Global Corporate Default Risk Factors: Frailty and Spillover Effects

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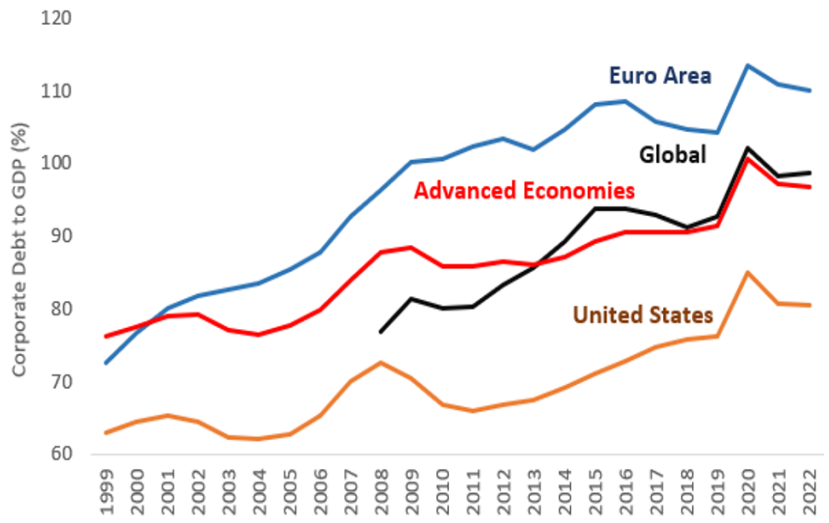
Motivation

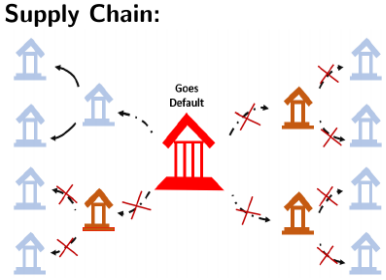


- Global corporate leverage is currently at one of the **highest point** of all time
- Holds for most economic regions worldwide
- Elevated corporate leverage posed **more severe** systemic risk to corporate debt distress
- Minimal research on **corporate debt vulnerability** to systemic risk

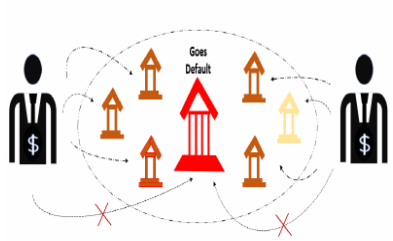
Systemic Risk

- How systemic risk impact corporate debt distress risk

Supply Chain:



Informational Contagion:



Research Approach

- Employ a dataset that contains **global** coverage of default events for public listed firms
- Assess for global corporate debt vulnerability to systemic risk
  - Control for holistic coverage of firm fundamentals and systematic variables
- Construct a corporate default risk model with dynamic latent variable (frailty):
  - Benchmark model is based on a binary logit model
  - Frailty factor is estimated based on Generalized Autoregressive Score (GAS) paradigm

Data

- **NUS CRI**

Firm-level data and Corporate Default Events (Missed Payments (i), Distressed Exchange (ii), Bankruptcy (iii), etc)

- **BIS, FRED, World Bank**

Systematic variables (Global Financing and Macroeconomic variables)

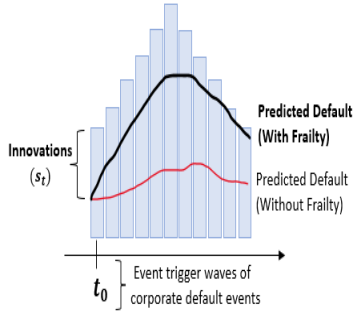
Main Findings

1. Identify strong evidence of a dynamic latent variable (frailty) that impacts corporate debt distress risk worldwide
2. Frailty factor can be simulated in OOS sample to provide more realistic assessment of firm distress risk exposure in crisis period
3. PCA analysis suggests strong evidence of a global corporate default latent risk factor that impacts default risk across different regions
4. Granger causal relations among frailty factors of different regions suggest evidence of cross economies spillover

Econometrics Specification

- Propose a dynamic latent variable based on the Generalized Autoregressive Score (GAS) paradigm (Babii et al, 2019) to account for **systemic risk exposure**

$$\pi_{i,t} = \frac{\exp(\mu_{i,t})}{1+\exp(\mu_{i,t})} \qquad \mu_{i,t} = X_{i,t}^T\beta + \boldsymbol{f_t}$$



Frailty $f_t = \delta + \theta f_{t-1} + \alpha \boldsymbol{s_{t-1}}$

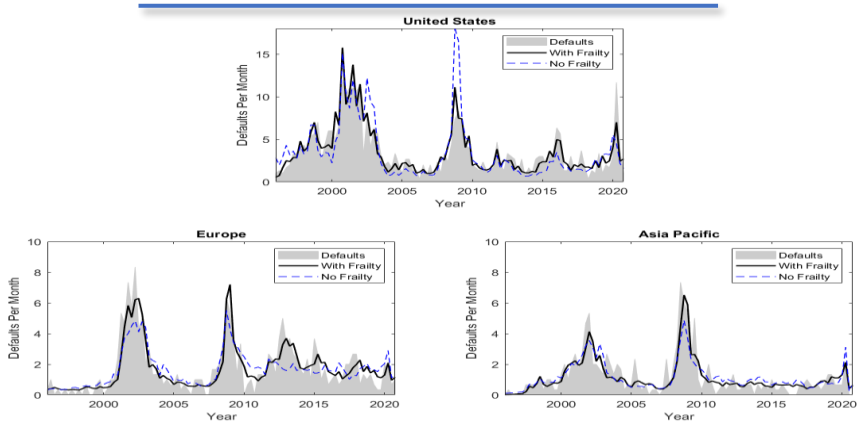
Generalized Residuals $s_{t-1} = \bar{y}_{t-1} - \hat{y}_{t-1}$

Empirical Default Rate $\bar{y}_{t-1} = \frac{1}{n}\sum_{i=1}^{n_t} y_{i,t-1}$

Predicted Default Risk $\hat{y}_{t-1} = \frac{1}{n}\sum_{i=1}^{n_t} \hat{\pi}_{i,t-1}$

- Intuition: Generalized residuals act as a proxy for omitted risk factor

Empirical Results

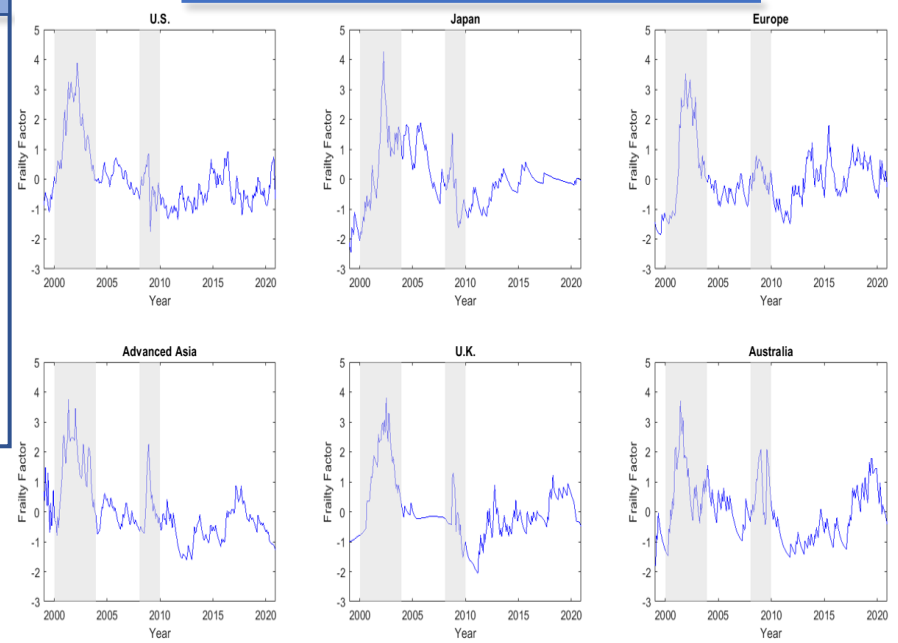


- **Strong evidence** of a dynamic latent variable that impacts debt distress risk

Parameters	United States	Europe	Asia Pacific
	...		
Theta (θ)	0.905***	0.942***	0.938***
Alpha (α)	3.712***	4.264***	4.462***
Delta (δ)	-0.254**	-0.398*	-0.833***

*Partial result based on Campbell et al. (2008) and Asis et al. (2021) main explanatory variables

Global Frailty Factors

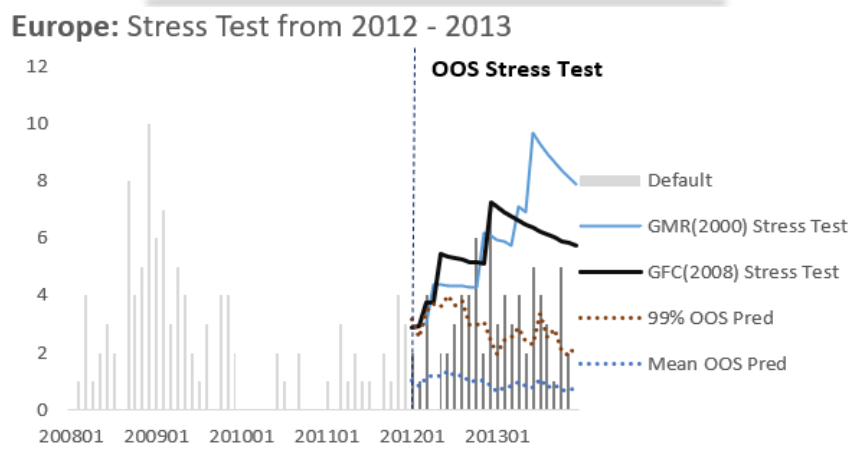


- **PCA analysis** shows evidence of a common global default latent risk factor

	PC1	PC2	PC3	PC4	PC5	PC6
US	0.444	-0.14	-0.455	-0.141	-0.533	-0.522
Europe	0.417	0.333	0.129	0.683	0.32	-0.359
UK	0.463	0.12	-0.096	0.244	-0.366	0.754
Advanced Asia	0.392	-0.549	-0.326	-0.126	0.632	0.153
Japan	0.354	0.635	0.063	-0.642	0.234	0.011
Australia	0.368	-0.388	0.81	-0.16	-0.158	-0.085
% Var	63.0	14.3	8.69	6.68	3.93	3.44

- Frailty factors of all economic regions load almost evenly on the first principal component
- First principal component explains more than **60%** of variations

Stress Test



- Quantile corporate default risk prediction at 99th percentile level is not able to account for actual default events in **Europe** during part of Eurozone Sovereign Debt Crisis (2012 – 2013)
- Quantile estimate at 99th percentile is 68 but actual default events is 76
- Estimation of default events based on simulation of generalized residuals based on past crisis provides more realistic estimation of actual default risk exposure during crisis period