System-wide stress simulation

By David Aikman, Pavel Chichkanov, Graeme Douglas, Yordan Georgiev, James Howat, and Benjamin King

Discussion by Jose Berrospide

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Paper Summary

- Paper develops a GE model of the UK's system of market finance:
  - 7 representative agents: Pension funds, Life insurers, Investment funds (Long-term investors), hedge funds (arbitrageurs), MMFs and banks (cash providers), and broker dealers (intermediary).
  - 3 markets: bond, Repo, and derivatives.
- Authors use the model to assess resilience of market-based finance and the system performance under stress scenarios:
  - Agents optimization (e.g., max. expected return of asset portfolios) include regulatory (solvency and liquidity) and other (e.g., margin calls) constraints.
  - Liquidity in asset and funding markets is endogenously determined.
  - Agent interactions in these markets generate feedback loops and contagion channels leading to fire sale externalities.
  - Individual and multi-shock stress scenarios leading to portfolio rebalancing (e.g. deleveraging) and funding strains illustrate "tipping points" beyond which shock amplifications generate large illiquidity premium.

Paper Contribution

- Paper addresses a very interesting and hot topic: significant post-crisis expansion of nonbank financial institutions (NBFI):
  - New and unique dataset on NBFI's balance sheet information.
  - Heterogeneous behavior of NBFIs with focus on interconnectedness and fire sales externalities.
- Lots of institutional details for behavior of NBFIs and their interactions in asset, funding, and derivatives markets.
- Novelty: liquidity and asset prices are endogenously determined
  - Nonlinear price adjustments when agents hit constraints lead to shock amplification.
  - Model illustrates how the interplay of capital and liquidity constraints could mitigate impact of the shocks.

Comments I: Model

- Very ambitious and complex model:
  - Many simplifying assumptions, sectors with passive behavior, sectors not modeled, markets that are unconstrained or do not clear domestically.
  - No macro variables.
  - Shocks (e.g., deteriorating outlook for credit risk and corporate profits) are changes in parameters.
- No model dynamics
  - Two periods, but one-shot game: agents react today to expectations of a shock tomorrow (e.g. corporate bond defaults).
  - What are fire sales externalities? (asset unwinding happens all at once but how about sequential decisions according to liquidation rules?).
  - Price determination and role of (exogenous) price targets of arbitrageurs (hedge funds) need more explanation.
- Model layout and description makes it hard to follow
  - Notation issues and missing (e.g. more explicit) identities.

Comments II: Assumptions and Notation

- Lots of simplifying assumptions:
  - Investment funds and Insurers do not participate in repo markets.
  - MMF and banks do not participate in derivatives (IRS) markets.
  - Broker-dealers do not maximize profits.
  - Endogenous prices: Why is the repo rate exogenous?
  - Broker-Dealers and investment funds are exposed to IRS markets: Initial and Variation margin constraints are missing (only IM^{IF} in Table B6)
- Notational issues:
  - Model splits repo into short-term and long-term, sometimes constraints use $A^i_{R,t}$ and $L^i_{R,t}$. Other times you only see: $A^i_{SR,t}$ and $L^i_{SR,t}$
  - Duration: sometimes as exponents, T^I (insurers' obligations); other times as variables: D^{PF}_{GB} (pension funds' government bonds). How are these determined? Parameters in Table B8 do not include them!
  - Mixed funds target their leverage ratio by adjusting their IRS exposure: No expression for this!
  - Derivatives (IRS) gross positions modeled only for some but not all exposed agents.

Comments III: Results

- Single shocks have only modest impact (no fire sales)
- Large Multi-shocks (stress scenario) illustrate contagion channels:
  - Need to impose binding constraints on both broker dealers and commercial banks to amplify drop in prices and to generate fire sales, illiquidity and presumably real effects.
  - Bank capital and insurer's solvency constraint, as well as liquidity of investment funds matter.

<u>Concerns</u>

- Can't rule out multiple equilibria
- Are small effects of large shocks surprising?
  - Bank capital in the model calibrated to Basel III requirements (solvency issues?)
- Model separation of banking into commercial banks and broker dealers does not allow assessing real effects.
  - CBs only supply repo and loan losses to HH and firms are exogenous.
  - DBs in repo markets explain all the action on liquidity and funding.

Comment IV: Conclusions

- Model predictions: what do we learn?
  - Qualitatively (e.g. directionally): contagion, fire sales, and illiquidity due to large shocks and binding constraints seem reasonable but not surprising.
  - Quantitatively: model only generates “tipping points” or thresholds for deleveraging and fire sales.

- Do we need a very complex model with 7 representative agents and 3 markets for those outcomes?
  - Model complexity forces too many simplifying assumptions which may defeat the purpose of quantifying effects.
  - Complexity also obscures identification of driving forces.
  - Are there new policy implications for financial stability?

Wrapping Up

- Paper considers a very interesting and hot topic.
- Authors have created new and unique dataset for NBFIs
- Model illustrates interaction of shocks and binding (capital, liquidity, and institutional) constraints in generating deleveraging, fire sales, and illiquidity.
- General suggestions:
  - Model seems too complex to deliver quantitative results with new financial stability implications and more relevant policy discussions.
  - Authors may want to simplify the model.