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GLOBAL RISK, NON-BANK FINANCIAL INTERMEDIATION, AND EMERGING MARKET VULNERABILITIES

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ABSTRACT

Over the last two decades, the unprecedented increase in non-bank financial intermediation, particularly open-end mutual funds and ETFs, accounts for nearly half of the external financing flows to emerging markets exceeding cross-border lending by global banks. Evidence suggests that investment fund flows enhance risk-sharing across borders and provide emerging markets access to more diverse forms of financing. However, a growing body of evidence also indicates that investment funds are inherently more vulnerable to liquidity and redemption risks during periods of global financial market stress, increasing the volatility of capital flows to emerging markets. Benchmark-driven investments, namely passive funds, appear particularly sensitive to global risk shocks such as tightening US dollar funding conditions relative to their active fund counterparts. The procyclicality of investment fund flows to emerging markets during times of global stress poses financial stability concerns with implications for the role of macroprudential policy.

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1. Introduction

The empirical relevance of theories of international risk sharing is an issue of long-standing interest in international finance. While international trade in financial assets has the potential to bring welfare gains, it can also entail significant risks. As part of a more extensive debate about financial globalization, an important question emerging-market policymakers face is whether to allow foreign capital to flow into their economies. Two quintessentially different views about the merits of open capital markets as a policy choice for emerging markets exist.

From an allocative efficiency perspective, integrated international financial markets allow capital to flow from capital-abundant countries, where expected returns are low, to capital-scarce countries, where expected returns are high (Fischer, 1997; Fischer, 2003; Obstfeld, 1998; Rogoff, 1999; Summers, 2000; Henry, 2007). Capital flows into capital-scarce countries reduce their cost of capital, increase real investment and growth permanently raise living standards (Chari, Henry, and Moussa, 2022; Bekaert, Harvey, and Lundblad, 2005; Chari and Henry, 2004, 2008; Chari, Henry and Reyes, 2021).

When foreign portfolio debt and equity flows witnessed dramatic reversals during a series of financial crises in East Asia and Latin America in the 1990s, an alternative view began to take hold. This alternative view suggests that the notion that we can extend the wisdom of the welfare gains from international trade in goods to international trade in financial assets is fundamentally flawed (Bhagwati, 1998; Rodrik, 1998). Rodrik (1998) argues that there is no correlation between open capital accounts and real variables of consequence, such as real investment or economic growth. Literature in a similar vein concludes that the ostensible benefits of open capital accounts are not obvious, but given recurrent turbulence in emerging financial markets, the costs are strikingly evident (Eichengreen 2001, Edison, Klein, Ricci, and Sløk, 2004, Kose, Prasad, Rogoff, and Wei, 2009; Kose and Prasad, 2012, Gourinchas and Jeanne, 2006).

International financial integration has increasingly exposed emerging capital markets to shocks that originate outside their domestic economies. Sudden stops and capital flight present pressing challenges for policymakers and investors (Forbes and Warnock (2012, 2019), Rey 2013, Miranda-Agrippino and Rey, 2020a). Evidence has mounted to support the alternative view culminating in the IMF's new institutional prescription of pre-emptive capital controls (Das et al., 2022).

The last two decades witnessed an unprecedented increase in non-bank financially intermediated (NBFI) flows to emerging markets.[1] In contrast, deleveraging in the aftermath of the Global Financial Crisis and balance sheet constraints have limited the cross-border intermediation capacity of global banks. NBFI flows account for nearly half of the external financing flows to emerging markets exceeding that provided by global banks (IMF, 2021). EPFR data suggest that assets under management in global open-end funds and ETFs investing in emerging market equities and bonds rose from $69 billion to $1.15 trillion between 2004 and 2020. Bond funds rose from $11 billion to $383 billion, while equity funds rose from $58 billion to $759 billion (calculations from Chari, Dilts Stedman, and Lundblad (2022) based on EPFR data). The

[1] Non-bank financial intermediation refers to open and closed-end mutual funds, ETFs, hedge funds, pension funds, insurance companies, and private equity flows.

magnitude of the portfolio holdings and their vulnerability to redemption risk during global financial market stress raises financial stability concerns (FSB Report, 2022).

Further benchmark-driven investments, namely passive index funds, comprise a significant fraction of the holdings; emerging market external financing chains are complex and inherently dependent on US dollar funding conditions. The procyclicality of these flows during times of global stress poses financial stability concerns, especially concerning liquidity management tools. Regulators and central banks worldwide are increasingly concerned about the regulatory perimeter and whether open-end mutual funds implicitly rely on a liquidity backstop from central banks giving rise to macroprudential considerations.

The Financial Stability Board 2022 report notes that the "greater variety in sources of funding has the potential to improve access to financing, reduce the cost of capital, and increase the effectiveness and efficiency of markets through the better matching of savers and borrowers, as well as the sharing of risk across borders." However, the report also goes on to caution that "the greater reliance on NBFIs may have contributed to new challenges for EMEs." Recent evidence suggests that by being more vulnerable to global financial conditions, NBFI flows may increase the volatility of capital flows to emerging markets (Bertaut et al., 2021, Carney 2019, Feroli et al., 2014). For example, the initial months of the Covid-19 crisis saw rapid retrenchments out of emerging markets by investment funds in response to the deterioration in global financial conditions (Chari et al., 2020, Eguren Martin et al., 2020).

This review article examines the impact of global risk shocks on non-bank intermediated capital flows to emerging markets, financial returns, and the implications for tail risk. I explore the landscape of global risk shocks that could spill over internationally, focusing on non-bank financial intermediation in the form of portfolio debt and equity flows. To assess the impact of global financial conditions on the riskiness of emerging financial markets, I also provide a brief overview of possible transmission mechanisms that can act as conduits for global risk shock spillovers to capital markets in emerging countries.

Candidate global financial shocks that receive attention in the capital flows literature primarily fall into three interrelated categories; (i) US/advanced economy monetary policy shocks, (ii) global liquidity and funding condition shocks, and (iii) exchange rate shocks. The shocks can impact foreign investor risk aversion, the risk-bearing capacity of international financial intermediaries, international capital market liquidity, and global exchange rate configurations. Consequently, the focus of methods to measure global risk has evolved from examining unitary sources of risk to composite measures encapsulating the variable sources of global risk. Given that the origins of global risk can differ over time, the resulting efforts draw upon multiple financial asset prices to summarize risk-on, risk-off states of the world.

The rise of non-bank intermediated capital flows highlights shifts in global portfolio allocations as a vital conduit that transmits global risk shocks to emerging market flows and returns. Benchmark-driven passive investment flows appear more responsive to global risk shock-driven portfolio rebalancing amplifying price impacts. Evidence suggests that collective rebalancing by investment funds that benchmark to standard indices with concordant portfolio holdings can drive elevated correlations with the potential for feedback loops and price-liquidity spirals.

Automatic rebalancing by passive investors in response to global risk shocks appears to significantly impact tail risk in emerging markets. Furthermore, shocks to both the quantity of risk (macro uncertainty) and the price of risk (risk aversion) have distributional consequences for emerging market flows and returns. Policy implications highlight the need for a macro-prudential approach to investment fund regulation. Extant discussions call for reforms such as liquidity management tools and stress testing to mitigate the redemption risks, procyclicality, and the herding associated with investment fund flows.

The article proceeds as follows. Section 2 provides a typology of global risk shocks to enumerate the provenance of shocks originating in developed markets that can transmit across borders to emerging markets. Section 3 briefly overviews international transmission mechanisms that can act as conduits for these global risk shocks. Section 4 focuses on investment funds as a key channel for shock transmission. Section 5 reviews the existing empirical evidence on the impact of investment fund flows on emerging market flows and returns with attention to the distributional consequences, especially tail risk. Section 6 concludes with a brief discussion of policy implications.

2. A Typology of Global Risk Shocks

The capital flows literature has various perspectives on what constitutes or summarizes changes in global risk sentiment. Broadly speaking, there are two complementary approaches to measuring the variation in global investor risk appetite.[2] The first is a non-parametric, largely statistical approach. Several papers focus on market risk and investor sentiment and use the VIX as a proxy to measure the risk appetite of global investors as portending greed or fear and closely linked to the global financial cycle (Bekaert et al. (2013), Miranda-Agrippino and Rey (2020a), Rey, 2013). Fratzscher (2012) uses the TED spread to measure credit risk and liquidity in international capital markets. Chari et al. (2020) show that capital flows to emerging markets are sensitive to term premium shocks in the US yield curve using high-frequency identification and Treasury derivatives data.

Recent evidence suggests that the relationship between the VIX and other key variables has weakened since 2008 (Forbes, 2020; Miranda-Agrippino and Rey, 2020b, Burcu et al., 2020; Shin, 2016). The declining role of the VIX may be related to the shifting composition of global capital flows (Avdjiev et al. (2017), or the correlation between the VIX and capital flows may be limited to crisis episodes and the role of the global financial cycle may have moderated (Cerutti et al., 2019). Burcu et al. (2020) point to a breakdown in the negative relationship between bank leverage and risk appetite since 2009 and suggest that the VIX no longer reliably proxies for the price of bank balance sheets. Forbes (2020) and Miranda-Agrippino et al. (2020b) highlight the VIX's declining role in explaining credit growth and capital flows. Chari, Dilts, and Lundblad (2020) propose a multi-faceted and time-varying measure of global risk, the risk-on risk-off or RORO index, that extracts the first principle component from the daily variation in four broad categories of asset prices. The underlying constituent sources of risk, namely advanced economy

[2] See Cascaldi-Garcia et al. (2022) for an excellent comprehensive survey of existing measures of uncertainty, risk, and volatility used in macroeconomics. The paper divides measures into four categories based on the construction methodology: news-based, survey-based, econometric-based, and market-based measures.

credit risk, equity market returns and implied volatility, funding liquidity, and currencies and gold, assert their importance or come to the forefront at different points in time. Given that the measure captures alternative sources of risk, the parameter values using the composite RORO index are remarkably stable (if not stronger) over time.

Moving on from evidence that primarily documents the relationship between unitary risk sources and risk appetite, Miranda-Agrippino and Rey, 2018 introduce a single global factor extracted from a large cross-section of risky asset prices that explains a large share of co-movement. Asis, Chari, and Haas (2021) construct a composite measure of exposure to global financial conditions, a Global Factor Z-score that proxies for more difficult financing conditions. A risk-off environment increases corporate default risk in emerging markets, and the impact is more significant for firms more exposed to such global factors.

Habib and Venditti (2019) propose a measure of global risk extracted as the common latent factor, the Global Stock Market Factor (GSMF), representing the global component of expected stock returns. The GSMF co-moves very closely with (i) measures of the global financial cycle proposed by Miranda-Agrippino and Rey (2020a), Bonciani and Ricci (2018), and Scheubel et al. (2018); (ii) financial risk proxied by the excess bond premium (Gilchrist and Zakrajsek (2012)), and the implied stock market volatility (VIX/VXO, VSTOXX), and (iii) uncertainty and geopolitical risk measured by indicators of political uncertainty and geopolitical risk (Baker, Bloom, and Davis (2016) and Caldara and Iacoviello (2018)).

Peaks and troughs in the global financial cycle tend to coincide with heightened financial risk, increased geopolitical risk, and broad economic uncertainty (Habib and Venditti (2019)). Exogenous swings in risk appetite in response to financial shocks play a prominent role in characterizing global risk fluctuations over time. They are strongly related to the global common component of gross capital flows to emerging markets.

Asis, Chari, and Haas (2021) find that global financial variables such as US interest rates, shifts in global liquidity, and global risk aversion have significant predictive power for forecasting corporate distress risk in emerging markets. The impact of global "risk-off" environments on default risk is more significant for firms whose returns are more responsive to a composite global factor. Chari, Dilts, and Lundblad (2020) further develop the composite global factor and introduce a risk-on, risk-off (RORO) index incorporating diverse signals from relevant asset markets to capture the underlying distributional granularity of global risk shocks.

The body of evidence on global risk factors suggests that it is important to note that the provenance of global risk can differ over time. The aim of Chari, Dilts, and Lundblad (2020) is, therefore, to arrive at a measure of risk encapsulating the multi-faceted and time-varying nature of global risk-on and risk-off states of the world. The RORO index extracts the first principle component from an amalgam of four broad categories of asset prices that reflect daily variation in advanced economy credit risk, equity market returns and implied volatility, funding liquidity, and currencies and gold. The index and the several sub-indices comprising these four constituent groups exhibit interesting distributional features well characterized by significant right skewness and fat tails (Figure 1). As mentioned earlier, with fat tails, extreme events become more probable and potentially more destabilizing. The index displays sharp risk-off movements during

well-recognized global stress episodes such as the global financial crisis, the European debt crisis, the 2013 taper tantrum, and the COVID-19 crisis.

Given that non-parametric approaches may confound information about variation in risk appetite with variation in physical risk, a complementary approach relies on structural modeling specifically designed to separate the price of risk (or risk aversion) from the quantity of risk (or macro uncertainty). Bekaert, Engstrom, and Xu (2021) propose a no-arbitrage dynamic model for equities and corporate bonds where fundamentals (such as industrial production, consumption earnings ratios, and corporate loss rates) display time variation in conditional variances and higher order moments. Unlike other habit models such as Campbell and Cochrane (1999), Bekaert, Engstrom, and Xu (2021) assume that stochastic time variation in risk aversion is less than perfectly correlated with fundamentals allowing a role for pure preference shocks.

External validation exercises show that the extracted stochastic risk aversion series loads positively and significantly on the equity variance risk premium proxied by the risk-neutral equity variance, credit spreads, and the realized corporate bond variance. Importantly, there is a strong correlation between stochastic risk aversion with consumer confidence and Sentix investor emotions indices (Bekaert et al., 2021). It is reassuring that the model-based measure is also highly skewed towards downside risk, fat-tailed, and spikes during the global financial and COVID-19 crises. However, model misspecification may taint inferences about the separation between risk aversion and physical. Therefore, the non-parametric statistical approaches and structural modeling provide a more comprehensive and holistic characterization of global risk shocks on emerging market flows and returns.

As mentioned above, a limitation of non-parametric approaches to measuring global risk is that they conflate the price of risk and the quantity of risk. For example, given that the VIX index ubiquitously used in international finance relies on traded option prices, comingles the variation in physical risk and that of the price of risk. A similar critique can apply to the composite RORO index in Chari et al. (2020). To highlight the importance of this issue, Figure 2, Panel A provides a decomposition of the daily log changes in the VIX index into daily log changes in physical volatility (following Bekaert and Hoerova, 2014) and the variance risk premium (reflecting variation in risk prices).

While the risk-on-risk-off terminology has become pervasive in recent years, there remains relatively little discussion about whether the perceived effects reflect risk aversion (the price of risk) or macro uncertainty (the quantity of risk). To circumvent this limitation, the structural model of Bekaert et al. (2022) explicitly separates the quantity of risk from the price of risk. Panel B projects the statistical RORO index onto the separated global risk and global investor risk appetite components from the structural model of Bekaert et al. (2021). The two figures highlight a salient fact—the provenance of risk changes over time and two somewhat different economic concepts (risk aversion and macro uncertainty) drive shocks to the VIX and RORO indices. The relative importance of the price and quantity of risk varies in the time series, with risk and risk aversion coming to the fore at different points in time. Understanding the implications of global risk shocks for emerging market flows and returns requires disentangling the quantity and price of risk afforded by the structural approach, as Chari et al. (2022) suggest.

3. Global Shocks and Cross-Border Transmission Mechanisms

While heightened macro uncertainty drives both adverse real and financial outcomes, measurement choices and identification considerations are crucial for understanding and interpreting how risk and uncertainty arise and the mechanisms by which and propagate through the economy (Cascaldi-Garcia et al., 2022). In the context of this review, we are interested in the mechanisms by which risk shocks propagate across borders.

3.1 The International Transmission Channels of US Monetary Policy

A body of research investigates how US monetary policy affects the risk appetite of global investors (Chari et al., 2021; Bruno and Shin, 20015, a, b; Gourinchas and Obstfeld, 2012). Using well-identified monetary policy shocks, the work establishes that US monetary policy has a causal effect on risk-taking internationally, impacting leverage, credit creation, gross capital flows, asset valuations, spreads, and risk aversion (Bekaert et al., 2013; Miranda-Agrippino and Rey, 2020a, 2022; and Bruno and Shin, 2015a). Here, risk-on and risk-off states correspond to changes in risk aversion holding fixed the quantity of risk. Whereas expansionary monetary policy corresponds to global "risk-on" states, tightening monetary policy shocks correlate with "risk-off" states of the world.

President Dilma Rousseff of Brazil evocatively claimed that US quantitative easing had unleashed a "monetary tsunami" in emerging markets. Conversely, following the first mention of policy normalization in May 2013 by Fed Chair Bernanke in congressional testimony, a "taper tantrum" led to large-scale capital retrenchments from emerging markets. The emerging market capital outflow episode in the early months of the Covid-19 crisis was dubbed by the popular press as "taper tantrum 2.0".

Consequently, several studies examine the causal effect of unconventional monetary policy on capital flows to emerging markets (Fratzscher, Lo Duca, and Straub 2018; Ahmed and Zlate 2014; Aizenman, Binici, and Hutchison 2014, Kroencke, Schmeling, and Schrimpf 2015). The evidence suggests that quantitative easing in the US was an essential driver of capital flows into emerging economies (Ahmed and Zlate 2014), although the impact of QE on asset prices was more significant than that on flows (Fratzscher, Lo Duca and Straub 2018). Leombroni, Venter, Whelan, and Vedolin (2017) disentangle the effects of forward guidance using data from the European Central Bank. Chari et al. (2021) link US monetary policy shocks to international risk-taking via cross-border portfolio flows (debt and equity) in the unconventional monetary policy period. The paper uses treasury futures data to extract market-based expectations of future Fed policy and summarize monetary policy shocks originating in the United States.

Factor analysis of changes in bond yields around FOMC events finds that unconventional monetary policy surprises had more significant effects on equity prices, exchange rates, bond yields, and mutual fund flows than those during conventional periods (Chen et al. (2014)). Additionally, "signal" shocks—those that portend the path of future interest rates—generate more extensive and ubiquitous spillovers.[3] Chari et al. (2021) document that US monetary policy

[3] Other studies using high-frequency identification suggest that US unconventional monetary policy significantly affected interest rates in advanced and emerging economies (Mishra, Moriyama, N'Diaye, and Nguyen 2014).

shocks exhibit sizable effects on U.S. holdings of emerging market assets. These effects disproportionately manifest through valuation changes versus physical flows. The impacts also differ across asset classes, are more pronounced for equity relative to bond markets, and are asymmetric between the quantitative easing and tapering periods, with outflows responding significantly during the unwinding.

US monetary policy-driven changes in risk premia also play an important role in capital flows to emerging markets. Chari, Dilts Stedman, and Lundblad (2021) disentangle the channels by which US monetary policy shocks affect expectations, hypothesis-driven yields, and risk premia in the term structure of US interest rates. Changes in domestic yields and risk premia can significantly impact emerging market equity prices and bond yields via portfolio rebalancing and signaling. There appears to be an inverse relationship between risk premia and emerging market returns; emerging market returns fall when US risk premia rise and vice-versa. Further, common fluctuations in the prices of risky assets driven by risk premia have increased by more than what can be explained by the integration of the real sector (Jorda et al., 2019).

Monetary policy shocks interact with leverage cycles, cross-border flows, and exchange rates, emphasizing alternative risk-taking mechanisms to explain international monetary policy spillovers. (Bruno and Shin 2015, Mueller, Tahbaz-Salehi, and Vedolin 2017, Gourinchas and Obstfeld 2012, Schularick and Taylor 2012, Rey 2013, Borio and Zhu 2012, Bekaert, Hoerova and Lo Duca 2013). For example, Bruno and Shin (2015) show that bank leverage adjustments drive a monetary policy transmission mechanism that works through fluctuations in risk-taking. There is some evidence to suggest that in the post-GFC period, the impact of global risk has increased for international bond flows and declined for cross-border banking flows. The unconventional monetary policy regime helped facilitate a partial shift from borrowing from global banks to bond markets (Avdjiev et al., 2016, McCauley et al., 2015). Macroprudential regulations adopted following the crisis also impinged upon the banking sector's leveraging capacity by imposing constraints on foreign currency-denominated borrowing (Chari, Dilts Stedman, and Forbes, 2022).[4]

Finally, Morais et al. (2018) identify an international credit channel by exploiting foreign monetary policy shocks in Mexico, with a significant presence of European and US banks.[5] Foreign monetary policy easing expands the credit supply of foreign banks. The findings support an international risk-taking channel and document advanced country monetary policy spillovers to emerging markets as a risk factor resulting in salient real effects for local firms.[6]

Karolyi and McLaren (2017) show that emerging market stocks that benefitted around earlier LSAP purchase announcements were hit particularly hard following the initial tapering announcement in 2013.

[4] See Forbes (2021) for a nice summary of some unintended consequences that can mitigate the effectiveness of macroprudential policies which increase the resilience of the domestic banking system but can generate new vulnerabilities and risks via leakages and spillovers to other parts of the financial system and financial markets.

[5] Baskaya et al. (2022) document the transmission of the Global Financial Cycle to domestic credit market conditions in yet another large emerging market, Turkey.

[6] Cerruti, Claessens and Rose (2017) provide an overview of the literature on the global financial cycle and its implications for global risk spillovers.

3.2 US Funding Liquidity as a Transmission Channel

Next, I turn to the central role of the US dollar as a funding currency in the international financial system as a cross-border transmission channel of global shocks. A vast literature underscores the role of liquidity in dollar funding markets that drives capital flows to emerging markets. Phases of expansionary monetary policy increase the risk-bearing capacity of financial intermediaries. In contrast, US monetary policy contractions lead to lower cross-border banking flows, a decline in the leverage of international banks, and a stronger US dollar (Bruno and Shin, 2015). The mechanism whereby a dollar depreciation leads to an increase in the supply of dollar credit is referred to as the "risk-taking channel" of exchange rate fluctuations by Bruno and Shin (2015a, b). Here, the value of the dollar acts as a barometer of risk-taking capacity in capital markets.

Covered interest parity (CIP) deviations measured by the cross-currency basis can turn on bank leverage constraints. Widening CIP deviations and dollar appreciations are correlated and portend a reduction in the supply of global dollar funding and intermediation activities (Avdjiev et al., 2019). Global banks supply hedging services by using their balance sheet capacity to borrow dollars, earning the size of the CIP deviations. The conjecture is that there is a negative relationship between dollar credit, which acts as a proxy for bank leverage, and the magnitude of CIP deviations proxying the price of balance sheet capacity. Widening CIP deviations or the cross-currency basis drives down the supply of dollar funding, impacting global banks. The cross-currency basis, therefore, becomes more negative when the marginal cost of offshore US dollar funding rises. In risk-off states of the world, widening TED spreads, a measure of liquidity conditions in US$ funding markets, or increased equity market volatility can reflect declining foreign investor risk appetite that impacts the intermediation capacity of global banks and non-bank financial intermediaries.

Credit line drawdowns induced by COVID-19 provide a salient example of how funding strains in US dollar funding markets can impact the global financial system. The "dash for cash" in the early months of the crisis first was the result of extreme precaution and heightened aggregate risk (Acharya and Steffen, 2020).[7] As Figure 3 shows, the early months of the COVID crisis and other periods of global financial stress are accompanied by massive capital flow retrenchments and declines in emerging market returns.

Further, wholesale funding markets rely on deposits and other liabilities from banks, and non-bank financial intermediaries, such as pension funds, money market mutual funds, and other financial intermediaries. Asset liability mismatches on intermediary balance sheets can be subject to funding shocks, especially when short-term liabilities are more liquid and subject to redemption risk than the more illiquid, longer-term assets. Strains in funding liquidity, whether in interbank funding or money markets or liquidations by investors in mutual funds, manifest in

[7] Outflows from prime money market funds, credit line drawdowns by firms, an increase in demand for foreign exchange swaps by institutional investors based outside the US, a strengthening dollar that that increased the demand for the synthetic funding available in the FX swap and cross-currency basis swap markets by unhedged foreign borrowers, and margin calls in response to collapsing asset prices are all examples of factors that drove heightened funding strains in US$ funding markets (FSB, 2022). FSB (2022) also notes that emerging market central banks resorted to liquidating their foreign exchange reserves to accommodate the demand for US$ funding.

the tightening of funding conditions. These funding strains can force financial intermediaries to adjust their balance sheets by altering their investments. For example, Jotiskathira et al. (2012) show that global mutual funds substantially alter their portfolio allocations in response to funding shocks from their investor, an important conduit for the international financial transmission of shocks. The funding shocks are inextricably linked with liquidity shocks and represent exogenous sources of variation propagated internationally via portfolio rebalancing by non-bank intermediaries or lending by global banks.

Finally, any review of international transmission channels would be remiss in not touching upon exchange rate configurations in the context of global risk shocks. While this is not a comprehensive overview of the vast literature on exchange rates and portfolio flows, I review a few salient findings. Portfolio flows do not impact equilibrium exchange rates in models of exchange rate determination based on uncovered interest parity. Theoretically, capital inflows can lead to currency appreciation if international financial intermediaries have limited risk-bearing capacity to absorb global imbalances (Gabaix and Maggiori, 2015). Changes in the size and composition of financier balance sheets induce them to demand risk premia for holding currencies, impacting expected currency returns and the volatility of exchange rates.

Further, local clientele demand shocks drive local currency sovereign bond prices if local-currency sovereign-debt markets are imperfectly integrated into global financial markets (Du and Schreger, 2016). Impacts on foreign and local-currency-denominated debt decline with more integrated markets where global investors are the marginal investor in both markets. Relatedly, Chari, Dilts Stedman, and Lundblad (2021) see significant effects on US dollar returns compared to local returns in response to US monetary policy shocks. The empirical evidence in Pandolfi and Williams (2019) and Hofmann et al. (2019) suggests that sovereign debt inflows drive currency appreciations and reductions in local-currency sovereign yields.[8]

Global risk shocks also drive currencies. Movements in the US broad dollar index, a global variable, also constitute an exogenous source of variation or exchange rate shocks. Evidence suggests that during periods of elevated global risk, risk-on currencies tend to depreciate with more pronounced impacts on flows and currencies (Chari et al., 2020, Forbes and Warnock, 2021, Goldberg and Krogstrup, 2022). Further, foreign investor portfolio shares respond significantly to currency depreciation shocks (Hau and Rey 2004; Hau and Rey 2006; Curcuru, Thomas, Warnock, and Wongswan 2014).

Relatedly, Goldberg and Krogstrup (2022) propose a new measure of capital flow pressures suggesting that we cannot view capital flow responses to global shocks in isolation from exchange rate and domestic monetary policy regimes. They develop an exchange market pressure index that combines observed exchange rate changes with estimated incipient pressures perhaps masked by foreign exchange interventions and policy rate adjustments. The evidence

[8] Related evidence suggests that increased foreign participation in local currency bond markets spillovers of foreign shocks to local markets and higher expected future U.S. interest rates imply sharp reductions in foreign holdings (Borri and Shaknov, 2018).

suggests that the sensitivity of capital flow pressures to risk sentiment varies over time, across countries and stress episodes.[9]

4. Global Portfolio Allocations as a Transmission Mechanism

It is helpful to consider a possible shock transmission mechanism through global portfolio allocations.[10] As discussed in Section 3, shocks originating in advanced economies can function as key transmission vectors across borders. Chari, Dilts Stedman, and Lundblad (2022) find that the redemption structure of investment vehicles such as open-end mutual funds can amplify global shocks on important emerging market quantities. Foreign investors rebalance into or away from risky emerging-market assets in response to, say, funding shocks from their investor base impacting emerging market capital flows and returns (Chari, Dilts Stedman and Lundblad (2022), Jotiskathira, Lundblad and Ramadorai (2012)).

Consider the balance sheet of an open-end mutual fund that invests in an emerging market. Fund liabilities are liquid investor funds subject to daily subscription and redemption pressures. Additionally, fund assets in emerging markets comprise somewhat illiquid equity and very illiquid bonds. If global investor risk appetite wanes in this setup, open-end mutual funds will face increased redemption pressures. With limited cash on hand, and a liquidity mismatch on the fund's balance sheets, redemptions, in turn, lead to forced sales of emerging market assets with attendant declines in financial returns. Faced with redemption pressures, mutual funds can face liquidity runs similar to banks but without deposit guarantee schemes (Morris et al., 2017) or liquidity backstops from central banks such as emergency lending windows (Chari et al., 2022). Asset fire sales and falling emerging market returns can drive further redemptions leading to feedback loops between flows and returns. Spillovers across countries and asset classes can engender co-movement in emerging market flows and returns.

Figure 4 presents a schematic representation of a standard rational expectations model of asset trading to emerging market fund flows and returns. Order flow shocks (redemptions or subscriptions) move funds away from their target portfolios. Reestablishing the desired portfolio allocations requires trading in some or all assets. Further, the larger the flow shock, the greater the motivation to trade to avoid fluctuations in the fund's cash position (Edelen, 1999). While cash positions provide a liquidity buffer, holding significant amounts of cash adversely impacts portfolio performance. If global risk shocks drive investor order flow shocks, trading (flows) reveals the asset payoffs (returns). This simplified setting captures the essence of the informed performance and liquidity services that open-end fund managers provide consistent with standard rational expectations models of trade, such as Grossman and Stiglitz (1980).

[9] Earlier non-parametric approaches to measuring exchange market pressures include studies by Eichengreen et al. (1994) and Forbes (2002). Goldberg and Krogstrup (2022) provide a comprehensive overview of alternative exchange market pressure indices.

[10] There is a broader literature on the international portfolio balance channel with recent contributions such as Coeurdacier and Rey (2012), Caballero, Farhi and Gourinchas (2016), and Gabaix and Maggiori (2015) and on the responsiveness of portfolio reallocations to changes in risk and return conditions (Bacchetta, Davenport and van Wincoop 2022; Koijen and Yogo 2020; Jiang, Richmond and Zhang 2021 and Camanho, Hau and Rey 2022).

Performance metrics are particularly salient if a fund manager's compensation depends on their ability to track a benchmark portfolio (Chevalier and Ellison, 1997), especially for passive fund managers who follow benchmark index returns closely. While active managers receive signals about the value of emerging-market assets, passive fund managers simply deliver emerging market exposures by aligning their portfolio weights to benchmark indices such as the MSCI Emerging Markets Index for equity or JP Morgan's EMBI index for bonds.

The risks faced by open-end fund managers invested in illiquid emerging markets include currency and maturity mismatches and daily redemption risks. The liquidity-motivated trades of fund managers responding to significant investor redemptions or subscriptions can adversely impact the relatively illiquid emerging-market assets returns. In the emerging market context, currency mismatches can further drive price impacts. Conformity in portfolio holdings across passive funds that benchmark to standard indices can drive elevated correlations with the potential for feedback loops and price-liquidity spirals.[11] Further, since end-investors can quickly redeem their shares in open-end funds, price movements of fund shares increase redemption pressures.

5. Global Risk Shocks, Investment Fund Flows, and Emerging Market Tail Risk

Destabilizing sudden stops, surges, and capital flight from emerging markets fundamentally constitute a tail risk in emerging markets. However, the extant literature's focus on moments of central tendency fails to capture responses in the tails of capital flow and returns distributions (Chari et al., 2022; Gelos et al., 2022, Eugren-Martin et al. (2020). The weight placed on means and variances as sufficient summary statistics precludes the data from speaking to the granularity in outcomes. Turning to heterogeneous effects across quantiles overcomes this challenge. Chari et al. (2020) formalize the measurement of tail risk in emerging market flows and returns by focusing on the distributional consequences of foreign portfolio investment flows that respond to changes in global risk appetite. They characterize how extreme capital flow and returns realizations are tied to global risk appetite ("risk-on/risk-off" or RORO).

Similarly, Gelos et al. (2022) adopt a "capital flows-at-risk" approach, while Eguren-Martin et al. (2021) examine the probability distribution of emerging market capital flows conditional on information contained in financial asset prices. Chari et al. (2020, 2022) focus on a multi-faceted measure of global risk that facilitates the decomposition of global risk drivers. Gelos et al. (2022) consider a unitary risk measure (the BBB corporate spread), and Eguren-Martin et al. (2020)

[11] Relatedly, numerous studies document benchmark inclusion effects in international finance (a non-exhaustive list includes Chen et al., 2004, Hau et al., 2010, Cremers et al., 2016, Raddatz et al. 2017). Some examples include Broner et al. (2021) who suggest that international investors who benchmark to an index have incentives to purchase sovereign bonds when a country is newly included to replicate the composition of the index. Announcement returns about index inclusion (Broner et al. 2021) and actual inflows at the time of implementation can have price impacts with limited arbitrage in theory (Hau, 2011). Basak and Pavlova (2013) present a theoretical framework to show that trade by institutions can induce excess correlations for stocks included in benchmark indices, generating an asset-class effect, and amplifying the index stock volatilities and aggregate stock market volatility. Kashyap et al. (2021) suggest that benchmark inclusion has real effects as benchmarking generates additional, inelastic demand for assets inside the benchmark which leads to a “benchmark inclusion subsidy” when valuing investment projects.

analyze the degree to which capital flows respond to different types of shocks using a single-dimensional measure of global risk.

Chari et al. (2022) suggest that portfolio allocations can reflect variation in global investor risk aversion or macro uncertainty. Foreign investors rebalance their portfolios away from risky emerging-market assets with flight to safety flows when either the price or quantity of global risk increases. The distributional consequences of global risk shocks can manifest in the form of sudden stops or capital flow slowdowns on the right tail or capital flight on the left tail. With fat or long tails, destabilizing responses of flows and returns become more probable and of greater magnitude. Indeed, the evidence suggests that global risk shock distributions are highly skewed towards downside risk with greater weight residing in the tails (Chari, Dilts Stedman, and Lundblad (2022); Bekaert, Engstom, and Xu (2021)).

Further, the share of active investing in emerging markets has steadily declined over the last decade, particularly for equities. Figure 5 shows that passive index funds and ETFs with very little managerial discretion represent an increasing fraction of the emerging market space. Given that active fund holdings closely align with asset weights in the benchmark indices, the tracking error, which is the difference between fund performance and that of the benchmark index, has also fallen significantly (FSB, 2022). The increased conformity in fund investments and observed unison in portfolio-rebalancing during risk-off episodes may amplify the effects of global shocks through flow and price responses. Theoretically, mutual funds can amplify global shocks due to benchmark-investment-driven herding (Scharfstein et al., 1990) or contagion (Broner et al., 2006).

Figure 6 from Chari et al. (2020) illustrates a compelling rationale for measuring global risk shock impacts across different parts of capital flow distributions. In the left panel, a one standard deviation risk-off shock shows that the median response of both equity and bond flows is negative and suggests that the entire distributions shift to the left. However, the tail responses vary across asset classes.

For bonds, we see that the worst outflow realizations are more negative than the median response suggesting a lengthening of the left tail (Q5) or capital flight. The negative reaction on the right tail, Q95, is, however, of lower magnitude than that of the response at the median of the distribution. The resulting impact is one of an elongating right tail signaling capital inflows slowing down but not quite a sudden stop. In sum, the net distributional response of capital flows to a risk-off shock is a leftward distributional shift with a lengthening of the tails. This simple example illustrates the incompleteness of focusing on moments of central tendency, which would fail to capture that the bond flow response to a global risk-off shock would primarily manifest as capital outflows and a slowdown in inflows. Notably, the lengthening in the left tail causes "large" outflow realizations in the unconditional distribution to appear at a higher frequency in the post-shock distribution. Equities display a similar but more muted "tails out" pattern. On balance, the equity flow distribution shifts leftward more uniformly than bond flows.

The right panel plots the quantile regression coefficients for both bonds and equities. The distance from zero captures the magnitude of the negative impact of a risk-off shock for bond and equity flows. The slope of the quantile coefficients curve highlights the dispersive effect of

the shock. The steeper, positively inclined curve for bonds is consistent with elongating tails consistent with capital flight and an inflow slowdown. The flat, slightly upward-sloping quantile coefficient curve for equities depicts the more uniform response of the equity flow distribution. Focusing on the distributional consequences illustrates the differential responses of outflows and inflows at the tails and differential responses across asset classes.[12]

Chari et al. (2020) also examine the distributional impacts of global risk shocks on asset returns. Across asset classes and currency denominations, risk-off shocks shift returns distributions to the left and magnify downside risk, i.e., return realizations on the left tail are more negative than median returns. However, the magnitude and dispersion of the impact differ between fixed income and equity and between the local currency and US$ denominated indices. In particular, equity returns are five times more responsive to risk-off shocks than fixed income returns. Within each asset class, dollar returns react more than local currency returns. Fixed income bears this relationship out strikingly. In the face of the risk-off shocks, dollar returns decrease three to six times more than local currency index returns. Further, MSCI US$ total equity returns decline by 28-32% more than the local currency equity returns.

Consistent with the observed more significant US$-denominated returns response to risk-off shocks in Chari et al. (2020) and find that proxies for global risk appetite comove significantly with exchange rates in the post-GFC period (Lilley et al. (2022)). U.S. purchases of foreign bonds were highly correlated with these risk measures and with exchange rates supporting the narrative that the U.S. dollar's role as a safe-haven currency has surged since the global financial crisis (Lilley et al., 2022). Eguren Martin and Sokol (2022) characterize the tail behavior of a large sample of currencies to examine the likelihood of observing large swings in returns in response to tightening global financial conditions and conditional on prevailing macro fundamentals.[13]

Sub-constituents of the composite risk index illustrate that the underlying factors that constitute global risk can differ across crises and evolve over time. Chari et al. (2020) find that advanced economy equity returns and volatility, along with corporate spreads proxying for credit risk, were the most significant risk factors during the global financial crisis. In contrast, movement in corporate spreads and stoppages in funding liquidity predominantly explain capital flows and returns in the aftermath of the Covid-19 shock. Compared to the global financial crisis, the corporate spreads factor during the Covid-era is an order of magnitude greater. The risk-aversion factor was more conspicuous during the global financial crisis relative to the quantity of risk, whereas the opposite is true during the Covid crisis.

Revisiting the idea that non-parametric approaches to measuring global risk conflate changes in the price of risk with changes in the quantity of risk, it is further helpful to decompose the distributional response to global shocks into these constituent parts. Do changes in risk appetite

[12] Evidence also suggests the during periods of market turbulence, asset managers of open-end mutual funds invested in emerging market bonds tend to amplify asset sales coming from end-investor redemptions (Shek et al., 2018). Countries with higher shares of investment fund flows in their portfolio liabilities are more sensitive to global factors (Cerutti et al., 2019).

[13] Currencies of countries with higher interest rates, low levels of international reserves, and large fiscal deficits are more likely to face significant losses in response to a tightening of global financial conditions (Eguren Martin and Sokol, 2022).

or macro uncertainty drive tail responses in emerging market capital flow and return distributions? To answer this question, we can appeal to the structural model in Bekaert, Engstrom, and Xu (2021). Notably, the interplay between the non-parametric and structural approaches helps identify the underlying channels through which global shocks manifest the flow and return responses. Figure 7 separates the contributions of risk aversion from physical risk to examine the distributional response of EME capital flows to a one-standard-deviation risk-off shock. Heterogeneous patterns of distributional responses across asset classes emerge.

The fixed income flow distribution response displays a qualitatively similar pattern to the non-parametric approach--a risk-off shock measured using the structural method also shifts the bond flows distribution leftward and lengthens the tails relative to the median. Interestingly, changes in the quantity of risk or macroeconomic uncertainty constitute a larger share of the impact across the distribution and have more weight in the left tail than risk aversion.[14] We see this pattern across asset classes and for flows and returns— relative to risk aversion shocks, risk-off shocks to physical risk or uncertainty weigh heavily on negative tail events or capital flight, a pattern masked by simply focusing on conditional means and variances (Chari et al. 2020).[15] Therefore, the existing literature's focus on global risk aversion may underemphasize the importance of global macro uncertainty.

The question of the drivers of the heterogeneous response is also fascinating. To the best of my knowledge, Chari et al. (2020, 2021, 2022) are the first to document the heterogeneity across asset classes in response to monetary policy and global risk shocks in emerging markets. The finance literature documents clientele effects in explaining flow responses more generally. This could suggest that investor populations differ in their responses to risk aversion or risk shocks for bonds. Establishing clientele effects would require information at the fund level. So, possible heterogeneity in the client base is a conjecture at this stage.

A decomposition of the distributional responses for bond flows using sub-indices of the risk-on risk-off index reveals that the funding liquidity and corporate spreads account for a significant fraction of the tail responses for bonds (Chari et al. 2020). The median response is primarily driven by shocks to corporate spreads. We can infer that the underlying provenance of the global risk shocks is correlated with the heterogeneity in bond flow responses.

Figure 7 further illustrates the heterogenous bond flow responses through the lens of a structural approach. To the extent that macro uncertainty drives the heterogeneity across asset classes, the cross-validation exercise for the dynamic no-arbitrage asset pricing model in Bekaert et al. (2021) suggests that physical risk is highly correlated with both credit spreads and corporate bond volatility. The equity variance risk premium is a good proxy for stochastic risk aversion shocks loading significantly on risk-neutral equity variance. It explains approximately 65% of the variation in the price of risk. Previous work has relatively little to say about heterogeneity in responses across asset classes and suggests an avenue for further research.

[14] Please note that the left tail (q5) represents outflows in the capital flow distribution. Therefore, the positive q5 coefficient for risk aversion in Figure 7 indicates a slowdown in equity outflows (and not inflows).

[15] Please note that the positive coefficient on equities for risk aversion on the left tail (q5) indicates a slowdown in outflows. The left tail represents outflows, so a positive coefficient pulls the tail in, indicating a slowdown in outflows (and not inflows).

Do the implications of global shocks differ across investor fund types? Answering this question requires a deeper dive into investor heterogeneity. Passive funds, in particular, have very little discretion in their portfolio allocations governed by the countries in the index to which they benchmark (Chari et al., 2022). Raddatz et al. (2017) find that 70% of country allocations of mutual funds benchmark to indices and impact equity and bond asset allocations by mutual funds, capital flows, asset prices, and exchange rates.

Benchmark composition can mechanically drive capital flow and return responses to global financial shocks---the greater the weight allocated to a country in the index, the greater the exposure. Evidence suggests that index inclusion can lead to a greater co-movement of asset returns resulting from a higher correlation and conformity in the investment decisions of investors who benchmark to the index (references). The increase in benchmark-driven investors may explain the increased sensitivity of open-end mutual fund flows to global financial conditions (FSB, 2022). The growth of exchange-traded funds (ETFs) further amplifies the sensitivity of international capital flows to the global financial cycle (Converse et al., 2022).

Broner et al. (2021) document that including countries in sovereign debt indices can reduce government bond yields and lead to domestic currency appreciation as foreign investor demand for these assets increases. Automatic rebalancing of portfolio allocations in local-currency government debt indices impacts government bond returns and the liquidity and depth of sovereign debt markets in emerging economies (Pandolfi and Williams, 2019). Further, there are heterogenous domestic firm impacts. Firms in tradable industries face adverse effects due to rising currency values, while firms in financial or government-related industries or more dependent on external finance experience the benefits of declining yields (Pandolfi and Williams, 2020). Thus, foreign investor flows that are a consequence of index inclusion can have real effects on domestic firms, pointing to the risks that are attendant to possible capital flow reversals in response to global risk shocks. Consistent with Gabaix and Maggiori (2015), capital inflows are associated with currency appreciations and vice-versa.

Do fund managers view emerging financial markets as a single asset class, or do country-specific fundamentals guide investment decisions? Evidence suggests that fund investors tend to consider EMEs bonds as a single, risky asset class that is more sensitive to global shocks and less sensitive to country factors (Arslanalp and Tsuda, 2014). Redemption pressures are particularly severe for passive funds that track benchmark indices. Benchmark-driven-investing and unidirectional co-movement in investor flows can generate correlated investment patterns that may create one-sided markets and exacerbate price fluctuations in emerging markets (Miyajima and Shim, 2014). Bond flows from benchmark-driven investors are three to five times more sensitive to changes in global risk aversion than balance of payments measures of portfolio flows (Arslanalp et al., 2020). Investment funds also tend to reduce their exposure to EMEs more than banks and other intermediaries during periods of financial upheaval, such as the Covid-19 pandemic (Moro and Schiavone, 2022).

Chari et al. (2022) suggest that passive fund investments provide a mechanism or a lens through which a risk aversion shock could hit and manifest spillovers with consequential price effects and elevated correlations. In contrast, actively managed mutual funds enjoy considerable

discretion. Interestingly, the EPFR data suggest that actual allocations and benchmark MSCI weight correlations are very similar for passive and active funds (Chari et al., 2022, Arnslap et al., 2020). However, passive fund redemptions and subscriptions are significantly more responsive to global risk aversion and risk shocks than active funds (Chari et al., 2022). The pattern implies that significant fractions of capital flows to emerging markets are associated with mutual funds that benchmark indices with little to no discretion regarding portfolio allocations.

While not explicitly focused on distributional consequences and tail risk, Moro and Schiavone (2022) find passive funds and exchange-traded funds (ETFs) more responsive to global shocks than active funds. The rise of mutual funds amplifies the sensitivity of emerging market capital flows to global shocks. Moro and Schiavone (2002) also find corroboratory evidence that the reliance on benchmark-driven investment funds makes emerging markets more vulnerable to global shocks.

Further, portfolio outflow risks may temper the benefits of index membership for some countries (Arnslap et al., 2020). These effects can disproportionately impact countries with higher index weights and therefore, more exposed to global shocks. Moreover, benchmark-driven investments raise the probability of tail events tied to global risk shocks unrelated to destination country-specific fundamentals. The recent body of evidence collectively suggests that the vehicles facilitating investor flows matter. It is necessary, therefore, to account for 'pipe factors' coined by Carney (2019), such as the typologies and characteristics of global investors.

5.1 Non-bank Financial Intermediation, Global Risk Shocks, and the Unintended Consequences of Macroprudential Policy

In the aftermath of the Global Financial Crisis, macroprudential regulations to increase financial system resilience became more pervasive to establish guardrails that could mitigate the amplification of financial shocks in the economy. A vast theoretical and empirical literature examines the optimal use of macroprudential policy (Bianchi and Mendoza, 2018; Brunnermeier et al., 2013; Claessens, 2015; Engel, 2016). The evidence suggests that macroprudential policy serves a beneficial role in addressing specific vulnerabilities, such as reducing credit growth or FX exposures (Araujo et al., 2020, Forbes, 2021). With regard to capital flows, the literature finds that macroprudential policy reduces the volume of cross-border bank flows and increases the banking system's resilience to different types of shocks (Ahnert et al., 2021; Avdjiev et al., 2020; Forbes, 2019).

However, evidence suggests that risks migrate to less regulated parts of the financial system as demand from borrowers shifts to alternative non-bank financing sources (Agénor and da Silva, 2018; Avdjiev et al., 2016; CGFS (2021)). For example, a 2012 study from the Sveriges Riksbank shows that regulation that tightens loan-to-value limits leads households to shift away from housing-backed loans to unsecured debt. Ahnert et al. (2021) find evidence that riskier borrowers sell FX-denominated bonds to non-bank financial intermediaries when regulations limiting FX currency borrowing from banks come into effect. Shin (2013) finds that corporate dollar-denominated debt financing increases. Moro and Schiavonne (2022) find that the volatility of investment fund flows exceeds that of bank flows, while Avdjiev, Gambacorta, Goldberg, and

Schiaffi (2020) use components of global liquidity to document that market-based finance flow elasticities in response to US policy rates and global risk sentiment are higher than banking flow elasticities, attributed to changes in the regulatory environment that have made bank-based international capital flows less sensitive to risk events.

Bengui and Bianchi (2018) present a theoretical model demonstrating how tighter regulations can reduce risk-taking in regulated sectors such as banks. But it can also lead to the perception that the overall financial system is safer, encouraging investors to engage in riskier activities and exposures. In each case, the macroprudential regulations shift financial intermediation in ways that could increase sensitivity to risk shocks outside the banking sector and parts of the financial system that are outside the purview of the regulatory perimeter.

Chari, Dilts Stedman, and Forbes (2022) find that tighter macroprudential regulation can have the unintended consequence of increasing the sensitivity of portfolio flows to risk shocks. The paper tests whether a country's macroprudential stance affects the sensitivity of portfolio investment flows over the global financial cycle. The evidence suggests that tighter macroprudential regulations, adopted *ex-ante*, amplify the impact of risk shocks on bond and equity portfolio investments—increasing outflows during "risk-off" episodes and increasing inflows during "risk-on" episodes. These amplification effects increase at the extremes of capital flow distributions, especially for extreme risk-off periods, and are larger and more significant for bonds than equity flows. The results suggest that certain macroprudential tools (e.g., limits on FX-denominated borrowing or housing loans) shift financial intermediation outside the regulated financial sector to portfolio investors more vulnerable to the global financial cycle.

Thus, macroprudential regulations may have the desired direct consequence of increasing the banking system's resilience. However, vulnerabilities in other parts of the financial system may arise if investors and borrowers shift to more risky financial exposures and ones that may be more sensitive to global risk shocks. These vulnerabilities can amplify for leveraged investors and non-bank financial intermediaries such as mutual funds subject to liquidity risks.

Unlike banks, non-bank financial intermediaries lack access to central bank liquidity as a backstop. With limited cash buffers, they are more likely to divest risky emerging market exposures in risk-off environments. Forced asset sales and the unwinding of investment positions can further aggravate the effects of the global financial cycle (Chari, Dilts Stedman, and Lundblad, 2022). Broader financial sector spillovers and interaction effects, therefore, deserve attention when discussing the effectiveness of macroprudential regulation.

6. Conclusion

The rapid growth of non-bank financial intermediation to emerging markets over the last two decades presents opportunities and risks. Improved access to international capital markets enhances the domestic pool of savings available for productive investment as an engine of real economic growth. However, the organizational form of the investment vehicles that facilitate cross-border capital flows, such as open-end mutual funds and ETFs, can have consequential impacts on emerging market flows and returns. While investment funds provide investors

domiciled in advanced economies low-cost access to emerging market assets, they are also subject to redemption and, therefore, liquidity risks, especially during periods of heightened global financial stress. Concerted buying and selling by investment funds can increase the volatility of capital flows to emerging markets. The rise of passive benchmark-driven investing can further amplify emerging market tail risk through capital flow retrenchments, surges, or sudden stops.

The vulnerability of investment fund flows to global financial conditions raises financial stability concerns for emerging market policymakers. Claessens and Luwerick (2021) highlight the need for a macro-prudential approach to the investment fund regulation and suggest that reforms be adopted to mitigate the risks associated with redemption pressures, procyclicality, and the herding behavior of investment fund flows. The Federal Reserve's Money Market Mutual Fund Stability Facility was established during the Covid crisis in response to the dislocations in funding liquidity in prime money market funds to provide a liquidity backstop. Evidence suggests that funds that used the facility experienced more severe redemption risk, which moderated particularly for funds that had larger shares of illiquid securities (Anadu et al., 2021).

Potential considerations for ex-ante macroprudential policy could include introducing liquidity management tools such as countercyclical liquidity buffers analogous to bank capital buffers (CCyb). Liquidity stress testing to gauge portfolio liquidity may also effectively align microprudential incentives at the fund level with macroprudential assessments of systemic liquidity risk (Claessens and Luwerick, 2021). The debate in policy circles about how to alleviate emerging market vulnerabilities to investment fund flows is ongoing. Policies to strengthen the resilience of emerging financial markets to global shocks will ultimately need to address the underlying currency and liquidity mismatches associated with non-bank intermediated financial flows.

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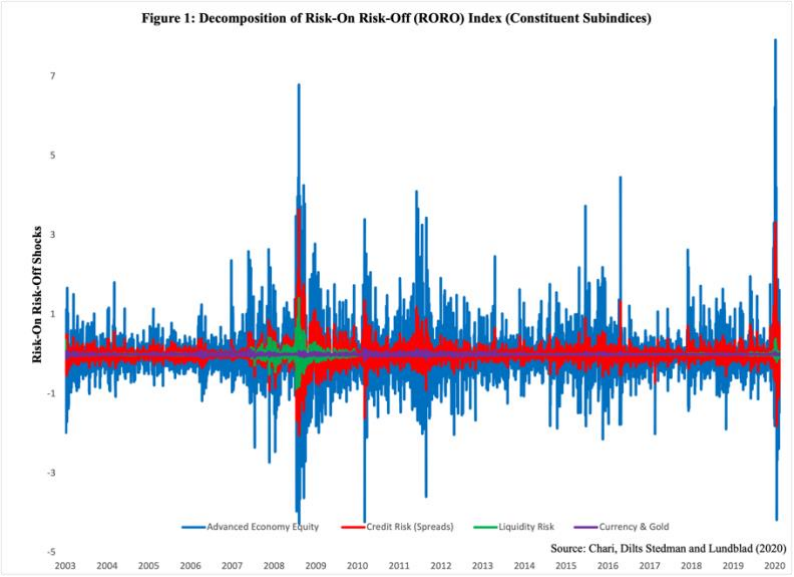
Figure 1: Decomposition of Risk-On Risk-Off (RORO) Index (Constituent Subindices)



Source: Chari, Dilts Stedman and Lundblad (2020)

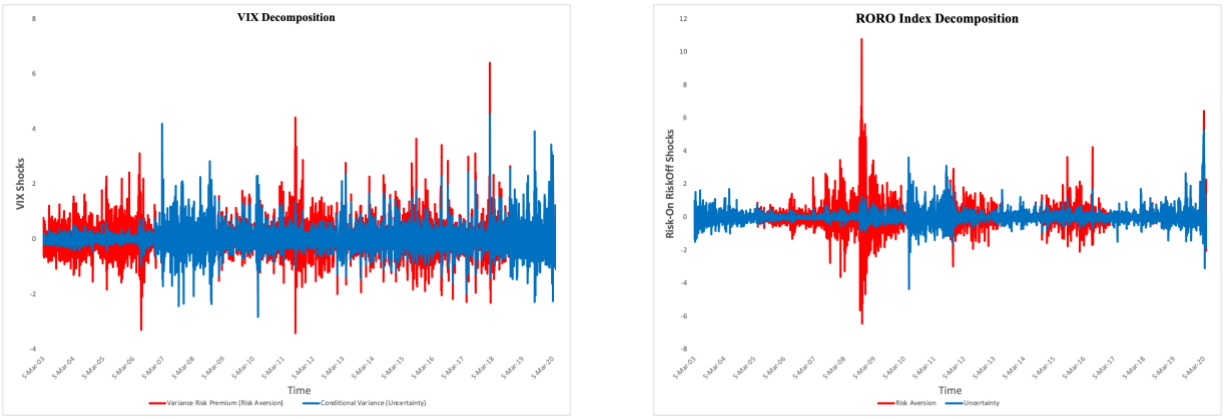


Figure 2

Notes: The left panel decomposes VIX shocks into the variance risk premium and conditional variance. The right panel projects the RORO index onto the structural decomposition of risk aversion and uncertainty from the model in Bekaert et al. (2021).

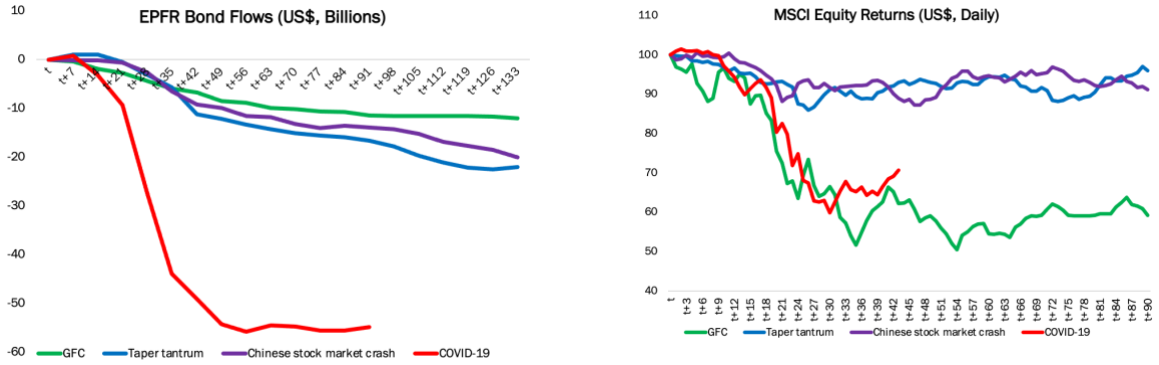
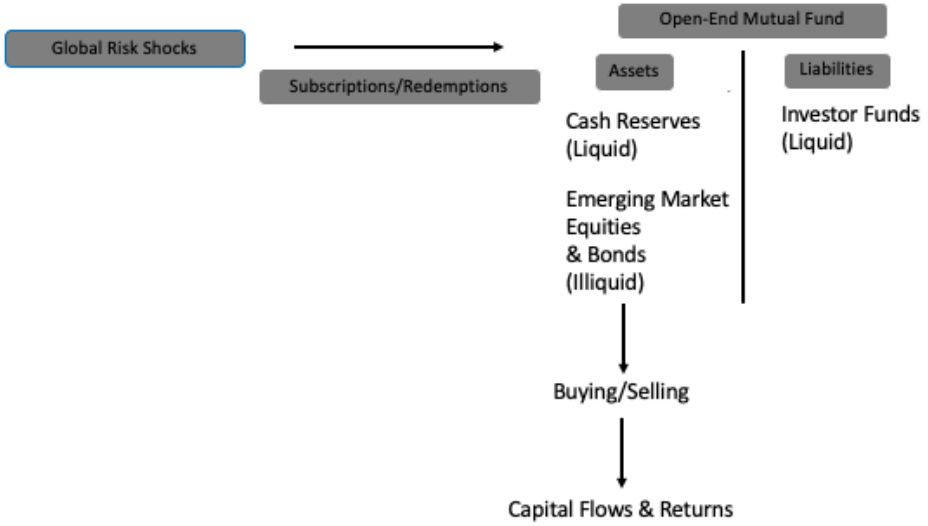
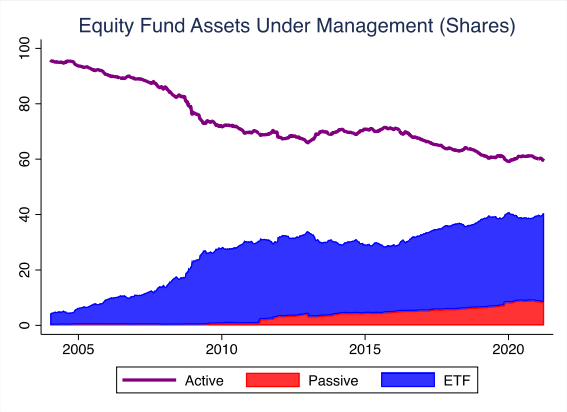


Figure 3

Notes: The left panel of Figure 3 shows the cumulative net weekly flows (EPFR) to emerging markets for different stress episodes. The right panel shows US$ daily returns (MSCI).

Figure 4: Schematic Representation of Open-End Mutual Fund Trading





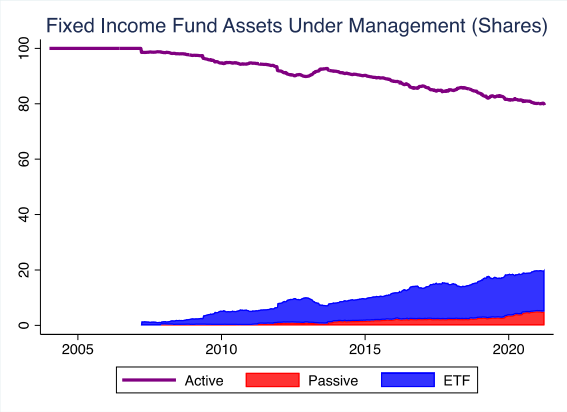


Figure 5

Notes: Figure 5 summarizes the trends in shares of assets under management for active funds, passive funds, and ETFs in emerging markets for equities and fixed income.

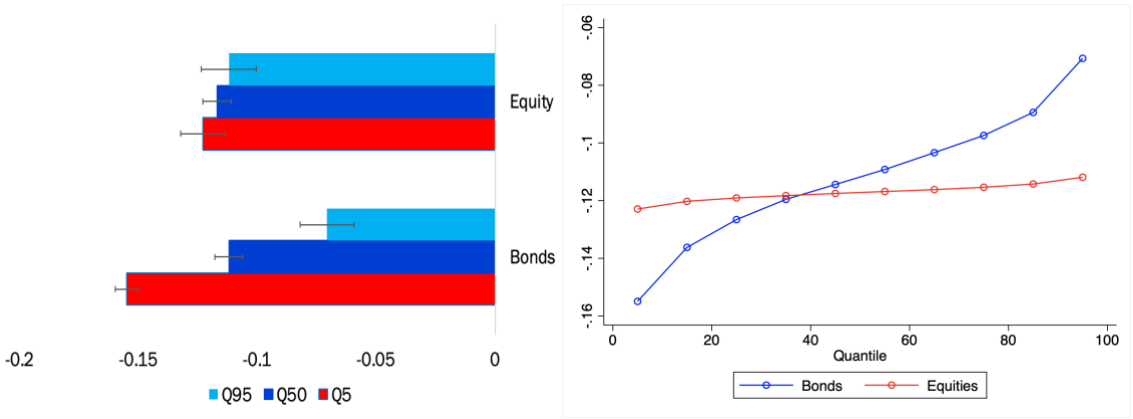


Figure 6: The distribution of EPFR flows (% of AUM) in response to a risk-off shock (RORO)

Notes: This figure summarizes the impact of a one-standard-deviation risk-off shock as measured by the RORO index in Chari, Dilts Stedman & Lundblad (2020). Error bars represent 90% confidence intervals.

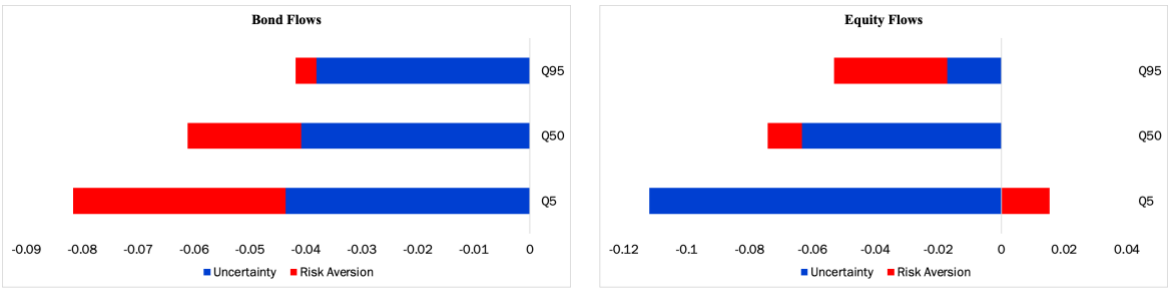


Figure 7: The distribution of EPFR flows (% of AUM) in response to a risk-off shock (BEX)

Notes: This figure summarizes the impact of a one-standard-deviation risk-off shock as measured by the structural decomposition of risk aversion and uncertainty in Bekaert, Engstrom, and Xu (2021).