

Climate-Proofing Sovereign Bonds

An Analysis of Climate Resilient Sovereign Debt Clauses
and Doctrines Relating to Unexpected Circumstances
in Light of Physical Risks

Dissertation
der Rechtswissenschaftlichen Fakultät
der Universität Zürich

zur Erlangung der Würde eines Doktors der Rechtswissenschaft

vorgelegt von

Dominic Wälchli

genehmigt auf Antrag von

Prof. Dr. Kern Alexander
und
Prof. Dr. Mads Andenas

Dike Verlag Zürich 2025

Table of Contents

Foreword.....	V
List of Abbreviations.....	XIX
Bibliography.....	XXIII
List of Cases.....	XLV
A. Introduction.....	1
I. Outline of Research Question.....	3
II. Course of Analysis.....	5
III. Key Concepts.....	7
1. Sovereign Debt.....	7
a. the Public Entity.....	7
b. the Debt Instruments.....	8
c. Loans.....	9
i. Official Bilateral Loans.....	9
ii. Official Multilateral Loans.....	9
iii. Commercial Loans (Syndicated Debt).....	10
2. Sovereign Bonds (Bonded Debt).....	10
a. Legal Qualification.....	10
b. Domestic or International Sovereign Bonds.....	11
c. Issuing Procedure.....	11
d. Legal Documents.....	12
i. Mandate Letter.....	13
ii. Fiscal Agency Agreement or Trust Deed.....	13
iii. Subscription Agreement.....	14
iv. Prospectus.....	14
v. Terms and Conditions.....	14
3. Sovereign Risk.....	15
4. Sovereign Default.....	16
a. Technical Defaults.....	16
b. Substantive Defaults.....	17
i. CRAs' Default Definitions.....	17
ii. CDS Default Definitions.....	18
c. Contractual Defaults.....	19

Table of Contents

5.	Sovereign Debt Restructuring.....	19
6.	Physical Risks.....	19
7.	Doctrines Relating to Unexpected Circumstances.....	20
8.	State-Contingent Debt Instruments (SCDIs).....	22
a.	Continuous Adjustment	22
b.	Discrete Adjustments.....	22
IV.	Limits of this Thesis	23
B.	Setting the Scene: Climate-Related Sovereign Defaults and Suspension of Sovereign Debt Obligations.....	25
I.	Physical Climate Risk as Cause for Sovereign Defaults	27
1.	General Remarks.....	27
2.	Fiscal Impacts of Physical Risk.....	27
a.	Macroeconomic Risks.....	28
b.	Contingent Liabilities.....	29
3.	Higher Borrowing Costs and Rating Inclusions as Ancillary Support.....	31
a.	Higher Borrowing Costs	31
b.	Inclusion of Climate-Related Financial Risks in Sovereign Credit Ratings	33
4.	Conclusion.....	34
II.	Costs of Sovereign Defaults.....	35
1.	Costs of Sovereign Defaults for the Defaulting Government.....	35
2.	Costs of Sovereign Default for the Economy and Population of the State in Default	35
3.	Cost of Sovereign Default for the Bondholders of the Defaulting Government	36
4.	Legal Costs.....	37
a.	Codification of Sovereign Immunity under US Law.....	38
b.	Codification of Sovereign Immunity under English Law.....	39
c.	Implications of Doctrine of Relative Sovereign Immunity for Sovereign Bonds.....	40
5.	Conclusion.....	41
III.	Overall Conclusion of Section B.....	42

C. Contract versus Doctrine: Climate Resilience Debt Clauses or Doctrines Relating to Unexpected Circumstances as Potential Solutions.....	43
I. CRDCs: Contractual Suspension of Sovereign Debt Payments.....	45
1. State-Contingent Sovereign Debt as Solution to Climate-Related Sovereign Defaults.....	45
2. Climate Resilience Debt Clauses (CRDCs) and Natural Disaster Clauses.....	46
3. CRDCs and Force Majeure Clauses.....	47
4. Evolution of CRDCs.....	48
a. First-Generation CRDCs – Grenada’s Hurricane Clauses.....	48
i. Hurricane Clauses in Sovereign Bonds.....	48
ii. Hurricane Clause in Commercial Bilateral Debt.....	49
iii. Hurricane Clause in Official Bilateral Debt.....	50
b. Second-Generation CRDCs – Barbados’ Hurricane Clause.....	51
c. Third-Generation CRDCs – ICMA hurricane clauses.....	52
d. Fourth-Generation CRDCs – ICMA CRDCs.....	54
5. Design of CRDCs.....	55
a. Trigger Mechanism.....	55
b. Debt Covered by Deferral.....	56
c. Length of Deferral.....	57
d. Number of Deferrals.....	57
e. Repayment Mechanism.....	58
6. Advantages of CRDCs.....	59
a. Avoiding Sovereign Defaults and Sovereign Debt Restructurings.....	59
b. Creation of Fiscal Space.....	59
c. Reduction of Moral Hazard.....	60
7. Limited Adaptation as Challenge.....	62
a. Legacy Issues.....	62
b. Pricing.....	63
c. CACs as Hopeful Precedent.....	64
i. Background of CACs.....	64
ii. Adaptation of CACs.....	65
iii. Implication for CRDCs.....	66

8.	Conclusion.....	66
II.	Doctrines Relating to Unexpected Circumstances: Statutory Suspension of Sovereign Debt Payments	67
1.	General Remarks.....	67
a.	Relevance.....	67
b.	Terminology.....	67
2.	Doctrine of Frustration Pursuant to English Law.....	68
a.	General Remarks.....	68
b.	Types of Frustration.....	69
i.	Impossibility.....	69
ii.	Impracticability.....	71
iii.	Frustration of Purpose.....	73
iv.	Supervening Illegality.....	74
c.	Limits for the Doctrine of Frustration.....	76
i.	Foreseeability.....	76
ii.	Self-Induced Frustration.....	76
iii.	Effects of the Doctrine of Frustration.....	77
3.	Doctrine of Impossibility, Impracticability, and Frustration of Purpose Pursuant to US Law.....	79
a.	General Remarks.....	79
b.	Types of Frustration.....	80
i.	Impossibility.....	80
ii.	Impracticability.....	80
iii.	Supervening Illegality.....	83
iv.	Frustration of purpose.....	83
c.	Limits to Impossibility, Impracticability and Frustration of Purpose.....	84
i.	Foreseeability.....	84
ii.	Self-Induced Frustration.....	85
d.	Effects of the Doctrines of Impracticability and Frustration of Purpose.....	85
4.	Public International Law Doctrines Relating to Unexpected Circumstances.....	86
a.	Force Majeure.....	86
i.	General Remarks.....	86
ii.	Requirements for Force Majeure.....	86
iii.	Limits of Force Majeure.....	87
iv.	Effects of Force Majeure.....	88

b. Necessity	89
i. General Remarks	89
ii. Requirements for Necessity	89
iii. Limits of Necessity	91
iv. Consequences of Necessity	92
c. Supervening Impossibility of Performance	92
i. General Remarks	92
ii. Requirements of Supervening Impossibility of Performance	92
iii. Limits of Supervening Impossibility of Performance	93
iv. Consequences of Supervening Impossibility of Performance	94
d. Clausula Rebus Sic Stantibus	95
i. General Remarks	95
ii. Requirements for Clausula Rebus Sic Stantibus	95
iii. Limits of Clausula Rebus Sic Stantibus Doctrine	97
iv. Effects of Clausula Rebus Sic Stantibus	98
5. Conclusion	98
III. Overall Conclusion of Section C	99
D. Comparing CRDCs and Doctrines Relating to Unexpected Circumstances ...	101
I. Applicability of Doctrines Relating to Unexpected Circumstances in the Context of Sovereign Bonds	103
1. General Remarks	103
2. Legal Nature of Sovereign Bonds	103
a. Commercial Nature of Sovereign Bonds	103
b. Governing Law of Sovereign Bonds	105
3. Applicability of Municipal Doctrines Relating to Unexpected Circumstances	105
4. Applicability of Public International Law Doctrines Relating to Unexpected Circumstances	106
a. General Remarks	106
b. Necessity and Force Majeure	106
i. Customary International Law as Part of English Law	106
ii. Customary International Law as Part of US Law	107
iii. Conclusion	107

c.	Applicability of Necessity vis-à-vis Private Bondholders: Decision of the German Constitutional Court.....	107
i.	Majority Decision.....	108
ii.	Dissenting Opinion by Justice Lübbe-Wolff.....	109
d.	Implication of the Decision by the German Constitutional Court.....	112
i.	Arguments for a Rule of Customary International Law to Apply Necessity towards Private Bondholders.....	112
ii.	Arguments for the Applicability of Necessity towards Private Bondholders.....	115
e.	Applicability of Force Majeure to Private Bondholders.....	120
f.	Supervening Impossibility and Clausula Rebus Sic Stantibus.....	120
i.	Supervening Impossibility and Clausula Rebus Sic Stantibus based on the VCLT.....	121
ii.	Supervening Impossibility and Clausula Rebus Sic Stantibus based on Customary International Law.....	121
g.	Claiming Public International Law Doctrines Relating to Unexpected Circumstances before International Courts and Tribunals.....	122
h.	Conclusion.....	122
II.	Applicability of Doctrines Related to Unexpected Circumstances in the Context of Sovereign Default Caused by Physical Risk.....	124
1.	General Remarks.....	124
2.	Impossibility.....	124
a.	Impossibility of Monetary Obligations under English Law.....	124
b.	Impossibility of Monetary Obligations under US Law.....	126
c.	Impossibility of Monetary Obligations under Public International Law.....	126
d.	Conclusion.....	127
3.	Commercial Impracticability under Domestic Law Doctrines Relating to Unexpected Circumstances.....	127
a.	Commercial Impracticability under English Law.....	127
i.	Financial Distress in General.....	127
ii.	Special Consideration in Exceptional Circumstances.....	128
b.	Commercial Impracticability under US law.....	130
c.	Foreseeability of Physical Risks.....	131
4.	Force Majeure.....	132

5. Necessity	133
6. Frustration of Purpose	140
a. Frustration of Purpose under English law	140
b. Frustration of Purpose under US Law	142
c. Clausula Rebus Sic Stantibus	142
7. Supervening Illegality	143
a. Supervening Illegality under English Law	143
b. Supervening Illegality under US Law	145
c. Conclusion	146
III. Applicability of CRDCs	147
1. General Remarks	147
2. Physical Risks Covered	147
3. Materiality	148
4. Popularity	149
a. Limited Use of CRDCs	149
b. CRDCs as Implied Terms	149
i. General Remarks	149
ii. Frustration as Implied Term	150
iii. CRDCs as Implied Terms under English Law	150
iv. CRDCs as Implied Terms under US Law	152
c. Retrofitting CRDCs in Outstanding Sovereign Bonds	153
d. Conclusion	154
IV. Preventing Sovereign Default	156
1. General Remarks	156
2. Triggering a Sovereign Default	156
a. Cross-Default Clauses	156
i. Doctrines Relating to Unexpected Circumstances	156
ii. CRDCs	157
b. Substantive Sovereign Defaults	159
i. Doctrines Relating to Unexpected Circumstances	159
ii. CRDCs	160
c. Conclusion	164

Table of Contents

V.	Legal Effects of Successful Application	165
1.	General Remarks.....	165
2.	Effects of Doctrines Relating to Unexpected Circumstances.....	165
a.	Effects of Domestic Law Doctrines Relating to Unexpected Circumstances under English Law.....	165
b.	Effects of Domestic Law Doctrines Relating to Unexpected Circumstances under US law.....	166
c.	Effects of Public International Law Doctrines Relating to Unexpected Circumstances	167
i.	Necessity and Force Majeure	167
ii.	Supervening Impossibility and Clausula Rebus Sic Stantibus	168
3.	CRDCs.....	169
4.	Conclusion.....	169
VI.	Miscellaneous Considerations	171
1.	Moral Hazard.....	171
a.	Moral Hazards in Connection with Doctrines Relating to Unexpected Circumstances	171
i.	General Remarks	171
ii.	Applying a more Liberal Approach.....	172
iii.	Conclusion.....	173
b.	Moral Hazards in Connection with CRDCs	174
c.	Conclusion.....	175
2.	Pricing Implications.....	176
a.	Pricing Implications of Doctrines Relating to Unexpected Circumstances.....	176
b.	Pricing Implications of CRDCs.....	178
c.	Conclusion.....	178
3.	Assessment of Miscellaneous Considerations	179
VII.	Overall Conclusion of Section D.....	180

E. A Middle Ground: A Domestic Law Statutory Approach	183
I. Contractual v Statutory Approach in General.....	185
1. General Remarks.....	185
2. Sovereign Debt Restructuring and the Statutory Approach.....	186
a. Background: Collective Action Problems in Sovereign Bonds.....	186
b. Arguments Against a Statutory Approach.....	187
i. Pure Market-Based Approach.....	187
ii. Contractual Approach.....	190
c. Arguments for a Statutory Approach.....	193
i. Reduction of Moral Hazard.....	193
ii. Mitigating Holdout Risk.....	194
iii. Preservation of Asset Values.....	196
iv. Equity Considerations.....	196
v. Reducing Information Asymmetries.....	197
vi. Mitigating the ‘Too Little, Too Late’ Problem.....	197
vii. Legacy Issues.....	198
d. Implications of Statutory Approach for Suspending Sovereign Debt Payments in the Context of Physical Risk-Induced Sovereign Defaults	198
i. Preserving the Sanctity of Contracts.....	199
ii. ‘Too Little, too Late’.....	199
iii. Moral Hazards.....	201
iv. Information Asymmetries.....	202
v. Equity Considerations.....	203
vi. Holdout Issue.....	203
vii. Asset Values.....	203
viii. Legacy Issues.....	204
3. Conclusion.....	204
II. Initiatives for Statutory Approach in the Context of Sovereign Debt.....	206
1. General Remarks.....	206
2. International Initiatives.....	206
a. Sovereign Debt Restructuring Mechanism	206
b. Basic Principles on Sovereign Debt Restructuring Process.....	207
3. Multilateral Initiatives by Creditor Groups.....	209
a. Paris Club.....	209
b. London Club.....	210

Table of Contents

c.	Debt Service Suspension Initiative	211
d.	Common Framework for Debt Treatment	212
e.	HIPC	214
i.	Original HIPC	214
ii.	Enhanced HIPC	216
f.	MDRI	216
4.	Domestic Laws	217
a.	CACs in the European Union	217
i.	Greece	217
ii.	EU	217
b.	Anti-Vulture Legislation	218
i.	UK	218
ii.	Isle of Man	219
iii.	Jersey	219
iv.	Belgium	220
v.	France	221
c.	Bills under New York Law to Facilitate Sovereign Debt Restructuring	222
i.	Changes to Champerty in Respect of Sovereign Claims	222
ii.	Sovereign Debt Restructuring Mechanism	223
iii.	Anti-Vulture Fund Legislation	224
5.	Implications for a Statutory Approach to Sovereign Debt Payment Suspension in the context of Physical Risk-induced Sovereign Defaults	225
a.	Arguments for a Domestic Law Statutory Approach	225
i.	Regulatory Arbitrage	225
ii.	Difficulties of Reaching an International Agreement	227
iii.	Exclusion of Private Bondholders	229
6.	Conclusion	231
III.	Unilateral Modifications of Sovereign Bond Contracts	232
1.	General Remarks	232
2.	Subsequent Amendments of Outstanding Sovereign Bonds	232
a.	Unilateral Changes to Sovereign Bonds	232
b.	Challenges to the Greek Bondholder Act	233
i.	Decision by the Greek Council of State	233
ii.	Decision by the German Constitutional Court	235
iii.	ICISD Decisions	236

iv. Decision by the European Court of Justice.....	236
v. Implications for the Statutory Domestic Law Approach.....	237
3. Conclusion.....	239
IV. Overall Conclusion to Section E.....	240
F. Concluding Remarks	241
Annex 1	245