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Discussion of “Congestion and Cascades in Coupled Payment Systems”

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Purpose of the Study

- To potentially complement the work of the CPSS WG on System Interdependencies
- WG utilizes a global survey, among other tools, to explore three forms of interdependency among PCSS:
  - System-based interdependencies
  - Institution-based interdependencies
  - Environmental interdependencies
- This study employs network analysis to explore two of the three types of interdependencies by:
  - Introducing ‘global’ banks which participate in multiple RTGS systems;
  - Introducing cross-border (FX) settlement activity subject to a PvP constraint
- Study analyzes the trade-off between system-wide liquidity and settlement risk given these interdependencies and alternative modes of FX settlement.

Model Set-up (1 of 2)

- Infrastructure Design
  - 2 countries; 2 RTGS systems (USD and EUR)
  - Payments processed by each RTGS include local and FX-related instructions
  - Proportion of FX-related payments is allowed to vary across simulations
  - For simplicity, payment values are identical
- Participation Structure
  - Each RTGS has 100 participants; banks differ by size of deposit base
  - 6 large ‘global’ banks directly participate in both systems
  - Only global banks engage in FX trading and settlement
- Participant Behavior
  - Banks receive payment instructions randomly from their clients
  - **Payment Submission Rule**: If liquidity available, send payment; if not, queue payment internally
  - Release of queued funds conditional on having sufficient liquidity; queue release triggered by receipt of incoming payment
  - Banks not required to make any decisions regarding intraday liquidity management

Model Set-up (2 of 2)

- FX settlement
  - **PvP Settlement Rule**: Both counterparties must have sufficient liquidity for settlement to occur; if not, both legs queued regardless of individual counterparty liquidity.
  - **FoP Settlement Rule**: If one counterparty has sufficient liquidity but other does not, then its leg can still be settled; other counterparty's payment will be queued.

- Modeling Exposure to FX Settlement Risk
  - Exposure begins when bank pays out sold currency, ends when receive bought currency with finality
  - Typically caused by global time-zone differences; primary cause here is liquidity differential between systems

- A Key Aspect of the Analysis: Intraday Liquidity
  - System-wide liquidity is fixed over a given time period
  - Sources of intraday liquidity: 1) beginning CB balances; 2) incoming payments
  - System-wide liquidity is allowed to vary across simulations and between systems within a simulation

Summary of Findings (1 of 2)

- Impact of (Equal System-wide) Liquidity on Queuing
  - As liquidity is reduced in each system, queue usage is increased
  - Queuing is slightly increased under PvP settlement for each level of liquidity considered
- Impact of Differential System-wide Liquidity on Queuing
  - FoP: Average queue length in USD RTGS exceeds that of EUR RTGS for all differential liquidity variations
  - PvP: Queuing in “richer” EUR RTGS system is increased relative to FoP case
  - PvP: Queue usage in EUR RTGS increases as proportion of FX is increased, notably when liquidity in USD system is lowest

Summary of Findings (2 of 2)

- Impact of Liquidity on FX Settlement Risk Expsoure
  - Regardless of liquidity levels in both systems, priority given to FX instructions heavily influences FXSR exposure between banks
  - EUR banks with greater access to liquidity face larger aggregate FX settlement exposure vis-a-vis USD banks, e.g., exogenous system-wide liquidity stock is greater or have access to interbank liquidity market

Major Comments (1 of 2)

- No question that modeling full complexity of payments systems is difficult (if not impossible!)... but to meet study objectives parsimony must have limits!

- "Liquidity" is a bit of a mysterious concept...
  - Need to do a better job of motivating/providing rationale for this part of the study. What does it really mean that liquidity in an RTGS is "high" or "low"?
  - Results show that low liquidity has potential to increase payments delay and FX settlement exposure faced by banks. But what could cause such a liquidity shortage? Perhaps a breakdown in the functioning of interbank lending markets?

Major Comments (2 of 2)

- Where is the central bank? How would results change if there was one?
  - Study emphasizes importance of central bank intraday credit facility as a source of liquidity for system participants
  - Root cause of delay is that banks face random payment demands from clients, timing of which makes it difficult for them to coordinate incoming and outgoing payment flows
  - Central banks around the world have long recognized this, and provide intraday credit to participants (typically interest-free!) to eliminate these frictions and preserve the smooth flow of payments throughout the day
  - Upcoming investigations sound interesting, but I think we all now realize the important role central banks play in times of crisis!

Minor Comments

- FX Settlement
  - When FX payments are given high priority, exposure is negligible. For what proportion of FX activity does this result continue to hold?
  - Worth simulating some combination of PvP and FoP activity, giving high priority to PvP settlements only?
- RTGS design
  - In current model, payments are queued internally where liquidity is insufficient. Would it be difficult to implement central queuing facility into simulations?
  - Central queuing, combined with central bank intraday credit, could dramatically alter results of study!
- Slide 6: I really like your depiction of the interbank liquidity market as a dark gray cloud – a very timely characterization! ☺

Thank you for this opportunity!