

CLIMATE DEFAULTS AND FINANCIAL ADAPTATION

Toan Phan and Felipe Schwartzman

Discussion by Tamon Asonuma (IMF)
with inputs from Hyungseok Joo (University of Surrey)

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DISCLAIMER

- The views expressed herein are those of ours and should not be attributed to the IMF, its Executive Board, or its management

SUMMARY OF THE PAPER

- Overview:
 - Theoretical and quantitative paper on climate-related disasters and sovereign default
- Motivation:
 - Rising climate-related disaster risk and large damages
- What the paper does:
 - Develop a tractable framework to analyze both (i) physical risk of climate-related disasters, (ii) sovereign default risk
 - Analyze effects of (a) impacts of climate-related disasters on the economy, (b) financial adaptation (CAT bonds, disaster insurance)

SUMMARY OF THE PAPER

- Theoretical finding:
 - Interaction of disaster and sovereign default generates slow post-disaster recovery (compared to non-default case)
⇒ **Key mechanism:** vicious cycle between investment and default risk

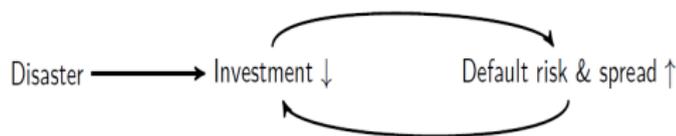


Figure: Viscous cycle

- Quantitative finding:
 - Financial adaptation can significantly reduce welfare loss from a projected increase in disaster-related default risk
⇒ **Key mechanism:** financial adaptation eliminating the effect on default risk (i.e., standstill)

COMMENT 1: COMPARISON AMONG GDP-LINKED, DISASTER-LINKED AND NON-STATE CONTINGENT BONDS

	GDP-linked bonds	Disaster-linked bonds	Non-state contingent bonds
Disaster-related recession	Debt service deferral	Debt service deferral	None / Default
Non-disaster related recession	Debt service deferral	None / Default	None / Default
Premium due to default risk	Low	Moderate	High
Premium (i.e.insurance fee) due to state-contingency clauses	High	Moderate	None

COMMENT 1: COMPARISON AMONG GDP-LINKED, DISASTER-LINKED AND NON-STATE CONTINGENT BONDS

- Comparison of bond prices:
 - Theory: Premium due to default risk $>$ Premium (i.e., insurance fee) due to state-contingent clauses
Bond prices: GDP-linked $>$ Disaster-linked $>$ NSCB
 - Data: Can we test the theoretical hypothesis?
- Measure for “premium (i.e. insurance fee) due to state-contingency clauses”
 - Dynamics of “premium”: ex ante and ex post
 - Similar to Collective Action Clauses (CACs) premium—Bardozzetti and Dottori (2014 JIE)
- Comparison of “premium due to state-contingent clauses”
 - GDP-linked, disaster-linked, bonds with CACs

COMMENT 2: OPTIMAL LENGTH OF STANDSTILL (DEBT SERVICE DEFERRAL)

Type	Country	Nominal/NPV Haircut ^{1,2}	Currency of denomination	Period covered	Main trigger	Formula for payout/deferral	Caps/Exercise limits
Downside instrument ⁴	Grenada (2015) - Hurricane clause ⁵ in 2030 bond	50% nominal (of which 25% upfront)/ 54% NPV	Local and Foreign Currency	13	"Modelled" Hurricane damage	<ul style="list-style-type: none"> • 6 month deferral if modelled loss is greater than USD 15mn, less than USD 30mn • 12 month deferral if modelled loss is greater than USD 30mn 	Can be triggered a maximum of 3 times
	Barbados (2018) - Natural disaster clause in domestic-currency long-term bonds	0% nominal / 43 % NPV	Local currency	15-35	"Modelled" natural disaster (earthquake, rainfall, tropical cyclone) damage	<ul style="list-style-type: none"> • 24 month deferral if modelled loss is greater than USD 5 mn 	Can be triggered a maximum of 3 times
	Barbados (2019) - Natural disaster clause in 2029 bond	25% nominal / 29% NPV ⁶	Foreign Currency	8	"Modelled" natural disaster (earthquake, rainfall, tropical cyclone) damage	<ul style="list-style-type: none"> • 24 month deferral if modelled loss is greater than USD 5 mn in the case of earthquake and flooding • 24 month deferral if modelled loss is greater than USD 7.5 mn in the case of tropical cyclone 	Can be triggered a maximum of 3 times

¹ These haircuts calculations do not account for the value of the state contingent instruments

² Sources for Haircut estimates are Anthony et al. (2020), Asonuma et al. (2017, 2018), Cruces and Trebesch (2013), Zettelmeyer et al (2013).

³ Payments to be discounted back to May 2015 using average yield on the 2030 bond in the year in which they occur

⁴ Glencore loan to Chad restructured in 2018 included specific contingencies to reduce the debt payments in low oil revenue scenarios and accelerate the payment of debt in case of high oil revenue scenarios

⁵ Similar clauses were included in restructured debts with the Import-Export Bank of Taiwan and the Paris Club

⁶ Only for debt held by private (domestic and external) creditors

COMMENT 2: OPTIMAL LENGTH OF STANDSTILL (DEBT SERVICE DEFERRAL)

- Hatchondo, Martinez and Sosa-Padilla (2020) – standstills due to Covid-19 shocks
 - Conflict of interest between debtors and creditors
 - Debtors: willing to extend the length of standstill
 - Creditors: willing to minimize the length of standstill
- What is the socially optimal (“welfare improving”) length of standstills?
 - Solve theoretically
 - Solve quantitatively
- How can we set social optimal length of standstills in bond contract ex ante?

COMMENT 3: FUNDAMENTAL QUESTION TO DISASTER-LINKED BONDS

- **Fundamental question:** Why these bonds are illiquid, i.e. rarely issued and traded?
- Reality:
 - Only issue at the time of debt restructurings (as new instruments): Grenada (2015) and Barbados (2018, 2019)
 - No (limited) issue of disaster-linked bonds in normal time
- **Key mechanism:** Premium due to default risk $<$ Premium (i.e., insurance fee) due to state-contingent clauses
- Possible explanations:
 - (i) Risk averse creditors in segmented markets (local / regional)
 - (ii) State-contingent bond market is very illiquid (rarely traded)
 - (iii) High income correlation between creditors and debtors
- Can we explain theoretically and quantitatively?

COMMENT 3: FUNDAMENTAL QUESTION TO DISASTER-LINKED BONDS

- **Question:** How can policy makers and academic researchers overcome this problem?
- Approach (A): Portfolio (i.e., a basket) of disaster-linked bonds issued by sovereign debtors with country-specific disaster probability
 - (i) purchased by risk averse local creditors
 - (ii) purchased by more benevolent creditors (e.g., bilateral creditors)
 - (iii) purchased by risk averse sovereign debtors
- Approach (B): Regional-level pooling of disaster insurance by sovereign debtors with country-specific disaster probability
 - (i) mutually hedged (held) by risk averse sovereign debtors

CONCLUSION

- Very nice paper!
- Very timely and policy relevant!
- An interesting theoretical explanation on slow recovery after disaster
- Thoughtful quantitative results different measures of financial adaptation improves welfare
- Enriched policy implications