Comment

Supplementary information to:

National COVID debts: climate change imperils countries' ability to repay

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SUPPLEMENTARY INFORMATION

NATIONAL COVID DEBTS: CLIMATE CHANGE IMPERILS COUNTRIES' ABILITY TO REPAY

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S1 SUMMARY OF LONG-TERM SOVEREIGN BONDS/NOTES ISSUED IN 2020

Method:

We searched for bonds issued on or after 1 Jan 2020 up to 18 Dec 2020, with maturities on or after 1 Jan 2050 issued by national governments only. We search for sovereign bond issuances on two commercial databases (Refinitiv Eikon[1] and CBonds[2]). We removed duplicate listings, where it was possible to do so, and combined the results to estimate the aggregate issued debt.

Using the International Securities Identification Number (ISIN) of each bond, we then searched for prospectuses in a number of stock exchanges (Luxembourg, London, Nasdaq). The available prospectuses became a convenience sample which we used to analyse the risk disclosures within the available prospectuses.

Theme	Category		Number		Notes
Summary Statistics of Long-Term Sovereign Bonds/Notes issued in 2020					
	Total Bonds/Notes Issued (No.)		193		
	Total Available and Reviewed Prospectuses (No.)		50		
	Total Issuing Sovereigns (No.)		48		
	Total Estimate Value of Issued Debt (USD,'000)		783,396,687.16		
	Mean Bond Term (Years)		39		
	Mean Coupon Rate (%)		2.12		
References to Climate Risk within Sample Bonds					
	Total references to Physical and Transition Risks		1		Ghana
	Total references to Transition Risk Only		2		Bulgaria, UAE
	Total references to Physical Risk Only		3		Bermuda, Dominican Republic, El Salvador

S2 CLIMATE RISK IMPACTS AND SOVEREIGN BONDS/NOTES ISSUED IN 2020

Method:

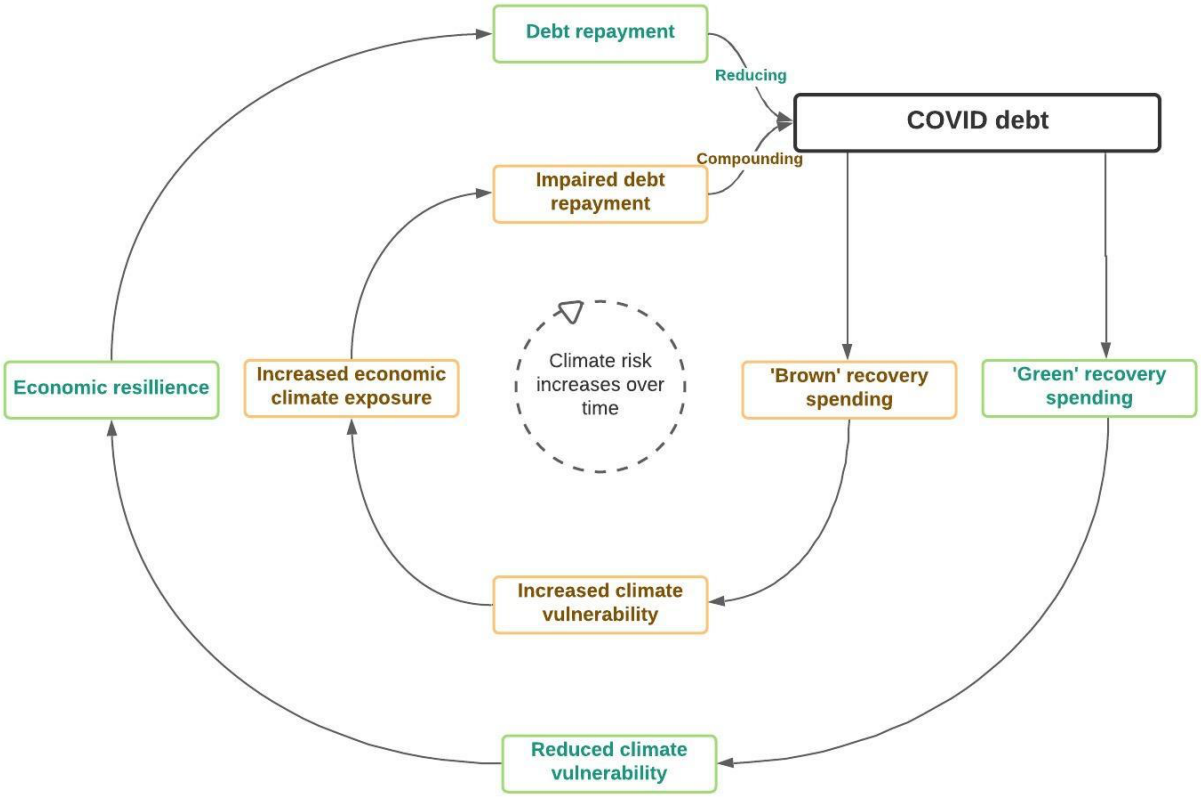
For each bond/note-issuing country whose prospectus we reviewed (following the method outlined in S1, above), we identified its latest maturing bond/note and then estimated the impact of projected temperature changes on its GDP at the year of maturity. We use the data and method from Burke, Hsiang and Miguel (2015) to estimate projected climate impacts at the year of maturity.[3]

Country Name		Longest Maturity Date (post-2050)	Issue date	Bond Length (Yrs)	Projected per-capita GDP at Maturity (w/out climate)	Projected per-capita GDP at Maturity (with climate)	Projected per capita GDP Change at Maturity (% change in per-capita GDP)
Australia		21/06/2051	5/08/2020	30	60,514.03	52,675.30	-12.95
Belgium		23/07/2079	23/07/2020	59	100,225.20	120,515.49	20.24
Bulgaria		23/09/2050	23/09/2020	30	14,547.49	15,949.42	9.64
Cyprus		16/04/2050	16/04/2020	30	29,579.34	23,203.01	-21.56
Denmark		15/11/2052	3/04/2020	32	78545.044	92635.914	17.94
Ireland [1]		27/11/2120	27/11/2020	100	130841.995	192708.066	47.28
Lithuania		28/07/2050	28/07/2020	30	19120.793	24095.609	26.02
Peru		1/12/2060	24/11/2020	40	19751.115	16399.495	-16.97
United Arab Emirates		28/07/2050	14/07/2020	30	113656.16	60653.02	-46.63
Israel [1]		3/04/2120	3/04/2020	100	99,637.31	17,697.48	-82.24
Mexico		24/05/2061	24/11/2020	40	37,265.86	25,055.54	-32.77
China		21/10/2050	21/10/2020	30	8,534.57	7,920.24	-7.20
Indonesia		15/04/2070	15/04/2020	50	20,232.31	8,800.46	-56.50
Ghana		11/03/2061	11/02/2020	41	8,758.95	4,180.44	-52.27
Panama		1/04/2056	1/04/2020	36	21,756.18	13,319.27	-38.78
Saudi Arabia		22/04/2060	22/04/2020	40	45,149.38	16,763.67	-62.87
Dominican Rep.		30/01/2060	30/01/2020	40	16,039.61	8,930.14	-44.32
Egypt		29/05/2050	29/05/2020	30	6,997.73	4,997.15	-28.59
El Salvador		15/07/2052	15/07/2020	32	11,833.69	7,944.05	-32.87
Colombia		15/05/2051	4/06/2020	30	14,255.01	10,684.41	-25.05
Romania		14/02/2051	14/07/2020	30	19,414.36	22,011.80	13.38
USA		15/11/2050	16/11/2020	29	71,606.08	67,786.88	-5.33
UK		22/10/2061	20/05/2020	41	77026.776	88568.202	14.98
Bermuda [2]		20/08/2050	20/08/2020	30	--	--	--
Guatemala		1/06/2050	24/04/2020	30	13,580.16	9,729.72	-28.35
Qatar		16/04/2050	16/04/2020	30	137,397.48	73,292.02	-46.66

[1] Projections only available until 2099

[2] No economic data available

FIGURE S1


Debt repayment
Reducing
COVID debt
Compounding
Impaired debt repayment
Economic resillience
Increased economic climate exposure
Climate risk increases over time
'Brown' recovery spending
'Green' recovery spending
Increased climate vulnerability
Reduced climate vulnerability

REFERENCES

1. Refinitiv Eikon. Available at: https://www.refinitiv.com/en/products/eikon-trading-software.
2. Cbonds. Available at: https://cbonds.com/.
3. Burke, M., Hsiang, S. M. & Miguel, E. Global non-linear effect of temperature on economic production. *Nature* **527**, 235–239 (2015).