Capital Flows in Risky Times: Risk-on / Risk-off and Emerging Market Tail Risk

Anusha Chari
UNC-Chapel Hill
& NBER

Karlye Dilts Stedman*
FRB Kansas City

Christian Lundblad
UNC-Chapel Hill

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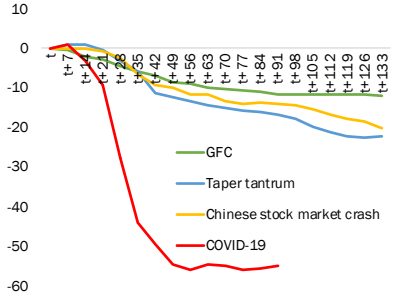
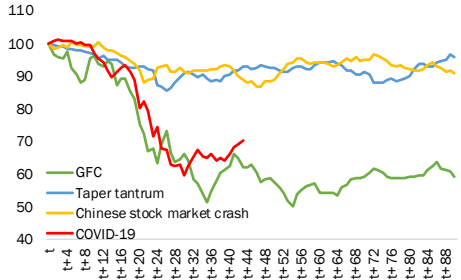
* The views expressed here are solely the responsibility of the authors and should not be interpreted as reflecting the view of the Federal Reserve Bank of Kansas City or of any other person associated with the Federal Reserve System.

Stress Episodes & Emerging Market Capital Flows

There are several examples of extreme events that might have distributional implications.

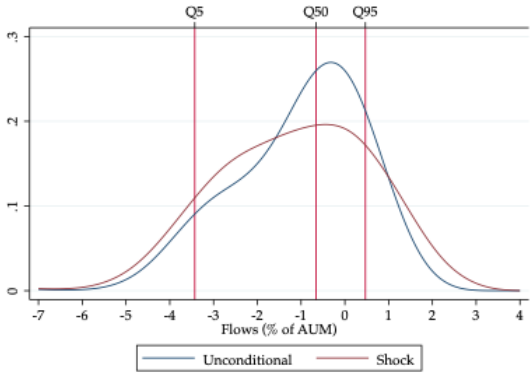


(a) EFPR Bond Flows, Billions USD

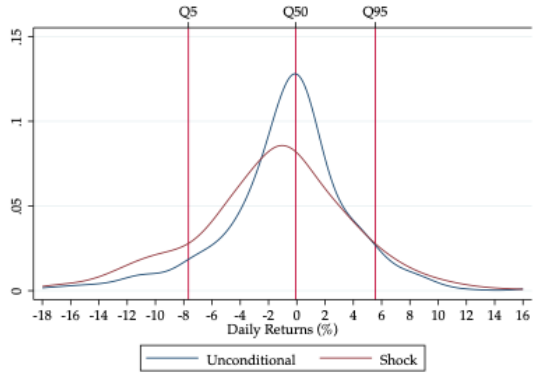


(b) MSCI USD Returns

Distributional Consequences of RORO Shocks: The COVID19 Shock



(a) Bond Flows



(b) Bond Returns (US$)

This Paper Takes a Deep Dive into Risk-On/Risk-Off

- How do changes in risk appetite affect the distribution of emerging market capital flows and valuations? In particular tail risk?

- Use a quantile regression approach to characterize the distributional implications.

- Summarize the risk-on/risk-off states of the world:
  - Generate a multi-faceted, generalizable, shock series to see how different manifestations of risk affect the distribution of flows & returns.
  - Amalgam of changes in global funding liquidity and the risk bearing capacity of international investors.

- Application to COVID-19 shock:
  - Examine the distributional pattern of flow and return realizations.
  - Reactions to the sizeable risk-off nature of this shock?
  - Where do they lie in the distribution?

Preview of Findings

- RORO shocks have important implications for the median and tails of emerging market flows & returns.
- **Flows:**
  - Bond Funds: Risk-off shocks increase the worst **outflow** realizations more than they decrease median flows, fattening the left tail.
  - Equity Funds: Risk-off shocks decrease the highest **inflow** realizations to equity funds more than they increase the worst outflow realizations. Q5 decreases less than Q50, bringing the left tail in.
- **Returns:**
  - Equity returns more heavily impacted across distribution than bond returns.
  - USD indices are more sensitive than LC indices for both fixed income & equity.

- Document **inflows** to Treasury money market funds, consistent with flight to safety.
- Underlying composition of factors that drive risk-off shocks differs across crises:
  - GFC: Credit Risk & AE Stock Volatility.
  - COVID 19: Credit Risk & Funding Liquidity.

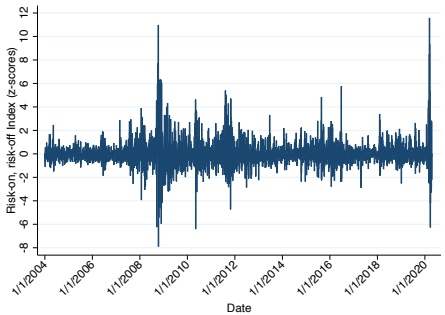
Measuring Risk-on/Risk-off

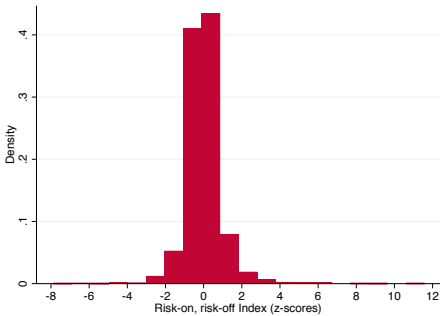
To measure different sources of risk-on/risk-off changes, we generate subindices of the RORO index from components that fall into four categories using PCA:

- Corporate Spreads (credit risk)
  - US, Euro area corporate spread
- Advanced economy equities (volatility/physical risk)
  - Inverse total return changes: S&P 500, STOXX 50, MSCI Adv. economies
  - Option implied volatility: VIX, VSTOXX
- Liquidity (funding conditions)
  - G-spread (avg. 2-, 5-, 10-year)
  - TED Spread, 3-month LIBOR-OIS spread, 3-month Treasury bid-ask spread
- Currencies and Gold
  - Trade weighted U.S. Dollar Index against adv. foreign economies
  - Gold price

Measuring Risk-on/Risk-off

Our RORO index comprises the z-score of the **first PC** of daily changes in several standardized variables. Components are normalized such that **positive changes** $\implies$ **risk-off behavior**. Highly skewed (1.56) & Long tails (Kurtosis = 21.98)





- Also use variance risk premium measure from Bekaert et al (2020) $\rightarrow$ separates price (risk aversion) from the quantity (physical) of risk . Similar properties.

Data Description: Capital Flows

Weekly EPFR Country Flows dataset to measure gross capital flows to EMs.

- High frequency proxy of capital flows into and out of emerging markets, cleansed of valuations.
- EPFR: Weekly portfolio investment flows by more than 14K equity & 7K bond funds, AUM $>$ US$8 trillion.
- Combines EPFR's Fund Flow and Country Weightings data to track EM flows.
- Country-level total return indices (daily):
  - Equity: MSCI Local Currency and MSCI USD
  - Fixed income: Bloomberg Local Currency Bond Indices and EMBI USD
  - Data spans Jan. 7, 2004 - Apr. 15, 2020

Methodology

Panel quantile regression approach of Machado and Santos Silva (2019) with country & year fixed effects:

Returns:

$$R_{it}^{(q)} = \alpha_i^{(q)} + \delta_t^{(q)} + \boxed{\beta^{(\mathbf{q})}} Risk_t + \gamma_1^{(q)} PUSH_t^R + \gamma_2^{(q)} PULL_{it}^R + \epsilon_{i,t} \quad (1)$$

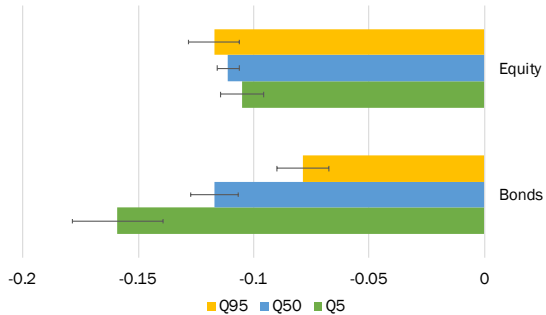
Flows:

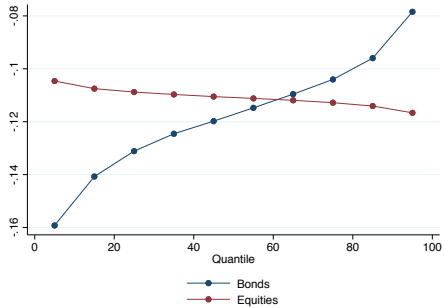
$$k_{it}^{(q)} = \alpha_i^{(q)} + \delta_t^{(q)} + \rho k_{it-1}^{(q)} + \boxed{\beta^{(\mathbf{q})}} Risk_{t-7,t} + \gamma_1^{(q)} PUSH_t^k + \gamma_2^{(q)} PULL_{it}^k + \epsilon_{i,t} \quad (2)$$

$$k_{it}^{(q)} = \left(\frac{K_{it}}{H_{it-1}} * 100 \right)$$

Where R_{it} is the EMBI, LC Bond index, MSCI LC or MSCI USD, $Risk_t$ is either the RORO Index, a vector of its subindices, or the BEX 2020 measures, K_{it} is either equity or debt flows, H_{it-1} is the previous week's allocation of the same.

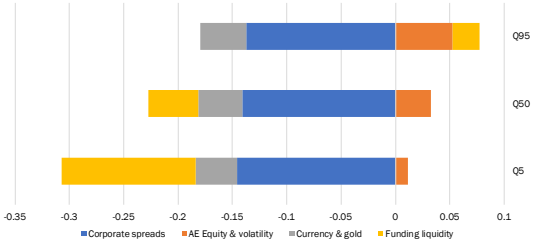
Results: Coefficient Estimates for Flows, $\beta^{(q)}$

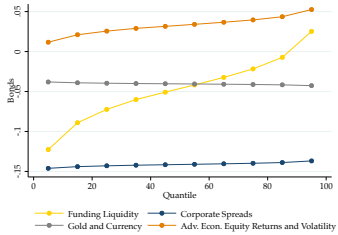




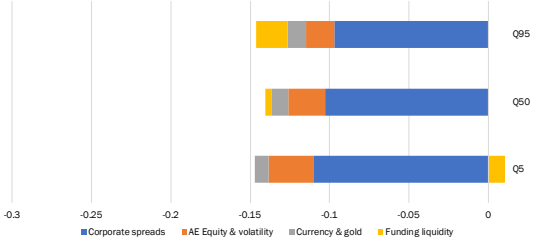
- A steeper quantile curve implies more dispersion. Greater distance from zero implies a stronger impact.

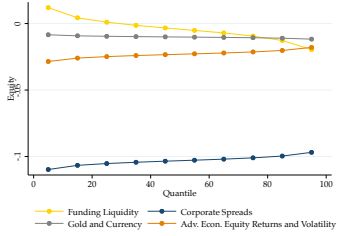
Results: Decomposition (Flows)





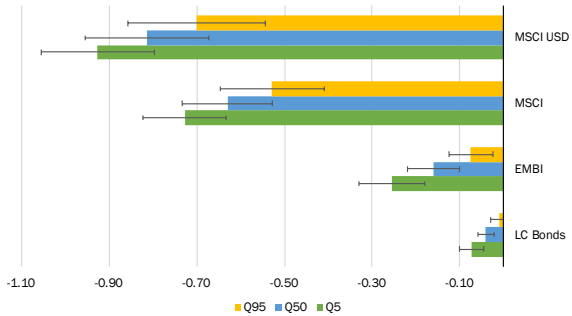
(a) Bonds

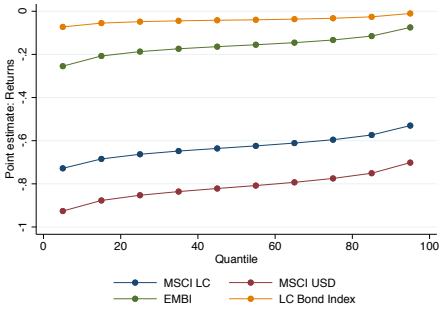




(b) Equity

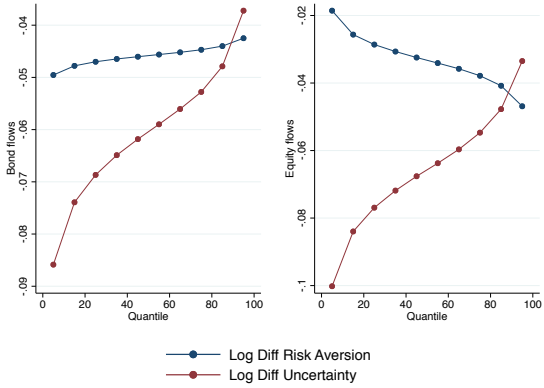
Results: Coefficient Estimates for Returns, $\beta^{(q)}$





- Equity is more sensitive than debt. USD returns more sensitive than LC returns.

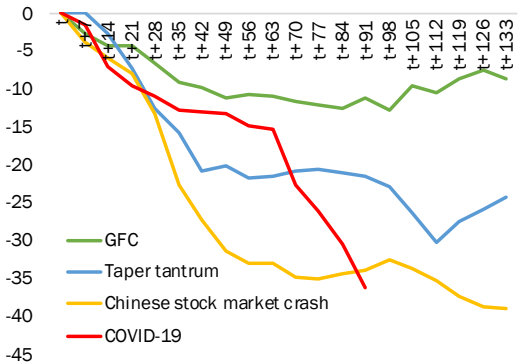
Risk Aversion vs. Physical Risk: Flows



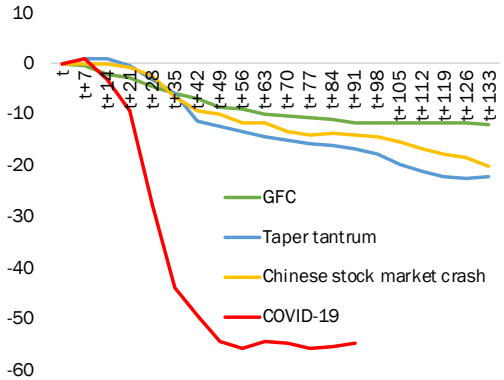
- Both risk-aversion & physical risk in bond flows exhibit tails out behavior maps to statistical approach.
- Equities: Physical risk (tails-out), Risk-aversion (tails-in) $\rightarrow$ reflects pattern in empirical RORO.

Stress Episodes & Emerging Market Capital Flows

- COVID-19 shock: The sudden stop in portfolio flows into emerging economies has been unprecedented.
- "Mother of all sudden stops." Barry Eichengreen, 2020.

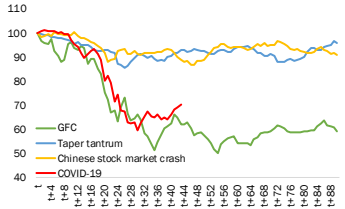


(a) Equity flows (Billions USD)

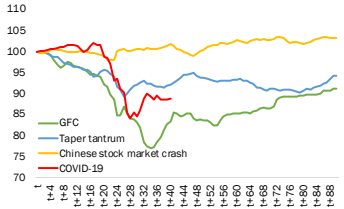


(b) Bond flows (Billions USD)

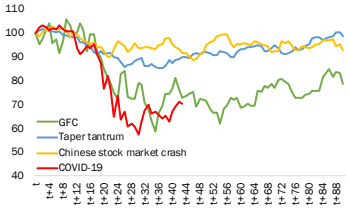
Stress Episodes & Emerging Market Returns



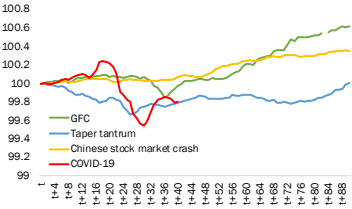
(a) MSCI USD



(b) EMBI



(c) MSCI LC



(d) Local currency Bond Index

Quantitative Exercise: COVID-19

How has the distribution of capital flow realizations changed in the face of COVID-19 shocks?

$$\hat{k}^q = k^q + \hat{\beta}^q * shock * H \tag{3}$$

Where

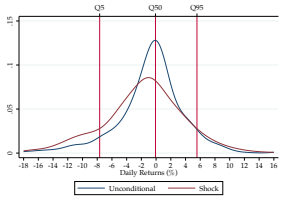
- $\hat{k}^q$ is the estimated flow calculated from fitted values
- k^q is the qth percentile observed average country flow per week in the data since Jan. 2020
- H is the average assets under management
- *shock* is the magnitude of either the mean, 10th percentile, or maximum shock realization in the COVID era (1, 3.1 and 11.56 standard deviations, respectively)

We also fit a kernel density to the predicted values to visualize changes in the distribution.

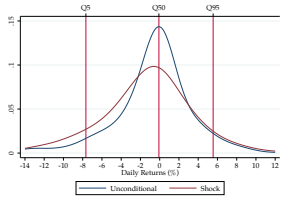
Quantitative Exercise: COVID-19

	Panel A: Bonds	Q5	Q50	Q95	**Panel B: Equity**	Q5	Q50	Q95
	Observed flows	-473.56	3.73	178.13	Observed flows	-258.62	-5.79	109.69
β (unconditional)								
$\sigma = 1$	% of AUM/week	-0.16	-0.12	-0.08	% of AUM/week	-0.11	-0.11	-0.12
	Millions USD	-502.64	-17.67	163.78	Millions USD	-277.83	-26.09	88.30
β*Covid1Stdev								
$\sigma = 3.1$	% of AUM/week	-0.49	-0.36	-0.24	% of AUM/week	-0.33	-0.34	-0.36
	Millions USD	**-563.70**	**-62.60**	**133.63**	**Millions USD**	**-318.15**	**-68.72**	**43.36**
β*CovidPeak								
$\sigma = 11.56$	% of AUM/week	-1.84	-1.35	-0.91	% of AUM/week	-1.21	-1.28	-1.35
	Millions USD	-809.69	-243.61	12.18	Millions USD	-480.60	-240.44	-137.65

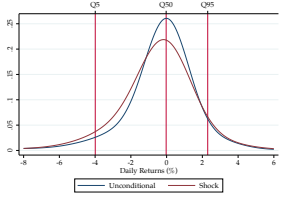
Quantitative Exercise: COVID-19



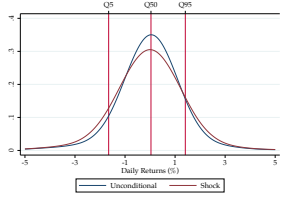
(a) MSCI USD



(b) MSCI LC



(c) EMBI



(d) LC Bond Index

Next steps: Country and Investor-level Heterogeneity

Do the implications of a RORO shock differ across recipient countries? Given that the mutual fund business exhibits significant variation in manager discretion, the heterogeneity question requires a deeper dive.

- **Country-level heterogeneity**: (see, e.g., Gelos et. al. (2019))
  Does variation in recipient country economic policy and business fundamentals affect fund re-allocation in the face of a RORO shock? Do fund managers largely no longer view EM as an single 'asset class'?
- **Investor-level heterogeneity**:
  - Passive index funds and ETFs (with zero manager discretion) represent about half of the EM space; induce elevated correlations and little cross-country heterogeneity?
  - Actively managed mutual (and hedge) funds enjoy considerable discretion. In the face of a RORO shock, country fundamentals may be central for them.

To gauge the total effect, the actual conduits that facilitate investors flows matter.

Sample Countries

Table: Sample Countries

Argentina	Pakistan
Brazil	Peru
Chile	Philippines
Colombia	Poland
Czech Republic	Qatar
Egypt	Russia
Hungary	South Africa
India	Taiwan*
Indonesia	Thailand**
Malaysia	Turkey
Mexico	United Arab Emirates

Back

Long (Partial) List of Papers

Alfaro, L., S. Kalemli-Ozcan, and V. Volosovych (2008, 2014); Avdjiev, S., L. Gambacorta, L. S. Goldberg, and S. Schiaffi (2017); Ammer, J., M. De Pooter, C. J. Erceg, and S. B. Kamin (2016); Baskaya, Y. S., J. di Giovanni, S. Kalemli-Ozcan, J.-L. Peydro, and M. F. Ulu (2017); Bauer, M. D., & Neely, C. J. (2014); Broner, F., Didier, T., Erce, A., & Schmukler, S. L. (2013); Bruning, F. and V. Ivashina (2019); Bruno, V. and H. S. Shin (2014, 2015); Burger, J., R. Sengupta, F. Warnock, and V. Warnock (2015); Calvo, G. A., L. Leiderman, and C. M. Reinhart (1993, 1996).; Cerutti, E., S. Claessens, and D. Puy (2019); Chari, A., K. Dilts Stedman, and C. Lundblad (2020); Chen, J., Mancini Griffoli, T., & Sahay, R. (2014); Clark, John, Nathan Converse, Brahima Coulibaly, and Steve Kamin (2016); Dedola, L., G. Rivolta, and L. Stracca (2017); Dilts Stedman, K. (2019); Eichengreen, B. and P. Gupta (2017); Forbes, K. J. and F. E. Warnock (2012, 2019); Fratzscher, M. (2012); Fratzscher, M., Duca, M. L., & Straub, R. (2016, 2018); Georgiadis, G., & Grab, J. (2015); Ghosh, A. R., Kim, J., Qureshi, M., and Zalduendo, J. (2012); Gilchrist, S., Yue, V., & Zakrajsek, E. (2014, November); Gourinchas, P. O., & Obstfeld, M. (2012); Karolyi, G. A., & McLaren, K. J. (2016); Kim, S. (2001); Kroencke, T. A., Schmeling, M., & Schrimpf, A. (2015); Jotikasthira, P., C. Lundblad, and T. Ramadorai (2012); McCauley, R. N., McGuire, P., & Sushko, V. (2015); Miranda-Agrippino, S. and H. Rey (2019); Milesi-Ferretti, G., & Tille, C. (2011); Mishra, P., Moriyama, K., N'Diaye, P. M. B., & Nguyen, L. (2014); Moore, J., Nam, S., Suh, M., & Tepper, A. (2013); Neely, C. J. (2010); Obstfeld, M. (2015); Obstfeld, M., J. D. Ostry, and M. S. Qureshi (2018); Rogers, J. H., Scotti, C., & Wright, J. H. (2014); Reinhart, C. and V. Reinhart (2009); Rey, H. (2013) back

Results: Decomposition (Returns)