

# Global Liquidity: Drivers, Volatility, and Toolkits

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23rd Jacques Polak Annual Research Conference

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\*The views expressed herein are those of the author and not necessarily those of the Federal Reserve Bank of New York or the Federal Reserve System. Thanks to Oliver Hannaoui and Stone Kalisa for teamwork and excellent research assistance.

# Honoring Maurice Obstfeld

# Global Liquidity: The Concept

## Introduction

### Global Liquidity

### Prudential Spillovers

### Risk Migration and Toolkits

### Conclusion

### Bibliography

### Appendix

- Global liquidity:
  - ▶ Official liquidity – components created by central banks
  - ▶ Private liquidity – funding conditions for the broader international economy. Reflects behavior of financial sector in providing cross-border and/or foreign currency financing (BIS CGFS 2011)
  - ▶ Proxy – the volumes of financial flows, largely intermediated through global banks and non-bank financial institutions, that can be reallocated at relatively high frequencies
- Two of the key drivers:
  - ▶ Monetary policy
  - ▶ Risk conditions (engaging with the vulnerabilities of and constraints on financial institutions)

# Prudential Policies: The Concept

## Introduction

Global  
Liquidity

Prudential  
Spillovers

Risk  
Migration  
and  
Toolkits

Conclusion

Bibliography

Appendix

- Prudential policies:
  - ▶ Micro-prudential – supervision and regulation aimed at making individual financial institutions more robust
  - ▶ Macro-prudential – tools for managing the cycle by targeting specific sectors or financial activities
- Early focus on macroprudential indicators more closely aligned with early warning indicators than with a toolkit to directly influence financial activity
- After the Global Financial Crisis (GFC), efforts shifted toward developing toolkits to manage financial conditions associated with excessive booms and damaging busts in credit availability

# Main Messages

## Introduction

Global  
Liquidity

Prudential  
Spillovers

Risk  
Migration  
and  
Toolkits

Conclusion

Bibliography

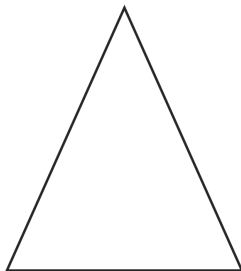
Appendix

- ① Prudential policies dampen the amplitude of global financial cycles
- ② Appropriately targeted policy requires layered approach using granular data
- ③ Risk migration occurs within global liquidity flows, including in response to home country banking regulation and supervision. Increased role of heterogeneous non-banks
- ④ The toolkit: Policy tradeoffs for global liquidity destinations improve when foreign financial institutions have better risk management and risk-absorbing capabilities. Non-banks?
- ⑤ Open questions: What is the endgame for risk migration? What is the right mix of (international) debt and equity flows, and how is this ideal mix achieved?

# Global Liquidity

## Monetary Trilemma

Monetary Policy Autonomy

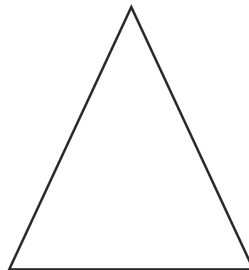


Fixed Exchange Rate

Free Capital Flows

## Financial Trilemma

Financial Stability



Financial Integration

National Financial Policies

# Ingredients of a More Efficient International Financial System

Obstfeld (2014)'s ingredients include:

- ① Sound domestic macroprudential policies (addressing inadequacy of monetary policy alone)
- ② Domestic regulatory control over large foreign banking organizations
- ③ Since full coordination politically impossible, rules of road for capital controls, if they are at times needed to address nation-specific issues
- ④ Enhanced facilities for international liquidity support in key currencies – to counteract downsides of gross reserve accumulation
- ⑤ More equity and less debt for emerging market (EM) economies



# International Capital Flow Pressures

# International Capital Flow Pressures

- Exchange rates not sufficient statistics for international capital flow pressures
- Exchange Market Pressure *EMP* Goldberg and Krogstrup (2022)

$$EMP_t \equiv \frac{de_t}{e_{t-1}} + di_t \frac{\pi_i}{\pi_e} - dFXI_t \frac{1}{\pi_e} \quad (1)$$

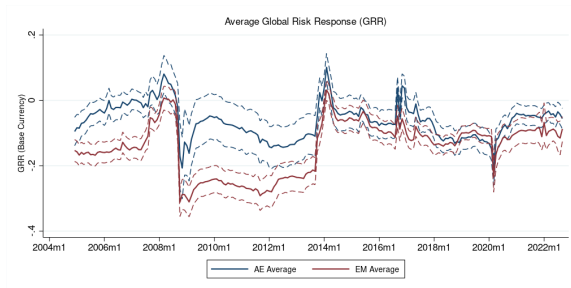
where  $e$  is the exchange rate,  $i$  is the policy rate, and  $FXI$  is official purchases of foreign exchange.  $\pi_i$  and  $\pi_e$  derive from forces within the balance of payments, including gross foreign asset and liability positions, currency denomination of debt, international portfolio wealth effects, and investor sensitivities to return differentials.

- Global Risk Response *GRR*

$$GRR_t^j = -corr_{t-x,t}(EMP_t^j, VIX_t) \quad (2)$$

computed for each country  $j$  by month  $t$  using 60 months of data

# Lessons Learned About Risk Sensitivities Depend on Aggregation



# Lessons Learned About Risk Sensitivities Depend on Aggregation

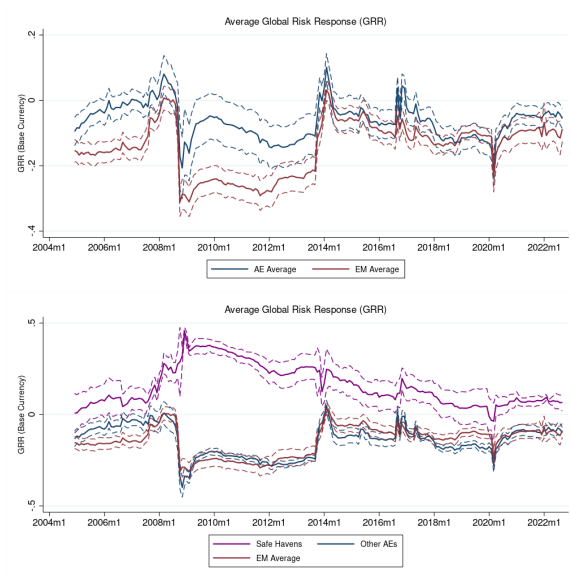
Introduction

Global  
LiquidityPrudential  
SpilloversRisk  
Migration  
and  
Toolkits

Conclusion

Bibliography

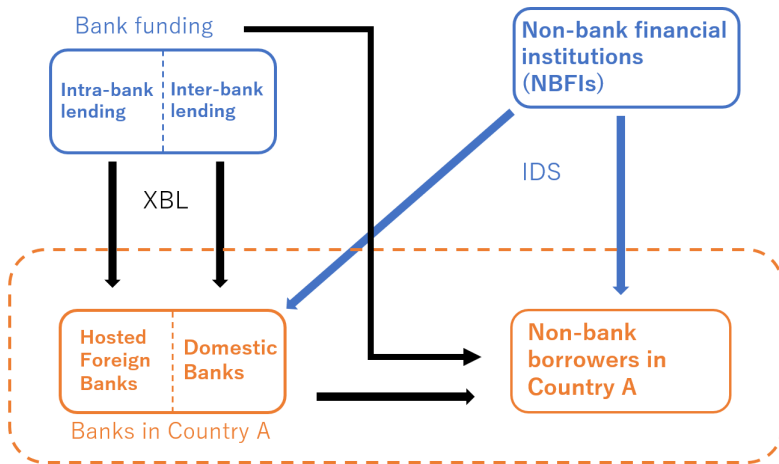
Appendix



Source: author's calculation based on Goldberg and Krogstrup (2022)

Safe Havens v. Other AEs

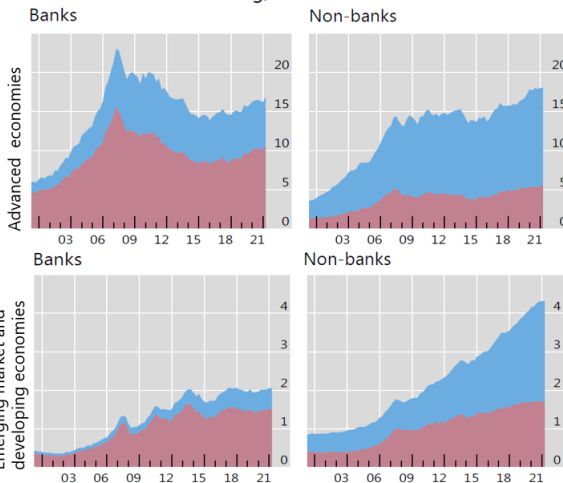
# Global Liquidity Channels: A Stylized Depiction



Source: author's construction, starting with BIS (2022)

# The Evolving Composition of External Debt Flows

Amounts outstanding, in trillions of US dollars



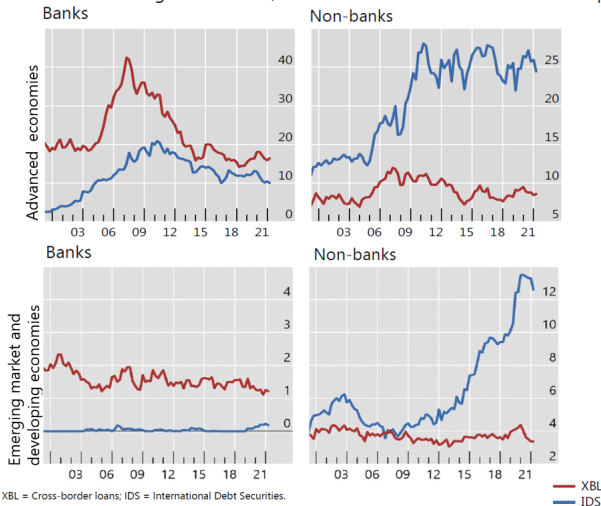
XBL = Cross-border loans; IDS = International Debt Securities.

XBL  
IDS

Sources: BIS Locational Banking Statistics by residence and International Debt Securities Statistics.

# Large Increases in Market-Based Financing of Non-Bank Borrowers

Amounts outstanding as % of GDP, median across countries for each time period



XBL = Cross-border loans; IDS = International Debt Securities.

Economies included (147) are those with nominal GDP data from IMF-WEO. Annual GDP data converted to quarterly using linear interpolation.

Sources: IMF, World Economic Outlook; BIS Locational Banking Statistics by residence and International Debt Securities Statistics.

# International Capital Flows: A Stylized Recent History



# International Capital Flows: A Stylized Recent History

Introduction

Global  
LiquidityPrudential  
SpilloversRisk  
Migration  
and  
Toolkits

Conclusion

Bibliography

Appendix

- Obstfeld and Taylor (2005) provide a history of financial globalization from 1850s through 2000
  - ① Late 1800s through 1914: First era of financial globalization
  - ② Interwar period collapse
  - ③ 1980 through 2000: Second era of financial globalization
- Next, I revisit recent history, 1980 to 2022, providing a stylized depiction in three phases

# Stylized History of Global Liquidity: Phase (1) Increase in cross-border bank lending

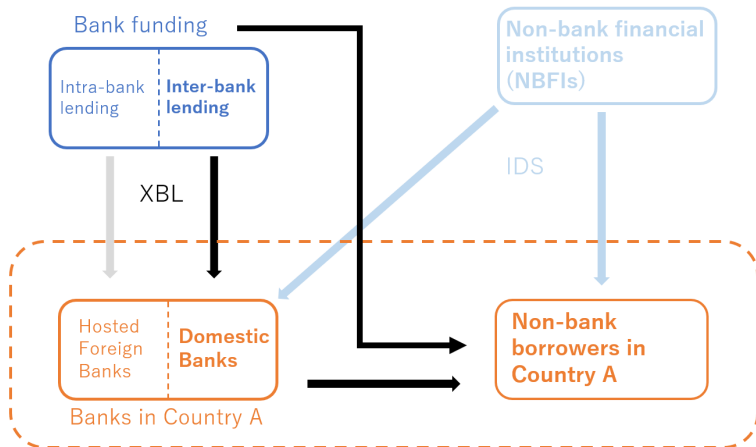
Introduction

Global  
LiquidityPrudential  
SpilloversRisk  
Migration  
and  
Toolkits

Conclusion

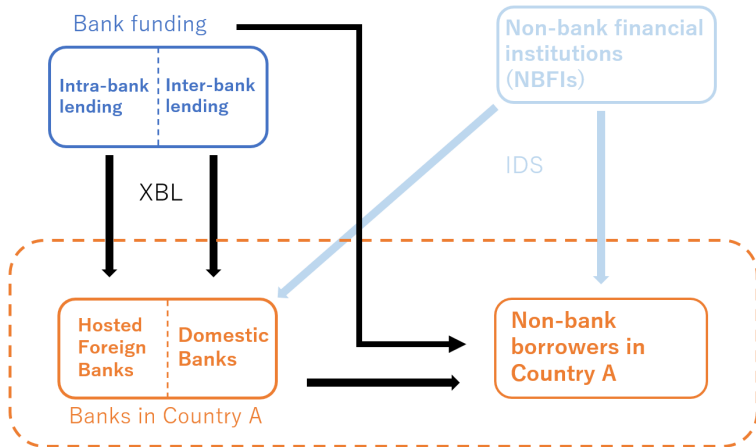
Bibliography

Appendix



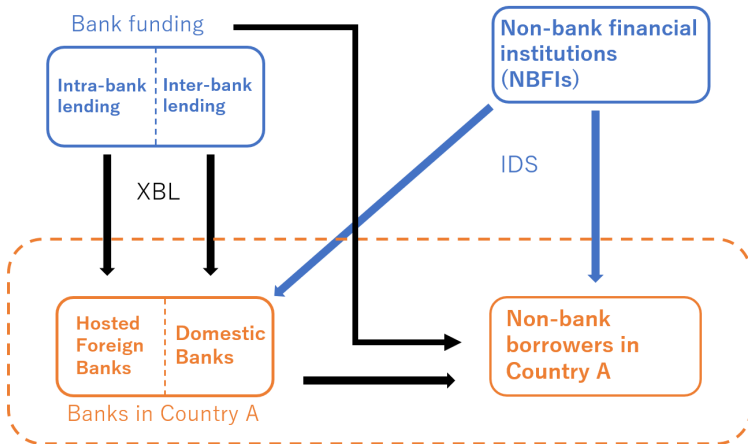
Source: author's construction

# Stylized History of Global Liquidity: Phase (2) Enhanced roles of global banks' hosted branches, subsidiaries



Source: author's construction

# Stylized History of Global Liquidity: Phase (3) Migration of activity toward NBFIs and IDS



Source: author's construction

# Risk Sensitivity of Global Liquidity Flows

# Sensitivity to Global Factors from the Borrower Perspective

## Introduction

## Global Liquidity

## Prudential Spillovers

## Risk Migration and Toolkits

## Conclusion

## Bibliography

## Appendix

Avdjiev, Gambacorta, Goldberg, Schiaffi (2022) explore IDS and XBL, by bank and non-bank borrowers. Consider characteristics of source country banking systems and composition of NBFIs types

- Sensitivity to global factor components: change in U.S. federal funds rate (or shadow policy rate), risk sentiment ( $VIX$ ), global GDP growth
- Control for local conditions: GDP growth, sovereign rating, capital account openness
- Estimate sensitivity pre-GFC and patterns post-GFC
- Separate borrowers by "safe havens", other advanced economies, and emerging markets
- Test for drivers of sensitivities, including composition and characteristics of banking systems and NBFIs

# Sensitivity to Risk: Reduced Only for Cross-Border Bank Lending

Introduction

Global Liquidity

Prudential Spillovers

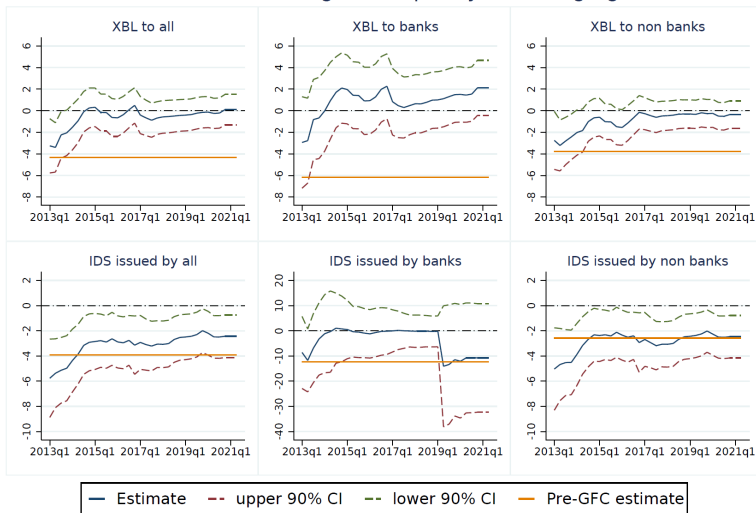
Risk Migration and Toolkits

Conclusion

Bibliography

Appendix

## Effect of risk conditions on global liquidity to emerging economies



Source: Avdjiev, Gambacorta, Goldberg and Schiaffi (2022)

# Global Liquidity: Summary

In sum, the post-GFC period has been characterized by dramatic changes

- A few advanced economies have emerged as "safe havens"
- Risk sensitivities of global liquidity flows through banks have declined
- The role of market-based funding has increased, especially for non-bank borrowers
- NBFI funding remains risk sensitive, with considerable heterogeneity in types across borrowing locations
  - ▶ See also Chari, Stedman, and Lundblad (2022) for evidence of extensive heterogeneity in risk response across bond and equity funds, as well as across institutional funds versus retail funds



# Prudential Policy Spillovers Across Borders

# Prudential Spillovers: Evidence from Granular Data

From Avdjiev, Gambacorta, Goldberg, Schiaffi (2020 JIE, 2022)

- Better capitalization in banks: major role in XBL risk-sensitivity decline
  - ▶ Lower capitalization banks sharply amplify risk transmission across borders, especially for EM borrowers
- Additional stabilizing effects from compositional changes within XBL
  - ▶ Less well capitalized banking systems lost market share
  - ▶ Inter-bank lending declined, increasing intra-bank lending share
- The composition and balance sheets of NBFIs are not transparent
- Risk sensitivity is higher when higher leverage types of NBFIs account for larger share of flows
- Share of high leverage NBFIs types is highest for EMs High Leverage NBFIs

# Prudential Policy Spillovers: Lessons from IBRN Research

Introduction

Global  
LiquidityPrudential  
SpilloversRisk  
Migration  
and  
Toolkits

Conclusion

Bibliography

Appendix

- **Bank stress testing advances** (Niepmann, Schmidt-Eisenlohr, Liu 2021)
- **Prudential policy spillovers depend on bank characteristics in source and recipient countries** (Buch and Goldberg 2017)
  - ▶ Heterogeneous results across countries, general findings via meta-analysis
  - ▶ Spillovers internationally through banks lending. Country- and sector-specific dynamics documented by individual countries
  - ▶ Effects on lending differ with bank balance sheet characteristics and business models
  - ▶ Direct effects not large on average through 2014 data
  - ▶ **Bank capital requirements** tied to migration of activity across banks/ banking systems
- **Recovery and resolution frameworks for large and systemically important banks** simplify organizational complexity, alter patterns of risk exposures (Correa and Goldberg 2022)

# Official Liquidity Facilities and Risk Sensitivity

Introduction

Global  
LiquidityPrudential  
SpilloversRisk  
Migration  
and  
Toolkits

Conclusion

Bibliography

Appendix

- Access to lender of last resort and liquidity facilities (in dollars) should weaken the amplitude and amplification of some global liquidity responses to negative risk shocks
- Goldberg and Ravazzolo (2022) consider the early pandemic period
  - ▶ Countries and currencies differentiated by access to Federal Reserve's swap lines (Standing or Temporary) and the Foreign and International Monetary Authority (FIMA) repo facility
  - ▶ By reducing some of the tail risk on dollar funding costs, facilities support continued credit provision through banks and reduced amplification effects when large shocks hit global markets
  - ▶ Risk sensitivity of equity and bond fund flows declined
  - ▶ Bond funds' results depend on the features of funds

# Risk Migration and Toolkits

# Evolving Global Liquidity and Risk Migration

## Introduction

Global  
LiquidityPrudential  
SpilloversRisk  
Migration  
and  
Toolkits

## Conclusion

## Bibliography

## Appendix

- ① Pre-GFC, liberalized access by global banks shift some XBL to local lending. More credit access to smaller, riskier local borrowers
- ② Global bank liquidity allocation across organization responds to risk
  - ▶ Lending by branches and subsidiaries less risk sensitive than XBL
  - ▶ Intra-bank lending more stable than inter-bank lending
  - ▶ When shocked, global banks follow pecking order on liquidity reallocation across foreign affiliates: core locations are more protected than periphery (Cetorelli and Goldberg 2012)
- ③ Post-GFC, internationally active banks with stronger balance sheets and risk-absorbing capacity expand relative to banks that had to focus more on balance sheet repair
- ④ Regulation and innovation fuel expansion of NBFIs relative to banks
- ⑤ NBFIs locate more in cross-border financial centers with less stringent regulation (Pogliani, von Peter, and Wooldridge 2022)

# Relevance for Toolkits

## Introduction

Global  
LiquidityPrudential  
SpilloversRisk  
Migration  
and  
Toolkits

## Conclusion

## Bibliography

## Appendix

- Extensive work on toolkits has focused on managing priorities, conditional on characteristics of global liquidity
- Trilemmas bind less under stronger foreign prudential policies
- Reinforce importance
  - ▶ Continued focus on risk management and ample risk buffers of global banks – positive global externalities for XBL
  - ▶ Liquidity management within global banks helps fund more information-intensive, relatively stable local lending by affiliates
  - ▶ More peripheral locations less protected (even less so by XBL)
  - ▶ Liquidity facilities by central banks: reduce amplification of strains, liquify instead of liquidate
- IMF Integrated Policy Framework has focus on recipient country policy. Explore thresholds on prudential strength of source countries? Characteristics of specific providers?

# Challenges from Risk Migration and NBFIs

## Introduction

Global  
LiquidityPrudential  
SpilloversRisk  
Migration  
and  
Toolkits

## Conclusion

## Bibliography

## Appendix

- ① Financial Stability Board work program (FSB 2022) on monitoring and enhancing resilience of the NBFI sector, while preserving its benefits.  
Priorities:
  - ▶ Leverage, open-ended mutual funds, data gaps, regulatory frameworks
  - ▶ Heterogeneous institutions and activities NBFI Classification
  - ▶ Efforts span broader regulatory and policy communities
- ② IMF analytics and monitoring
  - ▶ IMF (2021) source country policies increase the stability of funds intermediated by open-ended investment funds
  - ▶ October 2022 IMF 2022 GFSR Ch 3 – empirical analysis of policy levers, including swing pricing and liquidity measures
- ③ Frameworks to consider challenges from risk migration through NBFIs and to locations with weaker regulation?
- ④ Ripe for research! Understanding NBFI heterogeneity, interconnections to markets, consequences for monetary policy transmission, potential for amplifying international risk shock transmission



# Forward Thinking: What is the Desired Endgame?

Introduction

Global  
LiquidityPrudential  
SpilloversRisk  
Migration  
and  
Toolkits

Conclusion

Bibliography

Appendix

- Global liquidity dynamics focus on flows through banks and purchasers of international debt securities
- Risk migration a pervasive feature. If more constraints on NBFIs or activities, where does risk migrate?
- Obstfeld (2014) also flagged role for equity
- Research query: What is the ideal composition of financing?
  - ① Optimal configuration of debt and equity?
  - ② What is needed to move toward the optimal?
  - ③ What other issues arise if equity flows are even more prominent?

# Concluding Remarks

## **Congratulations to Maury Obstfeld!**

### **Managing challenges from global liquidity**

- Appropriately target policy using a layered approach with granular data
- Maintain strong focus on prudential policies and effective supervision
- Focus on features of liquidity facilities that help dampen the global financial cycle, but do not create moral hazard
- Address the continuing challenges that arise from risk migration
- Additional forward-looking work toward a debt/equity frontier endgame

Thank you!

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# Bibliography

Introduction

Global  
LiquidityPrudential  
SpilloversRisk  
Migration  
and  
Toolkits

Conclusion

Bibliography

Appendix

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## Bibliography – Continued

Introduction

Global  
LiquidityPrudential  
SpilloversRisk  
Migration  
and  
Toolkits

Conclusion

Bibliography

Appendix

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# Appendix

# Share of NBFIs with high leverage

- ① Avdjiev, Gambacorta, Goldberg and Schiaffi (2022) consider the narrow measure of NBFIs entities that authorities have assessed as being involved in credit intermediation activities that may pose bank-like financial stability risks (i.e. credit intermediation that involves maturity/liquidity transformation, leverage or imperfect credit risk transfer) and/or regulatory arbitrage, according to the methodology and classification guidance used in the FSB's annual NBFI monitoring exercise.
- ② High leverage NBFIs have been evaluated based on the ratio  $L1 = \text{total financial assets} / \text{equity}$ . High liquidity transformation NBFIs have been evaluated using the ratio  $LT1 = (\text{Total financial assets} - \text{liquid assets} + \text{short term liabilities}) / \text{Total financial assets}$ .
- ③ High leverage NBFIs: Finance companies, leasing/factoring companies, consumer credit companies; Broker-dealers, securities finance companies; securitisation vehicles, structured finance vehicles, asset-backed securities.

High Leverage NBFI Graphic



# Share of High Leverage NBFIs

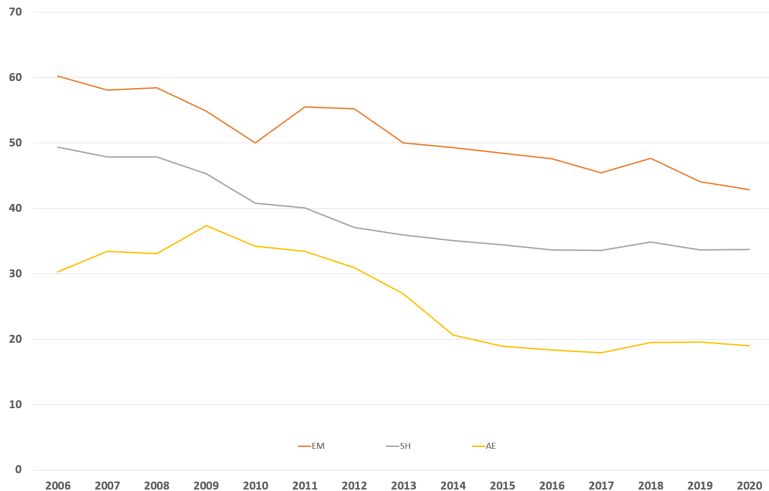
Introduction

Global  
LiquidityPrudential  
SpilloversRisk  
Migration  
and  
Toolkits

Conclusion

Bibliography

Appendix



Source: Avdjiev, Gambacorta, Goldberg and Schiaffi (2022)

Prudential Spillovers

# FSB NBFI Classification

Classification of non-bank financial intermediation by economic functions (EFs)

Table 1

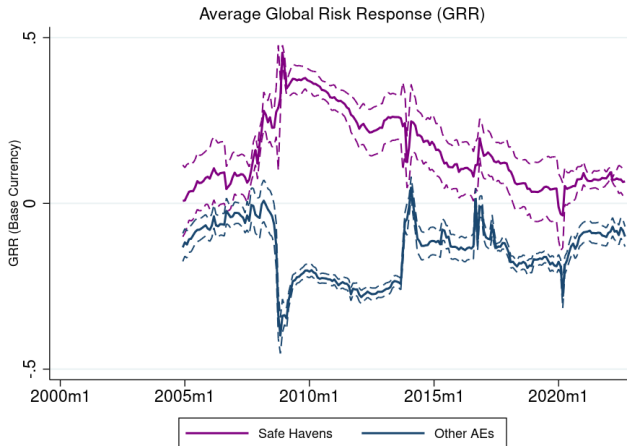
Economic function	Definition	Typical entity types	Leverage	Liquidity Transformation
EF1	Management of collective investment vehicles with features that make them susceptible to runs	MMFs, fixed income funds, mixed funds, credit hedge funds, real estate funds	Low	High
EF2	Loan provision that is dependent on short-term funding	Finance companies, leasing/factoring companies, consumer credit companies	High	Low
EF3	Intermediation of market activities that is dependent on short-term funding or on secured funding of client assets	Broker-dealers, securities finance companies	High	Low
EF4	Facilitation of credit creation	Credit insurance companies, financial guarantors, monolines	n.a.	n.a.
EF5	Securitisation-based credit intermediation and funding of financial entities	Securitisation vehicles, structured finance vehicles, asset-backed securities	High	Low

The FSB Policy Framework acknowledges that shadow banking may take different forms across jurisdictions due to different legal and regulatory settings as well as the constant innovation and dynamic nature of the non-bank financial sector. It also enables authorities to capture new structures or innovations that may create financial stability risks from NBFI, by looking through to the underlying economic function and risks of these new innovative structures. Thus, the entity types listed should be taken as typical examples. NBFIs is a broad measure of all non-bank financial entities, composed of all financial institutions that are not central banks, banks or public financial institutions. In this table we consider the narrow measure of NBFIs include NBFI entities that authorities have assessed as being involved in credit intermediation activities that may pose bank-like financial stability risks (i.e. credit intermediation that involves maturity/liquidity transformation, leverage or imperfect credit risk transfer) and/or regulatory arbitrage, according to the methodology and classification guidance used in the FSB's annual NBFI monitoring exercise. The leverage position has been evaluated based on the ratio  $L1 = \frac{\text{total financial assets}}{\text{equity}}$ . Liquidity transformation is evaluated using the ratio  $LT1 = \frac{(\text{Total financial assets} - \text{liquid assets} + \text{short term liabilities})}{\text{Total financial assets}}$ . For details, see FSB (2020).

Source: FSB.

# GRR: Safe Havens vs Other Advanced Economies

Safe Haven countries: Denmark, Hong Kong (PRC), Japan, Switzerland



Source: author's calculation based on Goldberg and Krogstrup (2022)

GRR Slide 12

## Goldberg and Krogstrup (2022)'s EMP Measure

$$EMP_t \equiv \frac{de_t}{e_{t-1}} + di_t \frac{\pi_i}{\pi_e} - dFXI_t \frac{1}{\pi_e}$$

- $e$  – Domestic currency price of foreign exchange
- $i$  – Interest rate (policy or Krippner shadow rate)
- $FXI$  – Official foreign exchange intervention (positive values represent reserve accumulation, negative values are reserve sales)

16 Advanced economies	25 Emerging Markets
United States, Japan, Switzerland, United Kingdom, Denmark, Norway, Sweden, Canada, Euro area, Czech Republic, Israel, South Korea, Singapore, Hong Kong, Australia, New Zealand	South Africa, Benin, Bolivia, Botswana, Brazil, Chile, Colombia, Mexico, Peru, Uruguay Jordan, India, Malaysia, Thailand, Morocco, Tunisia, Armenia, Senegal, Russia, China, Ukraine, Hungary, Croatia, Poland, Romania