Vulnerable Funding in the Global Economy

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Outline

General motivation

- Giglio et al. (2016) and Adrian et al. (2019) early document that financial conditions have significant predictive power on real economic activity during distressed macroeconomic scenarios (Growth at Risk).
- This relationship has been examined and evaluated over a large set of different countries (Brownlees and Souza, 2021; Figueres and Jarociński, 2020).
- Yet, the intermediate risk channel has not been fully explored: how US financial shocks propagate to global financial markets.

This paper

Research questions

- What is the impact of US financial shocks on global funding markets, including credit and stocks, during macro-financial distress scenarios?
- How can we comprehensively assess US financial shocks?
- What is the most likely reason for a given country's vulnerability to US financial shocks?

Related literature: Vulnerable growth

- Giglio et al. (2016) and Adrian et al. (2019) early document that financial conditions have significant predictive power on real economic activity during distressed macroeconomic scenarios.
- Extensive evidence for macroeconomic variables (Brownlees and Souza, 2021; Kiley, 2021; Adams et al., 2021; Lopez-Salido and Loria, 2022).

Contribution

- We propose two indicators of vulnerable funding: Credit at Risk (CaR) and Equity at Risk (EaR).

Related literature: US financial conditions

- Financial conditions is a broad concept which refers to the current state of financial variables that influence economic behavior and the future state of the economy (Hatzius et al., 2010).
- The National Financial Conditions Index (NFCI) is preferably used as a financial condition index for the US (Adrian et al., 2019).
- Ludvigson et al. (2021) construct a new financial uncertainty index (FUI) for the US that provides exogenous response to output fluctuations.

Contribution

- Our framework uses two different financial shocks indicators to support our claims: NFCI and FUI.

Related literature: Impact of US financial shocks on global markets

- US financial shocks impact global markets.
  - International credit view: capital flows, international exposition to credit markets, domestic cost of credit (Kalemli-Özcan, 2019; Bräuning and Ivashina, 2020; Di Giovanni et al., 2022).
  - Portfolio view: uncertainty effect (Fernández-Villaverde et al., 2011; Bordo et al., 2016).
- Determinants of financial vulnerability to external shocks.
  - Size and financial Depth (Carrière-Swallow and Céspedes, 2013; Kalemli-Özcan, 2019).
  - Financial connectedness across global markets (Alfaro et al., 2004).

Contribution

- We explore which channel, the credit view or the portfolio view, offers insights into the transmission of financial shocks from the US to the rest of the world.
- We analyze the cross sectional determinants of vulnerable funding.

Main findings

1. US financial shocks have a larger and more significant impact on the lowest quantiles of credit and stock prices than on the central and upper quantiles.

2. These effects exhibit considerable heterogeneity across different dimensions:

   - Country under examination,
   - Funding market (credit or stock),
   - Type of shock (whether it is related to financial conditions or financial uncertainty).

3. Funding markets (credit and stocks) with lower credit to GDP, higher U.S. investment relative to country's GDP and a higher Chinn-Ito index are more vulnerable to US financial shocks.

Methodology: Quantile regression

1. Augmented quantile-regression models (Koenker and Bassett, 1978; Koenker, 2005).
2. The base-line specification is given by Equation 1:

$$\underbrace{y_{it+h}(\tau)}_{\text{Credit or stock}} = \beta_{0i}(\tau)y_{it} + \beta_{1i} \underbrace{us.fs_t}_{\text{NFCI or FUI}} + \delta_{1i}(\tau)' \underbrace{X_t}_{\text{Global factors}} + \epsilon_{it}(\tau)$$

   $i = 1, .., N$ refers to the country, $h = \{0, 1, 4, 8, 12\}$ refers to the forecasting horizon, and $\tau\epsilon(0, 1)$ to the τ-th quantile.
3. We standardized all the variables to compare the magnitude and sign of the effects across different countries.
4. Smooth extended tapered block bootstrap S.E. proposed by Gregory et al. (2018) for quantile regressions.

Methodology: Global macroeconomic and financial factors

- We use a dynamic factor model as others (Doz et al., 2012; Brave et al., 2011).
- First factor: global macroeconomic factor (GDP growth, inflation, credit, stocks, bond yields).
- Second factor: global financial factor (credit, stocks, bond yields).
- Restrictions on the second factor (Plagborg-Møller et al., 2020).

Methodology: Cross-sectional determinants

OLS regressions for each τ and h.

$$\underbrace{\beta_{1i}(\tau)}_{\text{Vulnerability}} = \beta_2(\tau) * \underbrace{\overline{Credit/GDP_i}}_{\text{Financial depth}} + \beta_3(\tau) * \underbrace{\overline{US.FDI_i}}_{\text{US FDI on country i}} + \beta_4(\tau) * \underbrace{\overline{Chinn - Ito_i}}_{\text{Chinn-Ito}} + e_i(\tau)$$

Constant is considered.

Data

1. Long quarterly macro and finance database from 1960Q1 to 2019Q4 (Monnet and Puy, 2019).
   - Global financial factor (N=89; T=240) contains real credit growth, stock returns and changes in sovereign bond yields.
   - Global macroeconomic factor (N=174; T=240) also includes real GDP growth, inflation.
   - Real credit growth (N=44) and stock market returns (N=25).
2. National Financial Condition Index (NFCI) from 1971Q1 to 2019Q4[1].
3. Financial uncertainty indicator (Ludvigson et al., 2021) from 1960Q3 to 2019Q4[2].
4. Credit/GDP(N=44,1960-2019), Chinn-Ito(N=25,1970-2019), US direct investment abroad/GDP (N=44,1989-2019)

[1] https://www.chicagofed.org/publications/nfci/index

[2] https://www.sydneyludvigson.com/macro-and-financial-uncertainty-indexes

Data

- Our global factors point-out to the existence of a global cycle that commoves with the U.S. recession periods as identified by the NBER.

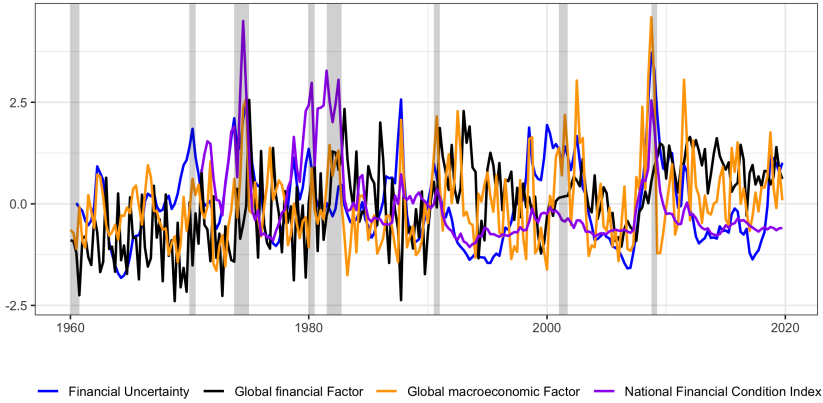


Figure 1: Global factors and US financial schocks indicators

Standardized variables. Time span 1960Q1 to 2019Q4. Gray shaded area represents NBER recessions at the end of the period.

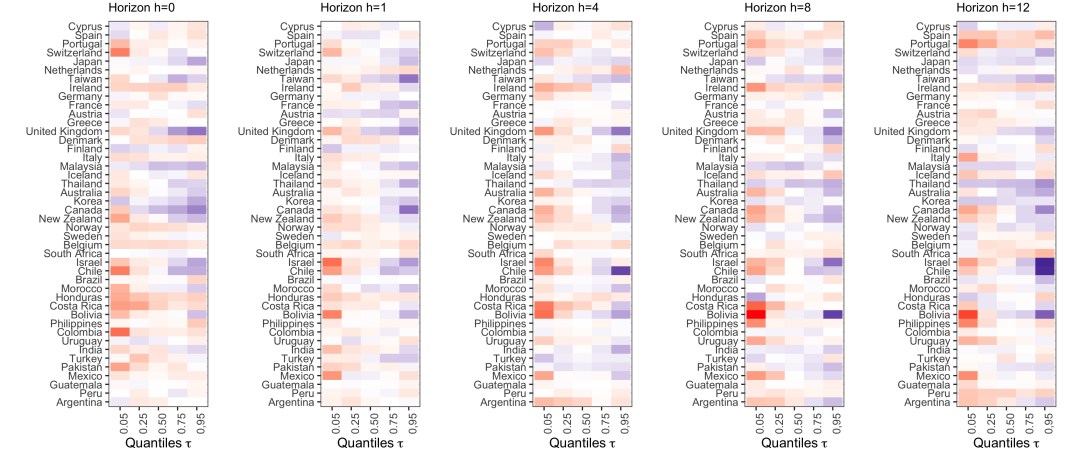
Results for Credit-at-risk

$$\underbrace{y_{it+h}(\tau)}_{\text{Real credit growth}} = \beta_{0i}(\tau)y_{it} + \beta_{1i}\underbrace{us.fs_t}_{\text{NFCI}} + \delta_{1i}(\tau)'\underbrace{X_t}_{\text{Global factors}} + \epsilon_{it}(\tau)$$

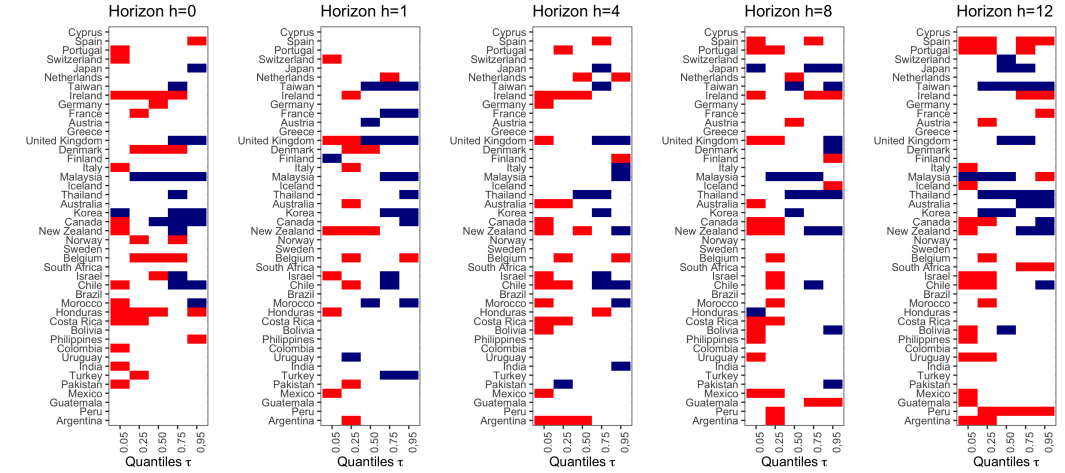
$i = 1, .., 44$ refers to the country, $h = \{0, 1, 4, 8, 12\}$ refers to the forecasting horizon, and $\tau\epsilon(0, 1)$ to the τ-th quantile.

We standardized all the variables to compare the magnitude and sign of the effects across different countries.

Results 1: Coefficients β_{1i}
Countries ordered by Credit-to-GDP (descendent)



Results 1: Significance β_{1i}
Countries ordered by Credit-to-GDP (descendent)



Results: Cross sectional analysis of β_{1i}

Horizon	Variable	q=0.05	q=0.25	q=0.50	q=0.75	q=0.95
	Constant	-0.265***	-0.126***	-0.062*	0.022	0.041
	US inv./GDP (%)	-0.006	-0.003**	-0.002	-0.003	0.000
	Credit/GDP (%)	0.002	0.001	0.000	0.000	0.000
0	Chinn-Ito index	0.027	0.027	0.012	0.032	0.043
	Constant	-0.265***	-0.076**	-0.016	0.028	0.059
	US inv./GDP (%)	-0.002	-0.004**	-0.002**	-0.003*	-0.001
	Credit/GDP (%)	0.002**	0.000	0.000	0.000	0.000
1	Chinn-Ito index	-0.003	0.017	0.015	0.012	0.020
	Constant	-0.315***	-0.069*	-0.039	0.036	0.176***
	US inv./GDP (%)	-0.007*	-0.005**	-0.004***	0.000	-0.002
	Credit/GDP (%)	0.003***	0.000	0.001	0.000	-0.001
4	Chinn-Ito index	-0.066**	-0.018	-0.006	0.000	0.008

Robust standard errors in parentheses $*p < 0.10, **p < 0.05, ***p < 0.01$.

Table 1: Cross-sectional determinants

Results for Equity-at-risk

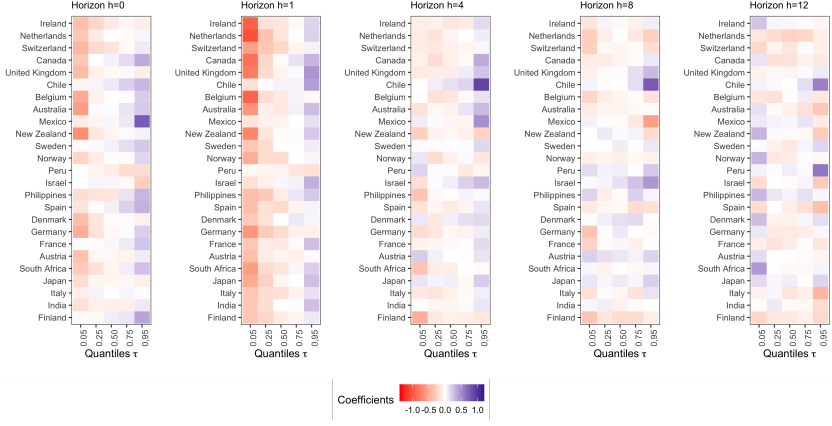
$$\underbrace{y_{it+h}(\tau)}_{\text{Stocks prices growth}} = \beta_{0i}(\tau)y_{it} + \beta_{1i}\underbrace{us.fs_t}_{\text{FUI}} + \delta_{1i}(\tau)'\underbrace{X_t}_{\text{Global factors}} + \epsilon_{it}(\tau)$$

$i = 1, .., 25$ refers to the country, $h = \{0, 1, 4, 8, 12\}$ refers to the forecasting horizon, and $\tau\epsilon(0, 1)$ to the τ-th quantile.

We standardized all the variables to compare the magnitude and sign of the effects across different countries.

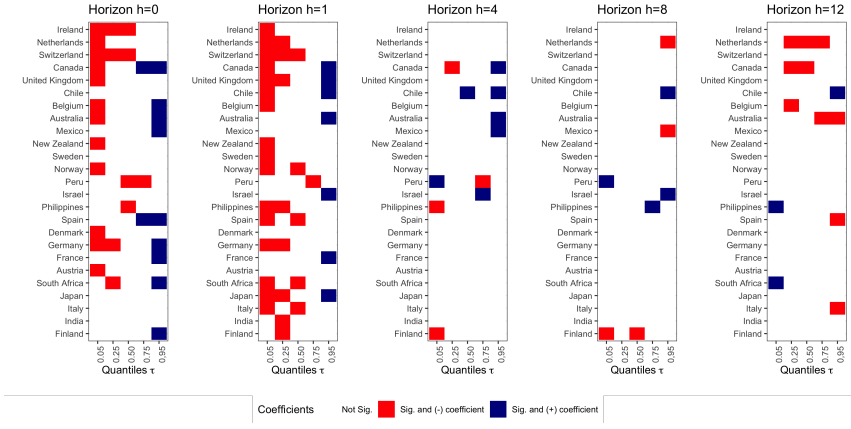
Results 2: Coefficients β_{1i}

Countries ordered by U.S. investment relative to country's GDP (descendent)



Results 2: Significance β_{1i}

Countries ordered by U.S. investment relative to country's GDP (descendent)



Results: Cross sectional analysis of β_{1i}

Horizon	Variable	q=0.05	q=0.25	q=0.50	q=0.75	q=0.95
	Constant	-0.219***	-0.122***	-0.077***	-0.007	-0.001
	US inv./GDP (%)	-0.006***	-0.002**	-0.001	-0.001	0.000
	Credit/GDP (%)	0.001	0.001**	0.001**	0.000	0.000
0	Chinn-Ito index	0.031	0.020*	0.016	0.021	0.043*
	Constant	-0.201***	-0.076***	-0.037**	-0.009	-0.029
	US inv./GDP (%)	-0.004**	-0.003**	-0.002***	-0.001	0.003
	Credit/GDP (%)	0.001**	0.000	0.000	0.001*	0.001
1	Chinn-Ito index	0.012	0.022**	0.014*	0.010	0.020
	Constant	-0.235***	-0.033	-0.030*	0.030	0.184***
	US inv./GDP (%)	-0.003	-0.003***	-0.003***	0.000	0.001
	Credit/GDP (%)	0.002***	0.000	0.000	0.000	-0.001*
4	Chinn-Ito index	-0.008	0.007	0.010	0.010	0.012

Robust standard errors in parentheses $*p < 0.10, **p < 0.05, ***p < 0.01$.

Table 2: Cross-sectional determinants

Robustness checks and other results in the paper

1. Relationship between coefficients: GaR vs EaR and CaR.
2. Add both US financial shocks in the same specification.
3. Consider 4 lags of the dependent variable.
4. Consider country-specific financial condition indicators for each country for a sub-sample of 24 OECD countries.

Conclusions

1. US financial shocks have significant predictive power on the lowest quantiles of credit growth and stock market prices around the global economy.
2. These effects exhibit considerable heterogeneity across different dimensions:
   - Country under examination,
   - Funding market (credit or stock),
   - Type of shock (whether it is related to financial conditions or financial uncertainty).
3. We show that international funding markets are a source of persistence and amplification of financial shocks across the global economy.

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