matches this goal since it aims to enhance theory and re-angle the lenses of the issues that sovereign credit ratings consider in order to minimise myopia and blind spots. In this case, the extensive literature review on sovereign credit ratings need not be cast aside, proven or disproven, but rather built on and reframed. This open-mindedness of GT is a core epistemology in this research, and has been reiterated by important GT scholars such as Glaser (2008) and Holton & Walsh (2016). Nonetheless, this broad-minded approach runs the risk of evolving without clear structure, hence GT researchers need to make conscious choices. Hence, this dissertation focuses specifically on Quantitative rather than Qualitative or Mixed GT, analyses aggregate observations of rated countries, and focuses the GT approach on unearthing factors and variables on the aggregate population space rather than excessive sub-sampling, which can be an area of future investigation.

Apart from a conscious choice made in the use of Quantitative GT, the omission of Qualitative GT ought to be discussed. Qualitative GT was not employed in this research due to the barrier to access sovereign rating analysts, given the oligopolistic and rarefied nature of the rating agencies, as compared to a mass market object of study where access to interviews is more readily available. Nonetheless, this would help support parsimony and delimits the GT methodology whilst arriving at theoretical saturation for the discovered theory. Furthermore, much secondary quantitative data on macroeconomic variables was already available, and the research in this case has made a deliberate choice to focus on this readily available aspect of data, against the practical backdrop that rating agencies themselves rely largely on such macroeconomic data in driving their decisions, as explained in the rating agencies' methodology papers. Throughout the research process, the reflexive nature of GT research also provides flexibility for the researcher to determine the best course of methodological action for the purpose of GT emergence (Walsh, 2014). However, future research could potentially focus on the users of rating agencies, and it is envisaged that access to these parties would be more plausible and could lead to more objective information, since it covers most users in the financial sector which is a larger and commoditised market as opposed to the less accessible and oligopolistic market of credit rating agencies.

Chapter 5 Results & Analysis

The following results and analysis start with the analysis of latent constructs through EFA, and subsequently supported by a more granular analysis, through independent variables, at the level of PRA. The EFA and PRA are precursors to QGT which advances a structured methodology of theory generation which is a core goal of the research question.

5.1 EFA results & analysis

The section on EFA results and analysis starts with suitability testing, followed by factor rotation and extraction, pattern matrix analysis and structure matrix analysis.

5.1.1 Tests for EFA suitability

The following discusses the suitability of factor analysis and related reliability tests prior to the examination of results.

Exploratory factor analysis (EFA) in this research is required to compare the latent constructs presented in the Big 3 Credit Rating Agencies' methodology papers against empirically discovered latent constructs. For the case of sovereign credit ratings, EFA is particularly relevant since rating agencies tend to cluster variables around broader factors of analysis such as economic structure, external finances, public finances, event risks, political and institutional variables. While this classification is utilised in practice by credit rating agencies, this dissertation further questions whether the categorisation in this case needs to be more granular, and whether the use of a greater number of categories beyond the recommendation by rating agencies would lend greater insight into unique factors which should be paid greater attention. Thus, EFA is helpful since it provides a structure of variables such that the dimension of inter-related variables' analysis is considered, apart from individual specific variables arising out of only a panel regression analysis. EFA results can then be compared against panel regression results to detect differences for analysis and discussion.

Examinations of the pair-wise correlations imply the usefulness of EFA which further suggests the need for dimension reduction. For example, flow indicators of government interest costs correlate well with debt servicing cost with a correlation of above 0.7, and the same can be said of institutional quality indicators such as control of corruption paired with rule of law. Nonetheless, this cursory examination is insufficient and statistical robustness can be obtained by proceeding formally with EFA to distil factors across an otherwise large and unwieldy correlation matrix.

The usual suitability tests of EFA was conducted, which is the Kaiser-Meyer-Olkin (KMO) test and Bartlett's test of sphericity. The results suggest the functionality of EFA in this research, where the KMO measured 0.787 while Bartlett's test returned a significance value of 0.00; the KMO test, being above 0.5, suggests data adequacy for EFA. Furthermore, the KMO result of 0.787 is quite good and suggests that the correlations between the variables are likely to yield a distinct solution after factor rotation in the EFA (Field, 2014).

5.1.2 Factor rotation & extraction

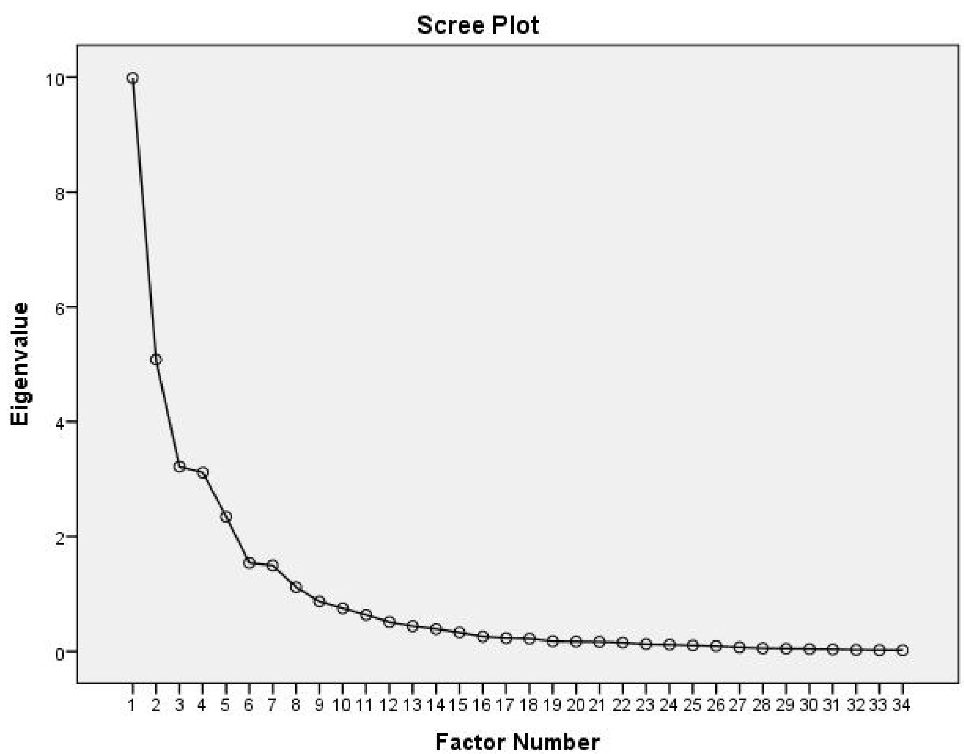
Considering Osborne & Costello (2009) and Field (2014), several iterations of the EFA were conducted to refine factor solution appropriateness, taking into account the size of loadings, number of cross loadings, free-standing factors, number of manifest variables per factor, and theoretical coherence, and whether these refinements led to improvements in total variance explained and the KMO test as compared with earlier iterations.

Following the iterative refinement process, eight factors or latent constructs with eigenvalues above one were extracted, explaining a good 76.84% of the variance of sovereign ratings. Supplementing the Eigenvalues, the scree plot was reviewed and the pivot point suggests the appropriate extraction of eight factors. The implication of this is that only 23.16% of information was not explained by the extracted factors, although this is to be expected given the imputation of judgment-based analysis such that the variation cannot be fully explained by a purely model-driven approach. The first two factors in particular, explained a major 28.84% and 14.33% of the variance which is a cumulative 43.17%. In the subsequent section 5.1.3, these two factors have been labelled as Institutional and socio-political quality and external financial strength.

Table 4: Variance explained by extracted factors

Factor	Identity	Total	% of variance	Cumulative % of variance explained
1	Institutional and socio-political quality	9.987	29.374	29.374
2	External financial strength	5.082	14.946	44.320
3	Monetary policy credibility	3.218	9.466	53.786
4	Government debt structure	3.116	9.166	62.952
5	Trade openness, financial sector depth and external vulnerability	2.347	6.902	69.853
6	Twin deficits propensity	1.543	4.538	74.391
7	Foreign currency dependence	1.497	4.404	78.795
8	Economic growth	1.120	3.294	82.089

Figure 1: Scree plot of factors



Principal axis factoring was conducted with direct oblimin rotation because of the presence of non-normality in data distribution and the oblique rotation was used to account for the likelihood of correlation between variables based on the known behaviour and interrelationships of sovereign debt metrics as expressed in the literature review and the examination of the correlation matrix.

5.1.3 Pattern matrix analysis

Following the rotation, we first evaluate the pattern matrix for the emergence of distinct factors or latent constructs, ranked with the most significant factor in explaining the variation of sovereign ratings placed on top, and labelled as follows:

1. Institutional and socio-political quality
2. External financial strength
3. Monetary policy credibility
4. Government debt structure
5. Trade openness, financial sector depth & external vulnerability
6. Twin deficits propensity
7. Foreign currency dependence
8. Economic growth

The above results from the pattern matrix suggests eight latent constructs as compared to just four or five in the present rating agency methodologies, which are: i) economic profile; ii) public finances; iii) external vulnerability (which is a function of trade openness and financial sector depth as shown by the following matrices); iv) political and institutional quality, and v) event risk. Hence, the pattern matrix also suggests that the variables used in sovereign credit rating analysis in practice likely follows a larger number of categories which is plausible and more likely to take into account some of the large set of 50 variables which are assessable by the Credit Rating Agencies.

The pattern matrix results are therefore, particularly useful and contributes to the methodological knowledge of sovereign ratings for the following reasons:

1. The pattern matrix sharpens the mode of analysis to create focal points, which is useful for sovereign rating analysts sifting through possible combinations of variables for analysis. Thus, the pattern matrix also identifies the variables which ought to be analysed in combination rather than independently.

2. The pattern matrix assists in characterising a paradigm shift from individual variable analysis within a linear framework to one which expresses a grouping of variables being analysed as factors or latent constructs. This further provides links to broader subject matters of importance which assists in the development of a narrative as compared to individual variables which provide limited scope for qualitative understanding.

Figure 2: Pattern matrix

Variable	Factor 1	2	3	4	5	6	7	8
Rule of law	0.956							
Control of corruption	0.944							
Government effectiveness	0.940							
Regulatory quality	0.916							
Ease of doing business	0.823							
Political stability	0.804							
Human development index	0.789							
Voice and accountability	0.712							
Development status	0.642							
GDP per capita	0.535				0.342			
Net sovereign external debt over current acct receipts		0.921						
Net sovereign external debt over GDP		0.893						
Reserves over current account purchases		-0.743						
Sovereign net foreign assets over GDP		-0.710						
Net sovereign foreign currency debt over GDP		0.620					0.389	
Liquidity ratio		-0.499						
CPI volatility			0.986					
Consumer prices			0.934					
REER volatility			0.769					
General government debt over GDP				0.896				
General government debt over revenues				0.868				
General government domestic debt over GDP				0.840				
General government debt maturities over GDP				0.734				
Net external debt over GDP					-0.995			
Trade openness					0.914			
Broad money over GDP				0.302	0.814			
General government primary balance over GDP						0.945		
General government balance over GDP						0.940		
Current account balance over GDP						0.450		
Public foreign currency debt over total debt	-0.377						0.700	
Dollarisation ratio							0.658	
Foreign ownership							0.427	
Real GDP per capita growth								0.845
Real GDP growth								0.743

5.1.4 Structure matrix analysis

Given the nature of the EFA and its benefit of being able to statistically determine communalities across variables, it is worth exploring these links to understand the theories underlying the sovereign credit assessment of rating agencies. The pattern matrix provides insights into the manifest variables which cluster in the latent construct, while the structure matrix lends a further richness to the results analysis of unsuppressed and complex cross-loadings and communalities, which remains pertinent for the social sciences where interdependencies are present (Osborne & Costello, 2009). Furthermore, the pattern matrix results are informative in emphasising the importance of understanding the variable linkages within factors which are in turn related to macroeconomic concepts which group interdependent effects within a single concept, such as the Twin Deficits Hypothesis (this is a long-standing theory, and see for example, amongst many others; Darrat, 1988; Normandin, 1999) and the interaction between Financial Openness with Financial Development and how this places an economy at risk to external financial vulnerability (Calvo, Izquierdo & Meija, 2004; Kim, Lin & Suen, 2010).

In this sense, the pattern matrix provides a first level of understanding through latent constructs, while the structure matrix provides a second level of understanding through the relationship of a latent construct with another latent construct, as well as a variable with another variable through the results of the cross-loadings.

The key findings of the inter-relationships by examining the cross-loadings between the latent constructs or factors in the structure matrix are as follows:

1. Socio-political development cross-loads across several factors: i) monetary policy credibility; ii) government debt structure; iii) twin deficits propensity; iv) external vulnerability; and v) economic growth. This can be explained through the importance of institutions in affecting monetary policy credibility, attitudes towards adopting debt, attitudes towards being part of the liberal economic paradigm and enhancing per capita wealth levels through societal development. There has been much literature written on the relationship between politics, society, and economic development, such as seminal papers by Lipset (1960), followed by Przeworski (2000) and Rodrik (2003).
2. External financial strength cross-loads particularly (>0.5) on foreign currency dependence which is an expected relationship since the higher a sovereign's external financial strength, the weaker the risk link with foreign currency dependence (Obstfeld & Rogoff, 2005; Bordo, 2006; Lane & Milesi-Feretti, 2007).

The other cross-loadings are not particularly distinct, for example, being less than 0.5 or does not have a very pervasive effect on other factors as compared to say, socio-political and institutional development as abovementioned. The moderate cross-loadings for the other variables is a good finding since it vindicates the KMO test result of 0.787 which was earlier mentioned as an indication that the factor solution would provide a good degree of distinctiveness.

Figure 3: Structure matrix

Variable	*Factor* 1	2	3	4	5	6	7	8
Government effectiveness	0.965		-0.363			0.357		
Rule of law	0.956		-0.352		0.301	0.310		
Regulatory quality	0.942		-0.408			0.368		
Control of corruption	0.927		-0.310		0.300	0.311		
Human development index	0.854					0.410		-0.468
Ease of doing business	0.833		-0.372			0.352		
Political stability	0.817				0.313	0.363		
Development status	0.815					0.360	-0.400	-0.330
Voice and accountability	0.791	0.358						
GDP per capita	0.740				0.549	0.486		-0.318
Net sovereign external debt over current acct receipts		0.913						
Net sovereign external debt over GDP		0.905						
Sovereign net foreign assets over GDP		-0.736				0.307		
Reserves over current account purchases		-0.718						
Net sovereign foreign currency debt over GDP		0.693					0.531	
Liquidity ratio	-0.333	-0.538						
CPI volatility			0.968					
Consumer prices			0.961					-0.336
REER volatility			0.770					
General government debt over GDP		0.348		0.951				
General government domestic debt over GDP				0.859			-0.304	
General government debt over revenues				0.831				
General government debt maturities over GDP				0.762				
Net external debt over GDP					-0.948			
Trade openness	0.316				0.932			
Broad money over GDP	0.357				0.832			
General government balance over GDP	0.342			-0.301		0.969		
General government primary balance over GDP						0.898		
Current account balance over GDP	0.401					0.584	-0.333	
Public foreign currency debt over total debt	-0.593						0.795	
Dollarisation ratio							0.618	
Foreign ownership							0.469	
Real GDP per capita growth								0.833
Real GDP growth			-0.464					0.770

5.2 PRA results & analysis

The PRA produces two key results, which is: i) a distillation of variables of importance through significance levels; and ii) a detection of variables which appear to occur more or less frequently amidst the three rating agencies. In the PRA, the table with the restricted regression is shown as follows in order to distill the variables of importance. A discussion of the type of PRA (i.e. random or fixed effects) which is suitable was earlier mentioned under section 4.2.3.

5.2.1 Independent variables distilled through significance levels

The following table explains which variables were found to have statistically significant normalised beta coefficients. Variables were filtered by them meeting a minimum criteria of 10% statistical significance. A deliberate choice was made to use 10% as the significance level, a relatively generous assumption compared to the more common 5% significance level since we need to be cognisant of the limited time frame of the data and the exploratory nature of this research; a further explanation on the use of the 10% significance level is explained under Appendix D.

Table 5: Random effects panel regression's independent variables

Fitch				Moody's				S&P			
Variable	*Sig (%)*	*Coeff*	*Abs value coeff*	*Variable*	*Sig (%)*	*Coeff*	*Abs value coeff*	*Variable*	*Sig (%)*	*Coeff*	*Abs value coeff*
Regulatory quality	1	1.2334	1.2334	Regulatory quality	1	1.4520	1.4520	Regulatory quality	1	2.0801	2.0801
Rule of law	1	1.0003	1.0003	Control of corruption	1	1.1853	1.1853	Rule of law	1	1.4046	1.4046
Net sovereign external debt to current account receipts	1	-0.8552	0.8552	GDP per capita	1	0.9321	0.9321	Foreign ownership	1	-0.7756	0.7756
GDP per capita	1	0.8494	0.8494	Broad money over GDP	1	0.9128	0.9128	Broad money over GDP	5	0.6130	0.6130
GNI per capita at PPP	1	0.8063	0.8063	General government debt over revenue	1	-0.7807	0.7807	Net sovereign external debt to current account receipts	1	-0.5567	0.5567
Dollarisation ratio	1	-0.7281	0.7281	Trade openness	1	-0.7799	0.7799	General government debt over GDP	5	-0.4915	0.4915
General government debt over GDP	10	-0.3660	0.3660	Public FC debt over total debt	1	-0.7329	0.7329	GDP per capita	5	0.4444	0.4444
Political stability	5	0.3409	0.3409	Net sovereign external debt to current account receipts	1	-0.6963	0.6963	General government balance over GDP	1	0.4096	0.4096
General government balance over GDP	5	0.2695	0.2695	Non performing loans over gross loans	1	-0.6474	0.6474	Volatility of revenues over GDP	5	-0.3457	0.3457
				General government balance over GDP	10	0.2592	0.2592	Liquidity_ratio	5	0.3128	0.3128
				Loan-deposit ratio	5	0.2092	0.2092	Net external debt to current account receipts	5	-0.1120	0.1120
Overall R-sq	*0.8319*			*Overall R-sq*	*0.8637*			*Overall R-sq*	*0.8174*		

Note: Please refer to Table D2 in Appendix D for further details and data in relation to this table and the PRA.

5.2.2 Independent variables distilled through frequency of occurrence

The variables shared by all three rating agencies, two rating agencies, and an individual rating agency are produced in the following table. The purpose is to understand which narratives or variables may be in agreement and which may be divergent which could potentially cause differences in rating results. This information is particularly useful for further integration into the subsequent QGT analysis. Additionally, variables which are in agreement can be helpful in determining narratives of greater importance.

Table 6: Common and distinct variables to each rating agency & frequency of occurrence

Variable	Fitch	Moody's	Standard & Poor's	Frequency of occurrence
Regulatory quality	X	X	X	3
Net sovereign external debt to CAR	X	X	X	3
GDP per capita	X	X	X	3
General government balance over GDP	X	X	X	3
Rule of law	X		X	2
General government debt over GDP	X		X	2
Broad money over GDP		X	X	2
GNI per capita at PPP	X			1
Dollarisation ratio	X			1
Political stability	X			1
Control of corruption		X		1
General government debt over revenue		X		1
Trade openness		X		1
Public FC debt over total debt		X		1
Non performing loans over gross loans		X		1
Loan-deposit ratio		X		1
Foreign ownership			X	1
Volatility of revenues over GDP			X	1
Liquidity ratio			X	1

The variables shared by three rating agencies include regulatory quality, net sovereign external debt to CAR, GDP per capita and general government balance over GDP (i.e. fiscal balance) and their frequency of occurrence reflects their importance. Regulatory quality was the key proxy from the World Bank Governance Indicators and this is different from earlier research which focused on variables such as Corruption and Government Effectiveness.

Of the variables shared by two rating agencies, rule of law, general government debt over GDP and broad money over GDP was detected. Broad money over GDP was earlier mentioned by Borio & Packer (2004) and hence reinforces his findings even though other papers have yet to focus on this variable. Rule of law was another proxy which emerged amidst the World Bank Governance Indicators. Again, this is different from earlier research which focused on variables such as corruption and government effectiveness.

There were several unique variables utilised by each rating agency which highlights the idea that while there are some commonalities between variables analysed by each rating agency, there are significant differences. Three variables are unique to Fitch's use, three for Standard & Poor's, and three for Moody's. Of the 19 variables listed in the table above, only four (21%) were shared by all three rating agencies. QGT will be later used to analyse emergent narratives of these results by comparing this against the EFA results.

5.2.3 Robustness & predictive checks including extended sample data

A robustness check including 2014-2017 data was used to re-generate the regression equations, for comparison with the equations generated from the 2014-2016 panel data. The equation was regenerated using a similar methodology with the original data set, whereby the standardised independent variables were all included and sequentially dropped if the variable lacked statistical significance. The 2014-2017 regression results corroborate the findings of the panel regression which used 2014-2016 data, where: (i) the R-squared (labelled as “R2” in the following Table 7) was 0.8552 for Fitch, 0.8143 for Moody’s and 0.8419 for Standard & Poor’s; (ii) model fit as indicated by the Wald tests were significant for all three cases; (iii) all of the variables had expected signs (i.e. similar with the PRA results); and (iv) there was a majority (i.e. greater than 50%) match between the variables in the original data set for Fitch and Standard & Poor’s when compared with the extended sample data. Moody’s variables did not match very well and was consistent with the panel regression results’ Hausman test as noted under section 4.2.3 and could be attributed to a more extensive use of qualitative assessments by analysts, a greater weight placed on latent factors and the use of contingent methodologies (i.e. decision tree) as admitted in their methodology paper (Moody’s, 2013). Generally, this suggests the regression results are largely within expectations but one should not expect the out-of-sample regression results to completely match the PRA results given the different data set included in the out-of-sample check. The following table summarises the results of the robustness test.

Table 7: Robustness test results

	Fitch	*Moody's*	*Standard & Poor's*
Matched variables between 2014-2016 and 2014-2017	8	4	7
No. of variables derived from 2014-2016 data	9	11	11
No. of variables derived from 2014-2017 data	11	9	11
% variable match with 2014-2016 data set	88.89% (8/9)	36.36% (4/11)	63.63% (7/11)
% variable match with 2014-2017 data set	72.7% (8/11)	44.44% (4/9)	63.63% (7/11)
% beta coefficient signs match	100%	100%	100%
R2 for 2014-2016	0.8319	0.8637	0.8174
R2 for 2014-2017	0.8552	0.8143	0.8419
Wald chi-squared test for 2014-2016, prob>chi2	0.000, Significant	0.000, Significant	0.000, Significant
Wald chi-squared test for 2014-2017, prob>chi2	0.000, Significant	0.000, Significant	0.000, Significant

Another out-of-sample robustness test considered was to compare the random effects and fixed effects results but the Hausman tests and explanation in 4.2.3 already suggests that the fixed effects model is less valid in this study and this makes sense since this would also be inimical to country specific effects which led to the use of random effects regression. Furthermore section 4.2.3 and Appendix D discusses the rationale as to why random effects is more applicable than fixed effects in this study, for example, random effects rightly takes into account: (i) intercept heterogeneity expected of sovereigns as unique individual entities; (ii) time-invariant observations; and (iii) co-trending between observations.

The basis and quality of the robustness checks were also considered, with reference to Plümper & Neumayer (2012) and Lu & White (2014). Lu & White (2014) focus on the issue of critical and non-critical core variables (i.e. not using the right variables or incorrectly dropping important variables) which based on the regression results, have been filtered out through the comparison of EFA and PRA results which implies an in-built check through this triangulation. In addition, conducting the regression on the out-of-sample data suggests that majority of the independent variables are useful and not non-critical as per Lu & White's (2014) discussion since the values of the beta coefficients of variables were above 0.10, tested as significant, had the theoretically expected signs and were similar to PRA results. Lu & White (2014) further discussed the structural validity of models and in this research this has been addressed through: (i) PRA-EFA triangulation; (ii) the methodological use of a wide scope of variables before narrowing down and eliminating insignificant independent variables; and (iii) using the QGT methodology of examining if the variables are theoretically informed and hence warranting the high R-squared and significant F-test regression results, whether for in the core or out-of-sample data. The concerns raised by Plümper & Neumayer (2012) have also been addressed: (i) uncertainty over the population parameter is ameliorated since all sovereign entities with ratings were included in the observation set at the beginning; (ii) the problem of unobservable theories has been mitigated since the discovery of latent constructs were addressed by the EFA; and (iii) concept measurement problems are inevitable but the proxy variables are not randomly selected since they are based on the methodology of using a wide catchment of variables before narrowing down based on the EFA and PRA techniques. In view of the thought being given to the rationale and scope of robustness checks, this research applied the abovementioned linear regression on 2017 data and would provide an appropriate view of the reasonableness of the derived variables for theory generation through the R-squared and F-test results which proved both high and significant respectively.

A predictive test was also conducted on 2017 out-of-sample data, and although not core to the research question, it was done to understand to what extent would the regression equation be meaningful. One would also expect robust PRA results to also have some practical predictive use. Generally, the PRA equations could generate majority (i.e. over 50%) of rating predictions within 2 notches which is a good result considering that the rating scale runs from 1 to 22 (i.e. 2 notches is less than 10% of this scale) coupled with the existence of qualitative factors and judgmental analysis by the rating analyst. On average for all three rating agencies in 2017, 15.6% of the predicted ratings matched actual ratings exactly, 50.7% matched within 1 notch, and 72.9% matched within 2 notches. It appears that the PRA equations could predict Moody's ratings the best, followed by Fitch and Standard & Poor's, as shown in the following table.

Table 8: Predictive likelihoods of PRA equation using 2017 data

	Fitch	*Moody's*	*S&P*
No. of observations	97	90	101
% Exact match	9.3%	17.8%	19.8%
% within 1 notch	48.5%	61.1%	42.6%
% within 2 notches	75.3%	81.1%	62.4%
% within 3 notches	87.6%	84.4%	77.2%
% >3 notches diff	12.4%	15.6%	22.8%

Methodological robustness tests were also conducted through the following: (i) empirically testing the use of fixed effects to check if the use of fixed effects would be potentially more effective than the random effects, and to test the theoretical justification for the use of random effects as explained in section 4.2.3; and (ii) following (i) above, clustered random errors were applied to the panel regression equation, as an additional methodological test. The analytical summary of results are as follows, while the raw stata results and the tabulated summary of the fixed effects versus random effects results comparison are available in Appendix D.

(i) The FE panel analysis was conducted and as theoretically expected, the FE regression omitted the time-invariant variable "development status", hence this would cause an omitted variable bias. This was unlike the RE method which accommodates the use of time-invariant variables. In addition, the R^2 of the FE regression was less satisfactory compared to RE, suggesting that the model fit was poorer. The FE R^2 for the respective ratings from the Big 3 Rating Agencies was 0.47 to 0.52 compared to above 0.8 for the RE regressions. The FE equation was also examined and some of the equations appeared at odds with the theoretical framework. For example, the equation was not parsimonious in the case of FE regression with Fitch as 15 variables were found in the equation, and there were variables which were theoretically overlapping such as CPI and CPI volatility. For Moody's and Standard & Poor's, the negative sign of the current account balance-to-GDP ratio's coefficient was not coherent with the theoretical expectation that a higher current account balance would be beneficial to the sovereign rating. These results appear to reinforce the Hausman test which suggests the more appropriate use of RE regression.

(ii) The standard errors were clustered at country level in the RE model. For the case of the Fitch equation, the variables all tested significant. It was found that the difference in the equation was minor for the other rating agencies, for example, two variables were omitted in the Moody's regression and one variable for Standard & Poor's, but the other variables remained significant. The equations were then reviewed for consistency with the theoretical framework and the EFA results, and it was found that the original equations which were conducted under robust standard errors had broader theoretical depth, such as the inclusion of ratios relating to the banking system and government revenue volatility which corroborates the dimensions suggested by the EFA results. Thus, the original RE equations with robust standard errors appeared to be consistent with the EFA results and more helpful in expanding the theoretical narrative and theory generation which is core to the research question. A potential reason for the ineffectiveness of clustered standard errors in this research is that the sampling was not done on a stratified level and population data was utilized (Cameron & Miller, 2015; Abadie et al, 2017).

5.3 QGT results & analysis

The QGT results and analysis produces two core components, which are the variables and the latent constructs of importance. The analysis will then allow the emergence of core categories which lends itself to theoretical coding, which can then be subsequently substantiated with literature.

5.3.1 Structuring comparative analysis, coding and memos

In the following three tables, the QGT results are generated where orthodox and unorthodox or newly discovered variables alongside latent structures (also known as factors or dimensions) were compared, based on the following QGT steps:

1. *Constant comparative analysis* through the comparison of EFA and PRA data and results originating from this research with existing literature.
2. *Code emergence* through theoretical sorting and as a result of the constant comparative analysis in step 1.
3. Writing *theory-sensitive memos* whilst comparing it with existing literature for theoretical saturation to develop precursor ideas for eventual theoretical coding.

The methodology here assumes that a match of variables or factors suggests positive reinforcement of existing concepts and a mismatch helps define areas for further research. This method adheres to the constant comparative method of

GT and Holton & Walsh (2016) clarify that theory generation includes both *incremental* theorising and *rupture* theorising; the former relates to building on theories which are related to existing concepts and literature, while the latter constructs completely new findings which were previously unrelated to existing research. The distinction between these forms of theorising are particularly pertinent to this research, since it attempts to discover both new and partly related concepts as well as unorthodox ways of thinking about the inputs to sovereign credit ratings. As we shall see in the following tables, the open coding, selective coding, and theoretical coding concepts from GT have been weaved into the results arising from QGT analysis. Holton and Walsh (2016) explain that: (i) *open coding* relates to the identification of main concerns which this research has done through quantitative methods; (ii) *selective coding* helps in the emergence of core categories which we have done through comparative analysis via both the quantitative methods and the literature review; and (iii) *theoretical coding* is essentially relational and draws concepts together and anchors this through the research question; the following results table of the QGT provides a foretaste of theoretical coding but is not the elaborated and final version of the theoretical paradigm which shall be more fully discussed in the concluding chapter. While other terms such as *axial coding* or Straussian concepts of coding are potential pathways of structuring GT analysis, this dissertation relies on the clarification of definitions based on the recent book by Holton and Walsh (2016) since a choice was made to focus on QGT as a subset of Classic GT.

Drawing on a few ideas from the award-wining paper of Walsh (2014), the table of results in that paper supports the QGT methodology (as opposed to general GT) as it reproduces the significance levels and beta coefficients discovered in the earlier results of the panel regression analysis. Walsh (2014) compares newly researched results against secondary results from prior literature in order to detect variable reinforcement or unimportance. In this case, the constant comparative analysis through this method helps develop the theoretical codes as shown in the following Table 9.

However, unlike Walsh (2014), here the idea of generalisability is not context-dependent and is formalised through the statistical results of the panel regression because the research is based on a population study rather than sub-samples across time and/or space. While sub-samples and contexts can be evaluated for future research, this dissertation focuses on a population study for the purpose of studying broad generalisations as mentioned in the literature review. To recap, the literature review of this dissertation discovered studies applying to different contexts, such as the impact of macroeconomic variables on emerging economies versus developed economies, or the impact of financial market variables in contrast to macroeconomic variables. This dissertation focuses on macroeconomic variables for the population space inclusive of both emerging and developed economies. Hence, the column of generalisability is excluded (see Appendix C for a replication of the table used by Holton & Walsh (2016) in developing theoretical coding).

Another methodological difference is the use of the average beta coefficient for coherence since the panel regression results of 3 rating agencies were used. For the secondary data in the table, the average beta and significance levels were not calculated based on past literature because there were different variants used for a similar ratio, for example, external debt-to-exports and external debt-to-current account receipts which are conceptually similar but quantitatively different, which makes comparisons across literature invalid.

Additionally, the following table indicates the frequency of the variable occurring in rating agencies based on quantitative analyses, hence, the variable has earned its place and is based on data, rather than being based on the rating agencies' assertions, which is a foundation of GT methodology (Glaser, 2008, Walsh 2014; Holton & Walsh, 2016). The tabulation of the frequency of occurrence also lends us insight into the importance of a variable which will also aid in determining "core" and "peripheral" theoretical codes within (and as subsets) of the "orthodox" and "unorthodox" or potentially emergent theoretical codes as gathered from the quantitative variables analyses. By incorporating EFA results within the GT pillar of constant comparative analysis, further quantitative reinforcement is provided to the importance of a variable, and hence whether the variable is a "core" or "peripheral" variable. EFA in particular, further assists in the development of theory-sensitive memos and relational ideas between variables and codes and assists as a precursor to conclusions as we approach the theoretical development stage in the final chapter.

It is important to distinguish what this research means by “orthodox” and “unorthodox”, and how it differs between “variables” and “latent structures” (also known as “factors”). As explained in the literature review chapter, the “orthodox” variables refer to those which were already explored in academic literature while the “unorthodox” variables are those which have yet to be considered as a quantitatively modelled macroeconomic input for the determination of sovereign credit ratings. However, with regards to factors or latent structures, an “orthodox” factor relates to that which has been explained by the rating agencies’ methodology papers since this has not been a consideration in academic literature except for the paper by Mellios & Paget-Blanc (2006) and this dissertation. This would fulfil the spirit of this research which is to unearth orthodox and frequently encountered past narratives with unorthodox, more innovative angles at analysing sovereign credit ratings.

Do note that the frequency of occurrence is tabulated based on the occurrence in the data as well as the number of times it was used in the regression models of past academic literature (out of the relevant eight papers discussed in the literature review chapter which focused on macroeconomic variables that influence sovereign ratings) and not whether it was qualitatively mentioned as indirectly influencing sovereign credit ratings, since our analysis here is being quantitatively supported by specific variables and their related statistics in line with the method of QGT. The literature review chapter explains the context in which ten academic studies were selected, where the key characteristics shared by the studies had regression equation results, focused on quantifiable macroeconomic variables, and were applicable to all rating sovereigns rather than subsets (which is essentially a population rather than sample study). Nonetheless, the literature review did include general literature (which did not relate a variable specifically to a sovereign credit rating model) for maintaining theoretical sensitivity which will be incorporated in the GT method, and it is this open-mindedness to iterative theory generation which is foundational in GT.

Table 9: Structuring comparative analysis, coding and memos: comparative analysis

		Constant comparative analysis of data		
	Variables	Primary data based on this dissertation	Secondary data based on previous literature	Occurs in EFA?*
1	Regulatory quality	Average β = 1.5885 Average p < 0.01 Frequency in rating agencies = 3	Frequency in literature = 0	Yes
2	Net sovereign external debt to CAR	Average β = -0.7127 Average p < 0.01 Frequency in rating agencies = 3	Frequency in literature = 0	Yes
3	GDP per capita	Average β = 0.7420 Average p < 0.05 Frequency in rating agencies = 3	Frequency in literature = 7	Yes
4	General government balance over GDP	Average β = 0.3128 Average p < 0.10 Frequency in rating agencies = 3	Frequency in literature = 5	Yes
5	Rule of law	Average β = 1.2025 Average p < 0.01 Frequency in rating agencies = 2	Frequency in literature = 0	Yes
6	General government debt over GDP	Average β = -0.4288 Average p < 0.10 Frequency in rating agencies = 2	Frequency in literature = 4	Yes
7	Broad money over GDP	Average β = -0.7629 Average p < 0.05 Frequency in rating agencies = 2	Frequency in literature = 0	Yes
8	GNI per capita at PPP	Average β = -0.8063 Average p < 0.01 Frequency in rating agencies = 1	Frequency in literature = 1	No
9	Dollarisation ratio	Average β = -0.7281 Average p < 0.01 Frequency in rating agencies = 1	Frequency in literature = 0	Yes
10	Political stability	Average β = 0.3409 Average p < 0.05 Frequency in rating agencies = 1	Frequency in literature = 1	Yes
11	Control of corruption	Average β = 1.1853 Average p < 0.01 Frequency in rating agencies = 1	Frequency in literature = 1	Yes
12	General government debt over revenue	Average β = -0.7807 Average p < 0.01 Frequency in rating agencies = 1	Frequency in literature = 2	Yes
13	Trade openness	Average β = -0.7799 Average p < 0.01 Frequency in rating agencies = 1	Frequency in literature = 2	Yes
14	Public FC debt over total debt	Average β = -0.7329 Average p < 0.01 Frequency in rating agencies = 1	Frequency in literature = 1	Yes
15	Non performing loans over gross loans	Average β = -0.6474 Average p < 0.01 Frequency in rating agencies = 1	Frequency in literature = 0	No
16	Loan-deposit ratio	Average β = 0.2092 Average p < 0.01 Frequency in rating agencies = 1	Frequency in literature = 0	No
17	Foreign ownership	Average β = -0.7756 Average p < 0.01 Frequency in rating agencies = 1	Frequency in literature = 0	Yes
18	Volatility of govt revenues over GDP	Average β = -0.3457 Average p < 0.05 Frequency in rating agencies = 1	Frequency in literature = 0	No
19	Liquidity ratio	Average β = 0.3128 Average p < 0.05 Frequency in rating agencies = 1	Frequency in literature = 0	Yes

* Here, the pattern matix which is a result of the EFA (Exploratory Factor Analysis) was referred to.

Table 10: Structuring comparative analysis, coding and memos: coding

		Emergent codes through theoretical sorting				
	Variables	Orthodox (O) or Unorthodox (U) variable	Orthodox (O) or Unorthodox (U) factor	Core (C) or peripheral (P) code **	Rating agency coding	Theoretical code***
1	Regulatory quality	U	O	C	Politics & institutions	Institutional & socio-political quality
2	Net sovereign external debt to CAR	U	O	C	External finances	External financial strength
3	GDP per capita	O	O	C	Economic profile	Institutional & socio-political quality
4	General government balance over GDP	O	O	C	Public finances	Government debt structure
5	Rule of law	U	O	C	Politics & institutions	Institutional & socio-political quality
6	General government debt over GDP	O	O	C	Public finances	Government debt structure
7	Broad money over GDP	U	U	C	N.A.	External vulnerability
8	GNI per capita at PPP	O	O	P	Economic profile	Institutional & socio-political quality
9	Dollarisation ratio	U	O	P	External finances	Foreign currency dependence
10	Political stability	O	O	P	Politics & institutions	Institutional & socio-political quality
11	Control of corruption	O	O	P	Politics & institutions	Institutional & socio-political quality
12	General government debt over revenue	O	O	P	Public finances	Government debt structure
13	Trade openness	O	O	P	External finances	External vulnerability
14	Public FC debt over total debt	O	O	P	External finances	External vulnerability
15	Non performing loans over gross loans	U	U	P	N.A.	Banking system quality
16	Loan-deposit ratio	U	U	P	N.A.	Banking system quality
17	Foreign ownership	U	O	P	External finances	Foreign currency dependence
18	Volatility of govt revenues over GDP	U	O	P	Public finances	Government debt structure
19	Liquidity ratio	U	O	P	Public finances	Government debt structure

** Core codes arise when they appear at least twice in the Big 3 rating agencies' methodologies.
*** Based on EFA and its related variables except for the emergent category of banking system quality.

Table 11: Structuring comparative analysis, coding and memos: memos

		Theory-sensitive memos: issues to explore for theoretical coding
	Variables	Comments
1	Regulatory quality	Governance indicators are recurrent and have a high beta. This importance also occurs in EFA results.
2	Net sovereign external debt to CAR	External debt was used in orthodox literature, not sovereign external debt.
3	GDP per capita	A scholar used GNP per capita.
4	General government balance over GDP	The balance could be general or structural which excludes cyclical balances.
5	Rule of law	Governance indicators are recurrent and have a high beta. This importance also occurs in EFA results.
6	General government debt over GDP	Like general government balance above, this is a stock figure, and this suggests it has been prioritised.
7	Broad money over GDP	There has been no modelling of the size of broad money into sovereign ratings so far. The negative beta coefficient suggests the analysis of financial depth.
8	GNI per capita at PPP	The product approach (i.e.GDP or GNP) is more common as a measure than the income approach (i.e. GNI). This is conceptually similar to the orthodox concept of GDP per capita as shown above.
9	Dollarisation ratio	This relates to direct dependence on foreign currency. It occurred with foreign ownership and public foreign currency debt, also recurring amongst these significant variables.
10	Political stability	Governance indicators are recurrent and have a high beta. This importance also occurs in EFA results.
11	Control of corruption	Governance indicators are recurrent and have a high beta. This importance also occurs in EFA results.
12	General government debt over revenue	This is a flow component of public finances and complements stock numbers such as debt-to-GDP ratio. Stock components appear to be prioritised based on the quantitative results, being core codes.
13	Trade openness	This relates to external dependence rather than direct levels of foreign currency financial strength. However, the EFA classification of external vulnerability is a clearer relational code.
14	Public FC debt over total debt	This relates to direct dependence on foreign currency. It occurred with foreign ownership and public foreign currency debt, also recurring amongst these significant variables.
15	Non performing loans over gross loans	This ia a newly emerged category. Prior literature has not assessed this in sovereign ratings. While unorthodox, this is important in sovereign ratings given banking systems' role in debt crises.
16	Loan-deposit ratio	This ia a newly emerged category. Prior literature has not assessed this in sovereign ratings. While unorthodox, this is important in sovereign ratings given banking systems' role in debt crises.
17	Foreign ownership	This relates to external dependence rather than direct levels of foreign currency financial strength. However, the EFA classification of external vulnerability is a clearer relational code.
18	Volatility of govt revenues over GDP	Revenues as a ratio of GDP and debt has been considered but not its volatility. This is a flow component of public finances and complements stock numbers such as debt-to-GDP ratio.
19	Liquidity ratio	There has yet to be a focus on short term liquidity, unlike long term debt ratios. Unlike the liquidity ratio, flow and stock ratios might not assess maturity mismatch risk.

5.3.2 Summary of core QGT results

The QGT approach was instrumental in framing the overall nature of inputs to sovereign credit ratings from both the perspectives of latent constructs or factors as well as the individual independent variables. This summary approaches the results by delineating between the primary (core) and secondary (emergent) latent constructs and does the same categorisation as such for the independent variables. As this section remains within the empirical chapter, care was taken to avoid delving too much into what the results mean for recommendations in practice and policy, and the critique of rating agency approaches, since all these and other issues will be discussed in the concluding chapter. The concluding chapter will also aim to close the loop with theoretical sensitivity required of QGT, and expound on the results-driven theories with references to the relevant literature.

5.3.2.1 Latent constructs or factors

The latent constructs or factors derived from the empirical studies through the EFA, PRA and QGT methodologies suggest that the represented factors in the methodology papers written by rating agencies provide an underrepresented version of reality on three fronts: (i) there are more factors in actual use than represented by the rating agencies' methodology papers; (ii) the classification of variables within factors is too broad, leading to too few factors; and (iii) some factors are obviously weighted more heavily than others. These are explained as follows.

Firstly, as explained in the literature review, only four to five factors were represented in the methodology papers (Fitch Ratings, 2012; Moody's 2013; and Standard & Poor's, 2013), which generally spoke of: (i) economic structure and outlook; (ii) public sector finances; (iii) external finances; (iv) politics and institutions; and (v) event risks (unique to Moody's). These are classified by this research as "orthodox" factors or latent constructs. However, the EFA and QGT comparative analysis (as explained and tabulated in section 4.3.1) showed the presence of a more nuanced and specific five-factor structure or **primary (core) factor codes** characterised by:

(i) institutional and socio-political development (orthodox);

(ii) external financial strength (orthodox);

(iii) government debt structure (unorthodox);

(iv) trade openness, financial sector depth and external vulnerability (unorthodox); and

(v) foreign currency dependence (unorthodox).

Of the above core codes, the first two, can be considered orthodox as they match the rating agencies' methodology papers of what is deemed as pertinent factors, while the final three can be considered unorthodox. The EFA results also suggest the core code of institutional and socio-political development features very strongly as a factor. This is important as it suggests a necessary shift in the primary narratives of sovereign credit ratings analysis. In the above, while government debt structure closely matches the factor of public sector finances, on closer examination a key variable which emerged in the EFA's pattern matrix was the debt maturity structure as it considers the issue of liquidity risk, which was not apparent in Fitch's and Moody's methodology papers. Factor (iv) and (v) above were not explicitly discussed by the rating agencies and these narratives are worth exploring in the concluding chapter.

The pattern matrix on the other hand, provides additional insights into the **secondary (peripheral) factor codes** which were not accorded status as primary factor codes since they were not essentialized by the EFA and QGT comparative analysis. These codes as derived from the EFA's pattern matrix include:

(i) monetary policy credibility (unorthodox);

(ii) twin deficits propensity (unorthodox); and

(iii) economic growth (orthodox).

Of the above secondary codes, it appears that the first two are unorthodox while the final factor on economic growth is orthodox since it matches the rating agencies' existing factor methodology. While underlying ratios in monetary policy credibility were considered by the rating agencies, it was analysed as part of the factor of "economic structure and outlook", rather than being specific to the issue of monetary policy credibility as discovered in the EFA. Furthermore, the EFA suggests that the ratios to fiscal balance and current account balances should be discussed in tandem, rather than being placed separately in the factors of “public sector finances” and “external vulnerability” as described by the rating agencies’ methodology papers. Meanwhile, it is not too surprising that economic growth, despite being an orthodox factor, is not a core code although it does contribute to the concept of debt sustainability, an issue which will be explored in the concluding chapter.

The above results are an important contribution to what we know of sovereign ratings as it explicitly prioritises certain factors over others as primary or secondary, and helps create an empirically-informed judgment of which latent construct matters more than others as influencers of sovereign credit ratings.

5.3.2.2 Independent variables

The approach to the independent variables would be similar to the latent constructs discussed in 5.3.2.1, and the goal here is to have a grounded view of reality through empirical research rather than relying solely on assumed representations on the determinants of sovereign credit ratings. In this view of reality, prioritisation is key, and there will be a deliberate attempt to segregate primary independent variables from secondary independent variables, and QGT requires this to develop the distinction between core codes and peripheral codes. The independent variables derived from the empirical studies through the EFA, PRA and QGT methodologies suggest that the variables thought to be the key determinants of sovereign ratings in prior academic research does not accurately represent variables used by sovereign rating agencies. As surmised in the literature review, this could be due to the a priori deductive method of assuming certain variables hold which are then used for regression analysis, whereas this study utilises an inductive approach.

One might question the basis of comparing the specific variables against academic literature, whereas latent constructs are compared against rating agencies' methodology reports. This is due to the availability of information and nature of the research; here, this study aims to query if commonly accepted variables need to be revisited in case an information angle is overlooked, and therefore, only what was previously presented can be queried as significant or insignificant, and in this case, only the academic literature which has focused on generating regression equations from specific variables can be investigated in such a quantitative fashion (through EFA, PRA and QGT). On the other hand, the work on latent constructs has been limited to the paper by Mellios and Paget-Blanc (2006) whereas three representations of a similar nature with largely common latent constructs are available from the Big 3 rating agencies, hence there is a benchmark against which to compare. In summary, the purpose of this research is to detect the difference between empirical reality and approximated representation. Furthermore, even if the research were to compare the importance of specific independent variables, against the methodology papers of rating agencies, this is not possible because the regression equations and specific variable weights have not been revealed by rating agencies, and it is only available in academic literature.

The EFA, PRA and QGT methodologies reveal the following under-representations of reality in prior academic literature: (i) some variables previously used by academic literature are irrelevant based on this study which uses more recent data and has taken into consideration the fact that the Big 3 rating agencies had revised methodologies (Fitch Ratings, 2012; Moody's 2013; and Standard & Poor's, 2013); (ii) consequently, statistically significant and highly weighted relevant variables had been excluded; and (iii) some variables are obviously weighted more heavily than others. These are explained as follows.

The **core variables** discovered were those which occurred in majority (at least two out of three) of panel regression equations:

(i) regulatory quality*;
(ii) net sovereign external debt to current account receipts*;
(iii) GDP per capita;
(iv) general government balance-to-GDP;
(v) rule of law*;
(vi) general government debt-to-GDP; and
(vii) broad money-to-GDP*.

Quite a number of variables as indicated by the asterisk (*) above are unorthodox and were not previously included in the regression equations of prior literature, reflecting the methodological changes by rating agencies over time. It was also noted, like the discussion of latent constructs in section 4.3.2.1 above, there was a strong emphasis on variables related to institutions and socio-political development (three out of seven core variables) and of these variables, regulatory quality appeared in all rating agencies' regression results. Also to note, broad money-to-GDP, representing the idea of financial sector depth which was also discovered to be an important latent construct, was an unorthodox variable (and latent construct) which featured as a core variable.

Peripheral variables which appeared in only one rating agency and therefore unique to that agency are as follows:

(i) GNI per capita at PPP;

(ii) Dollarization ratio;

(iii) Political stability;

(iv) Control of corruption;

(v) General government debt-to-revenue;

(vi) Trade openness

(vii) Public foreign currency debt-to-total debt

(viii) Non-performing loans-to-gross loans

(ix) Loan-deposit ratio

(x) Foreign ownership

(xi) Volatility of government revenues-to-GDP

(xii) Liquidity ratio

A common pattern which appeared here is again the importance of institutional and socio-political development [i.e. (iii) and (iv)]. Furthermore, facets of the latent constructs and EFA results have appeared here, and in particular, the banking system [i.e. (viii) and (ix)] and foreign currency dependence [i.e. (ii) and (vii) and to some extent (vi) and (x)] latent constructs emerged as narratives which were not explicitly considered by prior literature. These findings show that the peripheral variables are by no means irrelevant, but could have been less prioritised within one rating agency or another. Hence, these variables lend variety and richness to the analysis of sovereign credit ratings, and would assist in forming emergent narratives as well as a holistic theoretical view to be considered in the concluding chapter.

5.4 Results discussion: the empirical-theoretical link

5.4.1 Factors and latent constructs

The EFA results clearly indicate the presence of factors beyond that which has been commonly depicted in the rating agencies' methodologies. This could mean that the reality in praxis has been underrepresented, since these methodology papers suggest the use of only four or five factors across Fitch, Moody's and Standard & Poor's. However, this is not to suggest that the rating agencies' factors are irrelevant, since the empirical research conducted in this dissertation helps reinforce and refine existing factors, as well as add complementary factors for a richer analysis of sovereign credit ratings. The following Table 12 explains the common orthodox factors and the additional unorthodox factors discovered through this research. This table lists the orthodox factors drawn from the methodology papers and lists the unorthodox factors drawn from this research.

Table 12: Comparison of orthodox and unorthodox factors

<table>
<tr><th>Orthodox factors</th><th>Reinforced factors</th><th>Unorthodox factors</th></tr>
<tr><td>Economic growth & policy</td><td>Economic growth</td><td>- Monetary policy credibility</td></tr>
<tr><td rowspan="2">Government finances</td><td rowspan="2"></td><td>- Government debt structure</td></tr>
<tr><td rowspan="2">- Twin deficits propensity*</td></tr>
<tr><td rowspan="2">External finances</td><td rowspan="2">External financial strength</td></tr>
<tr><td>- Trade openness, financial sector depth and external vulnerability.
- Foreign currency dependence.</td></tr>
<tr><td>Institutional-political quality</td><td>Institutional & socio-political development</td><td></td></tr>
</table>

** As depicted by its placement on the table, "twin deficits propensity" straddles both government finances and external finances since it relates to both the fiscal balance and current account balance.*

As the Table 12 suggests, the existing orthodox factors by the credit rating agencies all remain pertinent for the analysis of sovereign credit ratings. However, it appears that the four core factors used across all Big 3 rating agencies offer a coarse view of factors driving sovereign credit analysis. With the help of the EFA methodology in this dissertation, the factors driving ratings has been further refined from four core factors to eight core factors. Since the orthodox factors (i.e. economic growth, government finances, external finances and institutional-political quality) had been explained in the literature review, this section of the dissertation will focus on discussing the unorthodox factors given their unique contribution to this field of academic inquiry and how they relate to the theoretical framework.

1. **Monetary policy credibility** has been classified by the rating agencies as being related to economic growth & policy, but the EFA suggests it is of a significant weight and needs to be analysed as a separate factor. The EFA results in this case had extracted, as a factor grouping, the orthodox variables of CPI volatility, consumer prices and REER volatility (i.e. pattern matrix analysis under section 5.1.3). This context of being able to quantify monetary policy credibility is useful given the presence of readily available metrics in the form of CPI volatility, consumer prices and REER volatility as a measure of the central bank's ability to deliver its mandate effectively, and these quantifiable measures are preferred over qualitative measures (Lohmann, 1992; King, 1995; Blinder, 2000; Brumm, 2000; Devereux &

Engel, 2003). Nonetheless, this also suggests that the ability to analyse monetary policy credibility in this case would be ex-post and results based, although an additional angle to consider would be the process of setting monetary policy. In this sense, a process-driven approach would be helpful when analysing sovereign credit ratings qualitatively although methodological difficulties and debatable results would arise, especially when considering if a central bank is being judged on expected versus actual actions and normative concepts such as honesty (Drazen & Masson, 1993; Blinder, 2000; Henisz, 2004). The literature as outlined under Table 2 of the literature review in section 2.2 suggests these metrics were not primarily viewed as measures of assessing policy credibility and were not used in the selection of variables by previous researchers. Therefore, it would be necessary to analyse CPI volatility, consumer prices and REER volatility not as separate sub-components (e.g. high inflation is bad for the economy), but as a set of metrics against the backdrop of assessing monetary policy credibility which can be further complemented by analysing the qualitative credibility of monetary policy processes and actions (e.g. consistency of macroprudential measures with interest rate policy, transparency of economic information, appropriateness of exchange rate regime, etc.). For example, Standard & Poor's (2013) has an in-built preference for an open, liberalised economy with flexible exchange rates, in agreement with Mundell (1961), Obstfeld & Rogoff (1995), Chang & Velasco (2000b), Corsetti (2006), and Duarte &

Obstfeld (2008), amongst many others. Capital controls are also frowned upon, and affects monetary policy credibility from the perspective of policy independence argued by Edwards (1999) who explains capital controls as ineffective in controlling capital outflows and are a hurdle for monetary policy independence, while Edward's (2001a) and Edison et al (2004) suggest that the lack of capital controls is generally positive for economic growth. Furthermore, Dooley (1996) suggests that capital controls have been ineffective from the perspective of debt consolidation, particularly relevant when assessing sovereign credit risk.

Monetary policy credibility can thus be analysed through a two-pronged approach, using the quantitative measures of of CPI volatility, consumer prices and REER volatility, indicated by the pattern matrix analysis under section 5.1.3. The qualitative processes as earlier mentioned should then be used to complement the quantitative analyses of monetary policy credibility. Apart from the literature (e.g. Blinder, 2000) recommending quantitative measures as the primary measure of policy track record, the qualitative measures can be used to analyse credibility in a complementary but secondary fashion. It is also worth noting that institutional quality in a central bank could be partially proxied through the socio-political and institutional variables of the World Bank Governance Indicators, and this is partly affirmed by the cross-loading of these variables with the factor of monetary policy credibility (i.e. Factor 3 cross-loads on Factor 1 within the EFA's Structure Matrix shown in 5.1.4).

2. **Government debt structure** has not been explicitly considered by the rating agencies in their factor framework even though it is essentially a part of assessing a government's quality of public sector financial management. The EFA suggests that the debt structure needs to be analysed as a distinct factor, and apart from the orthodox variables of general government domestic debt-to-GDP ratio appearing within this factor, the unorthodox variables of general government debt-to-revenue ratio and general government debt maturities-to-GDP indicate a more holistic approach to the factor analysis. This approach can be considered holistic because the general government domestic debt-to-GDP ratio is a balance sheet item and does not capture servicing ability, as compared to the general government debt-to-revenue ratio which is an income statement item and considers servicing ability via tax revenue collection, and general government debt maturities-to-GDP helps determine short term liquidity risk. This nexus of metrics are important as it broadens the view of debt analysis to the overall structure of a government's debt repayment obligations. As evidenced in Table 2 of the literature review under section 2.2, the government debt-to-GDP ratio has been a frequently researched metric, as compared to metrics involving government revenue. However, the importance of government revenues metrics have been specifically highlighted by Roubini (2001) in his discussion of government debt sustainability, while the trend of revenue stability has been highlighted as an important indicator of the risk of debt

crises by Reinhart & Rogoff (2011). Theoretically, it would be worth extending the analysis of government revenues by considering its relative size and relationship to interest payments, as explained by Trehan & Walsh (1988) and Hakkio & Rush (1991), assuming data availability (it was found that public sector interest and revenue data were not readily available in several developing nations). Here, a higher revenue amount relative to interest payments would be expected to benefit the sovereign credit rating.

Another important component which helps in the analysis of government debt structure would be an asssessment of short term liquidity risk, as indicated by the distribution of government debt maturities and whether it is overly skewed towards the short term. Diamond (1991) explains the risk of an imbalanced short maturity structure and a good example of this manifestation was in the Asian Financial Crisis of 1997/98 where excessive short term borrowings led to a liquidity squeeze to banks amid capital outflows and low international reserves (Radelet & Sachs, 1998; Rodrik & Velasco, 1999; Chang & Velasco, 2000a; Chui, Gai & Haldane, 2002). The variable which appeared in the EFA results under the factor grouping of government debt structure was the measure of general government debt maturities (within a year) to GDP ratio, which can be used as a quantitative proxy for measuring government debt liquidity risk. The focus on short term liquidity risk should indeed be emphasised, because the short term debt structure poses the greatest risk for the foreseeable time horizon of the sovereign rating, since an annual review is done on an annual basis by the credit rating agency. On the other hand, the long term debt structure has limited bearing on the sovereign rating at a given point in time since long term debt (unlike short term maturities) does not have the additional burden of principal repayment risk.

It should be noted that there was little inter-variables cross-loading of the government debt structure factor which suggests this factor group can generally be analysed on a standalone basis. However, as suggested by the variables which load on factor 4 of the EFA matrices, government debt structure needs to be analysed on a multi-angled approach, inclusive of “stock”, “flow” and short-term liquidity measures.

3. **Twin deficits propensity** has been named as such in the EFA result to emphasise the grouping of the current account balance and fiscal balance metrics together in the same factor and therefore make reference to the importance of internal and external balance for economic viability. The theory that twin deficits are risky for an economy have been well-established by predecessors such as Darrat (1988) and Normandin (1999) whom draw on the seminal Mundell-Fleming model as well as more contemporary academics such as Kouassi, Mougoue, & Kymn (2004) and Salvatore (2006) whom find evidence of causality between the fiscal deficit and current account deficit. Essentially, external balance and internal balance are closely linked in the Mundell-Fleming model, since an

increase in the fiscal deficit or a rising internal imbalance raises the real interest rate which in turn leads to the current account deficit being financed by a higher proportion of foreign capital, raising vulnerability to the vicissitudes of foreign capital which results in an external imbalance. In relation to economic viability and hence sovereign credit risk, Reinhart (2002) explain the link between the risk of a currency crisis which causes a propensity for a debt crisis, and that the fiscal and current account balances are key indicators which can presage a currency crisis. During the literature search, it was found that the twin deficits hypothesis was discussed as a peripheral rather than core issue relating to sovereign credit risk, although the EFA results suggest that the propensity of twin deficits deserves greater distinct attention.

It is interesting to note the EFA structure matrix results suggest that the current account balance (or imbalance in the case of a deficit) cross-loads with the factor of foreign currency dependence, which is logical given that a current account deficit financed by foreign capital essentially leads to greater exposure to capital flight risk.

4. **Trade openness, financial sector depth and external vulnerability** appear as inter-related factors through the EFA results, whereby the variables of trade openness, broad money-to-GDP, and net external debt-to-GDP coalesce into one factor. Similar to the twin deficits hypothesis, the EFA results emphasises the importance of analysing these variables together and in this case, how it is linked to external vulnerability. While

the twin deficits hypothesis describes typical characteristics of an externally vulnerable economy, the degree of trade openness, broad money and external debt suggest channels which lead to this vulnerability. Svaleryd and Vlachos (2002) and Kim, Lin & Suen (2010) found that trade openness and financial development are positively correlated and in this research can be proxied by the broad money-to-GDP ratio which essentially describes the availability of money supply and size of capital markets. Of particular pertinence to the nexus of variables in this EFA result, Herwartz & Walle (2014) explain that trade openness promotes financial development and growth, but caveat that trade openness and financial sector depth have positive effects on the economy insofar as the economy is not heavily indebted to the international capital markets (i.e. high external vulnerability) due to the effects of volatility if capital flight occurs, hence the needs to analyse the external debt variable within this nexus of variables. Conversely, the causality works both ways as Chit & Judge (2011) determined that financial sector development helped contain exchange rate volatility which in turn assisted in promoting trade openness in an economy. Similarly, Prasad et al (2007) have weighed in on the ongoing debate of the risks of financial globalisation to developing economies which do not have the institutions and financial sector depth to manage global capital flows, resulting in economic vulnerability. To summarize, there needs to be a balance between having healthy net exports in the real economy to build up a trade balance against being overly dependent on external capital inflows.

The EFA structure matrix with the cross-loading of broad money and trade openness variables with socio-political and institutional variables under Factor 1 of the EFA matrices corroborate Prasad et al's (2007) point on institutional readiness being a prerequisite for financial sector depth as a mitigant to external vulnerability, alongside other authors such as Barth, Caprio Jr. & Levine (2004) and Čihák, Demirgüç-Kunt, Martinez Peria and Mohseni-Cheraghlou (2012). Considering both the pattern and structure matrix of the EFA results suggest that the analysis of trade openness, financial sector depth and external vulnerability are not only complex in being a set of related variables, but the extent to which these variables are beneficial to a sovereign's credit rating is also influenced by the nation's institutional quality.

5. **Foreign currency dependence.** For the purpose of understanding foreign currency dependence, the EFA result recommends the consideration of public foreign currency-to-total debt ratio, the dollarization ratio and foreign ownership ratio. Suarez (1990) and Brutti & Sauré (2013) characterize the level of foreign debt holdings as a result of macroeconomic issues and sovereign credit risk. Dooley (1988) and Conesa & Kehoe (2015) suggest that while the causality is unclear as to whether foreign debt crises are caused by a growing proportion of foreign holdings, this is also a function of markets sentiment. Chuhan, Claessens and Mamingi (1998) suggest an

integrated view, where internal country factors and external global factors play a role in capital flow changes for an economy. Milesi-Ferretti & Tille (2011) also suggest that foreign ownership via the banking system can create unfavourable foreign credit supply dependencies which may retrench during financial crises. The literature thus suggests that excessive foreign economic dependencies can be detrimental to the sovereign credit rating, and foreign ownership in this sense helps measure this economic dependency on foreign capital through the equity markets channel.

Whether dollarization is good for the sovereign rating however, has been a subject of debate. Authors such as Reinhart & Calvo (1999) suggest this is a panacea for economies with weak currency and monetary systems and that nations with such characteristics are likely to raise US Dollar funding anyway, although the caveat is the necessity of internal balance characterised by effective management of the fiscal balance. Quispe-Agnoli (2002), recognise that there are costs and benefits to Dollarization, in that it does provide a credible and functional currency for the local economy but at the same time, increases the reliance on foreign capital which might cause greater capital markets volatility in the event of capital flight. For the latter risk to be mitigated, Quispe-Agnoli (2002) corroborated by Weymouth (2007) explains that solid institutions are expected for robust dollarization, and it is with this insight it is noted that the public foreign debt-to-total debt ratio has a material cross-loading with Factor 1 of the EFA's Structure Matrix, suggesting that the factor of institutional & socio-political quality are integral to whether foreign capital dependency would be useful or rather, prove to be a moral hazard. As Reinhart & Calvo (1999) and Cowan et al (2006) suggest, dollarization appears to reflect underlying symptoms of structural problems in an economy and hence, high levels of dollarization are expected to correlate with a weaker sovereign credit rating.

It is worth noting that many of the orthodox and unorthodox factors derived from the EFA appear skewed towards an analysis of external vulnerability and its variants. This appears logical considering the rating provided by the rating agencies essentially measure the sovereign's foreign currency long term rating and its ability and willingness to repay principle and interest on debt. This is important because it also shows that there needs to be a prioritisation of the analysis of external vulnerability in the context of serving international sovereign bondholders' interests, while the domestic factors, particularly weighted towards institutional and socio-political quality (as seen from the EFA matrices) are necessary conditions but insufficient in themselves. This concept is important as it places sovereign credit analysis against a context-dependent backdrop, rather than a medley of disaggregated factors.

5.4.2 Independent variables

The empirical results from both the EFA and PRA both point to the presence of unorthodox factors which have yet to be explicitly considered in previous academic studies utilising quantitative models to determine variables of importance. This could mean that much a priori knowledge has been used as the basis of the modelling process and that the methodological approach has mainly been inductive rather than deductive. However, this is not to suggest that the prior studies are inappropriate, since the results also corroborate existing orthodox variables, and further adds unorthodox variables to deepen the analysis and understanding of sovereign credit ratings. The following Table 13 explains the common orthodox factors and the additional unorthodox factors discovered through this research. This table lists the orthodox factors which match prior literature and occur in the empirical results, and compares this list with the unorthodox variables arising from the empirical results.

Table 13: Comparison of orthodox and unorthodox variables

Reinforced* Orthodox variables	Unorthodox variables
GDP per capita	Regulatory quality
General government balance over GDP	Rule of law
General government debt over GDP	Net sovereign external debt to current account receipts
GNI per capita at PPP	Broad money over GDP
Political stability	Dollarisation ratio
Control of corruption	Non performing loans over gross loans
General government debt over revenue	Loan-deposit ratio
Trade openness	Foreign ownership
Public foreign currency debt over total debt	Volatility of government revenues over GDP
	Liquidity ratio

**Note: Unlike Table 12, Table 13 only shows the reinforced orthodox variables (i.e. found in prior literature and also the present research) due to the length of the list of all orthodox variables.*

From Table 13 it can be seen that 9 variables re-appeared in the present research, which is useful for prioritisation in modelling given that previous literature on quantitative studies of sovereign rating variables had as many as 24 different variables in a single equation. Furthermore, the results in table 13 suggest that the principle of parsimony can be maintained and this is even despite the fact that 50 variables were considered at the starting point of PRA modelling. Regardless of this, the significant result from Table 13 would be the discovery of 10 unorthodox variables which were found to be statistically significant, and these variables are a particularly interesting result given that they were not considered by prior literature (i.e. in reference to Table 2 of the literature review chapter). This result is positive in light of the hypothesis that the publication of the major methodological papers by the Big 3 Credit Rating Agencies could demarcate a period in which fresh perspectives have been internalised in the credit ratings process, which is also useful for the guidance of variables to be considered in future studies relating to determinants of sovereign credit ratings. In this section, it is worth considering the new or unorthodox variables which have emerged as statistically significant as follows, and how they relate to prior literature.

1. **Regulatory quality.** There are six World Bank Governance Indicators (WBGI) used to assess political variables and the overall governance quality related to a sovereign state, and therefore, it would be useful for a sovereign credit risk researcher to consider the prioritisation of these variables to represent governance. These WBGI variables are Control of Corruption, Government Effectiveness, Regulatory Quality, Rule of Law, Political Stability, and Voice & Accountability. Hence, it would be important to understand the theoretical reasons as to why some variables did not pass statistical significance testing in this research, which has assisted in the filtering process. As such, this sub-section considers all WBGI variables apart from Regulatory Quality to explain the the background context as to why some variables may be more pertinent tnhan others.

The variables of Political Stability and Control of Corruption were reinforced in this research and also used in prior academic literature. Government Effectiveness, however, did not recur in the present research although it was of pertinence to previous literature. A common factor here is the fact that variables such as Political Stability, Control of Corruption and Government Effectiveness appear to be ex post measures of overall governance quality, as compared to the new variable of Regulatory Quality which has entered into the equation which is an ex-ante measure. Another ex ante variable would be the Rule of Law which has indicated statistical significance in the present research, which will be subsequently discussed.

These results lead to the need for further research with regards to the definitions of the each of these WBGI components. Website files from the World Bank's website (no citation available due to the lack of information on authors and dates of these files) explain that the unorthodox variables which arose in this research, i.e. Regulatory Quality and Rule of Law, appear to be directly related to the ability of the economy's private sector to prosper, and measures components such as tariffs and the extent of deregulation (under Regulatory quality) as well as property rights and confidence in the judicial system (under Rule of Law). The orthodox variables which were reinforced in this research, i.e. Control of Corruption and Political Stability, also suggest the measurement of the cost of doing business such as diversion of public funds and irregular payments in sectors of the economy linked to government (under Control of Corruption), as well as violent demonstrations and the cost of terrorism (under Political Stability). However, from these explanations, it can be seen that the unorthodox variables (Regulatory Quality and Rule of Law) which arose appear more closely linked to institutional quality and processes which are ex ante in nature as opposed to the reinforced orthodox variables (Control of Corruption and Political Stability) which are consequences of the ex ante variables.

Meanwhile, the remainder WBGI variables which were not statistically significant at the 10% level in this research included Government Effectiveness and Voice & Accountability, as they appeared not to measure components which affected the private sector or the economy. For example, according to the World Bank website, Government Effectiveness measure components mainly relating to infrastructure which enhanced the quality of life, while Voice & Accountability measured components such as democracy, human rights and civil liberties. Hence, Government Effectiveness and Voice & Accountability appear more centred on societal quality and hence were not statistically significant in the sovereign credit quality rating which essentially measures economic and government financial quality, rather than quality of life. Studies on Government Effectiveness and the impact on sovereign credit quality has been lacking while the impact on economies appears mixed (for example, see Alam, Kitenge & Bedane, 2017 versus Kurtz & Schrank, 2007). On

Voice & Accountability, Eichler (2014) found that democracy had no significant effect on sovereign credit risk premia which corroborates the idea that Voice and Accountability has no bearing on economic effects and the sovereign credit rating. In fact, Block & Vaaler (2004) found that democracy was not supportive of higher sovereign credit ratings at developing economies.

Research on the reinforced orthodox variable of Political Stability suggests a positive correlationship between Political Stability and investors' propensity to purchase a sovereign nation's bonds (Eichler & Plaga, 2017) as well as a negative correlationship between Political Stability and sovereign default risk (Yu, 2017). Regarding this orthodox variable of Control of Corruption, Ciocchini, Durbin & Ng (2003) and Ng (2006) found that corruption had a negative impact on the cost of funding in financial markets which is in essence the market's risk premium imputable in sovereign credit risk, while Depken, LaFountain & Butters (2006) found a direct link between higher corruption and lower sovereign credit ratings.

With regards to Regulatory Quality, Cordes (2012) found that policies of economic liberalisation including private sector investments and the capital account were correlated with stronger sovereign credit ratings. Butler and Fauver (2006) found a positive relationship between the legal and institutional environment with sovereign credit ratings, but this is indirect as their measurement more broadly captures regulatory quality as a related variable.

2. **Rule of law.** As explained in the sub-section on Regulatory Quality above, which discusses the WBGI variables as a whole, the variable Rule of Law was found to be important and ex-ante in nature with a direct impact on the economy. Butler and Fauver (2006) found a positive relationship between the legal environment and sovereign credit ratings. Qian & Strahan (2007) and Bae & Goyal (2009) found that legal protection and enforcement through effective institutions were important in encouraging lending with narrower loan credit spreads. Little has been said in relation to the bond market on this topic though it is logical to infer that by extension, a reduction in legal risk reduces credit risk premia which supports credit ratings.

3. **Net sovereign external debt to current account receipts.** This macroeconomic ratio is not completely new but the assessment is one in which external debt is considered relative to the strength of a country's current account receipts. Hence, this presents a more holistic view in which external debt is directly superimposed on the ability of the current account to service debt through net exports, net foreign income and net transfers. Currency crises are closely linked with debt crises although rating agencies have not been effective in detecting currency crises, and hence it appears that comparing external debt to the current account is of pertinence, in view of the consideration that the health of the current

account balance is in turn linked to currency stability (Kaminsky & Reinhart, 1999; Reinhart, 2002). A closely related ratio used by prior literature (for example, Cantor & Packer, 1997; and Afonso, 2003) to determine sovereign ratings risks was the external-debt-to-exports ratio but the denominator in this ratio measures only a sub-component of the current account and hence may not present a full picture. There were also other papers which analysed external debt (for example, Mellios & Paget-Blance, 2006; and Galliard, 2012) or the current account (Afonso, Gomes & Rother 2011; and Galliard, 2012) on their own rather than in relative terms between these two variables, which lacks the relational status between a sovereign's ability to support its external debt through incoming economic value from the current account. As seen from the literature such as Roubini & Wachtel (1999) and Lane & Milesi-Feretti (2007, 2012), a core purpose of the analysis of the current account is to determine its sustainability and for the direct purpose of rating sovereign creditworthiness, the net sovereign external debt-to-current account receipts ratio is especially pertinent. However, it appears that the literature regarding the direct link between sovereign ratings or market risk-implied credit risk is lacking for the study of this specific macroeconomic ratio.

4. **Broad money over GDP.** There is a general lack of existing academic literature regarding the effect of broad money to sovereign credit ratings, apart from a working paper by Jaramillo (2010) whom explained that

countries with a high degree of financial markets depth would have easier access to funding and therefore, this lends financial flexibility to the government and supports an investment grade rating. Even so, Jaramillo's (2010) study was focused on the determinants for investment grade status within the emerging markets, as compared to the empirical results for this dissertation which attests to the general statistical significance of Broad money-to-GDP ratio for all rated observations in the population (which is therefore not specific to cohort). This variable corroborates the importance of financial system development as an important factor in the EFA result of *Trade openness, financial sector depth & external vulnerability*, and it is within this nexus Andreasen & Valenzuela (2016) mention the role of financial sector development in supporting sovereign ratings through the funding access channel via the capital markets (although they have not used broad-money-to-GDP as a variable in their research and have instead used narrower variables referencing the debt markets). Hence, the key variable used by rating agencies to proxy financial sector depth would be the broad money-to-GDP ratio and this is in turn analysed against the context of how this forms a theoretical nexus with trade openness and external vulnerability (please refer to bullet point number 4 within section 5.4.1 for a discussion of this factor in relation to the literature).

5. **Dollarisation ratio.** A high degree of monetary flexibility is viewed favourably by the rating agencies, which can be proxied by the sovereignty of a nation's fiat currency to access funding. Therefore, a high dollarisation ratio would be viewed negatively insofar as it represents the inability of a nation's fiat currency to effectively retain user confidence and access the capital markets at a low cost. Therefore, a higher degree of monetary policy flexibility would be supportive to a nation's sovereign rating. Standard & Poor's (2013) views a high level of dollarization negatively, although the literature on this suggests it can have both positive and negative effects (Alesina, 2001; Edwards, 2001b; Bahmani-Oskooee & Domac, 2003). For example, a high degree of dollarization may be helpful in linking a domestic economy's currency market to one which is more stable and allows the functionality of money infrastructure to facilitate basic activities such as the exchange of goods and services or to perform its role as a store of value that helps in inflation containment. As such, the Dollarisation ratio may be high for an economy for the lack of a better currency alternative, particular when domestic fiat currency would be viewed with suspicion due to the lack of economic credibility. As a result, Dollarisation levels are more likely indicative of an ex-post scenario whereby the local currency is ineffective due to a host of other macroeconomic problems which reflect an inability for widely accepted local currency supply in the financial markets.

6. **Non performing loans over gross loans.** The sixth and seventh variables under consideration both relate to the health of the banking system, and both the non performing loans over gross loans ("NPL ratio") and loan-deposit ratio ("LD ratio") appeared as unorthodox variables which were both statistically significant in the PRA. This empirical result provides greater support for the literature which emphasises the link between banking sector risk and sovereign credit risk. Acharya, Drechsler & Schnabl (2012; 2014) explain the commingling of sovereign credit and banking sector risk, since banks are exposed to the government securities which embeds government risk within banks' balance sheets. Conversely, the government is dependent on healthy banks for the government-to-banking sector liquidity ecosystem to function effectively. Given this interdependence, governments either explicitly or implicitly guarantee the continued functioning of the banking sector during period of severe economic stress. Farhi & Tirole (2016) have more directly suggested that banking sector risk and sovereign credit risk are interchangeably representative of each other. Financial markets evidence corroborate the interdependence between sovereign risk and banking sector risk. For example, Alter & Schüler (2012) found a that credit spreads of both sovereign markets securities and financial sector securities rose during periods of credit stress in the financial sector. Gerlach, Schulz & Wolff (2010) explained that capital markets would price in a risk premium for sovereign credit risk when the size of the banking sector was large given

the expected costs of a banking sector bailout by the government. Fitch (2012), Moody's (2013), and Standard & Poor's (2013) have also mentioned the analysis of banking sector risks and its liabilities in its assessment of sovereign ratings. It appears that the analysis of the banking sector is crucially linked to sovereign ratings analysis and specific banking sector risk variables need to be modelled as determinants of ratings.

Several consistently applied financial ratios have been utilised for understanding the health of banks with research on this as early as the 1970s (for example, Stuhr & Wicklen, 1974) and the use of these ratios (e.g. those relating asset quality and capital adequacy) has been extended to more advanced techniques in subsequent periods which aim to understand the impact of these banking ratios on credit default swap risk premia (Hasan, Liu & Zhang, 2016). Hence, it is helpful for parsimony to extract proxy ratios for the representation of banking sector risk amongst the multitude of banking sector financial ratios, and the PRA analysis conducted in this research has assisted in highlighting the importance of the NPL ratio and LD ratio. This section will focus on literature relating to the NPL ratio while the LD ratio will be discussed in the next paragraph.

The statistical significance of the NPL ratio in the PRA results resonates well with the research of Brůha & Kočenda (2018) which singles out the NPL ratio as the most significant indicator of sovereign credit risk, which they measured through both market-based indicators (such as credit spreads) and the sovereign credit rating. However, other than the general literature suggesting the importance of the link between banking system quality and sovereign credit risk, there is a lack of research other than Brůha & Kočenda (2018) specifically linking bank asset quality ratios to sovereign credit ratings.

7. **Loan-deposit (LD) ratio.** The discussion above on banking sector risk summarises the importance of the banking system's quality in having an interdependent effect on the sovereign credit rating. The LD ratio is a good proxy for bank liquidity and leverage (Klomp & De Hann, 2012). However, the direct link between the LD ratio and sovereign credit ratings has not yet been researched. Nonetheless, having sufficient liquidity to fund loans describes the essential purpose of a bank and also provides a gauge of a bank's sustainability which in turn provides the confidence required to avoid bank runs (Diamond & Rajan, 2001). Furthermore, during financial crises, banks tend to experience a shortfall of deposits relative to loans which causes a decline in banks' creditworthiness. During periods of financial crises, the maintenance of a functioning banking system was in turn dependent on government sponsorship which implies a reflection of banking system risks on the sovereign (Acharya, Drechsler, & Schnabl, 2014; Acharya & Mora, 2015).

8. **Foreign ownership.** As foreign ownership appeared within the EFA result which analyses foreign currency dependence, it appears that this variable which appeared in the PRA serves a similar purpose. At a broad level, authors such as Dooley (1988), Chuhan, Claessens and Mamingi (1998), , Conesa & Kehoe (2015) suggest that global capital flows are of pertinence in determining the extent of foreign capital dependence which is in turn a barometer for the health of the global economy and the ability of global investors to purchase equity stakes in companies. At a specific level, literature on foreign ownership of banks which is measured by this variable suggests evidence that dependence on foreign banks for funding may be adverse to an economy and implicitly its sovereign credit rating. Milesi-Ferretti & Tille (2011) link international capital retrenchments during the Lehman Brothers crises as being particularly acute to the bank sector of an economy, the degree of which was dependent on international financial integration. The papers by De Haas & Van Lelyveld (2010) and De Haas & Van Horen (2013) appears pertinent as a finding was that foreign banks' ability to provide capital during the 2008/09 Financial Crisis was greatly curtailed, with credit growth falling faster than local banks with an aversion towards cross-border lending. Cetorelli & Goldberg (2011) similarly recount the role of international banks in shock transmission via the credit creation channel during the 2008/09 Financial Crisis. Schnabl (2012) found a similar situation during the 1998 Russian default which led to a reduction in lending from international banks to Peruvian banks,

especially those which borrowed internationally, which in turn led to credit contraction in the local economy. Gianetti & Laeven (2012) explain the reinforcement of this feedback loop during financial crises where funds are channelled to domestic borrowers whilst reducing liquidity to foreign firms. As such, foreign banks are less reliable in being able to provide liquidity during critical periods of economic stress and as a result, a higher degree of foreign ownership in the banking system has adverse effects on an economy. These narratives appear to be have evolved from earlier findings as it contradicts papers which previously suggested that foreign bank presence supports credit stability (Dages, Goldberg & Kinney, 2000; De Haas & Lelyveld, 2006), although Arena, Reinhart & Vázquez (2006) explain that despite weak evidence foreign banks supported credit markets stability to some extent, this was also tempered by the individual bank's financial strength.

9. **Volatility of government revenues over GDP.** The PRA analysis coincides with the EFA finding of the significance of this macroeconomic metric. Furthermore, prior literature as found in this dissertation's literature review as well as the literature review of Gaillard (2012) and Tennant & Tracey (2016) showed that this variable or variants of it relating to government revenue had been poorly covered in the regression models, despite the importance of revenues in directly servicing government debt, which can be viewed as more useful in determining debt serviceability

than ratios such as debt-to-GDP; for example, developed countries with higher debt-to-GDP can have higher sovereign ratings by virtue of broader, more consistent and better tax revenue collections (Hausmann, 2004). Afonso & Fuceri (2010) also found that government revenue volatility has negative effects on GDP growth. GDP growth is important as it has a self-reinforcing loop with the ability to raise taxes and the degree of taxation is similarly integral to the concept of debt sustainability and directly affects the size of the primary deficit (Blanchard, 1990; Blanchard et al, 1990, Contessi, 2012). However, there has been a lack of studies relating general taxes or the specific ratio of tax volatility-to-GDP with regard to the level of sovereign credit risk.

10. **Liquidity ratio.** This ratio expresses liquid external assets to liquid external liabilities which are essentially short term and liquefiable in nature. This ratio similarly appeared in the EFA results under the factor of External Financial Strength, suggesting its significance in both the EFA and PRA. The difference of this ratio is its focus on complementing the nexus of metrics under the EFA result by including a short-term liquidity risk measure by the liquidity ratio as a variable. The issue of short term liabilities and flighty foreign capital is important, and the manageability of these liabilities depends on similar maturity assets which is present through the measurement of the liquidity ratio. Despite the lack of papers which directly study sovereign ratings in relation to the liquidity ratio and

the substance of its underlying measures which are short term liabilities and assets, the theoretical basis for the liquidity ratio in assessing creditworthiness has been well-established. Hodgman (1960), as a theoretical forerunner, raises the dimension of credit rationing being important and possibly preponderant in the short term through credit availability and demand, and this can be interpreted as price equilibrium being pertinent only after an assessment of the basic existence of credit supply and demand. Diamond's (1991) paper popularised the asset-liability matching conundrum by drawing on the case of the Asian Financial Crisis in 1997/98 by discussing the weight of short term liabilities and the risk of capital flight by foreign investors versus the inability of short term assets to cope with foreign withdrawals in the banking system, which was similarly reflected by capital outflows vis-a-vis international reserves (Radelet & Sachs, 1998; Rodrik & Velasco, 1999; Chang & Velasco, 2000a; Chui, Gai & Haldane, 2002). Hawkins & Turner (2000) formed a focal point by discussing the concept of "national liquidity" and Chui, Gai & Haldane (2002) similarly consider the importance of reducing short term debt and raising liquid assets for prudent debt management and also repel negative markets sentiment towards a country's creditworthiness.

The preceding section which explains new and unorthodox variables suggest a vast area of further research for use in the determination of sovereign credit ratings. These results widen the horizon of new narratives in understanding the drivers of sovereign credit ratings.

Chapter 6 Conclusion

The main goal of this study is to determine the factors and variables determining sovereign credit ratings, beyond what has been commonly known in academic literature and methodology papers by rating agencies. Thus, it is important to identify the epistemological approach, theoretical structure and analytical mindset to be adopted for the purpose of understanding sovereign credit ratings. This would allow an understanding of the underappreciated explanatory factors and variables to comprehensively broaden the view of what determines sovereign credit ratings, beyond the dominant narratives. The major contribution of this research is to prioritise the key factors and variables for sovereign credit ratings and to relate both variables and factors to one another, in forming an empirically-generated paradigm, which is depicted in the following Figure 4 under section 6.1.3. In this respect, the conclusion of this dissertation synthesises the key results into a theoretical framework, through the lens of an “ecosystems approach”. The conclusion section also discusses policy and practice implications, research limitations, and suggestions for future research.

6.1 A new theoretical framework for rating factors

6.1.1 Theoretical structure

The factor analysis results has indicated two basic empirical facts about the theoretical framework for rating factors:

(i) *depth* - there is greater granularity in terms of the number of the factors which help create the analysis and opinions on sovereign credit ratings;

(ii) *breadth* - the factors suggest narratives beyond what is commonly discussed in rating methodology papers and should incorporates other insights from academic papers;

Depth. The *depth* of the factors can be seen from the result where 4 to 5 core theoretical codes derived from the factors of the rating agencies' methodology papers have now been expanded to 8 theoretical codes. The presence of unorthodox factors are: (i) government debt structure; (ii) trade openness financial sector depth & external vulnerability; and (iii) foreign currency dependence. This is to be distinguished from the orthodox factors such as: (i) institutional and socio-political development; and (ii) external financial strength, as these are already present in rating agency methodologies.

Breadth. The greater number of dimensions used in sovereign ratings then suggests that the present clustering of variables within factors would be too general and broad in the rating agencies' methodological papers, where as many as 14 variables could be clustered within a single factor (see tables 1.1 to 1.3

under the Literature Review in Chapter 2). This is important because to subscribe strictly to rating agencies' methodology papers, would lead to too many variables to consider which compromises the focus of important variables which are helpful in understanding each factor. On one hand, too few variables would be a problem in limiting the scope of the narrative, and on the other hand, too many would cause a user of the factor structure to lose focus. Hence, the EFA results in this research has allowed am empirically-justified method which has led to the discovery of 8 factors.

Expanding the narrative. The emergence of a greater number of factors then lends further theoretical depth to the factor structure being analysed. Here, a conclusion can be made that the original rating agencies' methodology papers has had a limited framework or one in which is insufficiently comprehensive to capture the range of narratives which would be helpful in assessing a sovereign credit rating. The implication of this to practice is that the sovereign credit analyst or user of sovereign credit rating reports would need have a mindset shift towards analysing a further range of unorthodox factors as abovementioned. Both the depth and breadth of the theoretical factor structure also implies that the credit rating process is likely more complex than envisaged.

6.1.2 Prioritising two key narratives

The central influence of political and socio-political development. A simplistic route towards utilising the factor structure would be to assume that the weights of each factor are generally similar. A more complex but insightful route would be to avoid equivocality with the aim of placing greater or less emphasis on some factors. As explained in section 6.1.1 above, it is important to present a focused narrative when explaining a sovereign credit rating report. As explained in the EFA results distilled through QGT, the core code of institutional and socio-political development is a very important factor. This needs to be well-considered despite scholars whom believe that financial and economic variables should probably bear greater weight in the analysis of debt repayment capabilities (Haque, Mark & Mathieson, 1998; Bird & Rowlands, 2001). Furthermore, the EFA results also indicate a cross-loading of the institutional and socio-political development factor with several other factors, suggesting its role as a unifying factor which influences other macroeconomic aspects. Thus, if this were the case, it can be argued that institutional and socio-political development is a central and unifying factor on which other macroeconomically-linked issues in sovereign credit ratings depend on. This result also shows that the formal definition of a sovereign rating which encompasses both the “willingness” and “ability” to repay a nation’s debt is two-pronged: (i) the concept of “willingness”, as encapsulated by institutional and political factors, leads to political will and structural reinforcers and (ii) in turn, this helps a nation honour its debt (i.e. “ability). Therefore, institutional and political factors, are important and interdependent with financial and economic resources.

The literature supporting the importance of the political element in debt repayment and a nation’s economic success is extensive, although its central importance in sovereign credit ratings has not been clearly prioritised. Sinclair (1994) has discussed the concept that rating agencies can be viewed as policy-generative institutions which reinforces state processes such as their role in surveillance and through that, capital allocation. Capital markets through multi-agent transactions function on feedback mechanisms and rating agencies fulfil this role as central information agents. Brewer & Rivoli (1990) explain that models which aim to assess sovereign creditworthiness only through economic variables are likely to be misspecified and that the political and institutional factor needs to be more granularly examined due to its multi-dimensionality. Balkan (1992) found a strong relationship between political events and the probability of default and debt rescheduling. Oatley (2010), found that autocratic regimes tended to accumulate larger amounts of debt which might not have been optimally allocated to economic projects. Biglaiser & Staats (2012) found a significant positive relationship between the quality of a country’s legal system and sovereign bond ratings.

The importance of using various factors and variables to assess foreign currency debt repayment. The factors discovered in the EFA also highlight that the sovereign credit rating is not merely a measure of general sovereign debt repayment ability but focuses on a sovereign's ability to repay debt to international investors. This result appears logical since the purpose of issuing a sovereign credit rating is to gain international capital markets access (Black & Munro, 2010) and the rating provides international investors a measure to easily recognise credit quality.

The factor analyses' core theoretical codes which arise comprise three factors which are related to external debt servicing capabilities, namely: (i) the orthodox factor of external financial strength; (ii) the unorthodox factors of trade openness, financial sector depth & external vulnerability; and (iii) the unorthodox factor of foreign currency dependence. These factors thus form a complementary nexus of factors which should be analysed concurrently. The contribution of this result is to create a more granular analytical framework for the purpose of analysing external debt servicing capabilities and the ability of an economy to withstand the vicissitudes of the international capital markets. Thus, apart from assessing the endogenous macroeconomic ratios of external debt stock, assets and reserves (i.e. the factor of external financial strength), the research results relate this to a country's exogenous interface through macroeconomic ratios such as the degree of trade openness and whether the financial markets have sufficient depth to withstanding the volatilities of foreign capital inflows and outflows through measures such as broad money to GDP (i.e. the factor of trade openness, financial sector depth & external vulnerability). Additionally, these factors are further analysed in the context of the degree to which a country is already dependent on foreign currency debt, such as the extent of use of foreign currencies through the dollarization ratio which can indicate whether the country has its own de jure monetary system, and the degree of dependency on foreign capital through the foreign ownership measure (i.e. the factor of foreign currency dependence).

There has been limited literature emphasising the core importance of external imbalances in debt repayment, apart from Gros (2011), who believes that correcting external imbalances in the Eurozone crisis was more important than internal imbalances since a country has sovereign powers of taxation and can expand money supply. There has also been limited literature considering the analysis of external imbalances and dependencies with the external sector as a nexus of factors as concluded above. However, the literature review chapter has suggested atomised research considering each of the variables which appear to be important for the analysis of the external sector, such as a few divided views relating to the risks of dollarisation (Alesina, 2001; Edwards, 2001b; Bahmani-Oskooee & Domac, 2003), the risks of trade openness (Herwartz & Walle, 2014; Chit & Judge, 2011), the risks of financial globalisation to developing economies (Prasad et al, 2007) and the risks of foreign ownership (Milesi-Ferretti & Tille; 2011). As such, future research could consider, through a collective grouping of these variables as proxy indicators, a country's degree of external sector risk.

6.1.3 Synthesising A New Paradigm for Sovereign Credit Analysis

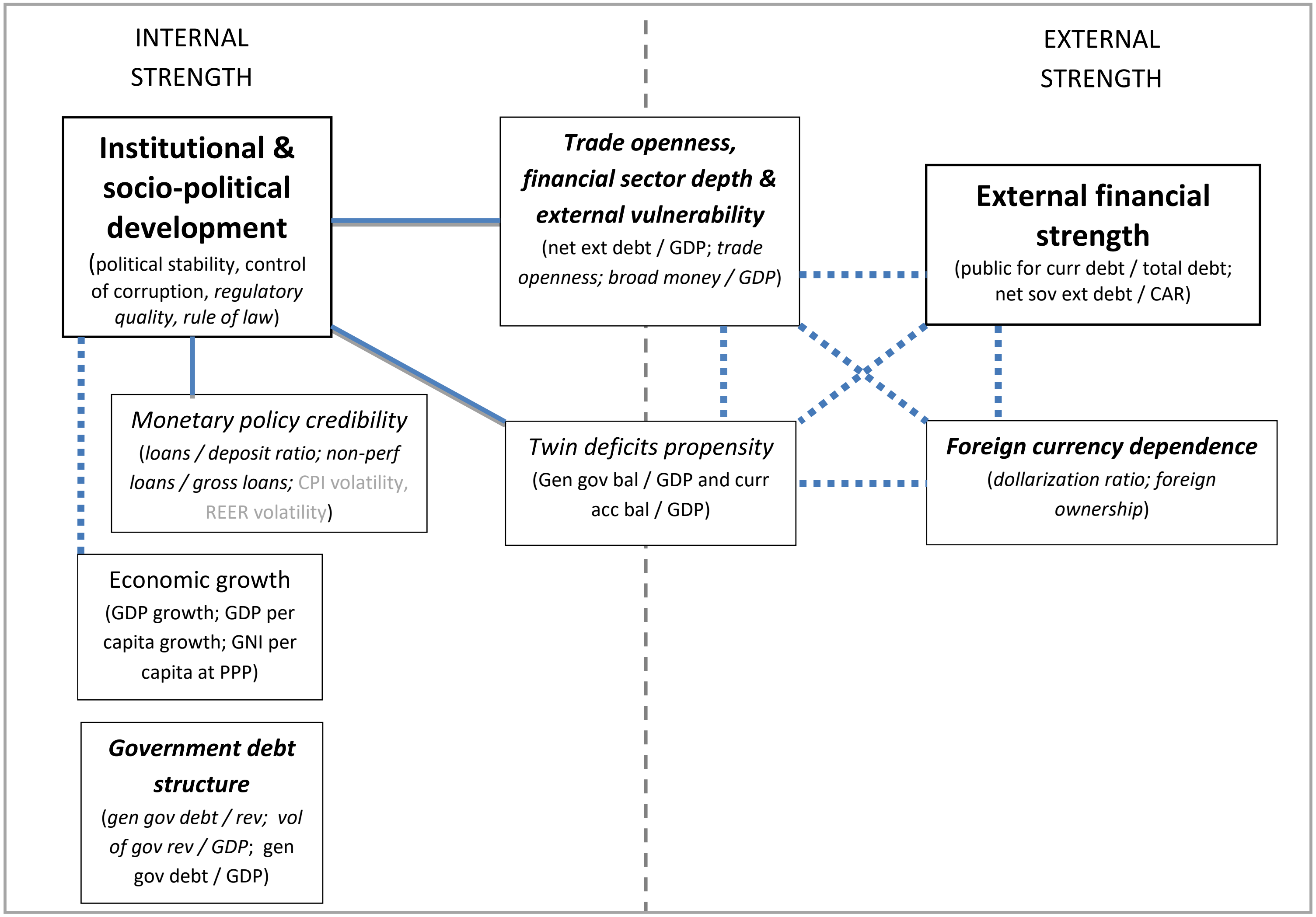
The major contribution of this research is the synthesised findings of the results which can be visualised as an ecosystem in Figure 4, in order to understand the relationships between the core factors and variables important to sovereign credit ratings and analysis. In constructing the diagram, consideration was given to the results of the EFA, PRA and QGT, and how they were linked to each other. Essentially, the PRA would indicate the appropriate variables to be assessed under each factor derived from the EFA, while the QGT would add to the additional selection process of considering which orthodox factors were reinforced and emerged as core theoretical codes to develop a parsimonious paradigm.

The following explains the interpretation of the diagram on the following page:

1. "Internal Strength" and "External Strength" are added narratives to better communicate the structure of the analytical framework.
2. The larger bold font for external financial strength and institutional & socio-political development indicates the importance of these as unifying concepts for both factors and the variables which explain these factors.
3. Unorthodox concepts inclusive of new factors and variables are italicised.
4. The three solid lines emanating from institutional & socio-political development are based on the empirical links with the other factors based on EFA cross-loadings.

5. The dotted lines between factors are based on the theoretical links from the literature review. Greyed text of variables is based on EFA results but not from PRA results.

Figure 4: A New Paradigm for Sovereign Credit Analysis



6.2 Policy recommendations

As suggested in the literature review (e.g. Frost, 2007), a limitation of sovereign rating assessments is opacity in the methodological processes and these concerns were further debated following the Great Financial Crisis of 2007/08. One way to resolve concerns over the information asymmetry of sovereign ratings would be to consider the use of a more comprehensive theoretical paradigm as recommended in Figure 4 in the previous section, which is a holistic map of inter-related factors depicting how sovereign ratings might be arrived at. This issue further highlights the need to keep an open mind with the changes in rating methodologies, factors and variables and remain updated on future research involving sovereign ratings. Furthermore, the end goal is not so much to obtain a mere idea of what rating agencies are thinking, but to consider the constellation of inputs which may enhance or impair a country's sovereign creditworthiness. Furthermore, the recommended paradigm does not take a mere checklist approach of disparate factors in the sovereign creditworthiness assessment but assists the sovereign credit rating user or analyst in: i) prioritising factors of importance; and ii) forming analytical links between factors.

Extending this idea, it is apparent that sovereign credit analysis cannot be done through a linear interpretation of disparate variables which has often been the implied mode through literature on sovereign credit ratings which has utilised mainly linear regressions of different variants in order to arrive at sovereign rating results. Furthermore, there is the added risk where a linear view of variables takes a rear-view mirror approach in arriving at rating results, since inter-related factors are not fully considered in their entirety. For example, through the paradigm presented in Figure 4, it has been made explicit that external financial strength can be best understood as an ecosystem of inter-related factors, hence warning signals of deterioration in key variables can lead one to investigate related issues which may suggest imbalances within the nexus of external financial strength. Similarly, the assessment of whether a central bank is credible and whether there are signs of internal imbalances leading to the possibility of twin deficits should not be done through an ex post lens of merely observing ratios such as non-performing loans and current account deficits in the economy, but by assessing if the fundamental institutional and socio-political structures engender limitations to a country's ability to achieve a higher level of sovereign creditworthiness. This "ecosystems approach" through the empirically-generated paradigm would be essential in an ex ante view of analysing sovereign creditworthiness and potentially useful in providing intuitive warning signals prior to sovereign debt rating downgrades (or upgrades).

This integrated mindset also suggests that there is no single factor which can easily determine a country's willingness and ability to repay its debt. There should also be an avoidance of myopia in judging a nation's credit quality. For example, the empirical results of this research disagree with the stereotypical concept of "resource-cursed" countries in being automatically relegated down the ratings ladder. Qatar (Aa3/AA-) and Australia (Aaa/AAA) are examples of nations which are high grade and are at the same time, their economies are heavily skewed towards being natural resource-based. Another finding is that there is no stylised ratings bias towards developed and against developing nations and this variable does not contribute much to the analysis of a country's sovereign creditworthiness. Key narratives which emerged remained with existing findings on the importance of external financial strength as well as institutional and socio-political development as lynchpins in the sovereign rating assessment, while new emergent narratives were a nation's degree of integration with the global economy through variables such as trade openness and foreign currency dependence, the quality of the banking system, and domestic public finance features such as the tax base, tax revenue generation, and debt maturity structure. Given the latter, the sovereign rating should thus be viewed as not merely an assessment of broad macroeconomic issues, but inclusive of micro-level issues such as the structure of debt issuances and sustainability through sound public sector financial management.

As such, the result of a sovereign rating assessment can be defined as a synthesised understanding which occurs within an ecosystem of economic and political factors and variables, which contributes to the understanding of a nation's internal strength, external strength, viewed on both macro and micro levels.

6.3 Limitations

This research is conducted on the premise of methodological changes which were clustered in 2011-2012. The data following these methodological changes would be limited, hence it would be useful to conduct a similar research several years later. However, this is also under the assumption that future methodological changes would be limited. Furthermore, the development of new variables measuring concepts relating to factors may change over time which would need a substitution of research variables. Other variables may also gain more importance over time and this would then be dependent on the choices made by rating agencies which could be opaque. Finally, as with most research involving the emerging economies, the veracity and consistency of data has remained questionable hence, making fine distinctions between the ratings of some of these economies may be less meaningful.

6.4 Future research

The findings of this dissertation reveal several other avenues for future research. For example, given the range of unorthodox factors and variables which were unearthed in this research, individual analysis of these factors and variables with sovereign ratings and/or sovereign creditworthiness could be analysed. Namely, this includes issues such as how sovereign credit ratings relate to issues such as trade openness, banking system financial ratios, perceptions of monetary policy credibility and tax system effectiveness. The relevant regression analyses can be done for ratings against a single-variable, a grouping of variables under a factor, or a grouping of several variables under related factors.

Based on ideas from this conclusion, the rating agencies' methodology papers and some academic literature explain that sovereign credit ratings may be a non-linear process. Further methodological changes to academic research can be implemented to refine the way research on the results of ratings are arrived at. Hence, there might be a need to avoid fixation on deterministic systems (e.g. linear regressions) of analysing sovereign credit ratings by considering the use of other methodologies (e.g. artificial neural networks as employed by Bennell et al, 2006, or the use of factor analysis as employed in this dissertation). Thus, further research can be conducted on the methodologies of sovereign credit ratings analysis in practice by both credit rating agencies and other entities which design their own ratings or sovereign credit assessment methodologies, whether ideas of best practice have been evolving, and the gaps between commonly used research methodologies in sovereign credit assessments and methodologies in praxis.

At the government sector, the issue of public sector financial management and how this connects with sovereign credit ratings is of pertinence as well. Much has been discussed about creditworthiness on a macroeconomic level, but there needs to be further and specific research conducted on issues at a micro level, namely, the effects of tax revenue generation, debt structure, and government short-term liquidity management on a government's debt sustainability and its sovereign creditworthiness.

Appendix A: Transformation of ratings to a numeric scale

To conduct the exploratory factor analysis and panel regression analysis, it was necessary to assign a numerical rating scale to the credit rating nomenclature utilised by the main credit rating agencies ("Big 3"), Moody's, Fitch Ratings and Standard & Poors. The scale runs from 1 to 22, with 1 the lowest rating of "D" or default and 22 the highest rating of triple-A.

Moody's	*S&P*	*Fitch*	*Numerical rating*
Aaa	AAA	AAA	22
Aa1	AA+	AA+	21
Aa2	AA	AA	20
Aa3	AA−	AA−	19
A1	A+	A+	18
A2	A	A	17
A3	A−	A−	16
Baa1	BBB+	BBB+	15
Baa2	BBB	BBB	14
Baa3	BBB−	BBB−	13
Ba1	BB+	BB+	12
Ba2	BB	BB	11
Ba3	BB−	BB−	10
B1	B+	B+	9
B2	B	B	8
B3	B−	B−	7
Caa1	CCC+	CCC+	6
Caa2	CCC	CCC	5
Caa3	CCC−	CCC−	4
Ca	CC	CC	3
	C	C	2
C	RD	DDD	1
D	SD	DD	1
D	D	D	1

Appendix B: Analysed variables

The following describes the 50 variables analysed in this research and their related formulae used in the statistical analyses (EFA and PRA). The data is sourced from the respective national authorities, international and supranational institutions, credit rating agencies and Bloomberg. While each variable has their unit of measurement, the scale has been normalised for comparability during the statistical analyses.

1. Development Status

Advanced Economies classified in the latest IMF World Economic Outlook are reported as Developed Markets (DM). Emerging Market and Developing Economies are reported as Emerging Markets (EM).

2. Real GDP Growth (% Change)

Annual percentage change of a country's gross domestic product (GDP) in constant prices. GDP is the total of consumption (private and government) plus gross fixed capital formation plus the change in inventories plus exports of goods and services minus imports of goods and services.

3. Consumer Prices (% Change)

Annual percentage change in the consumer price index (CPI).

4. Volatility of GDP (%)

Standard deviation of the annual percentage change in real GDP over 10 years.

5. Volatility of CPI (%)

Standard deviation of the annual percentage change in CPI over 10 years.

6. Broad Money (% of GDP)

Broad money is narrow money (currency outside deposits of money in banks plus demand deposits excluding central government deposits) plus quasi-money (foreign-currency deposits plus fixed deposits plus savings deposits, all excluding the central government); or currency in circulation plus deposits. Measured as a percentage of local currency GDP at current prices.

7. Private Credit (Real % Change)

Annual percentage change in domestic credit lent by financial institutions to the non-financial sectors, deflated by the CPI. Source: National authorities, international institutions, Bloomberg.

8. Loan-to-Deposit Ratio (LDR) (%)

Domestic banking system loans excluding the government and central bank, expressed as percentage of total domestic deposits.

9. Capital Adequacy Ratio (CAR) (%)

Total capital of the domestic banking system expressed as a percentage of its risk-weighted credit exposures, based on Basel rules.

10. Non-Performing Loans (NPL) (%)

Non-performing loans of the domestic banking system including provisions (i.e. gross NPL) to total loans.

11. Foreign Ownership (%)

The share of banking system assets accounted for by banks in which the majority and/or controlling shareholder is a foreign entity.

12. Public Ownership (%)

The share of banking system assets accounted for by banks in which the government or its agents is the majority and/or controlling shareholder.

13. Dollarisation Ratio (%)

The ratio of foreign-currency denominated deposits as a percentage of total deposits in the banking system. For dollarised economies (i.e. those which use US Dollars as the primary currency in circulation with no sovereign fiat currency) the ratio is set at 100%. Source: National authorities, international institutions, Bloomberg.

14. General Government Balance (% of GDP)

Consolidated fiscal balance of the general government which includes the central government, provincial, regional and local governments; data may be cash or more acceptably, as accruals, of revenues and expenditures. In some countries data are available only for a fiscal year not coinciding with the calendar year (e.g. India, where the fiscal year ends in March).

15. General Government Primary Balance (% of GDP)

Similar to the General Government Balance as above, but excludes interest payments from the expenditure figure.

16. General Government Debt (% of GDP)

Debt stock of the general government (as defined above), including monetary authorities' debt issued on behalf of the government. Contingent liabilities such are excluded, except where specified as a line item in the budget.

17. General Government Debt Maturities (% of GDP)

The stock of outstanding short-term general government debt plus amortisation paid or due on general government debt in the current calendar year.

18. General Government Debt (% of General Government Revenue)

The debt stock of the general government as a percentage of general government revenue.

19. General Government Interest Payments (% of General Government Revenue)

The general government interest expenditure on government debt as a percentage of general government revenue.

20. General Government Domestic Debt (% of GDP)

Domestically issued general government debt on the capital market.

21. Volatility of the government revenues-to-GDP ratio (%)

The coefficient of variation of the general government revenue including grants to GDP over the last 10 years.

22. Real Effective Exchange Rate (REER)

Annual average index value which measures a country's nominal exchange rate changes relative to a weighted average (or basket) of the currencies of its main trading partners, deflated by inflation rate.

23. Volatility of REER (%)

The standard deviation of the annual percent change in the average annual index of the REER.

24. Trade Openness (% of GDP)

The total value of all transactions on the current account of the balance of payments divided by two and expressed as a percentage of GDP at current prices.

25. Commodity Dependence (% of CXR)

The proportion of current account receipts from the primary sectors or non-manufactured goods based on the World Bank definition.

26. Current Account Balance (CAB, % of GDP)

Current account receipts minus current account payments as a percentage of GDP.

27. Net External Debt (NXD) (% of current account receipts)

Gross external debt less gross external assets from a country's GXD, expressed as a percentage of current account receipts.

28. Net External Debt (NXD) (% of GDP)

Gross external debt less gross external assets from a country's GXD, expressed as a percentage of GDP.

29. Net Sovereign External Debt (NSXD) (% of current account receipts)

Gross sovereign external debt less official international reserve assets, including gold, and other debt claims on foreigners held by the government (including the debt claims of sovereign wealth funds), expressed as a percentage of current account receipts.

30. Net Sovereign External Debt (NSXD) (% of GDP)

Gross sovereign external debt less official international reserve assets, including gold, and other debt claims on foreigners held by the government (including the debt claims of sovereign wealth funds), expressed as a percentage of GDP.

31. Short term external debt to gross external debt (%)

Debt maturing within a year or less owed to non-residents expressed as a percentage of outstanding debt liabilities of residents to non-residents, converted into US dollars at year-end exchange rates and expressed as a percentage of GDP and CXR. These liabilities may be denominated in foreign and/or local currency but must be identified with non-resident entities.

32. External debt service (% of current account receipts)

Current year principal or amortisation and interest servicing requirements due to non-resident entities expressed as a percentage of current account receipts. These liabilities may be denominated in foreign and/or local currency as long as they belong to non-resident entities.

33. External interest service (% of current account receipts)

Current year principal or amortisation and interest servicing requirements due to non-resident entities expressed as a percentage of current account receipts. These liabilities may be denominated in foreign and/or local currency as long as they belong to non-resident entities.

34. Net sovereign foreign currency debt (% of GDP)

General government plus central bank foreign currency denominated debt (irrespective of the residency of the holder), less foreign currency denominated assets (typically official international reserves and the foreign currency assets of sovereign wealth funds), expressed as percentage of GDP.

35. Public foreign currency debt (% of total debt)

Gross general government plus central bank foreign-currency denominated debt (irrespective of the residency of the holder), expressed as percentage of total domestic and foreign currency denominated debt. For dollarised economies, this ratio is set at 100%.

36. Liquidity Ratio (%)

Liquid (liquefiable or marketable in the immediate time horizon) external assets as a percentage of its liquid external liabilities. Liquid external assets are official international reserves including gold plus banks' external assets. Liquid external liabilities are external debt servicing requirements due in the current year, plus the short-term external debt and non-resident holdings debt.

37. Reserves (% of current account purchases)

Official international reserves (i.e. foreign exchange plus SDRs plus reserves position in the IMF) including gold, excluding forward purchases/sales, presented in US dollars and expressed as months of cover against current account purchases.

38. Sovereign Net Foreign Assets (SNFA) (% of GDP)

Calculated as net sovereign external debt netted off with sovereign holdings of equities overseas (for example, sovereign wealth funds), expressed in USD and as a percentage of GDP.

39. GDP per capita

GDP per head of the population, presented in US dollars at annual average market exchange rate.

40. GNI per capita at Purchasing Power Parity (PPP)

GNI per head of the population, taking into account purchasing power parities (that take account of price differentials between countries), rather than market exchange rates (which can be influenced by cross-border capital flows and other factors).

41. Real GDP growth per capita

Annual percentage change over the last five years of a country's per capita GDP in constant prices (ie, volume terms).

42. Unemployment Rate (%)

Annual average number of unemployed as a percentage of total labour force.

43. Political Stability

Political stability and absence of violence/terrorism is one of the six World Bank Governance Indicators, which evaluates the likelihood that the government will be destabilised by unconstitutional or violent means, including terrorism. Expressed as a percentile ranking.

44. Government Effectiveness

Government effectiveness is one of the six World Bank Governance Indicators, which evaluates the quality of public services; the capacity of the civil service and its independence from political pressures; and the quality of policy formulation. Expressed as a percentile ranking.

45. Rule of Law

Rule of law is one of the six World Bank Governance Indicators, which captures the extent to which agents have confidence in and abide by the rules of society, including the quality of contract enforcement and property rights, the police, and the courts, as well as the likelihood of crime and violence. Expressed as a percentile ranking.

46. Control of Corruption

Control of corruption is one of the six World Bank Governance Indicators, which measures the extent to which public power is exercised for private gain, including both petty and grand forms of corruption, as well as “capture” of the state by elites and private interests. Expressed as a percentile ranking.

47. Regulatory quality

Regulatory quality is one of the six World Bank Governance Indicators, which measures the extent to which captures perceptions of the ability of the government to formulate and implement sound policies and regulations that permit and promote private sector development. Expressed as a percentile ranking.

48. Voice & accountability

Voice and accountability is one of the six World Bank Governance Indicators, which captures perceptions of the extent to which a country's citizens are able to participate in selecting their government, as well as freedom of expression, freedom of association, and a free media. Expressed as a percentile ranking.

49. Human Development Index

The Human Development Index (HDI) reported by the UN Development Programme (UNDP) combines normalised measures of health, educational attainment and income per capita. Expressed as a percentile ranking.

50. Ease of Doing Business

The Ease of Doing Business Index is updated annually by the World Bank based on a review of regulations and procedures that govern business activities, such as enforcing contracts and international trade. Expressed as a percentile ranking.

Appendix C: Example of a structured use of quantitative methods in grounded theory

The use of grounded theory has often been mistaken as a purely qualitative exercise, and this dissertation relies on using quantitative methods with a grounded theory methodology. The below partial image is an extract from a textbook on classic grounded theory written by Holton & Walsh (2016) which further develops Glaser's (2008) pioneering work on quantitative grounded theory, a branch of classic grounded theory. The extract was taken to exemplify the structured use of both qualitative and quantitative methods in grounded theory, and how it is used to systematically generate theory which is a core purpose of this dissertation.

		Constant comparative analysis of all data as one set		
Theoretical codes	*Generalizability*	*Secondary data (from previous phases and from the literature)*	*Primary qualitative data*	*Primary quantitative data*
Proposition 1: Individual information technology (IT) culture has a positive influence on the individual's global IT needs.	Substantively formalized	We found, during previous phases of our research, three main attitudinal user groups (proactive, passive, and refusal). These groups include different user profiles, with differing degrees of IT acculturation. We also found that the most IT-acculturated users are proactive. They are perceived by managers as having a facilitating influence during the implementation of new IT in organizations. They are also those users with high levels of global IT needs, whereas passive users have lower levels of global IT needs and refusal users have none.	"For me, there is a clear link between an individual's level of IT acculturation and the need they perceive for IT in their life." (CEO of an IT firm)	IITC → GLOBITNEE: $\beta = 0.598$, $p < 0.001$, R^2 for GLOBITNEE = 35.8%
Proposition 2: Individual IT culture has a positive influence on contextual IT needs.	Bounded by context	We found during previous phases of our research that the users who were highly IT-acculturated also had high levels of contextual IT needs.	"I certainly could not do my job in X school without IT. This was not the case in my previous institution, although I personally feel I need IT to do my job as a professor . . . For instance, it's the first time I have been asked to use PowerPoint slides to teach. In my old school, nobody ever used PowerPoint." (Young assistant professor with a couple of previous teaching experiences and who has started a new job in X school; she grew up in a computerized home environment with a father who is an IT engineer)	IITC → CONITNEE: $\beta = 0.400$, $p < 0.001$
Proposition 3: Global IT needs influence situational IT needs, positively or negatively.	Substantively formalized	Vallerand (1997, 2001) showed that motivation at the situational level results from the effects of both global motivation and "social factors at the appropriate level of generality." (Vallerand, 1997, p. 275)	"I have fairly important IT needs; for example, I have several computers, and I always need to be connected through the Web. When I travel abroad, I remain connected even if it costs me a lot of money. . . . You evaluate the platform and how it helps you fulfill needs linked with your responsibilities. I found that Moodle helped only with uploading the files that I wanted the students to have, and I found other functionalities inadequate, so I use the platform only minimally." (Young informations systems [IS] assistant professor)	POSITION → SITITNEE: $\beta = -0.138$, $p < 0.001$

Appendix D: Technical notes and panel regression details

The panel regression analysis began with 50 variables which were eventually reduced sequentially by removing variables with insignificant beta coefficients at each iteration of equation generation. The 10% significance level was deliberately chosen as the statistical cut-off for the determination of significance, given the exploratory nature of the statistical exercise and to limit omitted variable bias. While the 10% significance level is atypical, Sauley and Bedeian (1989) argue that the use of the significance level is dependent on the sample size and nature of the research construct, while the more frequent use of the 5% significance level is a matter of convention rather than logic or scientific basis. Corroborating this dissertation's use of the 10% significance level, Labovitz (1968) and Sauley and Bedeian (1989) explain the supporting rationale as follows: (i) small sample sizes should use larger significance levels; (ii) practical consequences of Type 1 errors are not high, and in relation to this research, rating agencies have admitted to the use of human judgement when considering variables which comprise a rating, suggesting the mutability of input variables – in contrast, for quality control and medical science applications, lower significance levels (e.g. 0.5% or 1%) might be preferable; (iii) lower significance tests should be used in cases where the underlying theory or existing evidence is poorly developed, and in the case of this research, each explanatory variable has been reinforced and explained by a wide body of literature; and (iv) a higher significance level of "0.10 or 0.20 would be sufficient" (Labovitz,1968, pp.221) if the purpose of a study is to explore other potential variables which may be of importance in a subject area, which is the main purpose of this dissertation's research.

The 2014-2016 random effects (RE) regression results form the basis for the original equations, and the theoretical justification for this choice has been explained in the methodology under Section 4.2 and in Table D1. The 2014-2017 regression results form the basis of the robustness test, which was also repeated with clustered standard errors (the end of section 5.2.3 explains the rationale for not using this method). As part of the robustness test, the regression was also conducted with a fixed effects (FE) model to supplement the use of the Hausman test criterion to determine whether the results from fixed effects was indeed inferior to the use of the random effects model. The results, as explained under the robustness test under section 5.2.3, vindicates the theoretical justification for the use of the RE regression. Furthermore, fixed effects has omitted variable bias given the time-invariant variable “development status”. This appendix displays the details of the random effects results (Table D2) and descriptive statistics (Table D3).

In addition, the VIF (variance inflation factors) for the results are reported in Table D4. Since VIF is unavailable for fixed effects and random effects panel regressions, a pooled OLS (Ordinary Least Squares) study was conducted to generate the VIF for the equations determined by the regression equation. The purpose of this is mainly an exploratory exercise on the multicollinearity of variables. As reported in Table D4, multicollinearity does not appear to be a critical issue as there was no VIF above 10 (O’brien, 2007; Thompson et al., 2017). However, a degree of multicollinearity remained present, as is expected with most social science research which requires theory-assisted interpretation (Blanchard, 1987). As such, the VIF needs to be viewed with caution due to debatable interpretations of an ideal threshold level and that there should not be an exclusive emphasis on the VIF to judge accuracy or validity of regression results (O’brien, 2007).

Table D1: Results summary comparing fixed effects (FE) and random effects (RE)

	FE	RE
Theoretical basis	• FE is inappropriate when including time invariant variables or slow changing variables over time in the analysis. • FE is inappropriate in this study as predictor variables affect the country’s rating, country’s error terms do not affect rating.	• RE is appropriate due to analysis of time invariant variables or slow changing variables over time. • RE is appropriate in this study as predictor variables affect the country’s rating, country’s error terms do not affect rating.
Hausman test	• P-value is not significant, FE is inappropriate	• P-value is not significant, RE is appropriate
R^2	• 0.47 to 0.52	• 0.81 to 0.84
Consistency of results	• The signs of a few of the beta coefficient results were not consistent with theory. • A narrower range of theoretical concepts were measured and was not consistent with the EFA results.	• The signs of the beta coefficient results were consistent with theory. • A broader range of theoretical concepts were measured and were consistent with the EFA results.
Model parsimony	• Too many variables in the Fitch equation (more than 15 variables).	• Equations were relatively parsimonious (9 to 11 variables).

Table D2: Random effects panel regression's independent variables

Variable	Coeff	S.E	Absolute value of coeff
Panel A: Fitch			
Regulatory quality	1.2334***	0.3431	1.2334
Rule of law	1.0003***	0.2858	1.0003
Net sovereign external debt to current account receipts	-0.8552***	0.1847	0.8552
GDP per capita	0.8494***	0.2492	0.8494
GNI per capita at PPP	0.8063***	0.2820	0.8063
Dollarisation ratio	-0.7281***	0.1969	0.7281
General government debt over GDP	-0.3660*	0.2001	0.3660
Political stability	0.3409**	0.1674	0.3409
General government balance over GDP	0.2695**	0.1233	0.2695
R-squared	*0.8319*		
Number of observations	*414*		
Panel B: Moody's			
Regulatory quality	1.4520***	0.3238	1.4520
Control of corruption	1.1853***	0.3111	1.1853
GDP per capita	0.9321***	0.2160	0.9321
Broad money over GDP	0.9128***	0.3256	0.9128
General government debt over revenue	-0.7807***	0.2238	0.7807
Trade openness	-0.7799***	0.2880	0.7799
Public FC debt over total debt	-0.7329***	0.1623	0.7329
Net sovereign external debt to current account receipts	-0.6963***	0.1632	0.6963
Non-performing loans over gross loans	-0.6474***	0.2554	0.6474
General government balance over GDP	0.2592*	0.1331	0.2592
Loan-deposit ratio	0.2092**	0.1054	0.2092
R-squared	*0.8637*		
Number of observations	*409*		
Panel C: S&P			
Regulatory quality	2.0801***	0.3828	2.0801
Rule of law	1.4046***	0.3698	1.4046
Foreign ownership	-0.7756***	0.2037	0.7756
Broad money over GDP	0.6130**	0.2676	0.6130
Net sovereign external debt to current account receipts	-0.5567***	0.1252	0.5567
General government debt over GDP	-0.4915**	0.1108	0.4915
GDP per capita	0.4444**	0.2262	0.4444
General government balance over GDP	0.4096***	0.2118	0.4096
Volatility of revenues over GDP	-0.3457**	0.1442	0.3457
Liquidity ratio	0.3128**	0.1588	0.3128
Net external debt to current account receipts	-0.1120**	0.0522	0.1120
R-squared	*0.8174*		
Number of observations	*407*		

*Note: ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively. The dependent variable is the sovereign credit rating.*

Table D3: Descriptive statistics for the variables of Table D2

Variable	Obs	Mean	Std. Dev.	Min	Max
Regulatory quality	443	62.22	25.94	2.40	100.00
Net sovereign external debt to CAR	440	13.89	138.17	-450.59	694.00
GDP per capita	444	21220.77	23468.85	378.82	118957.00
General government balance over GDP	444	-2.74	4.38	-16.92	20.40
Rule of law	443	59.96	26.72	0.48	100.00
General government debt over GDP	444	55.86	36.04	0.00	242.47
Broad money over GDP	444	91.72	87.14	4.94	627.11
GNI per capita at PPP	423	25692.62	22884.67	1170.00	133850.00
Dollarisation ratio	407	27.66	26.82	0.00	100.00
Political stability	443	51.15	27.78	0.95	99.52
Control of corruption	443	57.60	27.82	3.40	100.00
General government debt over revenue	444	197.63	129.40	0.00	754.85
Trade openness	442	62.03	62.91	5.65	626.20
Public FC debt over total debt	443	36.30	32.01	0.00	100.00
Non performing loans over gross loans	384	6.79	8.47	0.10	54.54
Loan-deposit ratio	415	105.35	42.59	6.90	375.37
Foreign ownership	408	38.48	31.21	0.00	100.00
Volatility of revenues over GDP	444	7.07	5.48	0.59	38.78
Liquidity ratio	436	181.45	234.68	3.43	2047.80

Table D4: Variance inflation factors (VIF)

Fitch		**Moody's**		**S&P**	
Variable	*VIF*	*Variable*	*VIF*	*Variable*	*VIF*
Rule of law	8.80	Control of corruption	5.74	Rule of law	8.07
Regulatory quality	5.46	Regulatory quality	5.48	Regulatory quality	8.01
GNI per capita at PPP	5.12	GDP per capita	2.54	GDP per capita	3.33
GDP per capita	4.69	Broad money over GDP	2.42	Net sovereign external debt to current account receipts	2.43
Political stability	3.04	Trade openness	2.12	Net external debt to current account receipts	2.14
Net sovereign external debt to current account receipts	1.68	General government debt over revenue	1.87	Broad money over GDP	1.84
General government balance over GDP	1.61	Loan-deposit ratio	1.79	General government debt over GDP	1.71
General government debt over GDP	1.55	Net sovereign external debt to current account receipts	1.60	General government balance over GDP	1.71
Dollarisation ratio	1.31	Public FC debt over total debt	1.53	Liquidity ratio	1.61
		General government balance over GDP	1.43	Volatility of revenues over GDP	1.50
		Non-performing loans over gross loans	1.21	Foreign ownership	1.26
Mean VIF	*3.70*		*2.52*		*3.07*

References

Acharya, V., Drechsler, I. and Schnabl, P., 2012. A tale of two overhangs: the nexus of financial sector and sovereign credit risks. *Financial Stability Review*, (16), pp.51-56.

Acharya, V., Drechsler, I. and Schnabl, P., 2014. 'A pyrrhic victory? Bank bailouts and sovereign credit risk'. The Journal of Finance, 69(6), pp.2689-2739.

Acharya, V.V. and Mora, N., 2015. A crisis of banks as liquidity providers. The journal of Finance, 70(1), pp.1-43.

Adalid, R. and Detken, C., 2007. Liquidity shocks and asset price boom/bust cycles. European Central Bank WP No. 732, pp1-52.

Afonso, A., 2003. 'Understanding the Determinants of Sovereign Debt Ratings: Evidence for the Two LeadingAgencies'. Journal of Economics and Finance, 27(1), pp. 56-74.

Afonso, A. and Furceri, D., 2010. Government size, composition, volatility and economic growth. European Journal of Political Economy, 26(4), pp.517-532.

Afonso, A., Gomes, P.M., and Rother, P., 2007. 'What 'Hides' Behind Sovereign Debt Ratings?'. ECB Working Paper No. 711, pp. 1-65.

Afonso, A., Furceri, D. and Gomes, P., 2012. Sovereign credit ratings and financial markets linkages: application to European data. Journal of International Money and Finance, 31(3), pp.606-638.

Aikman, D., Alessandri, P., Eklund, B., Gai, P., Kapadia, S., Martin, E., Mora, N., Sterne, G. and Willison, M., 2009. Funding liquidity risk in a quantitative model of systemic stability, pp. 1-38.

Alam, M.R., Kiterage, E. and Bizuayehu, B., 2017. Government effectiveness and economic growth. *Economic Bulletin*, *37*(1), pp.222-227.

Alesina, A. and Ardagna, S., 2010. Large changes in fiscal policy: taxes versus spending. *Tax policy and the economy*, *24*(1), pp.35-68.

Alesina, A., & Barro, R., 2001. ‘Dollarization’. The American Economic Review, 91(2), pp. 381-385.

Alesina, A. and Tabellini, G., 1990. A positive theory of fiscal deficits and government debt. The Review of Economic Studies, 57(3), pp.403-414.

Alesina, A., Grilli, V. and Milesi-Ferrett, G.M., 1993. The political economy of capital controls (No. w4353). National Bureau of Economic Research, pp. 1-25.

Alexe, S., Hammer, P.L., Kogan, A. and Lejeune, M.A., 2003. ‘A non-recursive regression model for country risk rating’. Rutgers Center for Operational Research, Rutgers University Research Report 9, pp.1-40.

Almond, G.A. and Verba, S., 1963. The civic culture: Political attitudes and democracy in five nations. Princeton University Press.

Alter, A. and Schüler, Y.S., 2012. Credit spread interdependencies of European states and banks during the financial crisis. *Journal of Banking & Finance*, *36*(12), pp.3444-3468.

Amstad, M., and Packer, F., 2015. ‘Sovereign ratings of advanced and emerging economies after the crisis.’ BIS Quarterly Review December, pp. 77-91.

Andreasen, E. and Valenzuela, P., 2016. Financial openness, domestic financial development and credit ratings. *Finance Research Letters*, *16*, pp.11-18.

Arena, M., Reinhart, C. and Vázquez, F., 2006. 'The lending channel in Emerging economics: Are foreign banks different?' National Bureau of Economic Research, No. w12340, pp. 1-62 .

Arezki, R., Candelon, B., and Sy, A.N.R., 2011. 'Sovereign Rating News and Financial Markets Spillovers: Evidence from the European Debt Crisis'. IMF Working Papers No. 11/68, pp. 1-27.

Ariu, A., 2016. "Crisis-proof services: why trade in services did not suffer during the 2008–2009 collapse." Journal of International Economics 98 (2016): 138-149.

Arslanalp, S. and Liao, Y., 2013. Contingent Liabilities and Sovereign Risk: Evidence from Banking Sectors, pp. 1-50.

Asonuma, T., 2012. 'Serial default & debt renegotiation'. MPRA Paper No. 55139, pp.1-44.

Bae, K.H. and Goyal, V.K., 2009. Creditor rights, enforcement, and bank loans. The Journal of Finance, 64(2), pp.823-860.

Bahmani-Oskooee, M. and Domac, I., 2003. On the link between dollarisation and inflation: Evidence from Turkey. Comparative Economic Studies, 45(3), pp.306-328.

Balkan, E.M., 1992. Political instability, country risk and probability of default. *Applied Economics*, *24*(9), pp.999-1008.

Bartlett, W. and Prica, I., 2012. The variable impact of the global economic crisis in South East Europe. LSEE – Research on Southern Europe, pp. 1-37

Benítez, J. M., Castro, J. L., & Requena, I., 1997. Are artificial neural networks black boxes?. IEEE Transactions on neural networks, 8(5), 1156-1164.

Barro, R.J., 1979. On the determination of the public debt. *The Journal of Political Economy*, pp.940-971.

Barth, J.R., Caprio, G. & Levine, R. 2004, "Bank regulation and supervision: what works best?",Journal of Financial Intermediation,vol. 13, no. 2, pp. 205-248.

Bennell, J.A., Crabbe, D., Thomas, S. and Ap Gwilym, O., 2006. ‘Modelling sovereign credit ratings: neural networks versus ordered probit’. Expert Systems with Applications, 30(3), pp.415-425.

Bhatia, M.A.V., 2002. ‘Sovereign credit ratings methodology: an evaluation’. IMF Working Paper No. 2-170, pp. 1-59.

Biglaiser, G., & Staats, J., 2012. Finding the “Democratic Advantage” in Sovereign Bond Ratings: The Importance of Strong Courts, Property Rights Protection, and the Rule of Law. International Organization, 66(3), pp. 515-535.

Bird, G. and Rowlands, D., 2001. IMF lending: how is it affected by economic, political and institutional factors?. *The Journal of Policy Reform*, *4*(3), pp.243-270.

Bissoondoyal-Bheenick, E., 2005. ‘An analysis of the determinants of sovereign ratings’. Global Finance Journal, 15(3), pp. 251-280.

Bissoondoyal-Bheenick, E., Brooks, R. and Yip, A.Y., 2006. Determinants of sovereign ratings: A comparison of case-based reasoning and ordered probit approaches. Global Finance Journal, 17(1), pp.136-154.

Black, S. and Munro, A., 2010. Why issue bonds offshore?. BIS Working Papers No. 334, pp.1-55.

Blackburn, K., & Christensen, M., 1989. Monetary Policy and Policy Credibility: Theories and Evidence. *Journal of Economic Literature, 27*(1), pp. 1-45.

Blanchard, Olivier Jean. "[Vector Autoregressions and Reality]: Comment." Journal of Business & Economic Statistics 5, no. 4 (1987), pp. 449-451.

Blanchard, O.J., 1990. Suggestions for a new set of fiscal indicators. OECD Department of Economics & Statistics, WP79, pp. 1-34.

Blanchard, O.J., Chouraqui, J.C., Hagemann, R. and Sartor, N., 1991. The sustainability of fiscal policy: New answers to an old question. OECD Economic Studies No. 15, pp. 7-35.

Blinder, A.S., 2000. Central-bank credibility: why do we care? How do we build it?. *American Economic Review*, *90*(5), pp.1421-1431.

Bloch, D. & F. Fall, 2015.'Government debt indicators: Understanding the Data', OECD Economics Department Working Papers, No. 1228, pp. 1-35.

Block, S.A. and Vaaler, P.M., 2004. The price of democracy: sovereign risk ratings, bond spreads and political business cycles in developing countries. Journal of International Money and Finance, 23(6), pp.917-946.

Bohn, H., 1998. The Behavior of U.S. Public Debt and Deficits. *The Quarterly Journal of Economics, 113*(3), 949-963.

Borchert, I. and Mattoo, A., 2010. The crisis-resilience of services trade. The Service Industries Journal, 30(13), pp.2115-2136.

Borio, C., and P. Lowe (2002), 'Asset Prices, Financial and Monetary Stability: Exploring the Nexus'. BIS Working Papers No. 114, pp. 1-40

Borio, C.E. and Packer, F., 2004. 'Assessing new perspectives on country risk'. BIS Quarterly Review, December, pp. 47-65.

Bordo, M., 2006. Sudden Stops, Financial Crises, and Original Sin in Emerging Countries: Déjà vu? (No. 12393). National Bureau of Economic Research, Inc., pp. 1-35.

Bozic, V. and Magazzino, C., 2013. Credit rating agencies: The importance of fundamentals in the assessment of sovereign ratings. Economic Analysis and Policy, 43(2), pp.157-176.

Brewer, T.L. and Rivoli, P., 1990. 'Politics and perceived country creditworthiness in international banking'. *Journal of Money, Credit and Banking*, *22*(3), pp.357-369.

Brixi, H.P., 2001. Government contingent liabilities: A hidden risk to fiscal stability.Journal of Public Budgeting, Accounting & Financial Management, 13(4), pp. 582-623.

Brůha, J. and Kočenda, E., 2018. Financial stability in Europe: Banking and sovereign risk. Journal of Financial Stability, 36, pp.305-321.

Brumm, H., 2000. Inflation and Central Bank Independence: Conventional Wisdom Redux. Journal of Money, Credit and Banking, 32(4), pp. 807-819.

Bruner, C. M. & Abdelal, R., 2005. 'To Judge Leviathan: Sovereign Credit Ratings, National Law, and the World Economy'. Journal of Public Policy, 25(02), pp. 191-217.

Brutti, F. and Sauré, P.U., 2013. Repatriation of debt in the euro crisis: Evidence for the secondary market theory.

Bulow, J. and Rogoff, K. (1989) Sovereign Debt: Is to Forgive to Forget? American Economic Review, 79(1), 43–50.

Butler, A.W. and Fauver, L., 2006. Institutional environment and sovereign credit ratings. Financial Management, 35(3), pp.53-79.

Calvo, G.A., Izquierdo, A. and Mejia, L.F., 2004. ‘On the empirics of sudden stops: the relevance of balance-sheet effects’. No. w10520, National Bureau of Economic Research, pp. 1-50.

Canuto, O., Dos Santos, P. F. P., & de Sá Porto, P. C., 2012. ‘Macroeconomics and Sovereign Risk Ratings’. Journal of International Commerce, Economics and Policy, 3(02), pp.1-25.

Carey, M. & Hrycay, M., 2001. ‘Parameterizing credit risk models with rating data’, Journal of Banking & Finance, 25(1), pp.197-270.

Cantor, R. and Packer, F., 1996. ‘Determinants and Impact of Sovereign Credit Ratings’. Federal Reserve Bank of New York Economic Policy Review, October, 2(2), pp. 37-54.

Cantor, R., 2001. Moody’s investors service response to the consultative paper issued by the Basel Committee on Bank Supervision “A new capital adequacy framework”. Journal of Banking & Finance, 25(1), pp.171-185.

Cantor, R., Gwilym, O.A., and Thomas, S., 2007. ‘The Use of Credit Ratings in Investment Management in the US and Europe’. The Journal of Fixed Income, 17(2), pp. 13-26.

Caselli, F., Koren, M., Lisicky, M. and Tenreyro, S., 2015. ‘Diversification through trade’. No. w21498, National Bureau of Economic Research, pp. 1-67.

Catão, L. and Sutton, B., 2002. ‘Sovereign Defaults the Role of Volatility’. IMF Working Paper 02/149, pp. 1-27.

Cetorelli, N. and Goldberg, L.S., 2011. Global banks and international shock transmission: Evidence from the crisis. IMF Economic Review, 59(1), pp.41-76.

Chang, R. and Velasco, A., 2000a. Banks, debt maturity and financial crises.Journal of international Economics, 51(1), pp.169-194.

Chang, R. and Velasco, A., 2000b. Exchange-rate policy for developing countries. The American Economic Review, 90(2), pp.71-75.

Chen, Z., Lookman, A., Schurhoff, N., & Seppi, D., 2014. 'Rating-Based Investment Practices and Bond Market Segmentation'. Swiss Finance Institute Research Paper No. 10-30; WFA 2012 Las Vegas Meetings Paper. Available at http://ssrn.com/abstract=1343965 [Accessed on 16-June-2014]

Chit, M.M. and Judge, A., 2011. 'Non linear effect of exchange rate volatility on exports: the role of financial sector development in emerging East Asian economies'. International Review of Applied Economics, 25(1), pp.107-119.

Christopherson, S., Michie, J. and Tyler, P., 2010. Regional resilience: theoretical and empirical perspectives. *Cambridge journal of regions, economy and society*, *3*(1), pp.3-10.

Chuhan, P., Claessens, S. and Mamingi, N., 1998. Equity and bond flows to Latin America and Asia: the role of global and country factors. Journal of Development Economics, 55(2), pp.439-463.

Chui, M., Gai, P. and Haldane, A.G., 2002. Sovereign liquidity crises: analytics and implications for public policy. Journal of banking & finance,26(2), pp.519-546.

Čihák, M., Demirgüç-Kunt, A., Martinez Peria, M.S. and Mohseni-Cheraghlou, A., 2012. "Bank regulation and supervision around the world: a crisis update", Policy Research Working Paper No. 6286, World Bank.

Čihák, M., Demirgüč-Kunt, A., Feyen, E. and Levine, R., 2013. Financial development in 205 economies, 1960 to 2010 (No. w18946). National Bureau of Economic Research.

Ciocchini, F., Durbin, E. and Ng, D.T., 2003. Does corruption increase emerging market bond spreads?. Journal of Economics and Business, 55(5-6), pp.503-528.

Clarke, G.R., Cull, R. and Shirley, M.M., 2005. Bank privatization in developing countries: A summary of lessons and findings. Journal of Banking & Finance, 29(8), pp.1905-1930.

Conesa, J.C. and Kehoe, T.J., 2015. Gambling for redemption and self-fulfilling debt crises (No. w21026). National Bureau of Economic Research, pp. 1-41.

Contessi, S., 2012. An application of conventional sovereign debt sustainability analysis to the current debt crises. Federal Reserve Bank of St. Louis Review, 94(3), pp.197-220.

Cordes, Till, Sovereign Ratings and Economic Liberalisation (August 3, 2012). APSA 2012 Annual Meeting Paper. Pp. 1-43.

Cosset, J. C., & Roy, J., 1991. 'The Determinants of Country Risk Ratings'. Journal of International Business Studies, 22(1), pp. 135-142.

Corsetti, G., 2006. Openness and the case for flexible exchange rates.Research in Economics, 60(1), pp.1-21.

Cowan, K., Levy-Yeyati, E.L., Panizza, U. and Sturzenegger, F., 2006. Sovereign debt in the Americas: new data and stylized facts. IDB working paper No. 481, pp. 1-41.

Cuadra, G. and Sapriza, H., 2006. ‘Sovereign default, terms of trade, and interest rates in emerging markets’. Banco de Mexico Working Papers No. 2006-01, pp.1-62

Cull, R. and Xu, L.C., 2003. Who gets credit? The behavior of bureaucrats and state banks in allocating credit to Chinese state-owned enterprises.Journal of Development Economics, 71(2), pp.533-559.

Dages, B.G., Goldberg, L.S. and Kinney, D., 2000. Foreign and domestic bank participation in emerging markets: Lessons from Mexico and Argentina.

Dagnis Jensen, M. and Snaith, H., 2016. When politics prevails: the political economy of a Brexit. Journal of European Public Policy, pp.1-9.

D'Agostino, A. and Lennkh, A., 2016. Euro area sovereign ratings: An analysis of fundamental criteria and subjective judgement. European Stability Mechanism Working Paper No. 14, pp. 1-37.

Darrat, A.F., 1988. Have large budget deficits caused rising trade deficits?. Southern Economic Journal, pp.879-887.

DeCoster, J., 1998. ‘Overview of Factor Analysis’, pp. 1-8. Available from http://www.stat-help.com/factor.pdf [accessed on 4-Oct-2016]

De Haas, R. and Van Horen, N., 2013. Running for the exit? International bank lending during a financial crisis. The Review of Financial Studies, 26(1), pp.244-285.

De Haas, R. and Van Lelyveld, I., 2006. Foreign banks and credit stability in Central and Eastern Europe. A panel data analysis. Journal of banking & Finance, 30(7), pp.1927-1952.

De Haas, R. and Van Lelyveld, I., 2010. 'Internal capital markets and lending by multinational bank subsidiaries'. Journal of financial Intermediation, 19(1), pp.1-25.

Depken, C., LaFountain, C. and Butters, R., 2007. Corruption and creditworthiness: Evidence from sovereign credit ratings. Pp. 1-37.

De Santis, R.A., 2012. 'The Euro Area Sovereign Debt Crisis: Safe Haven, Credit Rating Agencies and the Spread of the Fever from Greece, Ireland and Portugal'. ECB Working Paper No. 1419., pp.1-59.

Devereux, M.B. and Engel, C., 2003. Monetary policy in the open economy revisited: Price setting and exchange-rate flexibility. The Review of Economic Studies, 70(4), pp.765-783.

Dhingra, S. and Sampson, T., 2016. Life after Brexit: what are the UK's options outside the European union? The Centre for Economic Performance, The London School of Economics & Political Science, pp. 1-12.

Diamond, D., 1991. Debt Maturity Structure and Liquidity Risk. The Quarterly Journal of Economics, 106(3), pp. 709-737.

Diamond, D.W. and Rajan, R.G., 2001. Liquidity risk, liquidity creation, and financial fragility: A theory of banking. Journal of political Economy, 109(2), pp.287-327.

Dinç, I.S., 2005. Politicians and banks: Political influences on government-owned banks in emerging markets. Journal of financial economics, 77(2), pp.453-479.

di Patti, E.B. and Hardy, D.C., 2005. Financial sector liberalization, bank privatization, and efficiency: Evidence from Pakistan. Journal of Banking & Finance, 29(8), pp.2381-2406.

Dooley, M.P., 1988. Capital flight: a response to differences in financial risks.Staff Papers, 35(3), pp.422-436.

Dooley, M.P., 1996. A survey of literature on controls over international capital transactions. Staff Papers, 43(4), pp.639-687

Dooley, M.P., 2000. A model of crises in emerging markets. The economic journal, 110(460), pp.256-272.

Douglas, D., 2003. Inductive theory generation: A grounded approach to business inquiry. Electronic journal of business research methods, 2(1), pp.47-54.

Drazen, A. and Masson, P.R., 1993. Credibility of policies versus credibility of policymakers (No. w4448). National Bureau of Economic Research, pp.1-30.

Duarte, M. and Obstfeld, M., 2008. Monetary policy in the open economy revisited: The case for exchange-rate flexibility restored. Journal of International Money and Finance, 27(6), pp.949-957.

Edison, H.J., Luangaram, P. and Miller, M., 2000. Asset bubbles, leverage and ‘lifeboats’: Elements of the east asian crisis. The Economic Journal,110(460), pp.309-334.

Edwards, S., 1999. How Effective Are Capital Controls?. Journal of Economic Perspectives, 13(4), pp.65-84.

Edwards, S., 2001a. Capital mobility and economic performance: Are emerging economies different? (No. w8076). National bureau of economic research, pp. 1-32.

Edwards, S., 2001b. Dollarization and economic performance: an empirical investigation (No. w8274). National Bureau of Economic Research, pp. 1-27.

Eichengreen, B., 2005. Sterling's past, dollar's future: Historical perspectives on reserve currency competition (No. w11336). National Bureau of Economic Research, pp. 1-29.

Eichengreen, B., 2010. ‘Managing a multiple reserve currency world’. University of California, Berkeley. Pp. 1-11.

Eichler, S., 2014. The political determinants of sovereign bond yield spreads. Journal of International Money and Finance, 46, pp.82-103.

Eichler, S. and Plaga, T., 2017. The political determinants of government bond holdings. Journal of International Money and Finance, 73, pp.1-21.

Eisenhardt, K.M., 1989. Agency theory: An assessment and review. *Academy of management review*, *14*(1), pp.57-74.

Farhi, E. and Tirole, J., 2016. *Deadly embrace: Sovereign and financial balance sheets doom loops.* No. w2184, National Bureau of Economic Research,pp. 1-84

Fatás, A. and Mihov, I., 2013. Policy volatility, institutions, and economic growth. *Review of Economics and Statistics*, *95*(2), pp.362-376.

Federal Reserve Bank of New York Economic Policy Review, October, 2(2), pp. 37-54.

Ferri, G., Liu, L.-G., and Stiglitz, J.E., 1999. ‘The Procyclical Role of Rating Agencies: Evidence from the East Asian Crisis’. Economic Notes by Banca Monte dei Paschi di Siena SpA, 28(3), pp. 335-355.

Ferrucci, G., 2003. Empirical determinants of emerging market economies' sovereign bond spreads.

Field, A. (2014). ‘Discovering Statistics Using IBM SPSS Statistics’. 4th Ed. London: SAGE Publications.

Finch, D., 1951. ‘Investment Service Of Underdeveloped Countries’. International Monetary Fund, Staff Papers, 2(1), pp. 60-85.

Fitch Ratings, 2012. ‘Sovereign Rating Criteria’. 13 August 2012, pp.1-21.

Frost, C.A., 2007. Credit rating agencies in capital markets: A review of research evidence on selected criticisms of the agencies. *Journal of Accounting, Auditing & Finance*, *22*(3), pp.469-492.

Fry, M.J., 1997. In favour of financial liberalisation. The Economic Journal, 107(442), pp.754-770.

Fukuyama, F., 2001. Social capital, civil society and development. Third world quarterly, 22(1), pp.7-20.

Galliard, N., 2012. ‘A Century of Sovereign Ratings’. Softcover re-print of 1st Ed. New York: Springer.

Gelos, R.G., Sahay, R., & Sandleris, G.. "Sovereign borrowing by developing countries: What determines market access?." Journal of international Economics 83, no. 2 (2011): 243-254.

Gerdesmeier, D., Reimers, H.E. and Roffia, B., 2010. Asset Price Misalignments and the Role of Money and Credit*. International Finance,13(3), pp.377-407.

Gerlach, S., Schulz, A. and Wolff, G.B., 2010. Banking and sovereign risk in the euro area. Discussion Paper, Series 1: Economic Studies, No. 09/2010, pp. 1-57.

Giannetti, M. and Laeven, L., 2012. The flight home effect: Evidence from the syndicated loan market during financial crises. Journal of Financial Economics, 104(1), pp.23-43.

Giavazzi, F. and Spaventa, L., 2010. 'Why the current account may matter in a monetary union: lessons from the financial crisis in the euro area.' The Euro area and the financial crisis, CEPR Discussion Paper

Giglio, S., Kelly, B. & Pruitt, S. 2016, "Systemic risk and the macroeconomy: An empirical evaluation", Journal of Financial Economics, vol. 119, no. 3, pp. 457-471.

Giordano, R. & Tommasino, P., 2011. 'The Institutional Determinants of Debt Intolerance'. In Kolb, R.W., ed. 2011. 'Sovereign Debt: From Safety To Default'. Hoboken, New Jersey: John Wiley & Sons. Ch. 2.

Glaser, B., 2008. 'Doing quantitative grounded theory'. Sociology Press, Mill Valley, California, USA.

Gonzalez, F., Haas, F., Johannes, R., Persson, M., Toledo, L., Violi, R., & Wieland, M., 2004. 'Market dynamics associated with credit ratings: a literature review'. Financial Stability Review, (4), pp. 53-76.

Gray, D.F., Merton, R.C. and Bodie, Z., 2007. Contingent claims approach to measuring and managing sovereign credit risk. Journal of Investment Management, 5(4), pp.1-42.

Gros, D., 2011. External versus domestic debt in the euro crisis. CEPS policy brief No. 243, pp.1-5.

Grossman, H.I. and Van Huyck, J.B., 1988. Sovereign Debt as a Contingent Claim: Excusable Default, Repudiation, and Reputation. The American Economic Review, 78(5), pp.1088-1097.

Guiso, L., Sapienza, P. and Zingales, L., 2004. The role of social capital in financial development. The American Economic Review, 94(3), pp.526-556.

Gylfason, T., 2001. Natural resources, education, and economic development. European economic review, 45(4), pp.847-859.

Haidar, J.I., 2012. Sovereign credit risk in the euro zone. World Economics,13(1), pp.1-15.

Hakkio, C.S. and Rush, M., 1991. Is the budget deficit "too large?". Economic inquiry, 29(3), pp.429-445.

Hand, J. R., Holthausen, R. W., & Leftwich, R. W., 1992. The effect of bond rating agency announcements on bond and stock prices. The Journal of Finance, 47(2), 733-752.

Haque, N.U., Mathieson, D. and Mark, N., 1997. 'Rating the raters of country creditworthiness.' Finance & Development, 34(1), pp.10-13.

Haque, N., Mark, N.C. and Mathieson, D.J., 1998. 'The relative importance of political and economic variables in creditworthiness ratings.' pp. 1-13.

Haque, N.U., Kumar, M.S., Mark, N. and Mathieson, D.J., 1996. 'The economic content of indicators of developing country creditworthiness'. Staff Papers – International Monetary Fund, pp.688-724.

Hasan, I., Liu, L. and Zhang, G., 2016. The determinants of global bank credit-default-swap spreads. Journal of Financial Services Research, 50(3), pp.275-309.

Hausmann, R., 2004. Good credit ratios, bad credit ratings: the role of debt structure. In Rules-Based Fiscal Policy in Emerging Markets (pp. 30-52). Palgrave Macmillan, London.

Hawkins, J. and Turner, P., 2000. Managing foreign debt and liquidity risks in emerging economies: an overview. BIS Policy Papers, 8, pp.3-59.

Henisz, W.J., 2004. Political institutions and policy volatility. *Economics & Politics*, *16*(1), pp.1-27.

Herwartz, H. and Walle, Y.M., 2014. Openness and the finance-growth nexus. Journal of Banking & Finance, 48, pp.235-247.

Hilscher, J.and Nosbusch, Y., 2010. 'Determinants of Sovereign Risk: Macroeconomic Fundamentals and Pricing of Sovereign Debt'. Review of Finance 14(2), pp. 235-262.

Hite, G., & Warga, A., 1997. The effect of bond-rating changes on bond price performance. Financial Analysts Journal, 53(3), pp. 35-51.

Hodgman, D.R., 1960. Credit risk and credit rationing. The Quarterly Journal of Economics, 74(2), pp.258-278.

Hofmans, H.M.J. and Van De Coevering, C.,R., 2014. How to deal with contingent liabilities - Lessons from the Dutch experience. OECD Journal on Budgeting, 14(1), pp. 35-45.

Holton, J.A. and Walsh, I., 2016. Classic grounded theory: Applications with qualitative and quantitative data. SAGE Publications.

Hsiao, C., 2003. Analysis of Panel Data. Cambridge, UK: Cambridge University Press.

Hu, Y.T., Kiesel, R. and Perraudin, W., 2002. The estimation of transition matrices for sovereign credit ratings. Journal of Banking & Finance, 26(7), pp.1383-1406.

Hull, J., Predescu, M., & White, A. (2004). The relationship between credit default swap spreads, bond yields, and credit rating announcements. Journal of Banking & Finance, 28(11), pp. 2789-2811.

Irwin, T., 2012. 'Some Algebra of Fiscal Transparency: How Accounting Devices Work and How to Reveal Them'. IMF Working Paper, WP/12/228, pp. 1-18.

Isham, J., Woolcock, M., Pritchett, L. and Busby, G., 2005. The varieties of resource experience: natural resource export structures and the political economy of economic growth. The World Bank Economic Review, 19(2), pp.141-174.

Ismailescu, I. and Kazemi, H., 2010. 'The Reaction of Emerging Market Credit Default Swap Spreads to Sovereign Credit Rating Changes'. Journal of Banking & Finance, 34(12), pp.2861-2873.

Jaramillo, L., 2010. Determinants of Investment Grade Status in Emerging Markets. IMF Working Paper 11/44, pp1-17.

Jensen, N.M., 2003. 'Democratic governance and multinational corporations: Political regimes and inflows of foreign direct investment'. International organization, 57(03), pp.587-616.

Jordà, Ò., Schularick, M. and Taylor, A.M., 2011. Financial Crises, Credit Booms, and External Imbalances: 140 Years of Lessons. IMF Economic Review,59(2), pp. 340-378.

Jorion, P., Liu, Z., & Shi, C., 2005. ‘Informational effects of regulation FD: Evidence from rating agencies’. Journal of Financial Economics, 76(2), 309-330.

Kaminsky, G.L. and Reinhart, C.M., 1999. The twin crises: the causes of banking and balance-of-payments problems. *American economic review*, *89*(3), pp.473-500.

Kaminsky, G.L., Reinhart, C.M. and Vegh, C.A., 2003. The unholy trinity of financial contagion. The Journal of Economic Perspectives, 17(4), pp.51-74.

Khatkhate, D. R., 1966. ‘Debt-Servicing as an Aid to Promotion of Trade of Developing Countries’. Oxford Economic Papers, New Series, 18(2), pp. 224-236.

Kim, D.H., Lin, S.C. and Suen, Y.B., 2010. ‘Dynamic effects of trade openness on financial development’. Economic Modelling, 27(1), pp.254-261.

King, M., 1995. CREDIBILITY AND MONETARY POLICY: THEORY AND EVIDENCE1. Scottish Journal of Political Economy, 42(1), pp.1-19.

Klomp, J. and De Haan, J., 2012. Banking risk and regulation: Does one size fit all?. Journal of Banking & Finance, 36(12), pp.3197-3212.

Knack, S. and Keefer, P., 1997. Does social capital have an economic payoff? A cross-country investigation. The Quarterly journal of economics, pp.1251-1288.

Koren, M. and Tenreyro, S., 2004. ‘Diversification and Development’. Federal Reserve Bank of Boston Working Paper Series, pp. 1-60.

Kouassi, E., Mougoue, M. and Kymn, K.O., 2004. Causality tests of the relationship between the twin deficits. Empirical Economics, 29(3), pp.503-525.

King, M.R. and Sinclair, T.J., 2003. Private actors and public policy: a requiem for the new Basel Capital Accord. International Political Science Review, 24(3), pp.345-362.

Kraay, A. and Ventura, J., 2007. Comparative advantage and the cross-section of business cycles. Journal of the European Economic Association, 5(6), pp.1300-1333.

Kubelec, C., Bjorn-Erik Orskaug & Tanaka, M., 2007. 'Financial globalisation, external balance sheets and economic adjustment'. Bank of England.Quarterly Bulletin, 47(2), pp. 244-257.

Kurtz, M., & Schrank, A. 2007, "Growth and governance: Models, measures and mechanisms", Journal of Politics 69(2), pp. 538–554.

Lane, P.R. and Milesi-Ferretti, G.M., 2007. A global perspective on external positions. In *G7 current account imbalances: sustainability and adjustment*(pp. 67-102). University of Chicago Press.

Lane, P.R. and Milesi-Ferretti, G.M., 2012. External adjustment and the global crisis. Journal of International Economics, 88(2), pp.252-265.

La Porta, R., Lopez-de-Silanes, F., Shleifer, A., 2002. Government ownership of commercial banks. Journal of Finance 57 (1), 265–301.

Lee, S.H., 1993. 'Relative importance of political instability and economic variables on perceived country creditworthiness'. Journal of International Business Studies, pp.801-812.

Lee, F.S., 2002. Theory creation and the methodological foundation of Post Keynesian economics. Cambridge Journal of Economics, 26(6), pp.789-804.

Lee, L., and Lu, W., 2015. 2015. Do bank regulation and supervision matter?. Journal of Financial Economic Policy, 7(3), pp.275-288.

Levine, R. (1997). Financial Development and Economic Growth: Views and Agenda. Journal of Economic Literature, 35(2), 688-726.

Lipset, S.M., 1959. Some social requisites of democracy: Economic development and political legitimacy. American political science review, 53(01), pp.69-105.

Lipset, S. M., 1960. Political Man: The Social Bases of Politics. Garden City, New York: Anchor Books

Löffler, G., 2004. ‘Ratings versus market-based measures of default risk in portfolio governance’. Journal of Banking & Finance, 28(11), 2715-2746.

Löffler, G., 2013. Can rating agencies look through the cycle?. Review of Quantitative Finance and Accounting, 40(4), pp.623-646.

Lohmann, S., 1992. Optimal commitment in monetary policy: credibility versus flexibility. The American Economic Review, 82(1), pp.273-286.

Lu, X. and White, H., 2014. ‘Robustness checks and robustness tests in applied economics’. Journal of Econometrics, 178, pp.194-206.

Manasse, P., Roubini, N., and Schimmelpfennig, A., 2003. ‘Predicting Sovereign Debt Crises’. IMF Working Paper, Working Paper 03/221, pp. 1-40.

McKinnon, R.I. and Pill, H., 1998. International overborrowing: a decomposition of credit and currency risks. *World Development*, *26*(7), pp.1267-1282.

Mellios, C. and Paget-Blanc, E., 2006. ‘Which factors determine sovereign credit ratings?’. The European Journal of Finance, 12(4), pp.361-377.

Mendoza, E. G., 1997. ‘Terms of Trade Uncertainty and Economic Growth’. Journal of Development Economics 54(2), pp. 323–356.

Mikesell, R.F., 1965. ‘Economic Growth and External Debt by Dragoslav Avramovic’. The Journal of Finance , 20(3), pp. 556-557.

Milesi-Ferretti, G.M. and Tille, C., 2011. The great retrenchment: international capital flows during the global financial crisis. Economic policy, 26(66), pp.289-346.

Minsky, H.P., 1992. The financial instability hypothesis. The Jerome Levy Economics Institute Working Paper, (74).

Moody’s, 2013. ‘Sovereign Bond Ratings’. Rating Methodology, 12 September 2013, pp. 1-36.

Mundlak, Y. 1978. ‘On the pooling of time series and cross section data’. Econometrica, 46(1), pp. 69-85.

Mundell, R.A., 1961. A theory of optimum currency areas. The American Economic Review, 51(4), pp.657-665.

Nakonieczna-Kisiel, H., 2011. International Investment Position Versus External Debt. Folia Oeconomica Stetinensia, 10(1), pp. 89-98.

Narasimham, M. , Gulhati, R., Honavar, M., Sutcliffe R.B. and Khatkhate, D.R. 1969. Debt-Servicing as an Aid to Promotion of Trade of Developing Countries: Four Comments and Rejoinder’. Oxford Economic Papers , New Series, 21(3) , pp. 404-427.

Ng, D., 2006. The impact of corruption on financial markets. Managerial Finance, 32(10), pp.822-836.

Normandin, M., 1999. Budget deficit persistence and the twin deficits hypothesis. Journal of International Economics, 49(1), pp.171-193.

Oatley, T., 2010. Political institutions and foreign debt in the developing world. International Studies Quarterly, 54(1), pp.175-195.

Obara-Minnitt, M., 2016. Challenges for Europe in the World, 2030. Journal of Contemporary European Studies, 24(1), pp.199-200.

O'brien, R.M., 2007. A caution regarding rules of thumb for variance inflation factors. Quality & quantity, 41(5), pp.673-690.

Obstfeld, M. and Rogoff, K., 1995. The Mirage of Fixed Exchange Rates. The Journal of Economic Perspectives, 9(4), pp.73-96.

Obstfeld, M. & Rogoff, K. S., 2005. Global Current Account Imbalances and Exchange Rate Adjustments. Brookings Papers on Economic Activity 2005(1), pp. 67-146.

Olsen, W. and Morgan, J., 2005. A critical epistemology of analytical statistics: addressing the sceptical realist. Journal for the Theory of Social Behaviour, 35(3), pp.255-284.

Orlowski, L.T., 2008. Stages of the 2007/2008 Global Financial Crisis Is There a Wandering Asset-Price Bubble?. Economics Discussion Paper, (2008-43), pp. 1-40.

Osborne, J.W. and Costello, A.B., 2009. 'Best practices in exploratory factor analysis: Four recommendations for getting the most from your analysis'. Pan-Pacific Management Review, 12(2), pp.131-146.

Partnoy, F., 1999. ‘Siskel and Ebert of Financial Markets: Two Thumbs Down for the Credit rating Agencies’. The Washington University Law Quarterly, 77(3), pp. 619-712.

Peiris, S.J., 2010. Foreign participation in emerging markets’ local currency bond markets. IMF Working Papers No. 10/88, pp.1-19.

Plümper, T. and Neumayer, E., 2012. ‘Model uncertainty and robustness tests: Towards a new logic of statistical inference.. pp. 1-36.

Prasad, E.S., Rogoff, K., Wei, S.J. and Kose, M.A., 2007. Financial globalization, growth and volatility in developing countries. In Globalization and Poverty, pp. 457-516. University of Chicago Press.

Pratschke, J., 2003. ‘Realistic models? Critical realism and statistical models in the social sciences’. Philosophica 71(2003), pp.13-38

Przeworski, A., 2000. Democracy and development: political institutions and well-being in the world, 1950-1990 (Vol. 3). Cambridge University Press.

Qian, J. and Strahan, P.E., 2007. How laws and institutions shape financial contracts: The case of bank loans. The Journal of Finance, 62(6), pp.2803-2834.

Quintos, C.E., 1995. Sustainability of the deficit process with structural shifts.Journal of Business & Economic Statistics, 13(4), pp.409-417.

Quispe-Agnoli, M., 2002, March. Costs and Benefits of dollarization. In LACC Conference on Dollarization and Latin America, Miami, Florida, pp. 1-31.

Radelet, S., Sachs, J., 1998. ‘The East Asian financial crises: Diagnosis, remedies, prospects’. Brookings Papers on Economic Activity 1, pp.1–90.

Reinhart, C.M., 2002. Default, currency crises, and sovereign credit ratings. The World Bank Economic Review, 16(2), pp.151-170.

Reinhart, C. and Calvo, G., 1999. Capital flow reversals, the exchange rate debate, and dollarization.

Reinhart, C., Rogoff, K., and M. Savastano, 2003, "Debt Intolerance," Brookings Papers on Economic Activity, Vol.1, Spring 2003, pp.1-74.

Reinhart, C., and K. Rogoff, 2004, "Serial Default and the "Paradox" of Rich-to-poor Capital FlowsÑ" The American Economic Review, 94(2), pp.53-58

Reinhart, C.M. and Rogoff, K.S., 2011. “A decade of debt” (No. w16827). National Bureau of Economic Research. pp. 1-48.

Reisen, H., 2003. ‘Ratings since the Asian crisis’. OECD Development Centre, Working Paper No. 214, pp. 1-31.

Reisen, H., & Von Maltzan, J., 1999. ‘Boom and bust and sovereign ratings’. International Finance, 2(2), pp. 273-293.

Reusens, P. and Croux, C., 2017. Sovereign credit rating determinants: A comparison before and after the European debt crisis. Journal of Banking & Finance, 77, pp.108-121.

Rodrik, D. and Velasco, A., 1999. Short-term capital flows (No. w7364). National bureau of economic research, pp. 1-31.

Rodrik, D., ed., 2003. In search of prosperity: Analytic narratives on economic growth. Princeton, New Jersey: Princeton University Press.

Rojas-Suarez, L, 1990. Risk and Capital Flight in Developing Countries. IMF Working Paper, No. 90/64 , pp. 1-26.

Ross, M.L., 1999. The political economy of the resource curse. World politics,51(02), pp.297-322.

Ross, S.A., 1973. The economic theory of agency: The principal's problem.*The American Economic* Review, 63(2), pp.134-139.

Roubini, N., 2001. Debt sustainability: How to assess whether a country is insolvent. Stern School of Business, New York University, pp. 1-19.

Roubini, N. and Wachtel, P., 1999. Current-account sustainability in transition economies. In *Balance of Payments, Exchange Rates, and Competitiveness in Transition Economies,* pp. 19-93.

Rowland, P., 2004. Determinants of spread, credit ratings and creditworthiness for emerging market sovereign debt: a follow-up study using pooled data analysis. *Borradores de Economía; No. 296*.

Rueschemeyer, D., Stephens, E.H. and Stephens, J.D., 1992. Capitalist development and democracy. Great Britain, UK: The University of Chicago Press.

Sachs, J.D. and Warner, A.M., 2001. 'The curse of natural resources'. European economic review, 45(4), pp.827-838.

Salvatore, D., 2006. Twin deficits in the G-7 countries and global structural imbalances. Journal of Policy Modeling, 28(6), pp.701-712.

Sapienza, P., 2004. The effects of government ownership on bank lending.Journal of financial economics, 72(2), pp.357-384.

Sarr, M., Bulte, E., Meissner, C., and Swanson, T., 2011. ‘Sovereign Debt and the Resource Curse.’ In Kolb, R.W., ed. 2011. ‘Sovereign Debt: From Safety To Default’. Hoboken, New Jersey: John Wiley & Sons. Ch. 6.

Sauley, K.S. and Bedeian, A.G., 1989. ‘.05: A case of the tail wagging the distribution’. Journal of Management, 15(2), pp. 335-344.

Schnabl, P., 2012. ‘The international transmission of bank liquidity shocks: Evidence from an emerging market’. The Journal of Finance, 67(3), pp.897-932.

Schnabl, G. and Hoffmann, A., 2008. ‘Monetary Policy, Vagabonding Liquidity and Bursting Bubbles in New and Emerging Markets: An Overinvestment View’. World Economy, 31(9), pp.1226–1252.

Shmueli, G., 2010. To explain or to predict?. Statistical science, 25(3), pp.289-310.

Standard & Poor’s, 2013. ‘Sovereigns: Sovereign Government Rating Methodology and Assumptions’. 24 June 2013, pp. 1-24.

Stiglitz, J.E., 1993. The role of the state in financial markets. The World Bank Economic Review, 7(suppl 1), pp.19-52.

Strange, S. 1967. ‘Debts, Defaulters and Development’. International Affairs (Royal Institute of International Affairs 1944-), 43(3), pp. 516-529.

Stuhr, D.P. & Wicklen, R.V, 1974. Rating the financial condition of banks: A statistical approach to aid bank supervision. Monthly Review.

Svaleryd, H. and Vlachos, J., 2002. Markets for risk and openness to trade: how are they related?. Journal of International Economics, 57(2), pp.369-395.

Svensson, L.E., 1997. Inflation forecast targeting: Implementing and monitoring inflation targets. *European economic review*, *41*(6), pp.1111-1146.

Sy, A.N.R., 2004. ‘Rating the rating agencies: Anticipating currency crises or debt crises?’. Journal of Banking & Finance, 28(11), pp.2845-2867.

Teixeira, J.C., Silva, F.J., Ferreira, M.B. and Vieira, J.A., 2018. Sovereign credit rating determinants under financial crises. Global Finance Journal, 36, pp.1-13.

Tennant, D.F. & Tracey, M.R., 2016. ‘Sovereign Debt and Credit Rating Bias’. New York: Palgrave Macmillan.

Thompson, C.G., Kim, R.S., Aloe, A.M. and Becker, B.J., 2017. ‘Extracting the variance inflation factor and other multicollinearity diagnostics from typical regression results’. Basic and Applied Social Psychology, 39(2), pp.81-90.

Towe, C., 1990. Government Contingent Liabilities and the Measurement of Fiscal Impact (June 1990). IMF Working Paper, Vol. , pp. 1-38.

Trehan, B. and Walsh, C.E., 1988. Common trends, the government's budget constraint, and revenue smoothing. Journal of Economic Dynamics and Control, 12(2), pp.425-444.

Waldenström & Frey, 2011. ‘How Government Bond Yields Reflect Wartime Events: The Case of the Nordic Market’. In Kolb, R.W., ed. 2011. ‘Sovereign Debt: From Safety To Default’. Hoboken, New Jersey: John Wiley & Sons. Ch. 30.

Walsh, I., 2015. Using quantitative data in mixed-design grounded theory studies: an enhanced path to formal grounded theory in information systems. European Journal of Information Systems, 24(5), pp.531-557.

Weymouth, S., 2007. Political Institutions, Policy Instability, and Financial Dollarization. University of California, pp. 1-22.

Wooldridge, J.M., 2010. Econometric analysis of cross section and panel data. Cambridge, Massachusetts: MIT press.

World Economic Forum, 2016. ‘FAQs’. [online] Available at: <http://reports.weforum.org/global-competitiveness-report-2015-2016/faqs/> [Accessed 5-May-2016]

World Bank’s Doing Business Report, 2016. ‘About Doing Business’. [online] Available at: <http://www.doingbusiness.org/about-us> [Accessed 5-May-2016]

Yu, S., 2016. The effect of political factors on sovereign default. Review of Political Economy, 28(3), pp.397-416.